MIAMI-DADE METROPOLITAN PLANNING ORGANIZATION

Implementation Plan for Enhanced Bus Service along Flagler Street

prepared for:
Miami-Dade County
Metropolitan Planning Organization

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IMPLEMENTATION PLAN FOR
ENHANCED BUS SERVICE
ALONG FLAGLER STREET

Work Order GPC #IV-04

Prepared for

Prepared by

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1.0 INTRODUCTION

The following report documents a transit service analysis of the SR 968/Flagler Street corridor, a key east-west transportation corridor serving Miami and the suburban communities of Fontainebleau and Sweetwater. The study will determine whether enhanced bus service (EBS) improvements consisting of both changes to bus operations and the implementation of transit infrastructure (e.g. stop and park-and-ride improvements) along SR 968/Flagler Street are warranted and feasible.

The study will further examine the recommendations of previous studies and plans made for the corridor as well as the state of the existing transit and traffic environment along SR 968/Flagler Street. Based on this analysis, the study will provide recommendations for improvements to transit service, and the development of new transit infrastructure along the corridor and provide a plan for implementation of these recommendations in the short and medium term.

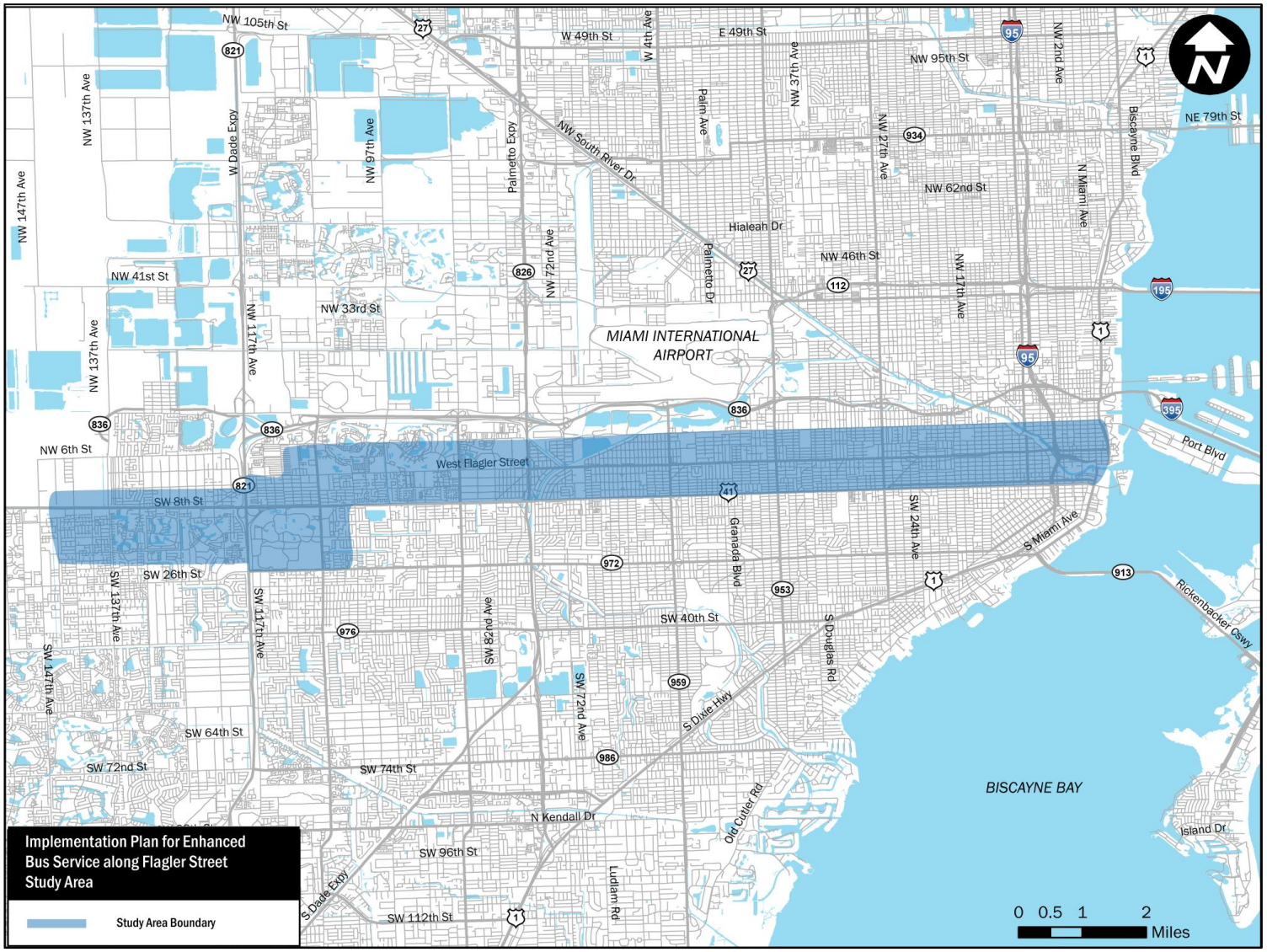
1.1 Study Corridor

The study corridor extends over 17 miles on SR 968/Flagler Street from Downtown Miami to the western end of the developed area west of SW 147th Avenue. The study area is shown in Figure 1. Between SR 968/Flagler Street and SR 972/SW 24th Street, the corridor consists of a one way pair of streets, Flagler Street, which operates westbound, and SW 1st Street, which operates eastbound from Downtown Miami, before the two combine to form a single, bidirectional roadway at SW 24th Avenue. West of SW 107th, connections to the west may follow a variety of roadways, including SW 24th Street/Coral Way, Walsh Boulevard, and other streets as the route serves FIU and circulates throughout the neighborhoods in suburban Sweetwater and Fontainebleau.

The corridor is served by two bus routes, Route 11 – one of the highest ridership routes in the Miami-Dade Transit (MDT) system, and the Route 51 Max, which provides limited stop service to the corridor. As the primary east-west thoroughfare through the densely populated Little Havana neighborhood, transit service on Flagler Street supports a large number of short distance trips along the corridor, as well as providing connections among several strong trip generators, including Little Havana, Downtown Miami, Mall of the Americas, Florida International University (FIU) and the Fountainbleau-Sweetwater area in western Miami-Dade County, and numerous high schools and middle schools in the corridor.

The corridor is also an important conduit for private vehicular transportation, and transit service is frequently delayed by auto traffic. Right of way constraints prevent the widening of the corridor along most of its alignment (particularly east of 79th Street) to provide for either additional mixed traffic capacity or dedicated transit lanes. The combination of these conditions on one of MDT's highest ridership transit corridors results in delays and overcrowding on buses, providing a less than optimal travel experience for transit users likely suppressing transit ridership in the corridor.

Figure 1: Flagler Street Corridor Study Area



2.0 PROJECT BACKGROUND

Flagler Street has long been one of the most important transit corridors served by MDT. Numerous studies, going back to the 1990s, have proposed transit improvements along Flagler Street. To improve transit service in this and other corridors, MDT has begun implementing EBS in a number of key transit corridors in Miami-Dade County. EBS improvements are meant to identify relatively low cost and quickly implementable improvements to transit service in a particular high volume transit corridor.

These improvements consist of improvements to bus operations including the installation of station-stops to increase comfort for transit users and the visibility of the service, the installation of transit signal priority systems and, if possible given the physical or traffic conditions in the corridor, the implementation of peak period or all day lane restrictions, dedicated transit lanes or queue jump lanes to increase transit travel speed relative to auto traffic.

Branding schemes, to enhance the visibility of the service to potential users, often are an important element of EBS service. EBS improvements can provide a high level of benefit to transit users in terms of improved service frequency, capacity, comfort, and travel time improvements at a fraction of the cost of more extensive bus rapid transit (BRT), light rail or heavy rail systems.

The development of EBS in high volume transit corridors has been facilitated by a series of corridor studies conducted by Miami-Dade Metropolitan Planning Organization (MPO). The first of these studies, conducted on Biscayne Boulevard, was completed in 2012. A second study, on NW 27th Avenue, was completed in 2013. MDT is in the process of implementing the recommendations of these studies in the form of bus service and infrastructure improvements along Biscayne and NW 27th Avenue. The present study of Flagler Street is the third in this series of studies, which will analyze the Flagler Street corridor, and, if warranted, develop enhanced bus improvements appropriate to the transit needs of the corridor.

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3.0 PREVIOUS STUDIES RECOMMENDATIONS

The Flagler Street corridor has been the subject of a number of transportation planning studies over many years, including several recent plans advocating the development of high-capacity bus service in the corridor. Summaries of relevant recommendations for the Flagler Street corridor are provided in the following sections.

3.1 Flagler Street Reversible Flow Study – Miami-Dade MPO (1992)

This study evaluated the possibility of introducing reversible flow on West Flagler Street between NW 27th Avenue and the Palmetto Expressway (SR 826). Traffic in the less predominant direction, such as in the opposite direction of peak traffic flow, was determined to be too high to support implementation of a reversible flow lane. The analysis concluded that the impacts to both directions of travel related to safety, residential access, increased cross-traffic, and bus operations would have a net negative impact.

Additionally, traffic congestion during peak periods was found to be focused on a select number of signalized intersections, rather than along the entire corridor, where operational changes such as signal phasing, timing, turn prohibitions, or additional turn lanes could be targeted to provide congestion relief.

3.1.1 Study Recommendations

The outcome of the analysis includes the following:

- Not to consider reversible traffic flow on the Flagler Street corridor, primarily due to the lack of directional imbalance in peak period (AM/PM) travel.
- Identified these Flagler Street intersections where improvements could have the greatest benefit on traffic congestion - NW 27th Avenue, NW 42nd Avenue/Le Jeune Road, and NW 72nd Avenue/Milam Dairy Road

3.2 Transit Hub Evaluation Study – Miami-Dade MPO (2009)

This study presents a hub system plan for Miami-Dade County, with a focus on providing guidance for creating functioning transit spaces and encouraging private sector investment in Transit Oriented Development (TOD) focused around transit hubs. An initial list identified 79 potential transit hub sites, which were further evaluated and reduced to a list of 29 transit hub sites. Two of the sites are located in the Flagler Street Corridor.

The study classified both sites as Tier 3 "superstop" facilities, which are characterized as bus transfer locations with a smaller infrastructural footprint than a transit center. Tier 3 facilities are local access points, as opposed to community access points or regional hubs. The typical amenities of a Tier 3 facility are a covered shelter(s), seating capacity of approximately 15, bicycle parking, automated ticketing, system map, emergency call box, and preferably dedicated bus bays. The capital cost associated with developing a Tier 3 facility was estimated to be approximately $100,000.

3.2.1 Study Recommendations

Identified two Tier 3 “superstop” facilitates within the Flagler Street corridor:

- Flagler Street/NW 42nd Avenue; and
- Flagler Street/NW 37th Avenue.

3.3 Short Term Improvements Study – Miami-Dade MPO (2009)

This report was prepared by the MPO at the request of MDT to develop short-term improvements that could be implementable within a two-year period. The report focuses on developing a more effective transit network that would concentrate transit services to reduce operating costs, eliminate or consolidate redundant service, and provide operational flexibility for future changes. A hierarchical or "trunk and feeder" network was determined to be the best transit service network to meet the needs of the MDT service area, in part because this system would give MDT the flexibility to improve the current service and build ridership on major corridors, like Flagler Street, that could be considered as potential candidates for BRT services in the future.

3.3.1 Study Recommendations

Recommendations for converting the Flagler Street corridor to a trunk and feeder route system include:

- Evaluate routes that operate on short segments of Flagler Street as candidates for feeder routes, particularly those that are primarily north-south routes.
- Create a Flagler Street trunk route from Downtown Miami to Mall of the Americas and Florida International University (FIU). The proposed operating plan would provide 10 minute peak/20 minute off peak service to Mall of the Americas and 10 minute peak/15 minute off peak service to FIU.
- A FIU-Coral Way feeder route would operate every 20 minutes during the peak and 30 minutes during off peak periods. This feeder route would serve the current Coral Way alignment, but terminate at the FIU Bus Terminal where it would connect with the Flagler Street trunk route. It would not continue along Flagler Street to Downtown Miami. The proposed changes would not affect service on any segments of the corridor and would generate operating savings of 271 revenue miles and approximately $1,200 per weekday.

Recommendations for capital improvements in the Flagler Street corridor include:

- Construct transfer facilities at Flagler/NW 27th Avenue and Flagler/NW 42nd Avenue to facilitate transfers between trunk routes, preferably with an L-shaped continuous shelter to allow passengers to move from one route to the other.

- Construct a multi-level intermodal facility at Mall of the Americas, with public facilities on the first floor to be used by MDT and other buses and upper level parking to serve as a park and ride and for carpool, vanpool and mall customers.
- Consider additional locations for park-and-ride or transfer facilities at Flagler Street and NW 79th, NW 99th and NW 107th Avenue. Direct access to the FIU bus terminal from SW 107th Avenue is recommended.
- Consider additional locations for larger bus stops at Flagler Street and NW 27th, NW 37th, NW 42nd, NW 57th, NW 67th and NW 87th Avenue.
- Evaluate the costs and benefits of converting a center lane to a reversible flow lane on Flagler Street, with curb lanes dedicated to Bus Rapid Transit (BRT) vehicles. Impacts to pedestrian safety and restriction of left turns must also be considered.

3.4 Near Term Transportation Plan for Miami-Dade County 2012 – 2015 – Miami-Dade MPO (2010)

The objective of this plan was to recommend transportation improvements in major corridors that could be implemented within two-to-five years. Flagler Street was one of those corridors evaluated and recommended service adjustments and a re-alignment of Route 51 in the western segment of the service area.

3.4.1 Study Recommendations

The proposed improvements include:

- Reducing peak period headways on Route 51 from 15 to 12 minutes
- Re-align Route 51 west of NW 107th Avenue to eliminate the circuitous Coral Way alignment,
- From NW 107th Avenue, the Route 51 would travel south and then west on SW 8th Street to a planned park-and-ride facility at SW 147th Avenue. This service expansion would require five new stations (plus the park-and-ride facility)
- Purchase of four articulated buses to be operated on the new Route 51, equipped to activate the traffic signal priority (TSP) system. The plan notes that no funding is programmed for new buses for the Flagler Street corridor

The proposed Route 51 re-alignment would reduce travel time from 80 to 68 minutes, and is expected to increase daily ridership to 3,500 riders from 3,400 riders.

3.5 Miami-Dade Transit Bus Service Evaluation Study – Miami-Dade MPO (2011)

This is an analysis of impacts from December 2009 service adjustments and evaluates individual routes according to standardized performance measures. Analysis of the Flagler Street corridor identified the eastern portion of the corridor having the highest passenger activity, with high numbers of boardings and alightings also observed at the Mall of the Americas, NW 79th

Avenue, and SW 1st Street stop locations. The consolidation or elimination of low-activity bus stops is recommended for Routes 11 and Route 51 to reduce running time and improve on-time performance.

3.5.1 Study Recommendations

In the short term, it is recommended that Route 11 remain as a local route and Route 51 be maintained as a limited-stop route. Consideration is recommended for truncating Route 51 at NW 117th Avenue, with a circulator route providing feeder service to both the local and limited-stop Flagler Street routes.

The longer term recommendation is the consolidation of both routes as a BRT/EBS service on Flagler Street. Further evaluation of the segment connecting Flagler Street to the Mall of the Americas is recommended once a BRT/EBS service is implemented.

3.6 Miami-Dade Transit Bus Service Evaluation Phase 2 – Miami-Dade Transit (2013)

This document describes proposed service improvements for the MDT bus system to include specific adjustments for Routes 11 and 51, the primary routes operating within the Flagler Street corridor.

3.6.1 Study Recommendations

- Operate Route 11 as a local service between FIU and Downtown Miami every 30 minutes, with a deviation to serve the Mall of the Americas.
- Operate Route 11M (formerly Route 51) as MAX service (limited stop) between FIU and Downtown Miami every 10 minutes. When articulated buses are available in 2018, operate only the 11M service and eliminate the local service.
- Terminate service at the new FIU terminal at SW 8th Street/SW 110th Street once opened.
- Replace the circuitous western segment of Route 51 with a circulator, operating between FIU and Dolphin Mall via SW 8th Street, NW 122nd Avenue (southbound), 18th Street, 127th Avenue and 12th Street. The route would enter the Dolphin Mall at the mall's south entrance.

3.7 Rapid Biscayne: Implementation Plan for Enhanced Bus Service along Biscayne Boulevard – Miami-Dade MPO (2013)

This study, which is being conducted concurrently with the Implementation Plan for Enhanced Bus Service along Flagler Street, provides a plan for the implementation of enhanced bus service (EBS) in the Biscayne corridor. In this ongoing study, The Biscayne EBS Implementation Plan establishes the branding plan for EBS service that will be applied within the Flagler corridor.

3.7.1 Study Recommendations

- Defines EBS as a hybrid between a limited-stop service and a Bus Rapid Transit (BRT) service, which can also be seen as an intermediate step in the evolution of a limited-stop service to an ultimate configuration where buses will travel on dedicated bus-only lanes for a portion or the entire length of a route.
- Defines a branding plan for MDT's Enhanced Bus Service to include articulated bus vehicles, station markers, and stations with distinct identity and design.
- Provide enhanced amenities, including well-lit, safe, comfortable stations; traffic signal priority; real-time bus arrival information; and potentially off-board fare collection.
- Provide enhanced infrastructure, including queue jump lanes at key intersections; a potential dedicated guideway; and signals, markings, or signage at nearest intersection.

3.8 Transit Development Plan – FY 2014 to FY 2023 – Miami-Dade Transit (2013)

The MDT Recommended Service Plan (RSP) for FY2013-2022 proposes 13 new transit routes to replace existing routes or add new service, one of which is Flagler Street Enhanced Bus Service (EBS). This route would provide premium limited-stop service from Downtown Miami to a proposed park-and-ride/bus terminal at SW 8th Street and SW 147th Avenue. The proposed service headway is 12 minutes during the peak and 30 minutes during the off-peak. Revenue service is anticipated to begin in 2018 using 10 new 60-foot diesel/electric hybrid buses, clean diesel, compressed natural gas, or other alternate fuel buses. Preliminary operating costs estimates for this proposed service are $3.6 million.

The RSP also includes the development of 15 transit hubs throughout Miami-Dade County for FY2013-2022. Two of the identified transit hubs would be served by the Flagler Street EBS: the Downtown Intermodal Hub and SW 8th Street/SW 147th Avenue park-and-ride. A feasibility study is being conducted for the Downtown Intermodal Hub, which would consolidate the existing Downtown Miami bus terminal into a facility serving various transportation modes. The SW 8th Street/SW 147th Avenue park-and-ride is a committed project which would serve as the western terminal for both the Flagler Street EBS and the SR-836 Express EBS projects. An 8-acre vacant parcel has been identified at this location, which would include up to 500 parking spaces and offer strategic TOD opportunities.

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4.0 EXISTING SERVICE CHARACTERISTICS

Service characteristics were compiled for all MDT routes operating along the length of, or a portion of, the Flagler Street corridor. Data sources for the service characteristics include the Omnibus Schedule Information, Vehicle Requirement and Operating Data Reports and the Bus Productivity Analysis Reports from MDT. The Flagler Street corridor is primarily served by Routes 11 and 51 – Flagler MAX.

4.1 Route 11

Route 11 provides local service in the corridor between Downtown Miami and the FIU Bus Terminal at SW 107th Avenue/SW 17th Street. In Downtown Miami, the route is operated on the one-way SW/SE 1st Street and NW/NE 1st Street pair, and provides a connection to the Government Center Station at NW 1st Avenue and NW 1st Street. Bi-directional service on West Flagler Street begins to the west of SW 24th Avenue and continues to SW 107th Avenue, then continues south to the FIU Bus Terminal. During the day, every other trip is short-turned at NW 79th Avenue to serve the Mall of the Americas. In the evening, all trips serve the mall, and then continue to the FIU Bus Terminal (Figure 2).

On weekdays during the peak, Route 11 is operated every 8 minutes to NW 79th Avenue and every 15 minutes to the FIU Bus Terminal. During the midday, the route is operated with headways set at 12 minutes to NW 79th Avenue and every 24 minutes to the FIU Bus Terminal. Route 11 has the highest number of estimated boardings (more than 12,500) of all routes serving any portion of Flagler Street. The route is operated for 24 hours on weekdays and has a farebox recovery ratio of 53%. On the weekends, service frequencies and span are reduced, but estimated boardings remain high (more than 8,500) with the farebox recovery ratio maintained at 53%.

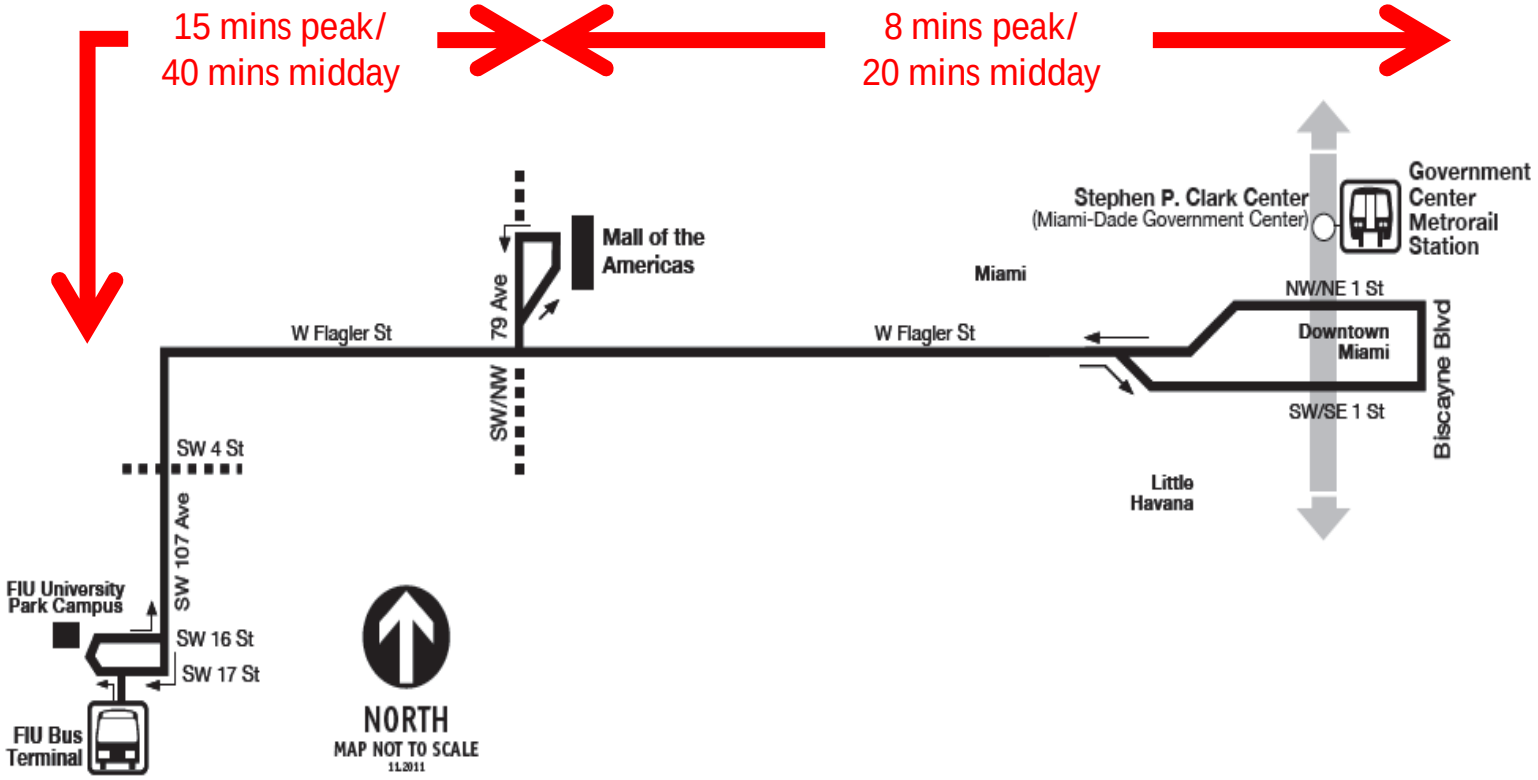
Weekday and weekend service characteristics and performance data for Route 11 are shown in Table 1.

Table 1: Route 11 Weekday/Weekend Service Characteristics

Roundtrip Route Length (Miles)	Roundtrip Travel Time (Minutes)	Scheduled Speed (MPH)	Peak Headway (Minutes)	Off-Peak Headway (Minutes)	Service Span	Buses in Service (Peak)	Buses in Service (Off-Peak)	Average Daily Revenue	Recovery Ratio	Estimated Daily Boardings	Calculated Annual Revenue Miles*	Calculated Total Annual Operating Cost*
Weekday Service Characteristics												
25.5	192	8.0	8/15	12/24	24	20	14	$10,858	53.10%	12,579	547,485	$5,392,700
Weekend Service Characteristics												
25.5	167	9.2	12/24 (Sat) 15/30 (Sun)	12/24 (Sat) 15/30 (Sun)	24	13	12	$7,827	52.90%	8,715	178,494	$1,605,103

Source: Miami-Dade Transit (2013)/ *Calculated by Parsons Brinckerhoff based on NTD Data (2012)

Figure 2: Route 11 Alignment



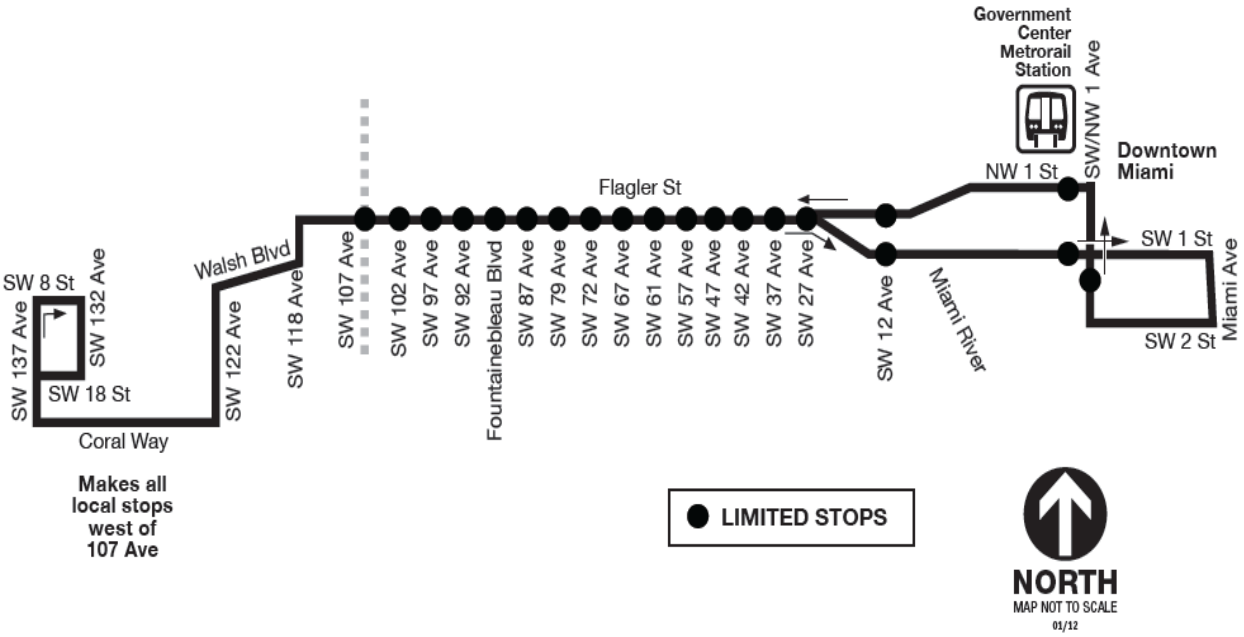
Source: Miami-Dade Transit, 2013

4.2 Route 51 – Flagler MAX

Route 51 – Flagler MAX provides limited-stop service on weekdays between Downtown Miami and SW 137th Ave and SW 8th Street. Flagler MAX service is not operated on weekends. The Downtown alignment differs from Route 11 as it has a limited number of stops at SW 1st Street, SW/SW 1st Avenue, and NW 1st Street at the Government Center Station. Limited stop service continues on Flagler Street to SW 107th Avenue. To the west of 107th Avenue, Route 51 makes all local stops on a circuitous route serving Walsh Boulevard, SW 122nd Avenue, Coral Way, SW 137th Ave, SW 8th Street, SW 132nd Ave, and SW 18th Street (Figure 3).

The Route 51 – Flagler MAX is operated for 16 hours per day with headways set at 15 minutes during the peak and every 30 minutes during the off-peak. There are an estimated 3,730 boardings per weekday on the limited-stop route and a farebox recovery ratio of 33%. Weekday service characteristics and performance data for Route 51 are shown in Table 2.

Figure 3: Route 51 – Flagler MAX Alignment



Source: Miami-Dade Transit, 2013

Table 2: Route 51 – Flagler MAX Weekday Service Characteristics

Roundtrip Route Length (Miles)	Roundtrip Travel Time (Minutes)	Scheduled Speed (MPH)	Peak Headway (Minutes)	Off-Peak Headway (Minutes)	Service Span	Buses in Service (Peak)	Buses in Service (Off-Peak)	Average Daily Revenue	Recovery Ratio	Estimated Daily Boardings	Calculated Annual Revenue Miles*	Calculated Total Annual Operating Cost*
Weekday Service Characteristics												
34.7	180	11.6	15	30	16.3	12	7	$3,668	33.10%	3,727	380,205	$2,978,316

Source: Miami-Dade Transit (2013) / *Calculated by Parsons Brinckerhoff based on NTD Data (2012)

4.3 Other MDT Routes within the Flagler Street Corridor

In addition to Route 11 and Route 51 – Flagler MAX, MDT also operates other transit service that either operates over segments of or intersects Flagler Street. Those MDT bus routes that provide intersecting service offer transit connections and access to communities to the north and south of Flagler Street. The following tables provide service characteristics and performance data for these routes for both weekdays and weekends, respectively. Those routes with the highest number of weekday passengers include Route 27 (10,300 boardings), Route 17 (5,000 boardings), Route 7 (4,600 boardings), and Route 12 (3,400 boardings). Each of these routes intersect Flagler Street where as Route 7 operates on Flagler Street between the Mall of the Americas at NW 79th Avenue and NW 62nd Avenue.

Table 3: Weekday Service Characteristics - MDT Routes that Operate/Intersect Flagler Street

Route	Roundtrip route length (miles)	Roundtrip travel time (minutes)	Scheduled Speed (mph)	Peak headway (minutes)	Midday headway (minutes)	Service hours	Buses in service (peak)	Buses in service (offpeak)	Revenue Miles	Direct Operating Costs	Average Revenue	Recovery Ratio	Estimated Boardings
6	31.7	180	10.6	60	60	10.7	6	3	317.3	$2,762	$435	15.7%	846
7	31.3	175	10.7	15/30	20/40	18.2	11	7	1,301.7	$11,624	$4,325	37.2%	4,644
12	24.5	180	8.2	30	30	19.9	6	6	807.2	$7,742	$2,686	34.7%	3,384
17	42.6	210	12.2	15/30	30	19.9	11	7	1,681.5	$13,339	$4,306	32.3%	5,056
27	39.8	210	11.4	15/30	15/30	24.0	14	14	2,609.8	$20,674	$9,582	46.4%	10,325
37	40.7	240	10.2	30	30	19.0	9	8	1,365.5	$11,844	$3,310	28.0%	4,139
42	33.8	180	11.3	20/40	30/60	19.1	8	5	995.7	$8,648	$1,701	19.7%	1,759
51	34.7	180	11.6	15	30	16.3	12	7	1,403.4	$11,079	$3,668	33.1%	3,727
57	41.2	180	13.7	40	60	13.4	3	3	525.2	$3,864	$690	17.9%	674
71	26.2	130	12.1	30	60	14.4	5	2	508.1	$4,419	$1,700	38.5%	1,420
73	46.4	280	9.9	30	40	17.5	9	7	1,255.9	$10,814	$2,701	25.0%	2,816
87	32.4	180	10.8	30	45	16.7	6	5	793.5	$6,772	$2,033	30.0%	2,115
137	52.3	225	13.9	30	45	17.1	7	5	1,230.0	$8,743	$2,516	28.8%	2,198
207	7.1	60	7.1	15	20	14.7	4	3	348.1	$3,781	$1,290	34.1%	1,810
208	7.3	60	7.3	15	20	14.7	4	3	358.5	$3,771	$1,916	50.8%	2,610
212	4.3	30	8.6	-	30	6.2	-	1	53.5	$611	$143	23.4%	127

Source: Miami-Dade Transit, 2013

Table 4: Weekend Service Characteristics - MDT Routes that Operate/Intersect Flagler Street

Route	Roundtrip route length (miles)	Roundtrip travel time (minutes)	Scheduled Speed (mph)	Peak headway (minutes)	Midday headway (minutes)	Service hours	Buses in service (peak)	Buses in service (offpeak)	Revenue Miles	Direct Operating Costs	Average Revenue	Recovery Ratio	Estimated Boardings
6	31.7	180	10.6	60	60	9.7	3	3	285.8	$2,558	$308	12.1%	570
7	31.3	180	10.4	20/40 (Sat) 30/60 (Sun)	20/40	16.1	7	7	910.0	$7,743	$2,718	34.9%	2,993
17	42.6	199	13.0	30	30	19.5	7	7	1,376.1	$9,791	$2,335	23.7%	2,786
27	39.425	193	12.3	20/40 (Sat) 30/60 (Sun)	20/40 (Sat) 30/60 (Sun)	24.0	9	9	1,839.7	$13,588	$5,626	41.1%	5,952
37	40.7	210	11.6	30	30	18.1	7	7	1,242.6	$9,632	$2,190	22.8%	2,704
42	33.8	168	12.2	40 (Sat) 60 (Sun)	40 (Sat) 60 (Sun)	18.0	4	4	681.1	$5,307	$831	15.8%	911
71	24.7	120	12.4	60	60	10.9	2	2	262.6	$2,089	$465	21.8%	413
73	46.4	219	12.9	60	60	14.2	4	4	626.5	$4,648	$936	19.6%	1,009
87	25.3	129	11.8	45 (Sat) 60 (Sun)	45 (Sat) 60 (Sun)	10.8	3	3	325.5	$2,640	$595	22.1%	667
137	54.4	204	16.0	40	40 (Sat) 45 (Sun)	16.8	5	5	1,122.4	$7,377	$1,433	19.4%	1,286
12/21	43.4	265	9.9	40	40	18.6	7	7	1,086.2	$9,264	$2,210	23.8%	2,918
207/208	14.4	100	8.6	20	20	14.8	6	5	620.1	$6,113	$2,224	36.4%	3,059

Source: Miami-Dade Transit, 2013

4.4 Existing Passenger Movement

Passenger movement was documented from Automated Passenger Counting (APC) data that was obtained from MDT and summarized. The data was aggregated for all transit routes serving all or part of the Flagler Street corridor, and then sorted to identify only those stops within the corridor (defined as stops served by Route 11 or Route 51 – Flagler MAX). Figures on the following pages show average weekday daily boardings and alightings by inbound and outbound directions for all routes serving the Flagler Street corridor.

4.4.1 Inbound Passenger Movement (Boardings and Alightings)

The inbound direction is described as the route from the Coral Way/SW 137th Street area towards Downtown Miami. As illustrated in Figure 4, inbound boardings are low on the Coral Way segment served by Route 51 – Flagler Max. From the layover point at SW 8th Street and SW 132nd Avenue to Flagler Street and NW 107th Avenue, there is an average of 820 boardings per day. The FIU Bus Terminal and Mall of the Americas are high boarding locations, accounting for 460 and 470 boardings per day, respectively.

From 107th Avenue east to NW 27th Avenue along Flagler Street, inbound boardings are fairly constant, with 3,830 average daily boardings on this eight-mile stretch, or approximately 470 boardings per mile. To the east of NW 27th Avenue, boarding activity increases considerably, with 4,840 average daily boardings on a four-mile segment, or 1,240 boardings per mile. The stop with the highest number of boardings (577) in the inbound direction is located at SW 1st Street and SW 12th Avenue. A table of the boardings and alightings at the individual stop level for the Flagler Street corridor is included in Appendix A.

Overall, in the inbound direction, Route 11 accounts for 7,000 average daily boardings, and Route 51 accounts for 1,800 average daily boardings. Together, these two routes account for approximately 83% of the inbound boarding activity in the corridor.

Similar to inbound boardings, inbound alightings are concentrated in the eastern half of the corridor. There are very few alightings to the west of NW 107th Avenue. From NW 107th Ave to NW 27th Avenue, alightings are highly concentrated at a few stops, all of which have more than 100 average daily alightings. These stops include Flagler Street and NW 87th Avenue, NW 78th Place, NW 72nd Avenue, NW 41st Avenue, and NW 37th Avenue (Figure 5).

The vast majority of inbound alightings (7,400 of 9,700 total alightings or 76%) occur to the east of NW 27th Avenue. The stop with the highest number of alightings (3,100) is located at SW 1st Street and SW 1st Court, which facilitates transfers to the Government Center Station.

Overall in the inbound direction, Route 11 accounts for 6,500 average daily alightings, and Route 51 accounts for 1,800 average daily alightings. Together these two routes account for 86% of the inbound alighting activity in the corridor.

4.4.2 Outbound Passenger Movement (Boardings and Alightings)

The outbound direction is described as the route from Downtown Miami to the Coral Way/SW 137th Street area. As expected, average daily boardings in the outbound direction mirror the average daily alightings in the inbound direction. The vast majority of outbound boardings (5,100 of 7,600) occur east of NW 27th Avenue. To the west of NW 27th Avenue, alightings are highly concentrated at a few stops: West Flagler Street and NW 37th Avenue, NW 42nd Avenue, NW 67th Avenue, NW 79th Avenue, and 7167 West Flagler Street (stop located east of NW 72nd Avenue), all of which have more than 100 average daily boardings. The stop with the highest average daily boardings (2,000) is located at NW 1st Street and NW 1st Avenue, which facilitates transfers to other bus routes and to Metrorail and Metromover at Government Center. There are very few boardings to the west of NW 107th Avenue in the outbound direction (Figure 6).

Overall, in the outbound direction, Route 11 accounts for 5,500 average daily boardings, and Route 51 accounts for 1,700 average daily alightings. Together these two routes account for 95% of the outbound boarding activity in the corridor.

Outbound alightings are closely aligned with the inbound boarding pattern in the corridor. The highest concentration of alightings occur east of NW 27th Avenue (2,600 alightings), but stops with a high level of alighting activity are located along the length of Flagler Street, albeit at more distant intervals. From NW 27th Avenue to SW 118th Avenue, there are 13 stops with more than 100 alightings. The stops with the highest number of alightings on this segment are the FIU Bus Terminal (422), West Flagler Street and 79th Avenue (307), and the Mall of the Americas (277). To the west of SW 118th Street, on the Coral Way segment served by Route 51 – Flagler MAX, there is only an average of 778 alightings per day. The stop with the highest number of alightings (556) in the outbound direction is located at West Flagler Street and NW 12th Avenue (Figure 7).

Figure 4: Average Weekday Inbound Boardings

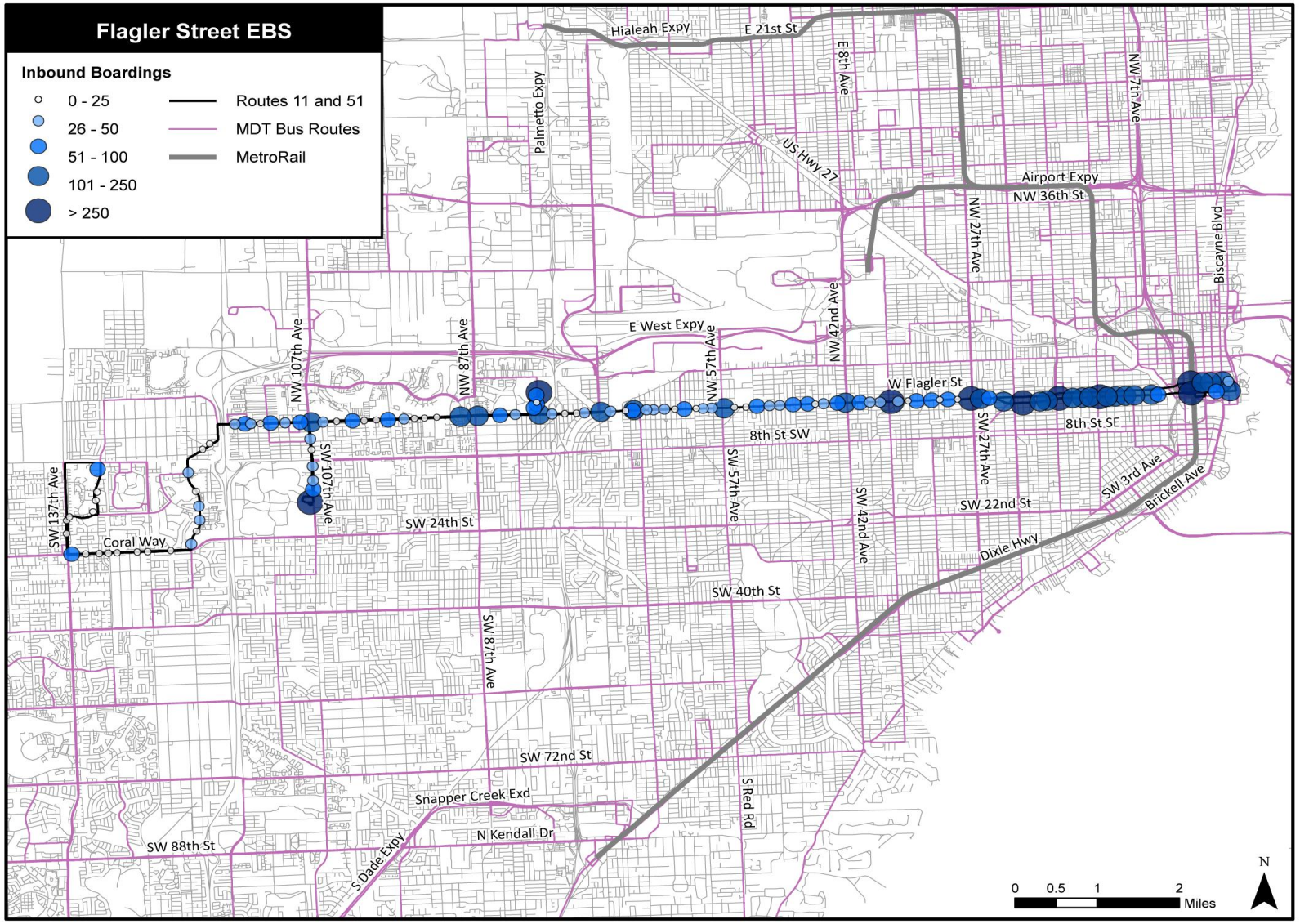


Figure 5: Average Weekday Inbound Alightings

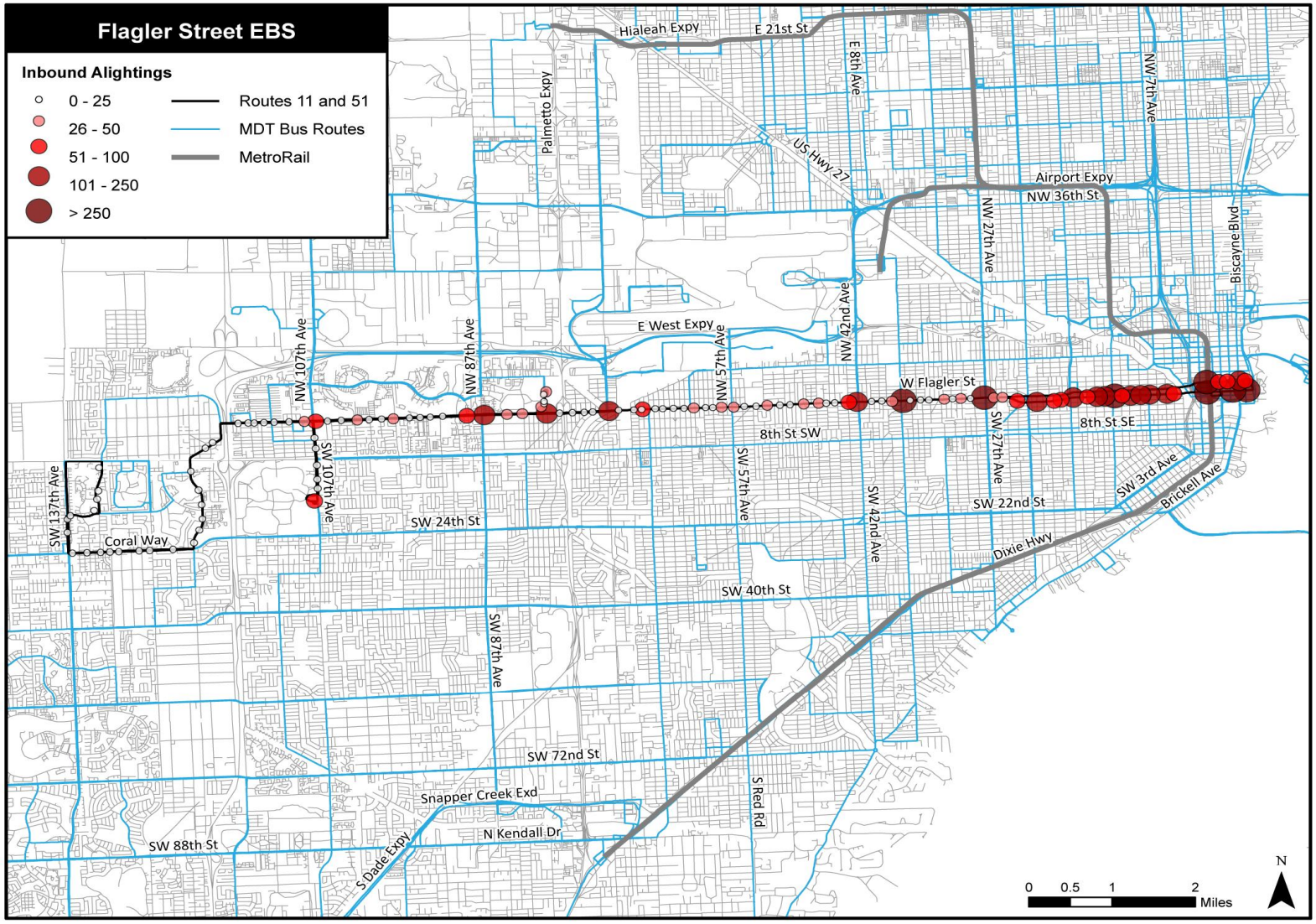


Figure 6: Average Weekday Outbound Boardings

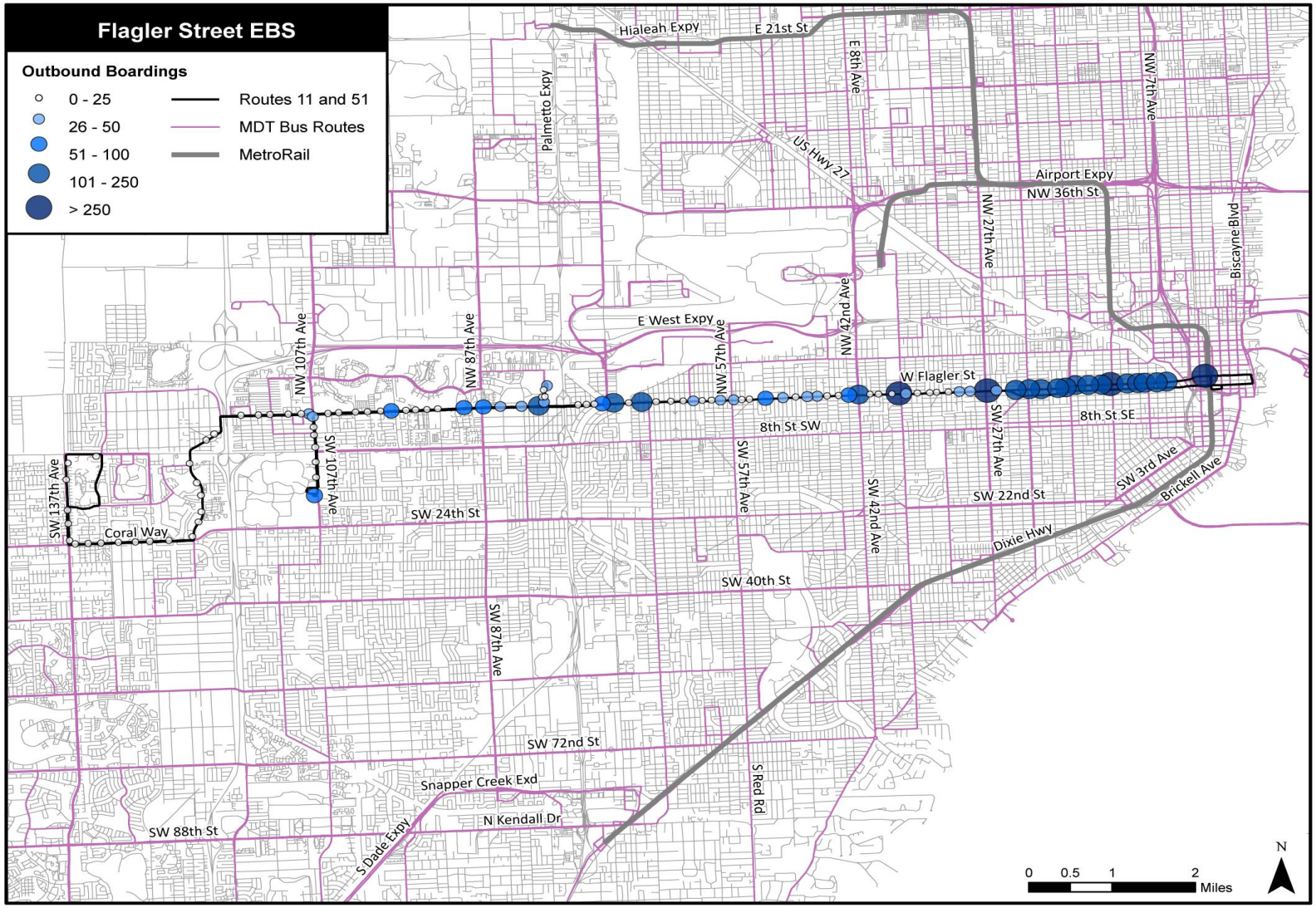
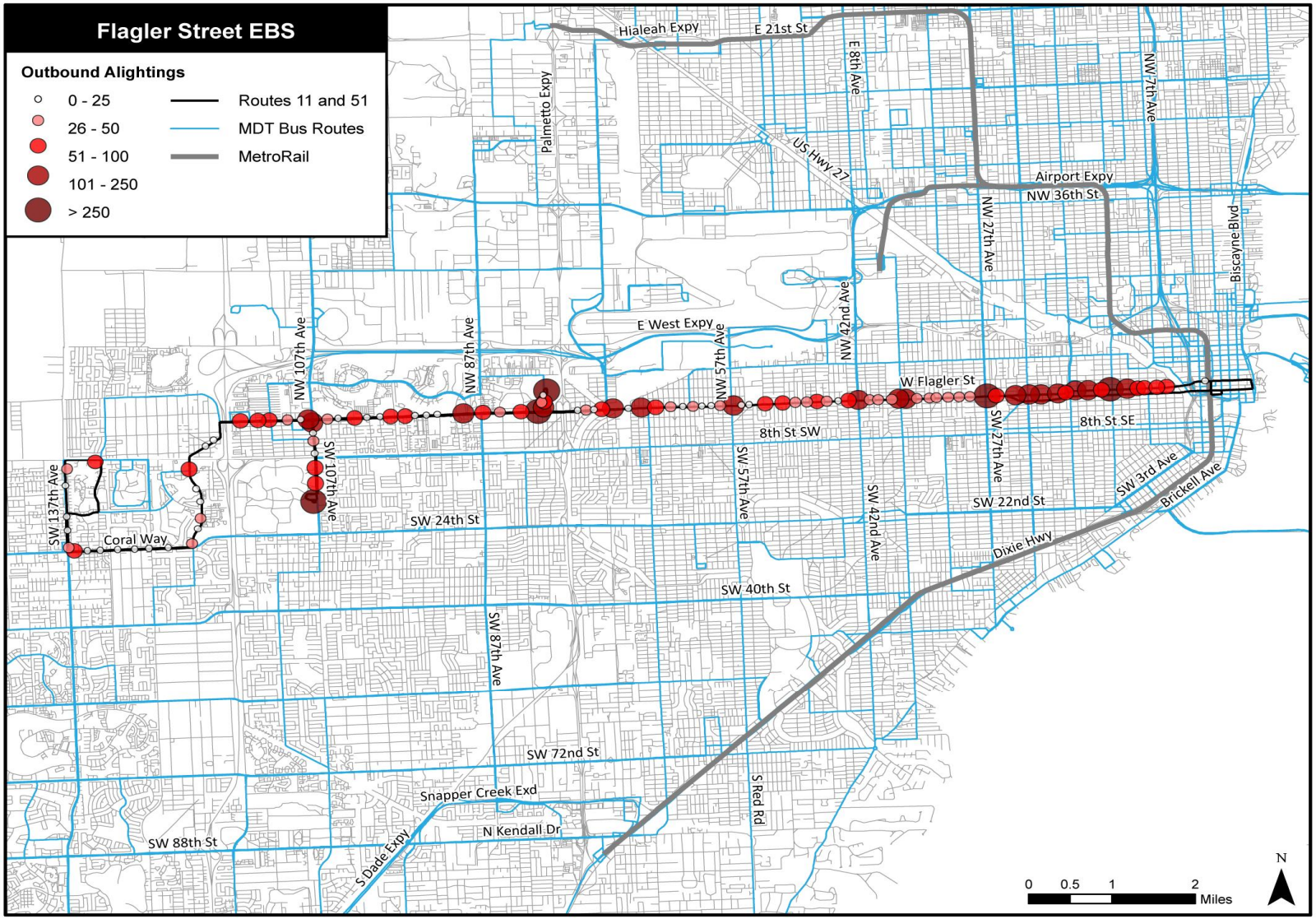


Figure 7: Average Weekday Outbound Alightings



Overall, in the outbound direction, Route 11 accounts for 5,860 average daily alightings, and Route 51 accounts for 1,800 average daily alightings. Together, these two routes account for 94% of the outbound alighting activity in the corridor.

