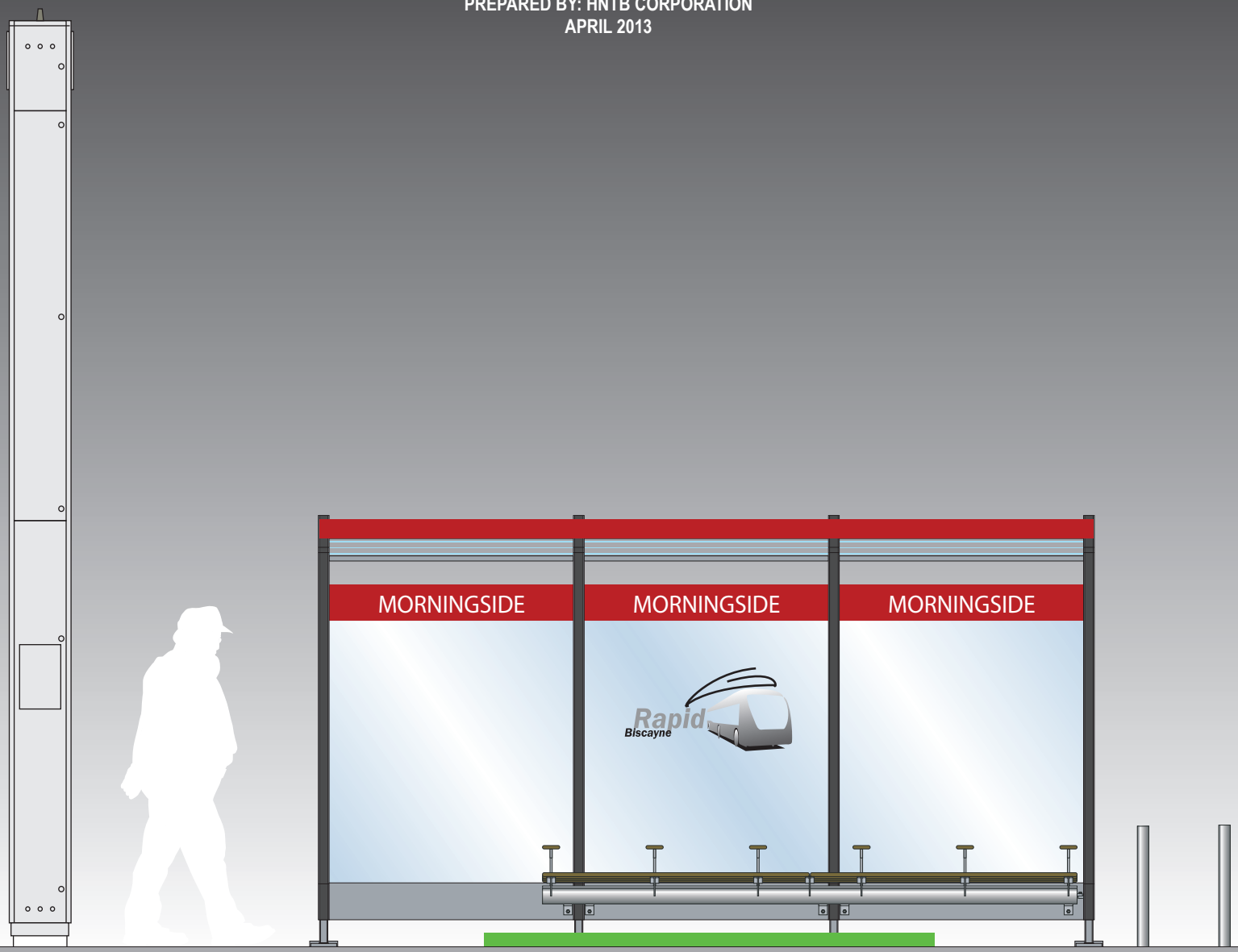
IMPLEMENTATION PLAN FOR ENHANCED BUS SERVICE ALONG BISCAYNE BOULEVARD

PREPARED FOR: MIAMI-DADE METROPOLITAN PLANNING ORGANIZATION

PREPARED BY: HNTB CORPORATION
APRIL 2013



The preparation of this report has been financed in part from the U.S. Department of Transportation (USDOT) through the Federal Highway Administration (FHWA) and/or the Federal Transit Administration (FTA), the State Planning and Research Program (Section 505 of Title 23, U.S. Code) and Miami-Dade County, Florida. The contents of this report do not necessarily reflect the official views or policy of the U.S. Department of Transportation.

RAPID BUS SERVICE

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Prepared for Miami-Dade Metropolitan Planning Organization

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Section 1

INTRODUCTION

The Biscayne Boulevard Corridor (Corridor), roughly defined as U.S. Route 1 from the Downtown Miami area to the Aventura Mall near the Miami-Dade – Broward County line, is one of the busiest transit corridors in Miami-Dade County (County). The Corridor extends approximately 15 miles through the historic core of the County that was developed along the Florida East Coast (FEC) railroad and links Aventura, North Miami, North Miami Beach, and Miami Shores with the County's Central Business District located in the Downtown Miami area.

The Corridor has been an integral part of the County's planning efforts. The foundation of the County's transit program was established in 1994 with the completion of the (Miami) Dade County Transit Corridors Transitional Analysis, which identified priority transit corridors and projected ridership and costs for developing each corridor. Based upon the results of that systemwide transit study, the County embarked on a number of detailed studies. However, a dedicated source of funding was not available. In 2002 the voters of Miami-Dade County passed a half-cent sales surtax that was dedicated to transportation funding, to implement premium transit services along nine corridors in the County. The plan, referred to as People's Transportation Plan (PTP), envisioned a premium transit service along the County's northeast portion. In 2005, the Miami-Dade Metropolitan Planning Organization (MPO), in partnership with the Florida Department of Transportation (FDOT), initiated a study along the South Florida East Coast Corridor (SFECC) for a fixed-guideway transit service. In between, the MPO in coordination with Miami-Dade Transit (MDT) developed Short- and Near-Term Transportation Plans to lay a foundation for future transit improvements along other transit corridors in the County.

Transit agencies across the nation are seeking new ways to increase ridership and to provide better service with limited resources. In recent years, transit agencies have investigated several options, including non-fixed-guideway systems such as buses. MDT adopted a similar approach and focused mainly on bus mode. Transit buses provide an essential transportation service in metropolitan areas, but are often viewed as slow and unreliable. MDT decided to enhance characteristics of bus mode to provide a better quality of service with more features. These transit improvements are referred to as "Enhanced Bus Services" (EBS).

The MPO has taken the lead to complete studies to develop implementation plans for Enhanced Bus Services. An EBS along Biscayne Boulevard will replace the existing Route 93. This study was tasked with identifying transit infrastructure improvements, defining service characteristics, capital needs, and fleet requirements. The scope of the implementation plan also included a branding plan, a strategy for developing a visual identity for all MDT enhanced bus services. This study seeks to maintain consistency with previous and ongoing planning efforts while advancing the status of transit planning in the County.

This implementation plan includes the following elements for a premium transit service along Biscayne Boulevard.

TRANSIT SIGNAL PRIORITY

The plan identifies candidate intersections for transit signal priority (TSP) implementation and prioritizes improvements based on the identified needs.

QUEUE JUMP LANES

The plan identifies candidate intersections for potential Queue Jump Lanes implementation and prioritizes improvements based on the identified needs. It also includes conceptual design, and provides preliminary cost estimates.

VISUAL IDENTITY

The plan includes visual identity guidelines that will also be used for similar services envisioned along Flagler Street, NW 27th Avenue, SR-836/SW 8th Street, and NW 37th Avenue.

STATION DESIGN

The plan identifies a station design to be used for the Biscayne Corridor and other similar premium transit corridor in the County. The plan also includes preliminary construction cost estimates for these stations.

STATION LOCATIONS

The plan identifies station locations for the Enhanced Bus Service (EBS). It also identifies right-of-way needs, constraints, and station locations in relation to the nearest intersection, a template that will be used for other similar studies.

IMPLEMENTATION PLAN

The plan identifies available funding and lays out an implementation plan for a premium transit service along the Biscayne Corridor.

ULTIMATE CONFIGURATION

The plan identifies a potential ultimate configuration for Biscayne Boulevard.

1.1 AGENCY COORDINATION EFFORTS

The project was directed by a Study Advisory Committee (SAC) headed by the MPO Project Manager. A list of SAC members is included as Appendix 1. The following list of meetings presents key dates in the progression of the Biscayne EBS Implementation Plan.

TABLE 1: **LIST OF AGENCY COORDINATION MEETINGS**

TYPE OF MEETING	DATE	TOPICS DISCUSSED
Study Advisory Kick-off Committee Meeting	January 24, 2012	• About the Study • Role of Study Advisory Committee • Overview – Biscayne Corridor and Services • Potential Service Improvements • Field Reconnaissance Survey Observations • Next Steps

2nd Study Advisory Committee Meeting	April 5, 2012	• About the Study
		• Items for Feedback
		• Overview – Biscayne Corridor and Services
		• Station Areas
		  • Locations
		  • ROW Constraints
		  • Other Constraints
		• Next Steps

3rd Study Advisory Committee Meeting	May 10, 2012	• Detailed Station Locations • Potential Transit Signal Priority Treatments • Potential Queue Jump Lane Configurations
4th Study Advisory Committee Meeting	July 5, 2012	• Queue Jump Lanes • Transit Signal Priority
Teleconference with Florida Department of Transportation (FDOT)	July 11, 2012	• Potential improvements along Biscayne Boulevard
Meeting with Miami-Dade Department of Public Works and Waste Management (PWWM)	August 1, 2012	• Potential Transit Signal Priority Treatments
5th Study Advisory Committee Meeting	October 3, 2012	• Potential Queue Jump Lanes

1.2 REPORT ORGANIZATION

The report is broadly categorized in the following sections:

SECTION 2: EVALUATION OF EXISTING SERVICES AND INFRASTRUCTURE

This section summarizes trip and passenger characteristics of existing services on Biscayne Boulevard and identifies services and infrastructure deficiencies. It also provides a description and characteristics of Biscayne Boulevard. In order to improve services, it is essential to understand the nature and character of the services that are being improved. Improvements, without an in-depth understanding, may not provide value for the investment as expected by the transit agency. The report includes an analysis which identifies limitations of the existing services along the Biscayne Corridor. Analysis methods, such as travel time runs, field observations, and data analysis were used to identify those deficiencies.

SECTION 3: DEFINING "ENHANCED BUS SERVICE" CONCEPT

This section defines the concept of an "Enhanced Bus Service". Irrespective of terminology, meaningful differentiation in service and infrastructure characteristics is essential to avoid duplication. The section lists how Enhanced Bus Services are envisioned to be different from other existing service types.

SECTION 4: DEVELOPMENT OF ACTION PLAN

This catch-all section includes a detailed list of recommendations related to infrastructure and services. Services characteristics of the Biscayne EBS are defined. Suitable station locations are identified and evaluated and a detailed description of necessary station improvements is provided. Vehicle needs envisioned for the planned EBS are identified as well. A detailed list of criteria for TSP and queue-jump lanes is included. A summary of the branding plan is included in this section and the complete plan, which is to be used for branding all EBS projects, is included in Appendix 4.

SECTION 5: IMPLEMENTATION PLAN

The implementation plan describes the process for the Biscayne EBS project as well as order-of-magnitude level itemized cost estimates. Available funding is identified and the anticipated funding short-fall for the Biscayne EBS project is also addressed.

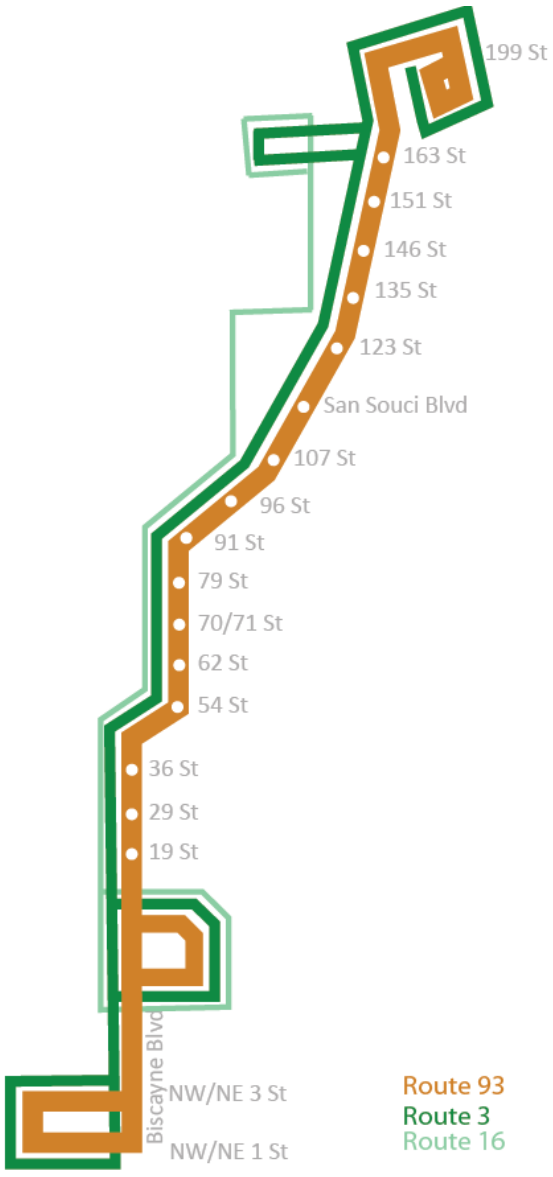
SECTION 6: RECOMMENDATIONS

Finally, the report includes a series of recommendations to improve and support the Biscayne EBS project. Several recommendations spanning from land-use to service implementation and infrastructure needs are included in this section.

Section 2

EVALUATION OF EXISTING INFRASTRUCTURE AND SERVICES

FIGURE 1: **MAJOR ROUTES ALONG BISCAYNE BOULEVARD**



A number of routes serve the entirety or portions of Biscayne Boulevard. There are three major routes that travel mainly on Biscayne Boulevard. These routes include: Route 3, Route 16, and Biscayne Max / Route 93 (Figure 1). Routes 3 and 16 are local services that also connect to the NE 163 Street Mall Transit Hub.

Biscayne Max or Route 93 travels from the Downtown Bus Terminal at Government Center located at NW 1 Avenue and NW 1 Street to Aventura Mall Food Court Bus Terminal approximately located at NE 29th Place and Aventura Mall Road. The subject corridor is approximately 14.7 mile long in the northbound direction and approximately 15.0 mile long in the southbound direction. Biscayne Max or Route 93 operates as a limited-stop service between NE 19 Street and NE 163 Street with 16 stops. The route makes all local stops between the Downtown Bus Terminal and NE 19 Street and, between NE 163 Street and Aventura Mall Bus Terminal. There are 80 signalized intersections along the route in the northbound direction and 78 signalized intersections in the southbound direction.

Other routes that serve different segments of Biscayne Boulevard are:

- Route 16
- Route 103/C
- Route 119/S
- Route 33
- Route 62
- Route 95
- Route 135
- Route 183

Service characteristics of Route 3 and 93 are included in Table 2. The data shows that Route 93, even though it is a limited-stop service, serves as many as half of the Route 3 stops on a per-mile basis.

Route 93 has more boardings per revenue hour, primarily due to its compressed service hours. It is one of the most successful limited-stop services in the MDT system.

TABLE 2: **SERVICE CHARACTERISTICS - ROUTE 3 AND 93**

SERVICE ATTRIBUTE	ROUTE 3	ROUTE 93
Route Length (miles)	18.5	15.4
On Biscayne	13.3	13.3
Peak Period Headway (mins)	18	18
Off-peak Period Headway (mins)	18 (mid-day) / 30 (late evening) / 60 (late night)	30
Service Hours	5:00 AM – 5:00 AM	5:45 AM - 8:15 PM
Number of Service Hours	24	14.5
Number of Stops (one direction)	101-111	34-48
On Biscayne Boulevard	72-77	26-28
Average Stop Spacing (miles)	0.17	0.48
On Biscayne Boulevard	0.17	0.41
Number of Average Weekday Boardings (July 2012)	8,241	4,003
Boardings per Revenue Hour (July 2012)	38.9	43.5

2.1 DATA COLLECTION EFFORTS

It is imperative that meaningful lessons are drawn from the existing services in designing a new service. The goal of any transit service plan is to improve service to the greatest extent possible. To achieve that goal, a series of questions were asked at the start of this effort. Data was collected and analyzed in an effort to address some of the questions. A more detailed description is included in Figure 2 and analysis in subsequent sections.

FIGURE 2: **DATA ANALYSIS EFFORTS**

QUESTION TO ANSWER	PURPOSE	LEVEL OF DETAIL	DATASET	SOURCE
- How can we make buses faster?	Understand causes of transit delay and identify locations where transit delay occurs	Route 93 travel time	Field data collection	HNTB Corporation
- What would it take to make buses more competitive against private autos?	Identity nature and extent of roadway congestion	Auto travel time	Field data collection	HNTB Corporation
- Who is riding the buses? - What are their trip characteristics?	Understand trip characteristics and users	By route	On-board Passenger Survey for Routes 3 and 93	Miami-Dade MPO
- Which are potential station areas?	Understand activity at each stop location Understand volume and nature of existing ridership	Ridership by stop by route	Automatic Passenger Counts for Routes 3 and 93	Miami-Dade Transit
- What can we realisticly build (stations, lanes, etc.)?	Right-of-Way Constraints	Ridership by time-of-day	US-1 As-built Drawings Property Appraiser Dataset	Florida Department of Transportation Miami-Dade County

2.2 RIDERSHIP CHARACTERISTICS

The Automatic Passenger Counter (APC) data for Routes 3 and 93 was collected and utilized to identify boardings and alightings by time-of-day, by stop location, and by route which provides an indication of spatial distribution of passenger demand along Biscayne Boulevard.

Tables 3 and 4 list northbound and southbound boardings for Route 93 by stop and by time-of-day. The data shows four locations with significant activity (sum of boardings and alightings): the CBD Terminal, the Omni Terminal, NE 79 Street, and the area around NE 123 Street. Generally, the data shows that east-west arterials are major trip activity areas. Also, the segment between NE 146 Street and the Miami Downtown area witnesses more consistent activity compared to the segment north of it. This could potentially be attributed to two factors: (1) the FEC railroad separates residential development and Biscayne Boulevard on the northern segment, further reducing walkability to transit services; and, (2) Route 93 makes all local stops north of NE 163 Street, thereby reducing activity concentration at each stop location.

According to the APC data, two peak periods (6 hours of the total 14.5 hours of service) account for nearly 55 to 60 percent of average daily activity (Tables 3 and 4). These numbers are similar to the Metrorail service, reflecting trip making characteristics unique to Miami-Dade County. According to the MPO's 2008 Metrorail On-Board Survey, Metrorail carries only about 57 percent of its daily ridership during peak periods.

Tables 5 and 6 are for northbound and southbound Route 3 by stop and by time-of-day. The data indicates that Route 3 carries only 35 percent of its average daily ridership during peak periods, a significantly lower number compared to Route 93. It is noteworthy that the route also has significantly more service during off-peak periods. Compared to Route 93, the segment south of NE 146 Street for Route 3 sees proportionately less activity. The midday ridership on the southbound local bus is consistent along the entire corridor. Stops at NE 79 Street show nearly 7 percent of the route activity – another similarity to Route 93 ridership pattern.

Overall, the analysis confirmed the activity nodes along Biscayne Boulevard. The NE 79 Street transfer point should be emphasized during development of the project. Generally, both routes share common activity nodes which indicate ridership potential at these locations. This data was utilized to identify potential station locations for the Enhanced Bus Service.

TABLE 3: **ROUTE 93 NORTHBOUND AVERAGE DAILY RIDERSHIP BY STOP AND BY TIME-OF-DAY**

STOP#	STREET	CROSS-STREET	EARLY MORNING		MORNING PEAK		MIDDAY		EVENING PEAK		LATE EVENING		ALL DAY		DAILY ACTIVITY	% OF TOTAL
			Ons	Offs	Ons	Offs	Ons	Offs	Ons	Offs	Ons	Offs	Ons	Offs		
40	CBD TERMINAL		6	0	139	0	134	0	107	0	26	4	412	4	416	10.8%
6663	SE 1 ST	SE 1 AV	0	0	15	0	17	3	17	2	4	0	54	5	59	1.5%
103	SE 1 ST	SE 3 AV	0	0	17	2	50	5	49	3	14	0	130	10	140	3.6%
6630	BISCAYNE BLVD	NE 2 ST	0	0	2	0	14	2	7	1	4	0	27	3	30	0.8%
6631	BISCAYNE BLVD	NE 4 ST	0	0	4	0	38	2	20	1	6	1	69	4	73	1.9%
6717	BISCAYNE BLVD	NE 6 ST	0	0	1	0	2	1	2	1	1	0	6	2	8	0.2%
6718	BISCAYNE BLVD	NE 9 ST	0	0	2	0	8	3	2	0	2	0	14	3	17	0.4%
39	OMNITERT		1	0	25	13	84	16	79	16	26	7	215	52	268	7.0%
6721	BISCAYNE BLVD	NE 20 ST	0	0	10	4	12	5	16	3	7	1	45	14	59	1.5%
6725	BISCAYNE BLVD	NE 29 ST	1	0	20	5	10	12	7	14	2	5	40	37	76	2.0%
43	BISCAYNE BLVD	NE 36 ST	1	0	32	14	27	25	31	19	7	6	98	64	161	4.2%
6735	BISCAYNE BLVD	NE 55 TE	3	3	22	3	24	19	14	14	3	4	66	43	109	2.8%
6739	BISCAYNE BLVD	NE 62 ST	2	0	23	4	19	13	13	16	2	7	60	39	99	2.6%
6743	BISCAYNE BLVD	NE 70 ST	1	0	6	6	7	8	5	7	3	4	22	25	47	1.2%
44	BISCAYNE BLVD	NE 79 ST	4	1	46	18	67	54	49	49	18	16	185	139	324	8.4%
8386	BISCAYNE BLVD	NE 91 ST	2	0	20	8	20	22	14	20	9	6	64	56	120	3.1%
8389	BISCAYNE BLVD	NE 96 ST	1	0	7	3	6	2	7	2	0	0	21	8	29	0.7%
5385	BISCAYNE BLVD	NE 108 ST	1	0	19	11	14	23	15	29	3	11	52	73	125	3.3%
5391	BISCAYNE BLVD	SANS SOUCI BLVD	2	1	18	11	17	27	9	23	3	8	48	69	117	3.1%
45	BISCAYNE BLVD	NE 123 ST	2	3	26	25	34	31	24	40	6	10	92	109	202	5.3%
8726	BISCAYNE BLVD	NE 135 ST	2	0	17	13	19	25	16	38	3	11	56	87	143	3.7%
8551	BISCAYNE BLVD	NE 146 ST	1	1	19	18	35	31	18	22	3	6	77	78	155	4.0%
46	BISCAYNE BLVD	NE 156 ST	0	0	7	19	9	27	8	20	2	8	27	74	101	2.6%
	BISCAYNE BLVD	NE 163 ST														
8553	BISCAYNE BLVD	NE 172 ST	0	0	1	2	1	4	1	9	0	1	4	17	21	0.5%
1353	BISCAYNE BLVD	NE 178 ST	0	0	2	6	3	4	1	5	0	2	6	18	24	0.6%
1354	BISCAYNE BLVD	NE 180 ST	0	0	2	4	2	4	0	4	0	0	5	12	17	0.4%
743	BISCAYNE BLVD	NE 182 ST	0	0	3	7	2	4	2	3	0	0	7	15	22	0.6%
1355	BISCAYNE BLVD	NE 183 ST	0	3	1	25	4	13	2	5	0	2	7	48	55	1.4%
1356	BISCAYNE BLVD	NE 186 ST	0	1	1	13	6	11	3	5	0	1	10	31	41	1.1%
1357	BISCAYNE BLVD	NE 187 ST	0	1	14	24	2	9	2	5	0	1	18	38	56	1.5%
1358	BISCAYNE BLVD	# 18999	0	0	0	13	0	4	0	3	0	1	1	21	22	0.6%
1359	BISCAYNE BLVD	NE 191 ST	0	0	0	6	1	8	1	4	0	1	3	20	23	0.6%
1383	AVENTURA BLVD	#2740	0	0	0	10	1	19	1	8	0	2	2	39	41	1.1%
1384	AVENTURA BLVD	NE 29 PL	0	15	1	124	2	95	0	55	0	15	3	305	308	8.0%
34	AVENTURA MALL		0	4	0	70	0	154	0	82	0	21	0	331	331	8.6%
	SUB-TOTAL		31	35	522	481	693	683	544	530	155	164	1,944	1,893	3,837	