4.4.3 Passenger Boarding by Corridor Segment

The total estimated daily boardings for the Flagler Street Corridor are approximately 16,000. Figure 8 presents a breakdown of boarding activity by segment within the Flagler street corridor. About 82% of boardings occur east of NW 79th Avenue, with the majority occur east of NW 27th Avenue. Total daily inbound and outbound boardings show an even more concentrated pattern of consistent activity in the east sections of the Flagler Street Corridor (Figure 9), with more than 90% of total boardings occurring east of NW 79th Avenue, 55% east of NW 27th Avenue.

Figure 8: Estimated Total Daily Boardings (Route 11 / Route 51)

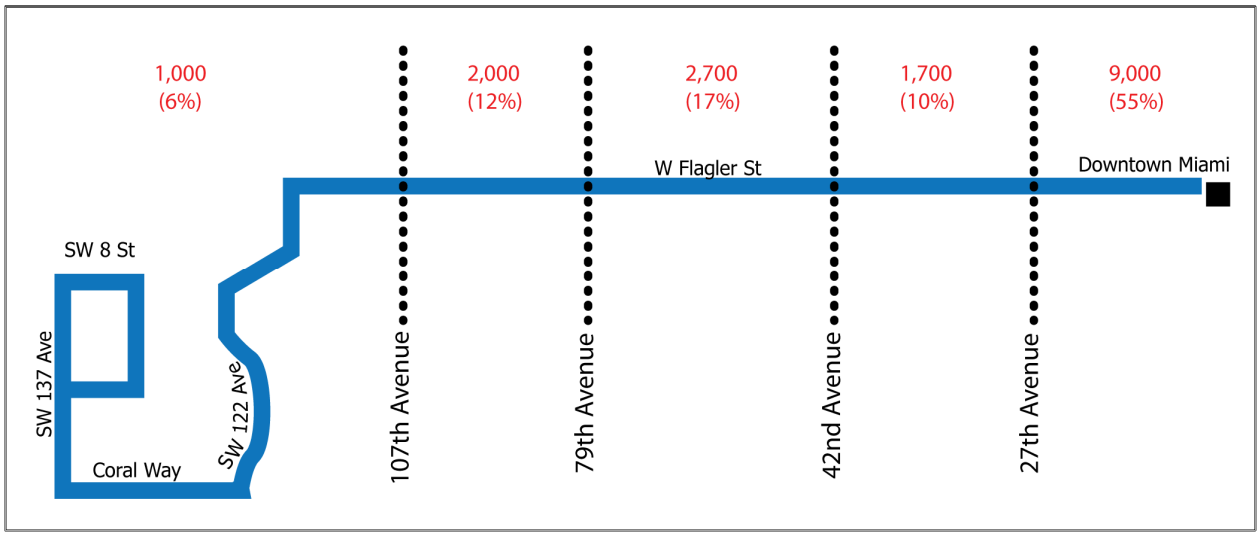
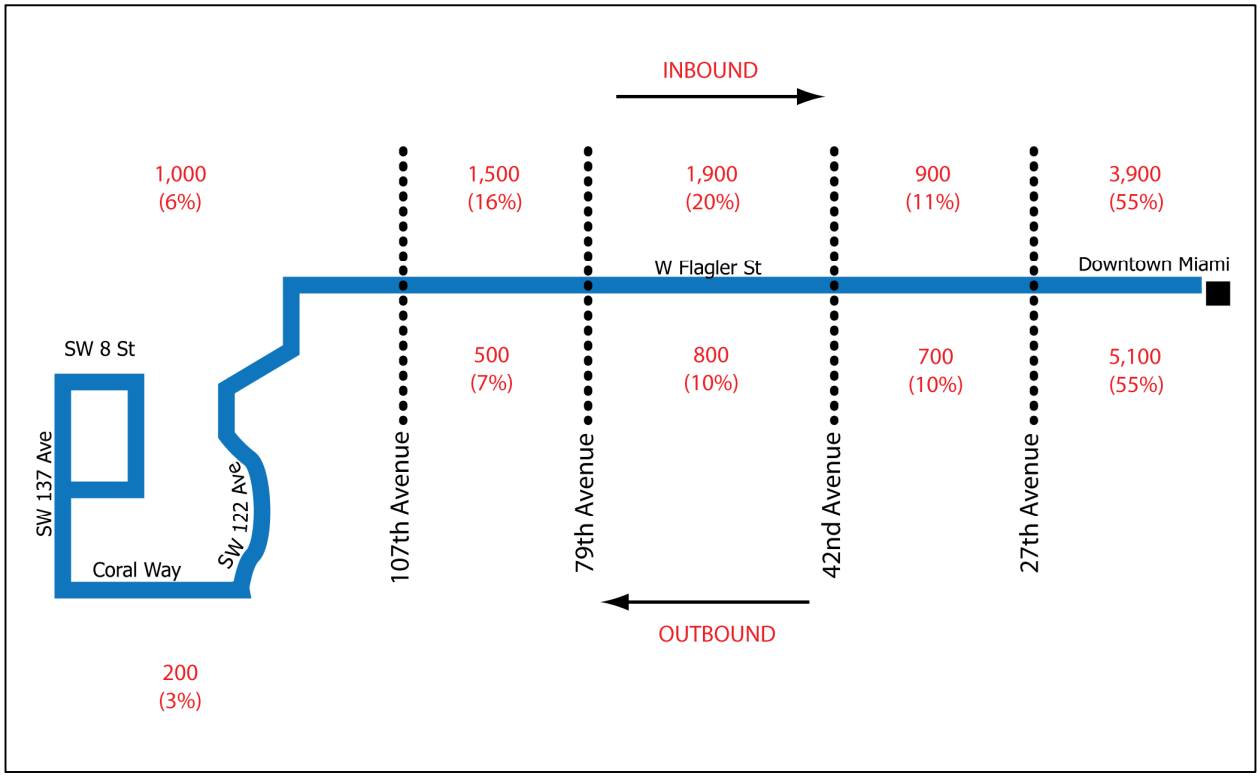


Figure 9: Estimated Total Daily Inbound/Outbound Boardings (Route 11 / Route 51)



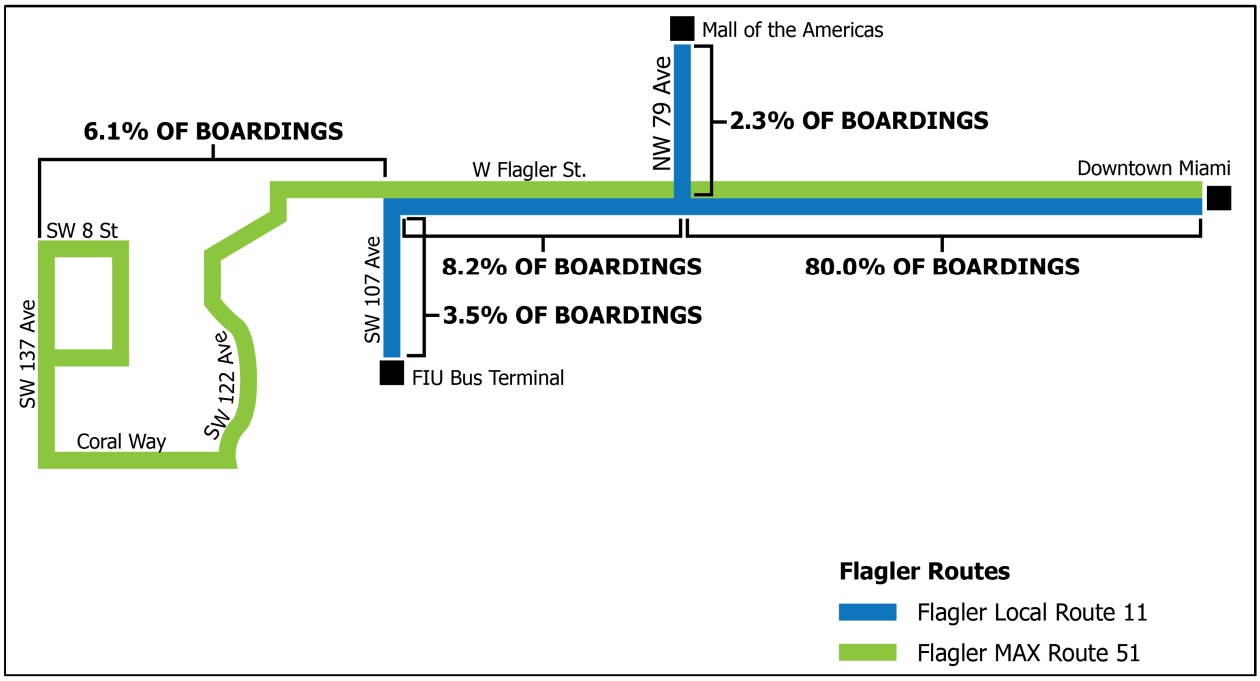
4.4.4 Summary of Existing Service Characteristics

Based upon the MDT passenger data, the primary travel market within the Flagler Street Corridor are points between Downtown Miami and NW 27th Avenue. A Secondary market is from the NW 27th Avenue area to destinations further west on Flagler Street. This secondary market is comprised of:

- Mall of the Americas and surrounding development
- Florida International University
- Transfer points at major north-south arterials (e.g., NW 37th Avenue, NW 42nd Avenue, NW 57th Avenue, NW 79th Avenue).

Existing ridership is low west of NW 87th Avenue and between major north-south arterials west of NW 27th Avenue (Figure 10).

Figure 10: Flagler Street Corridor Boarding Breakdown



4.5 Existing Roadway Travel Lanes Configuration

The roadway configuration of Flagler Street varies throughout the corridor to include two-way and one-way segments. As Figures 11 and 12 show, significant portions of the west of the corridor feature three traffic lanes in each direction, while the area east of NW 27th Avenue includes three and even four lane sections in each direction. However, from just west of NW 27th Avenue to just east of the Palmetto Expressway, the roadway is limited to two lanes in each direction (The roadway configuration of these segments also includes an additional center turn lane and/or right hand turn lane at intersections, and does not include dedicated, striped on-street parking areas. The lone two lane section acts as a choke point between the wider three lane sections in much of the corridor's west and the three and four lane sections in the one way pair segment of the corridor to the east.

Figure 13 shows the configuration of the various segments, their directionality and the location of the traffic stations.

Throughout the corridor there are three jurisdictions that are responsible for maintaining various roadway segments of the Flagler Street Corridor. The segment from 107th Avenue to NW 87th Avenue is within the Miami-Dade County jurisdiction, from NW 87th Avenue to NW 2nd Street in Downtown Miami is the Florida Department of Transportation (FDOT) jurisdiction while the segment east of NW 2nd Avenue is within the jurisdiction of the City of Miami.

Figures 13 through 20 depict the lane configurations typically seen along the Flagler Street corridor.

Figure 11: Total Number of Inbound (Downtown Miami to FIU) Travel Lanes

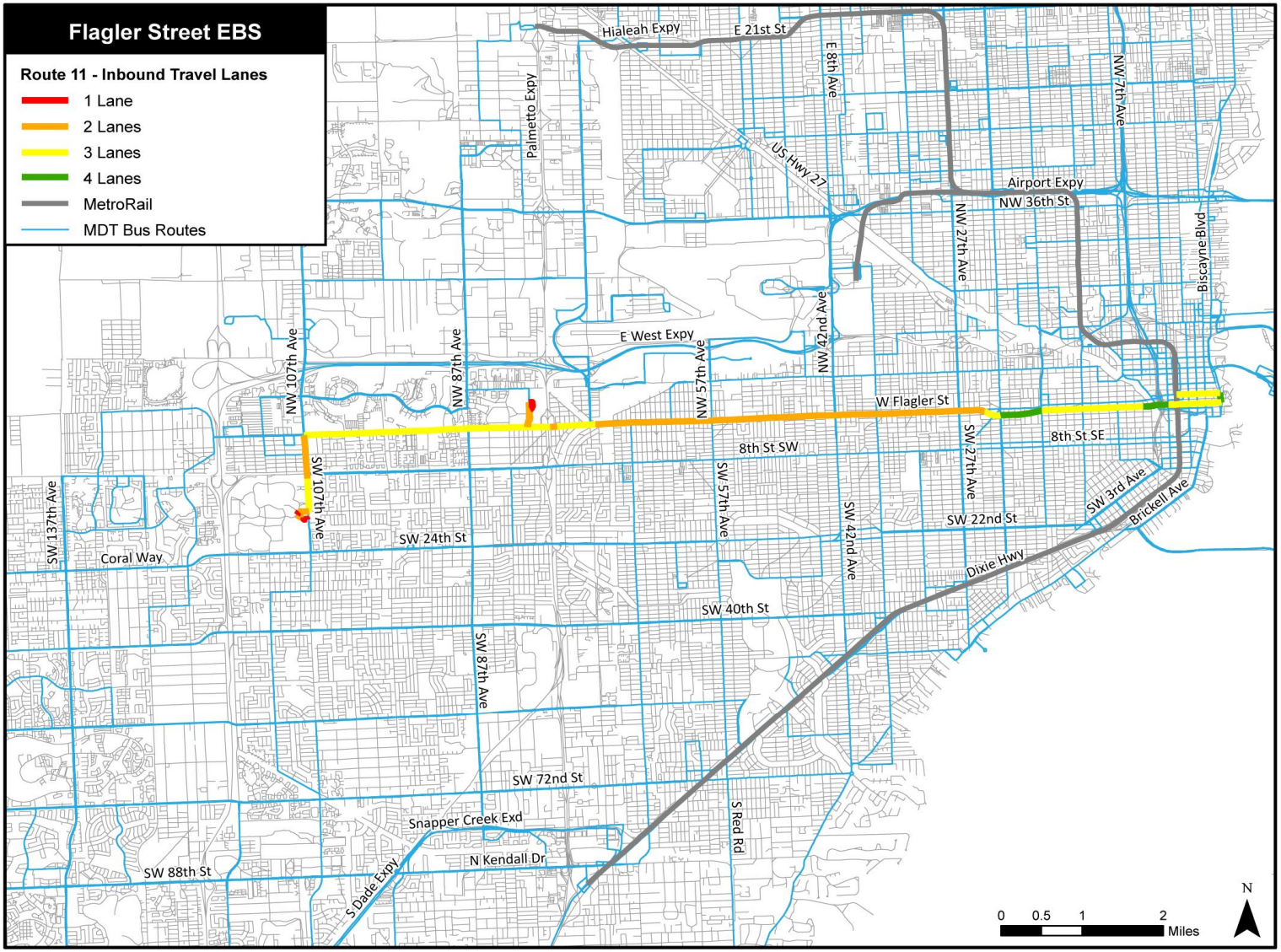


Figure 12: Total Number of Outbound (FIU to Downtown Miami) Travel Lanes

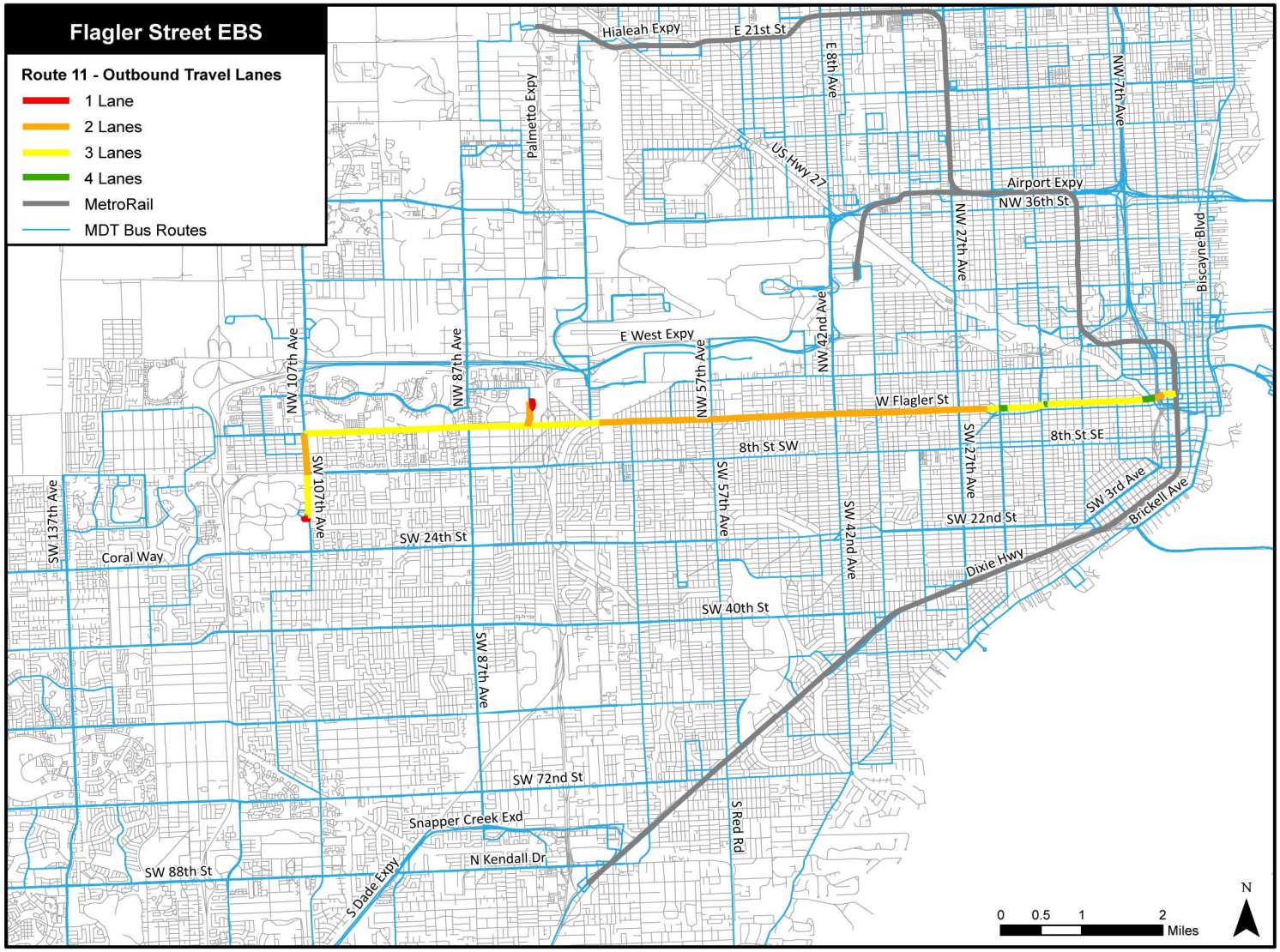


Figure 13: Flagler Street Roadway Configuration

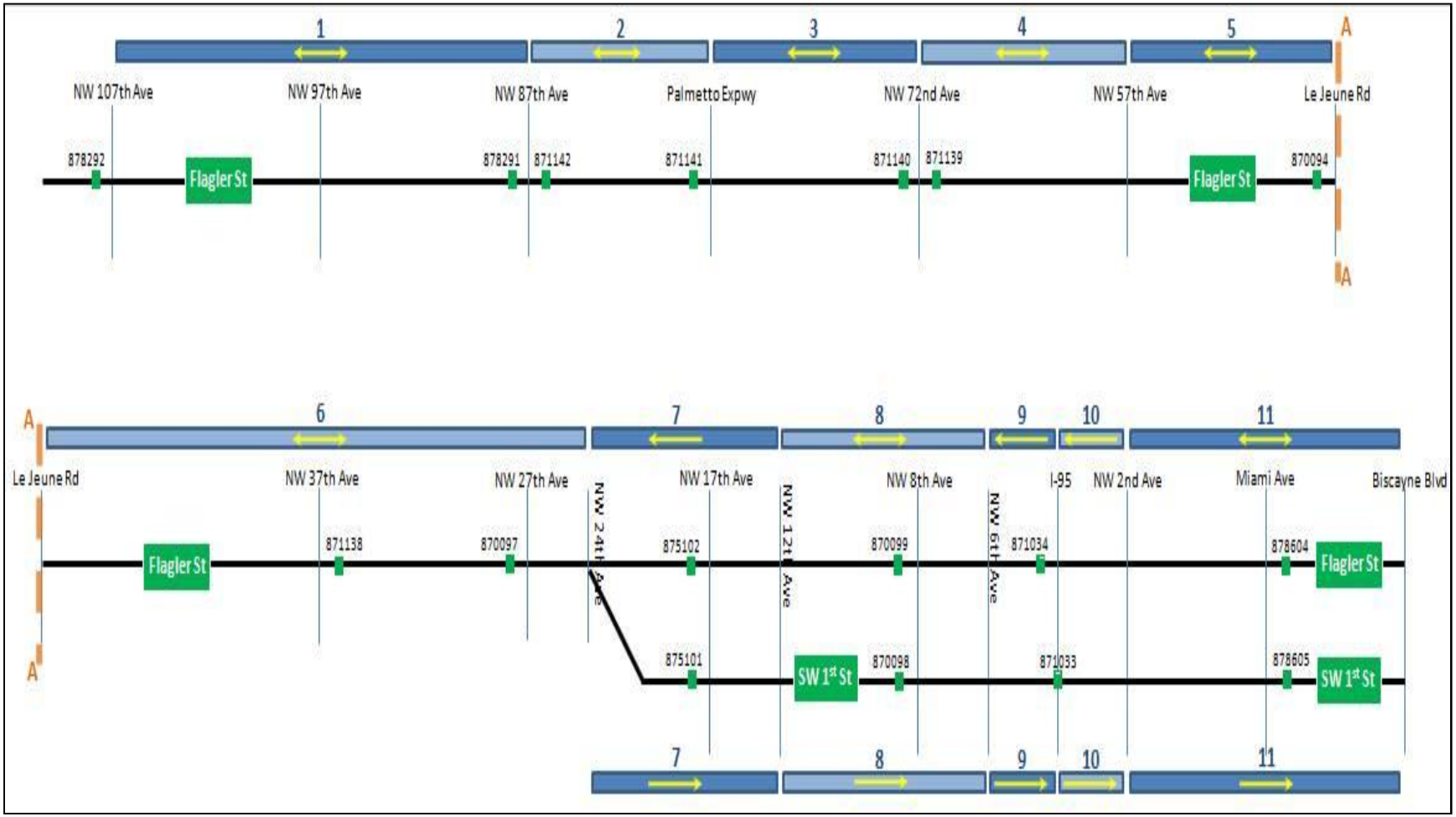


Figure 14: Typical Flagler Street Lane Configuration – NW 107th Avenue to NW 72nd Avenue

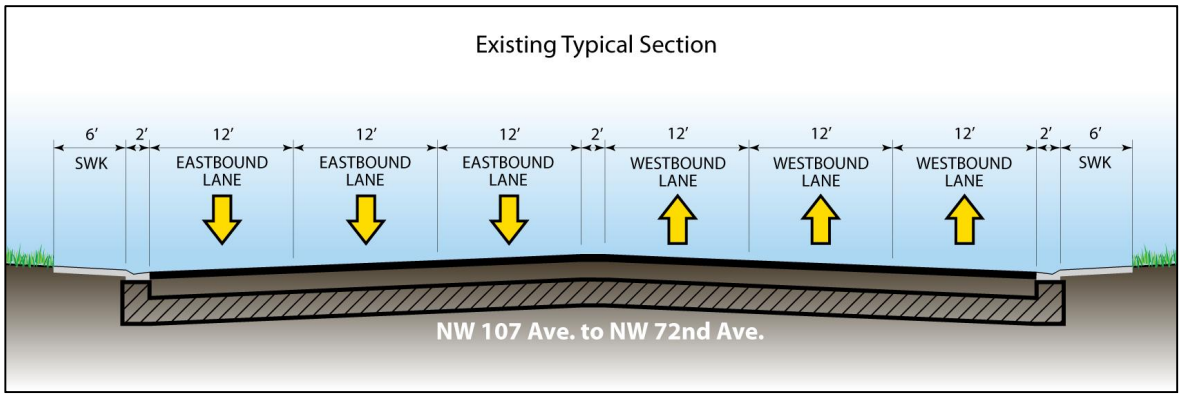


Figure 15: Typical Flagler Street Lane Configuration – NW 72nd Avenue to NW 24th Avenue

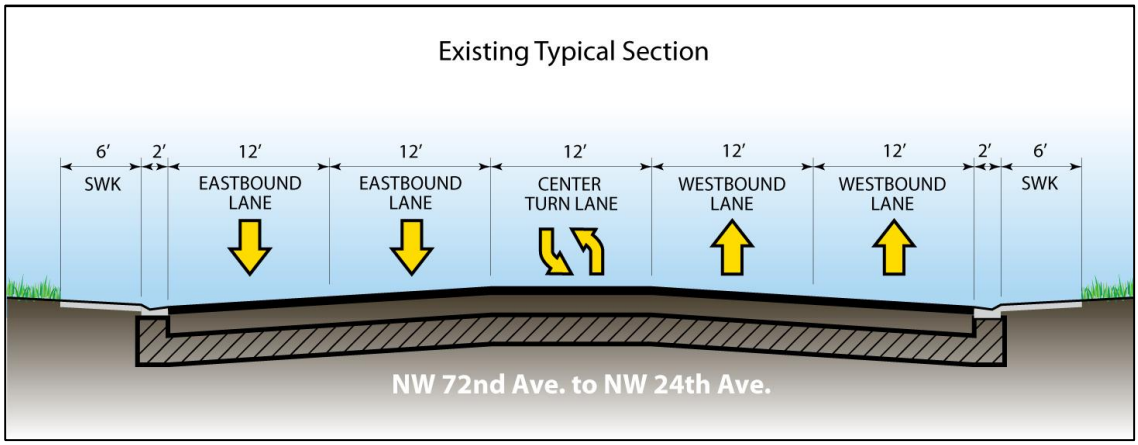


Figure 16: Typical SW 1st Street Lane Configuration – NW 24th Avenue to NW 12th Avenue

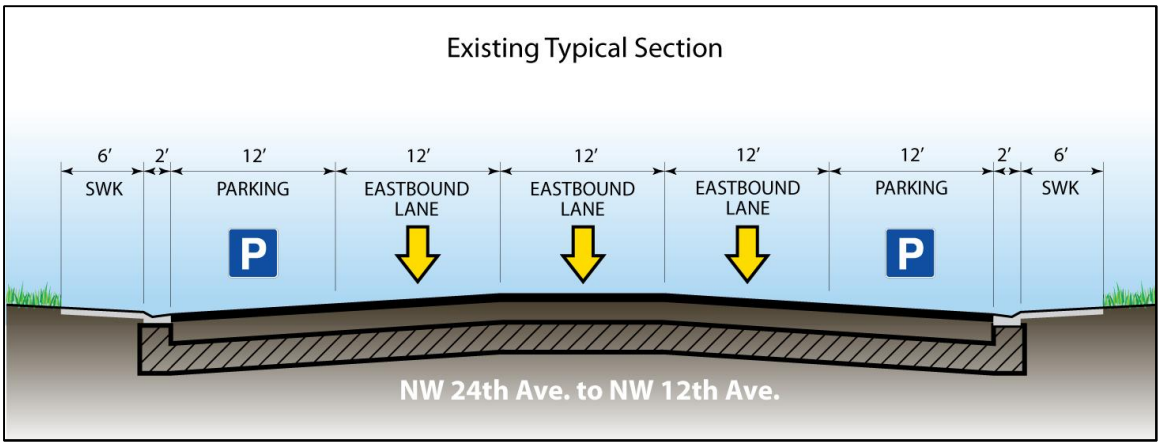


Figure 17: Typical SW 1st Street Lane Configuration – NW 12th Avenue to NW 6th Avenue

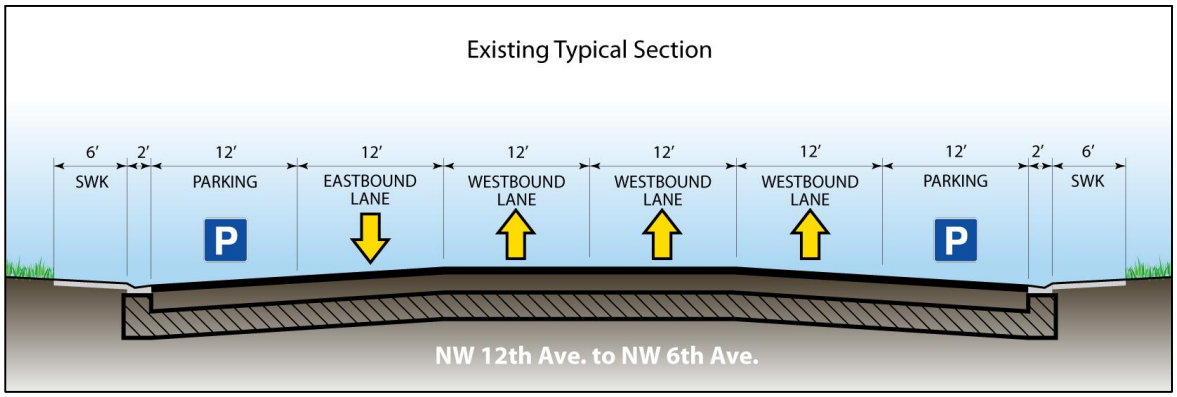


Figure 18: Typical SW 1st Street Lane Configuration – NW 6th Avenue to NW 1st Avenue

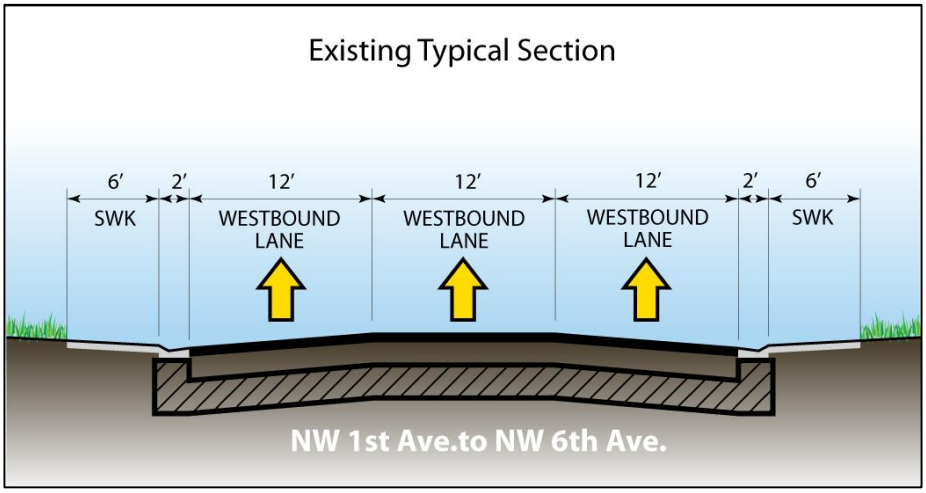


Figure 19: Typical SW 1st Street Lane Configuration – SW 22nd Avenue to SW 17th Avenue

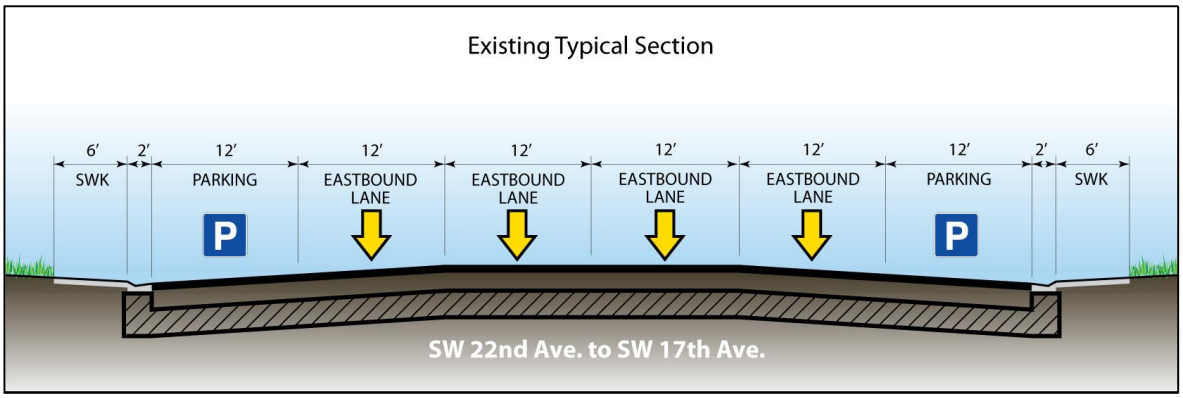
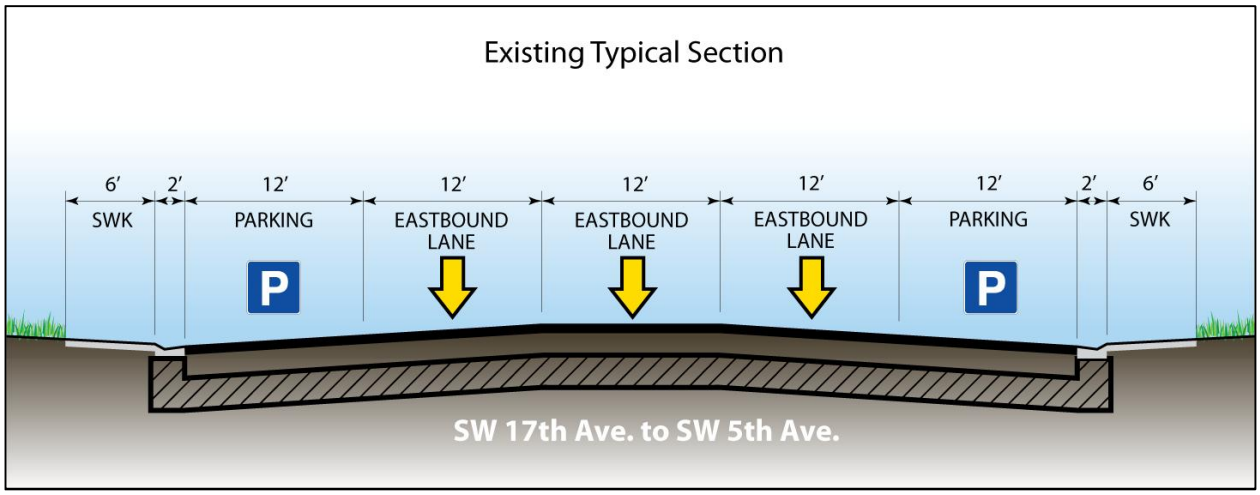


Figure 20: Typical SW 1st Street Lane Configuration – SW 17th Avenue to SW 5th Avenue



4.6 Existing Traffic Conditions

The limits of the project study on Flagler Street between NW 107th Avenue and North Miami Avenue were examined to understand existing traffic flow and travel lane capacity.

4.6.1 Roadway Level of Service

A roadway traffic Level of Service (LOS) evaluation was performed on the Flagler Street corridor. The methodology applied for this planning level analysis is based on the 2009 Quality Level of Service Handbook developed by FDOT. The Generalized Annual Average Daily Volumes for Florida's Urbanized Areas Table was selected for this particular analysis. Specifically, the 2012 Annual Average Daily Traffic (AADT) was taken from the FDOT Florida Traffic Online application maintained by the Transportation Statistics Office. Various segments along Flagler Street were defined as geometric and therefore traffic conditions change throughout the corridor.

In general, Flagler Street has a considerable traffic demand and limited capacity between NW 87th Avenue and NW 24th Avenue. In fact, traffic demand exceeds capacity between NW 87th Avenue and NW 57th Avenue resulting in LOS F. Table 5 summarizes the findings of the Level of Service evaluation at the bidirectional level based on AADTs and presented by segment area.

Table 5: Flagler Street and SW 1st Street Level of Service Evaluation

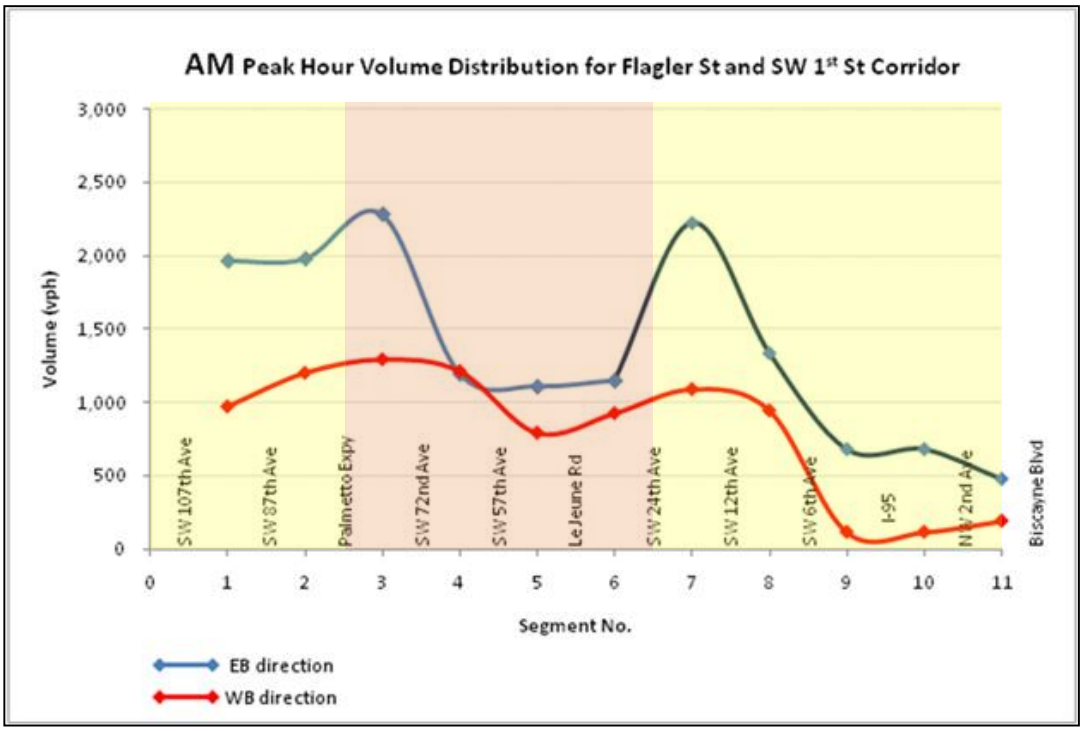
Segment	Description	# Lanes	AADT	LOS
1	Two-way segment from NW 107th Ave to NW 87th Ave	6	43,000	C
2	Two-way segment from NW 87th Ave to Palmetto Expressway	6	51,000	F
3	Two-way segment from Palmetto Expressway to NW 72nd Ave	6	54,500	F
4	Two-way segment from NW 72nd Ave to NW 57th Ave	4	43,000	F
5	Two-way segment from NW 57th Ave to Le Jeune Rd	4	34,000	E
6	Two-way segment from Le Jeune Rd to NW 24th Ave	4	34,750	E
7	One-way segment (WB) from NW 24th Ave to NW 12th Ave	3	20,500	D
	(SW 1st St)One-way segment (EB) from NW 24th Ave to NW 12th Ave	3	26,000	D
8	Two-way segment from NW 12th Ave to NW 6th Ave	4	18,100	C
	(SW 1st St) One way segment (EB) from NW 12th Ave to NW 6th Ave	3	12,500	C
9	One-way segment (WB) from NW 6th Ave to I-95	3	-	-
	(SW 1st St) One-way segment (EB) from NW 6th Ave to 2nd Ave	3	8,500	C
10	One-way segment (WB) from I-95 to NW 2nd Ave	1	-	-
11	Two-way segment from NW 2nd Ave to Biscayne Blvd	2	6,500	D

The Level of Service for Segment No. 9 (WB Flagler Street) is not provided in Table 5 due to the lack of reliable information from the Portable Monitoring Site No. 871034. Similarly, the Level of Service for Segment No. 10 (WB Flagler Street) was not reported because there is no traffic information available for this particular segment. However, these two segments are very short and are located in a section of Flagler Street on the east portion of the study area with low traffic volumes.

Another way to look at traffic flow is to apply AADT of the segments and determine peak hour volume distribution along the Flagler Street corridor. Both Figure 21 and Figure 22 illustrate a traffic flow profile by segment for the east bond and westbound direction to show traffic volumes on Flagler Street.

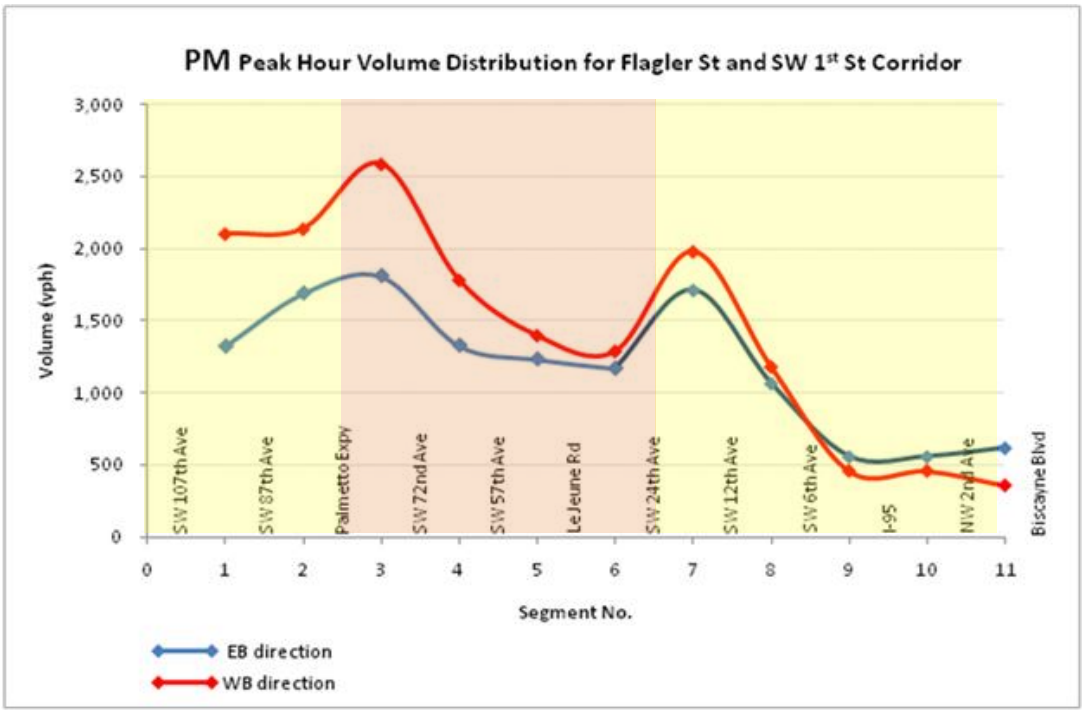
During the AM peak hour, when people are heading for work, most trips come from the west in the eastbound direction. This correlates with the land use distribution along the corridor and the fact that most auto trips are generated on the western section of the study area, in areas such as Sweetwater and Fontainebleau that are predominantly residential. Traffic volumes along eastbound Flagler Street drop as soon as drivers reach the Palmetto Expressway, which a majority of people take to reach their final destination outbound in the morning hours (Figure 21).