TABLE 4: **ROUTE 93 SOUTHBOUND AVERAGE DAILY RIDERSHIP BY STOP AND BY TIME-OF-DAY**

STOP#	STREET	CROSS-STREET	EARLY MORNING		MORNING PEAK		MIDDAY		EVENING PEAK		LATE EVENING		ALL DAY		DAILY ACTIVITY	% OF TOTAL
			Ons	Offs	Ons	Offs	Ons	Offs	Ons	Offs	Ons	Offs	Ons	Offs		
34	AVENTURA MALL		7	0	57	0	102	0	123	0	14	0	303	0	303	10.0%
1363	NE 29 PL	AVENTURA BLVD	2	0	29	1	42	0	55	6	6	0	134	7	140	4.6%
1387	AVENTURA BLVD	NE 29 PL	1	0	22	0	22	0	31	1	3	0	78	1	79	2.6%
1388	AVENTURA BLVD	# 2845	0	0	6	0	5	0	9	0	1	0	21	0	22	0.7%
1347	BISCAYNE BLVD	NE 195 ST	0	0	3	0	5	0	9	2	1	0	18	2	21	0.7%
1348	BISCAYNE BLVD	NE 191 ST	0	0	3	1	9	1	11	3	2	0	24	5	29	0.9%
1349	BISCAYNE BLVD	# 19000	0	0	3	2	5	1	10	1	2	0	20	4	24	0.8%
742	BISCAYNE BLVD	NE 186 ST	0	0	3	3	3	1	4	1	0	0	10	4	14	0.5%
1350	BISCAYNE BLVD	NE 183 ST	1	1	15	4	27	5	33	4	2	0	79	14	93	3.1%
1351	BISCAYNE BLVD	NE 180 ST	0	0	3	2	5	4	4	3	0	0	12	9	21	0.7%
1352	BISCAYNE BLVD	NE 178 ST	0	0	8	0	7	3	7	3	0	0	23	6	29	1.0%
8554	BISCAYNE BLVD	NE 172 ST	0	0	10	0	6	1	5	3	0	0	21	4	25	0.8%
35	BISCAYNE BLVD	NE 163 ST	2	0	24	2	24	10	19	10	2	1	71	23	94	3.1%
8730	BISCAYNE BLVD	NE 151 ST	2	1	3	8	14	6	13	6	2	0	34	21	55	1.8%
8555	BISCAYNE BLVD	NE 146 ST	3	0	10	6	9	10	9	12	0	1	32	29	61	2.0%
8731	BISCAYNE BLVD	NE 135 ST	1	0	33	4	26	11	20	18	1	2	81	35	116	3.8%
36	BISCAYNE BLVD	NE 123 ST	0	1	32	13	30	22	29	24	3	2	94	62	156	5.2%
5392	BISCAYNE BLVD	SANS SOUCI BLVD	2	0	30	11	17	11	19	15	1	1	70	38	108	3.6%
5399	BISCAYNE BLVD	# 10700	4	0	22	7	32	11	16	11	2	1	76	30	106	3.5%
8397	BISCAYNE BLVD	NE 97 ST	0	0	1	3	1	7	4	3	1	0	6	13	19	0.6%
8401	BISCAYNE BLVD	NE 91 ST	2	1	13	5	24	20	16	18	1	2	57	45	102	3.4%
37	BISCAYNE BLVD	NE 79 ST	4	1	42	23	54	60	26	51	3	7	130	141	271	9.0%
6687	BISCAYNE BLVD	NE 71 ST	0	0	3	5	5	8	5	9	0	1	14	22	36	1.2%
6691	BISCAYNE BLVD	NE 62 ST	2	1	12	8	13	11	6	21	0	2	32	43	75	2.5%
6694	BISCAYNE BLVD	NE 54 ST	1	0	4	8	12	17	6	25	0	1	23	52	74	2.5%
38	BISCAYNE BLVD	NE 36 ST	0	1	3	24	8	30	4	45	0	4	15	103	118	3.9%
6706	BISCAYNE BLVD	NE 28 ST	2	0	2	6	5	13	3	15	0	2	12	36	49	1.6%
6711	BISCAYNE BLVD	NE 18 ST	0	0	0	7	5	12	2	11	0	1	8	32	40	1.3%
39	OMNITERT		1	4	8	54	15	66	13	46	1	4	37	174	211	7.0%
6714	BISCAYNE BLVD	NE 11 ST	0	0	0	2	0	1	0	1	0	1	1	5	6	0.2%
6715	BISCAYNE BLVD	NE 9 ST	0	1	1	39	1	29	1	13	0	0	3	82	85	2.8%
10269	NW 3 ST	N MIAMI AV	0	5	0	52	2	52	2	32	0	3	4	143	147	4.9%
40	CBD TERMINAL		0	15	0	78	0	96	0	92	0	10	0	292	292	9.7%
	SUB-TOTAL		38	32	407	375	535	521	511	503	49	47	1,541	1,479	3,019	

TABLE 5: **ROUTE 3 NORTHBOUND AVERAGE DAILY RIDERSHIP BY STOP AND BY TIME-OF-DAY**

STOP#	STREET	CROSS-STREET	EARLY MORNING		MORNING PEAK		MIDDAY		EVENING PEAK		LATE EVENING		ALLDAY		DAILY ACTIVITY	% OF TOTAL
			Ons	Offs	Ons	Offs	Ons	Offs	Ons	Offs	Ons	Offs	Ons	Offs		
40	CBD TERMINAL		16	0	82	1	153	2	90	1	121	0	462	4	466	6.1%
6663	SE 1 ST	SE 1 AV	0	0	11	1	24	8	18	5	16	7	69	21	90	1.2%
103	SE 1 ST	SE 3 AV	4	0	16	3	57	12	43	7	32	2	152	23	175	2.3%
6630	BISCAYNE BLVD	NE 2 ST	0	0	3	1	13	1	15	0	22	1	52	2	55	0.7%
6631	BISCAYNE BLVD	NE 4 ST	1	0	6	0	48	2	28	1	38	2	120	5	125	1.6%
6717	BISCAYNE BLVD	NE 6 ST	0	0	3	0	2	1	4	2	8	1	18	4	22	0.3%
6718	BISCAYNE BLVD	NE 9 ST	0	0	2	1	9	1	5	1	9	1	25	3	28	0.4%
39	OMNITERT		7	1	37	14	104	27	78	25	106	23	332	91	422	5.6%
6720	BISCAYNE BLVD	NE 18 ST	0	0	4	2	10	1	11	3	5	1	30	7	37	0.5%
6721	BISCAYNE BLVD	NE 20 ST	0	0	2	2	12	3	9	2	9	2	33	10	42	0.6%
6722	BISCAYNE BLVD	NE 21 ST	0	0	3	4	4	6	4	6	3	4	13	20	33	0.4%
6723	BISCAYNE BLVD	NE 23 ST	2	2	1	4	6	12	1	11	3	10	12	38	50	0.7%
6724	BISCAYNE BLVD	NE 25 ST	1	0	4	3	10	14	11	16	4	12	30	45	75	1.0%
6725	BISCAYNE BLVD	NE 29 ST	6	3	6	3	22	30	6	8	6	12	46	57	102	1.3%
6726	BISCAYNE BLVD	NE 30 ST	0	0	3	1	8	11	9	8	8	8	28	28	56	0.7%
6727	BISCAYNE BLVD	NE 32 ST	1	0	7	4	9	11	10	12	4	10	31	36	67	0.9%
6728	BISCAYNE BLVD	NE 35 ST	2	2	8	16	18	25	26	14	10	14	64	72	136	1.8%
43	BISCAYNE BLVD	NE 36 ST	2	5	4	5	14	8	12	4	9	5	41	27	68	0.9%
6729	BISCAYNE BLVD	NE 39 ST	1	0	5	2	25	6	21	3	14	1	65	12	77	1.0%
6730	BISCAYNE BLVD	OP # 4301	0	0	1	2	2	1	2	1	1	1	5	6	11	0.1%
6731	BISCAYNE BLVD	# 4501	0	0	0	10	2	7	6	2	2	2	11	20	31	0.4%
6732	BISCAYNE BLVD	OP # 4770	0	0	6	6	25	14	10	7	7	7	47	34	81	1.1%
6733	BISCAYNE BLVD	NE 50 TE	0	0	1	2	11	7	3	2	2	3	16	15	31	0.4%
6734	BISCAYNE BLVD	NE 52 ST	0	1	1	2	2	4	1	5	2	5	6	17	24	0.3%
6735	BISCAYNE BLVD	NE 55 TE	4	0	10	4	24	14	15	14	14	19	66	51	117	1.5%
6736	BISCAYNE BLVD	NE 56 ST	0	0	0	1	1	2	0	1	1	0	3	4	7	0.1%
6737	BISCAYNE BLVD	NE 58 ST	0	0	0	2	4	2	1	3	0	3	6	10	16	0.2%
6738	BISCAYNE BLVD	NE 60 ST	1	0	1	5	6	7	5	6	4	8	16	26	43	0.6%
6739	BISCAYNE BLVD	NE 62 ST	2	2	8	5	31	21	11	11	12	17	64	56	120	1.6%
6740	BISCAYNE BLVD	NE 64 ST	0	0	2	1	2	4	2	2	1	6	7	13	20	0.3%
6741	BISCAYNE BLVD	NE 66 ST	2	1	4	11	13	10	6	3	3	8	28	33	61	0.8%
6742	BISCAYNE BLVD	NE 68 ST	1	0	2	3	4	6	2	3	3	4	12	16	28	0.4%
6743	BISCAYNE BLVD	NE 70 ST	1	0	3	3	3	3	4	8	2	4	14	18	32	0.4%
6744	BISCAYNE BLVD	NE 72 TE	1	1	2	2	4	6	5	5	1	4	13	18	31	0.4%
6745	BISCAYNE BLVD	NE 75 ST	0	0	0	4	5	4	0	3	0	3	6	14	20	0.3%
6746	BISCAYNE BLVD	NE 77 ST	0	1	3	2	4	8	2	7	1	11	10	28	38	0.5%
44	BISCAYNE BLVD	NE 79 ST	11	3	37	10	93	70	48	42	44	39	233	163	396	5.2%
6747	BISCAYNE BLVD	NE 82 ST	2	0	7	2	10	7	6	4	6	7	30	20	51	0.7%
6748	BISCAYNE BLVD	NE 83 ST	0	0	5	11	7	9	4	5	1	8	18	33	51	0.7%
6749	BISCAYNE BLVD	NE 85 ST	4	2	6	2	11	20	6	8	5	10	32	43	75	1.0%
8385	BISCAYNE BLVD	NE 87 ST	0	0	3	7	4	9	1	7	3	5	11	28	39	0.5%
8386	BISCAYNE BLVD	NE 91 ST	1	2	11	6	27	32	17	16	11	13	68	70	138	1.8%

STOP#	STREET	CROSS-STREET	EARLY MORNING		MORNING PEAK		MIDDAY		EVENING PEAK		LATE EVENING		ALLDAY		DAILY ACTIVITY	% OF TOTAL
			Ons	Offs	Ons	Offs	Ons	Offs	Ons	Offs	Ons	Offs	Ons	Offs		
8387	BISCAYNE BLVD	NE 93 ST	0	0	1	1	1	1	1	0	0	1	3	3	6	0.1%
8388	BISCAYNE BLVD	0P # 9510	0	0	0	0	0	0	0	1	0	0	1	1	1	0.0%
8389	BISCAYNE BLVD	NE 96 ST	1	0	6	2	8	2	3	2	2	0	19	7	27	0.4%
8390	BISCAYNE BLVD	NE 98 ST	0	0	0	0	0	0	0	0	0	0	0	0	1	0.0%
8391	BISCAYNE BLVD	# 10055	0	0	0	1	1	1	1	0	0	1	1	3	4	0.1%
8392	BISCAYNE BLVD	NE 104 ST	0	0	0	0	0	0	0	0	0	0	1	0	1	0.0%
8393	BISCAYNE BLVD	NE 105 ST	0	0	1	5	3	23	1	8	2	11	7	46	53	0.7%
5385	BISCAYNE BLVD	NE 108 ST	6	2	12	13	30	21	13	19	6	22	66	78	144	1.9%
5386	BISCAYNE BLVD	NE 110 TE	0	0	8	3	8	13	5	8	0	8	22	33	55	0.7%
5387	BISCAYNE BLVD	NE 111 ST	2	1	7	10	11	6	1	5	2	8	23	30	54	0.7%
5388	BISCAYNE BLVD	11200 BLOCK	0	0	4	2	4	2	1	5	0	3	9	12	21	0.3%
5389	BISCAYNE BLVD	NE 116 ST	1	2	5	5	8	14	3	6	1	6	19	33	52	0.7%
5390	BISCAYNE BLVD	# 11707	4	1	5	6	4	13	1	9	1	7	15	37	51	0.7%
5391	BISCAYNE BLVD	SANS SOUCI BD	8	1	14	6	17	27	7	11	4	11	50	56	105	1.4%
8722	BISCAYNE BLVD	NE 121 ST	0	0	2	1	7	14	3	3	5	3	16	21	37	0.5%
45	BISCAYNE BLVD	NE 123 ST	3	4	18	22	35	39	15	26	16	30	88	120	208	2.7%
10270	BISCAYNE BLVD	NE 124 ST	2	0	1	2	5	5	6	1	3	4	16	12	28	0.4%
8723	BISCAYNE BLVD	NE 125 ST	0	1	2	7	9	8	8	10	1	2	20	28	48	0.6%
8724	BISCAYNE BLVD	NE 127 ST	1	4	3	12	12	17	4	5	3	3	22	42	64	0.8%
8725	BISCAYNE BLVD	IXORA LA	0	0	1	2	5	6	4	2	2	2	11	13	24	0.3%
8726	BISCAYNE BLVD	NE 135 ST	3	3	7	6	16	18	11	11	7	22	43	59	102	1.3%
8545	BISCAYNE BLVD	NE 135 ST	0	2	3	1	9	5	2	0	2	1	17	9	26	0.3%
8546	BISCAYNE BLVD	# 13675	0	0	0	0	1	1	0	0	0	0	1	1	3	0.0%
8547	BISCAYNE BLVD	OP # 13702	0	0	3	0	2	1	3	3	1	1	9	5	15	0.2%
8548	BISCAYNE BLVD	NE 139 ST	2	1	5	6	8	6	2	6	1	13	18	31	50	0.7%
8549	BISCAYNE BLVD	NE 140 ST	3	0	8	4	10	12	7	10	2	12	30	37	67	0.9%
8550	BISCAYNE BLVD	NE 143 ST	0	0	1	2	6	10	2	2	1	1	10	14	24	0.3%
8551	BISCAYNE BLVD	NE 146 ST	2	0	6	4	20	18	10	10	6	13	44	44	88	1.2%
8728	BISCAYNE BLVD	NE 156 ST	2	7	5	20	22	23	6	5	4	4	39	59	97	1.3%
46	BISCAYNE BLVD	NE 156 ST	1	2	0	0	1	1	0	1	1	1	2	5	8	0.1%
8662	NE 163 ST	NE 23 AV	0	2	5	14	13	30	7	17	2	17	27	80	107	1.4%
8663	NE 163 ST	NE 22 AV	1	0	3	1	6	2	4	1	0	1	14	5	19	0.2%
8664	NE 163 ST	NE 21 AV	1	1	2	2	11	11	1	2	0	2	15	17	32	0.4%
8665	NE 163 ST	NE 20 AV	1	0	4	4	4	6	1	6	0	2	11	17	28	0.4%
8666	NE 163 ST	NE 19 AV	8	1	10	5	10	19	4	17	4	12	35	55	90	1.2%
8667	NE 163 ST	NE 18 AV	2	1	7	5	10	13	2	6	2	2	22	27	49	0.6%
8668	NE 163 ST	NE 17 AV	0	1	4	5	6	13	3	2	1	2	14	24	37	0.5%
8669	NE 163 ST	NE 16 AV	0	0	2	5	4	8	1	3	0	2	7	18	25	0.3%
524	NE 163 ST	NE 15 AV	2	2	2	13	11	52	7	25	2	8	25	101	126	1.7%
523	NE 163 ST	NE 13 AV	3	9	6	23	23	65	13	27	7	15	53	140	193	2.5%
5731	NE 12 AV	NE 165 ST	2	3	10	7	10	12	3	5	2	5	27	34	60	0.8%
5732	NE 12 AV	NE 167 ST	2	10	3	24	3	4	3	4	1	2	12	45	57	0.8%

STOP#	STREET	CROSS-STREET	EARLY MORNING		MORNING PEAK		MIDDAY		EVENING PEAK		LATE EVENING		ALLDAY		DAILY ACTIVITY	% OF TOTAL
			Ons	Offs	Ons	Offs	Ons	Offs	Ons	Offs	Ons	Offs	Ons	Offs		
5828	NE 167 ST	NE 13 AV	1	0	5	1	13	3	6	3	1	0	26	8	34	0.4%
30	NE 167 ST	NE 15 AV	19	1	46	8	116	35	34	14	23	5	237	63	301	4.0%
8597	NE 15 AV	NE 167 ST	0	0	3	0	7	2	3	2	1	2	15	5	21	0.3%
8598	NE 15 AV	NE 170 ST	1	0	4	1	4	4	2	2	1	1	12	9	20	0.3%
8707	NE 171 ST	NE 15 AV	2	0	3	0	3	5	1	4	0	2	9	11	20	0.3%
8708	NE 171 ST	NE 16 AV	0	0	1	0	0	0	0	0	0	0	1	1	2	0.0%
8709	NE 171 ST	NE 17 AV	1	1	1	1	2	4	0	6	0	1	4	12	16	0.2%
8710	NE 171 ST	NE 18 AV	9	0	20	7	24	24	5	12	2	8	59	50	109	1.4%
8712	NE 171 ST	NE 22 AV	5	0	8	1	11	14	5	8	1	8	30	31	61	0.8%
8713	NE 172 ST	NE 23 AV	3	1	8	2	5	14	2	9	1	5	19	31	50	0.7%
8714	NE 172 ST	W DIXIE HY	1	0	6	1	10	10	3	6	2	6	22	23	45	0.6%
8553	BISCAYNE BLVD	NE 172 ST	1	0	2	2	4	2	1	0	1	0	8	4	12	0.2%
1353	BISCAYNE BLVD	NE 178 ST	1	1	6	3	4	4	2	1	0	2	13	10	23	0.3%
1354	BISCAYNE BLVD	NE 180 ST	0	0	1	4	8	5	2	1	1	0	11	11	22	0.3%
743	BISCAYNE BLVD	NE 182 ST	1	1	1	0	3	6	2	1	0	1	6	9	15	0.2%
1355	BISCAYNE BLVD	NE 183 ST	0	8	2	20	5	20	1	4	1	3	9	54	63	0.8%
1356	BISCAYNE BLVD	NE 186 ST	1	5	2	5	7	10	3	2	2	4	15	26	41	0.5%
1357	BISCAYNE BLVD	NE 187 ST	0	1	3	3	7	8	4	2	3	1	17	15	32	0.4%
1358	BISCAYNE BLVD	# 18999	0	0	1	7	4	8	1	1	0	2	6	19	25	0.3%
1359	BISCAYNE BLVD	NE 191 ST	0	1	0	3	2	5	4	6	0	2	6	18	24	0.3%
1383	AVENTURA BLVD	#2740	0	3	0	10	0	25	0	5	1	10	2	53	55	0.7%
1384	AVENTURA BLVD	# 2900	0	0	0	4	0	11	0	2	0	4	1	21	22	0.3%
1367	NE 29 PL	AVENTURA BD	0	41	0	76	2	69	2	29	2	28	6	241	247	3.3%
34	AVENTURA MALL		0	28	0	57	0	238	0	80	0	67	0	468	468	6.2%
	SUB-TOTAL		176	177	626	640	1,459	1,514	812	781	690	726	3,763	3,838	7,601	

TABLE 6: **ROUTE 3 SOUTHBOUND AVERAGE DAILY RIDERSHIP BY STOP AND BY TIME-OF-DAY**

STOP #	STREET	CROSS-STREET	EARLY MORNING		MORNING PEAK		MIDDAY		EVENING PEAK		LATE EVENING		ALLDAY		DAILY ACTIVITY	% OF TOTAL
			Ons	Offs	Ons	Offs	Ons	Offs	Ons	Offs	Ons	Offs	Ons	Offs		
34	AVENTURA MALL		5	0	32	0	168	3	75	0	189	0	469	3	472	6.3%
1363	NE 29 PL	AVENTURA BLVD	6	0	19	1	47	4	23	1	78	15	173	20	193	2.6%
1387	AVENTURA BLVD	NE 29 PL	0	0	7	0	14	2	11	0	23	1	56	3	59	0.8%
1388	AVENTURA BLVD	# 2845	0	0	3	0	12	1	8	0	13	1	36	2	38	0.5%
1389	AVENTURA BLVD	BISCAYNE BLVD	0	0	1	1	1	0	4	0	4	1	9	2	12	0.2%
1347	BISCAYNE BLVD	NE 195 ST	0	0	1	0	3	1	18	0	5	1	28	2	30	0.4%
1348	BISCAYNE BLVD	NE 191 ST	0	0	1	1	5	3	5	1	10	2	21	8	29	0.4%
1349	BISCAYNE BLVD	# 19000	0	0	1	2	5	1	3	1	7	1	16	5	21	0.3%
742	BISCAYNE BLVD	NE 186 ST	0	0	0	0	9	6	1	0	1	0	11	7	18	0.2%
1350	BISCAYNE BLVD	NE 183 ST	1	0	6	4	28	10	17	4	22	5	74	22	96	1.3%
1351	BISCAYNE BLVD	NE 180 ST	0	0	1	2	4	5	2	2	6	5	13	14	27	0.4%
1352	BISCAYNE BLVD	NE 178 ST	0	0	1	1	8	4	2	1	2	6	13	11	24	0.3%
8554	BISCAYNE BLVD	NE 172 ST	1	0	1	0	4	2	1	1	1	0	8	3	11	0.1%
8698	NE 172 ST	W DIXIE HY	2	0	11	2	10	8	4	5	6	7	33	22	56	0.7%
8699	NE 172 ST	NE 23 AV	3	0	14	0	9	3	2	5	4	5	32	14	46	0.6%
8700	NE 171 ST	NE 22 AV	0	0	8	1	6	3	2	3	2	5	18	12	29	0.4%
8701	NE 171 ST	NE 21 AV	2	0	10	0	5	3	2	3	2	9	20	15	35	0.5%
8702	NE 171 ST	NE 19 AV	1	0	14	2	18	9	5	9	3	13	42	32	74	1.0%
8703	NE 171 ST	NE 18 AV	0	0	7	0	5	2	2	2	1	4	14	8	23	0.3%
8704	NE 171 ST	NE 17 AV	0	0	3	0	1	2	1	1	1	1	5	4	9	0.1%
8705	NE 171 ST	NE 16 AV	0	0	2	0	5	1	2	2	1	3	11	8	18	0.2%
8612	NE 15 AV	NE 170 ST	1	0	7	2	5	8	1	4	2	11	16	25	41	0.5%
30	NE 167 ST	NE 15 AV	1	1	19	29	33	41	12	24	8	8	73	103	176	2.3%
5723	NE 15 AV	NE 165 ST	3	3	21	29	81	72	48	49	54	43	206	196	403	5.4%
8648	NE 163 ST	MIAMI DR	1	0	8	6	22	7	18	9	13	7	63	29	91	1.2%
8649	NE 163 ST	NE 17 AV	0	1	5	4	12	10	8	3	4	5	28	24	52	0.7%
8650	NE 163 ST	NE 18 CT	0	0	6	2	9	5	3	3	5	7	23	16	40	0.5%
8651	NE 163 ST	NE 19 CT	7	0	20	2	20	11	8	7	7	9	62	29	91	1.2%
8652	NE 163 ST	NE 20 AV	3	0	5	3	8	6	4	5	3	2	24	15	39	0.5%
8653	NE 163 ST	NE 21 AV	0	0	1	1	2	7	1	3	1	2	5	12	17	0.2%
8654	NE 163 ST	NE 22 AV	3	0	12	5	12	8	9	3	18	3	54	18	72	1.0%
35	BISCAYNE BLVD	NE 163 ST	5	0	10	2	18	5	9	1	11	2	53	10	63	0.8%
8729	BISCAYNE BLVD	NE 156 ST	0	0	1	2	11	8	3	1	1	0	16	11	27	0.4%
8730	BISCAYNE BLVD	NE 151 ST	0	1	3	10	21	7	8	3	7	5	39	26	65	0.9%
8555	BISCAYNE BLVD	NE 146 ST	1	0	6	4	17	18	10	10	21	13	55	46	100	1.3%
8556	BISCAYNE BLVD	NE 144 ST	0	0	1	2	3	4	3	4	1	1	8	11	19	0.2%
8557	BISCAYNE BLVD	# 14100	6	0	12	3	20	12	8	7	11	11	58	33	90	1.2%
8558	BISCAYNE BLVD	# 13700	1	0	6	2	7	6	8	5	5	9	27	22	48	0.6%
8559	BISCAYNE BLVD	NE 135 ST	1	0	5	1	9	3	5	4	2	9	21	17	38	0.5%
8731	BISCAYNE BLVD	NE 135 ST	4	0	21	2	26	13	12	5	10	10	72	30	102	1.4%
8732	BISCAYNE BLVD	NE 130 ST	0	0	3	2	5	5	2	2	4	4	15	12	27	0.4%