Figure 21: Flagler Street AM Peak Hour Traffic Profile



For the PM peak hour the peak traffic direction is inverted compared to the AM peak, with high traffic volumes in the westbound direction on Flagler Street to reach their final destination as they return home from work (Figure 22).

Figure 22: Flagler Street PM Peak Hour Traffic Profile



In summary, traffic volumes are high throughout the Flagler corridor, with traffic conditions causing delay for buses operating in mixed traffic in the corridor. Auto traffic volumes differ significantly from transit ridership patterns in the corridor, with the heaviest traffic volumes in the corridor found in the central and western areas of the corridor (near the Mall of the Americas and Palmetto Expressway). However, a secondary peak of traffic volumes, and a number of segments with relatively high levels of traffic congestion (levels of service C/D), occurs between SW 12th and SW 24th Avenues, coinciding with the areas of the highest transit ridership volumes. This combination of significant traffic congestion and high transit ridership means that many transit users suffer delay and overcrowding due to traffic congestion. In the next section, the potential for providing additional capacity, either for mixed traffic use or for exclusive bus use, will be explored.

4.7 Physical Constraints

The physical constraints of the corridor were documented using aerial photography and Google Streetview resources. Two types of physical constraints were considered: existing development that could potentially impede roadway expansion or the development of station-stop locations, and the number of existing travel lanes (as a proxy for potential for lane conversion to a dedicated guideway).

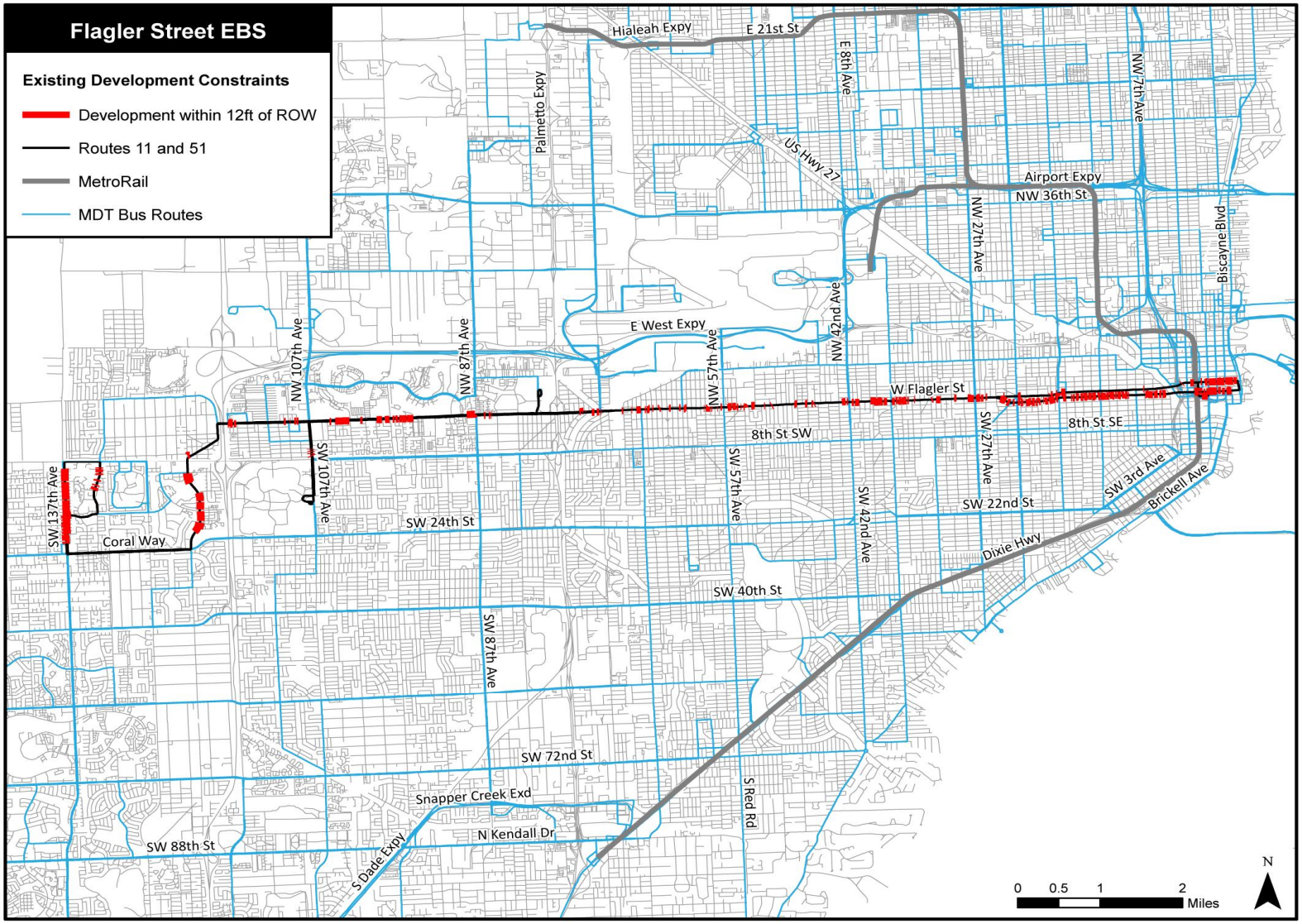
4.7.1 Existing Development Constraints

Development within approximately 12 feet of the existing right-of-way was documented for the length of the corridor. While such development does not necessarily preclude roadway widening or the location of transit station-stops, it does greatly complicate it, with property takes increasing the costs, development time and uncertainty associated with development of transportation improvements. Given that EBS improvements are meant to be relatively low cost and quickly implementable, significant property takes involving buildings, which require negotiations with property owners, and both costs and time associated with demolition and relocation, are to be avoided.

As shown in Figure 23, most sections of the corridor have a significant amount of development within this buffer area. The most constrained section of the corridor is located in Downtown Miami, where the development pattern is such that many building fronts are located only a few feet from the roadway. To the west of I-95, the corridor is more constrained along eastbound SW 1st Street than along westbound Flagler Street, which together act as a one-way pair east of NW 24th Avenue. To the west of NW 42nd Avenue, the density of developmental constraints lessens considerably, but most blocks still contain at least one development within 12 feet of the existing right-of-way.

From the Palmetto Expressway (SR 826) west to SW 118th Avenue, the developmental constraints are primarily located on the southern side of the street, indicating some potential for roadway expansion on the northern side. There are few developmental constraints on the segment of SW 107th Avenue to the FIU Terminal that is currently served by Route 11. The meandering Coral Way alignment of the Route 51 – Flagler MAX is more constrained, particularly on SW 122nd and SW 137th Avenues. Overall, the potential for sustained lane expansion on most sections of the Flagler Street corridor is low, particularly in the eastern areas of the corridor where both transit ridership and traffic-related delays are highest. Indeed, the right of way constraints in the corridor make it difficult to locate station-stops at many locations.

Figure 23: Existing Development Constraints in the Flagler Corridor



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5.0 ENHANCED BUS SERVICE PLAN DEVELOPMENT

The existing high volume of transit ridership and level of traffic congestion in the corridor suggest a need for EBS improvements. The initial recommended alignment for EBS service along in this corridor is between Downtown Miami and the new FIU Transit Terminal on SW 8th Street and SW 110th Avenue along Flagler Street, with a possible extension from the FIU Transit Terminal to the proposed SW 147th Street Park-and-Ride Lot on SW 8th Street in the Coral Way area. Potential improvements include

- changes to the configuration of the running way, to allow for part-or full-time lane restrictions to benefit buses;
- the potential for queue jump facilities at key congested intersection locations along the corridor;
- the provision of transit signal priority (assumed to be installed in all potential running way scenarios);
- changes to the spacing and location of stations as well as the composition of improvements at the stations, to make the service more visible to potential users and more comfortable to those who use it;
- provision of park-and-ride lots to serve commuters who live beyond walking distance of the corridor, primarily in the western end; and
- changes to the operation of transit service in the corridor, to improve service frequency and/or service span, and to change the configuration of service to better reflect the ridership patterns of the corridor.

5.1 Running Way Configuration Alternatives

A variety of options for running way configuration were examined for the entire project limits of the Flagler Street study corridor, with the needs and physical constraints throughout the corridor quickly narrowing the list of potentially feasible options. Other options, such as the configuration of stations and other operating constraints, were suggested both by the existing operations of bus routes in the corridor and decisions that have been made in the previously completed EBS studies on Biscayne Boulevard and NW 27th Avenue.

Table 6: Summary of Roadway Configuration Alternatives

	Alternatives	Time period	Separated Guideway	Direction
A	Median Busway	All Times	Yes	Two-way
B	Reversible Center Bus Lane	AM/PM Peak only	Yes	EB AM / WB PM
C	Curbside Busway	All Times	Yes	Two-way
D	Curbside Bus Lane with Reversible Center Lane for Auto Traffic	AM/PM Peak only	No	Two-way
E	Restricted Curbside Bus Lane (all times and both directions)	All Times	No	Two-way
F	Restricted Curbside Bus Lane (peak period and both directions)	AM/PM Peak only	No	Two-way
G	Restricted Curbside Bus Lane (peak period and peak direction)	AM/PM Peak only	No	EB AM / WB PM
H	Enhanced Bus Operating in Mixed Traffic	N/A	N/A	N/A

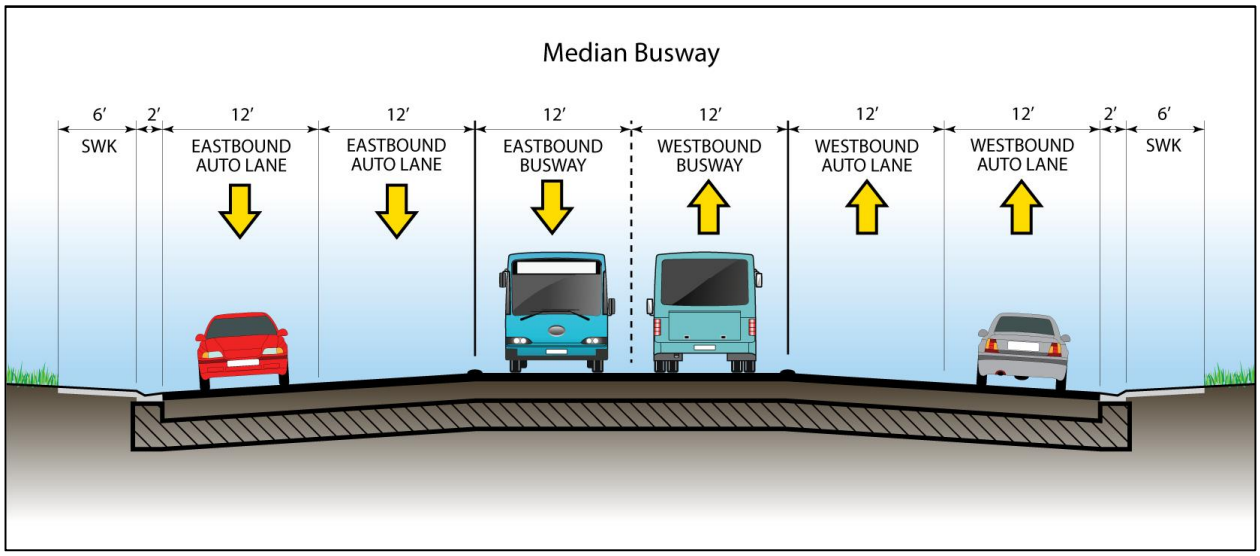
Ridership patterns in the corridor strongly suggest an optimum operating scenario that increases service frequency and makes other service improvements in the eastern portion of the corridor to meet high demand and reduce overcrowding and delay in that area, while maintaining coverage in the western areas. This section evaluates the potential roadway configuration alternatives for implementing enhanced bus service throughout all segments of the Flagler Street corridor. A total of eight configuration alternatives were considered, as summarized in Table 6.

Each of these modes would include implementation of a corridor-wide application and regional branding scheme and include the application of queue jump lanes and/or transit signal priority treatments at intersections. In the development of alternatives, previous MDT and MPO studies were referenced to include the Biscayne Boulevard Enhanced Bus and NW 27th Avenue Enhanced Bus studies completed in 2013.

5.1.1 Alternative A Median Busway (All Times)

The Median Busway alternative would have two 12-foot bus lanes in the median of the Flagler Street Corridor where buses would operate at all times, with a physical barrier separating the lanes from the rest of the automobile traffic. Stations also would be located within the median, and the busway lanes would shift to accommodate the station platforms. Stations could either have a center platform or directional platforms on each (farside) of an intersection. Buses would use the busway at all times of day and in both directions, as shown in Figure 24.

Figure 24: Median Busway (All Times)



Alternative Strengths:

- Travel time savings would be in both directions during all times of day.

Alternative Weaknesses:

- Requires a large amount of right-of-way, especially at station locations.
- Requires passengers to cross traffic to access stations.
- Eliminates left-hand turns at intersections.
- Requires additional right-of-way for median stations and pedestrian/passenger safety improvements for station access.
- Requires the taking or removal of auto traffic from an existing travel lane.

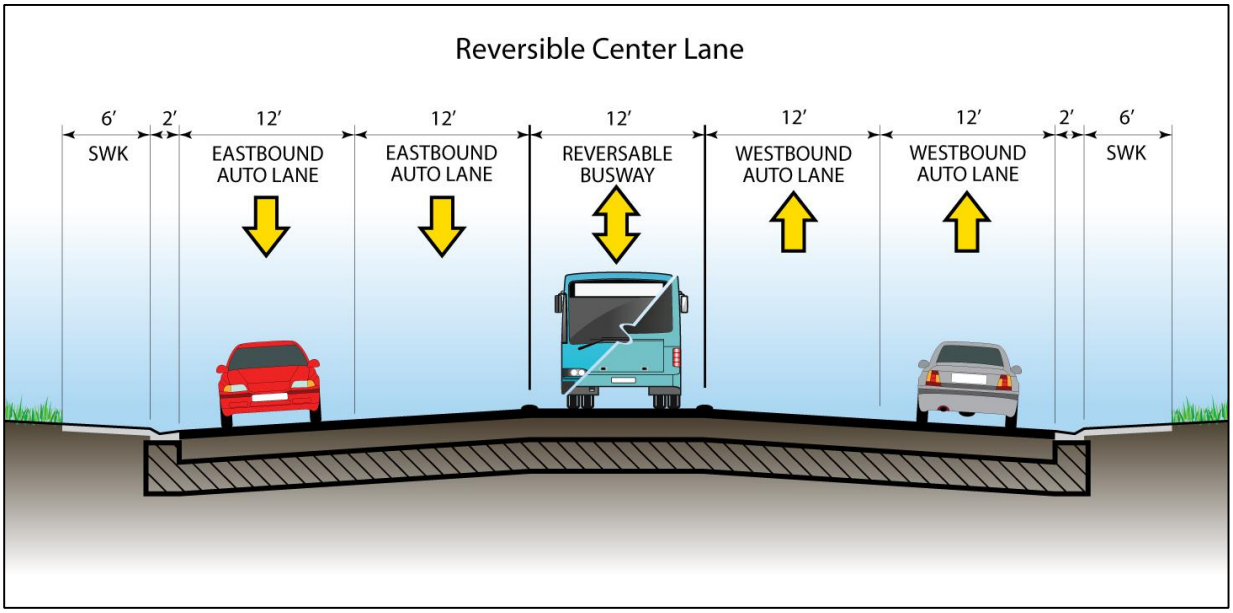
5.1.2 Alternative B Reversible Center Bus Lane (AM/PM Peak)

The Reversible Center Bus Lane alternative would have a single 12-foot bus lane operating in the center of the corridor. As the name suggests, the lane would be reversible, providing a

dedicated lane in one direction at a time, presumably operating inbound during the morning peak and outbound during the afternoon peak. During other times and in the opposite direction, buses would operate in mixed traffic.

Stations could be constructed in one of two ways. One possibility is to construct a single station at each location, but if this strategy were pursued, the bus used would need doors on both sides in order to serve the station depending on direction. Another possibility would be to construct separate stations for each direction, allowing a bus with doors on the right side the ability to serve a station configured for that side of the bus. Buses using the reversible center lane would only be able to use the guideway during peak periods.

Figure 25: Reversible Center Bus Lane (AM/PM Peak))



Alternative Strengths:

- Provides a dedicated lane improvement with less required right-of-way than a bi-directional busway.
- Directional travel time savings for transit.

Alternative Weaknesses:

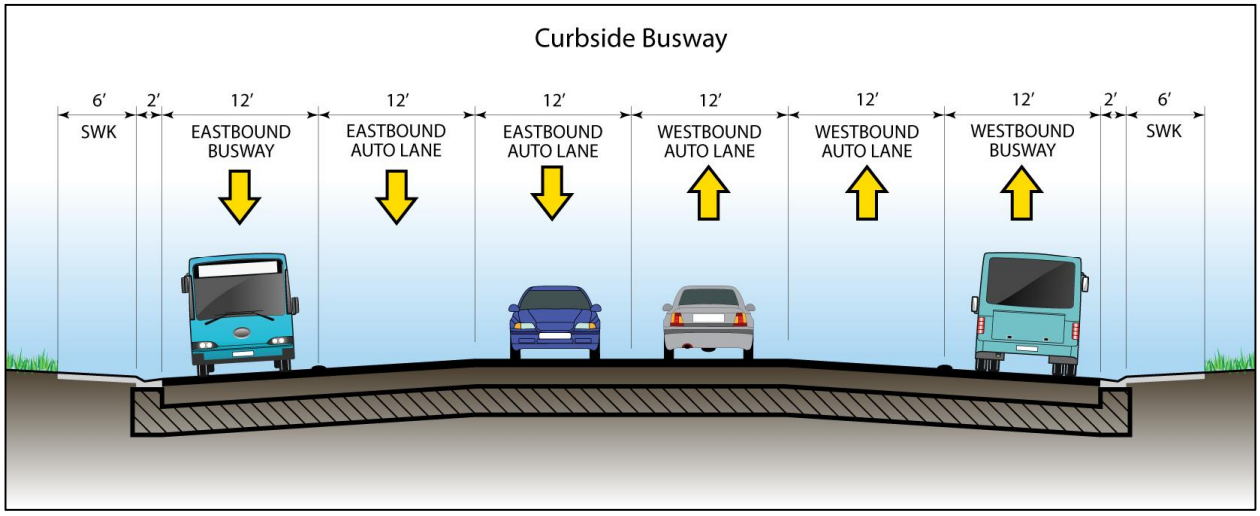
- Would only provide travel time savings in a single direction.
- Additional curbside stations would also be required for the non-peak period direction.
- Eliminates left-hand turns at intersections.

- Requires additional right-of-way for median stations and pedestrian/passenger safety improvements for station access.

5.1.3 Alternative C Curbside Busway (All Times)

The Curbside Busway alternative would place a 12-foot bus lane along the curb in each direction on the corridor where bus lanes would be operational at all times. These lanes would be separated from auto traffic by a barrier. As a result, access to driveways and access points to properties along the guideway would be restricted along the length of the busway. Left turn lanes would also be restricted at intersections. Stations would be located on the curbside within the available right-of-way. Buses would have the ability use the busways at all times of day.

Figure 26: Curbside Busway (All Times)



Alternative Strengths:

- Travel time savings would be in both directions during all times of day.
- Travel time savings would be greater than under options without a barrier separation, as barrier separation prevents intruding traffic and parked cars from partially or wholly blocking the bus lane.
- In some cases passengers would not need to cross traffic to reach the station (or their destination).
- Accessible curbside passenger stations from adjacent sidewalks.

Alternative Weaknesses:

- Station locations could be limited by right-of-way availability.
- Auto access to businesses and left turns would be restricted by the busway lanes.

5.1.4 Alternative D Curbside Bus Lane with Reversible Center Lane for Auto Traffic (AM/PM Peak Only)

The Curbside Bus Lane with Reversible Center Lane for Auto Traffic alternative would use the curbside lane for dedicated bus use during peak times in the peak time direction. An additional lane would be provided in the center lane that would be used for the automobile traffic heading in the same direction to provide capacity for automobiles taken up by the exclusive busway during peak times. Left turn lanes would be restricted at intersections. Stations would be located on the curbside within the available right of way. Buses would have the ability to use the busways during peak times only and during the appropriate time of day (i.e., AM peak, PM peak).

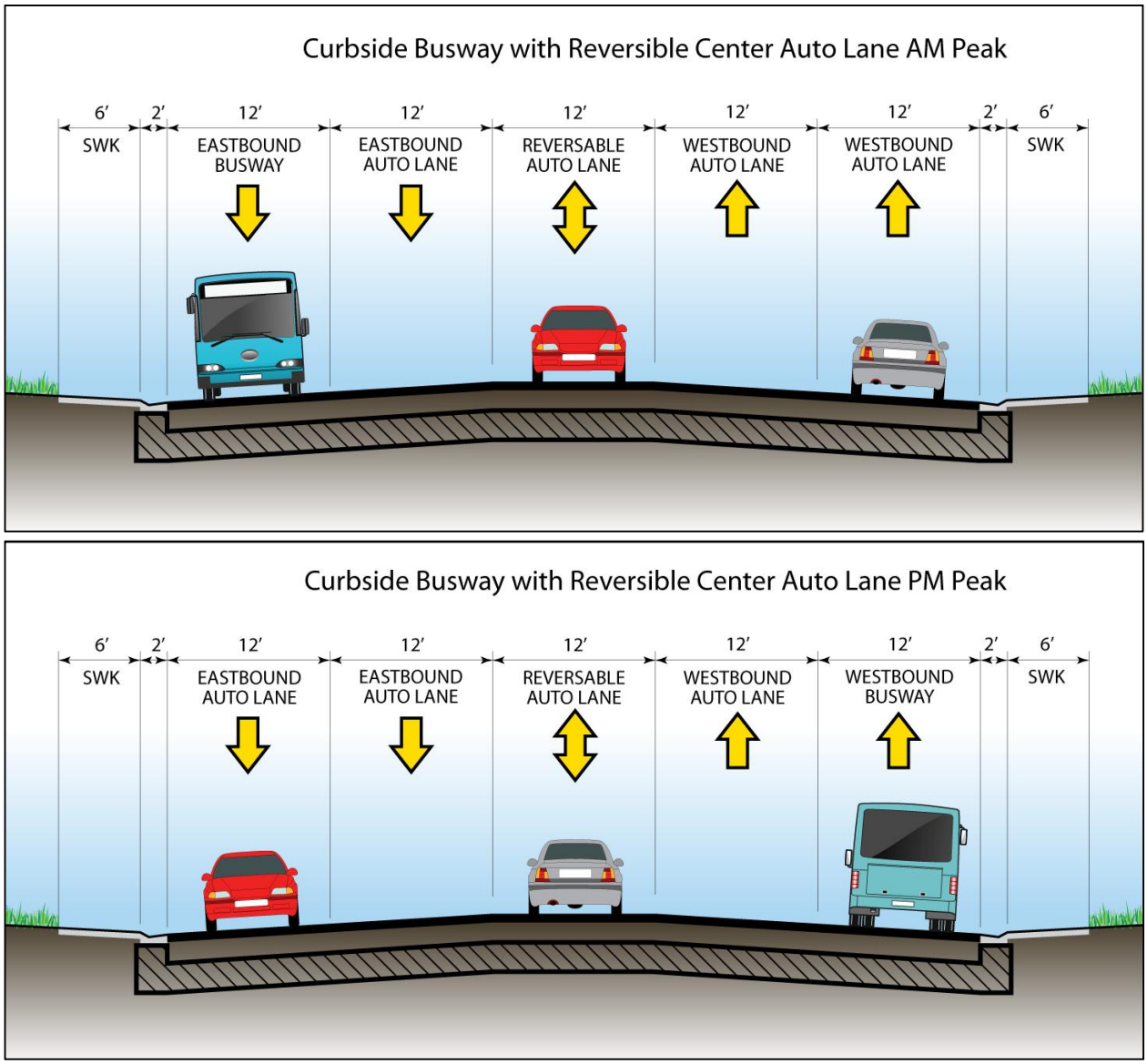
Alternative Strengths:

- Would provide travel time savings for transit riders in both directions during the times of the day with the greatest traffic congestion and potential delay, while allowing auto traffic to use the lanes during other periods.
- Would improve mobility by providing simplified timings due to the left turn prohibitions and the ability for better signal coordination.
- During the off-peak hours there are no impacts to accessibility since there are no restrictions on auto traffic.
- Accessible curbside passenger stations from adjacent sidewalks.

Alternative Weaknesses:

- Would require traffic enforcement during peak periods and would necessarily provide a somewhat less reliable benefit to bus travel, due to the ability of other vehicles to intrude on the busway.
- Station location dependent on right-of-way and/or building setbacks.

Figure 27: Curbside Bus Lane with Reversible Center Lane (AM/PM Peak Only)

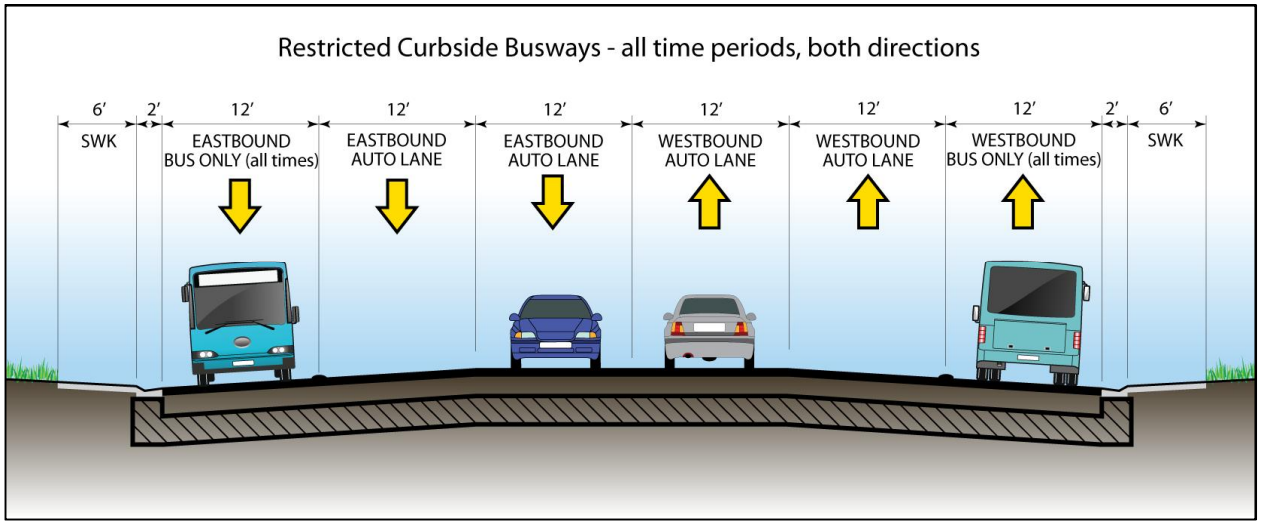


5.1.5 Alternative E Restricted Curbside Bus Lane (All Time Periods, Both Directions)

This Restricted Curbside Bus Lane alternative would place a 12-foot bus lane along the curb in each direction on the corridor. This alternative differs from the Curbside Busway alternative in that these lanes would not be barrier separated from auto traffic. The lane would be designated a bus lane through striping, pavement marking and signage. As a result of the lack of the barrier, auto access to businesses and left turns may be permitted with this alternative (depending on further traffic analysis), and the right lane would be available for right turning traffic. Because these lanes are open to traffic, they would require traffic enforcement to help ensure bus operations. Even with rigorous enforcement, there would be instances where intruding traffic and parked vehicles would partially or completely block the busway, reducing the benefit of the bus lane compared to barrier separated options.

Stations would be located on the curbside within the available right-of-way. Buses using the curbside lanes would do so during all time periods and directions.

Figure 28: Restricted Curbside Bus Lane (All Time Periods Both Directions)



Alternative Strengths:

- Would provide travel time savings for transit riders in both directions at all times of day within the corridor.
- Accessible curbside passenger stations from adjacent sidewalks.

Alternative Weaknesses:

- Would require traffic enforcement during peak periods and would necessarily provide a somewhat less reliable benefit to bus travel, due to the ability of other vehicles to intrude on the busway.
- Station location dependent on right-of-way and/or building setbacks.

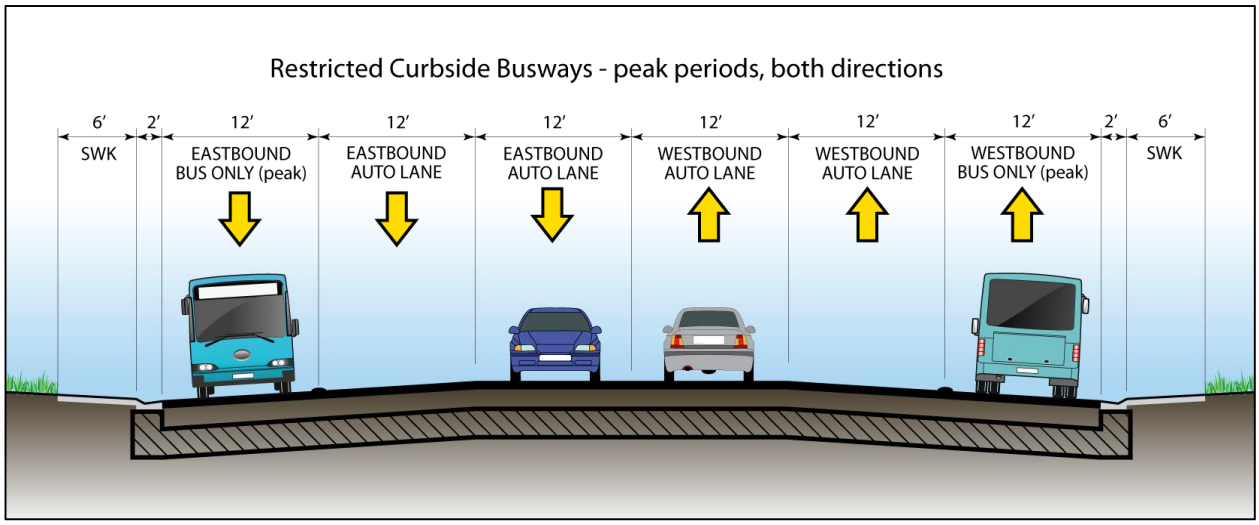
5.1.6 Alternative F Restricted Curbside Bus Lane (Peak Periods and Both Directions)

This alternative would be the same as the previous one, except that the curbside lane would only be restricted to bus operations during peak periods. As with the previous Restricted Curbside Bus Lane alternative, access would remain open for crossing automobile traffic along the corridor.

Stations would be located on the curbside within the available right-of-way.

Buses using the curbside lanes would only be able to do so during peak periods but in both directions. Buses traveling during off-peak periods would operate in mixed traffic.

Figure 29: Restricted Curbside Bus Lane (Peak Period and Both Directions)



Alternative Strengths:

- Would provide travel time savings for transit riders in both directions during the times of the day with the greatest traffic congestion and potential delay, while allowing traffic to use the lanes during other periods.
- Accessible curbside passenger stations from adjacent sidewalks.

Alternative Weaknesses:

- Would require traffic enforcement during peak periods and would necessarily provide a somewhat less reliable benefit to bus travel, due to the ability of other vehicles to intrude on the busway.
- Station location dependent on right-of-way and/or building setbacks.

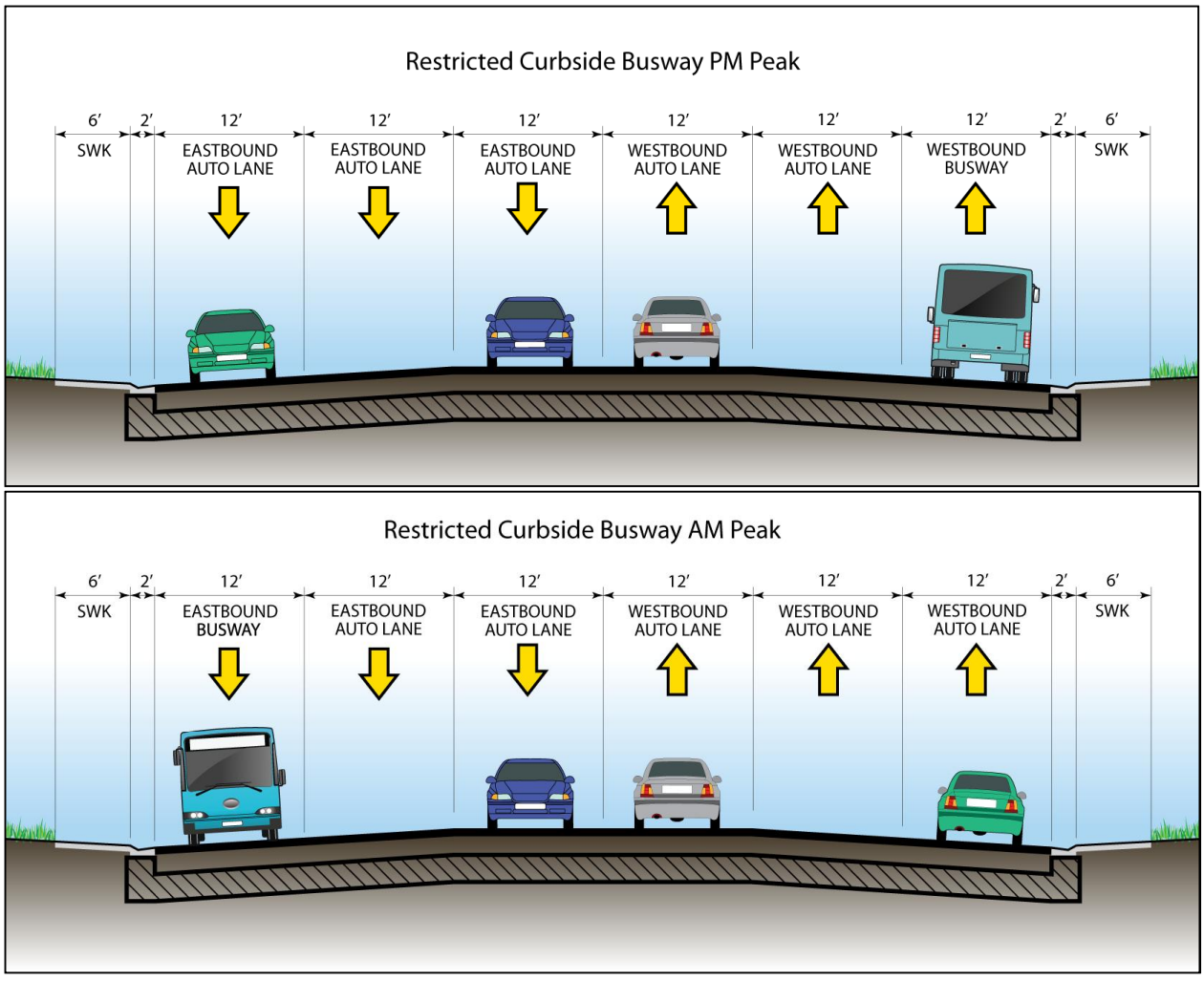
5.1.7 Alternative G Restricted Curbside Bus Lane (Peak Periods and Peak Directions)

This alternative would be the same as the Restricted Curbside Busways (Peak Periods and Both Direction) option, except the lane would only be restricted to bus operations in the peak period and in the peak direction (eastbound in the AM peak and westbound in the PM peak). During all other times the lane would be open to all traffic. As with the previous Restricted Curbside Busway alternative, access would remain open to crossing automobile traffic along the corridor at all times.

Stations would be located on the curbside within the available right-of-way.

The curbside lanes would only be restricted to bus use during peak periods and only in one direction. Bus service would be in the eastbound direction in the AM peak and in the westbound direction during the PM peak. Buses traveling in the opposite direction during peak periods and all bus operations during off-peak periods would operate in mixed traffic.

Figure 30: Restricted Curbside Bus Lane (Peak Periods and Peak Directions)



Alternative Strengths:

- Would provide travel time savings for transit riders in both directions at all times of day within the corridor.
- Accessible curbside passenger stations from adjacent sidewalks.

Alternative Weaknesses:

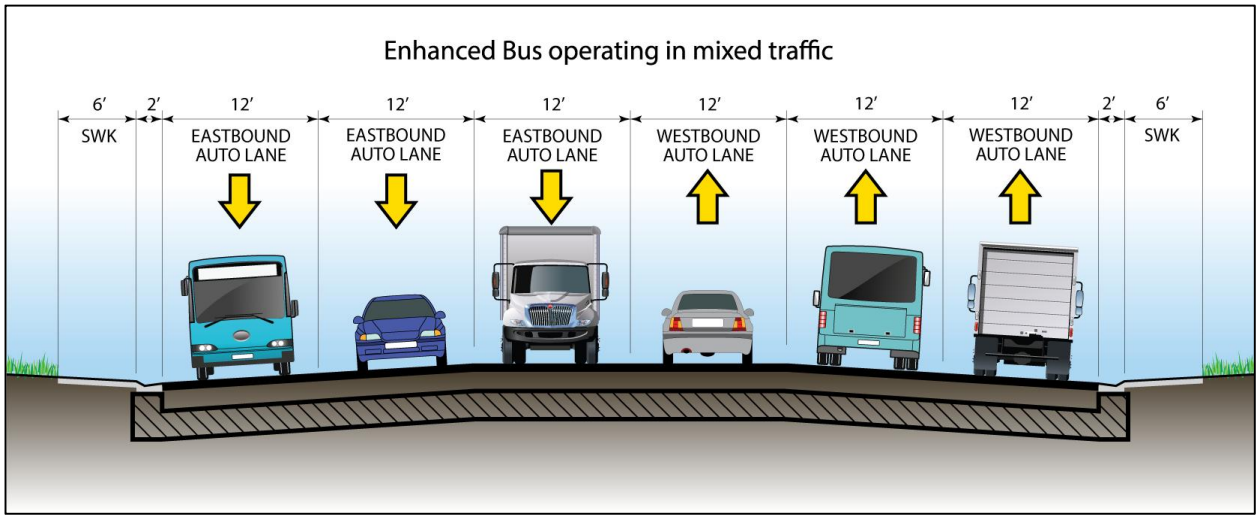
- Would require traffic enforcement during peak periods and would necessarily provide a somewhat less reliable benefit to bus travel, due to the ability of other vehicles to intrude on the busway.
- Station location dependent on right-of-way and/or building setbacks.

5.1.8 Alternative H Enhanced Bus Operating in Mixed Traffic

The enhanced bus alternative is different from all others in that no dedicated lanes will be provided for bus service at any time or direction and all operations will be in mixed traffic. The focus of the bus service will be in branding, with a distinctive color and logo on the bus, on MDT system maps, and at stations, and on travel time improvements that are included in the other alternatives but do not include dedicated bus lanes, such as the reduction in the number of bus stops and transit signal priority.

Stations will be improved and located along the curbside. Infrastructure improvements to stations will support the branding of the service.

Figure 31: Enhanced Bus Service Operating in Mixed Traffic



Operations would be in mixed traffic.

Alternative Strengths:

- The least costly of the proposed roadway alternatives, with the smallest amount of required infrastructure.

- Accessible curbside passenger stations from adjacent sidewalks.

Alternative Weaknesses:

- Less travel time savings than alternatives that include since bus would operate in mixed traffic during all time periods.

5.1.9 Running Way Configuration Second Screening

After the initial review of alternatives for roadway configurations and conducting an analysis of the vehicle traffic levels along the corridor, the Enhanced Bus Service Operating in Mixed-Traffic (Alternative H) and a hybrid of the Curbside Busway (Alternative C) and Restricted Curbside Bus Lanes with Reversible Center Lane for Autos (Alternative D – for segment between 72nd Avenue and 24th Avenue only) be were examined further as potential options for providing transit improvements for the Flagler Street corridor project limits.

The traffic congestion levels experienced along the corridor during both the AM and PM peaks coupled with the existing capacity restraints do not allow for dedicated bus lane operations where and when needed as shown in Table 7. Reducing capacity along many of the segments, especially between 72nd Avenue and 24th Avenue, for a dedicated EBS operation would greatly reduce the traffic capacity during peak travel times (between 25-50% per direction reduction) and further increasing traffic congestion and travel time.

While some of the segments could incorporate any of the running way alternatives based on capacity and traffic levels (Table 8), a comprehensive alternative should be chosen to use resources effectively and create the best possible running way configuration in each segment of the corridor. Only two of the options (Mixed Traffic and the implementation of Restricted Curbside Bus Lanes with Reversible Center Lane for Autos in Segment 2 (Alternative B) combined with Curbside Busway in Segments 1 and 3 (Alternative G)) are either “possibly” or “most likely” implementable alternatives along the entire corridor.

The three remaining restricted curbside bus lane alternatives (Restricted Curbside Bus Lane –All Times; Restricted Curbside Bus Lane—Peak Periods, Both Directions; and Restricted Curbside Bus Lane—Peak Periods; Peak Directions) could technically be implemented along each segment of the corridor. However, each of these options would require removing a lane from general purpose traffic use for at least part of the day. In Segments 1 and 3, capacity exists to allow the lanes to be removed from general purpose use while maintaining acceptable levels of traffic congestion. However, in segment 2, traffic volumes relative to capacity are such that removing a lane from general purpose use, without adding to capacity by other means (such as, by providing a reversible center traffic lane) would result in unacceptable levels of traffic. Therefore these alternatives are considered “unlikely” alternatives for Segment 2 and therefore not forwarded into the second screening of alternatives.

Mixed traffic operations allow the Flagler Street EBS to be implemented almost immediately. EBS would operate amongst regular traffic during both peak and off-peak times. A small improvement in travel time would be realized with a reduction in the number of bus stops compared to current local bus service in the corridor.

Restricted Curbside Bus Lane with Reversible Center Lane combined with a Curbside Busway approach is a more complex option. It involves changing the traffic patterns of a 4.8 mile stretch of the corridor in order to implement a restricted curbside lane while maintaining current capacity levels by converting the center lane to a peak direction reversible through lane and prohibiting left-turns between 24th Avenue and 72nd Avenue during peak travel periods. This approach of providing curbside bus lanes with a center turn lane in Segment 2 also maintains the curbside busway approach consistent with the rest of the corridor (i.e. Downtown to 24th Avenue/72nd Avenue to 107th Avenue). While traffic along Flagler Street tends to be high at all times of the day, it experiences especially high levels of congestion during the peak travel times, and this traffic congestion is exacerbated by left turns in the narrow right of way in the area between 24th and 72nd Avenues. The changes to the traffic patterns associated with this alternative could improve traffic flows as this alternative allows simplified signal timings and improved signal coordination during the peak times.

Additional traffic analysis beyond the limited scope of this evaluation is suggested to be completed in future phases for this project to fully understand the traffic impacts associated with the proposed transit running way configurations as proposed recommendation for this study.

Table 7: Summary of Flagler Street Traffic Analysis

								Can we take a lane?			
Segment	Description	EB Capacity	WB Capacity	AM EB Demand	AM WB Demand	PM EB Demand	PM WB Demand	AM EB	AM WB	PM EB	PM WB
1	Two-way segment along Flagler St. from NW 107th Ave. to NW 87th Ave.	1,950	1,950	1,950	1,000	1,250	2,100	No	Yes	Yes	No
2	Two-way segment along Flagler St. from NW 87th Ave to Palmetto Expy.	2,859	2,859	1,950	1,250	1,700	2,150	No	Yes	Yes	No
3	Two-way segment along Flagler St. from Palmetto Expy to NW 72nd Ave.	2,859	2,859	2,300	1,300	1,800	2,550	No	Yes	Yes	No
4	Two-way segment along Flagler St. from NW 72nd Ave to NW 57th Ave.	1,888	1,888	1,200	1,250	1,300	1,800	No	No	No	No
5	Two-way segment along Flagler St. from NW 57th Ave to Le Jeune Rd.	1,888	1,888	1,100	800	1,200	1,400	No	Yes	No	No
6	Two-way segment along Flagler St. from Le Jeune Rd to NW 24th Ave.	1,888	1,888	1,150	900	1,150	1,250	No	Yes	No	No
7	One-way EB along SW 1st St. and One-way WB along Flagler St between NW 24th Ave and NW 12th Ave	2,340	2,340	2,250	1,100	1,700	2,000	No	Yes	No	No
8	One-way EB along SW 1st St. and two-way segment along Flagler St. from NW 12th Ave to NW 6th Ave.	2,340	2,340	1,350	950	1,050	1,200	Yes	Yes	Yes	Yes
9	One-way EB along SW 1st St. and One-way WB along Flagler St. from NW 6th Ave to I-95.	3,120	2,340	650	150	550	450	Yes	Yes	Yes	Yes
10	One-way EB along SW 1st St. and One-way WB along Flagler St. from I-95 to NW 2nd Ave.	2,340	780	675	150	550	475	Yes	No	Yes	No
11	One-way EB along SW 1st St. and two-way segment along Flagler St. from NW 2nd Ave to Biscayne Blvd.	2,340	780	500	200	600	400	Yes	No	Yes	No

Table 8: Roadway Configuration Options and Implementation Feasibility

				Restricted Curbside Bus Lanes				
	Median Busway	Reversible Center Bus Lane	Curbside Busway	Restricted Curbside Bus Lane with Reversible Center Lane for Autos	Restricted Curbside Bus Lane (All Times)	Restricted Curbside Bus Lane (Peak Periods; Both Directions)	Restricted Curbside Bus Lane (Peak Periods; Peak Directions)	Mixed Traffic
Segment 1 Flagler Street and SW 1st Street One-Way Pair								
Segment 2 Flagler Street between NW 24th Avenue and NW 72nd Avenue								
Segment 3 Flagler Street between NW 72nd Avenue and SW 107th Avenue to FIU								

Key: Red: Unlikely; Yellow: Possibly; Green: Most Likely.

5.1.9.1 Second Screening – Mixed Traffic

A mixed traffic operation is the most common operating environment for transit in the United States, applicable to bus, BRT, and some streetcar operations. For this plan, Operations in Mixed Traffic is the alternative that requires the least amount of effort and capital to implement, as existing local service along the Flagler Street corridor currently operates in mixed traffic. Because this type of operation is already in place for the local bus service, this alternative was rated "most likely" in the initial screening of alternatives. Introducing EBS and lacking any type of dedicated bus way (peak-only or all times) results in buses (both local and EBS) having to share available traffic lanes with other vehicles, which can result in delays, especially during peak travel periods. This operating alternative causes travel times to increase, making transit less efficient and less attractive compared to private autos.

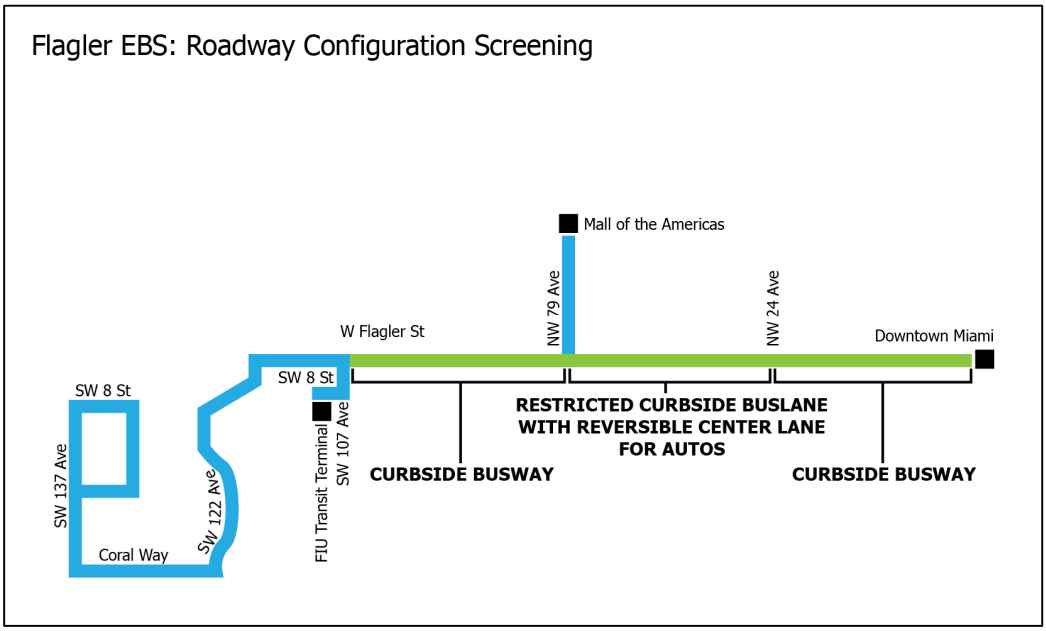
Implementing EBS along the Flagler Street corridor would allow for immediate operation upon completion of the proposed branding scheme (i.e. stops, buses, etc.) for the service and coordination of service between proposed local and EBS service.

5.1.9.2 Second Screening – Hybrid Curbside Busway with Restricted Curbside Bus Lanes with Reversible Center Lane for Autos

A hybrid of the Restricted Curbside Bus Lanes option with the addition of a Reversible Center Lane for general purpose traffic is the only other alternative that was deemed a viable option in the initial screening, with a "possibly" implementable rating in the feasibility analysis for all three segments of the corridor. A diagram of the roadway configuration is depicted in Figure 32. It was carried forward into the second phase of screening because it maintained existing capacity and provided a consistent running way configuration through the entire corridor. The alternatives that included a reversible bus lane required the removal of a general use lane to be used solely for bus operations during peak times, which removed much needed capacity for general purpose traffic.

While this alternative also has a curbside lane used for exclusive bus operations during peak times, it maintains the existing capacity by repurposing the center left-turn lane and converting it to a reversible center lane would operate as a through lane in the peak direction of travel during the hours that the exclusive bus lane is in use between 24th and 72nd Avenues. The center lane would operate as a center left turn lane during hours off peak hours when buses operate in mixed traffic.

Figure 33: Roadway Configuration Alternative



Left turns would be restricted at all intersections during peak travel periods between 24th Avenue and 72nd Avenue, a span of approximately 4.8 miles. With left turns restricted, reversible center general purpose through lanes would be in effect along the Flagler Street corridor that would provide capacity in the peak direction that was displaced by the proposed exclusive curbside bus lane. With this, through capacity remains intact or even slightly increased due to the left turn restriction. Right turns would continue to be permitted at all intersections, with drivers of private vehicles permitted to use the curb lane during peak periods to make right turns at the next intersection.

The use of reversible center lanes for automobiles is already implemented on the Georgia Avenue corridor in Silver Spring, Maryland. However, the use of reversible center lanes is not to accommodate an exclusive lane for transit operations but to increase the number of lanes of through traffic during the peak period, as shown in Figure 33. The center lane is used as a bidirectional left turn lane at all other times. Despite the Georgia Avenue example lacking an exclusive bus lane element, Silver Spring remains a good example and reference point for implementing reversible center lanes along the Flagler Street corridor. In the Georgia Avenue corridor, electronic signage is used to relay information to drivers and advise them on the current lane purpose at that time of day.

A similar set-up would be proposed for Flagler Street, with additional electronic signage indicating that the right hand-lane (in the peak direction) is for exclusive bus operations. A traffic analysis of the Flagler Street corridor was conducted to project the number of vehicles that make left turns at the intersections where left turns would be restricted, and to determine how those restrictions might impact existing traffic on the corridor.

Left turn restrictions were evaluated for a sample of intersections along the Flagler Street corridor. Ten intersections located between 24th Avenue and 72nd Avenue were selected for this analysis. Left turn movements at these intersections are proposed to be restricted during peak travel periods, when the reversible lane alternative is implemented. Estimating the number of vehicles that make left turns at these intersections is vital as it provides insight into how much traffic will be re-routed to other intersections and adjacent parallel corridors (e.g., SW 8th Street and NW 7th Street). The restriction of these left turns will reduce the number of points of interaction that vehicles will have with conflicting traffic, thereby simplifying signal timings during peak hours allowing for better progression and flow of through traffic between left-turn lane permitted intersections during the peak travel periods.

Figure 32: Reversible Center Lane in Silver Spring, MD (Source: Montgomery County)

The ten intersections evaluated were observed for two factors: the total green time available for left turn movements during the peak hours, and the number of vehicles that clear the intersection during the left turn signal phase as measured in field observation. To do this, the length of the green lift phase was recorded, as well as the fraction of the whole signal cycle that the green light phase occupies. Using this information, the total green time in a typical peak hour was determined. A sample count of the number of vehicles that clear the intersection during a single phase was expanded to estimate the total number of left turns that are made during a peak hour. The total green time available for left turn phases during the peak hours was estimated from existing signal timings downloaded from the Miami-Dade County Advanced

Traffic Management System (ATMS) website, maintained by the Miami-Dade Public Works and Waste Management Traffic Signals and Signs Division.

The observations were conducted between the hours of 7:30 AM and 9:00 AM for the morning peak and 5:00 PM and 6:30 PM for the afternoon/evening peak. Field observations were conducted for five intersections on the western half of Flagler Street between 72nd Avenue and 57th Avenue on May 28th, 2014,and the remaining intersections on the eastern half of the corridor between 47th Avenue and 27th Avenue on May 29th, 2014. Two separate observations were made per left turn movement to calculate an average number of vehicles processed at each phase and to reduce the margin of error in the calculation.

The intersection at Flagler Street and 72nd Street had a considerable number of left turns on the eastbound approach for both the AM and PM peak hours, with the east bound lane having the highest number of movements of all the observed intersections, as shown in Table 9. A large number of left turns on the eastbound approach were observed due to the reconstruction of the SR 826 and SR 836 interchanges. Drivers traveling from SR 826 northbound to SR 836 eastbound used this alternative route to bypass the construction of the interchange and to avoid excessive delays.

The intersection at Flagler Street and 67th Avenue was also observed to have a high number of left turns on the westbound approach during the PM peak hour. The intersection at Flagler Street and 42nd Avenue was also observed to have a high number of left turns on the eastbound approach during the PM peak hour. The intersection at Flagler Street and 27th Avenue also had a high number of left turns on the eastbound approach during the AM peak hour and on both the eastbound and westbound approaches during the PM peak hour. Prior to project implementation it is suggested that additional analysis occur at intersections throughout the corridor to fully understand potential impacts that left turn restrictions may impose on traffic flow.

5.1.9.3 Running Way Configuration Recommendations

Based upon the second screening of the two running way configuration alternatives, it is recommended that formal engineering studies be conducted on the restricted curbside bus lane with reversible center lane alternative combined with the curbside busway alternative. This hybrid alternative provides the greatest benefit to transit operations, as it provides a consistent dedicated bus lane for EBS during the most congested times of the day along the entire corridor. This hybrid alternative, in addition to the reduction in the number of bus stops for the EBS service, would greatly improve bus travel time along the corridor and would make transit a more attractive alternative to a private automobile in terms of travel time. The formal engineering studies would evaluate in greater detail the impact of removing the existing left turn lanes along Flagler Street during peak periods, impacts on those north-south arterials where left turns would be permitted, and impacts on east-west streets parallel to Flagler Street that could see an increase in traffic volumes. Restricting left-turning traffic would be a major change to east-west traffic patterns in central Miami, which should be extensively evaluated before formal a recommendation of the alternative can be made.

Implementing this hybrid alternative will undoubtedly change the traffic patterns of the corridor and the commuting patterns of drivers. Extensive preparation will need to be undertaken prior to the start of curbside busway and reversible center lane operations for vehicles along Flagler Street, including the implementation of signage in addition to new roadway striping along the corridor. Some type of initiative for educating the public may also need to be undertaken in order to introduce the concept of reversible lanes and to advise drivers of the new traffic pattern changes coming to the Flagler Street corridor to make the conversion process as smooth as possible. Furthermore consideration will need to be given to accommodate bicyclists either within the Flagler Corridor given the right-of-way limitations.

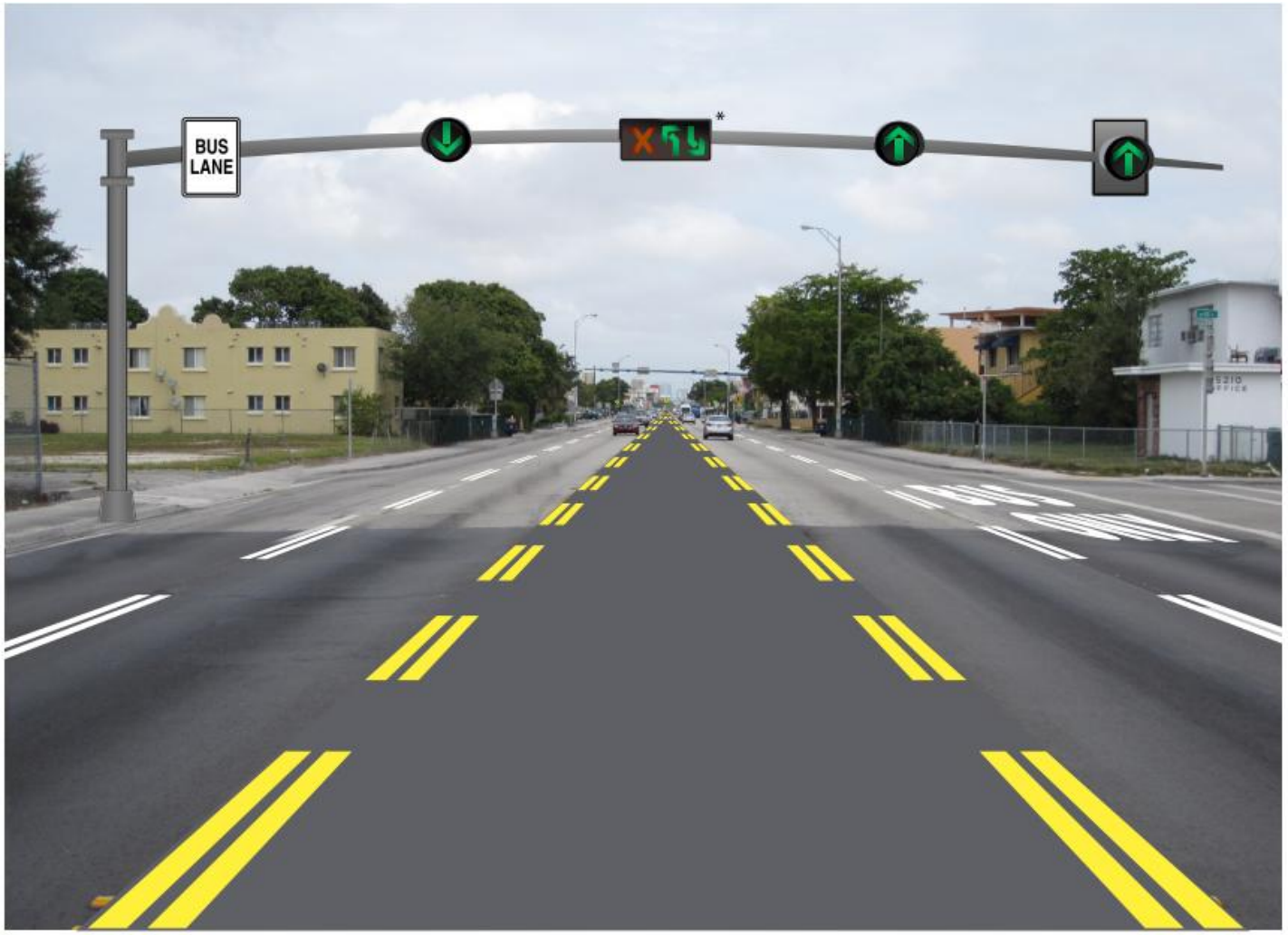
It is noted that common challenges arise from the implementation of a reversible lane on urban streets such as: driver confusion, and reduced accessibility due to the elimination of left turns. Reversible lanes require a well planned signage system to avoid safety issues. As part of their implementation a study should be conducted to determine the amount of time required to clear out the lane prior to switching directions. The clearance time vary according to corridor length, speed limit and congestion. Figures on the following pages illustrate the implementation of the reversible lane alternative on Flagler Street just west of SW 52nd Avenue.

Table 9: Summary of Flagler Street Left-Turn Traffic Analysis

Peak Hour Volume (Vehicles per Hour - VPH)				
Intersection	AM Peak Hour		PM Peak Hour	
	Eastbound Left	Westbound Left	Eastbound Left	Westbound Left
Flagler & NW 72nd Ave/Milam Dairy Rd	490	80	191	42
Flagler & NW 69th Ave	-	15	-	17
Flagler & NW 67th Ave/Ludlam Rd	80	110	74	159
Flagler & NW 62nd Ave	60	20	2	53
Flagler & NW 57th Ave/Red Rd	120	120	7	95
Flagler & NW 47th Ave	10	40	53	32
Flagler & NW 43rd Ave	30	50	60	0
Flagler & NW 42nd Ave/Le Jeune Rd	133	70	150	80
Flagler & NW 37th Ave	20	70	130	96
Flagler & NW 27th Ave	156	108	154	193

Figure 33: Existing Lane Configuration West of SW 52nd Avenue and Flagler Street

Figure 34: Illustration of Proposed Reversible Lane Concept west of SW 52nd Avenue and Flagler Street



* Red X will change to two green arrows during off-peak periods

5.2 Queue Jumps

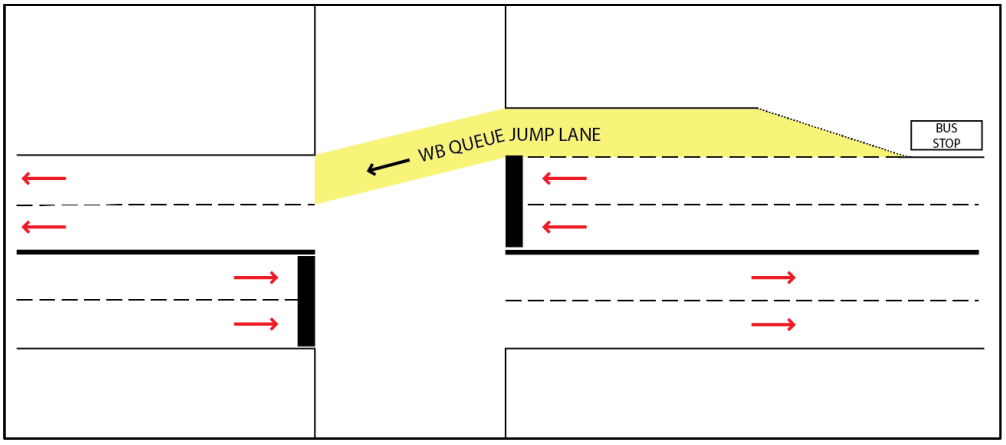
Queue jumps are a type of transit priority improvement that uses a dedicated lane for buses to bypass vehicles at signalized intersections. This application can be implemented either in an existing right-hand turn lane or an adjacent dedicated bus lane. When transit vehicles are allowed to bypass traffic at an intersection, a reduction of transit travel time/increase in travel speed and improvement to service reliability is the result.

An application of bus queue jumps has shown to produce up to a 15% reduction in travel time through intersections[1]. There are two types of queue jump facilities, queue jump lanes and a queue jump bypass. Several transit systems have implemented transit queue jump and bypass lanes in cities including Portland, Denver, San Francisco, Las Vegas and Seattle.

5.1.10 Queue Jump Lane

A queue jump lane allows a bus to enter into a lane that could also be utilized as a right turn lane, and stops at the near side of an intersection. An early green signal on a separate traffic signal is given to a bus to move through the intersection and into an existing travel lane before the general traffic begins to move through the intersection.

Figure 35: Queue Jump Lane Configuration



5.1.11 Queue Jump Bypass

A queue jump bypass lane does not use a separate green signal, but continues through the intersection with general traffic into a receiving lane on the far-side of the intersection before entering into an existing through travel lane. Intersections with queue bypass lanes typically have bus stops located on the far side of the intersection, allowing traffic to pass the bus while boarding and alighting is occurring.

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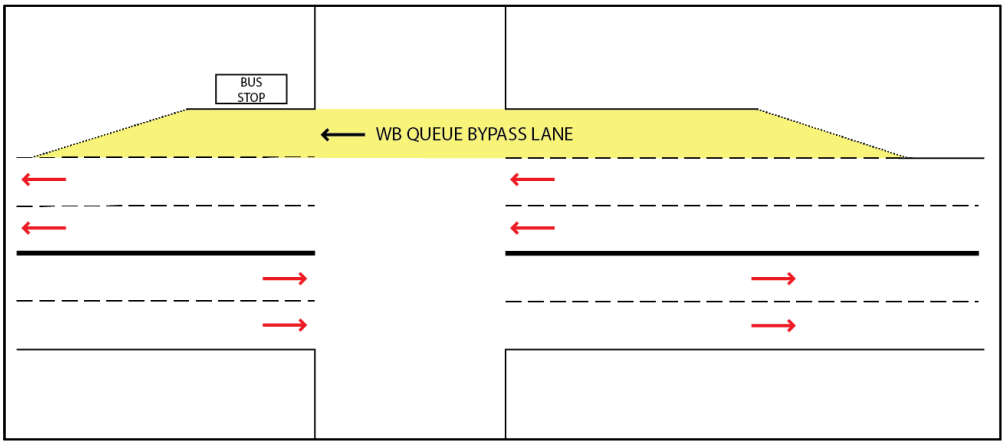
Figure 36: Queue Bypass Lane Configuration



5.1.12 Queue Jump Initial Screening

An analysis was conducted of the Flagler Street corridor to determine which intersections along the corridor were suitable for queue jump and queue bypass lane operations. Several factors were considered in the analysis, including whether an exclusive right-turn lane was available at the intersection, right-of-way availability, and presence of on-street parking at the intersection, LOS at the corridor level, in addition to the proposed location of the future stations.

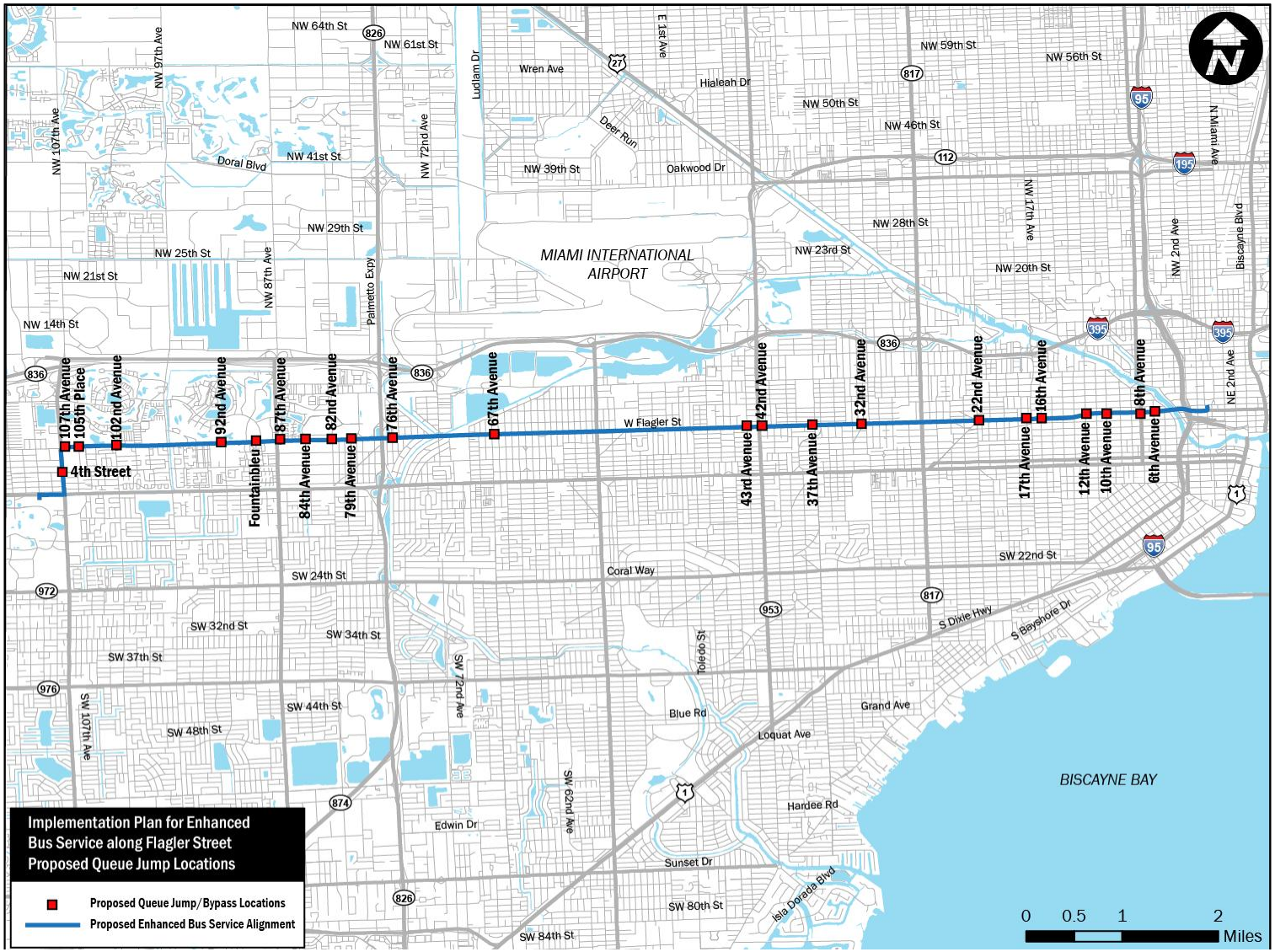
Table 10 and Figure 38 present the intersections that are proposed to have queue jump/bypass lanes for the Flagler Street corridor. These intersections were analyzed to determine whether exclusive right-turn lanes were available to accommodate queue jump/bypass lanes. The eastern side of study area between 24th Avenue and Downtown along both Flagler Street and SW 1st Street offer on-street parking, which may reduce the available right-of-way needed to implement queue jump/bypass lanes. While implementing a queue jump/bypass lane would be beneficial to bus operation along this segment of the corridor, other travel time savings methods (e.g. exclusive bus lanes, signal priority, reduction of stops) may be more appropriate in this location.

A total of 23 intersections were identified as potential candidates for queue jump or bypass stations based on the initial analysis. Future analysis at the individual intersection level will be required to determine the traffic and congestion levels and LOS of the proposed intersections to screen out intersections where queue jump/bypass benefits would be negligible, and where existing traffic conditions would make them impractical.

Table 10: Summary of Queue Jump/Bypass Intersections

Intersection	Proposed Station Location?	Corridor Segment Level of Service	EB Right-Turn Lane Available?	EB ROW Available?	WB Right-Turn Lane Available?	WB ROW Available?
SW107th Avenue and SW 4th Street		N/A		✓		
Flagler Street and 107th Avenue	✓	C				✓
Flagler Street and 105th Place		C	✓			
Flagler Street and 102nd Avenue	✓	C		✓		
Flagler Street and 92nd Avenue	✓	C		✓		✓
Flagler Street and Fontainebleau	✓	C		✓		✓
Flagler Street and 87th Avenue	✓	F			✓	
Flagler Street and 84th Avenue		F		✓		
Flagler Street and 82nd Avenue		F		✓		✓
Flagler Street and 79th Avenue	✓	F		✓	✓	
Flagler Street and 76th Avenue		F			✓	
Flagler Street and 67th Avenue	✓	F		✓		
Flagler Street and 43rd Avenue		E		✓		
Flagler Street and 42nd Avenue	✓	E				✓
Flagler Street and 37th Avenue	✓	E	✓			
Flagler Street and 32nd Avenue		E	✓			
Flagler Street/SW 1st Street and 22nd Avenue	✓	D			✓	
Flagler Street/SW 1st Street and 17th Avenue	✓	D	✓		✓	
Flagler Street/SW 1st Street and 16th Avenue		D			✓	
Flagler Street/SW 1st Street and 12th Avenue	✓	D	✓		✓	
Flagler Street/SW 1st Street and 10th Avenue		C			✓	
Flagler Street/SW 1st Street and 8th Avenue	✓	C	✓		✓	
Flagler Street/SW 1st Street and 6th Avenue		C			✓	
Total			6	9	11	5

Figure 37: Proposed Queue Jump Location Plan



5.1.13 Queue Jump Second Screening

A closer look was taken at each of the recommended queue jump locations using a number of criteria to determine the feasibility and usefulness of a queue jump lane for transit service. Overall traffic demand was observed during the AM (7-8 AM) and PM (5-6 PM) peak hours. During this time, an assessment of the traffic queues was conducted and used to determine the effects of queue jumps at each of the intersections based on right-turn demand. The assessments recorded during this analysis are provided in Table 11 below and the accompanying photographs in Appendix B.

From the original 23 intersections presented above, 11 intersections were identified for an initial queue jump rollout. These intersections are presented in Figure 39. The first tier of queue jump intersections all experienced heavy traffic and congestion levels and a high demand for right-turns resulting in a high level of queuing in the right-turn and through lanes.

5.1.14 Queue Jump Recommendations

Queue jumps are more invasive and more costly than some other transit time savings improvements (e.g. transit signal prioritization) as they are comprised of both physical and technological components. The combination of the bus lane/right-turn lane and the prioritized signal allows buses to gain a time advantage over private vehicles operating at the same intersection. While the time savings advantage is small at the individual intersection level, by implementing the proposed queue jump network, the total time savings for each trip would be significant, especially during peak times. Travel time savings would accrue not only to EBS but for all bus services along the Flagler Street Corridor.

Based upon the second screening of selected queue jump intersection candidates (outlined in Table 10), it is recommended that the queue jump lanes be implemented in two phases. The first phase would comprise the 11 intersections recommended in the second screening of the queue jump analysis. The second set of 12 intersections and those intersections where queue jump lanes is offered in only one direction is recommended to be implemented at a later stage, when traffic and congestion levels increase and projected travel time savings at the intersection level is significant with the presence of a queue jump lane.

Prior to any further development in the queue jump lane implementation project, further engineering studies should be conducted, including roadway design, drainage, formal traffic analysis, utilities, and public involvement.

Table 11: Summary of Queue Jump/Bypass Second Screening Analysis

Intersection	Observations	Photos	Recommended for Queue Jump Lanes?
1. 107th Ave and SW 4th St	• Field visit was conducted on 4/17/2014. • A maximum queue of 5 (4), 10 (10) vehicles was perceived at the northbound and southbound approaches during the AM and (PM) peak hours. • There is a bus stop on the far side of the intersection on both the southbound and northbound approaches. • A queue jump lane might benefit transit performance on the southbound approach. However, there is space limitations (no right turn lane) on this particular approach.	1-1,1-2,1-3,1-4	No
2. 107th Ave and Flagler St	• Field visit was conducted on 4/17/2014. • A maximum queue of 5 (2), 6 (10) vehicles was perceived on the northbound and westbound approaches during the AM and (PM) peak hours. • There is a bus stop east of the intersection on the eastbound direction and a bus stop south of the intersection on the southbound direction. • A queue jump lane might benefit transit performance on the northbound approach. However, there is space limitations (no right turn lane) on this particular approach.	2-1,2-2,2-3,2-4	No
3. 105th PL and Flagler St	• Field visit was conducted on 4/17/2014. • Very little traffic was observed on the eastbound approach during AM and (PM) peak hours. Heavy traffic was perceived on the westbound approach during the (PM) peak hour (queue of 12 vehicles). In fact, there is a queue that spills back from 107th Ave to this intersection. • There is a bus stop on the far side of the intersection on the eastbound approach and near side on the westbound approach. • The right turn lane on the westbound approach could be used for a queue jump lane.	3-1,3-2,3-3,3-4	Yes (WB)

Table 11: Summary of Queue Jump/Bypass Second Screening Analysis (continued)

Intersection	Observations	Photos	Recommended for Queue Jump Lanes?
4. 102nd Ave and Flagler St	• Field visit was conducted on 4/17/2014. • A maximum queue of 5 (4), 3 (4) vehicles was perceived on the eastbound and westbound approaches during the AM and (PM) peak hours. • There is a bus stop on the far side of the intersection on the eastbound approach and near side of the intersection on the westbound approach. • Queue jump lanes will have limited effect on transit operations given the relatively low traffic volumes at the intersection. There is also space limitations (no right turn lanes) for the implementation of queue jump lanes.	4-1,4-2,4-3,4-4	No
5. 92nd Ave and Flagler St	• Field visit was conducted on 4/21/2014. • A maximum queue of 7 (10), 2 (2) vehicles was perceived on the eastbound and westbound approaches respectively during the AM and (PM) peak hours. • There is a bus stop on the far side of the intersection along the eastbound and westbound approaches. • There are relatively short queue lengths at the intersection. There is also space limitations (no right turn lane) for the implementation of a queue jump lane on the eastbound approach.	5-1,5-2,5-3,5-4	No
6. Fontainebleau Blvd and Flagler St	• Field visit was conducted on 4/21/2014. • A maximum queue of 15 (2), 2 (6) vehicles was perceived on the eastbound and westbound approaches during the AM and (PM) peak hours. • There is a bus stop on the near side of the intersection along the eastbound approach and far side of the intersection along the westbound approach. • Traffic along the eastbound direction sometimes spills back from 87th Ave to Fontainebleau Blvd during the AM peak hour. • There is relatively high traffic volume along the eastbound approach so a queue jump lane will benefit transit operations. There is space limitations (no right turn lane) for the implementation of a queue jump lane on this particular approach.	6-1,6-2,6-3,6-4	Yes (EB)

Table 11: Summary of Queue Jump/Bypass Second Screening Analysis (continued)

Intersection	Observations	Photos	Recommended for Queue Jump Lanes?
7. 87th Ave and Flagler St	• Field visit was conducted on 4/21/2014. • A maximum queue of 30 (2), 3 (20) vehicles was perceived on the eastbound and westbound approaches during the AM and (PM) peak hours. • There is a bus stop on the far side of the intersection on the eastbound approach and near side of the intersection on the westbound approach. • Exclusive right turn lane on the eastbound approach has relatively low traffic and could potentially be used for a queue jump lane. There are space limitations (no right turn lane) for the implementation of queue jump lanes on the westbound approach.	7-1,7-2,7-3,7-4	Yes
8. 84th Ave and Flagler St	• Field visit was conducted on 4/21/2014. • A maximum queue of 5 (2), 2 (3) vehicles was perceived on the eastbound and westbound approaches during the AM and (PM) peak hours. • There is a bus stop on the far side of the intersection along the eastbound and westbound approaches. • Queue jump lanes will have limited effect on transit operations given the relatively low traffic volumes at the intersection. There is also space limitations (no right turn lanes) for the implementation of queue jump lanes.	8-1,8-2,8-3,8-4	No
9. 82nd Ave and Flagler St	• Field visit was conducted on 4/22/2014. • A maximum queue of 6 (8), 4 (3) vehicles was perceived on the eastbound and westbound approaches during the AM and (PM) peak hours. • There is a bus stop on the near side of the intersection along the eastbound approach. • Queue jump lanes will have limited effect on transit operations given the relatively short queue lengths at the intersection. There is also space limitations (no right turn lane) for the eastbound or westbound approaches.	9-1,9-2,9-3	No
10. 79th Ave and Flagler St	• Field visit was conducted on 4/22/2014. • A maximum queue of 8 (3), 4 (5) vehicles was perceived on the eastbound and westbound approaches during the AM and (PM) peak hours. • There is a bus stop on the far side of the intersection along the eastbound and westbound approaches. • Queue jump lanes will have limited effect on transit operations given the relatively short queue lengths at the intersection. There is also space limitations (no right turn lane) for the eastbound approach.	10-1,10-2,10-3,10-4	No

Table 11: Summary of Queue Jump/Bypass Second Screening Analysis (continued)

Intersection	Observations	Photos	Recommended for Queue Jump Lanes?
11. 76th Ave and Flagler St	• Field visit was conducted on 4/22/2014. • A maximum queue of 8 (3), 10 (15) vehicles was perceived on the eastbound and westbound approaches during the AM and (PM) peak hours. • There is a bus stop on the near side of the intersection along the eastbound and westbound approaches. • There are relatively high traffic volumes along the eastbound and westbound approaches so queue jump lanes will benefit transit operations. However, there is space limitation (no left turns) for the implementation of queue jump lanes.	11-1,11-2,11-3,11-4	Yes
12. 67th Ave and Flagler St	• Field visit was conducted on 4/22/2014. • A maximum queue of 8 (5), 3 (20) vehicles was perceived on the eastbound and westbound approaches during the AM and (PM) peak hours. • There is a bus stop on the near side of the intersection along the eastbound and far side of the intersection along the westbound approaches. • There is relatively high traffic volume along the eastbound and westbound approaches so a queue jump lane at both intersection approaches will benefit transit operations. There is space limitation (no left turns) for the implementation of queue jump lanes.	12-1,12-2,12-3,12-4	Yes
13. 43rd Ave and Flagler St	• Field visit was conducted on 4/22/2014. • A maximum queue of 20 (12) vehicles was perceived on the eastbound approach during the AM and (PM) peak hours. A maximum queue of 6 (14) vehicles was perceived on the westbound approach during the AM and (PM) peak hours. • There are bus stops on the near side of the intersections in both eastbound and westbound approaches. • There is high traffic demand and long queues along the eastbound and westbound approaches of the intersection. A queue jump lane on both intersection approached will benefit transit operations. There are space limitations (no right turn lanes) for the implementation of queue jump lanes.	13-1,13-2,13-3,13-4	Yes
14. 42nd Ave and Flagler St	• Field visit was conducted on 4/22/2014. • A maximum queue of 14 (12) vehicles was perceived on the eastbound approach during the AM and (PM) peak hours. A maximum queue of 10 (20) vehicles was perceived on the westbound approach during the AM and (PM) peak hours. • There are bus stops on the near side of the intersection on both eastbound and westbound approaches. • There is high traffic demand and long queues along the eastbound and westbound approaches of the intersection. A queue jump lane on both intersection approaches will benefit transit operations. There are space limitations (no right turn lanes) for the implementation of queue jump lanes.	14-1,14-2,14-3,14-4	Yes

Table 11: Summary of Queue Jump/Bypass Second Screening Analysis (continued)

Intersection	Observations	Photos	Recommended for Queue Jump Lanes?
15. 37th Ave and Flagler St	• Field visit was conducted on 4/22/2014. • A maximum queue of 23 (15) vehicles was perceived on the eastbound approach during the AM and (PM) peak hours. A maximum queue of 12 (>20) vehicles was perceived on the westbound approach during the AM and (PM) peak hours. • There is a bus stop on the far side of the intersections on the westbound approach. • There is a very high traffic demand and long queues along the eastbound and westbound approaches of the intersection. A queue jump lane on both intersection approaches will benefit transit operations. There are space limitations (no right turn lanes) for the implementation of queue jump lanes. However, it might be possible to have a queue jump lane on the eastbound approach by moving the alignment of Flagler St. and removing the right most receiving (only bus) lane on the westbound direction.	15-1,15-2,15-3,15-4	Yes
16. 32nd Ave and Flagler St	• Field visit was conducted on 4/22/2014. • There were recent roadway improvements for a section of Flagler St. that includes the intersection at SW 32nd Ave. • A maximum queue of 15 (20) vehicles was perceived on the eastbound approach during the AM and (PM) peak hours. A maximum queue of 5 (14) vehicles was perceived on the westbound approach during the AM and (PM) peak hours. • There is relatively high traffic demand and long queues on the eastbound approach. There are also opportunities to use the right turn lane for the implementation of a queue jump lane on the eastbound approach. There are space limitations (no right turn lane) for the implementation of a queue jump lane on the westbound approach.	16-1,16-2,16-3,16-4	Yes
17. 22nd Ave and Flagler St	• Field visit was conducted on 4/21/2014. • Very little traffic was perceived during the AM peak hour. A maximum queue of 10 vehicles was perceived on the westbound approach during the PM peak hour. • There is a bus stop on the near side of the intersection. • There are relatively short queue lengths at this intersection. A queue jump lane will provide limited benefit to transit operations. This is a rather complex intersection given its geometric configuration (six legged intersection). A queue jump lane might add safety and operational challenges to the intersection.	17-1,17-2	No

Table 11: Summary of Queue Jump/Bypass Second Screening Analysis (continued)

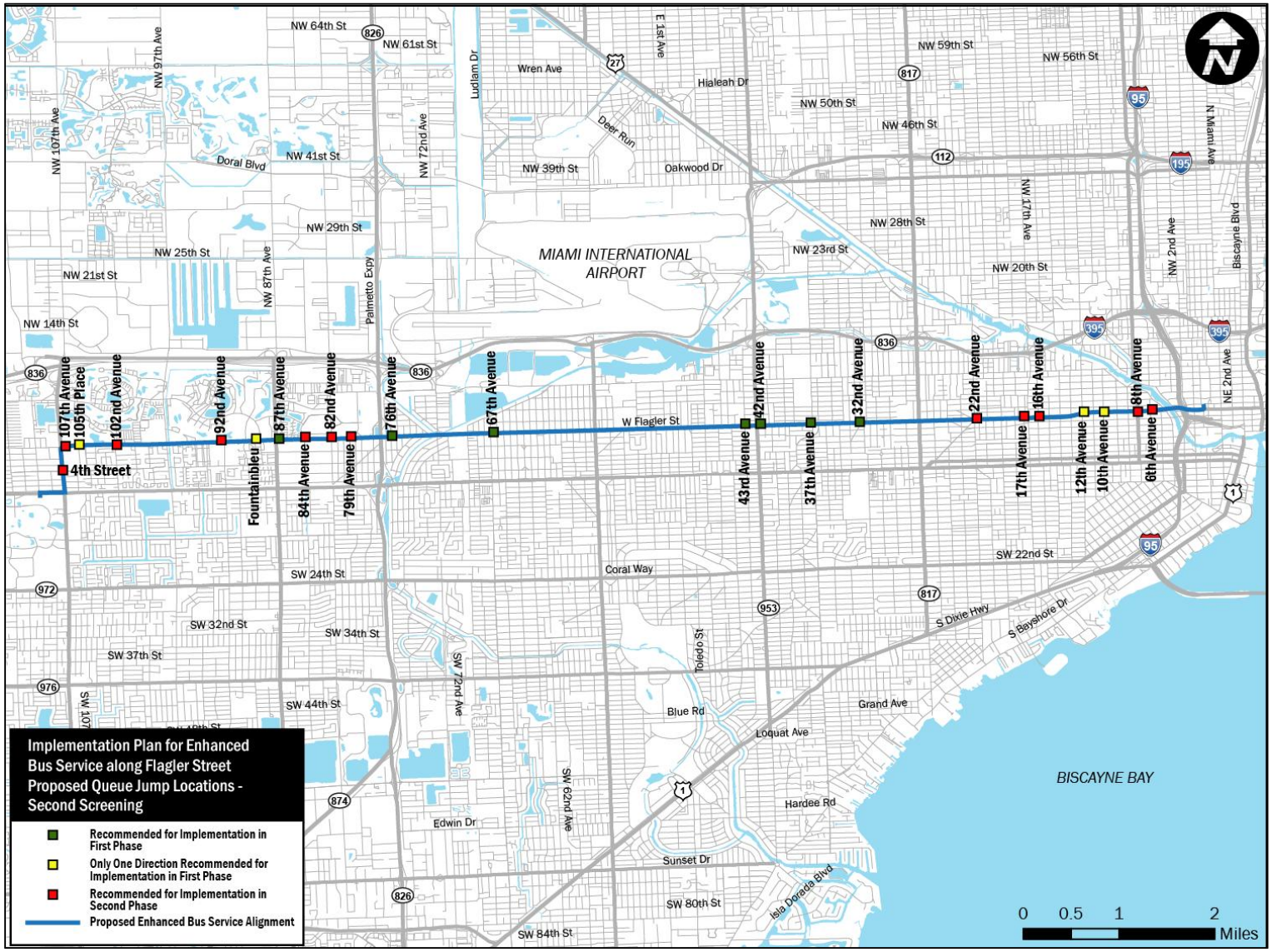
Intersection	Observations	Photos	Recommended for Queue Jump Lanes?
18. 17th Ave and Flagler St	• Field visit was conducted on 4/21/2014. • Very little traffic was perceived along the westbound approach during the AM and (PM) peak hours. A maximum queue of 8 vehicles was perceived during the PM peak hour. • There is a bus stop on the far side of the intersection. • There is a horizontal curve along the westbound approach right before the intersection. • Traffic demand is relatively low at this intersection. Queue jump lanes will have limited effect on transit operations.	18-1,18-2	No
19. 16th Ave and Flagler St	• Field visit was conducted on 4/21/2014. • Very little traffic was perceived along the westbound approach during the AM and (PM) peak hours. A maximum queue of 7 vehicles was perceived during the PM peak hour. • There is a bus stop on the far side of the intersection. • Traffic demand is relatively low at this intersection. Queue jump lanes will have limited effect on transit operations.	19-1,19-2	No
20. 12th Ave and Flagler St	• Field visit was conducted on 4/17/2014. • There is space available for a queue jump lane along the eastbound approach. On street parking along the westbound approach could be used for a queue jump lane. • Very little traffic was perceived on the eastbound approach during the AM and (PM) peak hours. A maximum queue of 6 (15) vehicles was perceived on the westbound approach during the AM and (PM) peak hours. • There is a bus stop on the far side of the intersection along the westbound approach. • There is relatively high traffic demand along the westbound approach during the PM peak hour. A queue jump lane on the westbound approach will benefit transit operations during the PM peak hour.	20-1, 20-2, 20-3, 20-4	Yes (WB)
21. 10th Ave and Flagler St	• Field visit was conducted on 4/17/2014. • On street parking along the eastbound approach could be used for a queue jump lane. • It seems like on street parking was removed along the westbound approach. There is space available for a queue jump lane. • A maximum queue of 4 (3) vehicles was perceived at the eastbound approach during the AM and (PM) peak hours. A maximum queue of 6 (16) vehicles was perceived during the AM and (PM) peak hours.	21-1, 21-2, 21-3, 21-4	Yes (WB)

	• There is relatively high traffic demand along the westbound approach during the PM peak hour. A queue jump lane on the westbound approach will benefit transit operations during the PM peak hour.		

Table 11: Summary of Queue Jump/Bypass Second Screening Analysis (continued)

Intersection	Observations	Photos	Recommended for Queue Jump Lanes?
22. 8th Ave and Flagler St	• Field visit was conducted on 4/17/2014. • On street parking along the eastbound and westbound approaches could be used for the queue jump lane. • A maximum queue of 3 (3) vehicles was perceived at the eastbound approach during the AM and (PM) peak hours. A maximum queue of 5 (8) vehicles was perceived during the AM and (PM) peak hours. • Traffic demand is relatively low at this intersection. Queue jump lanes will have limited effect on transit operations.	22-1, 22-2, 22-3, 22-4	No
23. 6th Ave and Flagler St	• Field visit was conducted on 4/17/2014. • On street parking along the eastbound approach could be used for the queue jump lane. • There is space to accommodate a short queue jump lane along the westbound approach. • There is a bus stop on the near side of the intersection along the westbound approach. • Traffic demand is low at this intersection and the effectiveness of a queue jump treatment will be diminished.	23-1, 23-2, 23-3, 23-4	No

Figure 39: Proposed Queue Jump Location Plan – Second Screening



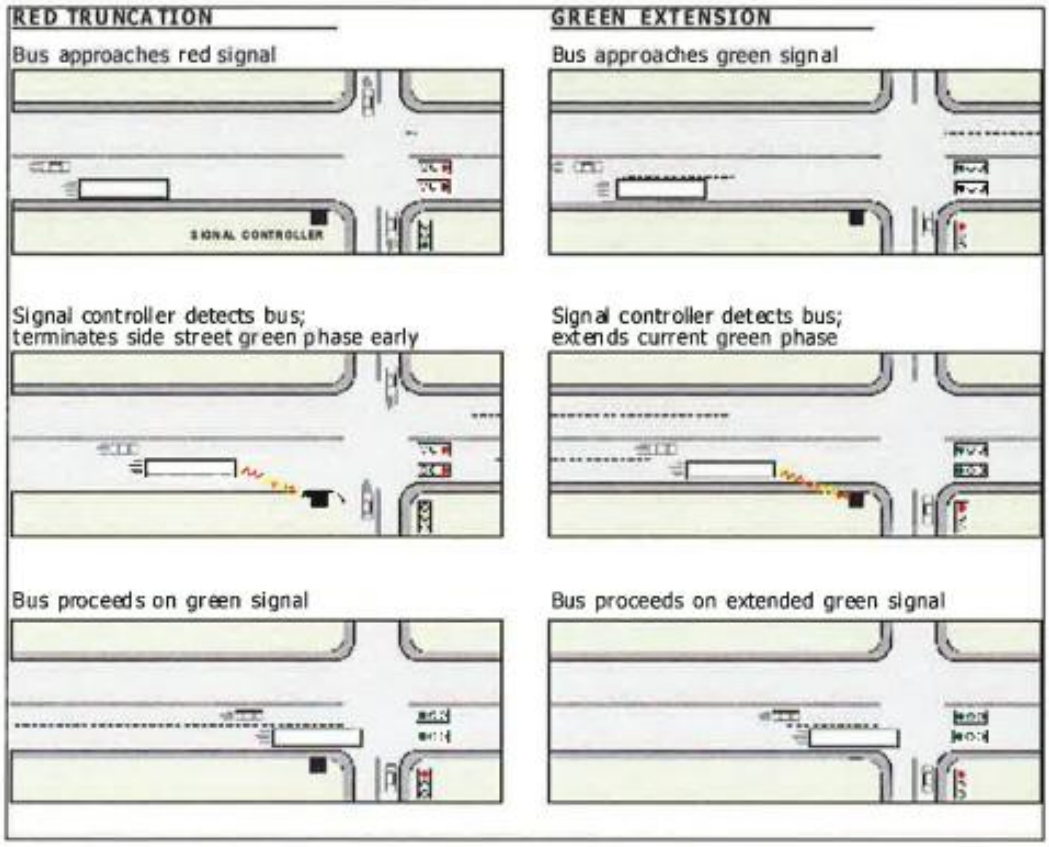
5.2 Transit Signal Priority

Transit signal priority (TSP) alters traffic signal timing at intersections to give priority to transit operating in a median transitway, in exclusive bus lanes, or in mixed traffic. TSP modifies the normal signal operation to better accommodate transit vehicles within the coordinated operation of the overall signal cycle in a corridor. TSP is different from signal pre-emption (Typically applied for emergency vehicles) where the normal signal operation is interrupted through changing of the signal cycle length, thus taking the general traffic progression out of coordination associated with the pre-emption call.

5.2.1 Transit Signal Priority Treatment

The usual TSP treatment is a minor adjustment in signal phase split times. The green phase serving an approaching transit vehicle may be triggered to begin sooner, or to remain green longer, so that delay for a transit vehicle approaching an intersection is reduced or eliminated. This is referred to as the "green extension/red truncation" concept. The expanded transit phase split time is recovered during the following signal cycle so that a corridor signal timing coordination plan is maintained. This concept is illustrated in Figure 40.

Figure 40: Red Truncation/Green Extension TSP Concept



Source: Transit Cooperative Research Project (TCRP) Report 118

TSP can be activated either manually by the transit operator or automatically using onboard technology. The automated procedure is preferred because it eliminates the requirement for an operator to activate the emitter on their vehicle. In many cases, the automated TSP will be tied to an Automatic Vehicle Location (AVL) or Automatic Passenger Counter (APC) system that can determine if priority should only be given if a certain condition in the transit operation is being met,-such as if the vehicle is running behind schedule, or if there are a certain number of passengers on-board the vehicle.

5.2.2 Transit Signal Priority Application

Strategies to improve bus transit service along Flagler Street should include TSP to help make transit service more reliable, faster and more cost effective. Transit vehicles' requests for priority can be made conditional, that is, the TSP system triggers only when buses are running a pre-determined number of minutes behind schedule. TSP can also be constrained by the traffic control system so that the request can be accommodated without significant adverse affect to passenger vehicle traffic flow, by limiting the number of times an hour that the system can be triggered, or requiring a minimum number of minutes between triggering events.