STOP #	STREET	CROSS-STREET	EARLY MORNING		MORNING PEAK		MIDDAY		EVENING PEAK		LATE EVENING		ALLDAY		DAILY ACTIVITY	% OF TOTAL
			Ons	Offs	Ons	Offs	Ons	Offs	Ons	Offs	Ons	Offs	Ons	Offs		
8733	BISCAYNE BLVD	NE 127 ST	0	1	3	4	19	10	12	7	9	8	43	31	74	1.0%
8734	BISCAYNE BLVD	NE 125 ST	0	0	3	4	8	10	4	4	3	6	19	25	44	0.6%
36	BISCAYNE BLVD	NE 123 ST	5	2	23	14	41	35	20	14	34	28	123	94	217	2.9%
8735	BISCAYNE BLVD	NE 121 ST	0	0	5	1	9	4	3	2	6	1	23	9	31	0.4%
5392	BISCAYNE BLVD	SANS SOUCI BD	9	0	19	7	26	13	14	7	17	10	84	37	121	1.6%
5393	BISCAYNE BLVD	# 11720	4	0	8	1	9	7	6	5	6	6	32	19	51	0.7%
5394	BISCAYNE BLVD	NE 114 ST	3	1	10	2	12	10	4	3	6	5	35	20	55	0.7%
5395	BISCAYNE BLVD	APPROX # 1120	0	0	2	2	3	1	1	1	1	1	8	5	12	0.2%
5396	BISCAYNE BLVD	NE 111 ST	4	1	8	4	14	7	10	4	7	8	43	24	67	0.9%
5398	BISCAYNE BLVD	NE 109 ST	5	0	14	6	24	25	5	13	11	24	59	69	127	1.7%
5399	BISCAYNE BLVD	# 10700	6	0	27	4	47	13	19	3	20	6	118	26	144	1.9%
8394	BISCAYNE BLVD	NE 104 ST	1	0	1	0	1	0	0	0	0	0	3	1	4	0.0%
8395	BISCAYNE BLVD	NE 101 ST	0	0	0	0	1	0	1	0	0	1	2	2	4	0.0%
8396	BISCAYNE BLVD	NE 99 ST	0	0	0	0	1	3	1	0	1	1	3	4	7	0.1%
8397	BISCAYNE BLVD	NE 97 ST	0	0	1	3	4	4	4	2	1	2	10	11	21	0.3%
8398	BISCAYNE BLVD	NE 96 ST	0	0	0	0	1	0	0	0	0	0	1	0	1	0.0%
8399	BISCAYNE BLVD	NE 95 ST	1	0	0	3	1	1	0	0	0	1	3	5	8	0.1%
8400	BISCAYNE BLVD	NE 93 ST	0	0	2	1	2	2	1	1	1	1	5	4	9	0.1%
8401	BISCAYNE BLVD	NE 91 ST	3	5	20	7	44	32	17	13	13	14	97	71	168	2.2%
8402	BISCAYNE BLVD	NE 87 ST	3	1	5	2	9	6	4	4	2	9	23	21	44	0.6%
6682	BISCAYNE BLVD	NE 85 ST	5	0	15	5	27	11	4	7	7	9	58	32	90	1.2%
6683	BISCAYNE BLVD	NE 82 ST	2	1	4	4	15	23	6	8	3	11	30	47	77	1.0%
37	BISCAYNE BLVD	NE 79 ST	7	8	53	43	93	92	26	42	32	64	210	249	459	6.1%
6684	BISCAYNE BLVD	NE 77 ST	0	0	0	0	1	0	1	1	0	0	2	2	4	0.0%
6685	BISCAYNE BLVD	NE 76 ST	1	0	3	2	16	6	8	7	5	3	33	18	51	0.7%
6686	BISCAYNE BLVD	NE 72 ST	1	0	3	2	11	8	3	3	5	3	22	15	37	0.5%
6687	BISCAYNE BLVD	NE 71 ST	1	0	4	4	11	5	4	2	6	2	25	12	38	0.5%
6688	BISCAYNE BLVD	NE 68 ST	0	0	7	6	5	8	1	3	4	3	18	21	39	0.5%
6689	BISCAYNE BLVD	NE 67 ST	3	0	8	6	16	13	7	3	6	6	40	28	68	0.9%
6690	BISCAYNE BLVD	NE 65 ST	0	1	2	1	5	6	1	2	2	6	10	16	26	0.3%
6691	BISCAYNE BLVD	NE 62 ST	6	3	16	12	23	26	6	16	11	16	63	73	136	1.8%
6692	BISCAYNE BLVD	NE 59 ST	3	1	6	4	17	4	4	1	6	2	36	12	48	0.6%
6693	BISCAYNE BLVD	NE 58 ST	1	1	1	0	10	6	1	3	1	1	13	10	24	0.3%
6694	BISCAYNE BLVD	NE 54 ST	1	3	13	10	19	25	4	8	13	24	50	70	120	1.6%
6695	BISCAYNE BLVD	NE 54 ST	1	0	6	1	10	2	5	2	5	3	26	9	35	0.5%
6696	BISCAYNE BLVD	NE 50 TE	0	2	1	7	6	11	4	3	2	1	13	24	36	0.5%
6697	BISCAYNE BLVD	# 4870	0	1	3	6	23	19	8	6	9	9	42	41	84	1.1%
6698	BISCAYNE BLVD	# 4500	0	0	2	4	7	4	3	2	3	2	16	11	27	0.4%
6699	BISCAYNE BLVD	# 4300	0	1	0	0	0	0	1	0	1	0	2	1	3	0.0%
6700	BISCAYNE BLVD	# 4200	0	0	0	1	2	1	1	1	1	2	3	6	9	0.1%
6701	BISCAYNE BLVD	NE 39 ST	1	3	7	13	21	14	7	4	6	7	41	42	83	1.1%
38	BISCAYNE BLVD	NE 36 ST	0	14	3	21	4	41	3	15	2	20	12	110	123	1.6%

STOP #	STREET	CROSS-STREET	EARLY MORNING		MORNING PEAK		MIDDAY		EVENING PEAK		LATE EVENING		ALLDAY		DAILY ACTIVITY	% OF TOTAL
			Ons	Offs	Ons	Offs	Ons	Offs	Ons	Offs	Ons	Offs	Ons	Offs		
6702	BISCAYNE BLVD	NE 35 ST	2	0	7	4	14	12	6	8	5	5	33	29	62	0.8%
6703	BISCAYNE BLVD	NE 34 ST	0	1	1	0	1	1	0	0	1	3	2	5	8	0.1%
6704	BISCAYNE BLVD	NE 32 ST	2	0	5	3	9	9	4	3	3	12	23	27	50	0.7%
6705	BISCAYNE BLVD	NE 30 ST	2	0	2	3	3	8	1	6	5	7	13	23	36	0.5%
6706	BISCAYNE BLVD	NE 28 ST	1	1	3	4	6	8	1	3	1	5	12	22	33	0.4%
6707	BISCAYNE BLVD	NE 26 ST	0	0	1	0	0	1	0	2	0	1	1	4	5	0.1%
6708	BISCAYNE BLVD	NE 23 ST	4	0	6	1	8	6	2	8	2	7	22	23	45	0.6%
6709	BISCAYNE BLVD	NE 22 ST	3	1	14	2	19	8	6	4	7	6	49	21	70	0.9%
6710	BISCAYNE BLVD	NE 20 TE	1	0	4	4	5	4	1	3	1	3	12	15	27	0.4%
6711	BISCAYNE BLVD	NE 18 ST	0	0	1	4	4	10	2	2	0	4	8	19	27	0.4%
39	OMNITERT		7	27	25	78	46	131	13	46	12	81	103	363	466	6.2%
6714	BISCAYNE BLVD	NE 11 ST	0	2	0	1	2	5	3	4	0	4	5	17	22	0.3%
6715	BISCAYNE BLVD	NE 9 ST	0	4	0	45	7	49	0	15	4	10	11	124	135	1.8%
10269	NW 3 ST	N MIAMI AV	1	18	1	59	3	87	1	22	2	27	7	213	220	2.9%
40	CBD TERMINAL		0	36	0	98	0	202	0	86	0	111	0	533	533	7.1%
	SUB-TOTAL		159	147	690	652	1,455	1,380	644	629	873	858	3,821	3,666	7,487	

FIGURE 3: **RIDERSHIP BY ROUTE AND BY TIME-OF-DAY**

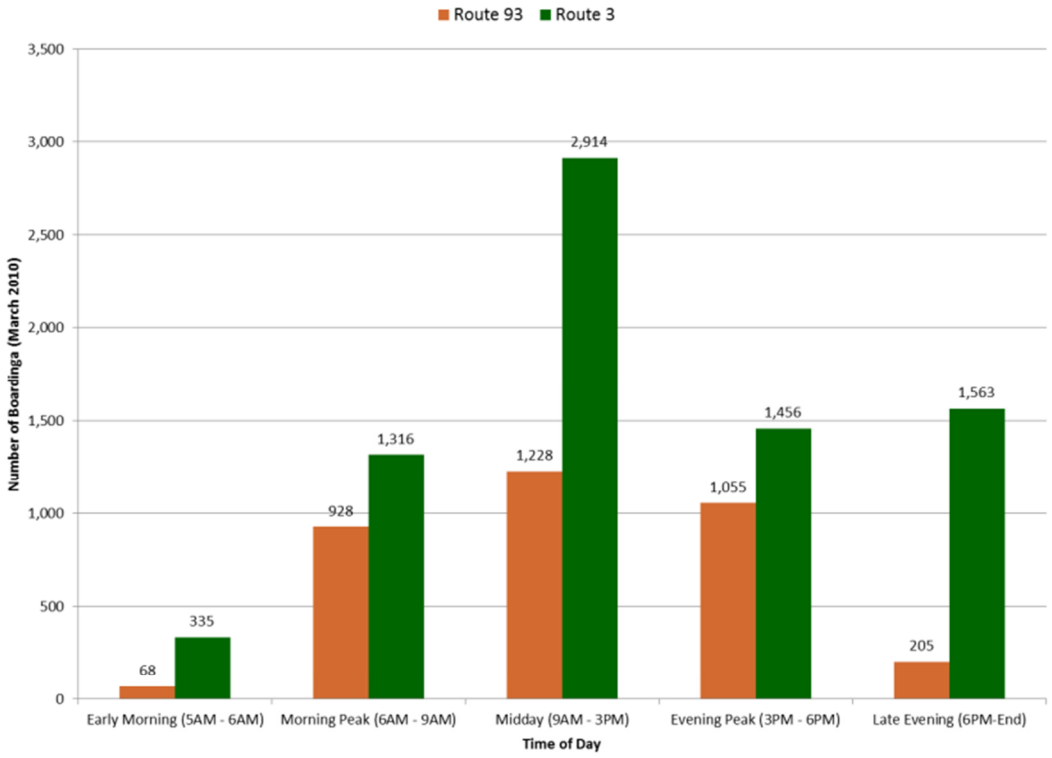


Figure 3 confirms the prior finding that Route 93 carriers a greater proportion of its riders during peak periods. Route 3 ridership is evenly spread across the day. Route 3 also operates for longer hours and that is reflected in 'Late Evening Period' boarding numbers.

FIGURE 4: **ROUTE 93 PASSENGER LOADS FOR SOUTHBOUND SERVICE**

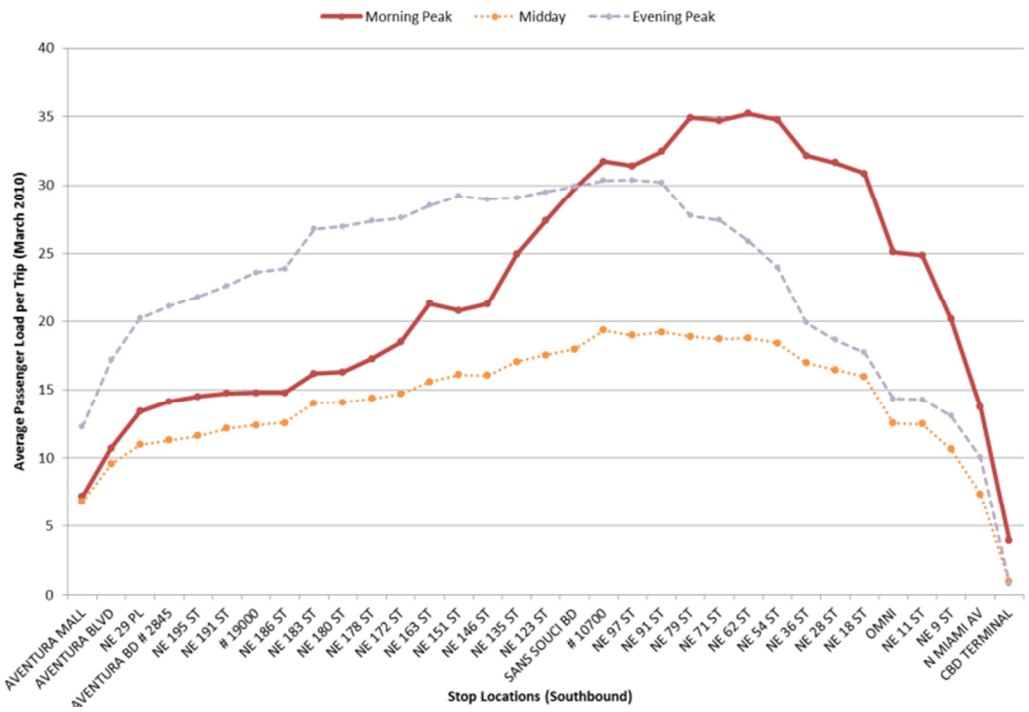
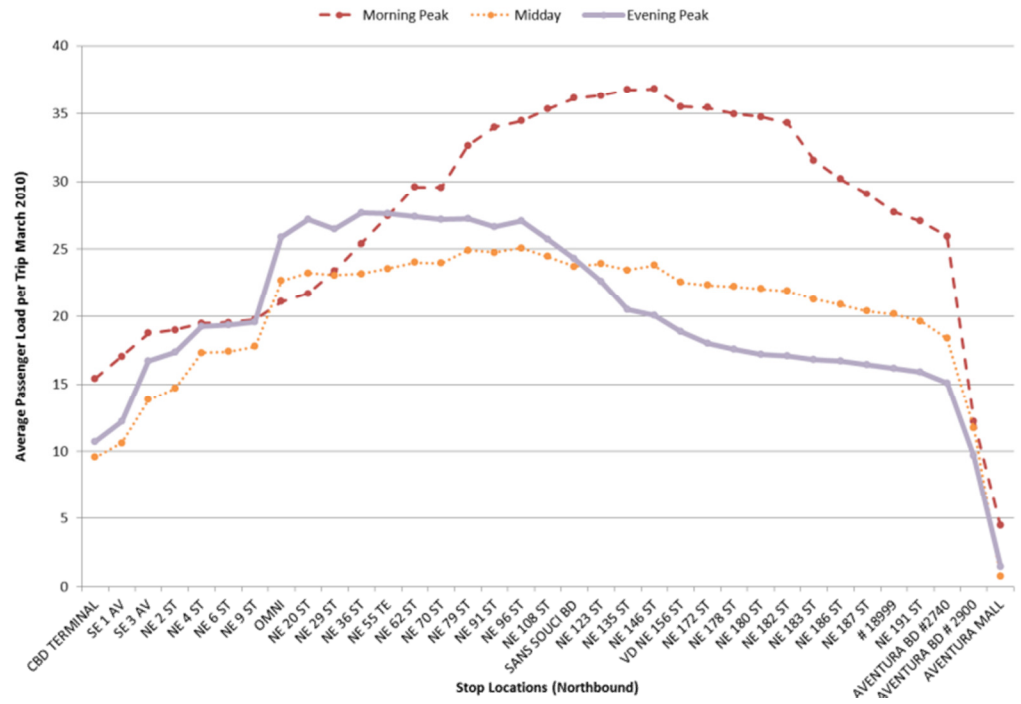


FIGURE 5: **ROUTE 93 PASSENGER LOADS FOR NORTHBOUND SERVICE**



The APC data was also utilized to develop passenger loads by time-of-day (Figures 4 and 5). Passenger load provide information about the vehicle utilization and service frequency. The data contradicts a general perception about directionality by time-of-day. Route 93 is bidirectional route with pre-dominant northbound directionality during both peak periods.

During the morning peak period, Route 93 predominantly displays a northbound ridership pattern – away from downtown (Figure 4). Moreover the load factors are equally as heavy as the southbound route during the morning peak. In both directions, the heaviest boarding points in the morning peak are between the Omni Terminal and NE 70 Street. The heaviest passenger loads are between NE 79 Street and NE 146 Street. The evening peak is just as pronounced as the morning peak and reflects the traditional 'downtown commute' pattern. The heaviest boardings occur between NE 4 Street and the Omni Terminal. The heaviest loads occur between the Omni Terminal and NE 96 Street with a gradual decline through Aventura. The midday loads are consistent from the Omni Terminal to Aventura, indicating a constant flux of boardings and alightings.

FIGURE 6: **ROUTE 93 BUSIEST INTERSECTIONS**

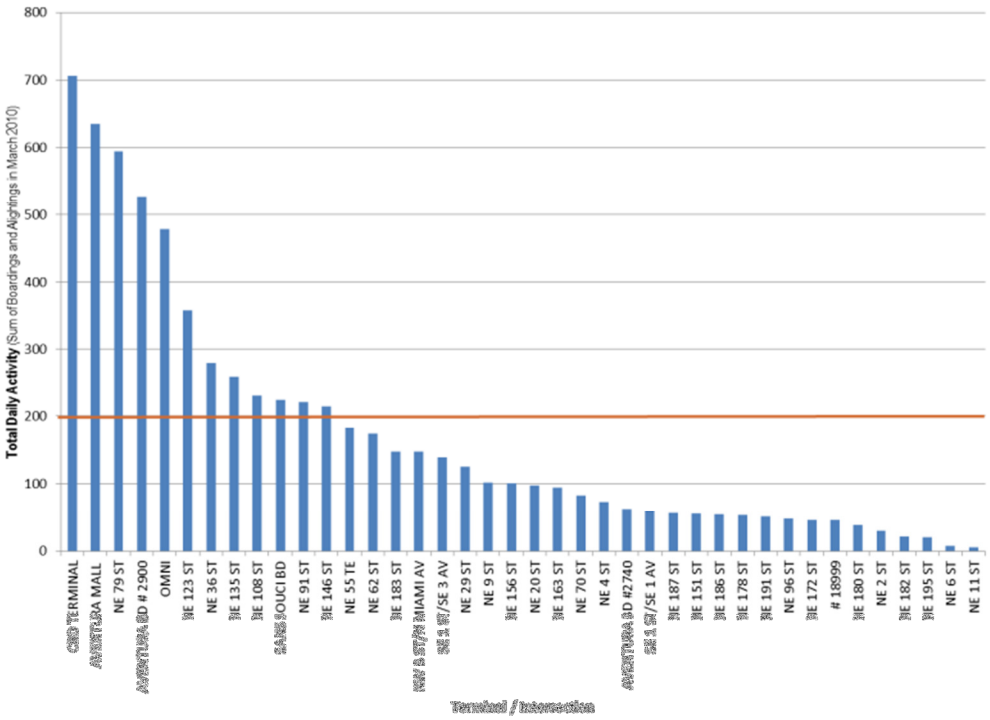


Figure 6 illustrates ridership by intersection (both directions) along Route 93. The CBD Terminal and Aventura Terminal expectedly stand out and show higher passenger activity. NE 79 Street clearly appears to be the busiest stop along the Route, closely followed by stops at NE 123 Street. Given the intensity of east-west transit services, NE 79 Street and NE 123 Street appear to be major transfer locations along the route.

In summary the boarding and alighting analysis of existing services provides the following conclusions:

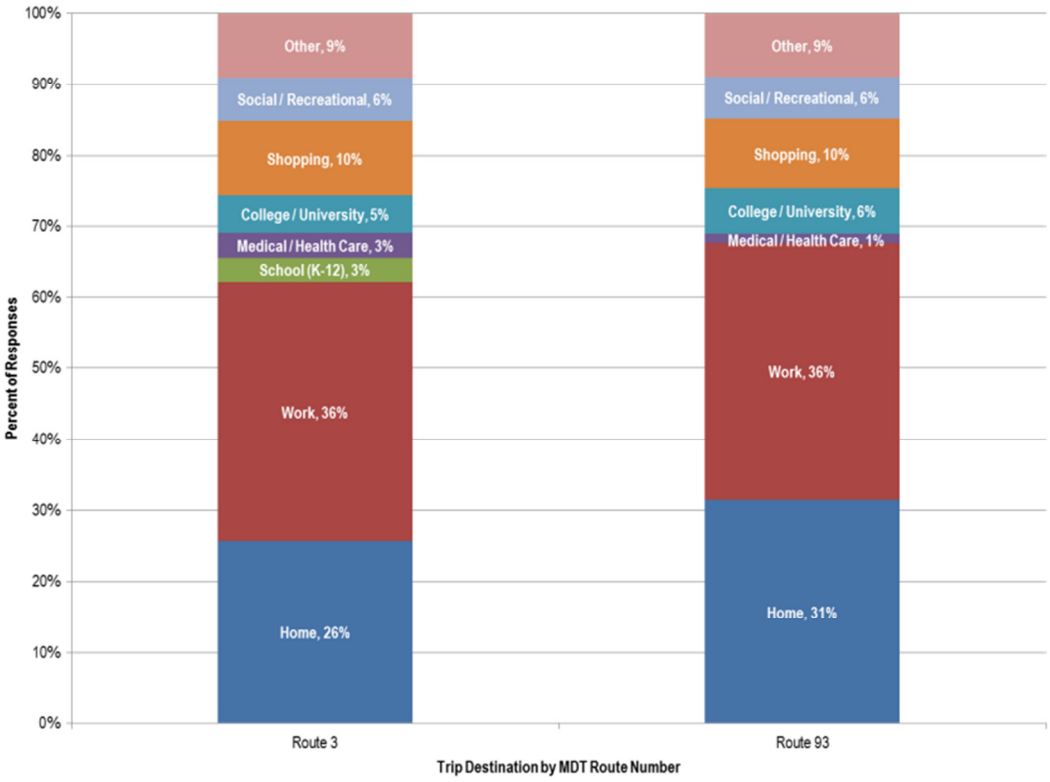
1. Route 93 is a bi-direcitonal route with a relatively busy mid-day period.
2. Route 93 activity distribution for a typical weekday is very similar to Route 3 which indicates that Route 93 is essentially serving the same passenger and that sufficient differentiation is lacking.
3. Route 93 passenger load confirms the observations during field visits that suggest crowded vehicles and insufficient vehicle capacity.
4. Stops at NE 79 Street and NE 123 Street stand out as major activity centers along both routes, along with the Omni Terminal.
5. Other busy locations along the route include: NE 36 Street, NE 108 Street, San Souci Boulevard, NE 91 Street, and NE 146 Street, NE 55 Street and NE 62 Street. Over 200 boardings and alightings per day occur at these locations.
6. The segment between the Downtown Terminal and NE 146 Street shows consistent and more evenly spread passenger activity. The segment between NE 79 Street and NE 146 Street carries the largest passenger load. The segment to the north appears to have slightly different trip characteristics.

2.3 PASSENGER AND TRIP CHARACTERISTICS

Along with service characteristics, passenger and trip characteristics are important to identify the unique aspects of a service. The MPO completed an on-board survey of local bus routes in 2012. Route 3 and 93 were surveyed as part of that effort. Some of the unique trip and passenger characteristics are included below. Please note that survey results are in 'origin-destination' format. The Biscayne EBS project is intended to provide incremental improvements as a first step towards other premium transit exclusive guideway services. Therefore, passenger and trip characteristics identified as part of the MPO's 2008 Metrorail On-Board Survey were utilized to provide reference points.