TSP is typically applied when there is significant traffic congestion, and hence bus delays along a roadway. Studies have found that TSP is most effective at signalized intersections operating under LOS F conditions with a volume to capacity ratio between 0.80 and 1.00 (LOS C to D). A basic guideline is to apply TSP when there is an estimated reduction in bus delay with negligible change in general traffic delay. Given this condition, the total person delay (on both buses and general traffic) should decrease with application of TSP at a particular intersection or along an extended corridor. TSP also has a positive impact in reducing travel time variability and hence keeping transit vehicles on schedule.

For mainline TSP to be most effective, bus stops should be located on the far side of signalized intersections so that a bus activates the priority call and travels through the intersection and then makes a stop. For queue jump signal treatments where there is a designated transit stop at an intersection, the stop could be located either near side or far side. With a transit stop located on the near side of the intersection, the operator can trigger the priority call while passengers board and alight.

5.2.3 Existing Corridor Transit Signal Priority Capability

An effective TSP implementation for Flagler Street will involve two key components. The Miami-Dade Traffic Control System involves the signalized intersections regulated by field controllers, the Traffic Management Center utilizing computer hardware and application software and various center-to-field communications. The Miami-Dade Transit System has buses with onboard equipment necessary for implementation of TSP, including AVL and APC equipment. The Miami-Dade Transit Center also has computer hardware and application software and center-to-vehicle wireless communications, elements that are necessary for TSP implementation.

The Miami-Dade Traffic Control System has been upgraded to a new platform (KITS System) and the traffic signal field controllers also have been upgraded with corresponding firmware. With

additional field controller modifications, this combination has been developed to provide TSP utilizing a centralized approach. That is, priority requests are sent by the Transit Control Center to the Traffic Management Control Center that analyzes the request and sends commands to the field controller to be executed. Center-to-field communications is in transition from leased communications to a combination of fiber and wireless communications. The Traffic Control Center itself is planned to be relocated to a new location, to be determined in the near future.

The Miami-Dade Transit AVL and APC system currently is being upgraded. Its capability of sending real-time conditional priority requests to the Miami Dade Traffic Control System is not confirmed at this time. The bus fleet and various routes that travel on and cross Flagler Street have not been analyzed to verify on-board vehicle equipment. New vehicles purchased for use in the EBS system would be specified to include whatever on-board equipment is necessary to facilitate TSP implementation.

The combination of the transit and traffic control systems, while intended to have TSP capability has not been tested, either by simulation or by actual field tests. While Miami-Dade County has a robust interagency communications network, communications for TSP between the two centers has not been designed or tested to date.

5.2.4 Transit Signal Priority Recommendations

Traffic signal priority is one of the most basic technological improvements associated with BRT or EBS. If properly configured and administered, it has virtually no down side to automotive traffic while providing modest but significant benefits to transit operations in a corridor, at a modest cost. For this reason, transit signal priority systems are recommended for all intersections in the corridor, and on all transit vehicles using the corridor, including both EBS vehicles and local buses operating on the corridor.

However, for further consideration based upon of a review of the existing systems, and in consultation with the affected Miami-Dade agencies and, the following approach is recommended prior to implementation of TSP within the Flagler Street EBS corridor:

1. Before any systems improvements are planned and budgeted, further analyses and documentation is needed. The capabilities of the traffic control system should be analyzed in detail to verify the TSP capabilities and gain a detailed understanding of how it operates. Queue jump capabilities also need to be verified and corresponding field equipment modifications need to be determined to account for the changes to intersection operation caused by the implementation of the queue jump facility and operation. The current AVL/APC system and any planned upgrades also need to be analyzed in detail to document these system operations and capabilities. Then the combination of the two working together needs to be detailed and documented, since this combination is untested.

2. When it can be confirmed and documented the systems are in place to affect TSP and Queue Jump, a Concept of Operations should be prepared. This best practice defines the systems involved. Just as importantly, a Concept of Operations defines and builds consensus on the roles and responsibilities of each stakeholder agency through the project life cycle. Key stakeholders for TSP and Queue Jump are Miami-Dade Public Works and Miami-Dade Transit.

3. With complex systems such as this, testing of components, subsystems and the full system is essential prior to deployment. This operational test should be planned, designed and documented to test every component, feature, and exercise every risk of a full scale deployment. Part of the design effort must involve Miami-Dade Traffic Signal Division, which operates the traffic control system. The signal timing parameters at each signalized intersection under their control must be managed so that the testing does not disrupt traffic flow on Flagler Street or any other test corridor.

4. Upon successful completion of testing and incorporation of any findings requiring modification of the systems, full scale implementation of TSP and potentially Queue Jump can be implemented on the Flagler Street Corridor. A before-after study is recommended for the benefit of the operating agencies, other stakeholders and to guide future deployments on other corridors.

5.3 Station Stops/Transfer Stations

Three types of station stops were considered during the development of the Flagler Street EBS. Each one of these is further described in the following sections. Based upon conversation with MDT planning and operations staff it is the agency's desire to locate far side station stops. However, roadway configuration, physical conditions, and availability of right-of-way in specific locales restrict the type of station stop that can be feasibly implemented.

5.3.1 Near-Side Station Stops

Near-side bus stops are located immediately *before* a bus enters an intersection. This type of stop allows passenger unloading and loading while the vehicle is stopped at a red light, preventing double-stopping. A bus re-enters traffic during a green traffic light phase, once the intersection is clear of traffic. Near-side station stops allow passengers to board the bus adjacent to a crosswalk, minimizing walk distances.

During peak travel periods, buses stopping at near side stops may block the through lane approach to the intersection, potentially disrupting traffic flow. This type of transit stop configuration may cause a conflict with right turning vehicles. This conflict also causes traffic delays resulting from passenger loading/unloading, and raises safety concerns when right turning vehicles drive around and make a right turn in front of a bus.

5.3.2 Far-Side Stations Stops

Far-side bus stops are located immediately *after* a bus passes through an intersection. Far side stops allow a bus to pass through an intersection and then stop to load/unload passengers. The

bus merges back into traffic upstream of a signal, which is typically facilitated by gaps in traffic created by the intersection. Far-side stops eliminate the potential for a bus to block and delay traffic on the approach to an intersection.

Peak travel periods and congested conditions may cause buses and cars to queue into an intersection while waiting to access a bus stop.

5.3.3 Curb Extension Station Stops

Curb extensions are a modified form of curbside stops, where the sidewalk extends towards the travel lane, allowing the bus to remain in the rightmost travel lane when picking up and dropping off passengers. Bus bulbs can be used at near-side, far-side, or mid-block locations, and the bulb typically replaces a small section of on-street parking to allow passengers to safety reach the bus. This type of stop also provides for additional space waiting passengers as well as station amenities. Curb extensions are considered an attractive streetscape element and are often installed throughout a corridor as part of a "complete streets" package to improve conditions for both transit users and pedestrians.

Curb extensions require buses to stop in a travel lane for passenger loading/unloading potentially generating traffic congestion. Buses stopping in the travel lane may also lead to rear end collisions, or results in unsafe passing maneuvers under congested conditions. Curb extensions are costly to develop, compared to the minimal cost of installing a bus stop on the curbside. Installation of curb extensions requires construction in the roadway, can require utility relocation, and can complicate roadway drainage.

5.3.4 Flagler EBS Option A Proposed Station Locations

In Option A, which is proposed to offer service between Downtown Miami and the new Transit Terminal at FIU on the corner of SW 8th Street and SW 110th Street, a total of 47 stations were initially selected as part of the Flagler EBS system based on spacing, current activity based on Route 11 and Route 51 boardings and alightings, and connection opportunities. All of the stations proposed were located along Flagler Street, SW 1st Avenue, or SW 107th Avenue to streamline the service, as shown in Figure 38. However, in an effort to improve the travel time and attractiveness of the service, the number of stations were reduced when even stricter guidelines were used based on the criteria mentioned above. Furthermore, an extensive field review was performed to include MDT planning and operations to best identify suitable locations for EBS stations. Additionally, the western terminus point for the proposed EBS was moved from SW 107th Street and SW 11th Street to SW 8th Street and SW 110th Street after FIU had announced their plans to construct a new transit terminal and park-and-ride lot at this location. After this round of analysis, a total of 28 stations were proposed. The proposed stations are shown in Figures 41 through 44 and their characteristics presented in Table 12. Despite the reduction in the number of stations in the EBS plan, a high level of transit accessibility will still be available along the corridor as existing local service will continue to operate as a complement to the proposed EBS.

5.3.5 Flagler EBS Option B Proposed Station Locations

In Option B, which is proposed EBS between Downtown Miami and the 147th Avenue Park-and-Ride Lot via the new Transit Terminal at FIU, a total of 5 stations are proposed in additional to the 28 stations selected in Option B. These 5 stations are all located along SW 8th Street and offer service to Florida International University and the 147th Avenue Park-and-Ride Lot located in the Coral Way area. The proposed stations are presented in Figure 45. The exact locations of the additional proposed stations in Option B are still being considered and will be finalized upon acceptance of the Option B proposal. Identical to Option A, existing local service will continue to operate as a complement to the proposed Option B EBS.

Figure 38: Initial Proposed Station Location Plan

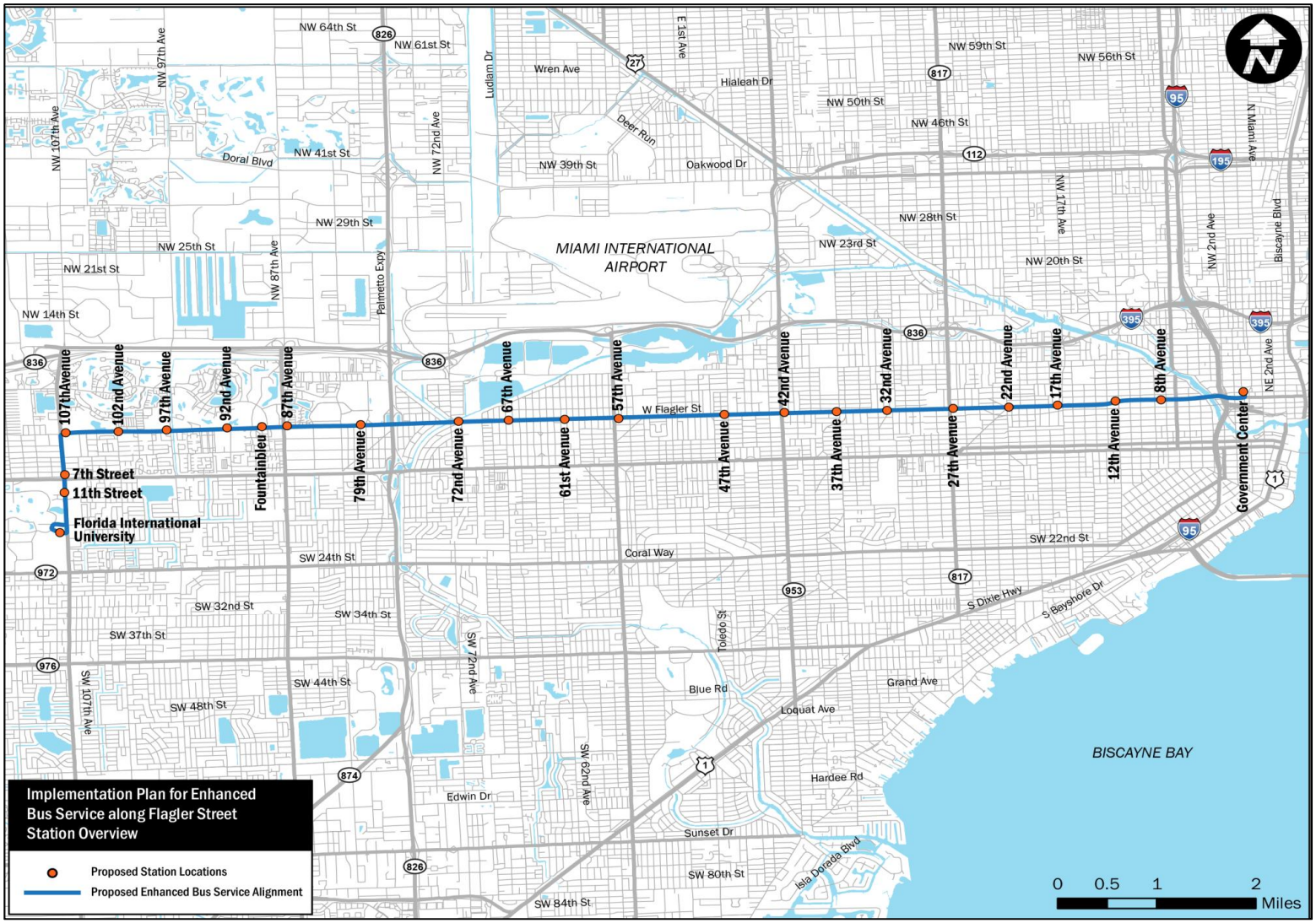


Figure 39: Final Proposed Station Location Plan (Eastern Segment)

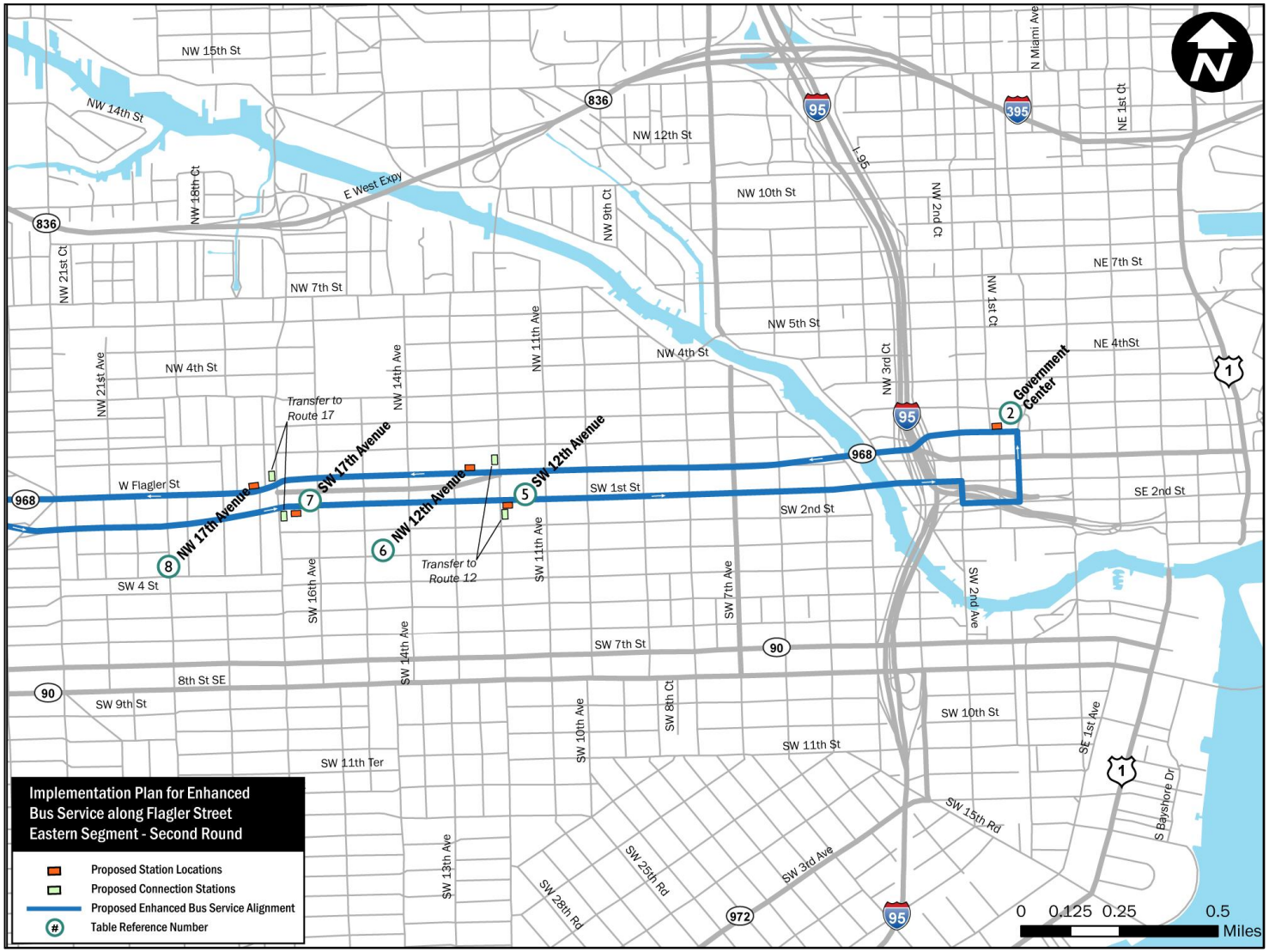


Figure 40: Final Proposed Station Location Plan (Central Segment)

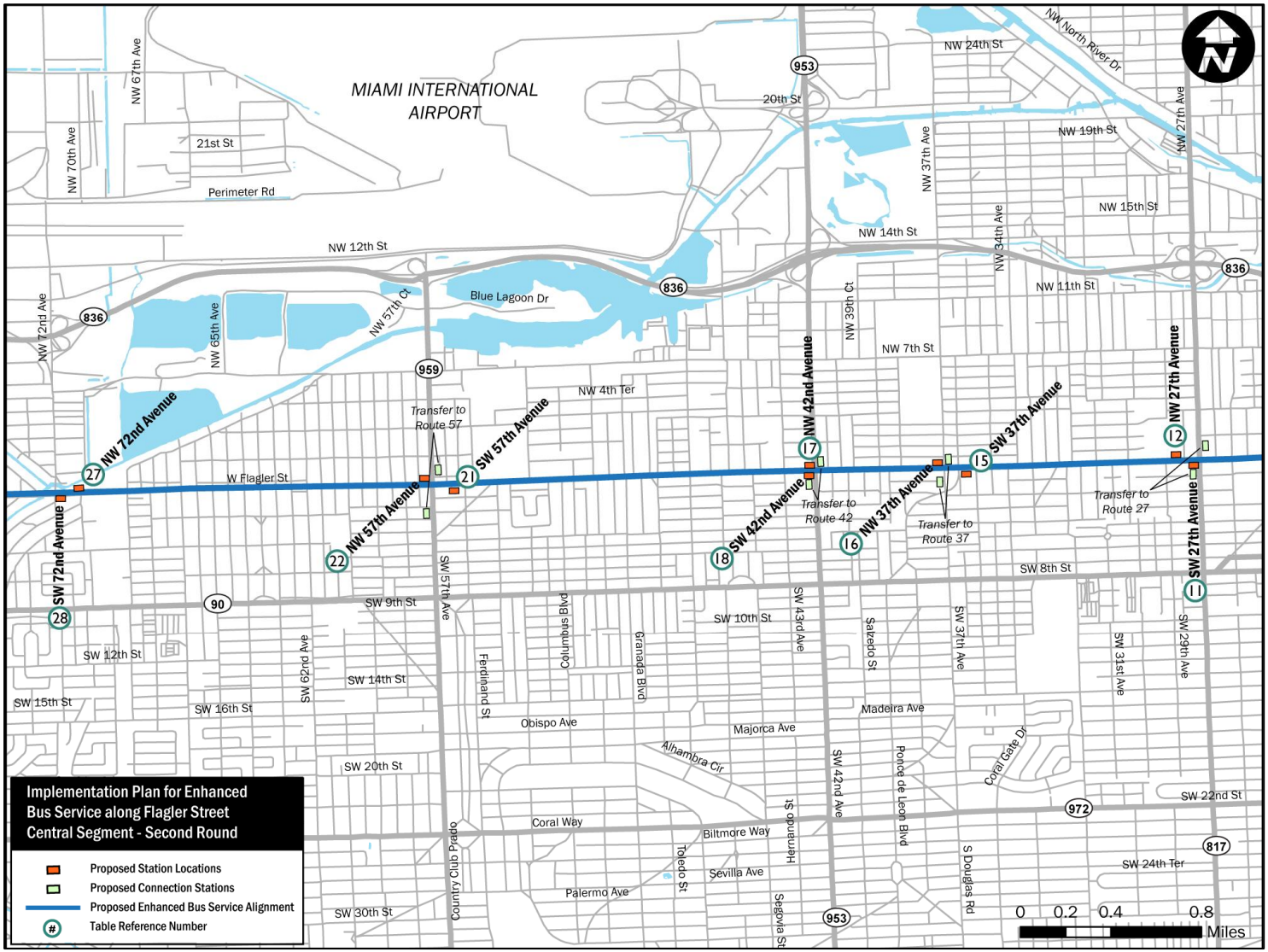


Figure 41: Final Proposed Station Location Plan (Western Segment)

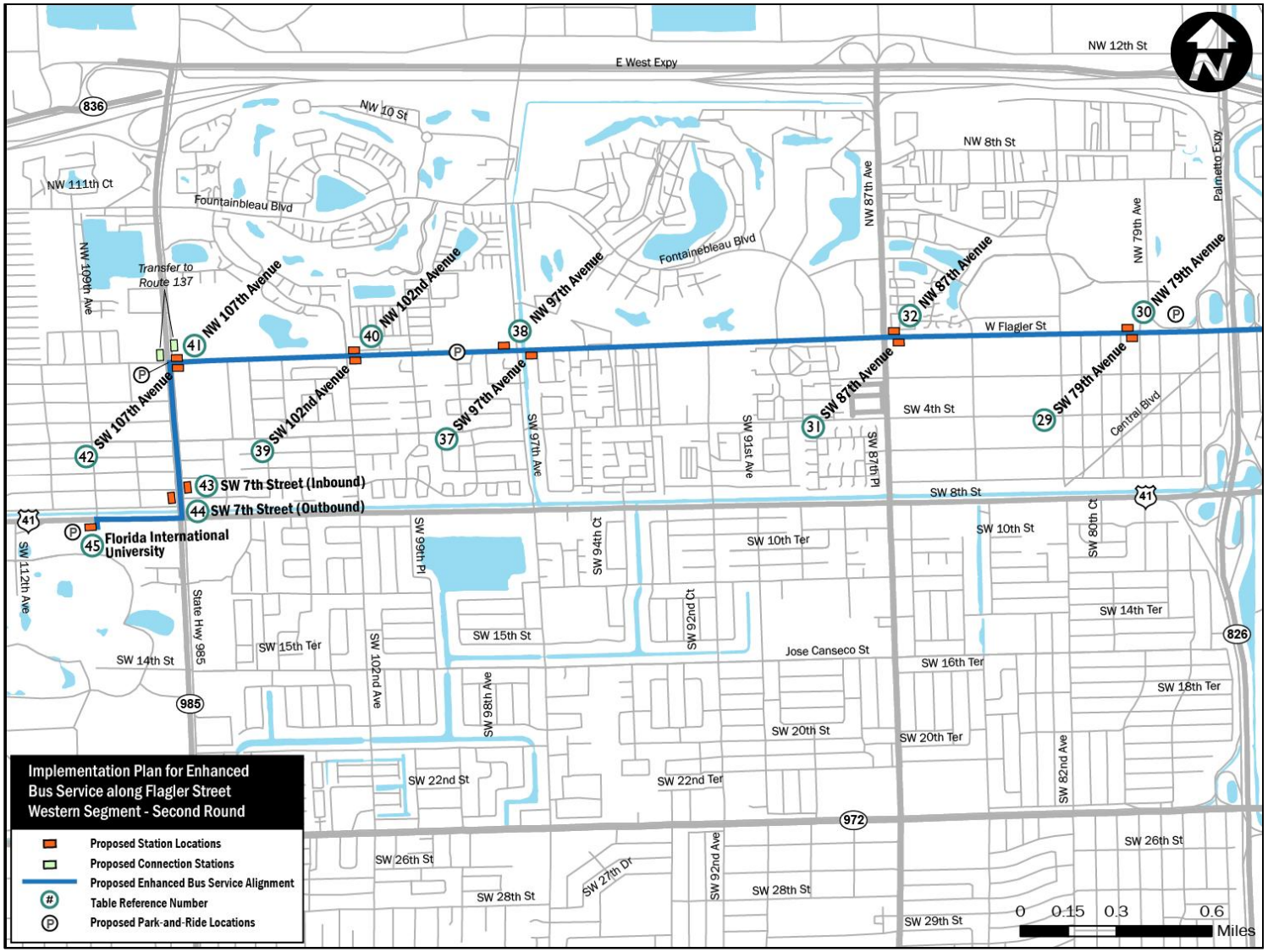


Table 12: Proposed Station List and Recommendations

Table No.	Station Name	Nearest Intersection	Direction	Station Location	Connections	Park-and-Ride Accessible	Station Type	Right-of-Way Availability	Advanced to 2nd Round?	Recommended Queue Jump Location?	Notes
1	SW 1st Street	SW 1st Street and SW 1st Avenue	Westbound	Nearside		No			No	No	
2	Government Center	W Flagler Street and SW 1st Avenue	Westbound	Nearside	Downtown Metromover	No	Marker		Yes	No	
3	SW 8th Avenue	SW 1st Street and SW 8th Avenue	Eastbound	Farside		No			No	No	Identified as a local stop - no EBS
4	NW 8th Avenue	W Flagler Street and NW 8th Avenue	Westbound	Farside		No			No	No	Identified as a local stop - no EBS
5	SW 12th Avenue	SW 1st Street and SW 12th Avenue	Eastbound	Farside	Route 12	No	Slim Station w/marker	curb extension - take an existing parking stall ~12'x 8'	Yes	No	~94 feet east of intersection
6	NW 12th Avenue	W Flagler Street and NW 12th Avenue	Westbound	Farside	Route 12	No	Slim Station w/marker	curb extension - take an existing parking stall ~12'x 8'	Yes	Yes	~165 feet west of intersection
7	SW 17th Avenue	SW 1st Street and SW 17th Court	Eastbound	Farside	Route 17	No	Marker		Yes	No	~195 feet east of intersection
8	NW 17th Avenue	W Flagler Street and NW 17th Court	Westbound	Farside	Route 17	No	Slim Station w/marker	curb extension - take an existing parking stall ~12'x 8'	Yes	No	~190 feet west of intersection
9	SW 22nd Avenue	SW 1st Street and SW 21st Court	Eastbound	Nearside	Route 22	No			No	No	Identified as a local stop - no EBS
10	NW 22nd Avenue	W Flagler Street and NW 22nd Avenue	Westbound	Nearside	Route 22	No			No	No	Identified as a local stop - no EBS
11	SW 27th Avenue	W Flagler Street and SW 27th Avenue	Eastbound	Nearside	Route 27	No	Slim Station w/marker	Additional ROW needed behind back of curb ~16'x4'	Yes	No	
12	NW 27th Avenue	W Flagler Street and NW 27th Court	Westbound	Farside	Route 27	No	Slim Station w/marker	Additional ROW needed behind back of curb ~16'x8'	Yes	No	~169 feet west of intersection
13	SW 32nd Avenue	W Flagler Street and SW 32nd Avenue	Eastbound	Farside		No			No	Yes	Identified as a local stop - no EBS
14	NW 32nd Avenue	W Flagler Street and NW 32nd Court	Westbound	Farside		No			No	Yes	Identified as a local stop - no EBS

Table 12: Proposed Station List and Recommendations (continued)

Table No.	Station Name	Nearest Intersection	Direction	Station Location	Connections	Park-and-Ride Accessible	Station Type	Right-of-Way Availability	Advanced to 2nd Round?	Recommended Queue Jump Location?	Notes
15	SW 37th Avenue	W Flagler Street and Ponce de Leon	Eastbound	Farside	Route 37	No	Marker	No additional ROW needed	Yes	Yes	~60 feet east of intersection - existing bus shelter
16	NW 37th Avenue	W Flagler Street and NW 37th Avenue	Westbound	Farside	Route 37	No	Marker	No additional ROW needed	Yes	Yes	~65 feet west of intersection - existing bus shelter
17	NW 42nd Avenue	W Flagler Street and NW 42nd Avenue	Westbound	Farside	Route 42	No	Marker w/bench	Additional ROW needed behind back of curb ~16'x8'	Yes	Yes	~106 feet east of intersection
18	SW 42nd Avenue	W Flagler Street and SW 42nd Avenue	Eastbound	Nearside	Route 42	No	Marker w/bench	Additional ROW needed behind back of curb ~12'x4'	Yes	Yes	~65 feet west of intersection
19	SW 47th Avenue	W Flagler Street and SW 47th Avenue	Eastbound	Farside		No			No	No	Identified as a local stop - no EBS
20	NW 47th Avenue	W Flagler Street and NW 47th Avenue	Westbound	Farside		No			No	No	Identified as a local stop - no EBS
21	SW 57th Avenue	W Flagler Street and SW 57th Avenue	Eastbound	Farside	Route 57	No	Marker	No additional ROW needed	Yes	No	~90 feet east of intersection - existing bus shelter
22	NW 57th Avenue	W Flagler Street and NW 57th Avenue	Westbound	Farside	Route 57	No	Slim Station w/marker	Additional ROW needed behind back of curb ~12'x6'	Yes	No	~195 feet west of intersection
23	NW 61st Avenue	W Flagler Street and NW 61st Avenue	Westbound	Farside		No			No	No	Identified as a local stop - no EBS
24	SW 61st Avenue	W Flagler Street and SW 61st Avenue	Eastbound	Nearside		No			No	No	Identified as a local stop - no EBS
25	NW 67th Avenue	W Flagler Street and NW 67th Avenue	Westbound	Nearside		No			No	Yes	Identified as a local stop - no EBS
26	SW 67th Avenue	W Flagler Street and SW 67th Avenue	Eastbound	Farside		No			No	Yes	Identified as a local stop - no EBS

Table 12: Proposed Station List and Recommendations (continued)

Table No.	Station Name	Nearest Intersection	Direction	Station Location	Connections	Park-and-Ride Accessible	Station Type	Right-of-Way Availability	Advanced to 2nd Round?	Recommended Queue Jump Location?	Notes
27	NW 72nd Avenue	W Flagler Street and NW 72nd Avenue	Westbound	Nearside		No	Marker w/bench	Additional ROW needed behind back of curb ~12'x4'	Yes	No	~430 feet east of intersection - existing bus shelter
28	SW 72nd Avenue	W Flagler Street and SW 72nd Avenue	Eastbound	Farside		No	Marker	No additional ROW needed	Yes	No	~120 feet east of intersection - existing bus shelter
29	SW 79th Avenue	W Flagler Street and SW 79th Avenue	Eastbound	Nearside		Yes	Marker w/bench	No additional ROW needed	Yes	No	Stop for Mall of the Americas - ~210 feet east of intersection - existing bus bench
30	NW 79th Avenue	W Flagler Street and NW 79th Avenue	Westbound	Farside		Yes	Marker w/bench	No additional ROW needed	Yes	No	Stop for Mall of the Americas - ~200 feet west of intersection - existing bus bench
31	SW 87th Avenue	W Flagler Street and SW 87th Avenue	Eastbound	Farside		No	Marker w/bench	No additional ROW needed	Yes	Yes	~80 feet east of intersection - existing bus bench
32	NW 87th Avenue	W Flagler Street and NW 87th Avenue	Westbound	Nearside		No	Marker w/bench	No additional ROW needed	Yes	Yes	~64 feet east of intersection- existing bus bench
33	Fontainebleau	W Flagler Street and SW 88th Place	Eastbound	Nearside		No			No	Yes	Identified as a local stop - no EBS
34	Fontainebleau	W Flagler Street and Fontainebleau	Westbound	Farside		No			No	No	Identified as a local stop - no EBS
35	SW 92nd Avenue	W Flagler Street and SW 92nd Avenue	Eastbound	Farside		No			No	No	Identified as a local stop - no EBS
36	NW 92nd Avenue	W Flagler Street and SW 92nd Avenue	Westbound	Farside		No			No	No	Identified as a local stop - no EBS

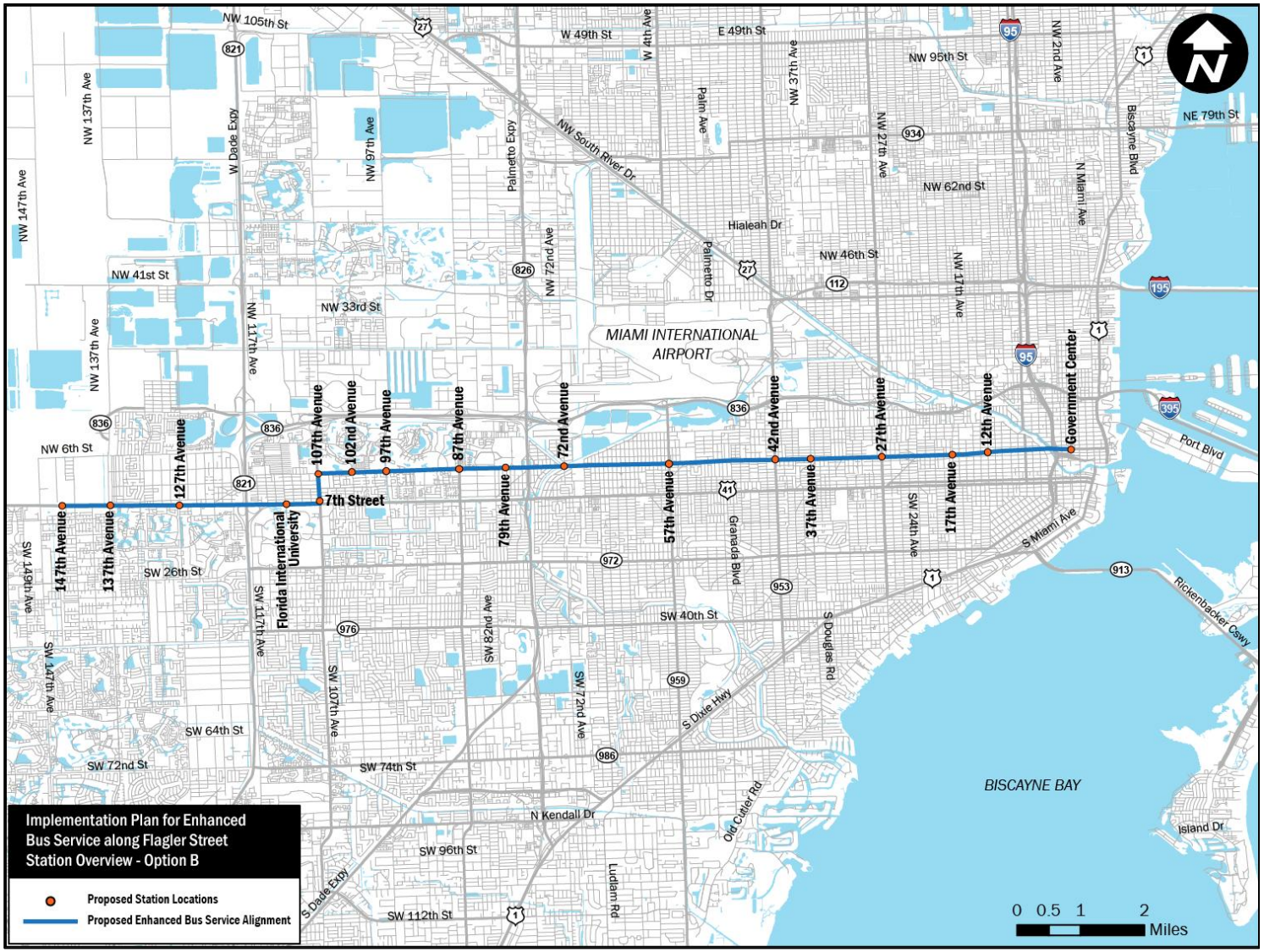
Table 12: Proposed Station List and Recommendations (continued)

Table No.	Station Name	Nearest Intersection	Direction	Station Location	Connections	Park-and-Ride Accessible	Station Type	Right-of-Way Availability	Advanced to 2nd Round?	Recommended Queue Jump Location?	Notes
37	SW 97th Avenue	W Flagler Street and SW 96th Court	Eastbound	Farside		Yes	Marker w/bench	Additional ROW needed behind back of curb ~8'x4'	Yes	No	~110 feet east of intersection
38	NW 97th Avenue	W Flagler Street and NW 97th Avenue	Westbound	Farside		Yes	Marker	No additional ROW needed	Yes	No	~110 feet west of intersection - existing bus shelter
39	SW 102nd Avenue	W Flagler Street and SW 102nd Avenue	Eastbound	Farside		No	Marker w/bench	No additional ROW needed	Yes	No	~150 feet east of intersection - existing bus shelter
40	NW 102nd Avenue	W Flagler Street and NW 102nd Avenue	Westbound	Nearside		No	Marker w/bench	No additional ROW needed	Yes	No	~50 feet east of intersection - existing bus bench
41	NW 107th Avenue	W Flagler Street and NW 107th Avenue	Westbound	Nearside	Route 137	Yes	Slim Station w/marker	Additional ROW needed behind back of curb ~26'x8'	Yes	No	~100 feet east of intersection
42	SW 107th Avenue	W Flagler Street and SW 107th Avenue	Eastbound	Farside	Route 137	Yes	Marker	No additional ROW needed	Yes	No	~150 feet east of intersection - existing bus shelter
43	SW 7th Street	SW 107th Street and SW 7th Terrace	Eastbound	Farside		No	Marker	No additional ROW needed	Yes	No	~200 feet north of intersection - existing bus bench
44	SW 7th Street	SW 107th Street and SW 7th Street	Westbound	Farside		No	Marker	No additional ROW needed	Yes	No	~160 feet south of intersection - existing bus bench
45	Florida International University	SW 8th Street and SW 110th Avenue	N/A	New Transit Terminal		Yes	Marker w/ bench	No additional ROW needed	Yes	No	Turnaround Point~700 feet south of intersection - existing bus shelter
46	SW 11th Street	SW 107th Street and SW 11th Street	Westbound	Farside		No			No	No	~700 feet south of intersection - existing bus shelter

Table 12: Proposed Station List and Recommendations (continued)

Table No.	Station Name	Nearest Intersection	Direction	Station Location	Connections	Park-and-Ride Accessible	Station Type	Right-of-Way Availability	Advanced to 2nd Round?	Recommended Queue Jump Location?	Notes
47	SW 11th Street	SW 107th Street and SW 11th Street	Eastbound	Nearside		No	Marker	No additional ROW needed	No	No	~335 feet south of intersection - existing bus bench
48	Florida International University	SW 108th Avenue and SW 107th Avenue	N/A	Farside		Yes	Marker	No additional ROW needed	No	No	Turnaround Point

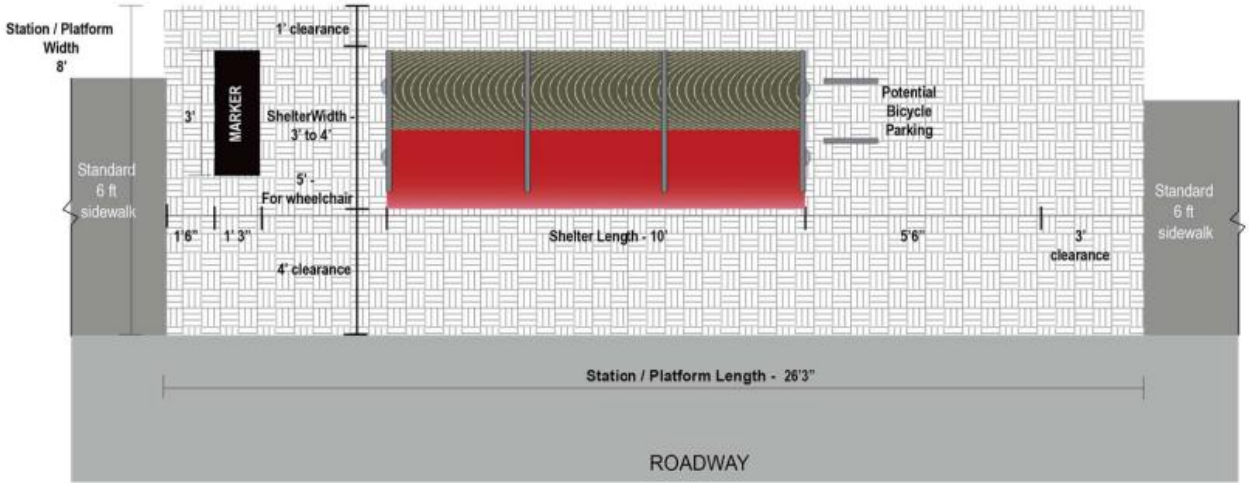
Figure 42: Option B Proposed Station Location Plan



5.3.6 Recommended Station Stops

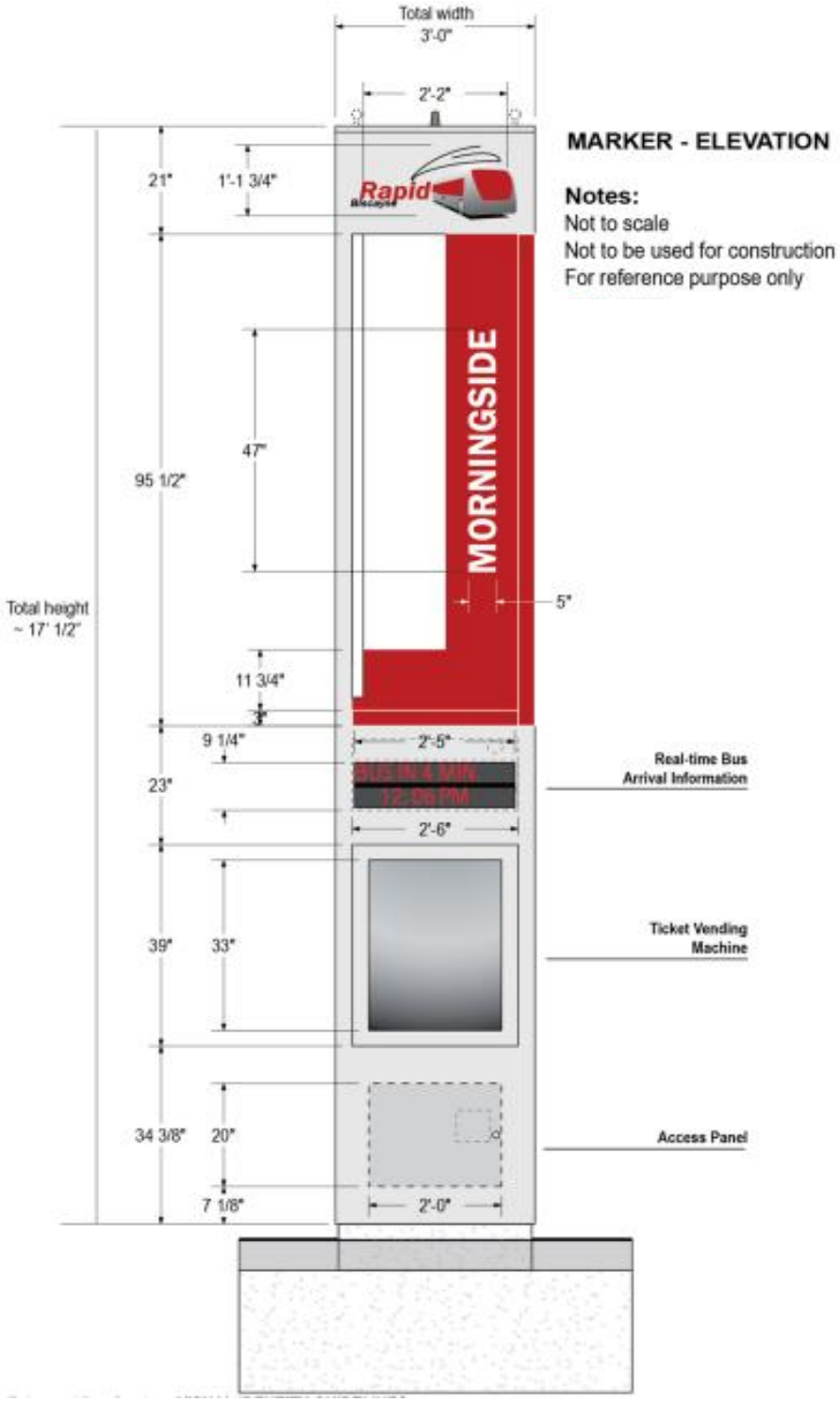
The two previous EBS Studies on Biscayne and NW 27th Avenue have set precedents for the EBS station-stop designs, which would be followed on the Flagler corridor. Due to the physical right-of-way constraints throughout the Flagler Street corridor two types of EBS station stops are proposed. The first is a narrow station stop that includes a station marker on a 28 foot long platform, a passenger shelter (10 ft long and about 4 ft wide) and bicycle parking, if sufficient right-of-way is available to accommodate it (Figure 43).

Figure 43: Enhanced Bus Service Narrow Station for Constrained Right-of-Way



For those recommended station stop locations that have no available right-of-way due to adjacent existing development of the built-up environment when only the width of the existing sidewalk is available, an EBS station marker will be installed at the bus stop location. The EBS station marker provides a visual landmark for the branded service at approximately 27 feet in height and three feet wide (Figure 44).

Figure 44: Enhanced Bus Service Station Marker



5.4 Park and Ride Locations

Park-and-Ride facilities are included in the Flagler Street corridor as part of the enhanced bus service initiative. Park-and-Ride lots were considered to increase the service area of the Flagler Street corridor by attracting those who would prefer to avoid paying high parking prices in Downtown Miami but also do not live within the immediate service area of the proposed Flagler EBS or any of its connecting services. Implementing park-and-ride locations allows these riders to drive to the lot and partake in the EBS. Providing park-and-ride lots also allows for reducing the number of stops along a corridor and decreasing travel time without affecting ridership by increasing boarding and alighting activity at stops with park-and-ride lot accessibility.

Site selection for park-and-ride lots in the Flagler Street corridor included identifying locations that had a good level of connectivity (i.e. primary roads, highways, etc.) for easy access to/from the lots, adequate space for the construction of the lot or use of an existing underused parking lot, and locations on or near the proposed Flagler EBS. Ensuring that the park-and-ride locations weren't too close to Downtown Miami was another concern as that may cause the site and service to appear ineffective and inefficient. Finally, sites that offered high service activity by the Flagler EBS as well as other routes were considered to increase the potential for usage of the park-and-ride.

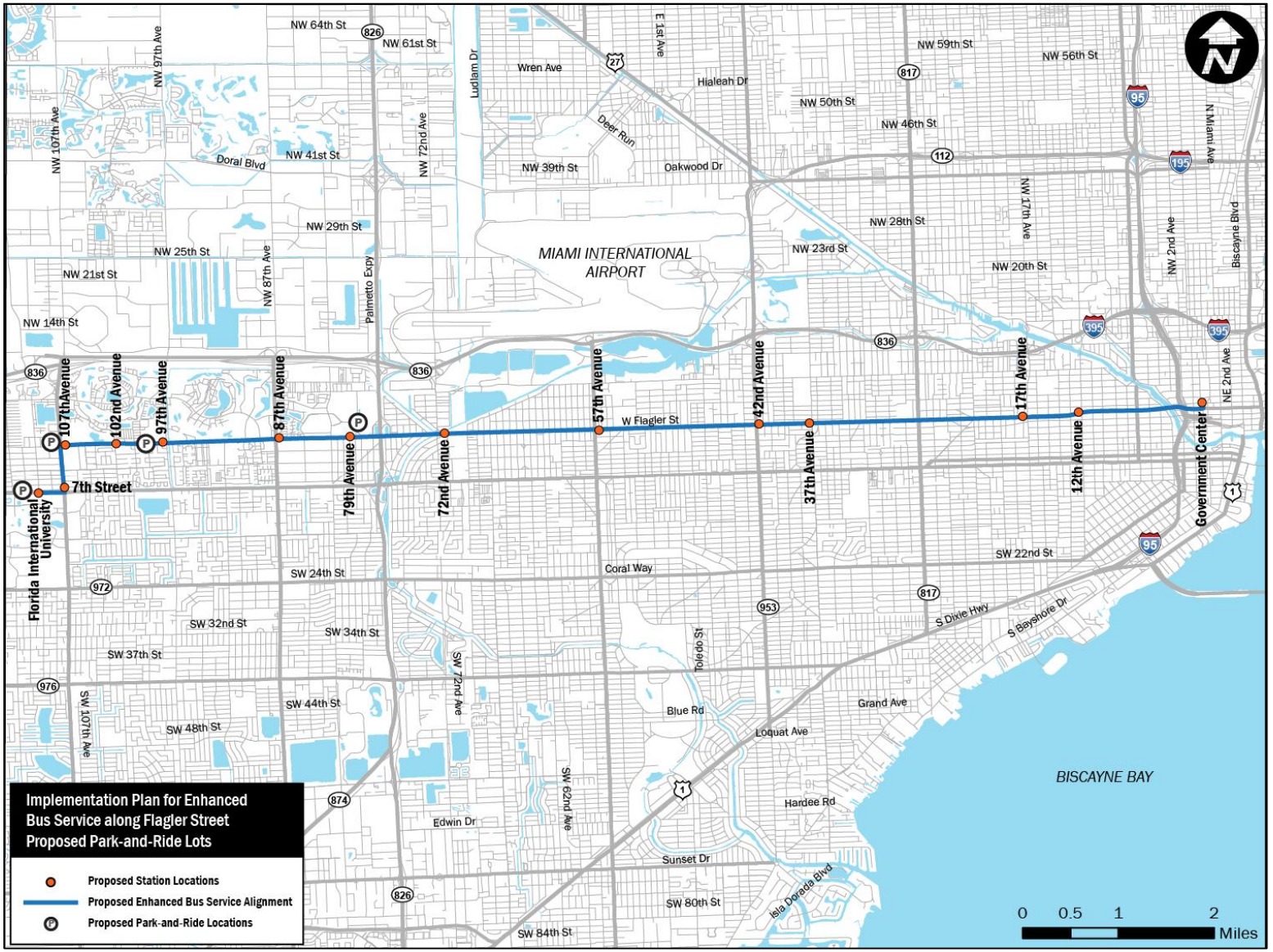
After careful evaluation, five sites were selected for potential park-and-ride sites along the Flagler Street corridor, as shown in Figure 4548. These sites include:

1. Florida International University,
2. Flagler Street and 107th Street,
3. Flagler Street and 99th Court,
4. A multimodal facility at the Mall of the Americas, and
5. SW 8th Street and SW 147th Avenue (Option B Only).

5.4.1 Florida International University

As the western terminus for the Flagler EBS, having a park-and-ride lot located at Florida International University increases the service area further to the south and west the corridor by attracting commuters that travel to/from Downtown Miami to the service by offering an efficient and affordable commuting option. Shared usage of the FIU parking lot also reduces the amount of resources needed to construct a new park-and-ride lot. The FIU Park-and-Ride Lot would be served by the new FIU Transit Terminal and depicted in Figure 469.

Figure 45: Proposed Park-and-Ride Locations



5.4.2 Flagler Street and 107th Street

The proposed park-and-ride lot at Flagler Street and 107th Street increases the service area further west and north by also attracting commuters who live in this area and commute to Downtown Miami. Its location also grants east access by commuters to/from the Dolphin Expressway and the Homestead Extension of the Florida Turnpike increasing the service area of the Flagler EBS. This park-and-ride lot would be served by the Flagler Street and 107th Avenue EBS Station and depicted in Figure 50.

5.4.3 Flagler Street and NW 99th Court

The selected site at Flagler Street and 99th Court provides a viable transit alternative to the heavy residential neighborhoods of Fontainebleau and Sweetwater where local transit access to connect to the Flagler EBS may not be an attractive option but a short drive to the park-and-ride lot with service to Downtown Miami on the EBS may be a viable alternative. This park-and-ride lot would be served by the Flagler Street and 97th Avenue EBS Station and presented in Figure 47.

5.4.4 Mall of the Americas

The multimodal facility at the Mall of the Americas provides shared usage of parking spaces with the mall in addition to the other routes and services provided by MDT at this site. Additionally, this park-and-ride lot has easy access to/from both the Palmetto Expressway and the Dolphin Expressway which increases the service area of the Flagler EBS in virtually all directions especially to the south and north. This park-and-ride lot would be served by the Flagler Street and 79th Avenue EBS Station and depicted in Figure 48.

5.4.5 SW 8th Street and SW 147th Avenue

An additional park-and-ride site was selected at the western terminus point for Option B (Figure 49). This lot would increase the service area to the far west of the corridor attracting those that commute to Downtown Miami and the Flagler Street corridor. This would also provide residents of the Coral Way area one-seat enhanced bus service to Downtown Miami. This park-and-ride lot would be served by the SW 147th Avenue EBS Station.

5.4.6 Park-and-Ride Lot Recommendations

Implementation of park-and-ride lots along the Flagler Street corridor is also recommended to be done in two phases. With existing parking lots already in use at the Mall of the Americas and at FIU, very little is required to convert these lots into park-and-ride facilities. These lots can serve as park-and-ride lots for riders upon implementation of EBS along the corridor and should be converted alongside the implementation of EBS. The remaining lots require more work including site selection, construction, and signage. These can be implemented during the second phase of implementation when demand for park-and-ride spaces increases throughout the corridor.

Figure 46: FIU Transit Terminal Proposed Park-and-Ride Location

Figure 50: Flagler Street and 107th Street Proposed Park-and-Ride Location

Figure 47: Flagler Street and 99th Court Proposed Park-and-Ride Location

Figure 48: Mall of the Americas Proposed Park-and-Ride Location

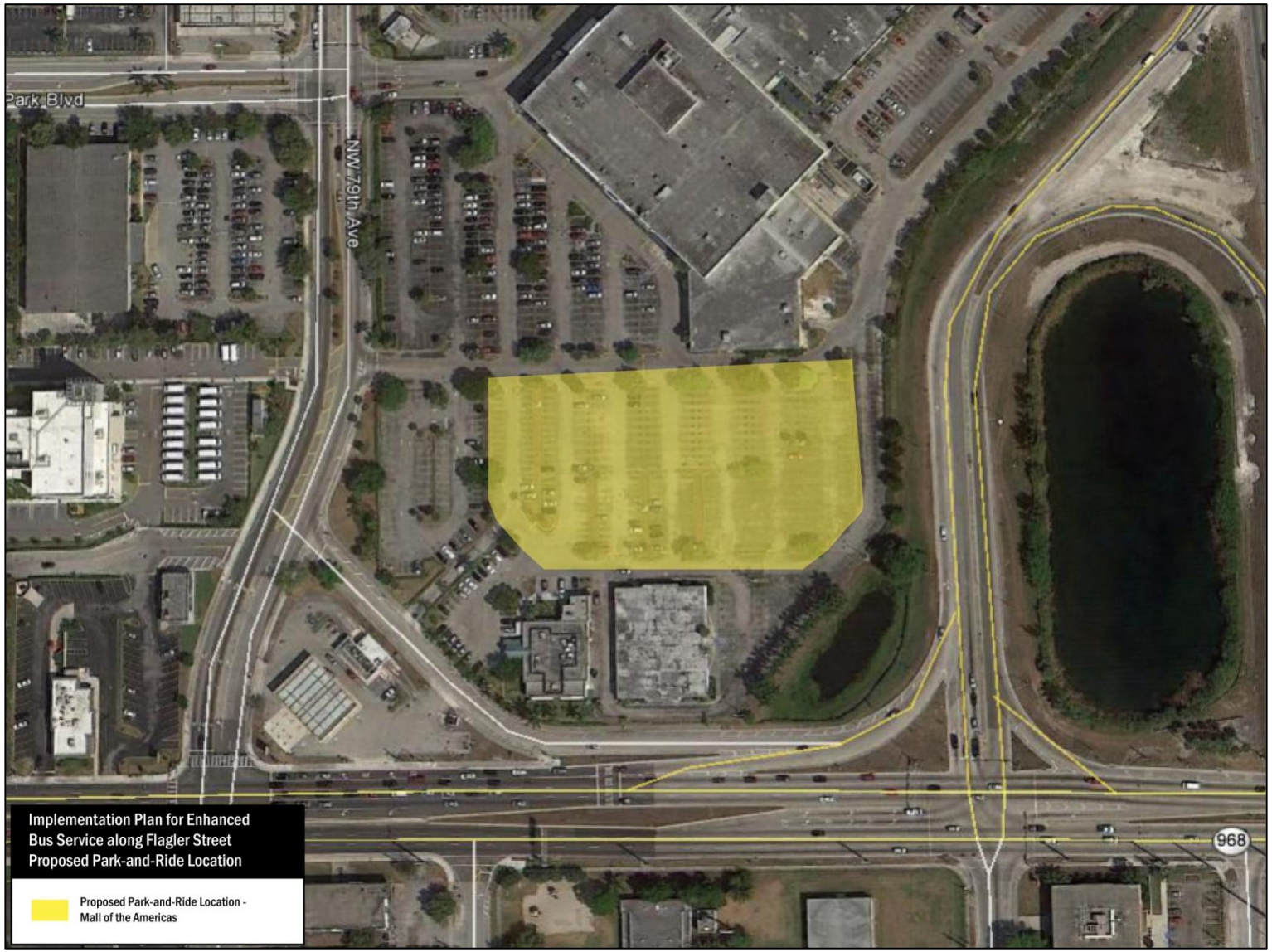
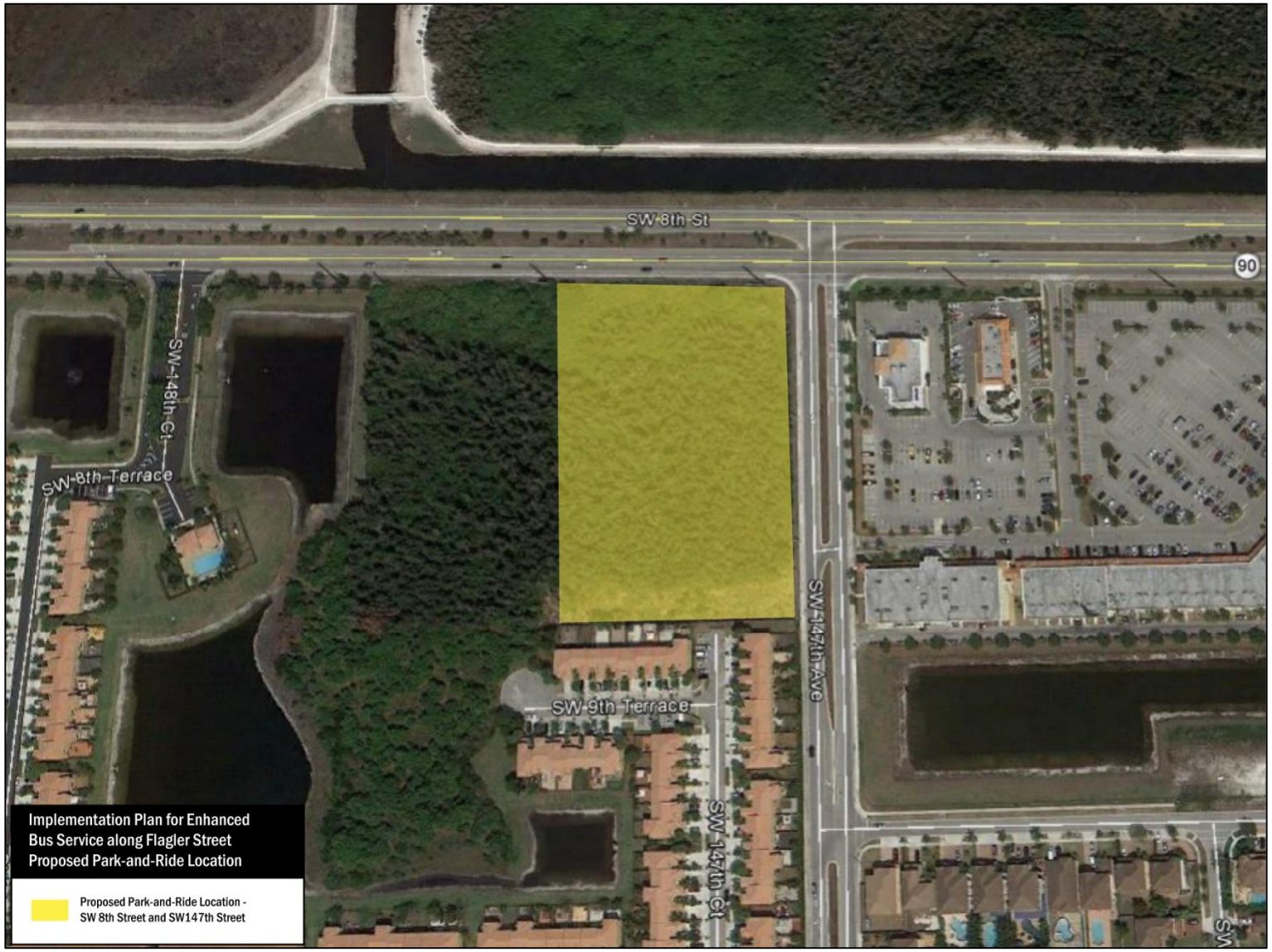


Figure 49: SW 8th Street and SW 147th Street Proposed Park-and-Ride Location



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6.0 IMPLEMENTATION ACTION PLAN

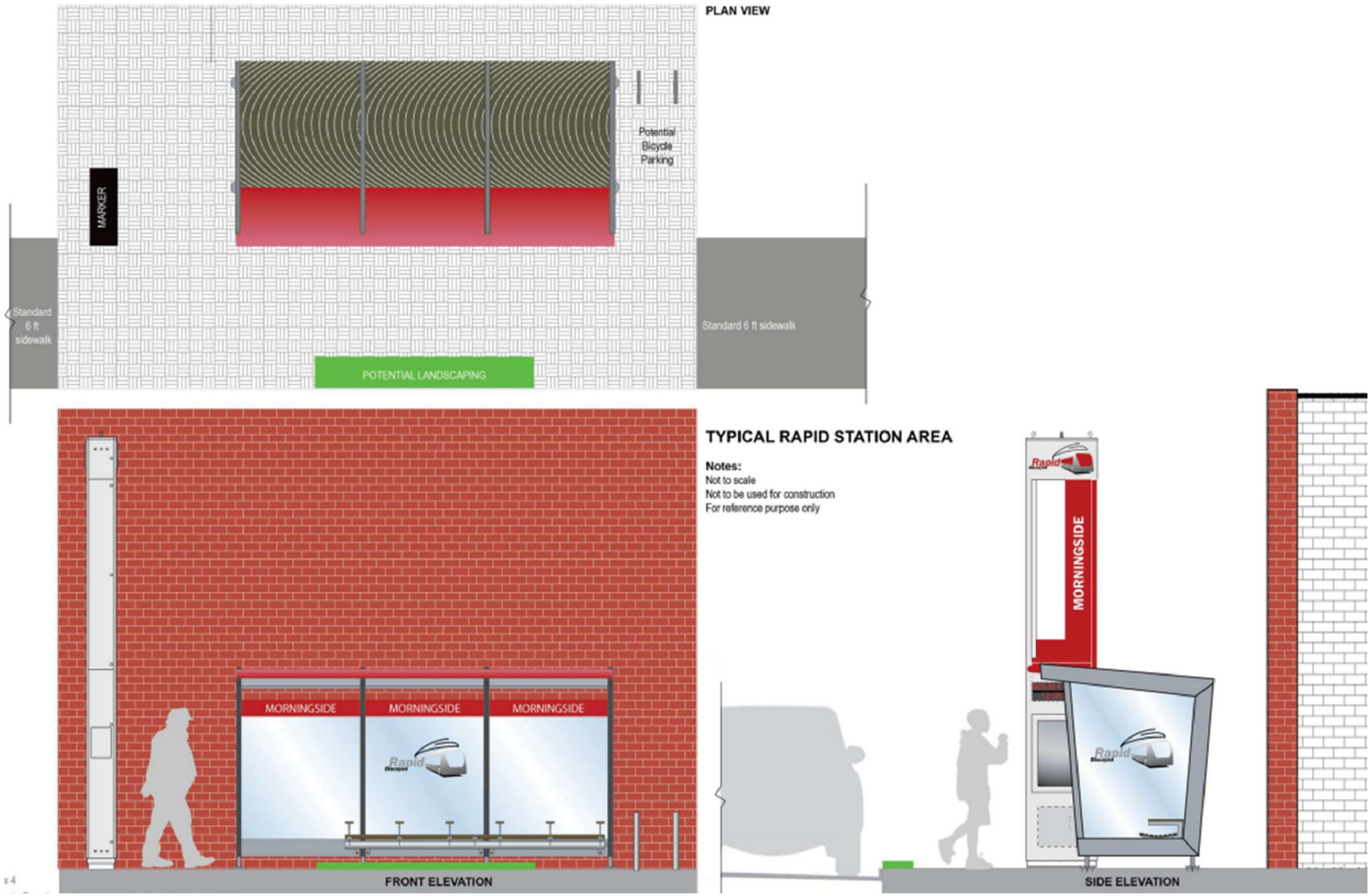
The implementation action plan brings together the various recommended elements into a unified program for development of transit improvements in the Flagler Street corridor, to be implemented over the next several years. The action plan includes recommendations and phasing of corridor branding, the phasing in of corridor service improvements and station improvements. The result will be improved travel times and an overall improved transit experience for transit users in the Flagler Street corridor, which will result in increased service efficiency and increased ridership on the corridor services.

6.1 Branding

The specific branding for the proposed implementation of the Flagler EBS service has been established according to a previously completed Biscayne Boulevard Enhanced Bus Service Implementation Plan. The distinct brand identity is known as Rapid Bus Service which will be implemented by MDT on Flagler Street and within select corridors throughout Miami-Dade County to signify fast convenient transit service that is direct with limited station stops.

Figure 50: Miami-Dade Transit's EBS Bus Branding

Figure 51: Miami-Dade Transit's EBS Station Branding



6.2 Recommended Service Plan

The proposed recommended service plan for the Flagler EBS would provide frequent and efficient express service between Florida International University and the Government Center in Downtown Miami running along Flagler Street/SW 1st Street. To complement the EBS service, local bus service will continue to operate along Flagler Street/SW 1st Street to the Mall of the Americas. Under a second option (Option B), the service would be extended to the west along SW 8th Street to serve a new park-and-ride lot at SW 147th Avenue. The Flagler EBS will improve travel times by serving only the most popular stops and connections within the Flagler Street corridor, and will improve and increase the volume of service on a number of segments. The service also will increase the number of trips along the corridor by reducing headways/increasing frequencies, thereby improving the quality of transit service throughout the corridor.

6.2.1 Operational Changes-Option A

As mentioned above, the proposed operating plan features enhanced bus service between Downtown Miami and the new FIU Transit Terminal on SW 8th Street and SW 110th Avenue. The proposed service span of the Flagler EBS is 5:00AM – 9:30PM, Monday through Friday. EBS would be complemented by local service along the corridor between Downtown Miami and the Mall of the Americas that would provide an additional level of service along the corridor's main trunk route, Flagler Street. Local service along the corridor will continue to be offered 24-hours a day, 7 days a week. The proposed service plan is detailed below.

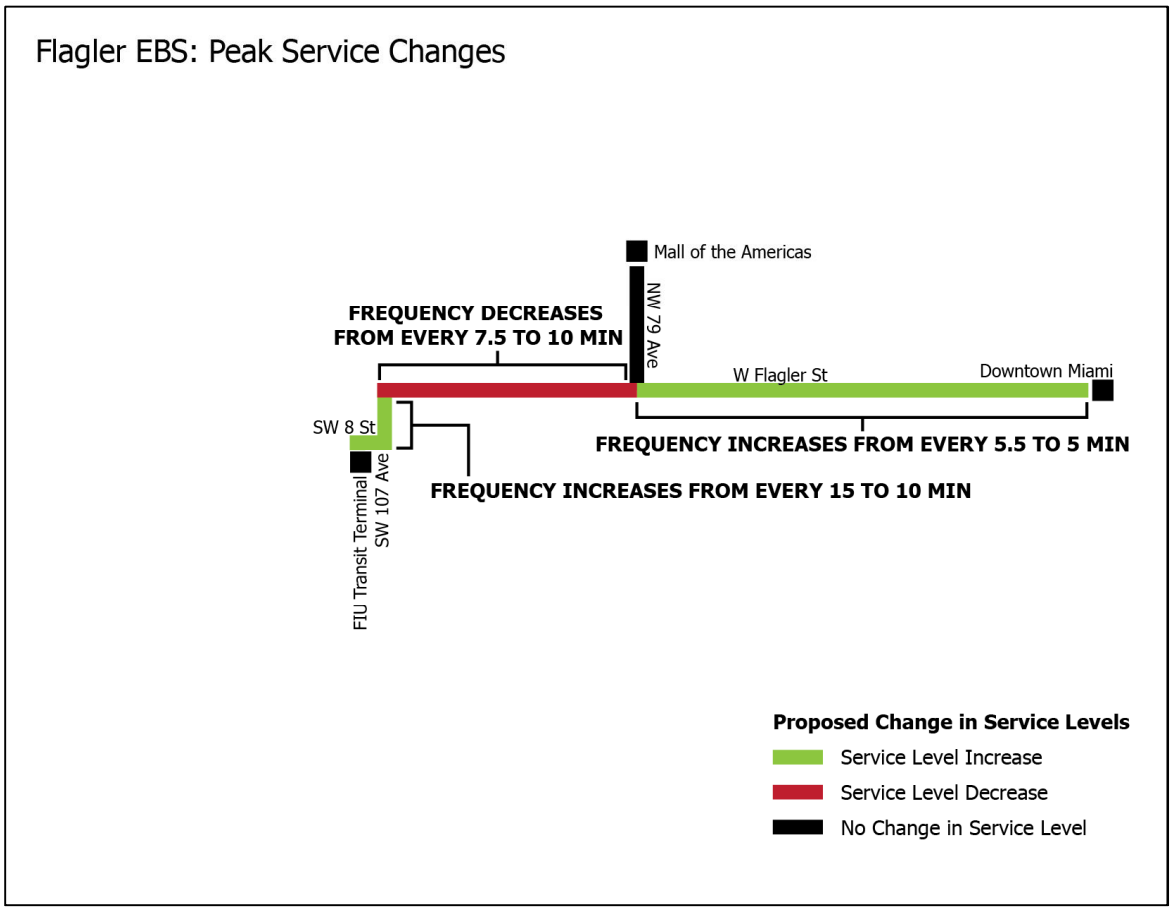
6.2.1.1 Option A Peak Service Plan

Peak service along the Flagler Street corridor would be provided between the hours of 6AM-9AM and 3PM-7PM. During these times, EBS would operate with 10 minute headways between Downtown Miami and the new FIU Transit Terminal on SW 8th Street. Local service would operate between Downtown Miami and the Mall of the Americas with 10 minute headways. As shown in Figure 52, composite headways between Downtown Miami and the Mall of the Americas/79th Avenue would be five minutes with service provided by both EBS and Route 11.

Figure 52: Flagler EBS Option A Proposed Peak Service Plan

As shown in Figure 53, the segments between Flagler Street at 107th Avenue and the new FIU Transit Terminal and 79th Avenue and Downtown Miami are expected to see a slight increase in service with headways improving from 5.5 minutes down to 5 minutes during peak times. The only segment of the corridor expected to see a decrease in service is between 107th Avenue and the 79th Avenue where headways would slightly increase from 7.5 minutes to 10 minutes. The short segment along 79th Avenue between Flagler Street and the Mall of the Americas would receive the same level of transit service as today.

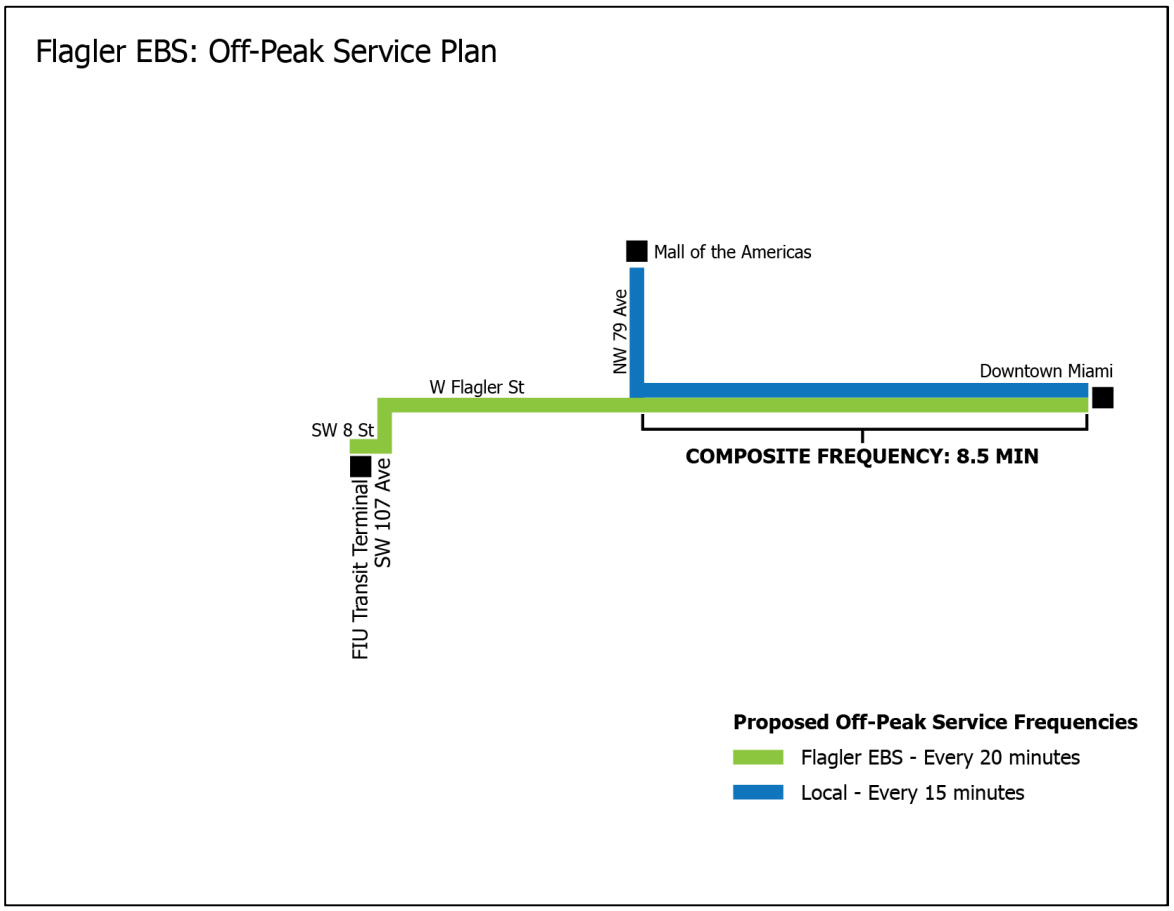
Figure 53: Weekday Flagler EBS Option A Peak Service Changes



6.2.1.2 Option A Off-Peak Service Plan

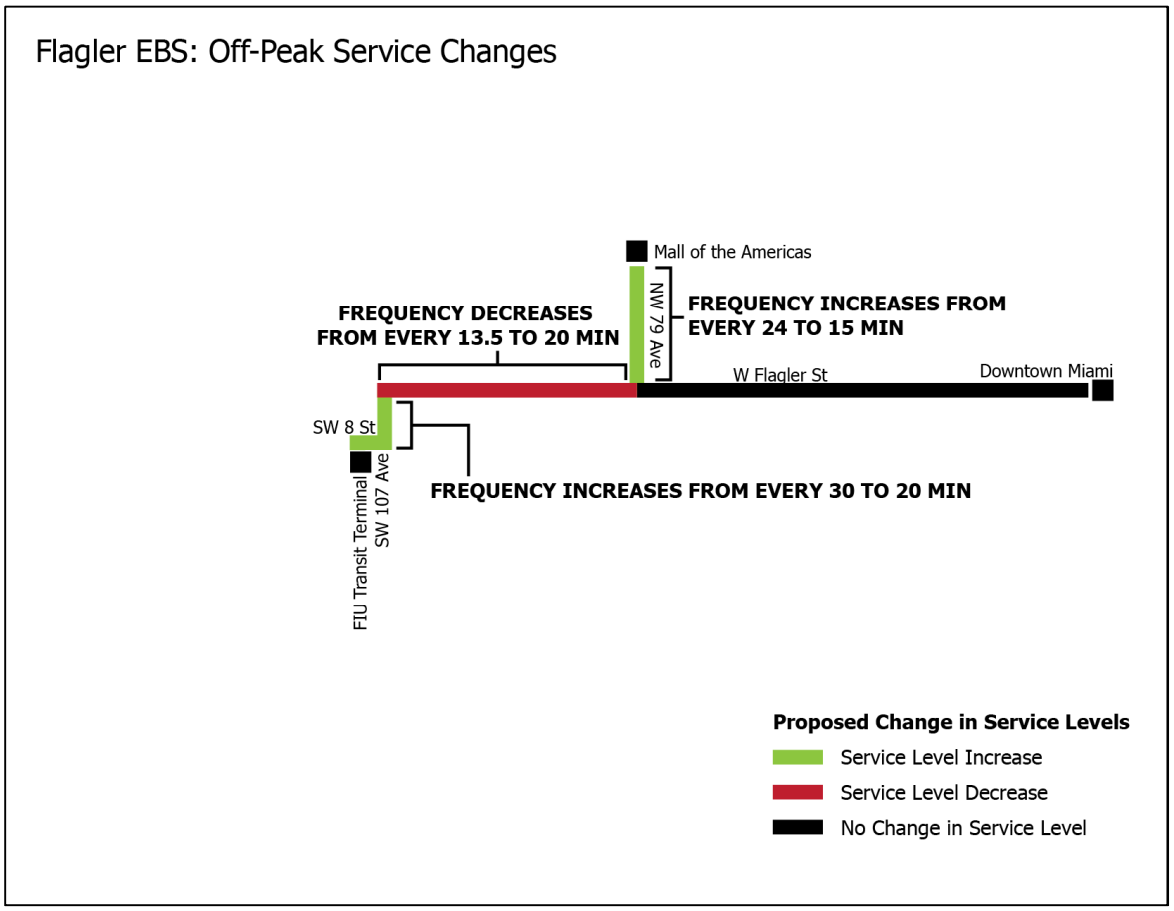
Off-peak service along the Flagler Street corridor would be provided during the early morning, midday and evenings of weekdays. Off-peak, EBS would operate with 20 minute headways between Downtown Miami and the new FIU Transit Terminal on SW 8th Street. Local service would operate with 15 minute headways between Downtown Miami and 79th Avenue and 30 minute headways between Downtown Miami and the Coral Way area via the Mall of the Americas. As shown in Figure 54, composite headways between Downtown Miami and 79th Avenue would be 8.5 minutes with service provided by EBS and Route 11.

Figure 54: Flagler EBS Proposed Option A Off-Peak Service Plan (Weekday)



As shown in Figure 55, the segment between Flagler Street at 79th Avenue and 107th Avenue would experience a service decrease during the off peak period with headways increasing from 13.5 minutes to 20 minutes. The segments between Flagler Street and NW 79th Avenue/Mall of the Americas and 107th Avenue to the FIU Transit Terminal would both see service improvements with headways decreasing from 30 to 20 minutes and 24 to 15 minutes, respectively. The segment of the corridor between Flagler Street at 79th Avenue and Downtown Miami would experience the same level of service as today.

Figure 55: Flagler EBS Option A Off-Peak Service Changes (Weekday)



On weekends, only local service will be offered on the Flagler Street corridor. On Saturdays, local service between Downtown Miami and 79th Avenue will be offered at 24 minute headways. Local service between Downtown Miami and the new FIU Transit Terminal will also be offered at 24 minute headways (Figure 60). The combination of these two local services will result in local service with 12 minute headways along Flagler Street between Downtown Miami and 79th Avenue.

On Sundays, local service similar to Saturday service will be operated with service between Downtown Miami and 79th Avenue offered at 30 minute headways. Local service between Downtown Miami and the new FIU Transit Terminal will also be offered at 30 minute headways, as shown in Figure 61. The combination of these two local services will result in local service with 15 minute headways along Flagler Street between Downtown Miami and 79th Avenue.

Figure 60: Flagler EBS Proposed Option A Off-Peak Service Plan (Saturday)

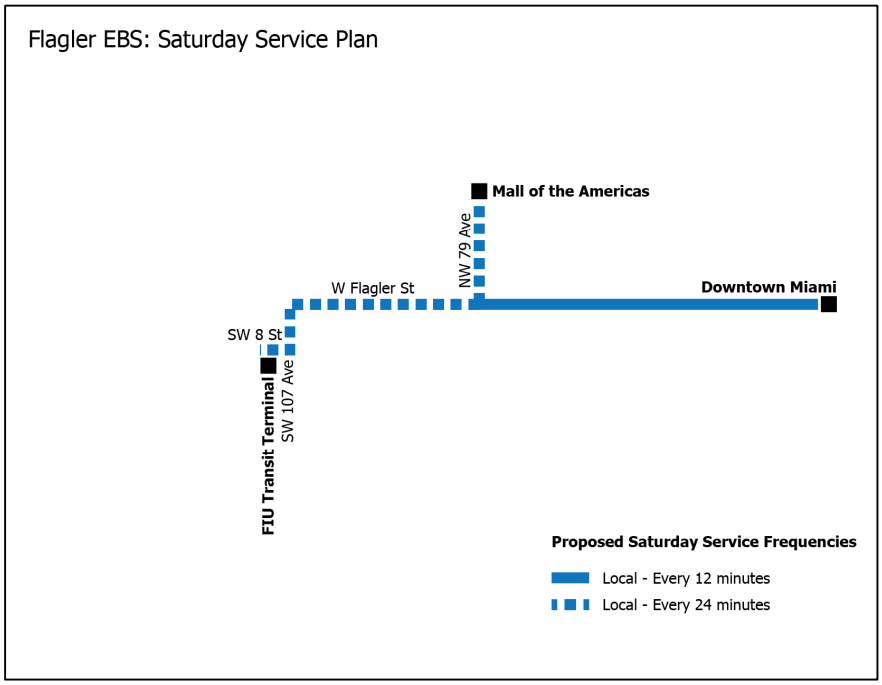
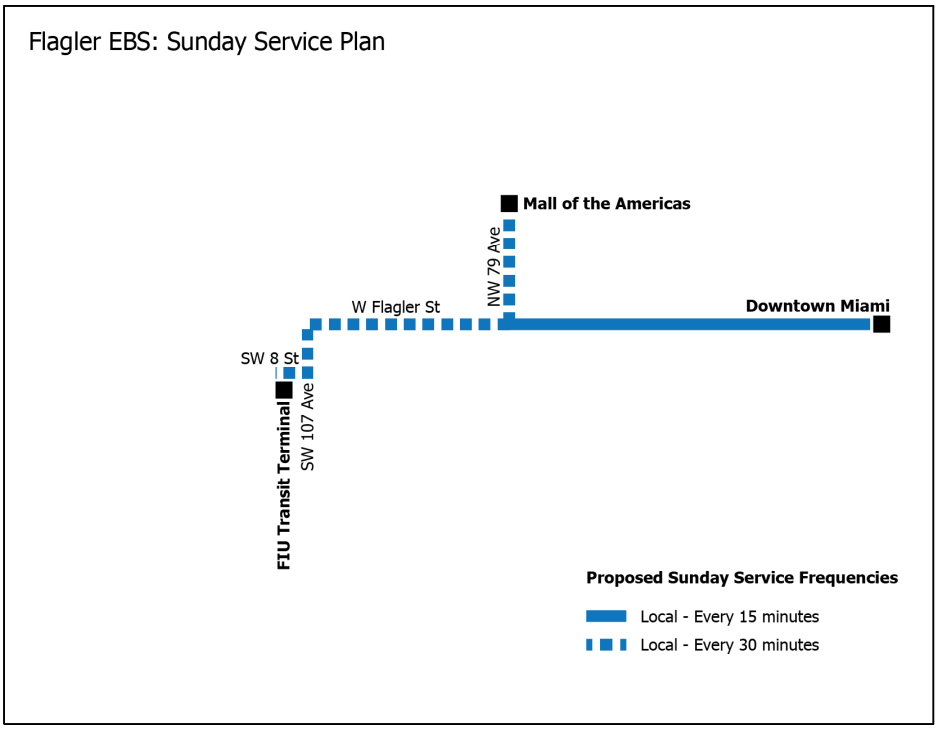


Figure 61: Flagler EBS Proposed Option A Off-Peak Service Plan (Sunday)



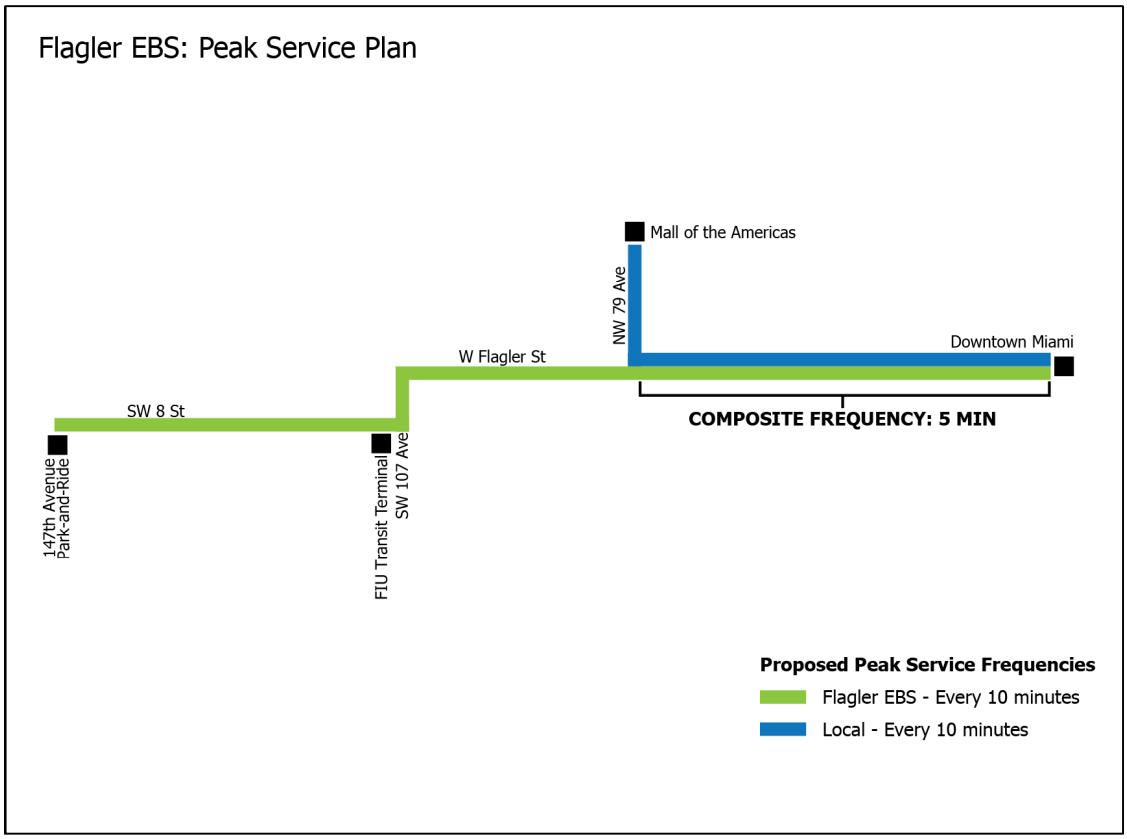
6.2.1.3 Flagler EBS – Option B

At the request of MDT, a second option was considered in which the Flagler Street EBS would be extended from the new FIU Transit Terminal to a proposed park-and-ride lot located on SW 147th Avenue and SW 8th Street. This option would provide one-seat enhanced bus service between Downtown Miami and the 147th Avenue Park-and-Ride Lot in the Coral Way area. The proposed operation plan of this option is presented below.

Option B Peak Service Plan

Under option B, peak service along the Flagler Street corridor would be provided between the hours of 6AM-9AM and 3PM-7PM. During these times, EBS would operate with 10 minute headways between Downtown Miami and the 147th Street Park-and-Ride Lot via the FIU Transit Terminal on SW 8th Street. Local service would continue to operate between Downtown Miami and the Mall of the Americas with 10 minute. As shown in Figure 62, composite headways between Downtown Miami and the Flagler Street at 79th Avenue would be five minutes.

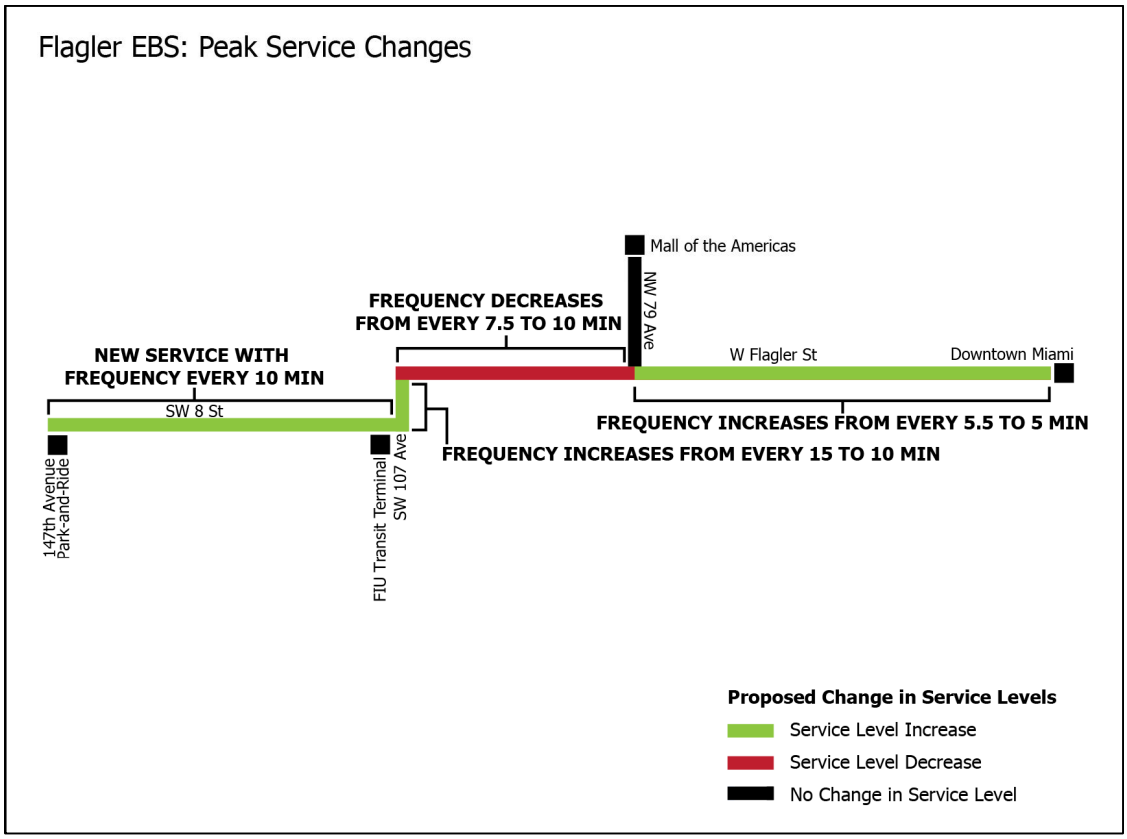
Figure 62: Flagler EBS Option B Proposed Peak Service Plan



As shown in Figure 56, a number of segments would experience an increase in service frequency including the segment between Downtown Miami and 79th Avenue, where headways would be reduced from 5.5 minutes down to 5 minutes. Headways along SW 107th Avenue would be reduced from 15 minutes to 10 minutes and new service along SW 8th Street would see headways at 10 minutes.

The only segment of the corridor expected to see reduction in service the segment between 79th Avenue and 107th Avenue along Flagler Street where headways would increase from 7.5 minutes to 10 minutes. The short trip up to the Mall of Americas on NW 79th Avenue would see the same level of service as today.

Figure 56: Flagler EBS Option B Peak Service Changes



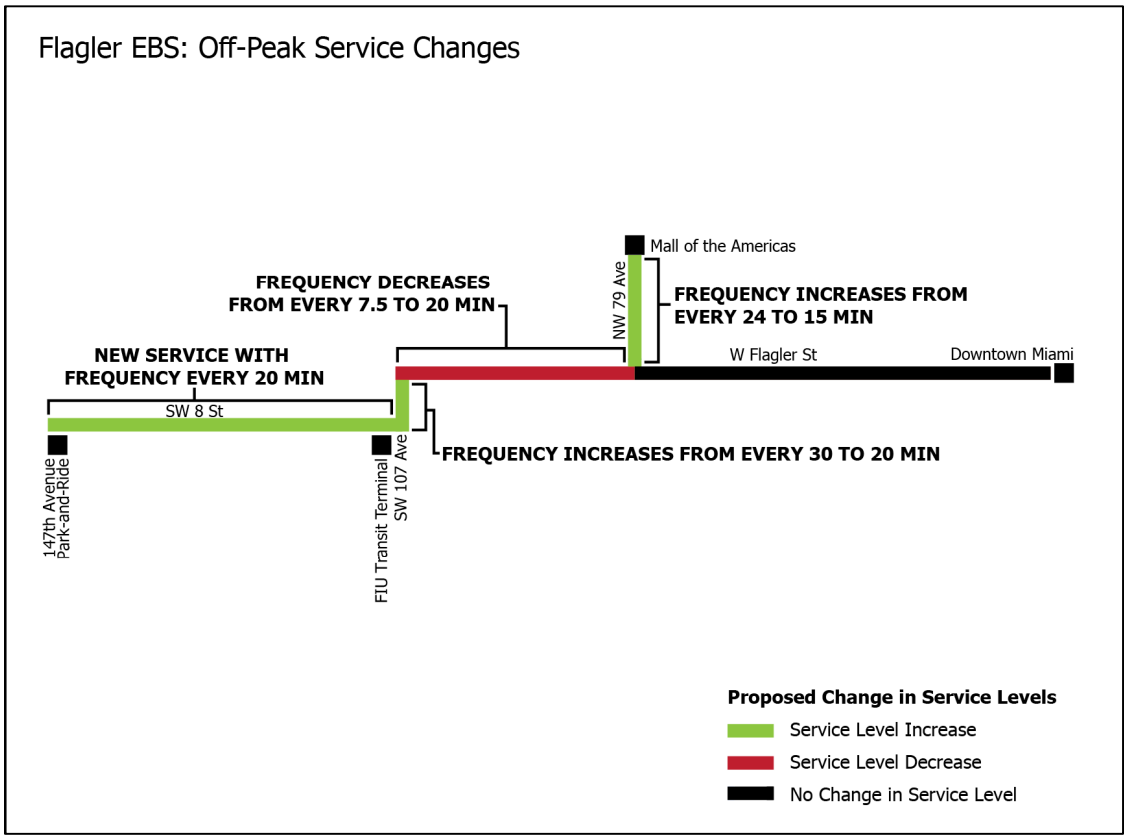
Option B Off-Peak Service Plan

Off-peak service along the Flagler Street corridor would be provided on weekday early mornings, midday and evenings. During these times, EBS would operate with 20 minute headways between Downtown Miami and the 147th Avenue Park-and-Ride Lot via the new FIU Transit Terminal on SW 8th Street. Local service would continue to operate at 15 minute headways between Downtown Miami and 79th. As shown in Figure 57, composite headways between Downtown Miami and 79th Avenue would be 8.5 minutes.