2.3.1 ORIGINS AND DESTINATIONS

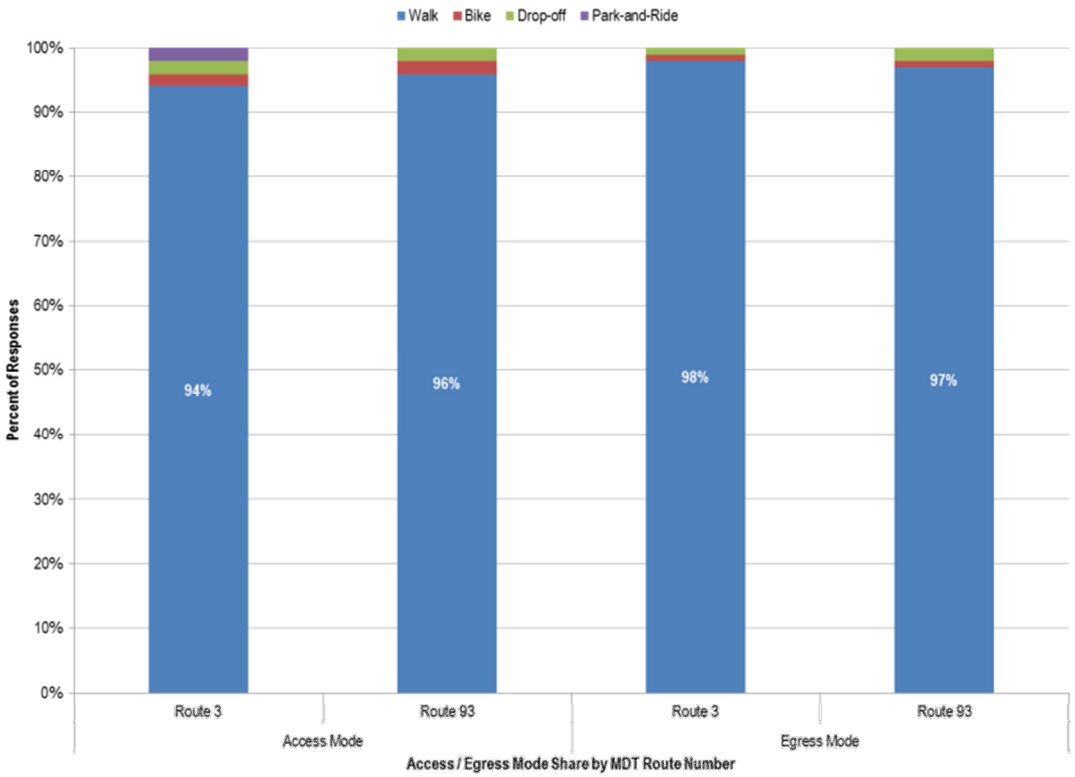
FIGURE 7: **ROUTES 3 AND 93 – DESTINATIONS**



Origins and destinations are important trip characteristics as they informs transit planners about the need for service during particular hours of the day and, to some extent, about trip lengths. Generally, there is no difference between trip making characteristics for Routes 3 and 93. Home-based Work trips are considered the prime travel market for premium transit services. The existing Route 93 has a relatively low share (36 percent) compared to Metrorail which exhibits 73 percent home-based work trips during peak periods (Figure 7). Unlike Route 3, Route 93 is not being utilized for school (K-12) trips.

2.3.2 ACCESS AND EGRESS MODE

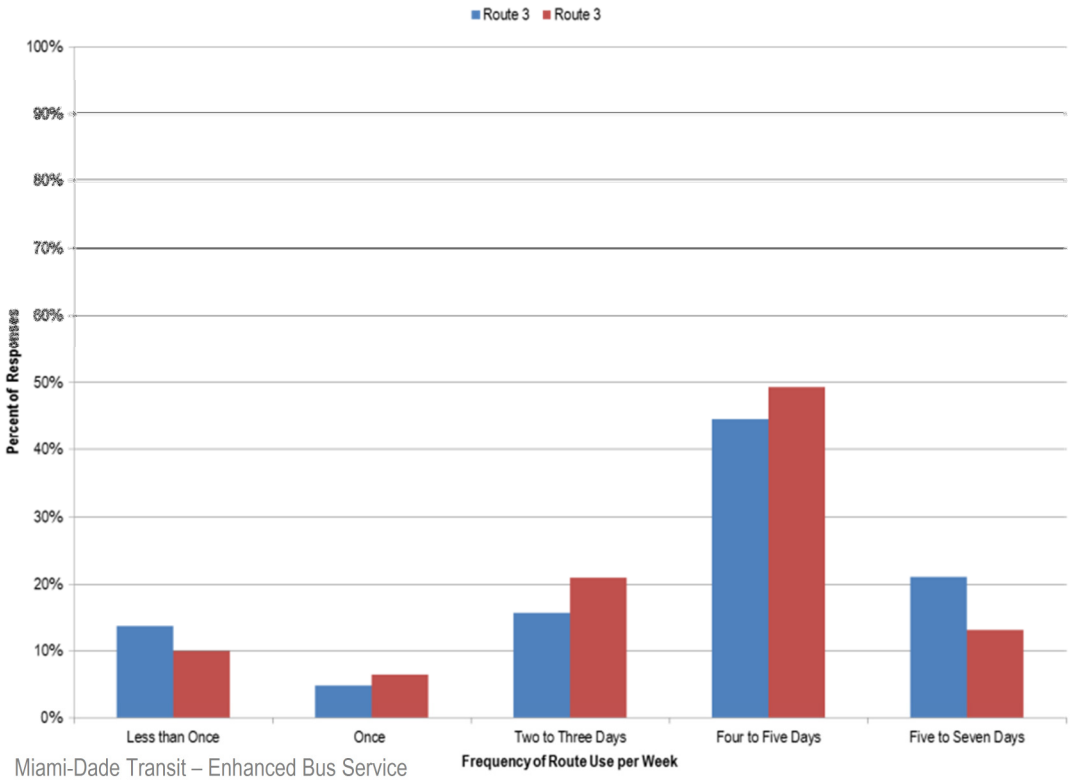
FIGURE 8: **ROUTES 3 AND 93 – ACCESS AND EGRESS MODE**



Again, Routes 3 and 93 exhibit identical trip-making characteristics with respect to access and egress modes (Figure 8). An overwhelmingly large majority of passengers walk to access these routes. Conversely, only about 27 percent of Metrorail patrons walk to access Metrorail stations. However, unlike Routes 3 and 93, Metrorail service is supported by a number of park-and-ride lots. This suggests that if a new customer base is to be attracted, the services will have to be supported by park-and-ride and/or kiss-and-ride infrastructure.

2.3.3 FREQUENCY OF USE

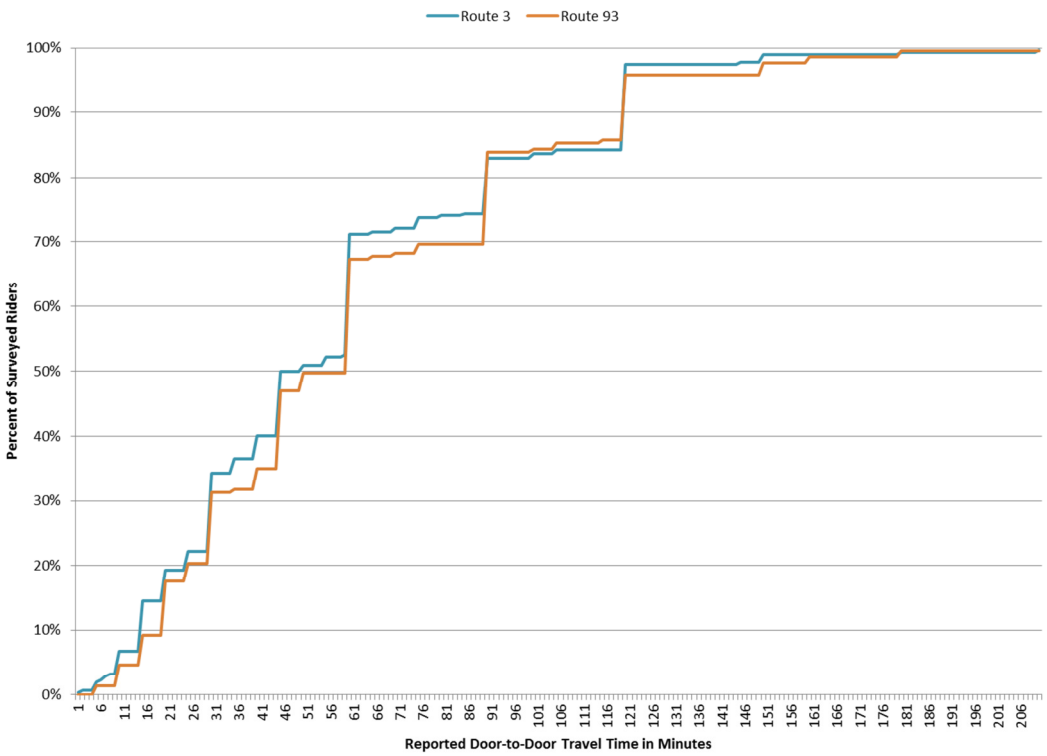
FIGURE 9: **ROUTES 3 AND 93 – FREQUENCY OF USE**



Routes 3 and 93 exhibit an identical pattern in terms of frequency of service usage (Figure 9). Some of the differences do not appear to be statistically significant. Nearly half of the riders use these two services for at least five days a week, indicating the routes usage for work related trips. This number is still lower than that observed for Metrorail service.

2.3.4 TRAVEL TIME

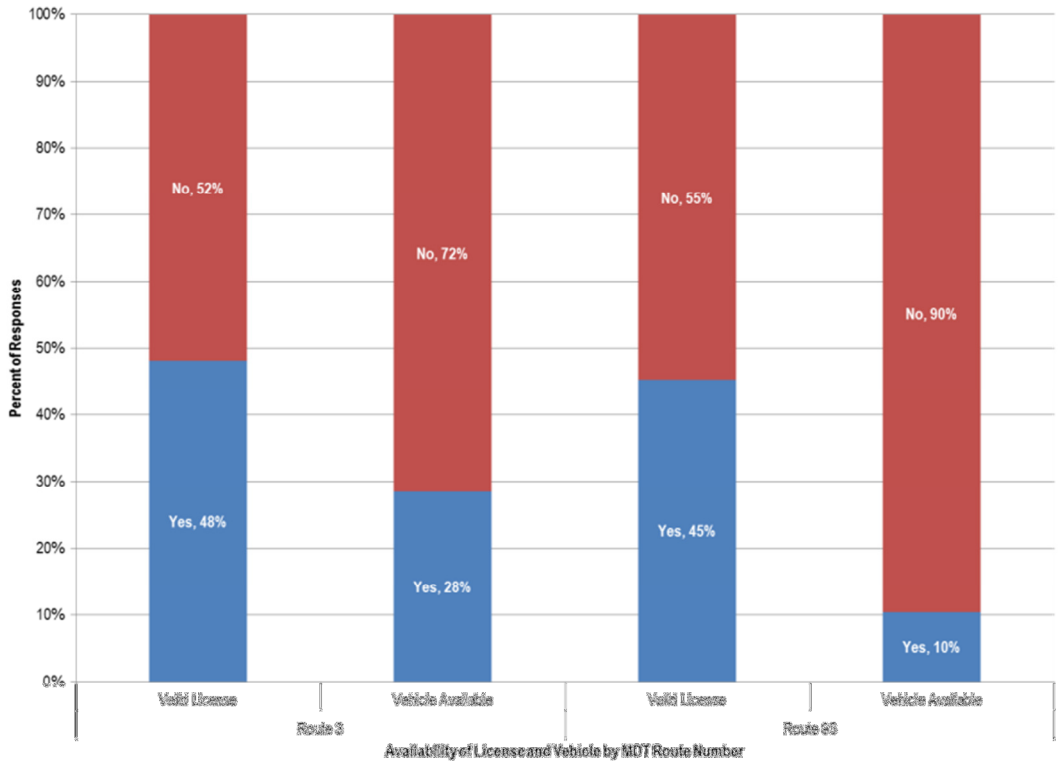
FIGURE 10: **ROUTES 3 AND 93 – REPORTED DOOR-TO-DOOR TRAVEL TIME**



The reported door-to-door travel time measures several items, one of which is trip lengths. Both, Route 3 and 93, have very similar trip lengths. The data suggests that nearly 30 percent of riders spend more than an hour on their one-way trips (Figure 10). These trip lengths are especially long given the fact that only one-third of passengers use these routes for home-based work trips. Home-based work trips are typically longer than shopping or recreational trips.

2.3.5 ABILITY TO DRIVE

FIGURE 11: **ROUTES 3 AND 93 – AVAILABILITY OF A VALID DRIVERS LICENSE OR A CAR**

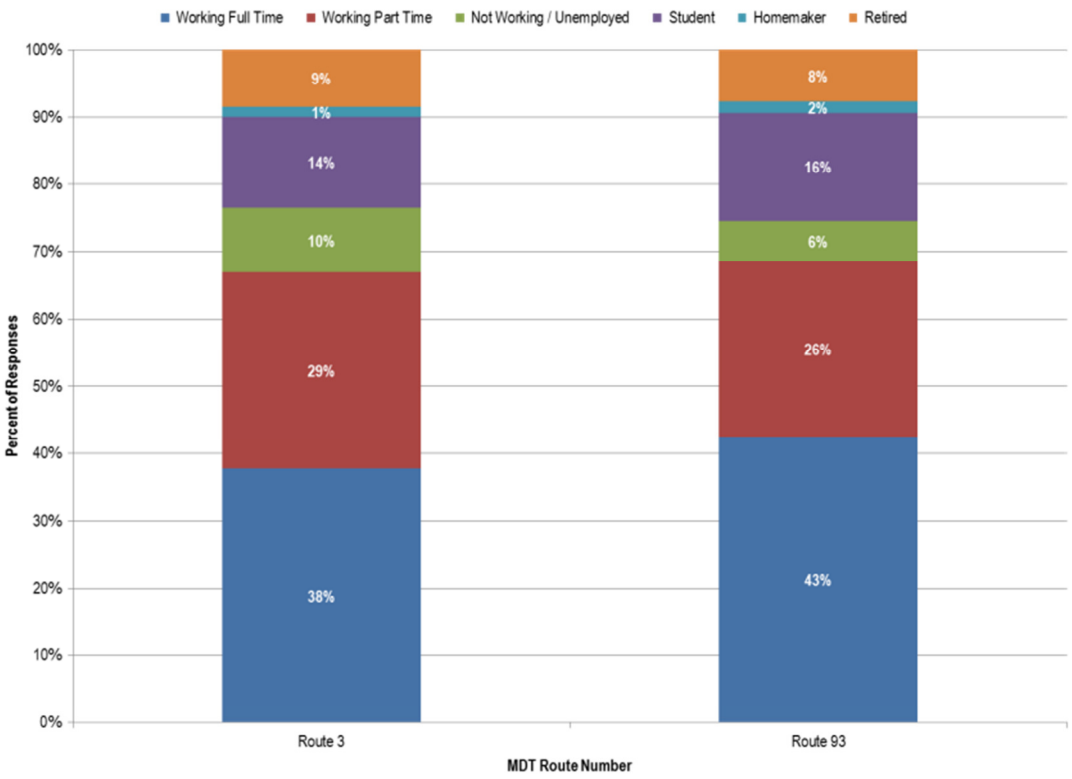


MDT seeks to attract choice riders to this new enhanced bus service. Analysis of the existing services suggests a highly transit dependent population. Nearly nine in ten riders of Route 93 did not have a vehicle available for their trip (Figure 11). These statistics are consistent with reported access and egress modes that showed nearly nine in ten riders walk to the bus.

Metrorail, on the other hand, has a very low transit-dependent population (25 percent of the total).

2.3.6 EMPLOYMENT STATUS

FIGURE 12: **ROUTES 3 AND 93 – EMPLOYMENT STATUS**



Only about 40 percent of passengers are full-time employees. Both routes shows identical passenger characteristics, including a higher than average usage by students. The presence of Miami-Dade College appears to be a big factor. A relatively large percentage of part-time employees suggest that these passengers' work hours may not necessarily align with traditional traffic peak periods.

2.3.7 UNIQUE TRIP AND PASSENGER CHARACTERISTICS

The above analysis provides the following conclusions:

1. A typical passenger for Route 3 is the same as the one for Route 93. In other words, service differentiation between local and limited-stop services has not resulted in a meaningful differentiation. It is very likely that passengers pick the route that is more accessible for that particular trip. The same was observed during field visits.
2. A low share of home-based work trips indicate improved services beyond peak hours should be considered.
3. Both routes indicate an extremely high share of pedestrian access and egress modes, indicating a need for upgrading pedestrian infrastructure if MDT wants to provide a better door-to-door trip experience. The share of pedestrians also suggests that local services that reduce walking distance should continue to be present.
4. High door-to-door travel time suggests a need for significantly better transit stop infrastructure and amenities.
5. Both Routes 3 and 93 have highly transit-dependent populations therefore, potential park-and-rides will not provide more convenience to the existing riders. However, park-and-ride lots may attract a new travel market segment of "choice" riders.
6. Services on Biscayne Boulevard exhibit a higher than average usage by student population, indicating a need to serve educational institutions. The available data does not differentiate between K-12 and College students.

2.4 EXISTING TRAVEL TIME

The principal benefits of transit in an urban area occur from minimizing travel times. Travel time is one of the most important measures related to travel. Management experts often say that one cannot manage what cannot be measured. As MDT strives to improve operations of its services, observed travel time is going to be an essential component of any measurement. However, there is a lack of data to measure travel time or causes of delay.

As part of this effort, travel and auto travel times were measured. The purpose of the travel time study was to identify the following:

1. Transit Travel Time and Delay: Travel time is closely associated with travel reliability. Fluctuations in travel time results indicate the lack of reliable service. For a transit service, a lack of competitive travel time and/or lack of a reliable service results in under-performance. Transit services have high out-of-vehicle travel time – the time it takes to go from a trip origin to the nearest stop. Given that transit services can never compete with private autos on out-of-vehicle travel time, it is important to have a good understanding of in-vehicle travel time and improve it to the greatest extent possible.

   MDT publishes schedules which take in to account average travel time experienced over the years. The survey, or observed travel time, provided a point of reference to measure transit travel time reliability, travel time variation, delay due to traffic signals, and delay due to the loading and unloading of passengers at stop locations. A travel time and delay survey can measure other variables such as delay due to recurring congestion, delay due to other traffic control devices (stop signs, merge, etc.), delay due to incidents, construction, school zones, etc. This survey focused on signal delay and dwell time delay – two variables that can be controlled by transit-specific improvements.
2. Auto Travel Time and Delay: MDT's Enhanced Bus Services seek to provide an attractive alternative to auto travel. Therefore, it is essential to measure relative attractiveness of auto mode, as that will be the benchmark to make transit improvements.

Transit travel time refers to end-to-end travel time for Route 93. Route 93 travels to Aventura Mall and to the Downtown Terminal, two points that are not on Biscayne Boulevard. There are 80 signalized intersections along the route in the northbound direction and 78 signalized intersections in the southbound direction. The Auto Travel Survey focused on an approximately 13.4 mile long segment along Biscayne Boulevard between SE 1st Street and NE 199th Street. There are 70/71 signalized intersections along this segment of the Biscayne Boulevard corridor.

2.4.1 TRAVEL TIME & DELAY STUDY AND ITS USAGE

According to the Manual on Uniform Traffic Studies (MUTS), Travel time and delay studies are conducted to evaluate the quality of traffic movement along a corridor, by time of day and by direction to determine the locations, types, and extents of traffic delays experienced at predefined locations or points by using a moving test vehicle. The data collected in the field is used to compute various Measures of Effectiveness' (MOE's) for determining the quality of traffic movement. Some of the important MOE's calculated from the field data collection include:

Average Travel Time: The average time needed to travel between two points.

Average Travel Speed: The average speed of travel between two points.

Average Delay Time: The average delay time experienced between two points due to any kind of obstruction to the free flow speed that would otherwise occur during ideal traffic conditions (in the absence of traffic control, in the absence of geometric delay, in the absence of any incidents, and when there are no other vehicles on the road).

2.4.2 TRANSIT TRAVEL TIME AND DELAY METHODOLOGY

The Transit Travel Time and Delay Study was conducted on-board transit vehicles for obtaining the travel time and delay data. All study trips were completed on a weekday representing typical traffic conditions. Five northbound and five southbound trips were completed during morning (6:00 AM to 9:00 AM) and evening (3:00 PM to 6:00 PM) peak periods.

Stopwatches were used by the surveyors to measure travel and delay times between control points. A delay was defined as speeds of 5 miles per hour (mph) or slower for the survey vehicle. Traffic signals on Biscayne Boulevard were used as control points. Cumulative time and delay were observed for the portions outside Biscayne Boulevard. Data was recorded on field datasheets and later transferred to spreadsheets. All trips were completed during periods of good weather to avoid unusual conditions that could have influenced the study.

2.4.3 TRANSIT TRAVEL TIME AND DELAY RESULTS

The transit speed results in Table 7 confirm that, on an average, Route 93 service generally meets the scheduled speeds. This is measured by comparing average observed speeds against the schedule speeds (shown in "Speed Variable against Schedule" column). The fluctuation is higher at 12 percent during the evening southbound direction. This can be confirmed with field observations taken in July 2012 which showed that changes in typical sections severally affect transit operations. However, another variable, "Speed Variation within Observed", highlights the limitations of using averages. The results suggest that the speed varies as much as 42 percent and generally around 25 percent, depending on the hour within each peak period.

TABLE 7: **OBSERVED TRANSIT SPEED AND SPEED VARIABILITY FOR ROUTE 93**

TIME PERIOD - DIRECTION	DISTANCE (MILES)	SCHEDULE TIME (MM)	SCHEDULE SPEED (MPH)	AVG OBSERVED SPEED (MPH)	OBSERVED SPEEDS BY TRIP (MPH)					SPEED VARIABILITY (WITHIN OBSERVED)	SPEED VARIABILITY (AGAINST SCHEDULE)
					Trip 1	Trip 2	Trip 3	Trip 4	Trip 5		
AM-NB	14.7	60.00	14.7	14.1	18.7	15.7	14.4	12.7	12.8	42%	-4%
AM-SB	15.0	60.00	15.0	15.8	16.5	15.2	13.5	12.5	13.3	26%	5%
PM-NB	14.7	71.00	12.4	12.5	11.9	14.5	13.2	11.4	20.9*	25%	1%
PM-SB	15.0	66.00	13.6	11.9	10.8	14.3	10.9	13.3	11.0	29%	-12%

* The southbound trip was delayed which impacted the schedule for the return northbound trip. A portion of this trip occurred outside the peak period. The trip was truncated and was from the Omni Bus Terminal to the Aventura Mall Food Court Bus Terminal.

The transit control delay results included in Table 8 again suggest a great fluctuation in the delay at signalized intersections. The control delay varies from 4.2 minutes per trip to as high as 29.2 minutes per trip, depending on the direction and hour of the day. The trip with the highest control delay (29.2 minutes) was for a trip that started around 3:10 PM. While it is difficult to draw reliable conclusions based on one trip, the conditions, according to the driver, were not unusual. Similarly, the last evening peak period trip started around 5:15 PM and the conditions were not unusual per the driver.

TABLE 8: **OBSERVED TRANSIT CONTROL DELAY FOR ROUTE 93**

TIME PERIOD - DIRECTION	DISTANCE (MILES)	SCHEDULE TIME (MINUTE)	AVG OBSERVED TIME (MINUTE)	AVERAGE CONTROL DELAY (MINUTE)	OBSERVED TOTAL CONTROL DELAY BY TRIP (MINUTE)				
					Trip 1	Trip 2	Trip 3	Trip 4	Trip 5
AM-NB	14.7	60.00	62.5	9.3	4.2	5.4	11.3	*	16.3
AM-SB	15.0	60.00	57.0	11.4	7.2	*	8.3	18.1	12.2
PM-NB	14.7	71.00	70.6	15.7	18.2	14.3	10.7	19.7	*
PM-SB	15.0	66.00	75.3	22.8	29.2	19.6	19.8	16.9	28.7

* The reliability of the delay data for these trips could not be verified and therefore the data was not used for this analysis.

The average transit dwell time results listed in Table 9 show considerably less variation. On an average passengers take nearly 11 to 13.1 minutes per trip to board and alight. The surveyors observed drivers providing assistance to passengers on wheel chairs, an activity that took as much as three minutes per stop.

TABLE 9: **OBSERVED DWELL TIME FOR ROUTE 93**

TIME PERIOD - DIRECTION	DISTANCE (MILES)	SCHEDULE TIME (MINUTE)	AVG OBSERVED TIME (MINUTE)	AVERAGE DWELL TIME (MINUTE)	OBSERVED TOTAL DWELL TIME BY TRIP (MINUTE)				
					Trip 1	Trip 2	Trip 3	Trip 4	Trip 5
AM-NB	14.7	60.00	62.5	13.1	8.4	16.0	11.9	*	16.3
AM-SB	15.0	60.00	57.0	12.4	11.7	*	16.0	9.9	12.1
PM-NB	14.7	71.00	70.6	12.7	13.6	10.2	12.6	14.4	*
PM-SB	15.0	66.00	75.3	11.0	6.7	15.0	15.1	7.2	11.2

* The reliability of the delay data for these trips could not be verified and therefore the data was not used for this analysis.

The results in Table 10 indicate that the buses are in-motion from 55 percent to 64 percent of the time, depending on the hour of the day. The southbound travel in the afternoon peak period was generally slower.