Figure 57: Flagler EBS Option B Proposed Off-Peak Service Plan (Weekday)

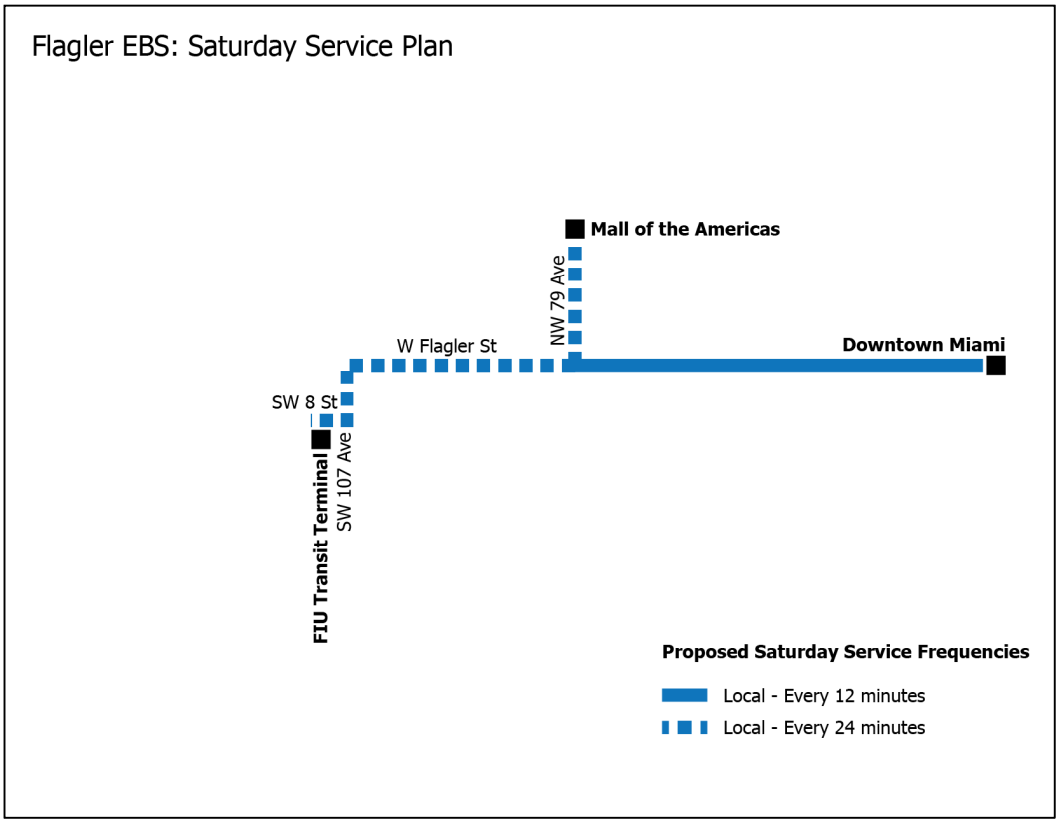
As shown in Figure 58, the segments between 79th and 107th Avenue and between Flagler Street and SW 8th Street would see an decrease in service levels where headways would increase from 7.5 minutes to 20 minutes The segment along SW 8th Street between SW 107th Avenue and the 147th Avenue Park-and-Ride lot including the FIU Transit Terminal is expected to see service levels increase with the proposed new service set at 20 minutes. The short segment along NW 79th Street to the Mall of the Americas would also experience service improvement with headways decreasing from 24 minutes to 15 minutes. The segment along Flagler Street between 79th Avenue and Downtown Miami would see the same level of service as today.

Figure 58: Weekday Flagler EBS Option B Off-Peak Service Changes (Weekday)



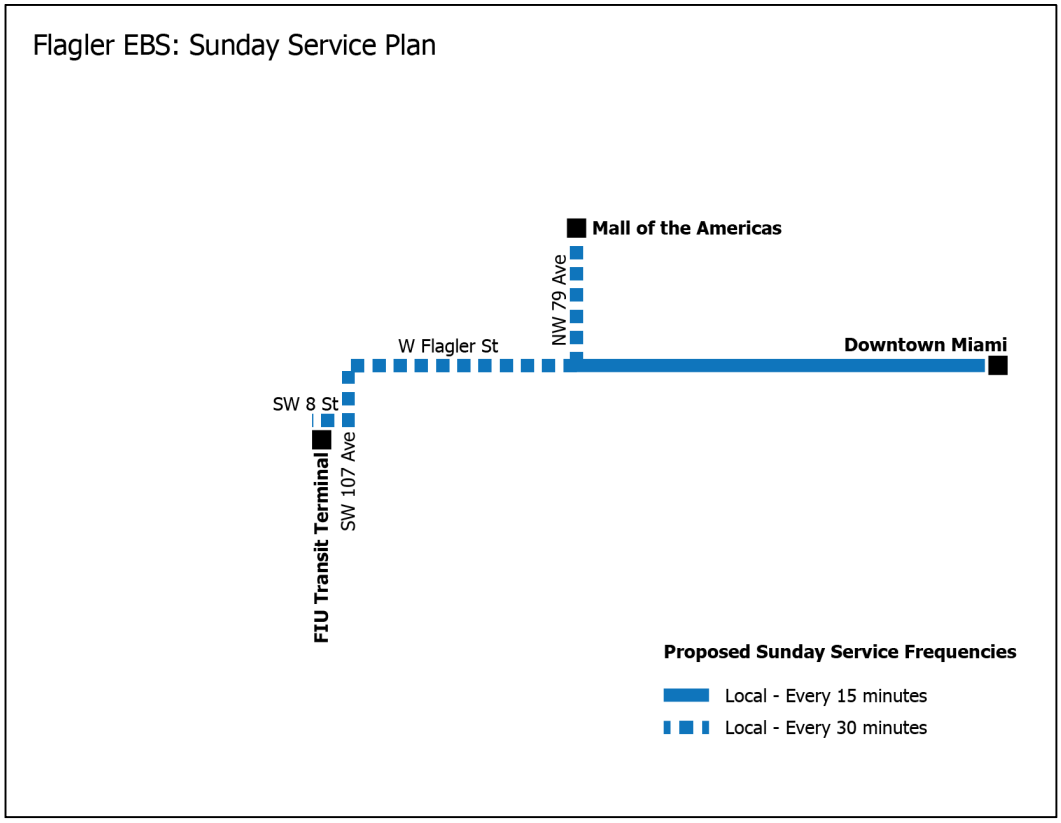
On weekends, only local service will be offered on the Flagler Street corridor. On Saturdays, local service between Downtown Miami and 79th Avenue/Mall of the Americas will be offered at 24 minute headways. Local service between Downtown Miami and the FIU Transit Terminal will also be offered at 24 minute headways (Figure 59). The combination of these two local services will result in local service with 12 minute headways along Flagler Street between Downtown Miami and 79th Avenue.

Figure 59: Flagler EBS Proposed Option B Off-Peak Service Plan (Saturday)



On Sundays, local service between Downtown Miami and 79th Avenue/Mall of the Americas will be offered at 30 minute headways in addition to service between Downtown Miami and the FIU Transit Terminal also at 30 minute headways. The combination of these two local services will result in local service with 15 minute headways along Flagler Street between Downtown Miami and 79th Avenue as shown in Figure 60.

Figure 60: Flagler EBS Proposed Option B Off-Peak Service Plan (Sunday)



6.2.3 Operational Performance

Cycle times and average running speeds were calculated for Route 11 and Route 51 and averaged by the time of day. These speeds were used as the baseline for the proposed local service in additional to the proposed new Flagler Street EBS. The EBS cycle times and estimated running speeds were based off the average running speeds of Route 51 as the two routes have very similar operating plans. The Route 51 travel speed was augmented to account for the change in alignment (i.e. branch to FIU), the reduction in bus stops along Flagler Street, and the introduction of transit technologies including TSP, queue jump lanes, and the roadway configuration improvements.

EBS is projected to improve the transit travel time for existing riders on the Route 11 and Route 51 Flagler Max through the combination of transit technologies and a reduction in bus stops. As shown in Table 13, the projected travel speed of the Flagler Street EBS is approximately 7 miles per hour faster than the existing Route 11 AM Peak service to FIU and approximately 1.5 miles per hour faster than the exiting Route 51 AM Peak serve to Flagler Street and 107th Avenue. Similar results appear for each part of the operating day. Please note that the cycle time is inclusive of any layover time allocated for each trip.

When normalized using the Flagler EBS total distance, it would take approximately 183 minutes for Route 11 to travel the corridor at 8.6 mph and approximately 95 minutes for Route 51 to travel the corridor at 16.5 mph. Therefore, the approximate time savings projected for EBS over Routes 11 and 51 are 96 and 8 minutes per trip, respectively.

Table 13: Existing and Proposed Operational Performance

	Total Distance (miles)	Cycle Time (minutes)	Average Speed (mph)
Route 11 Existing - AM Peak	25.5	119	8.6
Route 51 Existing - AM Peak	22.0	80	16.5
Flagler EBS Projected - AM Peak	23.8	87	18.0
Route 11 Existing - Midday	25.5	120	8.5
Route 51 Existing - Midday	22.0	85	15.5
Flagler EBS Projected - Midday	23.8	92	17.0
Route 11 Existing - PM Peak	25.5	125	8.2
Route 51 Existing - PM Peak	22.0	98	13.5
Flagler EBS Projected - PM Peak	23.8	105	15.0
Route 11 Existing - Evening	25.5	94	10.9
Route 51 Existing - Evening	22.0	85	15.5
Flagler EBS Projected - Evening	23.8	92	17.0

6.3 Estimated Costs

This section provides a framework for the presentation of methods, cost data and cost assumptions applied to develop planning level estimates of capital and operation costs for the Flagler EBS Implementation Plan. These estimates were developed based on a conceptual level of detail without the preparation of engineering drawings or design plans. The following overview of both capital and operation costs are based upon readily available local, regional and industry sources of information and data.

6.3.1 Operating Costs

The development of operating cost estimates for this study are based on actual reported MDT expenditures as submitted annually to the Federal Transit Administration's (FTA's) National Transit Database (NTD). The Flagler EBS Implementation Plan will result in additional operating costs from the implementation of recommended services, additional service hours, more frequent service, and the operation of additional transit vehicles. An estimate of annual operating costs was calculated according to defined service parameters. As shown in Table 13, the current total operating cost for existing transit service in the Flagler Street Corridor (Route 11 and Route 51 Flagler Max) is approximately $8.35 million per year. Details of the operations cost calculations used to estimate existing and project proposed service is provided in Appendix C.

Table 13: Existing Operating Costs

	Route 11	Route 51 - Flagler Max	Total Cost (Route 11 + Route 51)
Total Operating Cost	$5,844,000	$2,503,000	$8,347,000

6.3.2 Operating Costs – Option A

Operating and maintenance costs for the Flagler EBS and local service were calculated based on the proposed operating plan of both services and estimating the costs based on the approximate cost per revenue hour and mile for MDT during FY 2011. Option A proposes operation of Flagler EBS between Downtown Miami and the FIU Transit Terminal between 5AM and 9:30 PM, Monday through Friday only. Local service would complement the Flagler EBS operation between Downtown Miami and the Mall of the Americas 24 hours per day, 7 days a week and extended to the FIU Transit Terminal when EBS is not in operation (9:30 PM – 5 AM).

The projected annual operating cost for the Flagler EBS and the local service is approximately $9.3 million as presented in Table 15. With Option A, this results in an incremental cost of approximately $940,000 per year over current operating costs on the Flagler Street corridor.

Table 14: Flagler EBS Option A Estimated Operating Costs

	Revenue Hours	Cost per Revenue Hour	Revenue Miles	Cost per Revenue Mile	Operations Cost
Proposed Flagler EBS	28,013	$52.65	430,899	$3.16	$2,837,000
Proposed Local Service	74,462	$52.65	801,353	$3.16	$6,453,000
Total	102,475	-	1,232,252	-	$9,289,000

6.3.3 Operating Costs – Option B

Operation costs were also calculated for the second option of the Flagler EBS which extends to the 147th Street Park-and-Ride Lot in the Coral Way area and the accompanying local service. Option B proposes operation of Flagler EBS between Downtown Miami and the 147th Street Park-and-Ride Lot in the Coral Way area via the FIU Transit Terminal between 5 AM and 9:30PM, Monday through Friday only. Local service would complement the Flagler EBS operation between Downtown Miami and the Mall of the Americas 24 hours per day, 7 days a week and extended to the FIU Transit Terminal when EBS is not in operation (9:30 PM – 5AM). The operating costs were calculated using the same methodology as above. The projected annual operating cost for the Flagler EBS Option B and the local service is approximately $10.3 million as presented in Table 15. With Option B, this results in an incremental cost of approximately $2.5 million per year over current operating costs on the Flagler Street corridor.

Table 15: Flagler EBS Option B Estimated Operating Costs

	Revenue Hours	Cost per Revenue Hour	Revenue Miles	Cost per Revenue Mile	Operations Cost
Proposed Flagler EBS - Option B	38,321	$52.65	575,739	$3.16	$3,837,000
Proposed Local Service	74,462	$52.65	801,353	$3.16	$6,453,000
Total	112,783	-	1,377,092	-	$10,290,000

6.3.4 Capital Costs

Capital cost data was developed from several sources which were comparable to those experienced in the South Florida region for similar types of construction. Unit cost associated with civil and structural construction elements that are generally common to both transit and highway construction projects will use cost data found in the FDOT Item Average Unit Costs.

For those unit costs associated with stations and systems construction elements that are principally found on transit construction projects, cost data from recent construction bids from other transit systems throughout the United States was compared and adjusted to specific project needs. Unit cost data was obtained from Parsons Brinckerhoff's historical cost

estimating database of completed projects and their respective historical bid information (e.g. Biscayne Implementation Plan for EBS).

Costs associated with right-of-way acquisition for queue jumps, EBS stations, and park-and-ride lots were not estimated at this time due to fluctuations in land costs in time. These costs will be determined when the EBS proposal is accepted and schedule is in place.

The projected costs associated with the Restricted Curbside Bus Lane with Reversible Center Lane alternative per mile estimate includes costs associated with traffic control systems, milling and resurfacing, restriping, and signing.

Based on the capital costs estimated for stations, sitework, and the required systems for Option A EBS, the projected total capital construction cost for EBS in the Flagler Street corridor is approximately $18.6 million, $5.6 million in associated professional services including preliminary engineering, construction administration and managements, and legal services, and $11.4 million in new vehicles. This results in a total projected capital cost of $35.6 million in FY2013 dollars (Table 17) for Option A. Please note that the projected capital costs are exclusive of all right-of-way acquisition expenditures and will be calculated upon forwarding of the project. Capital costs will also be reported in year of expenditure (YOE) dollars when the EBS proposal is accepted and schedule is in place.

The total number of vehicles required for Option A is 12 vehicles and includes ten vehicles for normal daily operations and two vehicles as spare vehicles. This was calculated using the projected roundtrip cycle time and divided by the proposed frequency of the EBS operating plan which gives us the number of vehicles needed for service at each operational time period. The maximum number of vehicles (i.e. 10 vehicles – PM Peak) was then multiplied by 20 percent to account for the recommended spare vehicle requirement resulting in 12 vehicles for EBS daily operations in Option A.

Based on the capital costs estimated for stations, sitework, and the required systems for Option B EBS, the projected total capital construction cost for EBS in the Flagler Street corridor is approximately $25.8 million, $7.7 million in associated professional services including preliminary engineering, construction administration and managements, and legal services, and $15.2 million in new vehicles. This results in a total projected capital cost of $50.9 million in FY2013 dollars (Table 18) for Option B. Please note that the projected capital costs are exclusive of all right-of-way acquisition expenditures and will be calculated upon forwarding of the project. Capital costs will be reported in year of expenditure (YOE) dollars when the EBS proposal is accepted and schedule is in place.

The total number of vehicles required for Option B is 16 vehicles and includes 13 vehicles for normal daily operations and 3 vehicles as spare vehicles. This was calculated using the same methodology as described for EBS Option A above.

Table 16: Flagler EBS Option A Estimated Capital Costs

Flagler Enhanced Bus Service (EBS)
Downtown Miami to FIU Transit Terminal
Preliminary Order of Magnitude Costs

				All Costs in 2013 Dollars		
ITEM DESCRIPTION	UNITS	QTY	UNIT COST	ALLOCATED COSTS	*TOTAL COST*
10 Guideway & Track Elements (route miles)					
20 Stations, Stops, Terminals, Intermodal (number)					*$ 3,630,300*
20.01 Station Type 1 - Marker Only	EA	10	$ 69,000	$ 690,000	
20.01 Station Type 2 - Marker with Bench	EA	11	$ 72,000	$ 792,000	
20.01 Station Type 3 - Slim Station with Marker	EA	7	$ 210,900	$ 1,476,300	
20.01 Concrete Bus Stop Pad	EA	21	$ 32,000	$ 672,000	
30 Support Facilities: Yards, Shops, Admin. Bldgs					
40 Sitework & Special Conditions					*$ 945,000*
40.02 Utility Work & Relocation	PER STA	28	$ 12,500	$ 350,000	
40.01 Maintenance of Traffic	PER STA	28	$ 15,000	$ 420,000	
40.01 Roadway Work Adjacent to Station	EA	7	$ 15,000	$ 105,000	
40.01 Sidewalk Connection	PER STA	7	$ 10,000	$ 70,000	
40.01 Queue Jump Implementation (Single Site)	PER INT	8	$ 148,500	$ 1,188,000	
40.01 Queue Jump Implementation (Double Site)	PER INT	19	$ 237,000	$ 4,503,000	
50 Systems					*$ 14,033,940*
50.02 Roadway Modification Allowance - Signal Prioritization	EA	57	$ 76,500	$ 4,360,500	
50.03 Roadway Modification Allowance - Restricted Curbside Bus Lane	PER MI	4.80	$ 2,015,300	$ 9,673,440	
Allocated Contingency					*$ 5,582,772*
Allocated Contigency		30%		$ 5,582,772	
SUBTOTAL - CONSTRUCTION COSTS					*$ 18,609,240*
60 ROW, Land, Existing Improvements					*$ -*
60.01 ROW Purchase at SW 42nd Avenue	ACRE	0.001	$ -	$ -	
60.01 ROW Purchase at NW 72nd Avenue	ACRE	0.001	$ -	$ -	
60.01 ROW Purchase at NW 57nd Avenue	ACRE	0.002	$ -	$ -	
60.01 ROW Purchase at SW 27th Avenue	ACRE	0.001	$ -	$ -	
60.01 ROW Purchase at NW 42nd Avenue	ACRE	0.003	$ -	$ -	
60.01 ROW Purchase at NW 27th Avenue	ACRE	0.003	$ -	$ -	
60.01 ROW Purchase at NW 107th Avenue	ACRE	0.005	$ -	$ -	
60.01 ROW Purchase at SW 96th Court	ACRE	0.001	$ -	$ -	
60.01 ROW Purchase at SW 12th Avenue	ACRE	0.002	$ -	$ -	
60.01 ROW Purchase at NW 12th Avenue	ACRE	0.002	$ -	$ -	
60.01 ROW Purchase at NW 17th Court	ACRE	0.002	$ -	$ -	
60.01 ROW Administrative Costs		20%		$ -	
60.01 ROW/Relocation Administrative Costs		24%		$ -	
60.02 Relocation Costs		20%		$ -	
70 Vehicles					*$ 11,400,000*
70.01 Purchase of EBS Vehicles	VEH	12	$ 950,000	$ 11,400,000	
80 Professional Services					*$ 5,582,772*
80.01 Preliminary Engineering/Project Environmental		5%		$ 930,462	
80.02 Final Design		7%		$ 1,302,647	
80.03 Project Management for Design & Construction		2%		$ 372,185	
80.04 Construction Administration & Management		10%		$ 1,860,924	
80.06 Legal; Permits; Review Fees by other agencies, cities, etc.		3%		$ 558,277	
80.07 Surveys, Testing, Investigation, Inspection		3%		$ 558,277	
90 Unallocated Contingency					
90.01 Unallocated Contingency		5%		$ 1,779,601	
100 Finance Charges					
PRELIMINARY CAPITAL COST ESTIMATE	*(2013 Dollars)*				*$ 35,592,012*

Table 17: Flagler EBS Option B Estimated Capital Costs

Flagler Enhanced Bus Service (EBS)
Downtown Miami to the 147th Street Park and Ride Lot
Preliminary Order of Magnitude Costs

				All Costs in 2013 Dollars		
				UNIT	ALLOCATED	*TOTAL*
ITEM DESCRIPTION	UNITS	QTY		COST	COSTS	*COST*
10 Guideway & Track Elements (route miles)						
20 Stations, Stops, Terminals, Intermodal (number)						*$ 4,138,300*
20.01 Station Type 1 - Marker Only	EA	14	$	69,000	$ 966,000	
20.01 Station Type 2 - Marker with Bench	EA	12	$	72,000	$ 864,000	
20.01 Station Type 3 - Slim Station with Marker	EA	7	$	210,900	$ 1,476,300	
20.01 Concrete Bus Stop Pad	EA	26	$	32,000	$ 832,000	
30 Support Facilities: Yards, Shops, Admin. Bldgs						
40 Sitework & Special Conditions						*$ 1,082,500*
40.02 Utility Work & Relocation	PER STA	33	$	12,500	$ 412,500	
40.01 Maintenance of Traffic	PER STA	33	$	15,000	$ 495,000	
40.01 Roadway Work Adjacent to Station	EA	7	$	15,000	$ 105,000	
40.01 Sidewalk Connection	PER STA	7	$	10,000	$ 70,000	
40.01 Queue Jump Implementation (Single Site)	PER INT	8	$	148,500	$ 1,188,000	
40.01 Queue Jump Implementation (Double Site)	PER INT	19	$	237,000	$ 4,503,000	
50 Systems						*$ 14,645,940*
50.02 Roadway Modification Allowance - Signal Prioritization	EA	65	$	76,500	$ 4,972,500	
50.03 Roadway Modification Allowance - Restricted Curbside Bus Lane	PER MI	4.80	$	2,015,300	$ 9,673,440	
Allocated Contingency						*$ 5,960,022*
Allocated Contigency		30%			$ 5,960,022	
SUBTOTAL - CONSTRUCTION COSTS						*$ 25,826,762*
60 ROW, Land, Existing Improvements						*$ -*
60.01 ROW Purchase at SW 42nd Avenue	ACRE	0.001	$	-	$ -	
60.01 ROW Purchase at NW 72nd Avenue	ACRE	0.001	$	-	$ -	
60.01 ROW Purchase at NW 57nd Avenue	ACRE	0.002	$	-	$ -	
60.01 ROW Purchase at SW 27th Avenue	ACRE	0.001	$	-	$ -	
60.01 ROW Purchase at NW 42nd Avenue	ACRE	0.003	$	-	$ -	
60.01 ROW Purchase at NW 27th Avenue	ACRE	0.003	$	-	$ -	
60.01 ROW Purchase at NW 107th Avenue	ACRE	0.005	$	-	$ -	
60.01 ROW Purchase at SW 96th Court	ACRE	0.001	$	-	$ -	
60.01 ROW Purchase at SW 12th Avenue	ACRE	0.002	$	-	$ -	
60.01 ROW Purchase at NW 12th Avenue	ACRE	0.002	$	-	$ -	
60.01 ROW Purchase at NW 17th Court	ACRE	0.002	$	-	$ -	
60.01 ROW Administrative Costs		20%			$ -	
60.01 ROW/Relocation Administrative Costs		24%			$ -	
60.02 Relocation Costs		20%			$ -	
70 Vehicles						*$ 15,200,000*
70.01 Purchase of EBS Vehicles	VEH	16	$	950,000	$ 15,200,000	
80 Professional Services						*$ 7,748,029*
80.01 Preliminary Engineering/Project Environmental		5%			$ 1,291,338	
80.02 Final Design		7%			$ 1,807,873	
80.03 Project Management for Design & Construction		2%			$ 516,535	
80.04 Construction Administration & Management		10%			$ 2,582,676	
80.06 Legal; Permits; Review Fees by other agencies, cities, etc.		3%			$ 774,803	
80.07 Surveys, Testing, Investigation, Inspection		3%			$ 774,803	
90 Unallocated Contingency						*$ 2,140,738*
90.01 Unallocated Contingency		5%			$ 2,140,738	
100 Finance Charges						
PRELIMINARY CAPITAL COST ESTIMATE	*(2013 Dollars)*					*$ 50,915,529*

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7.0 FINAL RECOMMENDATIONS

The plan recommends that limited stop EBS service be implemented along Flagler Street between Downtown Miami and the new FIU Transit Terminal on SW 8th Avenue (Option A). Currently, ridership along the Flagler Street corridor is concentrated between Downtown Miami and 79th Avenue, which supports a ridership level of more than 750 boardings per mile. Ridership is lower west of 79th Avenue between the Mall of the Americas and FIU, at less than 225 boardings per mile. Ridership levels are even lower west of 107th Street in the Coral Way area, which supports less than 80 boardings per mile. Given this ridership pattern, implementation of EBS is not recommended for the area between FIU and the SW 147th Street Park-and-Ride Lot.

To complement the EBS proposed along the Flagler Street corridor, various transit improvements are recommended to improve the travel time and enhance the transit user's experience in the corridor. These improvements should both increase patronage among existing riders and attract new riders who are now using private autos for some or all of their travel in the corridor. These improvements include reconfiguring traffic patterns on Flagler Street between 24th and 72nd Avenues to accommodate an exclusive bus lane during the peak travel periods and in the peak direction (eastbound in the morning and westbound in the afternoon and providing a curbside busway between Downtown Miami and 24th Avenue and again between 72nd and 107th Avenues. In addition, improvements such as queue jump lanes and transit signal priority would be implemented at certain key intersections, and improved passenger amenities such as real-time information and more attractive and visible signage would be implemented at station/stop locations throughout the corridor. As with the other EBS projects in the Miami-Dade Transit service area, vehicles, station/stops, and informational and marketing materials would share a common branding scheme that would identify the distinctive Flagler Street EBS.

While EBS would operate most efficiently and provide the greatest benefit to riders if all of the improvements were implemented simultaneously, the availability of funding and the time required to design, implement and construct certain elements of the EBS system suggest that proposed EBS improvements be implemented in two phases: immediate to short, and short to medium-term. This would allow the Flagler Street corridor to benefit from some EBS improvements immediately by implementing limited stop EBS service, branded signage at EBS stations/stops, and an initial phase of transit signal priority, queue jump and park-and-ride improvements. This phasing would also allow certain transit improvements that are more costly and require more design and implementation time, such as a second tier of queue jump lanes and park-and-ride facilities and directional dedicated bus lanes, to be implemented when they are warranted by ridership and congestion levels.

7.1 Implementation Schedule

The two implementation phases are described below, while an implementation schedule is included in Section 8. While the project is proposed to be implemented in two distinct phases—immediate to short-term, and short to medium-term—it is also recommended that the time

span of each phase be minimized so that the corridor and the larger regional transit network might benefit from EBS improvements as soon as possible

The schedule is divided into two main phases:

- Immediate to Short Term – includes implementation of combined EBS and local bus service along Flagler Street corridor between Downtown Miami and the FIU Transit Terminal. Implementation would include EBS branding on buses and EBS stations/stops; transit signal priority along the Flagler Street corridor; first tier of queue jump lanes and park-and-ride lots. The Option A projected capital costs for this phase of the implementation schedule is approximately $23.0 million and is exclusive of any required right-of-way acquisition costs.

- Short to Medium-Term – includes hybrid Curbside Bus Lane with Reversible Center Lane for Automobiles/Curbside Busway running way configuration and the second tier of queue jump lanes and park-and-ride lots. The Option A projected capital costs for this phase of the implementation schedule is approximately $12.6 million and is exclusive of any required right-of-way acquisition costs.

Details of the methodology used to calculate the projected cost for capital costs for each implementation phase is provided in Appendix D.

8.0 PROJECT DEVELOPMENT SCHEDULE

A milestone schedule has been developed to illustrate the timeframe for implementation of the Flagler EBS improvements for both phases. Please note that Phases I and II are not mutually exclusive and may be simultaneous or overlapping in implementation.

SCHEDULE
Miami-Dade MPO/Miami-Dade Transit
Flagler Enhanced Bus Service

	Phase 1																Phase II													
	Year 1								Year 2								Year 1								Year 2					
Project Development																														
Preliminary Design																														
Develop Cost Estimates, Schedule																														
Review Preliminary Design																														
Develop Categorical Exclusion/PD&E and Submit																														
Final Design																														
Submit Request/Receive FTA Approval for FFGA																														
ROW Acquisition Process																														
Issue Request for Bids, Make Award of Construction Contracts																														
Construction																														
Construct Fixed Infrastructure																														
Finalize Real Estate Acquisitions																														
Acquire and Test Vehicles																														
Revenue Operations/Closeout of Project																														
Revenue Operations																														
Project Closeout																														

APPENDIX A CORRIDOR ACTIVITY (AVERAGE DAILY BOARDING AND ALIGHTINGS)

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STOP NO.	STOP LOCATION	ROUTE 11 BOARDINGS	ROUTE 11 ALIGHTINGS	ROUTE 51 BOARDINGS	ROUTE 51 ALIGHTINGS
59	SW 1 ST SW 1 CT	118.5	1749.9	34.5	738.8
98	W FLAGLER ST SW 107 AV	130.2	44.1	117.0	16.5
100	W FLAGLER ST SW 41 AV	99.2	76.0	48.4	61.2
101	W FLAGLER ST SW 27 AV	298.8	255.6	104.8	161.4
102	SW 1 ST SW 17 AV	215.1	171.9	0.0	0.0
103	SE 1 ST SE 3 AV	188.3	521.4	0.0	0.0
104	NW 1 ST NW 1 AV	1412.3	233.5	619.1	35.8
106	W FLAGLER ST NW 17 CT	136.0	77.1	0.0	0.0
107	W FLAGLER ST NW 27 AV	264.0	355.8	178.4	100.9
108	W FLAGLER ST NW 42 AV	108.4	110.8	73.4	50.5
110	W FLAGLER ST NW 107 AV	0.0	0.0	48.0	165.6
177	SW 26 ST SW 137 AV	0.0	0.0	77.9	4.4
178	SW 122 AV SW 26 ST	0.0	0.0	13.3	32.5
193	SW 122 AV SW 26 ST	0.0	0.0	33.3	17.3
194	SW 26 ST SW 137 AV	0.0	0.0	0.7	58.3
358	SW 137 AV SW 18 ST	0.0	0.0	12.6	0.7
365	SW 137 AV SW 18 ST	0.0	0.0	0.9	8.1
453	SW 107 AV W FLAGLER ST	41.6	183.9	0.0	0.0
482	W FLAGLER ST # 7167	82.2	158.3	0.0	0.0
590	SE 1ST SE 1 AV	74.6	404.6	0.0	0.0
952	W FLAGLER ST NW 72 AV	4.3	12.1	64.8	70.6
961	W FLAGLER ST SW 72 AV	112.8	61.4	69.4	60.5
1022	SW 132 AV SW 8 ST	0.0	0.0	103.9	89.0
1215	FIU UNIV CAMPUS SW 107 A - EOL	292.7	277.6	0.0	0.0
1271	SW 107 AV SW 4 ST	36.8	12.3	0.0	0.0
1306	MALL OF AMERICAS NW 79 A - EOL	233.6	245.4	0.0	0.0
1321	W FLAGLER ST NW 22 AV	148.4	126.5	0.0	0.0
1328	W FLAGLER ST NW 37 AV	177.9	124.0	106.8	83.4
3825	SW 107 AV SW 11 ST	2.6	72.3	0.0	0.0
3826	SW 107 AV SW 14 ST	1.6	67.3	0.0	0.0
3859	SW 107 AV #1431	55.4	3.7	0.0	0.0
3860	SW 107 AV # 1225	40.7	8.4	0.0	0.0
3861	SW 107 AV # 917	44.0	3.4	0.0	0.0
3902	SW 122 AV SW 10 ST	0.0	0.0	14.0	51.0
3903	SW 122 AV SW 14 ST	0.0	0.0	2.6	16.3
3904	SW 122 AV SW 16 TE	0.0	0.0	2.7	20.5
3905	SW 122 AV SW 20 TE	0.0	0.0	6.4	32.2
3906	SW 122 AV SW 22 ST	0.0	0.0	2.0	24.3
3915	SW 122 AV SW 22 ST	0.0	0.0	22.4	5.6
3916	SW 122 AV SW 20 TE	0.0	0.0	35.5	3.1
3917	SW 122 AV SW 18 ST	0.0	0.0	26.0	2.3
3918	SW 122 AV SW 14 ST	0.0	0.0	17.7	4.6
3919	SW 122 AV SW 10 ST	0.0	0.0	45.8	11.5
3939	SW 132 AV SW 12 ST	0.0	0.0	3.6	0.6
3940	SW 132 AV SW 13 ST	0.0	0.0	0.5	0.0
3941	SW 132 AV SW 18 ST	0.0	0.0	2.9	0.4
3963	SW 137 AV SW 22 ST	0.0	0.0	7.2	0.5
4003	SW 137 AV SW 26 ST	0.0	0.0	4.8	20.2
4004	SW 137 AV SW 22 ST	0.0	0.0	0.3	8.3

4006	SW 137 AV SW 12 ST	0.0	0.0	1.0	14.6
4007	SW 137 AV SW 8 ST	0.0	0.0	7.2	24.6
4050	SW 18 ST SW 137 AV	0.0	0.0	2.1	0.1
4083	SW 26 ST SW 124 AV	0.0	0.0	0.8	3.4
4084	SW 26 ST SW 127 AV	0.0	0.0	0.8	9.3
4085	SW 26 ST SW 129 AV	0.0	0.0	0.5	5.4
4086	SW 26 ST SW 130 AV	0.0	0.0	0.5	5.3
4087	SW 26 ST SW 131 PL	0.0	0.0	0.2	7.8
4088	SW 26 ST SW 134 AV	0.0	0.0	0.3	3.3
4092	SW 26 ST SW 134 AV	0.0	0.0	3.1	0.2
4093	SW 26 ST SW 132 AV N	0.0	0.0	11.0	1.5
4094	SW 26 ST SW 132 AV S	0.0	0.0	2.9	2.2
4095	SW 26 ST SW 130 AV	0.0	0.0	4.9	3.5
4096	SW 26 ST SW 129 AV	0.0	0.0	11.5	1.2
4097	SW 26 ST SW 127 AV	0.0	0.0	15.7	1.3
4098	SW 26 ST SW 124 AV	0.0	0.0	4.2	1.0
4535	W FLAGLER ST NW 73 CT	3.7	11.2	0.0	0.0
4536	W FLAGLER ST NW 74 AV	10.3	24.1	0.0	0.0
4537	W FLAGLER ST NW 76 AV	7.8	18.1	0.0	0.0
4538	W FLAGLER ST NW 79 AV	73.7	134.5	80.8	120.6
4539	W FLAGLER ST NW 82 AV	26.1	64.5	0.0	0.0
4540	W FLAGLER ST NW 84 AV	21.3	29.7	0.0	0.0
4541	W FLAGLER ST NW 87 AV	28.0	43.7	44.6	51.0
4542	W FLAGLER ST SW 87 AV	60.0	26.6	65.6	56.7
4543	W FLAGLER ST SW 84 AV	47.0	28.7	0.0	0.0
4544	W FLAGLER ST SW 82 AV	40.0	17.9	0.0	0.0
4545	W FLAGLER ST SW 78 PL	116.3	40.9	84.4	53.5
4546	W FLAGLER ST SW 78 AV	25.7	13.5	0.0	0.0
4547	W FLAGLER ST SW 76 CT	2.6	1.0	0.0	0.0
4548	W FLAGLER ST # 7400	16.7	10.9	0.0	0.0
4549	W FLAGLER ST GRAND CANAL	29.4	8.0	0.0	0.0
5027	NW 79 AV W FLAGLER ST	4.7	148.1	0.0	0.0
5028	NW 79 AV NW 2 ST	2.9	32.8	0.0	0.0
5031	NW 79 AV # 444	59.4	1.2	0.0	0.0
5032	NW 79 AV NW 2 ST	61.2	4.3	0.0	0.0
5338	W FLAGLER ST SW 102 AV	32.9	14.3	37.4	14.1
5339	W FLAGLER ST SW 99 CT	5.3	1.4	0.0	0.0
5340	W FLAGLER ST SW 98 CT	3.1	1.9	0.0	0.0
5341	W FLAGLER ST SW 97 AV	35.2	18.3	55.8	23.5
5342	W FLAGLER ST # 9440	48.7	12.9	0.0	0.0
5343	W FLAGLER ST # 9400	6.4	2.4	0.0	0.0
5344	W FLAGLER ST # 9250	7.9	2.0	15.4	6.4
5345	W FLAGLER ST SW 92 AV	4.1	1.9	0.0	0.0
5346	W FLAGLER ST FONTAINEBLEA	47.5	35.0	69.1	27.4
5347	W FLAGLER ST FONTAINEBLEA	33.6	55.2	27.1	50.9
5348	W FLAGLER ST OP # 9250	2.7	7.6	7.2	9.7
5349	W FLAGLER ST # 9301	1.3	4.2	0.0	0.0
5350	W FLAGLER ST OP # 9420	4.2	9.6	0.0	0.0
5351	W FLAGLER ST # 9501	11.6	67.1	0.0	0.0
5352	W FLAGLER ST NW 97 AV	24.4	29.2	26.4	65.8
5353	W FLAGLER ST OP SW 98 CT	1.7	2.5	0.0	0.0
5354	W FLAGLER ST # 9925	2.9	6.5	0.0	0.0

5355	W FLAGLER ST NW 102 AV	7.2	26.1	11.7	42.1
5356	W FLAGLER ST OP SW 103 AV	1.6	18.3	0.0	0.0
5357	W FLAGLER ST APPROX # 105	4.7	37.4	0.0	0.0
5358	W FLAGLER ST NW 108 CT	0.0	0.0	3.0	6.0
5359	W FLAGLER ST NW 109 AV	0.0	0.0	5.5	41.2
5360	W FLAGLER ST # 11495	0.0	0.0	15.3	75.7
5361	WALSH BD SW 4 ST	0.0	0.0	1.9	7.1
5362	WALSH BD SW 5 ST	0.0	0.0	3.4	13.1
5363	WALSH BD SW 5 ST	0.0	0.0	10.7	2.4
5364	WALSH BD SW 4 ST	0.0	0.0	8.3	1.3
6659	NE 1 ST NE 3 AV	37.5	56.0	0.0	0.0
6660	NE 1 ST NE 2 AV	248.0	170.3	0.0	0.0
6661	NE 1 ST NE 1 AV	238.4	52.8	0.0	0.0
6662	NW 1 ST N MIAMI AV	217.6	71.5	0.0	0.0
8026	W FLAGLER ST NW 6 AV	168.1	94.1	0.0	0.0
8027	W FLAGLER ST NW 7 AV	105.0	80.4	0.0	0.0
8028	W FLAGLER ST NW 8 AV	106.1	81.3	0.0	0.0
8029	W FLAGLER ST NW 9 AV	113.6	84.9	0.0	0.0
8030	W FLAGLER ST NW 10 AV	175.1	202.5	0.0	0.0
8031	W FLAGLER ST NW 12 AV	445.2	380.8	295.1	175.5
8032	W FLAGLER ST NW 13 AV	186.2	84.5	0.0	0.0
8033	W FLAGLER ST NW 15 AV	114.8	124.4	0.0	0.0
8034	W FLAGLER ST NW 16 AV	172.5	177.8	0.0	0.0
8035	W FLAGLER ST NW 18 AV	121.9	105.6	0.0	0.0
8036	W FLAGLER ST OP SW 20 AV	169.5	141.6	0.0	0.0
8037	W FLAGLER ST NW 23 AV	102.9	109.2	0.0	0.0
8038	W FLAGLER ST NW 25 AV	43.5	74.0	0.0	0.0
8039	W FLAGLER ST # 2987	45.0	33.8	0.0	0.0
8040	W FLAGLER ST NW 30 AV	36.1	37.0	0.0	0.0
8041	W FLAGLER ST NW 31 AV	24.2	45.3	0.0	0.0
8042	W FLAGLER ST NW 32 CT	18.5	34.4	0.0	0.0
8043	W FLAGLER ST NW 33 AV	18.9	36.8	0.0	0.0
8044	W FLAGLER ST NW 35 AV	18.8	48.0	0.0	0.0
8045	W FLAGLER ST NW 36 CT	42.1	210.8	0.0	0.0
8046	W FLAGLER ST OP SW 38 AV	24.7	33.9	0.0	0.0
8047	W FLAGLER ST NW 39 AV	15.6	29.0	0.0	0.0
8048	W FLAGLER ST NW 40 AV	8.6	33.0	0.0	0.0
8049	W FLAGLER ST NW 43 AV	92.0	95.2	0.0	0.0
8050	W FLAGLER ST NW 43 PL	16.0	22.5	0.0	0.0
8051	W FLAGLER ST NW 45 AV	11.5	27.2	0.0	0.0
8052	W FLAGLER ST NW 47 AV	49.8	79.2	0.0	0.0
8053	W FLAGLER ST NW 48 AV	33.3	43.7	0.0	0.0
8054	W FLAGLER ST NW 49 AV	20.0	39.3	0.0	0.0
8055	W FLAGLER ST NW 51 AV	26.9	52.4	0.0	0.0
8056	W FLAGLER ST NW 53 AV	56.5	90.1	0.0	0.0
8057	W FLAGLER ST NW 55 AV	3.8	10.4	0.0	0.0
8058	W FLAGLER ST NW 56 AV	7.4	15.2	0.0	0.0
8059	W FLAGLER ST NW 57 AV	47.2	101.3	0.0	0.0
8060	W FLAGLER ST NW 58 AV	28.4	35.1	0.0	0.0
8061	W FLAGLER ST NW 59 AV	11.2	22.8	0.0	0.0
8062	W FLAGLER ST NW 60 AV	6.0	21.8	0.0	0.0
8063	W FLAGLER ST NW 61 AV	18.6	23.9	13.2	19.9

8064	W FLAGLER ST NW 62 CT	10.2	19.0	0.0	0.0
8065	W FLAGLER ST NW 64 AV	13.1	28.3	0.0	0.0
8066	W FLAGLER ST NW 65 AV	13.0	44.0	0.0	0.0
8067	W FLAGLER ST NW 67 CT	55.5	133.7	36.7	53.2
8068	W FLAGLER ST NW 69 AV	7.7	17.3	0.0	0.0
8069	W FLAGLER ST SW 71 AV	22.8	9.3	0.0	0.0
8070	W FLAGLER ST SW 69 AV	17.9	8.5	0.0	0.0
8071	W FLAGLER ST SW 67 CT	42.3	15.2	0.0	0.0
8072	W FLAGLER ST SW 67 AV	87.7	32.9	36.4	29.8
8073	W FLAGLER ST SW 66 AV	27.9	8.2	0.0	0.0
8074	W FLAGLER ST SW 64 CT	30.7	8.8	0.0	0.0
8075	W FLAGLER ST SW 63 CT	23.0	8.1	0.0	0.0
8076	W FLAGLER ST SW 62 CT	13.0	12.3	0.0	0.0
8077	W FLAGLER ST SW 61 AV	42.6	16.1	30.6	19.7
8078	W FLAGLER ST SW 60 AV	4.3	1.5	0.0	0.0
8079	W FLAGLER ST SW 59 AV	25.8	12.6	0.0	0.0
8080	W FLAGLER ST SW 58 AV	27.9	28.6	0.0	0.0
8081	W FLAGLER ST SW 57 AV	104.4	38.6	0.0	0.0
8082	W FLAGLER ST SW 56 AV	16.1	6.6	0.0	0.0
8083	W FLAGLER ST SW 55 AV	12.2	15.7	0.0	0.0
8084	W FLAGLER ST SW 52 CT	85.2	49.4	0.0	0.0
8085	W FLAGLER ST SW 51 PL	39.3	20.0	0.0	0.0
8086	W FLAGLER ST SW 50 AV	44.6	21.4	0.0	0.0
8087	W FLAGLER ST SW 48 AV	55.1	31.8	0.0	0.0
8088	W FLAGLER ST SW 47 AV	83.4	39.6	0.0	0.0
8089	W FLAGLER ST SW 45 AV	21.6	12.1	0.0	0.0
8090	W FLAGLER ST SW 44 AV	31.8	21.5	0.0	0.0
8091	W FLAGLER ST SW 43 AV	62.9	61.6	0.0	0.0
8092	W FLAGLER ST SW 40 AV	53.7	23.0	0.0	0.0
8093	W FLAGLER ST SW 38 CT	30.1	21.0	0.0	0.0
8094	W FLAGLER ST SW 38 AV	43.2	34.4	0.0	0.0
8095	W FLAGLER ST SW 37 AV	311.2	175.2	89.0	90.8
8096	W FLAGLER ST SW 36 AV	43.9	11.7	0.0	0.0
8097	W FLAGLER ST SW 34 AV	16.0	10.9	0.0	0.0
8098	W FLAGLER ST SW 33 AV	54.7	20.5	0.0	0.0
8099	W FLAGLER ST SW 32 AV	51.0	29.7	0.0	0.0
8100	W FLAGLER ST SW 31 AV	24.1	15.9	0.0	0.0
8101	W FLAGLER ST SW 30 AV	54.8	31.9	0.0	0.0
8102	W FLAGLER ST SW 29 AV	20.6	21.2	0.0	0.0
8103	W FLAGLER ST # 2520	110.8	42.3	0.0	0.0
8104	W FLAGLER ST # 2446	67.2	27.0	0.0	0.0
8105	SW 1 ST SW 23 AV	109.1	85.5	0.0	0.0
8107	SW 1 ST SW 21 AV	206.0	179.7	0.0	0.0
8108	SW 1 ST SW 18 CT	82.4	62.0	0.0	0.0
8109	SW 1 ST SW 18 AV	137.1	74.8	0.0	0.0
8110	SW 1 ST SW 15 AV	108.2	48.7	0.0	0.0
8111	SW 1 ST SW 14 AV	116.7	85.1	0.0	0.0
8112	SW 1 ST SW 13 AV	101.8	157.4	0.0	0.0
8113	SW 1 ST SW 12 AV	299.9	214.8	127.9	269.3
8114	SW 1 ST SW 11 AV	99.3	73.0	0.0	0.0
8115	SW 1 ST SW 10 AV	149.4	88.7	0.0	0.0
8116	SW 1 ST SW 9 AV	99.8	74.3	0.0	0.0

8117	SW 1 ST SW 8 AV	130.4	115.9	0.0	0.0
8118	SW 1 ST SW 6 AV	103.0	101.2	0.0	0.0
8119	SW 1 ST SW 5 AV	61.1	68.6	0.0	0.0
9351	SW 107 AV SW 6 ST	23.9	6.3	0.0	0.0
9352	SW 107 AV SW 3 ST	4.8	21.4	0.0	0.0
9353	SW 107 AV SW 5 ST	13.3	26.2	0.0	0.0
9354	SW 107 AV SW 7 ST	3.7	22.8	0.0	0.0
9365	W FLAGLER ST SW 115 AV	0.0	0.0	27.8	6.3
9366	W FLAGLER ST SW 114 AV	0.0	0.0	72.8	13.3
9367	W FLAGLER ST SW 114 AV	0.0	0.0	44.0	3.5
9368	W FLAGLER ST SW 113 AV	0.0	0.0	21.7	6.6
9369	W FLAGLER ST SW 112 AV	0.0	0.0	96.5	12.7
9370	W FLAGLER ST SW 109 AV	0.0	0.0	36.2	9.2
9371	W FLAGLER ST SW 108 AV	0.0	0.0	54.2	30.9
9372	W FLAGLER ST SW 105 PL	27.2	6.1	0.0	0.0
9373	W FLAGLER ST SW 103 AV	7.1	2.4	0.0	0.0
9374	W FLAGLER ST NW 112 AV	0.0	0.0	14.6	83.4
9375	W FLAGLER ST # 11303	0.0	0.0	4.9	72.8
	Total:	12477.7	12387.2	3543.7	3607.5

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APPENDIX B QUEUE JUMP LANE ANALYSIS PHOTOGRAPHS

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SW 107th Avenue and SW 4th Street