TABLE 10: **TRANSIT VEHICLE IN-MOTION TIME FOR ROUTE 93**

TIME PERIOD - DIRECTION	DISTANCE (MILES)	SCHEDULE TIME (MINUTE)	AVG OBSERVED TIME (MINUTE)	AVG TIME IN MOTION (%)	IN-MOTION TIME AS % OF TOTAL TRIP TIME				
					Trip 1	Trip 2	Trip 3	Trip 4	Trip 5
AM-NB	14.7	60.00	62.5	64%	73%	68%	62%	*	53%
AM-SB	15.0	60.00	57.0	63%	65%	*	63%	60%	63%
PM-NB	14.7	71.00	70.6	61%	57%	64%	65%	56%	*
PM-SB	15.0	66.00	75.3	55%	56%	49%	57%	64%	50%

* The reliability of the delay data for these trips could not be verified and therefore the data was not used for this analysis.

2.4.4 SUMMARY OF TRANSIT TRAVEL TIME

The transit travel time and delay results are detailed by the time of day, direction, and control points and are provided in Figures 13 through 16.

FIGURE 13: **ROUTE 93 MORNING PEAK PERIOD – NORTHBOUND: TRANSIT TRAVEL TIME AND DELAY**

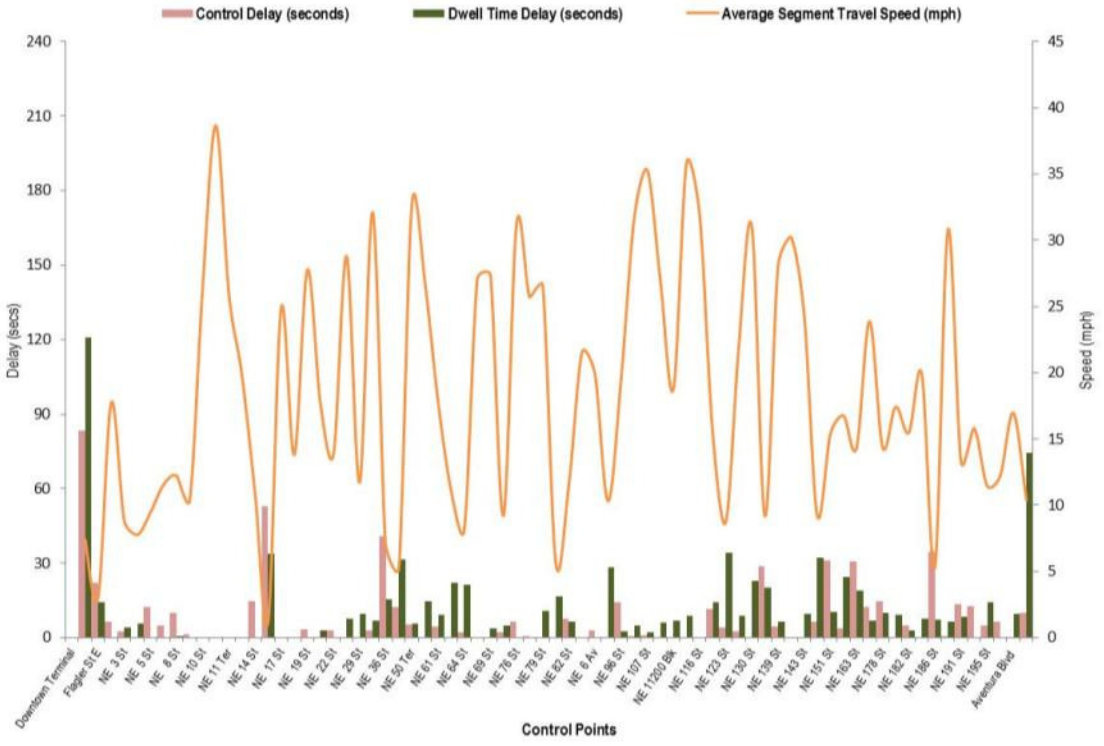


FIGURE 14: **ROUTE 93 MORNING PEAK PERIOD –SOUTHBOUND: TRANSIT TRAVEL TIME AND DELAY**

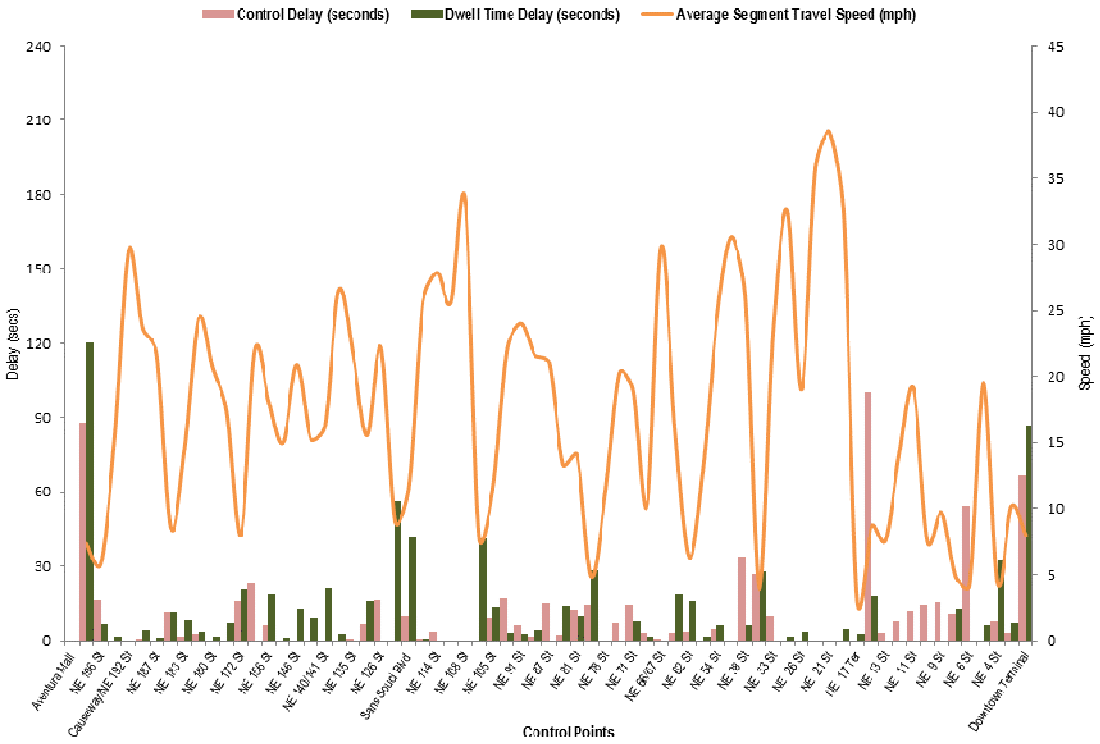


FIGURE 15: **ROUTE 93 AFTERNOON PEAK PERIOD – NORTHBOUND: TRANSIT TRAVEL TIME AND DELAY**

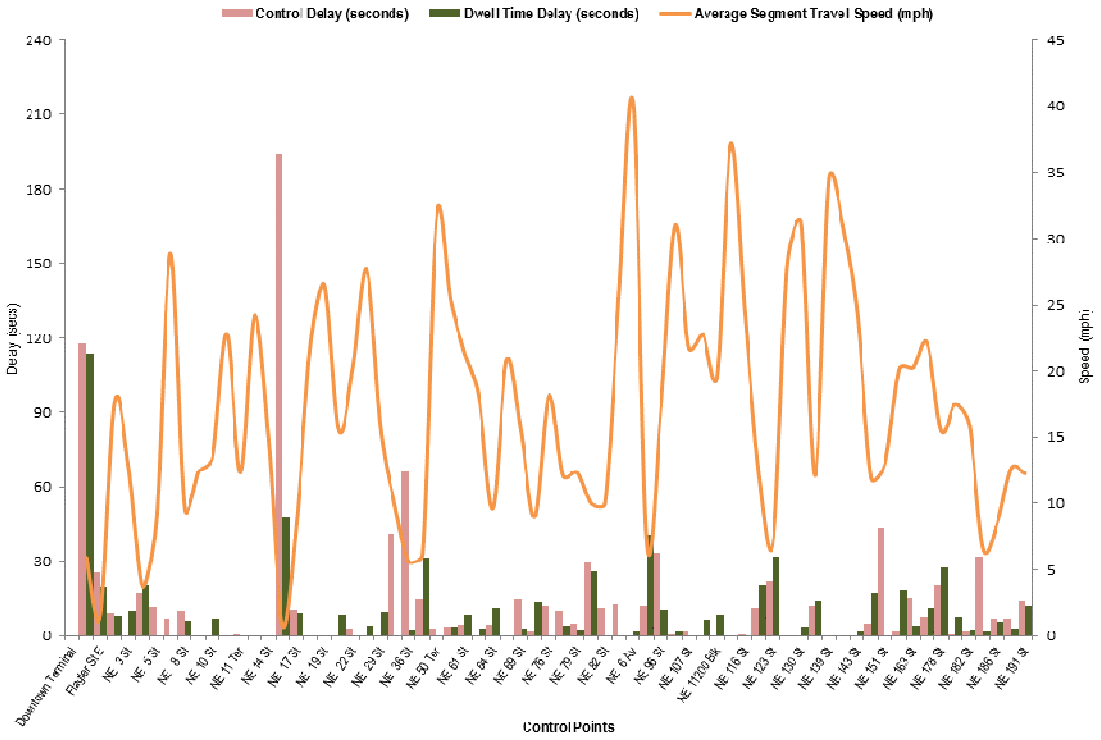
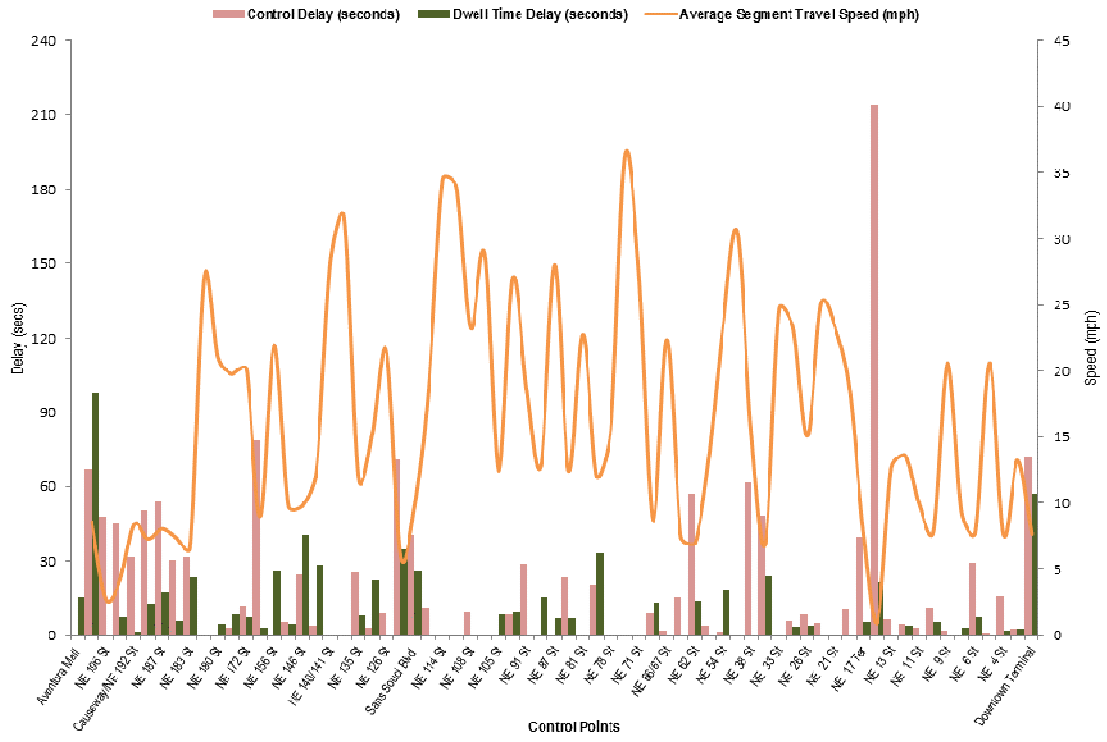


FIGURE 16: **ROUTE 93 AFTERNOON PEAK PERIOD – SOUTHBOUND: TRANSIT TRAVEL TIME AND DELAY**



Overall, Route 93 exhibits higher control delay at the following intersections:

1. NE 6 Street
2. At Signalized intersections to get in and out of the Omni Bus Terminal
3. NE 33 Street
4. NE 36 Street
5. NE 38 Street
6. NE 62 Street
7. NE 123 Street
8. NE 186 Street
9. NE 191 Street
10. NE 195 Street
11. NE 196 Street

2.4.5 AUTO TRAVEL TIME AND DELAY STUDY

The Auto Travel Time and Delay Study was conducted in general accordance with the Florida Department of Transportation (FDOT) Manual on Uniform Traffic Studies, Chapter 14 (January 2000). Three vehicles were used for obtaining the auto travel time and delay data, each with a driver and a surveyor, to conduct the study. The driver of the survey vehicle obeyed traffic laws and followed the flow of traffic while conducting the study. Under this approach, the survey vehicle kept-up with the majority of vehicles traveling on Biscayne Boulevard. All study trips were completed on a weekday representing typical traffic conditions. Five northbound and five southbound trips were completed during morning (6:00 AM to 9:00 AM) and evening (3:00 PM to 6:00 PM) peak periods.

Stopwatches were used by the surveyors to measure travel and delay times between control points. A delay was defined as speeds of 5 miles per hour (mph) or slower for the survey vehicle. Traffic signals on Biscayne Boulevard were used as control points. Data was recorded on field datasheets and later transferred to Microsoft Excel spreadsheets. All trips were completed during periods of good weather to avoid unusual conditions that could have influenced the study. The results are provided in Table 11.

TABLE 11: **OBSERVED AUTO SPEED AND SPEED VARIABILITY**

TIME PERIOD - DIRECTION	DISTANCE (MILES)	AVG OBSERVED SPEED (MPH)	OBSERVED SPEEDS BY TRIP (MPH)					SPEED VARIATION (WITHIN OBSERVED)
			Trip 1	Trip 2	Trip 3	Trip 4	Trip 5	
AM-NB	13.4	26.5	29.4	26.4	26.8	26.6	23.3	23%
AM-SB	13.4	27.2	32.4	29.8	30.1	23.2	20.4	44%
PM-NB	13.4	18.6	18.7	19.4	20.6	17.9	16.5	15%
PM-SB	13.4	19.5	17.4	19.6	20.5	19.4	20.5	16%

2.4.6 SUMMARY OF AUTO TRAVEL TIME

A summary of average travel speed and average delay due to traffic signals is provided in Figures 17 through 20.

FIGURE 17: **MORNING PEAK PERIOD – NORTHBOUND: AUTO TRAVEL TIME AND DELAY**

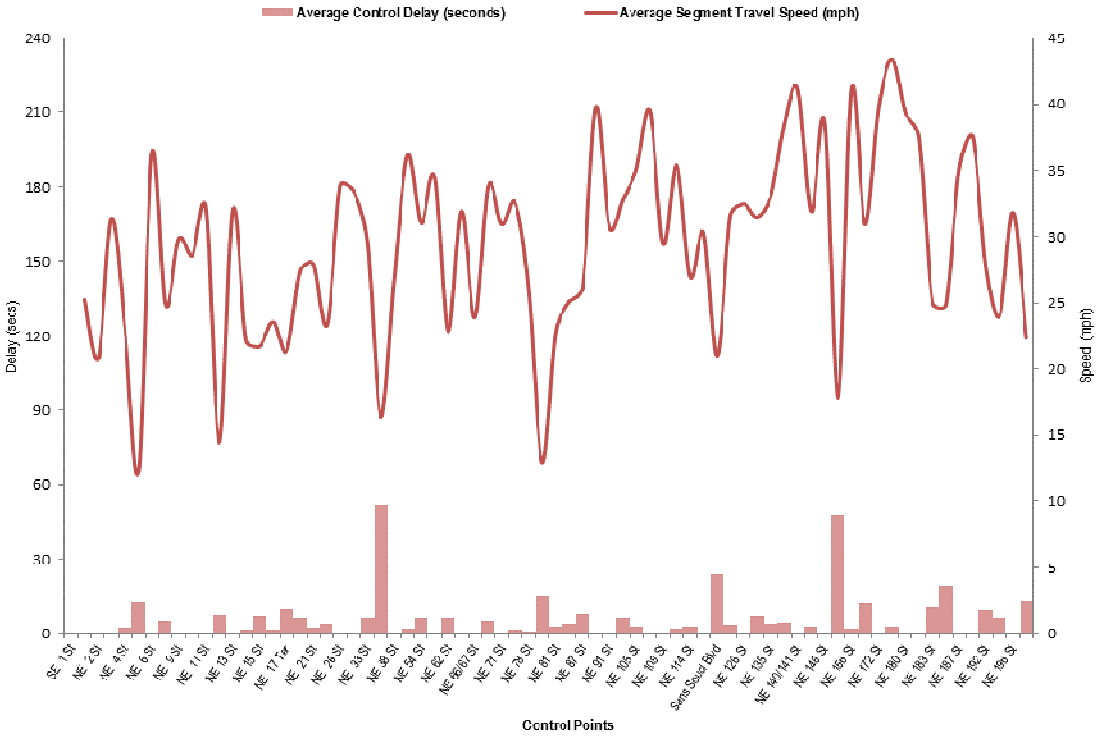


FIGURE 18: **MORNING PEAK PERIOD – SOUTHBOUND: AUTO TRAVEL TIME AND DELAY**

FIGURE 19: **EVENING PEAK PERIOD – NORTHBOUND: AUTO TRAVEL TIME AND DELAY**

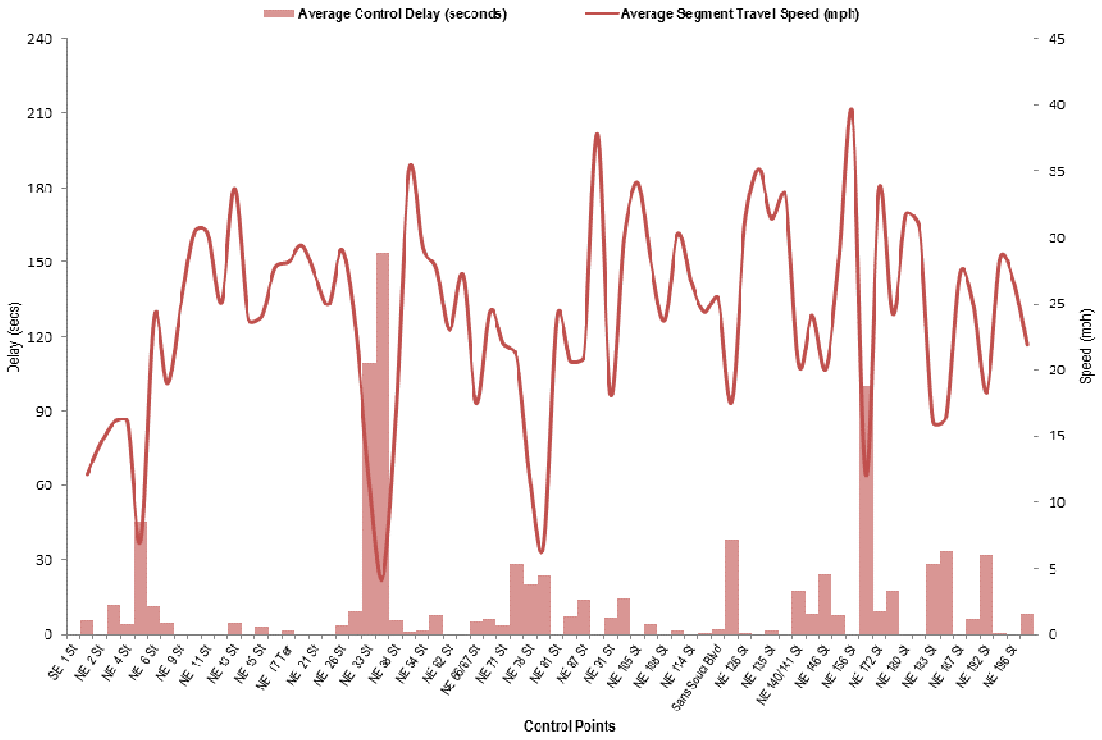
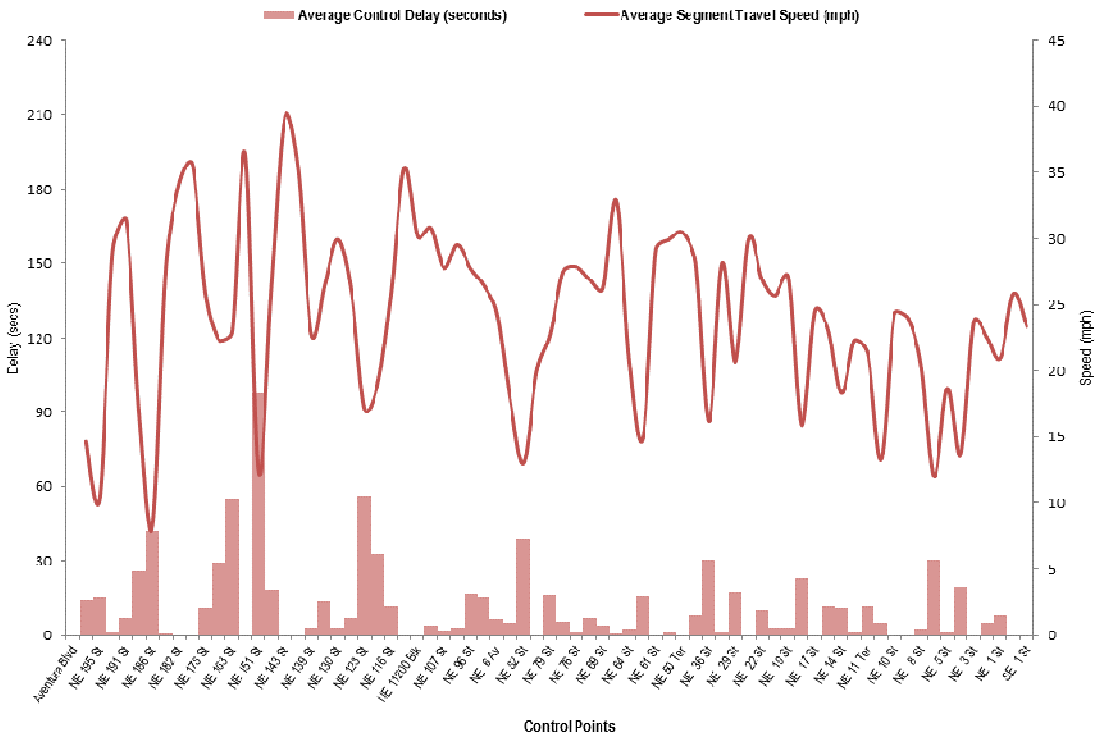


FIGURE 20: **EVENING PEAK PERIOD – SOUTHBOUND: AUTO TRAVEL TIME AND DELAY**



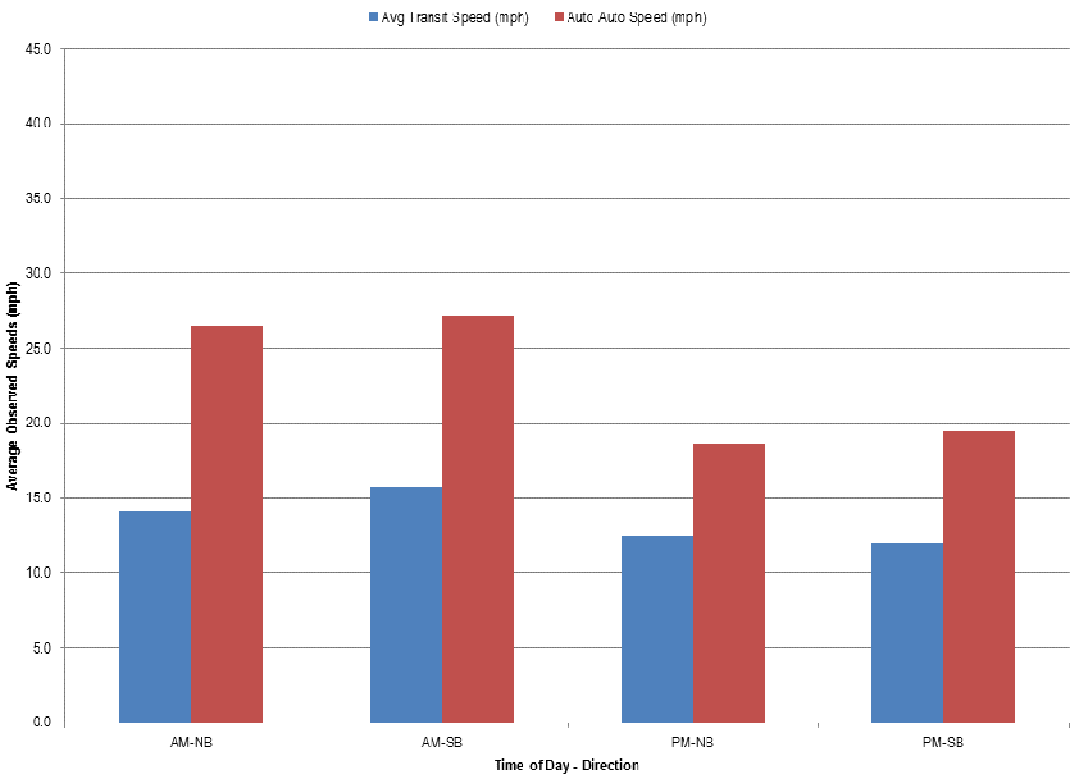
Overall, private vehicles exhibit higher control delay at the following intersections:

1. NE 6th Street
2. NE 33rd Street
3. NE 36th Street
4. NE 82nd Street
5. NE 123rd Street
6. NE 151st Street
7. NE 163rd Street
8. NE 186th Street

2.4.7 COMPARISON: AUTO TRAVEL TIME AND TRANSIT TRAVEL TIME

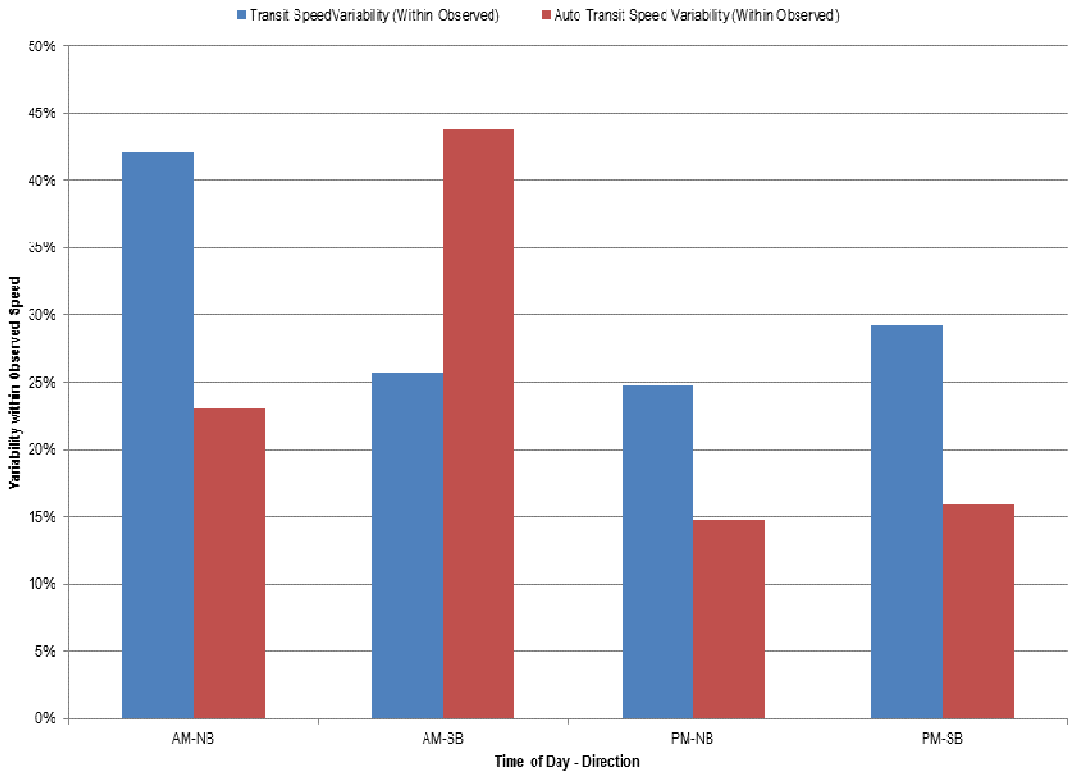
The goal of Route 93 is to provide an attractive transit service that can attract choice riders. Therefore, a comparison between auto and transit travel time is essential. The results of this survey show that travel by transit is 50 to 81 percent slower than that by private vehicles (Figure 21). Transit riders typically have higher terminal time – the time it takes to get to and leave from a transit stop. Therefore, a home to work trip for a transit rider will be much longer because of the terminal time. The effect of terminal time is not seen here in Figure 21.

FIGURE 21: **AUTO AND TRANSIT COMPARISON: TRAVEL TIME**



Another component of travel time is variability – the difference in travel time within a given peak period. In simpler terms, 20 percent variability implies that an average 60 minute travel could take 48 to 72 minutes, depending on the hour within that peak period. This measure, to some extent, indirectly reflects reliability of the service. The results included in Figure 22 indicate that transit is more susceptible to higher variability. However, in the morning southbound peak period, travel by auto exhibited higher variability. This is likely because of an outlier in the data.

FIGURE 22: **AUTO AND TRANSIT COMPARISON: TRAVEL TIME VARIABILITY**



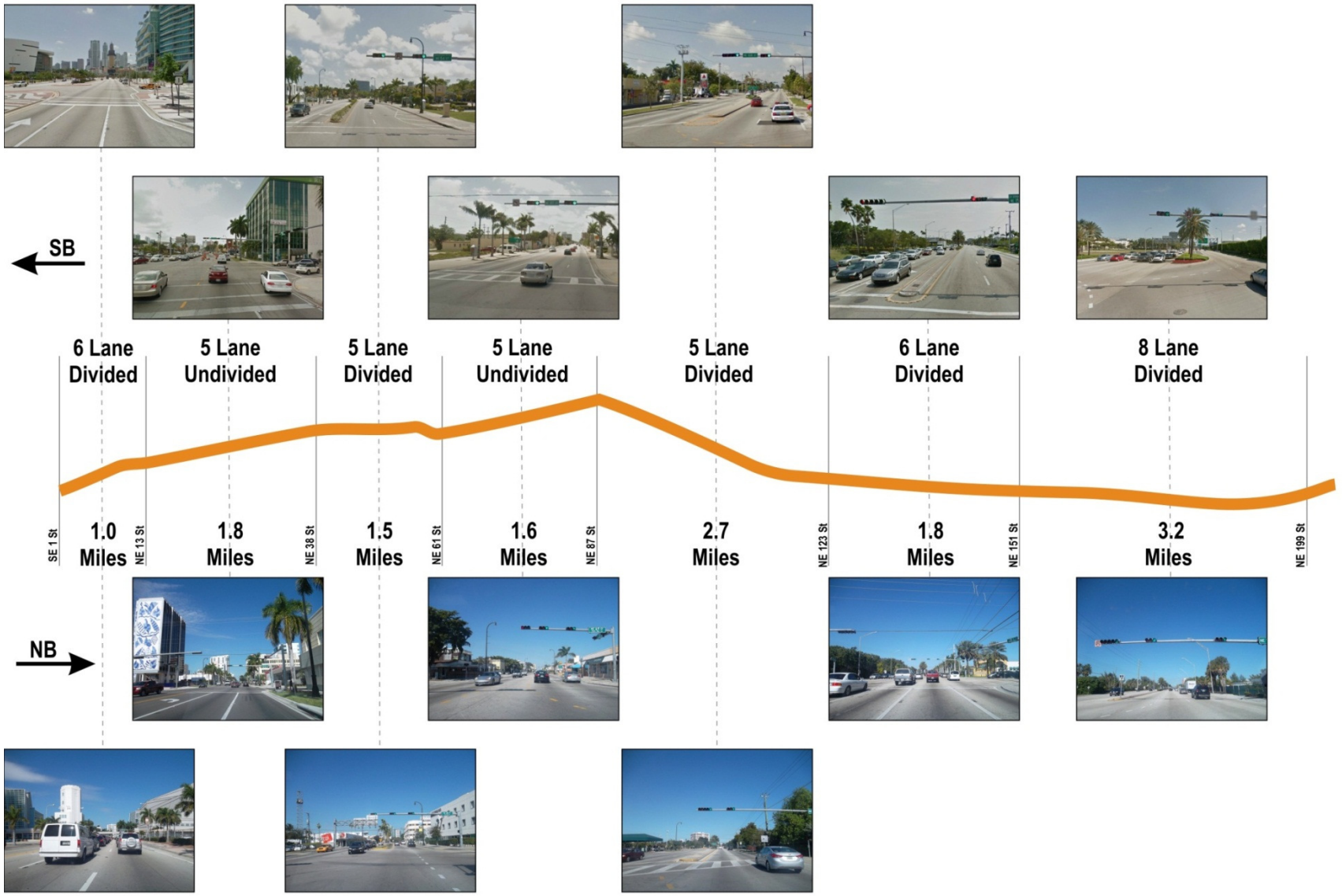
2.5 ROADWAY CHARACTERISTICS

Biscayne Boulevard is the portion of US-1 in Miami-Dade County between the Broward County line and the Miami River. It is a part of the US Highway System and is designated as a Principal Arterial. Biscayne Boulevard is maintained by FDOT. Over the course of this 23 mile stretch of roadway, the characteristics change dramatically as shown in Table 12 and Figure 23.

TABLE 12: **LOCATION OF SIGNALIZED INTERSECTIONS AND AUXILARY LANES ALONG BISCAYNE BOULEVARD**

	BISCAYNE BOULEVARD NORTHBOUND		BISCAYNE BOULEVARD SOUTHBOUND	
	Along Route 93	On Biscayne Blvd	Along Route 93	On Biscayne Blvd
Number of Signalized Intersections	80	70	78	71
Signalized Intersections with Auxiliary Right-Turn Lanes	8			7
Auxiliary Right-Turn Lane Locations	1. I-395 EB Ramp 2. NE 15 St 3. I-195 EB Ramp 4. NE 79 St 5. NE 163 St 6. NE 192 St 7. NE 195 St 8. NE 196 St		1. NE 186 St 2. NE 172 St 3. NE 163 St 4. NE 151 St 5. NE 79 St 6. NE 36 St 7. NE 54 St	

FIGURE 23: **AUTO AND TRANSIT COMPARISON: TRAVEL TIME VARIABILITY**



2.6 CORRIDOR CHARACTERISTICS

The area ½ mile on either side of Biscayne Boulevard was analyzed for its demographic characteristics. Between 1990 and 2000, the area lost both population and housing units. But between 2000 and 2010, the corridor grew by over 30 percent in both population and housing units. The corridor contains 131,000 people and the density is almost 6,000 people per square mile - over 5 times the density of Miami-Dade County. The corridor has a slightly lower proportion of elderly population than the County as whole and a much smaller proportion of young people. The average per capita income in the corridor is higher than the County's, $28,500 versus $22,900, but the poverty rate is higher than the County rate. As for mode of transportation, the corridor is served by a number of transit services and it is reflected in a higher mode split in favor of transit. Overall, from a transit perspective, few other variables distinguish the corridor from the rest of the county (Table 13).

TABLE 13: **CORRIDOR DEMOGRAPHIC CHARACTERISTICS**

	WORKERS IN CORRIDOR	% OF WORKERS IN CORRIDOR	WORKERS IN COUNTY	% OF WORKERS IN COUNTY
Employed (number)	56,118	58.07%	1,127,602	57.39%
Unemployed (number)	5,688	5.89%	104,421	5.32%
Not in Labor Force (16-64) (number)	19,584	20.27%	445,833	22.69%
Not in Labor Force (65 and up) (number)	15,150	15.68%	285,063	14.51%
VEHICLE OWNERSHIP				
Housing Units with Vehicle Available	43,473	86.92%	735,998	88.94%
Housing Units with No Vehicle Available	6,542	13.08%	91,558	11.06%
Mean Vehicles per Household	0.96		1.51	
MODE OF TRANSPORTATION				
Carpool	4,386	7.95%	105,148	9.51%
Drive Alone	39,886	72.28%	851,100	76.94%
Public Transit	5,329	9.66%	60,698	5.49%
Motorcycle	139	0.25%	2,292	.21%
Bicycle	275	0.50%	4,933	.45%
Walk	1,912	3.47%	24,194	2.19%
Other	674	1.22%	16,277	1.47%

Source: Census, 2000

2.7 EXISTING DEFICIENCIES AND ASSOCIATED NEEDS

A summary of the evaluation of existing services and infrastructure is included in Figure 24. These needs are utilized to define the planned Biscayne EBS project.

FIGURE 24: **EXISTING DEFICIENCES AND ASSOCIATED NEEDS**

EXISTING DEFICIENCY	EFFECT	HOW THE NEW SERVICE MAY ADDRESS THAT
- Slow transit speeds 50% to 81% slower than private auto	Transit becomes a less attractive mode of travel	**Improve Travel Speed**
- Travel time varies significantly 25% to 42% variation in travel time	Significant inconvenience to those who rely on transit to access work, hospitals, etc	**Improve Travel Time Reliability**
- Low bus run time Buses are spending as much as 40% to 50% time at bus stops and at signals	Potentially affects perception of transit; frustrates those who use transit	**Improve Travel Speed; potentially by increasing in-motion time**
- Buses suffer from roadway congestion Congestion affects private vehicles as well, but puts transit at a further disadvantage	Transit fails to attract a large number of choice-riders	**Provide preferential treatment to transit**
- Indistinguishiable infrastructure Route 93 uses the same stops as Route 3	Low awareness of Route 93; Route 93 rider is essentially same as Route 3 rider	**Provide distinguishiable infrastructure**
- Extremely low capacity during peak periods Very high passenger loads during peak periods	Significant inconvenience to passengers, especially those with special needs	**Increase capacity**

Section 3

DEFINING "ENHANCED" BUS SERVICE

MDT operates various types of services. Each service is designed to accomplish a set of well-defined objectives and to target different travel markets. A brief description of each service type is included below:

1. **FEEDER SERVICE**

   Feeder services, as the name suggests, are designed to feed ridership to other bus and fixed-guideway services. These services, typically with frequent stops and short passenger trips, are designed to provide 'last-mile' connectivity.

2. **CIRCULATOR AND SHUTTLE SERVICES**

   According to MDT's Transit Development Plan (TDP), "Circulator or shuttle bus service is operated for short route connections between activity centers, or as a feeder to another service. For MDT, these routes include the Tri-Rail commuter rail stations in Miami-Dade County, and short localized area-specific routes."

3. **LOCAL SERVICE**

   This service, to some extent, traverses the county and often terminates at MDT's fixed guideway services as a Metrorail, Metromover, and the Busway. According to MDT's Transit Development Plan, "this type of service is characterized by frequent stops, short passenger trips, and slow average bus speeds over the course of an entire route." Examples: Routes 3, 27, 37.

4. **LIMITED-STOP SERVICE**

   This service, as the name suggest, have fewer stops than local services. These routes are typically located within heavily traveled corridors and overlap with local services. Given the stop frequency, these routes have longer average passenger trip lengths than local routes. Examples: Route 51, 93, 97.

5. **EXPRESS SERVICE**

   This service is similar to the limited-stop service in terms of stop frequency and utilizes limited-access roadways for a portion of its trip. Examples: 95 Express services

6. **BUS RAPID TRANSIT**

   MDT's South Dade Busway is a two-lane bus-only roadway. According to MDT's TDP, "most of the routes that operate on the Busway are considered limited-stop service, or have portions that offer limited service, due to the exclusive use of the Busway coupled with fewer stops." In terms of service characteristics, the major difference is that buses are not traveling with other vehicles and therefore, are able to provide more reliable service.

7. **LONG-DISTANCE SERVICE**

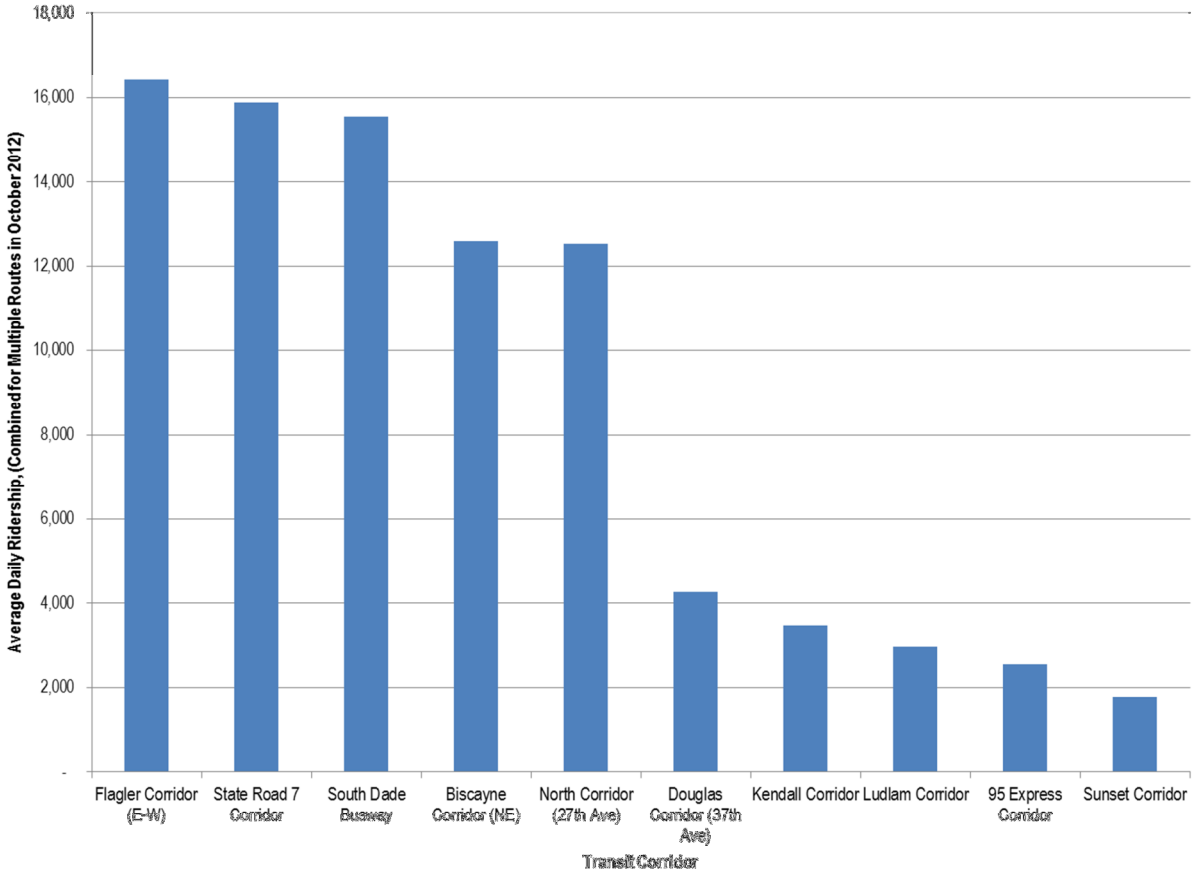
   This service has fewer stops and is used to connect Monroe County. Example: Route 301 Dade-Monroe Express

Each type of transit service, due to its service characteristics, will appeal to different transit markets. Therefore, in competition with other services, local services are more attractive for shorter trips as they provide greater access and reduce out-of-vehicle travel time. Conversely, limited-stop services, due to their nature, typically have higher than average out-of-vehicle travel time because patrons walk, bike, or drive longer distances to access a stop location. These services, in competition with local services, are likely to attract longer trips because of the higher travel time savings and the convenience compensates for higher out-of-vehicle travel times. In the midst of these services, introduction of a new service type must have a clear goal and purpose. The service should be attractive to one or more unique transit service markets and must also be substantially different, in terms of service characteristics, and potentially in terms of visual identity from other existing services to warrant a category of its own.

3.1 REVISITING THE NEED FOR "ENHANCED BUS SERVICE"

The need for an Enhanced Bus Service along Biscayne Boulevard has been established in MDT's plans. However, a quick glance of the recent ridership numbers reconfirms the attractiveness of the Biscayne Boulevard Corridor. Currently the Corridor carries over 12,000 daily transit trips, without any meaningful infrastructure support (Figure 25) and it is the fourth busiest corridor in the County. The success of 95 Express routes, which were supported by infrastructure improvements along Interstate 95, has confirmed that transit services can thrive if adequate infrastructure support is provided. The purpose of this plan is to fulfill the need for infrastructure improvements.

FIGURE 25: **RELATIVE ATTRACTIVENESS OF THE BISCAYNE CORRIDOR**



3.2 PURPOSE OF "ENHANCED BUS SERVICE"

FIGURE 26: **FEATURES UNIQUE TO EBS SERVICES**

One of the original intentions of the County's PTP was to make transit travel more attractive in comparison to auto travel. The Biscayne EBS would provide faster travel time, improved reliability, and better travel experience to the users of Route 93 (Figure 26). Transit service characteristics may also enable an increase in overall transit mode share.

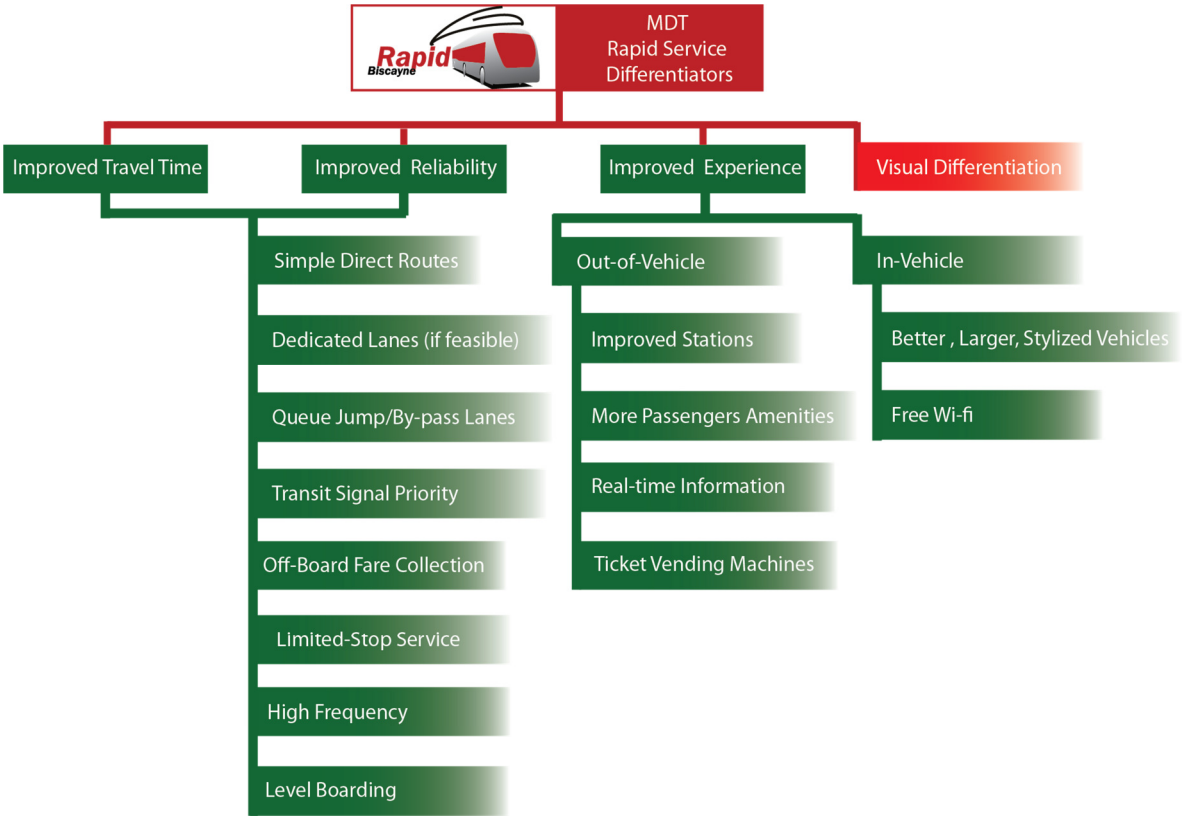
It has been established that many factors affect travel mode selection. These include the cost of travel, perceived safety/security, convenience, and comfort of the entire trip. As such, privately-owned autos have numerous advantages over traditional bus services in providing higher levels of accessibility, flexibility, convenience, comfort, and safety against crime. The relative disadvantages of public transit service vis-à-vis private vehicles explain why an overwhelming majority of personal travel in the County is in private vehicles.

This context formed the basis for development of the Enhanced Bus Service. The Enhanced Bus Service is generally defined as a hybrid between a limited-stop service and a BRT service. EBS 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 entirety of a route. A more detailed description of EBS is included in Figure 27. The proposed service offers unique advantages over other existing services, allowing it to provide a meaningful differentiation. The key differentiators of the proposed service are included in Figure 28.