1-1: AM Peak Northbound

1-2: AM Peak Southbound

1-3: PM Peak Northbound

1-4: PM Peak Southbound

SW 107th Avenue and Flagler Street

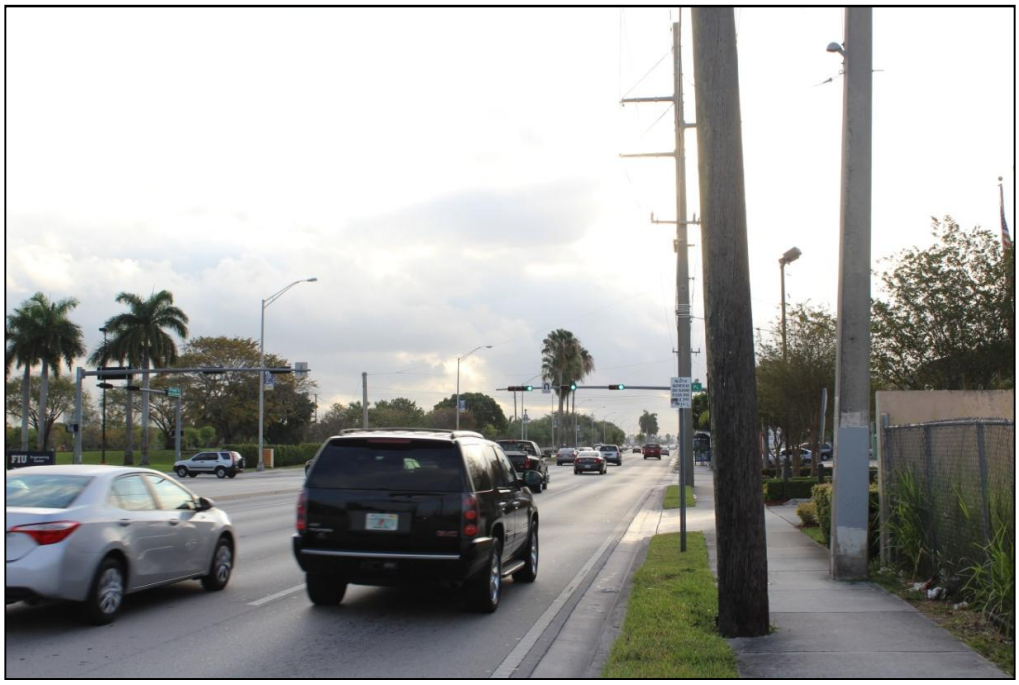
2-1: AM Peak North/Eastbound

2-2: AM Peak South/Westbound

2-3: PM Peak North/Eastbound

2-4: PM Peak South/Westbound

105th Place and Flagler Street



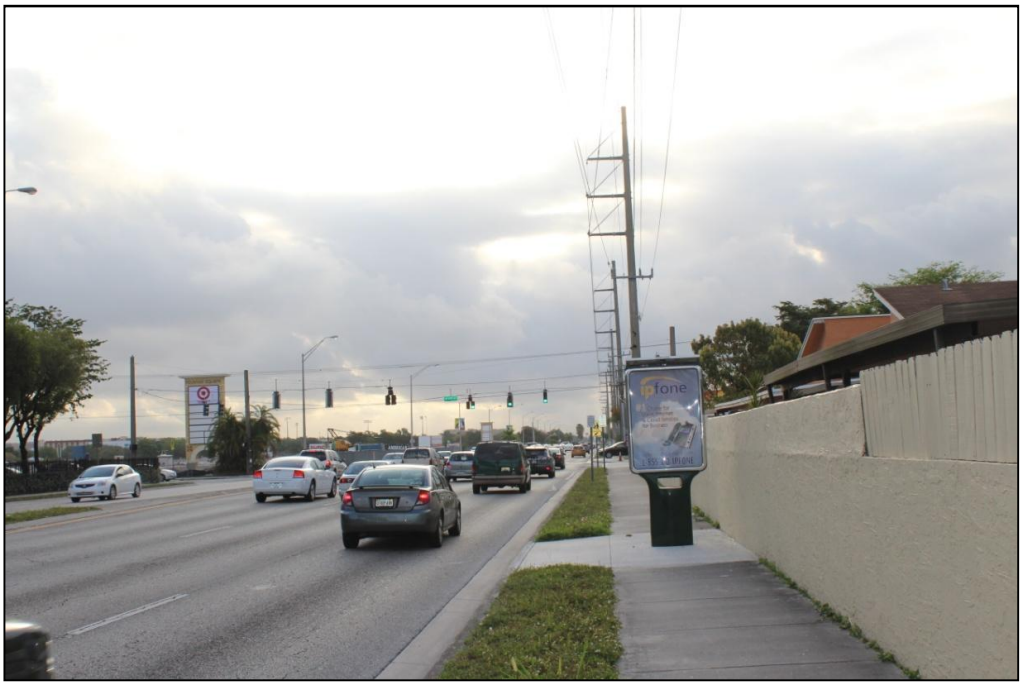
3-1: AM Peak Eastbound

3-2: AM Peak Westbound

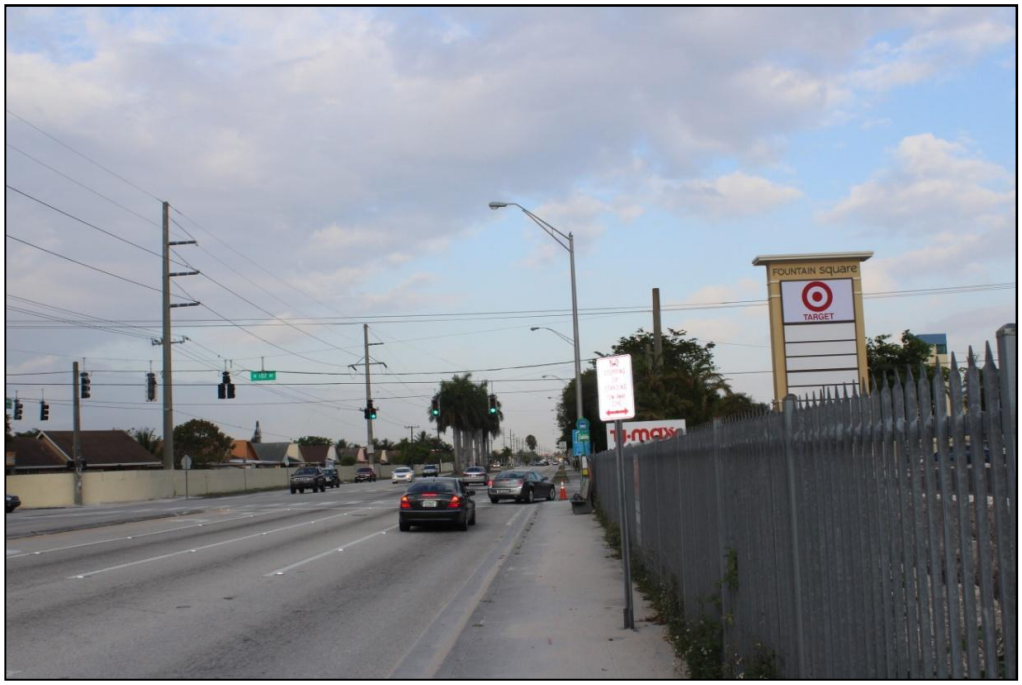
3-3: PM Peak Eastbound

3-4: PM Peak Westbound

102nd Avenue and Flagler Street



4-1: AM Peak Eastbound



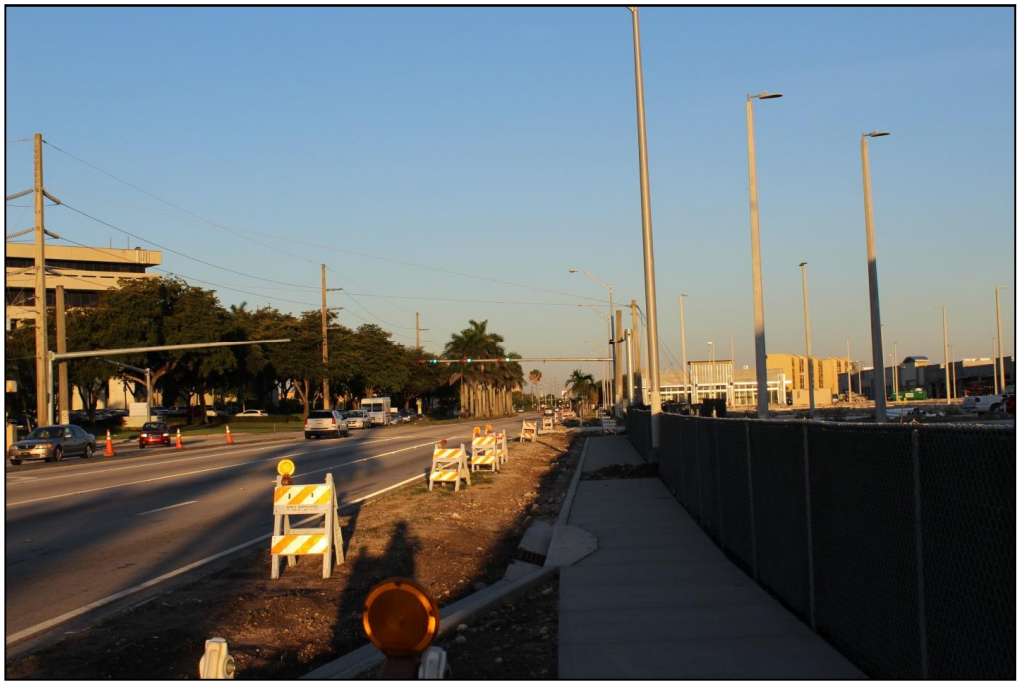
4-2: AM Peak Westbound

4-3: PM Peak Westbound

4-4: PM Peak Eastbound

92nd Avenue and Flagler Street

5-1: AM Peak Eastbound



5-2: AM Peak Westbound

5-3: PM Peak Eastbound

5-4: PM Peak Westbound

Fountainbleau Boulevard and Flagler Street

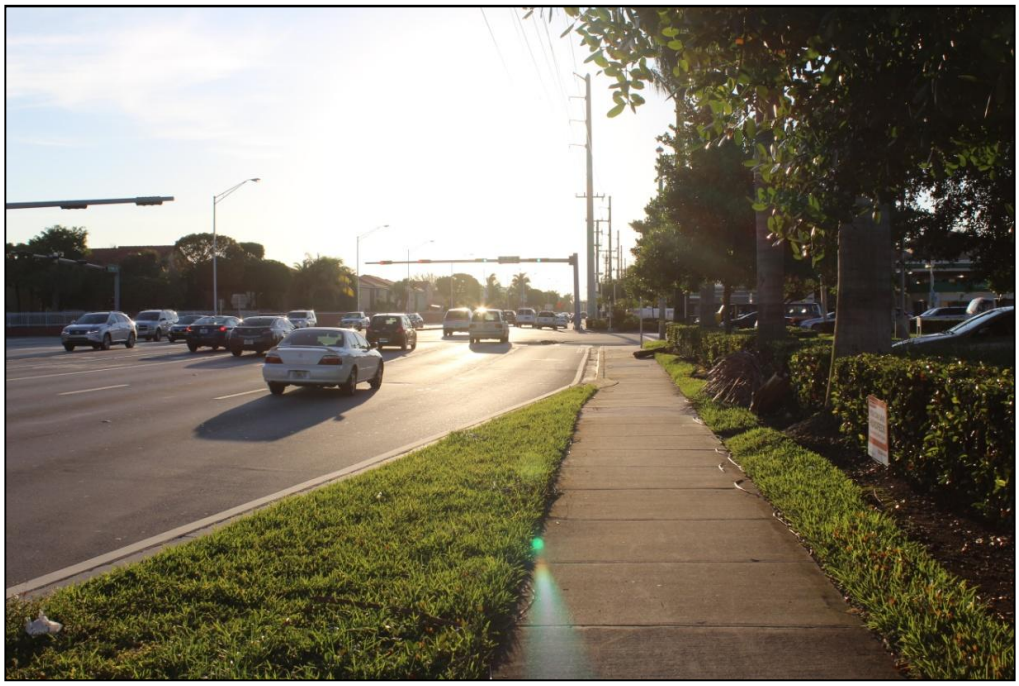
6-1: AM Peak Eastbound

6-2: AM Peak Westbound

6-3: PM Peak Eastbound

6-4: PM Peak Westbound

87th Avenue and Flagler Street



7-1: AM Peak Eastbound

7-2: AM Peak Westbound

7-3: PM Peak Westbound

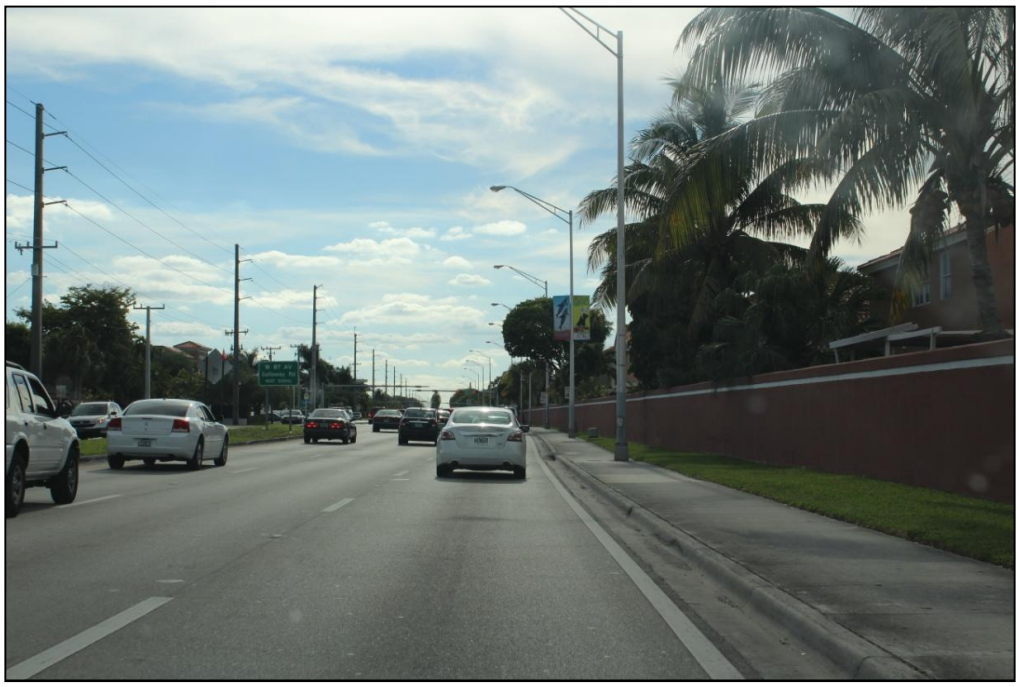
7-4: PM Peak Westbound

84th Avenue and Flagler Street

8-1: AM Peak Eastbound

8-2: AM Peak Westbound

8-3: PM Peak Eastbound



8-4: PM Peak Westbound

82nd Avenue and Flagler Street

9-1: AM Peak Eastbound

9-2: PM Peak Eastbound

9-3: PM Peak Westbound

79th Avenue and Flagler Street

10-1: AM Peak Eastbound

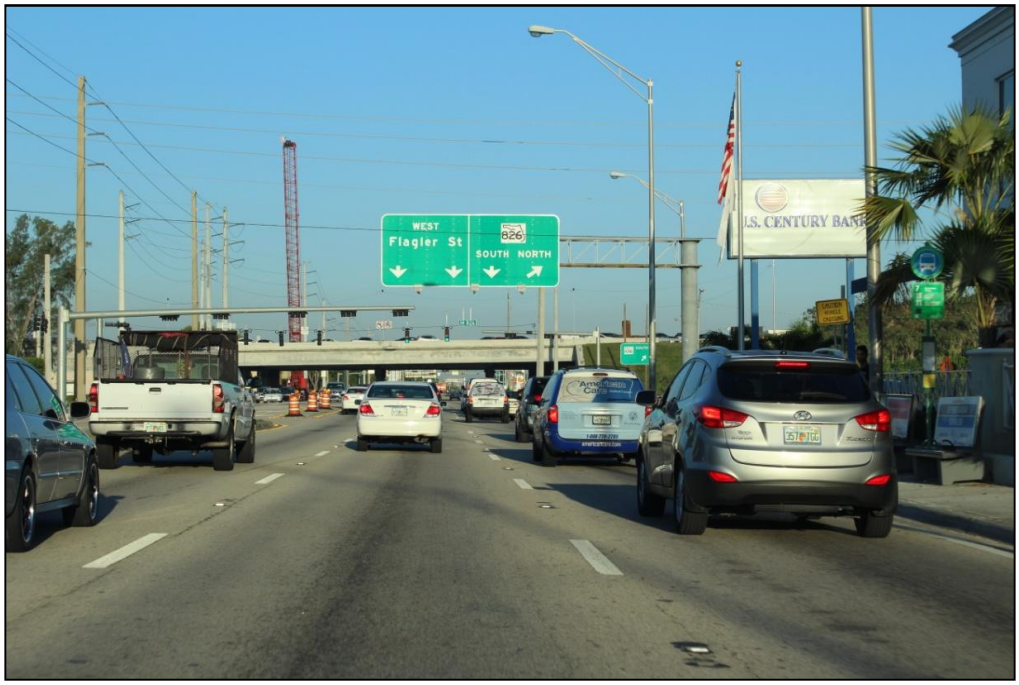
10-2: AM Peak Westbound

10-3: PM Peak Eastbound

10-4: PM Peak Westbound

76th Avenue and Flagler Street

11-1: AM Peak Eastbound



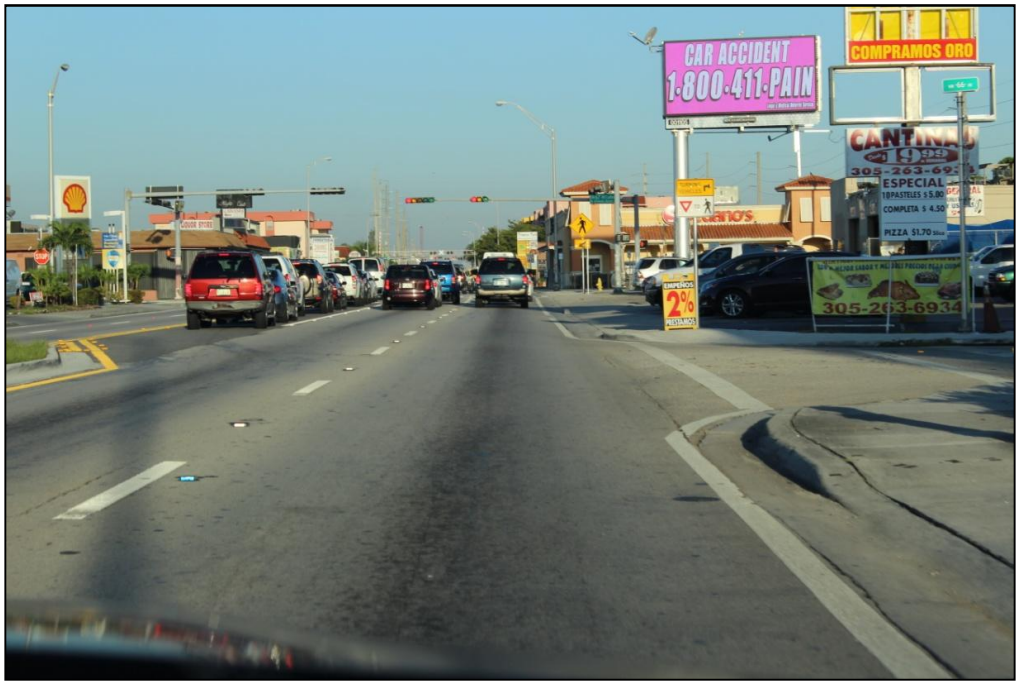
11-2: AM Peak Westbound

11-3: PM Peak Eastbound

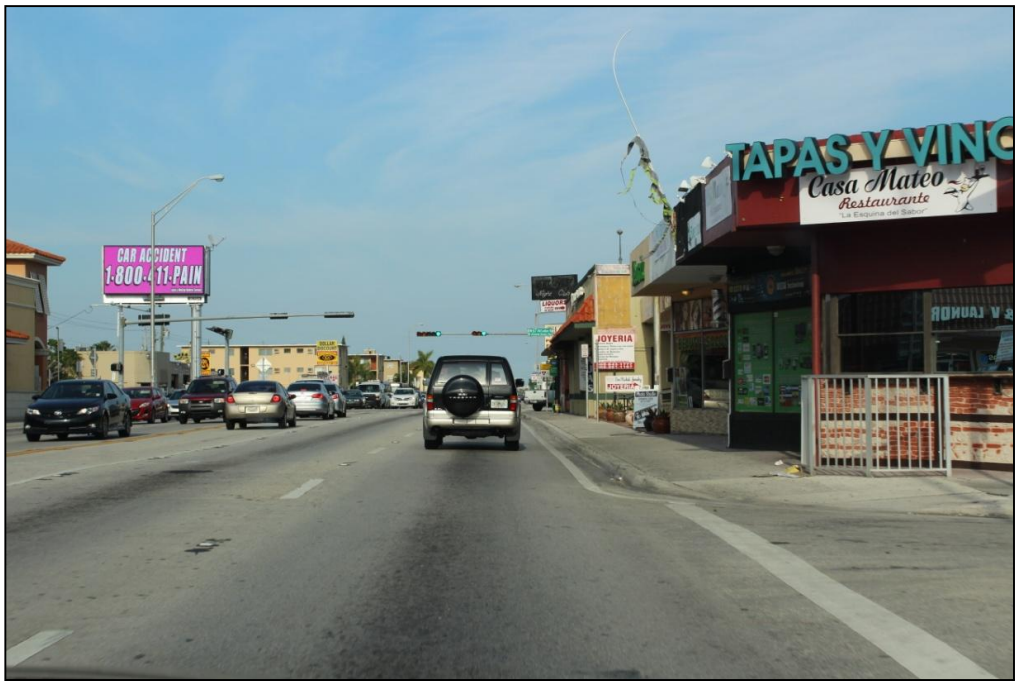
11-4: PM Peak Westbound

67th Avenue and Flagler Street

12-1: AM Peak Eastbound



12-2: AM Peak Westbound



12-3: PM Peak Eastbound

12-4: PM Peak Westbound

43rd Avenue and Flagler Street

13-1: AM Peak Westbound

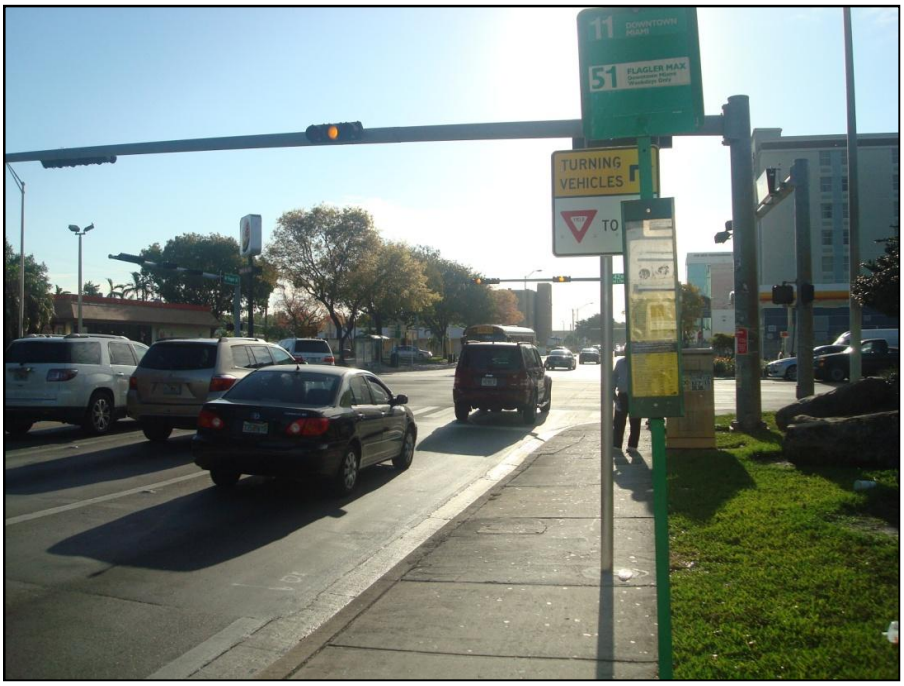
13-2: AM Peak Westbound

13-3: AM Peak Westbound

13-4: PM Peak Eastbound

13-5: PM Peak Westbound

42nd Avenue and Flagler Street



14-1: AM Peak Eastbound

14-2: AM Peak Westbound

14-3: AM Peak Eastbound

14-4: AM Peak Westbound

14-5: PM Peak Westbound

14-6: PM Peak Eastbound

37th Avenue and Flagler Street

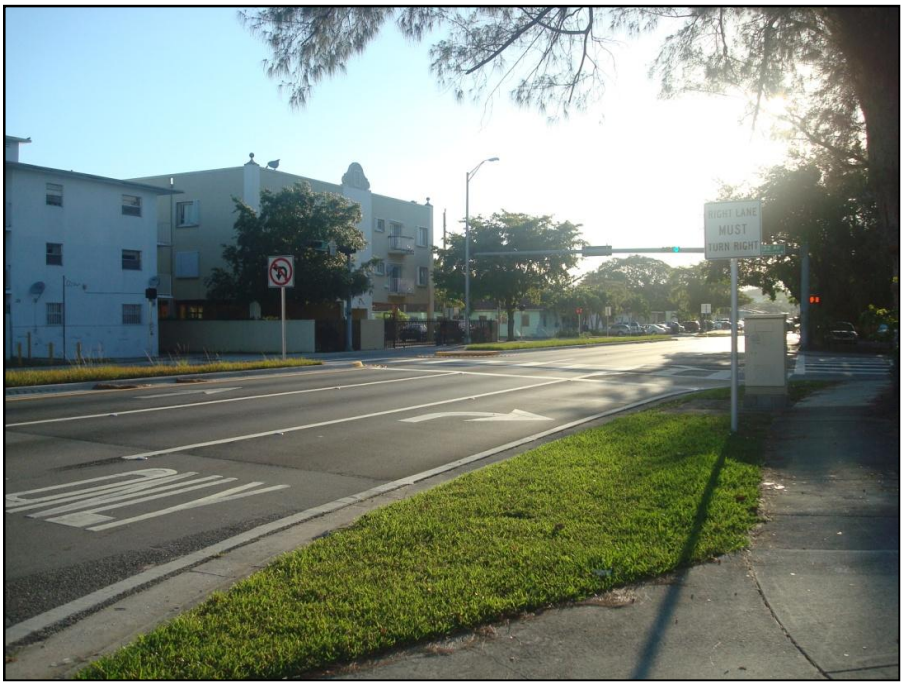
15-1: AM Peak Eastbound

15-2: AM Peak Westbound

15-3: PM Peak Westbound

15-4: PM Peak Eastbound

33rd Avenue and Flagler Street



16-1: AM Peak Eastbound

16-2: AM Peak Westbound

16-3: AM Peak Westbound

16-4: PM Peak Westbound

16-5: PM Peak Eastbound

22nd Avenue and Flagler Street

17-1: AM Peak Westbound

17-2: PM Peak Westbound

17th Avenue and Flagler Street

18-1: AM Peak Westbound

18-2: AM Peak Westbound

18-3: PM Peak Westbound

16th Avenue and Flagler Street

19-1: AM Peak Westbound

19-2: PM Peak Westbound

12th Avenue and Flagler Street

20-1: AM Peak Eastbound

20-2: AM Peak Westbound

20-3: AM Peak Westbound

20-4: PM Peak Eastbound

20-5: PM Peak Westbound

10th Avenue and Flagler Street

21-1: AM Peak Eastbound

21-2: AM Peak Westbound

21-3: PM Peak Eastbound

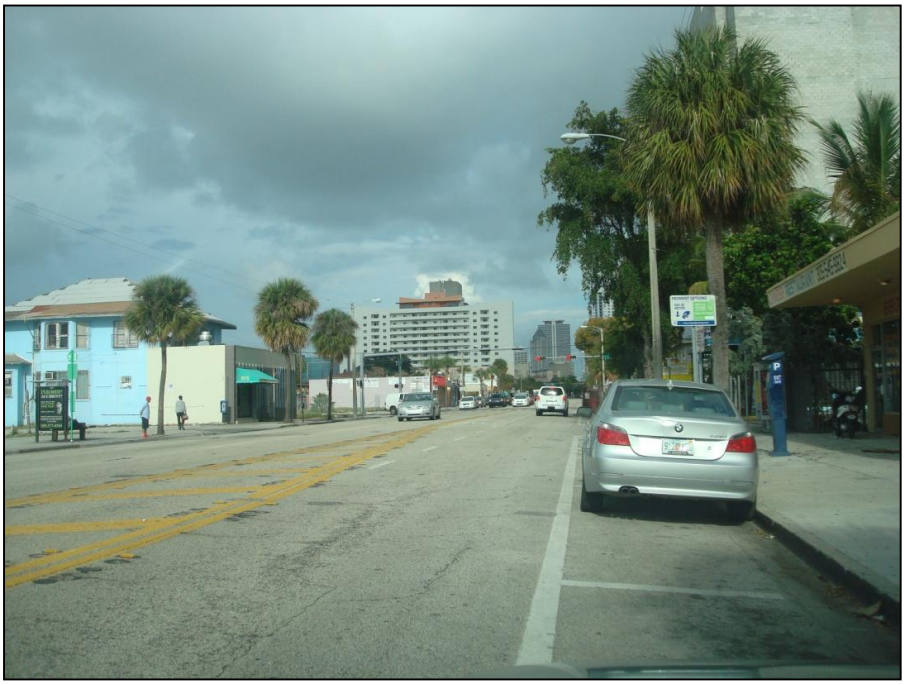
21-4: PM Peak Westbound

8th Avenue and Flagler Street

22-1: AM Peak Eastbound

22-2: AM Peak Westbound

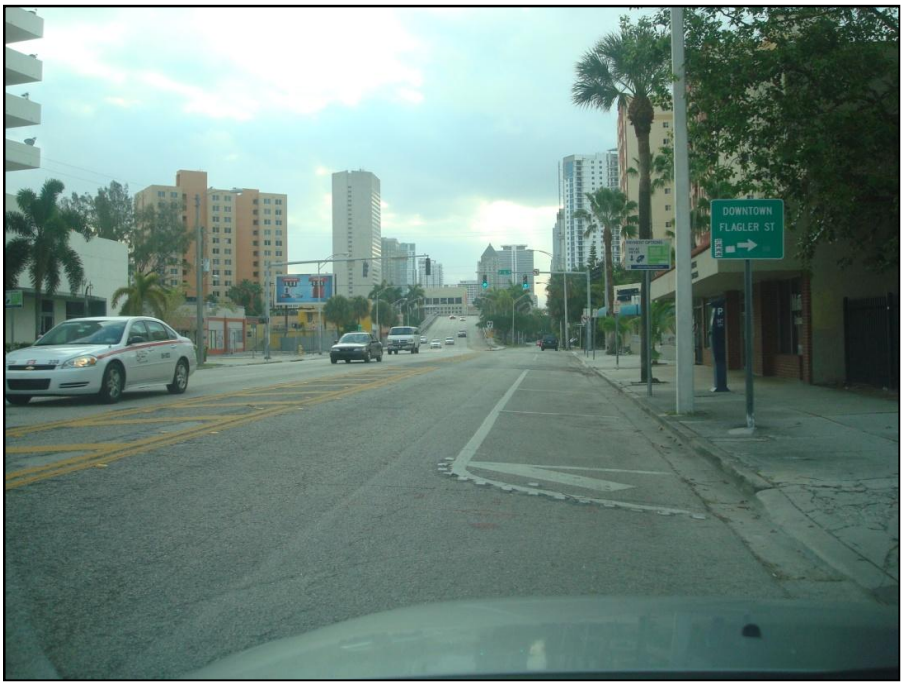
22-3: AM Peak Westbound



22-4: PM Peak Eastbound

22-5: PM Peak Westbound

6th Avenue and Flagler Street



23-1: AM Peak Eastbound

23-2: AM Peak Westbound

23-3: AM Peak Westbound

23-4: PM Peak Eastbound

23-5: PM Peak Westbound

APPENDIX C O&M COSTS METHODOLOGY AND WORKSHEETS

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Existing Service

Route 11	Round Trip Route Length (miles)	Travel Speed (miles per hour)	Round Trip Cycle Time (minutes)	Number of Vehicles in Max Service	Weekday Hours	Weekday Frequency	Weekday Trips	Weekdays	Annual Revenue Miles	Annual Revenue Hours
AM (12M - 530A)	35.5	22.7	94	2	5.5	60	7	255	63367.5	2796.5
AM Peak - FIU	25.5	11.3	136	10	3.5	15	11	255	71527.5	6358.0
AM Peak - Mall of the Americas	17.0	8.6	119	8	3.5	15	11	255	47685	5563.3
Midday - FIU	25.5	10.5	146	5	6	30	16	255	104040	9928.0
Midday - Mall of the Americas	17.0	8.5	120	4	6	30	16	255	69360	8160.0
PM Peak - FIU	25.5	9.2	166	12	4	15	13	255	84532.5	9171.5
PM Peak - Mall of the Americas	17.0	8.2	125	9	4	15	13	255	56355	6906.3
Evening - FIU	25.5	12.4	123	3	3	60	3	255	19507.5	1568.3
Evening - Mall of the Americas	17.0	10.9	94	2	3	60	3	255	13005	1198.5
Late Evening	35.5	18.5	115	2	2	60	2	255	18105	977.5
								Totals:	547485	52627.8

Route 11	Round Trip Route Length (miles)	Travel Speed (miles per hour)	Round Trip Cycle Time (minutes)	Number of Vehicles in Max Service	Saturday Hours	Saturday Frequency	Saturday Trips	Saturdays	Annual Revenue Miles	Annual Revenue Hours
AM (12M - 530A)	35.5	22.2	96	2	5.5	60	6	52	11076	499.2
AM Peak - FIU	25.5	14.0	109	8	3.5	15	8	52	10608	755.7
AM Peak - Mall of the Americas	17.0	10.7	95	7	3.5	15	7	52	6188	576.3
Midday - FIU	25.5	11.2	137	5	6	30	15	52	19890	1781.0
Midday - Mall of the Americas	17.0	9.2	111	4	6	30	15	52	13260	1443.0
PM Peak - FIU	25.5	11.3	136	10	4	15	9	52	11934	1060.8
PM Peak - Mall of the Americas	17.0	9.1	112	8	4	15	9	52	7956	873.6
Evening - FIU	25.5	14.2	108	2	3	60	3	52	3978	280.8
Evening - Mall of the Americas	17.0	11.5	89	2	3	60	5	52	4420	385.7
Late Evening	35.5	20.5	104	2	2	60	2	52	3692	180.3
								Totals:	93002	7836.4

Route 11	Round Trip Route Length (miles)	Travel Speed (miles per hour)	Round Trip Cycle Time (minutes)	Number of Vehicles in Max Service	Sundayy Hours	Sunday Frequency	Sunday Trips	Saturdays	Annual Revenue Miles	Annual Revenue Hours
AM (12M - 530A)	35.5	20.7	103	2	5.5	60	6	58	12354	597.4
AM Peak - FIU	25.5	13.8	111	8	3.5	15	6	58	8874	643.8
AM Peak - Mall of the Americas	17.0	11.3	90	6	3.5	15	5	58	4930	435.0
Midday - FIU	25.5	11.6	132	5	6	30	12	58	17748	1531.2
Midday - Mall of the Americas	17.0	9.6	106	4	6	30	12	58	11832	1229.6
PM Peak - FIU	25.5	11.6	132	5	4	30	8	58	11832	1020.8
PM Peak - Mall of the Americas	17.0	9.4	109	8	4	15	8	58	7888	842.9
Evening - FIU	25.5	14.3	107	2	3	60	2	58	2958	206.9
Evening - Mall of the Americas	17.0	11.6	88	2	3	60	3	58	2958	255.2
Late Evening	35.5	20.9	102	2	2	60	2	58	4118	197.2
								Totals:	85492	6960.0

Route 51	Round Trip Route Length (miles)	Travel Speed (miles per hour)	Round Trip Cycle Time (minutes)	Number of Vehicles in Max Service	Weekday Hours	Weekday Frequency	Weekday Trips	Weekdays	Annual Revenue Miles	Annual Revenue Hours
AM Peak - Coral Way	35.5	16.0	133	9	4	15	12	255	108630	6783
Midday - Coral Way	35.5	15.5	137	7	6	20	14	255	126735	8151.5
PM Peak - Coral Way	35.5	14.4	148	10	4	15	13	255	117682.5	8177
Evening - Coral Way	35.5	16.9	126	5	1	30	3	255	27157.5	1606.5
								Totals:	380205	24718

	Revenue Hours	Cost per Revenue Hour	Revenue Miles	Cost per Revenue Mile	Operations Cost
Existing Route 11	67,424	$52.65	725,979	$3.16	$5,843,975
Existing Route 51 - Flagler Max	24,718	$52.65	380,205	$3.16	$2,502,851
Total	92,142	-	1,106,184	-	$8,346,826

(Note: Cost per Revenue Hour/Mile Provided by MDT.)

Proposed Local Service

Route 11	Round Trip Route Length (miles)	Travel Speed (miles per hour)	Round Trip Cycle Time (minutes)	Number of Vehicles in Max Service	Weekday Hours	Weekday Frequency	Weekday Trips	Weekdays	Annual Revenue Miles	Annual Revenue Hours
AM - Mall of the Americas	17.0	20.7	54	3.0	6	24	15	255	65,025	3,455.4
AM - FIU	23.8	22.7	69	3.0	6	24	15	255	91,035	4,411.4
AM Peak - Mall of the Americas	17.0	8.6	130	14.0	3	10	18	255	78,030	9,980.6
Midday - Mall of the Americas	17.0	8.5	132	9.0	6	15	24	255	104,040	13,464.0
PM Peak - Mall of the Americas	17.0	8.2	137	14.0	4	10	24	255	104,040	13,956.6
Evening - Mall of the Americas	17.0	10.9	103	7.0	2.5	15	10	255	43,350	4,374.8
Late Evening - Mall of the Americas	17.0	18.5	61	3.0	2.5	24	7	255	30,345	1,804.3
Late Evening - FIU	23.8	20.5	77	4.0	2.5	24	7	255	42,483	2,279.6
								Totals:	558,348	53,726.6

Route 11	Round Trip Route Length (miles)	Travel Speed (miles per hour)	Round Trip Cycle Time (minutes)	Number of Vehicles in Max Service	Saturday Hours	Saturday Frequency	Saturday Trips	Saturdays	Annual Revenue Miles	Annual Revenue Hours
AM - Mall of the Americas	17.0	20.2	56	3.0	6	24	15	52	13,260	722.1
AM - FIU	23.8	22.2	71	3.0	6	24	15	52	18,564	919.8
AM Peak - Mall of the Americas	17.0	10.7	105	5.0	3	24	8	52	7,072	727.0
AM Peak - FIU	23.8	14.0	112	5.0	3	24	8	52	9,901	777.9
Midday - Mall of the Americas	17.0	9.2	122	6.0	6	24	15	52	13,260	1,585.4
Midday - FIU	23.8	11.2	140	6.0	6	24	15	52	18,564	1,823.3
PM Peak - Mall of the Americas	17.0	9.1	123	6.0	4	24	10	52	8,840	1,068.6
PM Peak - FIU	23.8	11.3	139	6.0	4	24	10	52	12,376	1,204.7
Evening - Mall of the Americas	17.0	11.5	98	5.0	5	24	13	52	11,492	1,099.2
Evening - FIU	23.8	14.2	111	5.0	5	24	13	52	16,089	1,246.3
								Totals:	129,418	11174.4

Route 11	Round Trip Route Length (miles)	Travel Speed (miles per hour)	Round Trip Cycle Time (minutes)	Number of Vehicles in Max Service	Sunday Hours	Sunday Frequency	Sunday Trips	Sundays	Annual Revenue Miles	Annual Revenue Hours
AM - Mall of the Americas	17.0	20.7	54	2.0	6	30	12	58	11,832	628.8
AM - FIU	23.8	22.7	69	3.0	6	30	12	58	16,565	802.7
AM Peak - Mall of the Americas	17.0	11.3	99	4.0	3	30	6	58	5,916	575.9
AM Peak - FIU	23.8	13.8	114	4.0	3	30	6	58	8,282	660.2
Midday - Mall of the Americas	17.0	9.6	117	4.0	6	30	12	58	11,832	1,355.8
Midday - FIU	23.8	11.6	135	5.0	6	30	12	58	16,565	1,570.8
PM Peak - Mall of the Americas	17.0	9.4	119	4.0	4	30	8	58	7,888	923.1
PM Peak - FIU	23.8	11.6	135	5.0	4	30	8	58	11,043	1,047.2
Evening - Mall of the Americas	17.0	11.6	97	4.0	5	30	10	58	9,860	935.0
Evening - FIU	23.8	14.3	110	4.0	5	30	10	58	13,804	1,061.8
								Totals:	113,587	9561.2

Proposed EBS

Flagler EBS	Round Trip Route Length (miles)	Travel Speed (miles per hour)	Round Trip Cycle Time (minutes)	Number of Vehicles in Max Service	Weekday Hours	Weekday Frequency	Weekday Trips	Weekdays	Annual Revenue Miles	Annual Revenue Hours
AM	23.8	18.0	87.3	5.0	1	20	3	255	18207	1112.7
AM Peak	23.8	18.0	87.3	9.0	3	10	18	255	109242	6675.9
Midday	23.8	17.0	92.4	5.0	6	20	18	255	109242	7068.6
PM Peak	23.8	16.0	98.2	10.0	4	10	24	255	145656	10013.9
Evening	23.8	17.0	92.4	5.0	2.5	20	8	255	48552	3141.6
								Totals:	430899	28012.6

Flagler EBS - Option B	Round Trip Route Length (miles)	Travel Speed (miles per hour)	Round Trip Cycle Time (minutes)	Number of Vehicles in Max Service	Weekday Hours	Weekday Frequency	Weekday Trips	Weekdays	Annual Revenue Miles	Annual Revenue Hours
AM	31.8	18.0	116.6	6.0	1	20	3	255	24327	1486.7
AM Peak	31.8	18.0	116.6	12.0	3	10	18	255	145962	8919.9
Midday	31.8	17.0	123.5	7.0	6	20	18	255	145962	9444.6
PM Peak	31.8	15.0	139.9	14.0	4	10	24	255	194616	14271.8
Evening	31.8	17.0	123.5	7.0	2.5	20	8	255	64872	4197.6
								Totals:	575739	38320.6

Projected Cost Calculations

	Revenue Hours	Cost per Revenue Hour	Revenue Miles	Cost per Revenue Mile	Operations Cost
Proposed Flagler EBS	28,013	$52.65	430,899	$3.16	$2,836,504
Proposed Local Service	74,462	$52.65	801,353	$3.16	$6,452,712
Total	102,475	-	1,232,252	-	$9,289,216

	Revenue Hours	Cost per Revenue Hour	Revenue Miles	Cost per Revenue Mile	Operations Cost
Proposed Flagler EBS - Option B	38,321	$52.65	575,739	$3.16	$3,836,914
Proposed Local Service	74,462	$52.65	801,353	$3.16	$6,452,712
Total	112,783	-	1,377,092	-	$10,289,626

Assumptions	
Cost per Revenue Hour	$52.65
Cost per Revenue Mile	$3.16

(Note: Cost per Revenue Hour/Mile Provided by MDT.)

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APPENDIX D CAPITAL COSTS – PHASE IMPLEMENTATION

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Flagler Enhanced Bus Service (EBS)

Downtown Miami to FIU Transit Terminal - Phase I

Preliminary Order of Magnitude Costs

				All Costs in 2013 Dollars		
				UNIT	ALLOCATED	*TOTAL*
ITEM DESCRIPTION	UNITS	QTY		COST	COSTS	*COST*
10 Guideway & Track Elements (route miles)						
20 Stations, Stops, Terminals, Intermodal (number)						*$ 3,630,300*
20.01 Station Type 1 - Marker Only	EA	10	$	69,000	$ 690,000	
20.01 Station Type 2 - Marker with Bench	EA	11	$	72,000	$ 792,000	
20.01 Station Type 3 - Slim Station with Marker	EA	7	$	210,900	$ 1,476,300	
20.01 Concrete Bus Stop Pad	EA	21	$	32,000	$ 672,000	
30 Support Facilities: Yards, Shops, Admin. Bldgs						
40 Sitework & Special Conditions						*$ 945,000*
40.02 Utility Work & Relocation	PER STA	28	$	12,500	$ 350,000	
40.01 Maintenance of Traffic	PER STA	28	$	15,000	$ 420,000	
40.01 Roadway Work Adjacent to Station	EA	7	$	15,000	$ 105,000	
40.01 Sidewalk Connection	PER STA	7	$	10,000	$ 70,000	
40.01 Queue Jump Implementation (Single Site)	PER INT	4	$	148,500	$ 594,000	
40.01 Queue Jump Implementation (Double Site)	PER INT	7	$	237,000	$ 1,659,000	
50 Systems						*$ 4,360,500*
50.02 Roadway Modification Allowance - Signal Prioritization	EA	57	$	76,500	$ 4,360,500	
Allocated Contingency						*$ 2,680,740*
Allocated Contigency		30%			$ 2,680,740	
SUBTOTAL - CONSTRUCTION COSTS						*$ 8,935,800*
60 ROW, Land, Existing Improvements						*$ -*
60.01 ROW Purchase at SW 42nd Avenue	ACRE	0.001	$	-	$ -	
60.01 ROW Purchase at NW 72nd Avenue	ACRE	0.001	$	-	$ -	
60.01 ROW Purchase at NW 57nd Avenue	ACRE	0.002	$	-	$ -	
60.01 ROW Purchase at SW 27th Avenue	ACRE	0.001	$	-	$ -	
60.01 ROW Purchase at NW 42nd Avenue	ACRE	0.003	$	-	$ -	
60.01 ROW Purchase at NW 27th Avenue	ACRE	0.003	$	-	$ -	
60.01 ROW Purchase at NW 107th Avenue	ACRE	0.005	$	-	$ -	
60.01 ROW Purchase at SW 96th Court	ACRE	0.001	$	-	$ -	
60.01 ROW Purchase at SW 12th Avenue	ACRE	0.002	$	-	$ -	
60.01 ROW Purchase at NW 12th Avenue	ACRE	0.002	$	-	$ -	
60.01 ROW Purchase at NW 17th Court	ACRE	0.002	$	-	$ -	
60.01 ROW Administrative Costs		20%			$ -	
60.01 ROW/Relocation Administrative Costs		24%			$ -	
60.02 Relocation Costs		20%			$ -	
70 Vehicles						*$ 11,400,000*
70.01 Purchase of EBS Vehicles	VEH	12	$	950,000	$ 11,400,000	
80 Professional Services						*$ 2,680,740*
80.01 Preliminary Engineering/Project Environmental		5%			$ 446,790	
80.02 Final Design		7%			$ 625,506	
80.03 Project Management for Design & Construction		2%			$ 178,716	
80.04 Construction Administration & Management		10%			$ 893,580	
80.06 Legal; Permits; Review Fees by other agencies, cities, etc.		3%			$ 268,074	
80.07 Surveys, Testing, Investigation, Inspection		3%			$ 268,074	
90 Unallocated Contingency						
90.01 Unallocated Contingency		5%			$ 1,150,827	
100 Finance Charges						
PRELIMINARY CAPITAL COST ESTIMATE	*(2013 Dollars)*					*$ 23,016,540*

Flagler Enhanced Bus Service (EBS)

Downtown Miami to FIU Transit Terminal - Phase II

Preliminary Order of Magnitude Costs

ITEM DESCRIPTION	UNITS	QTY	All Costs in 2013 Dollars: UNIT COST	ALLOCATED COSTS	TOTAL COST
10 Guideway & Track Elements (route miles)					$ -
20 Stations, Stops, Terminals, Intermodal (number)					$ -
30 Support Facilities: Yards, Shops, Admin. Bldgs					$ -
40 Sitework & Special Conditions					$ -
40.01 Queue Jump Implementation (Single Site)	PER INT	4	$ 148,500	$ 594,000	
40.01 Queue Jump Implementation (Double Site)	PER INT	12	$ 237,000	$ 2,844,000	
50 Systems					$ 9,673,440
50.03 Roadway Modification Allowance - Restricted Curbside Bus Lane	PER MI	4.80	$ 2,015,300	$ 9,673,440	
Allocated Contingency					$ 2,902,032
Allocated Contigency		30%		$ 2,902,032	
SUBTOTAL - CONSTRUCTION COSTS					$ 9,673,440
60 ROW, Land, Existing Improvements					$ -
60.01 ROW Administrative Costs		20%		$ -	
60.01 ROW/Relocation Administrative Costs		24%		$ -	
60.02 Relocation Costs		20%		$ -	
70 Vehicles					$ -
80 Professional Services					$ 2,902,032
80.01 Preliminary Engineering/Project Environmental		5%		$ 483,672	
80.02 Final Design		7%		$ 677,141	
80.03 Project Management for Design & Construction		2%		$ 193,469	
80.04 Construction Administration & Management		10%		$ 967,344	
80.06 Legal; Permits; Review Fees by other agencies, cities, etc.		3%		$ 290,203	
80.07 Surveys, Testing, Investigation, Inspection		3%		$ 290,203	
90 Unallocated Contingency					
90.01 Unallocated Contingency		5%		$ 628,774	
100 Finance Charges					
PRELIMINARY CAPITAL COST ESTIMATE	*(2013 Dollars)*				$ 12,575,472