FIGURE 27: **ANTICIPATED EVOLUTION OF THE EBS CONCEPT**

	Limited-stop service in Mixed Traffic (MDT MAX services)	Limited-stop service in Mixed Traffic with Preferential Treatment (EBS)	Limited-stop service with Dedicated Right-of-Way (BRT)
			
Investment	Low - Infrastructure/amenities unchanged	Moderate, depends on ROW availability	Major investment
Visibility	Low - Indistinguishable from local service	Higher due to indistinguishable infrastructure	High visibility
Travel Time	Typically higher than auto by 30% or more	Can be comparable to auto	Typically better than or comparable to auto
Reliability	Less reliable than auto due to boardings	Nearly as reliable as auto	Highly reliable in typical conditions
Amenties	Indistinguishable from local service	Typically supported by more amenities	Highly reliable
Local Example(s)	Route 93 Route 288 Route 97	Planned Enhanced Bus Services	Services along the South Dade Busway
National Example(s)	Numerous Almost all transit agencies have limited-stop services	Services in: City of Portland, Oregon City of Chandler, Arizona City of San Francisco, California	Service in: Healthline in Cleveland, Ohio

FIGURE 28: **BISCAYNE EBS DIFFERENTIATORS**



Section 4

DEVELOPMENT OF ACTION PLAN

The action plan is a result of the needs identification and corresponds with the needs previously identified in Figure 24. The purpose of the action plan is to prepare the best possible alternative while recognizing that conversion of a limited-stop service to a "true" BRT system, as discussed in Figure 27, will be a gradual process. A phased approach is recommended under which the first set of improvements will be implemented in the first three years and the final set of improvements will be implemented after that. Improvements, by phase, are identified in the sections below.

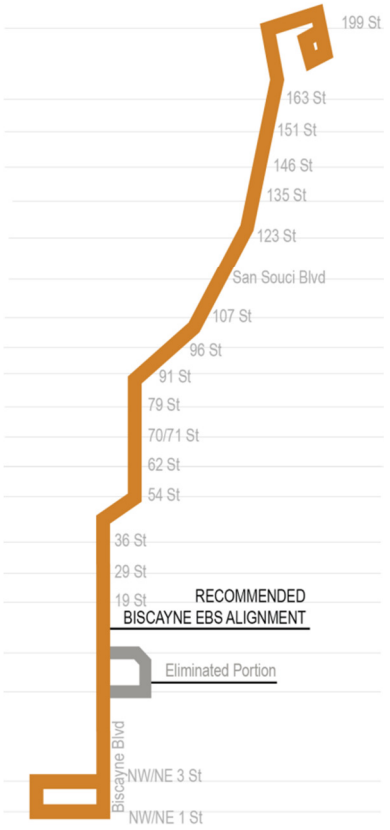
4.1 SERVICE CHARACTERISTICS

Service characteristics of a bus service include the following elements:

1. Alignment
2. Hours and Days of Operation or Service Span
3. Frequency of Service or Headways
4. Stop or Station Location and Spacing
5. Access - Connections to Potential Park-and-Ride Sites
6. Transfer - Connections to Other Major East-West Routes and Activity Centers

It also includes a frequent service, typically 10 to 15 minute service headways, and a minimum service span of six (peak periods only) to 18 hours (peak and off-peak periods). A detailed plan is outlined below.

FIGURE 29: **RECOMMENDED ROUTE ALIGNMENT FOR BISCAYNE EBS**



4.1.1 ALIGNMENT

The Biscayne EBS will replace the existing Biscayne Max / Route 93 which currently loops around the Omni Terminal. The travel time and delay study for this effort identified that the loop increases travel time by as much as eight minutes, depending on the time of day. The delay could be justified if it provided significant convenience to a large number of users. However, the Omni Terminal sees only seven percent of the total route activity, summation of boardings and alighting (Tables 3 and 4). Generally, fixed and other premium modes of transit have a simplified route structure which is a straight-forward route alignment with little or no deviation connecting to or from a major trip generator/attractor. The Biscayne EBS is envisioned to have line-haul, trunk service along Biscayne Boulevard and to be supported by east-west local routes. Therefore, the route deviation to Omni Terminal is recommended to be eliminated. The recommended route alignment is included in Figure 29.

IMPACT OF ALIGNMENT CHANGE

Data collected during Travel Time and Delay studies were reviewed to identify the impact of a potential alignment change resulting from elimination of the Omni Terminal deviation. This route change, according to the travel time and delay studies, could result in reduction of travel time by 2 to 6 percent – a significant service improvement without any capital expenditure (Table 14) or affecting the service. Also, the action would support the other objective of improving service reliability, as this route deviation takes 1.1 minutes to as much as 4.2 minutes. In other words, it makes the route less reliable as the timing to traverse the terminal varies.

TABLE 14: **IMPACT OF THE ALIGNMENT CHANGE**

TIME PERIOD - DIRECTION	SCHEDULED TIME (MM)	AVG OBSERVED TIME (MM)	ALIGNMENT SAVINGS (MM)	TRAVEL TIME SAVINGS DUE TO ALIGNMENT CHANGE (% OF SCHEDULED TIME)	TRAVEL TIME SAVINGS DUE TO ALIGNMENT CHANGE (% OF OBSERVED TIME)
AM-NB	60	63	1.1	1.9%	1.8%
AM-SB	60	57	1.7	2.8%	2.9%
PM-NB	71	71	3.2	4.6%	4.6%
PM-SB	66	75	4.2	6.4%	5.6%

4.1.2 HOURS AND DAYS OF OPERATION OR SERVICE SPAN

Currently Route 93 operates for 14.5 hours on weekdays. It does not operate on weekends. A 14.5-hour per weekday operation is also recommended for the Biscayne Enhanced Bus Service in the initial phase. However, the service span should be extended to 16 to 18 hours per weekday, depending on the response to the initial phase. Passengers should not have to consult schedules to determine the hours of operation, especially if the Biscayne EBS is expected to attract choice-riders.

IMPACT OF HOURS OF OPERATION

A 14.5-hour weekday service span is assumed for the first three years of operations. In the subsequent years, the service is assumed to have a 16-hour service on weekdays. The hours of operation have a direct cost impact. The cost implications are shown in Section 5.

4.1.3 HEADWAYS

The goal of the Biscayne EBS is a clear differentiation from local service. Good transit planning practices require that transit service levels match anticipated boardings, which are the surrogate for demand for transportation. If too much service (e.g. service every five minutes) is offered, resources may not be fully utilized and the value-for-money is not optimized. If too little service is offered, the Biscayne EBS may not reach its full potential. The existing Route 93 service operates at 18 minutes during peak periods and 30 minutes during off-peak periods (Table 2). The passenger loads for Route 93 indicate passenger loads as high as 30 passengers per vehicle during peak periods, which indicates the route can support increased service. A ten-minute headway is generally considered the threshold at which schedules are no longer required. However, the current ridership and the presence of Route 93 do not call for an immediate support of a 10-minute headway. Therefore, a phase-implementation is recommended. The recommended initial peak period service headway is 15 minutes. Route 93 offers a 30-minute headway during off-peak periods. The passenger loads indicate lower transportation need during off-peak periods. While passengers during the off-peak period are typically less sensitive to headways, they do have greater incentive to use private autos because roadway congestion levels are low. Therefore, the Biscayne EBS is recommended to have a 20-minute headway during off-peak periods which can be improved in the subsequent phases of the service implementation.

A summary of the recommended headways by hours of operation is included in Table 15.

TABLE 15: **RECOMMENDED SERVICE FREQUENCY BY PHASE**

Phase 1 Service Frequency
Morning Peak Period – 5:30 a.m. to 9:00 a.m. (3.5 hours) – 15 Minutes
Midday Period – 9:00 a.m. to 3:00 p.m. (6 hours) – 20 Minutes
Evening Peak Period – 3:00 p.m. to 6:00 p.m. (3 hours) – 15 Minutes
Early Evening Period – 6:00 p.m. to 9:30 p.m. (3.5 hours) – 20 Minutes
Phase 2 Service Frequency
Morning Peak Period – 5:30 a.m. to 9:00 a.m. (3.5 hours) – 10 Minutes
Midday Period – 9:00 a.m. to 3:00 p.m. (6 hours) – 15 Minutes
Evening Peak Period – 3:00 p.m. to 6:00 p.m. (3 hours) – 10 Minutes
Early Evening Period – 6:00 p.m. to 9:30 p.m. (3.5 hours) – 15 Minutes

IMPACT OF HEADWAYS

Changing headway will have two direct impacts: (1) it may require more vehicles; and, (2) the operations cost for running the service and the vehicle maintenance cost increases. The two cost implications of a 15-minute service during peak periods and a 20-minute service during off-peak periods are discussed in Section 5.

4.2 STATIONS

4.2.1 NUMBER OF STATIONS

Currently, bus stops along Route 93 are spaced at an average distance of half-a-mile. These stops provide access to the service but also result in a significant increase in travel time. The Travel Time and Delay Study for existing Route 93 indicated that the in-motion time for buses is as low as 50 percent, which implies that for a 60-minute trip, the bus is in-motion for only 30 minutes. The rest of time is spent on passenger pick-ups or drop-offs or waiting at signals. On an average, passengers take nearly 11 to 13.1 minutes per trip to board and alight, which amounts to 17 percent to 21 percent of an average trip time. An analysis of the On-Board Passenger Survey indicated that trip making characteristics of Route 93 passengers are essentially the same as those of Route 3 passengers.

Therefore, to provide a meaningful differentiation between local service and the EBS, the EBS is recommended to have a focus on longer trips. This can be done by eliminating stops with lower activity. An analysis of boarding and alighting data suggests that 44 percent of northbound stops (17 out of the existing 38 stops) exhibit 79 percent of activity (summation of boardings and alightings) (Table 16). Similarly, 36 percent of southbound stops (16 out of the existing 34 stops) exhibit 75 percent of activity (Table 17). A detailed listing of the recommended Enhanced Bus Stations and the eliminated Route 93 stops is included in Tables 16 and 17.

The recommended stations will yield an average stop spacing of nearly one-mile, which is more consistent with the recommended transit service planning practices for premium transit modes.

TABLE 16: **ROUTE 93 NORTHBOUND STOPS FOR ENHANCED BUS SERVICE**

STREET	CROSS-STREET	EARLY MORNING		MORNING PEAK		MIDDAY		EVENING PEAK		LATE EVENING		ALLDAY		DAILY ACTIVITY	PERCENTAGE OF TOTAL
		On	Off	On	Off	On	Off	On	Off	Ons	Off	On	Off		
CBD TERMINAL		**6**	**0**	**139**	**0**	**134**	**0**	**107**	**0**	**26**	**4**	**412**	**4**	**416**	**10.8%**
SE 1 ST	SE 1 AV	0	0	15	0	17	3	17	2	4	0	54	5	59	1.5%
SE 1 ST	SE 3 AV	0	0	17	2	50	5	49	3	14	0	130	10	140	3.6%
BISCAYNE BLVD	NE 2 ST	0	0	2	0	14	2	7	1	4	0	27	3	30	0.8%
BISCAYNE BLVD	**NE 4 ST**	**0**	**0**	**4**	**0**	**38**	**2**	**20**	**1**	**6**	**1**	**69**	**4**	**73**	**1.9%**
BISCAYNE BLVD	NE 6 ST	0	0	1	0	2	1	2	1	1	0	6	2	8	0.2%
BISCAYNE BLVD	NE 9 ST	0	0	2	0	8	3	2	0	2	0	14	3	17	0.4%
OMNITERT		**1**	**0**	**25**	**13**	**84**	**16**	**79**	**16**	**26**	**7**	**215**	**52**	**268**	**7.0%**
BISCAYNE BLVD	NE 20 ST	0	0	10	4	12	5	16	3	7	1	45	14	59	1.5%
BISCAYNE BLVD	NE 29 ST	1	0	20	5	10	12	7	14	2	5	40	37	76	2.0%
BISCAYNE BLVD	**NE 36 ST**	**1**	**0**	**32**	**14**	**27**	**25**	**31**	**19**	**7**	**6**	**98**	**64**	**161**	**4.2%**
BISCAYNE BLVD	**NE 55 TE**	**3**	**3**	**22**	**3**	**24**	**19**	**14**	**14**	**3**	**4**	**66**	**43**	**109**	**2.8%**
BISCAYNE BLVD	**NE 62 ST**	**2**	**0**	**23**	**4**	**19**	**13**	**13**	**16**	**2**	**7**	**60**	**39**	**99**	**2.6%**
BISCAYNE BLVD	NE 70 ST	1	0	6	6	7	8	5	7	3	4	22	25	47	1.2%
BISCAYNE BLVD	**NE 79 ST**	**4**	**1**	**46**	**18**	**67**	**54**	**49**	**49**	**18**	**16**	**185**	**139**	**324**	**8.4%**
BISCAYNE BLVD	**NE 91 ST**	**2**	**0**	**20**	**8**	**20**	**22**	**14**	**20**	**9**	**6**	**64**	**56**	**120**	**3.1%**
BISCAYNE BLVD	NE 96 ST	1	0	7	3	6	2	7	2	0	0	21	8	29	0.7%
BISCAYNE BLVD	**NE 108 ST**	**1**	**0**	**19**	**11**	**14**	**23**	**15**	**29**	**3**	**11**	**52**	**73**	**125**	**3.3%**
BISCAYNE BLVD	**SANS SOUCI BLVD**	**2**	**1**	**18**	**11**	**17**	**27**	**9**	**23**	**3**	**8**	**48**	**69**	**117**	**3.1%**
BISCAYNE BLVD	**NE 123 ST**	**2**	**3**	**26**	**25**	**34**	**31**	**24**	**40**	**6**	**10**	**92**	**109**	**202**	**5.3%**
BISCAYNE BLVD	**NE 135 ST**	**2**	**0**	**17**	**13**	**19**	**25**	**16**	**38**	**3**	**11**	**56**	**87**	**143**	**3.7%**
BISCAYNE BLVD	**NE 146 ST**	**1**	**1**	**19**	**18**	**35**	**31**	**18**	**22**	**3**	**6**	**77**	**78**	**155**	**4.0%**
BISCAYNE BLVD	NE 156 ST	0	0	7	19	9	27	8	20	2	8	27	74	101	2.6%
BISCAYNE BLVD	**NE 163 ST**								**No data**						
BISCAYNE BLVD	NE 172 ST	0	0	1	2	1	4	1	9	0	1	4	17	21	0.5%
BISCAYNE BLVD	NE 178 ST	0	0	2	6	3	4	1	5	0	2	6	18	24	0.6%
BISCAYNE BLVD	NE 180 ST	0	0	2	4	2	4	0	4	0	0	5	12	17	0.4%
BISCAYNE BLVD	NE 182 ST	0	0	3	7	2	4	2	3	0	0	7	15	22	0.6%
BISCAYNE BLVD	**NE 183 ST**	**0**	**3**	**1**	**25**	**4**	**13**	**2**	**5**	**0**	**2**	**7**	**48**	**55**	**1.4%**
BISCAYNE BLVD	**NE 186 ST**	**0**	**1**	**1**	**13**	**6**	**11**	**3**	**5**	**0**	**1**	**10**	**31**	**41**	**1.1%**
BISCAYNE BLVD	NE 187 ST	0	1	14	24	2	9	2	5	0	1	18	38	56	1.5%
BISCAYNE BLVD	# 18999	0	0	0	13	0	4	0	3	0	1	1	21	22	0.6%
BISCAYNE BLVD	NE 191 ST	0	0	0	6	1	8	1	4	0	1	3	20	23	0.6%
AVENTURA BLVD	#2740	0	0	0	10	1	19	1	8	0	2	2	39	41	1.1%
AVENTURA BLVD	**# 2900**	**0**	**15**	**1**	**124**	**2**	**95**	**0**	**55**	**0**	**15**	**3**	**305**	**308**	**8.0%**
AVENTURA MALL		**0**	**4**	**0**	**70**	**0**	**154**	**0**	**82**	**0**	**21**	**0**	**331**	**331**	**8.6%**
TOTAL (All Stops)		31	35	522	481	693	683	544	530	155	164	1,944	1,893	3,837	
TOTAL (Stops selected for Enhanced Bus Service)		27	32	412	370	544	560	416	434	115	135	1,514	1,532	3,046	
TOTAL (Share of Stops selected for Enhanced Bus Service)		88%	92%	79%	77%	79%	82%	76%	82%	74%	83%	78%	81%	79%	

Recommended EBS Station

Not recommended for EBS Station

TABLE 17: **ROUTE 93 SOUTHBOUND STOPS FOR ENHANCED BUS SERVICE**

STREET	CROSS-STREET	EARLY MORNING		MORNING PEAK		MIDDAY		EVENING PEAK		LATE EVENING		ALLDAY		DAILY ACTIVITY	PERCENTAGE OF TOTAL
		On	Off	On	Off	On	Off	On	Off	Ons	Off	On	Off		
AVENTURA MALL		**7**	**0**	**57**	**0**	**102**	**0**	**123**	**0**	**14**	**0**	**303**	**0**	**303**	**10.0%**
NE 29 PL	AVENTURA BLVD	2	0	29	1	42	0	55	6	6	0	134	7	140	4.6%
AVENTURA BLVD	**NE 29 PL**	**1**	**0**	**22**	**0**	**22**	**0**	**31**	**1**	**3**	**0**	**78**	**1**	**79**	**2.6%**
AVENTURA BLVD	# 2845	0	0	6	0	5	0	9	0	1	0	21	0	22	0.7%
BISCAYNE BLVD	NE 195 ST	0	0	3	0	5	0	9	2	1	0	18	2	21	0.7%
BISCAYNE BLVD	NE 191 ST	0	0	3	1	9	1	11	3	2	0	24	5	29	0.9%
BISCAYNE BLVD	# 19000	0	0	3	2	5	1	10	1	2	0	20	4	24	0.8%
BISCAYNE BLVD	**NE 186 ST**	**0**	**0**	**3**	**3**	**3**	**1**	**4**	**1**	**0**	**0**	**10**	**4**	**14**	**0.5%**
BISCAYNE BLVD	**NE 183 ST**	**1**	**1**	**15**	**4**	**27**	**5**	**33**	**4**	**2**	**0**	**79**	**14**	**93**	**3.1%**
BISCAYNE BLVD	NE 180 ST	0	0	3	2	5	4	4	3	0	0	12	9	21	0.7%
BISCAYNE BLVD	NE 178 ST	0	0	8	0	7	3	7	3	0	0	23	6	29	1.0%
BISCAYNE BLVD	NE 172 ST	0	0	10	0	6	1	5	3	0	0	21	4	25	0.8%
BISCAYNE BLVD	**NE 163 ST**	**2**	**0**	**24**	**2**	**24**	**10**	**19**	**10**	**2**	**1**	**71**	**23**	**94**	**3.1%**
BISCAYNE BLVD	NE 151 ST	2	1	3	8	14	6	13	6	2	0	34	21	55	1.8%
BISCAYNE BLVD	**NE 146 ST**	**3**	**0**	**10**	**6**	**9**	**10**	**9**	**12**	**0**	**1**	**32**	**29**	**61**	**2.0%**
BISCAYNE BLVD	**NE 135 ST**	**1**	**0**	**33**	**4**	**26**	**11**	**20**	**18**	**1**	**2**	**81**	**35**	**116**	**3.8%**
BISCAYNE BLVD	**NE 123 ST**	**0**	**1**	**32**	**13**	**30**	**22**	**29**	**24**	**3**	**2**	**94**	**62**	**156**	**5.2%**
BISCAYNE BLVD	**SANS SOUCI BLVD**	**2**	**0**	**30**	**11**	**17**	**11**	**19**	**15**	**1**	**1**	**70**	**38**	**108**	**3.6%**
BISCAYNE BLVD	**# 10700**	**4**	**0**	**22**	**7**	**32**	**11**	**16**	**11**	**2**	**1**	**76**	**30**	**106**	**3.5%**
BISCAYNE BLVD	NE 97 ST	0	0	1	3	1	7	4	3	1	0	6	13	19	0.6%
BISCAYNE BLVD	**NE 91 ST**	**2**	**1**	**13**	**5**	**24**	**20**	**16**	**18**	**1**	**2**	**57**	**45**	**102**	**3.4%**
BISCAYNE BLVD	**NE 79 ST**	**4**	**1**	**42**	**23**	**54**	**60**	**26**	**51**	**3**	**7**	**130**	**141**	**271**	**9.0%**
BISCAYNE BLVD	NE 71 ST	0	0	3	5	5	8	5	9	0	1	14	22	36	1.2%
BISCAYNE BLVD	**NE 62 ST**	**2**	**1**	**12**	**8**	**13**	**11**	**6**	**21**	**0**	**2**	**32**	**43**	**75**	**2.5%**
BISCAYNE BLVD	**NE 54 ST**	**1**	**0**	**4**	**8**	**12**	**17**	**6**	**25**	**0**	**1**	**23**	**52**	**74**	**2.5%**
BISCAYNE BLVD	**NE 36 ST**	**0**	**1**	**3**	**24**	**8**	**30**	**4**	**45**	**0**	**4**	**15**	**103**	**118**	**3.9%**
BISCAYNE BLVD	NE 28 ST	2	0	2	6	5	13	3	15	0	2	12	36	49	1.6%
BISCAYNE BLVD	NE 18 ST	0	0	0	7	5	12	2	11	0	1	8	32	40	1.3%
OMNITERT		**1**	**4**	**8**	**54**	**15**	**66**	**13**	**46**	**1**	**4**	**37**	**174**	**211**	**7.0%**
BISCAYNE BLVD	NE 11 ST	0	0	0	2	0	1	0	1	0	1	1	5	6	0.2%
BISCAYNE BLVD	NE 9 ST	0	1	1	39	1	29	1	13	0	0	3	82	85	2.8%
NW 3 ST	N MIAMI AV	0	5	0	52	2	52	2	32	0	3	4	143	147	4.9%
CBLVD TERMINAL		**0**	**15**	**0**	**78**	**0**	**96**	**0**	**92**	**0**	**10**	**0**	**292**	**292**	**9.7%**
TOTAL (All Stops)		38	32	407	375	535	521	511	503	49	47	1,541	1,479	3,019	
TOTAL (Stops selected for Enhanced Bus Service)		30	25	332	248	416	381	372	394	35	39	1,185	1,087	2,272	
TOTAL (Share of Stops selected for Enhanced Bus Service)		81%	78%	82%	66%	78%	73%	73%	78%	71%	82%	77%	73%	75%	

Recommended EBS Station

Not recommended for EBS Station

IMPACT OF REDUCTION IN STOPS/STATIONS

Elimination of 21 northbound stops and 18 southbound stops will result in travel time savings – furthering one of the goals of the Enhanced Bus Service Implementation Plan. Elimination of stops will yield travel time savings of 3 percent to 5 percent (Table 18). It is noteworthy that while in-vehicle travel time for several passengers will decrease, they will experience higher out-of-vehicle travel time. This is because they will have to walk or bike longer distances to access a stop location. It is a trade-off that comes with the usage of premium transit services that provides faster service.

TABLE 18: **IMPACT OF REDUCTION IN STOPS**

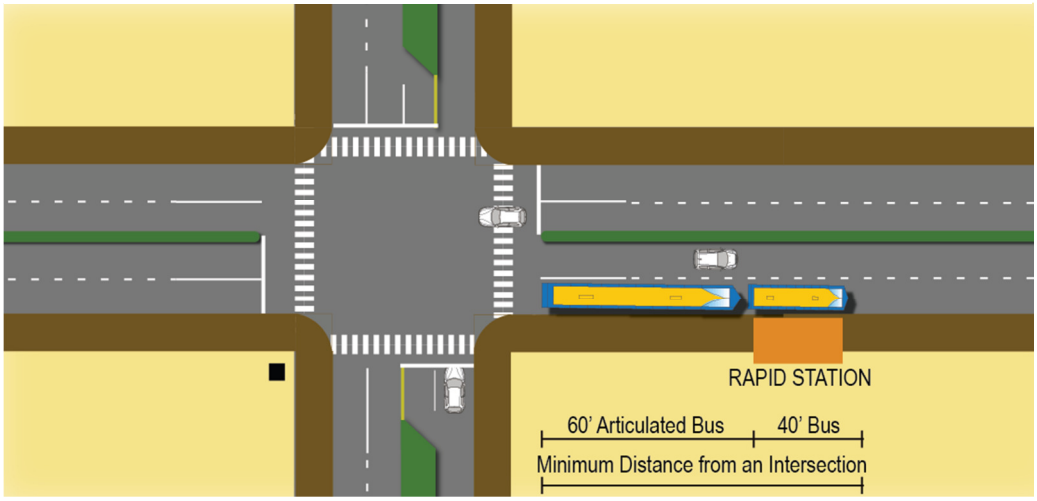
STOP SAVINGS	SCHEDULED TIME (MM)	AVG OBSERVED TIME (MM)	AVG SAVINGS PER TRIP (MINUTES)	TRAVEL TIME SAVINGS DUE TO STOP ELIMINATION (% OF SCHEDULED TIME)	TRAVEL TIME SAVINGS DUE TO STOP ELIMINATION (% OF OBSERVED TIME)
AM-NB	60	63	2.8	5%	5%
AM-SB	60	57	2.1	4%	4%
PM-NB	71	71	2.5	3%	3%
PM-SB	66	75	2.1	3%	3%

4.2.2 STATION IN RELATIONSHIP TO A TYPICAL INTERSECTION

A farside stop is located after an intersection in the direction of travel. Conversely, a nearside stop is located before an intersection in the direction of travel. A farside location eliminates conflicts with right-turning vehicles and stopped vehicles at the intersection.

NEARSIDE OR FARSIDE LOCATION

FIGURE 30: **STATION IN RELATION TO A TYPICAL INTERSECTION**



Farside stops also maximize effectiveness of potential TSP applications. Success of TSP, which is reducing travel time and improving travel time reliability, relies on accuracy of predictable arrival time at the intersection. A nearside stop increases uncertainty associated with predictable arrival time because the number of passengers boardings and alighting at a nearside stop varies with time-of-day and other factors. Therefore, buses may be required to stop twice at an intersection with a nearside stop: once for a red traffic signal and, again at the station to load and unload riders. A farside stop allows a transit vehicle to activate the priority call prior to arriving at the intersection, progress through the intersection, and then stop at the farside platform. Furthermore, farside station locations also afford the ability to add queue jump lanes that use auxiliary lanes (turn or through lanes at intersections) on the nearside of the intersection to bypass traffic. Therefore, stations for the Biscayne EBS are recommended to be on the farside of a typical intersection.

There are some exceptions. Several factors contribute towards determination of a stop location. The effectiveness of TSP and queue-jump/by-pass lanes are two important variables. For instance, right-of-way constraints, identified in the subsequent sections may require a nearside stop location.

Similarly, if a farside location is "too" downstream (250 ft or more) away from intersection then potential benefits of a farside stations are likely to be outweighed by discomfort to transferring passengers.

DISTANCE FROM THE NEAREST INTERSECTION

All farside stations are recommended to be at least 100 ft from the curb radii or a crosswalk (Figure 30). This is to allow a 60-ft vehicle and a 40-vehicle to stop simultaneously at a stop without blocking the intersection.

IMPACT OF ESTABLISHING FARSIDE STOPS

Station areas for the Biscayne EBS will require new station infrastructure and therefore, a station location in relation to an intersection has no additional impact on station cost.

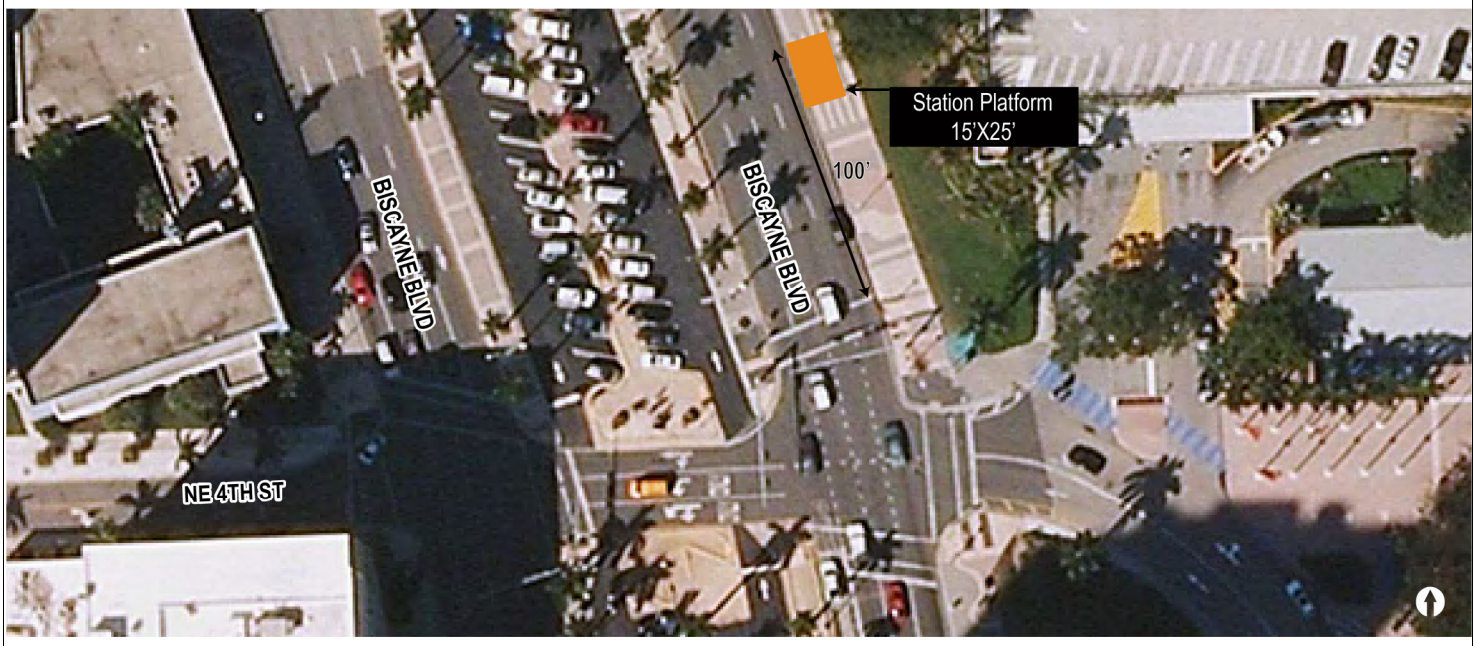
4.2.3 STATION LOCATIONS

A summary of the recommended station locations is included below. A detailed description of the recommended station area and recommendations is included on subsequent pages.

	STREET	CROSS-STREET	Northbound		Southbound	
			Preliminary Name	Location	Preliminary Name	Location
1	CBD TERMINAL		Downtown Terminal	N/A	Downtown Terminal	N/A
2	BISCAYNE BLVD	NE 4 ST	MDC	Farside	MDC	Farside
3	OMNITERT	NE 15 Street	Omni Station	Farside	Omni Station	Farside
4	BISCAYNE BLVD	NE 36 ST	Midtown Station	Farside	Midtown Station	Farside
5	BISCAYNE BLVD	NE 55 TE	Morningside Station	Farside	Morningside Station	Farside
6	BISCAYNE BLVD	NE 62 ST	Legion Park Station	Farside	Legion Park Station	Nearside
7	BISCAYNE BLVD	NE 79 ST	Miami Gateway Station	Farside	Miami Gateway Station	Nearside
8	BISCAYNE BLVD	NE 91 ST	Miami Shores Station	Farside	Miami Shores Station	Farside
9	BISCAYNE BLVD	NE 108 ST	NE 108 St Station	Farside	NE 108 St Station	Farside
10	BISCAYNE BLVD	SANS SOUCI BLVD	San Souci Station	Farside	San Souci Station	Farside
11	BISCAYNE BLVD	NE 123 ST	North Miami Station	Farside	North Miami Station	Farside
12	BISCAYNE BLVD	NE 135 ST	NE 135 St Station	Farside	NE 135 St Station	Nearside
13	BISCAYNE BLVD	NE 146 ST	North Miami Beach Station	Farside	North Miami Beach Station	Farside
14	BISCAYNE BLVD	NE 163 ST	NE 163 St Station	Farside	NE 163 St Station	Farside
15	BISCAYNE BLVD	NE 183 ST	NE 183/186 St Station	Farside	NE 183/186 St Station	Farside
16	AVENTURA BLVD	# 2900	Aventura Station	Farside	Aventura Station	Farside
17	AVENTURA MALL		Aventura Mall Station	Farside	Aventura Mall Station	Farside

1. BAYSIDE STATION – Northbound

Plan View



Route 93 Daily Acitivity: 73 Weekday Boardings and Alightings

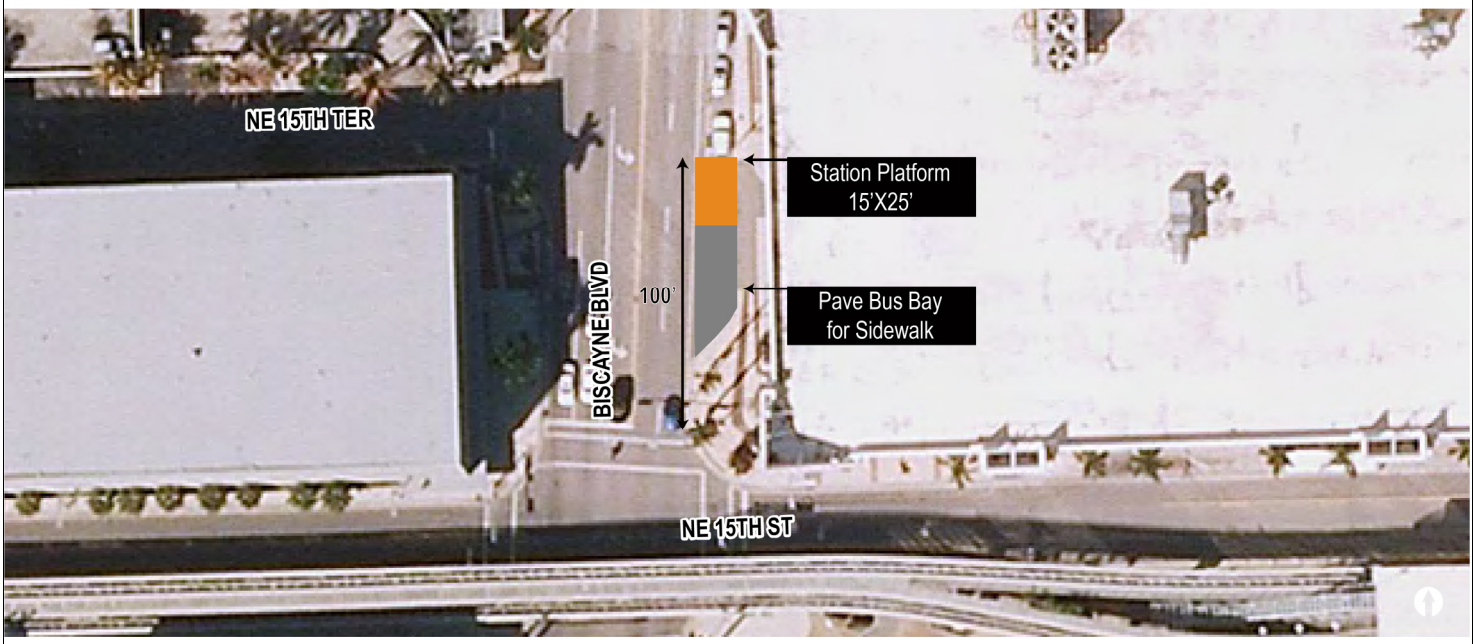
Photograph: Facing the Station Area

Photograph: In the Direction of Travel

• **Street**	Biscayne Boulevard
• **Cross-street**	NE 4 Street
• **Desired ROW**	15' x 25'
• **Available ROW (Preliminary)**	15' x 25'
• **Station Platform**	15' x 25'
• **Shelter Type**	Standard
• **Marker Type**	Standard
• **Other Considerations or Constraints**	None
• **Other Recommended Improvements**	Pavers and sidewalk design is recommended to be incorporated in station design

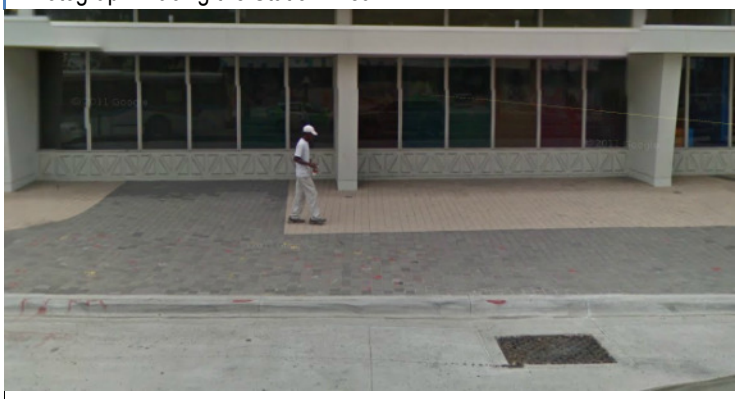
2. OMNI STATION – Northbound

Plan View



Route 93 Daily Acitivity: 268 Weekday Boardings and Alightings

Photograph: Facing the Station Area

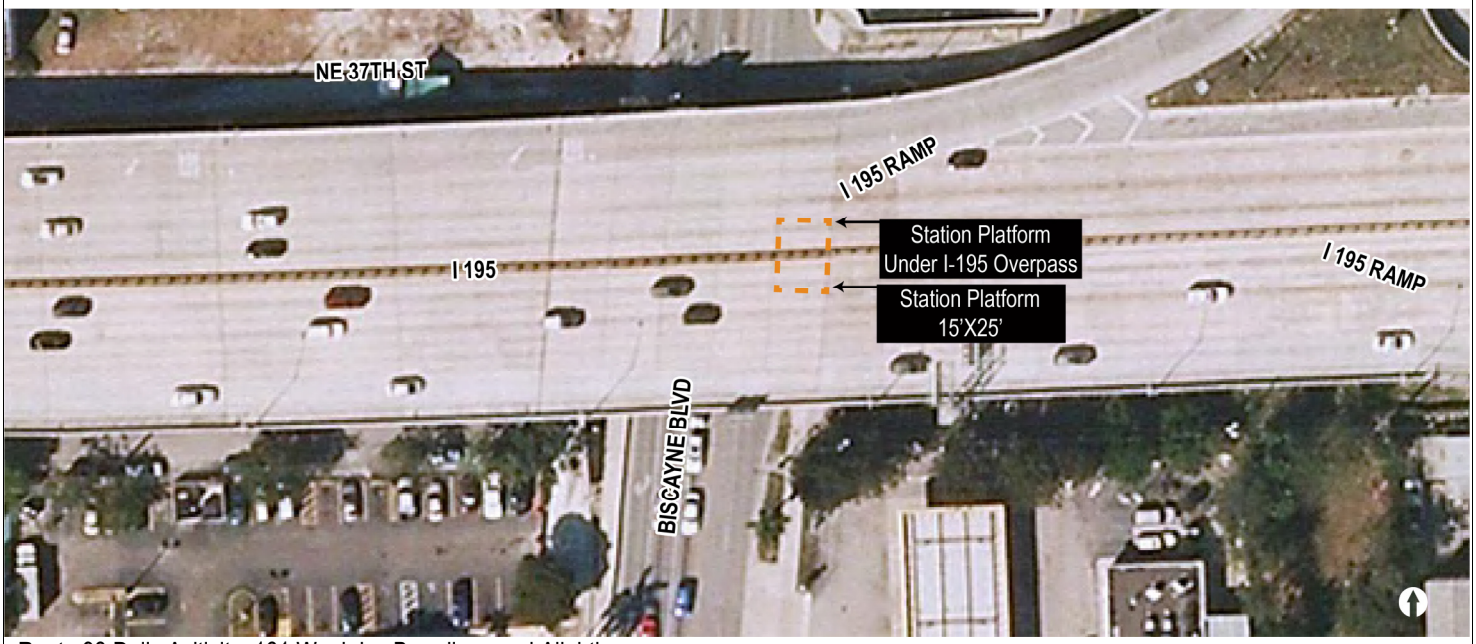


Photograph: In the Direction of Travel

• **Street**	Biscayne Boulevard
• **Cross-street**	NE 15 Street
• **Desired ROW**	15' x 25'
• **Available ROW (Preliminary)**	7'+ [9' Bay] x 25'
• **Station Platform**	15' x 25'
• **Shelter Type**	Standard
• **Marker Type**	Standard
• **Other Considerations or Constraints**	Eliminate Busbay to incorporate a station area
• **Other Recommended Improvements**	Pavers and sidewalk design is recommended to be incorporated in station design

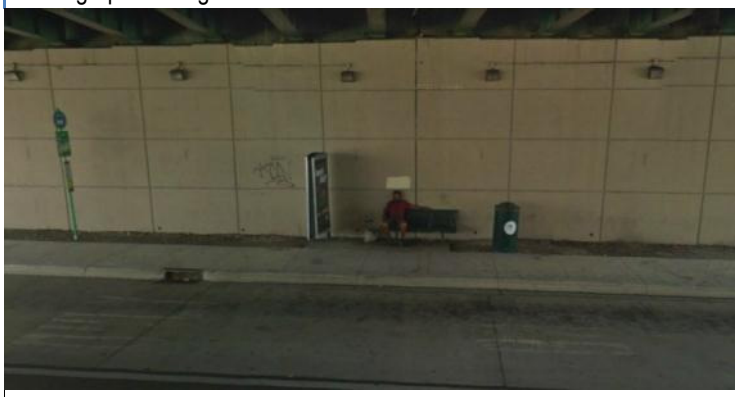
3. MIDTOWN MIAMI STATION – Northbound

Plan View



Route 93 Daily Acitivity: 161 Weekday Boardings and Alightings

Photograph: Facing the Station Area

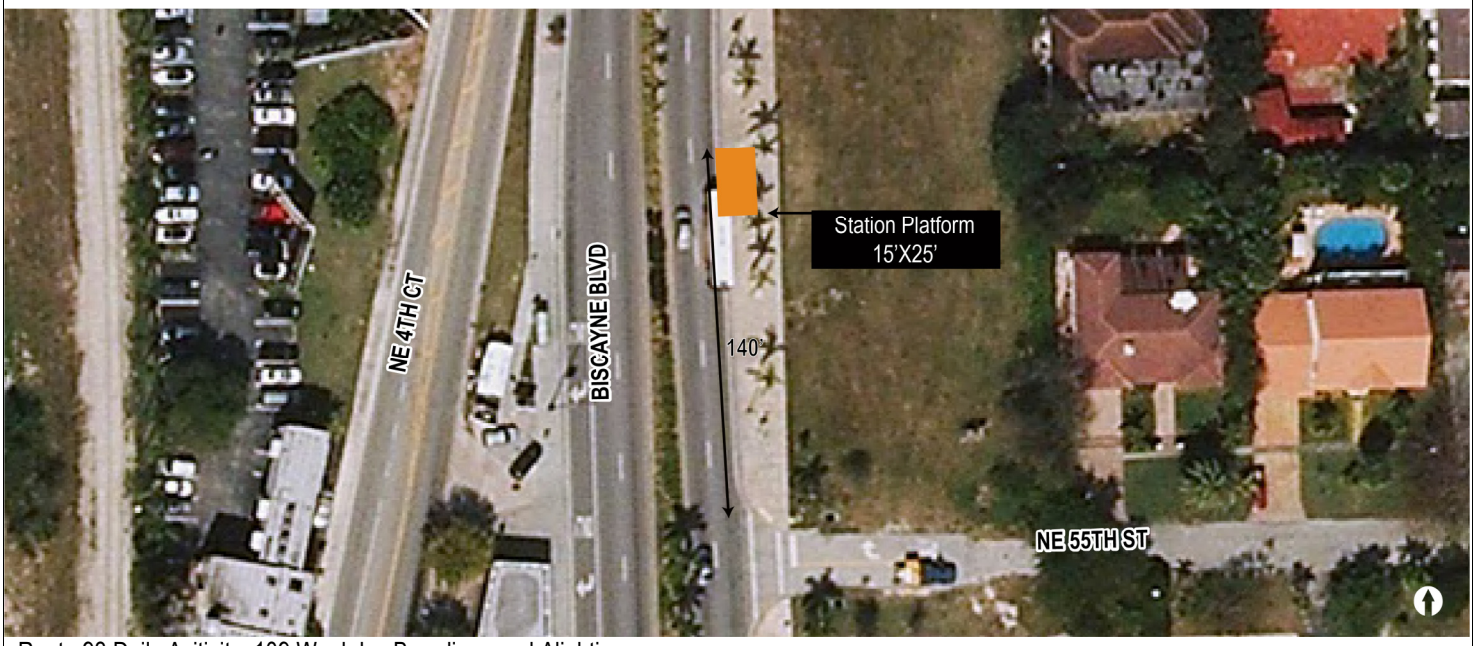


Photograph: In the Direction of Travel

• **Street**	Biscayne Boulevard
• **Cross-street**	NE 36 Street
• **Desired ROW**	15' x 25'
• **Available ROW (Preliminary)**	10' x 25'
• **Station Platform**	10' x 25'
• **Shelter Type**	None
• **Marker Type**	Standard
• **Other Considerations or Constraints**	Marker to be installed south of the overpass
	This station will not have a shelter
• **Other Recommended Improvements**	Additional lighting, painting, and clean-up is recommended.

4. MORNINGSIDE STATION – Northbound

Plan View



Route 93 Daily Acitivity: 109 Weekday Boardings and Alightings

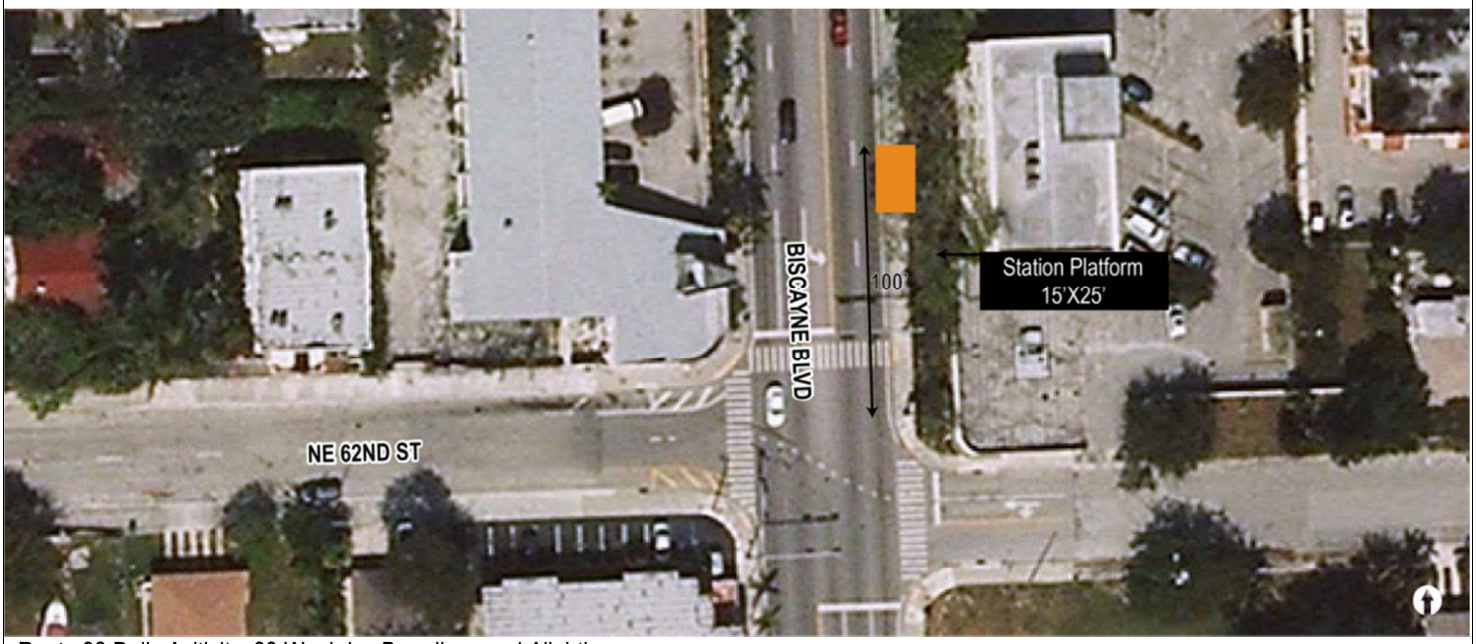
Photograph: Facing the Station Area

Photograph: In the Direction of Travel

• **Street**	Biscayne Boulevard
• **Cross-street**	NE 55 Street
• **Desired ROW**	15' x 25'
• **Available ROW (Preliminary)**	16' x 25'
• **Station Platform**	15' x 25'
• **Shelter Type**	Standard
• **Marker Type**	Standard
• **Other Considerations or Constraints**	Further coordination with the proposed development at 5501 Biscayne Boulevard is recommended.
• **Other Recommended Improvements**	Additional crosswalks at two legs of Biscayne Boulevard and NE 54th Street intersection are recommended.

5. LEGION PARK STATION – Northbound

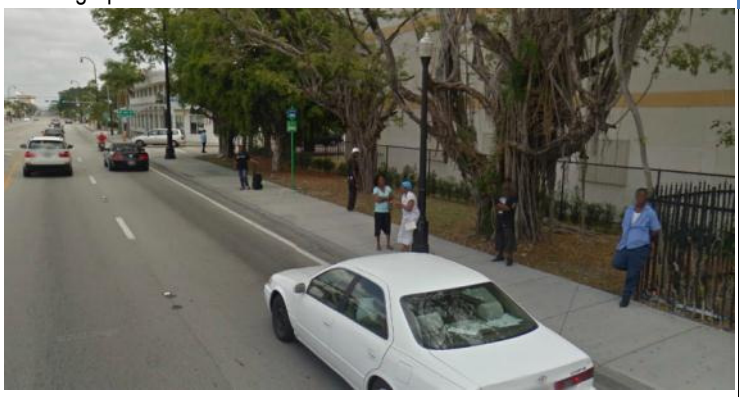
Plan View



Route 93 Daily Acitivity: 99 Weekday Boardings and Alightings

Photograph: Facing the Station Area

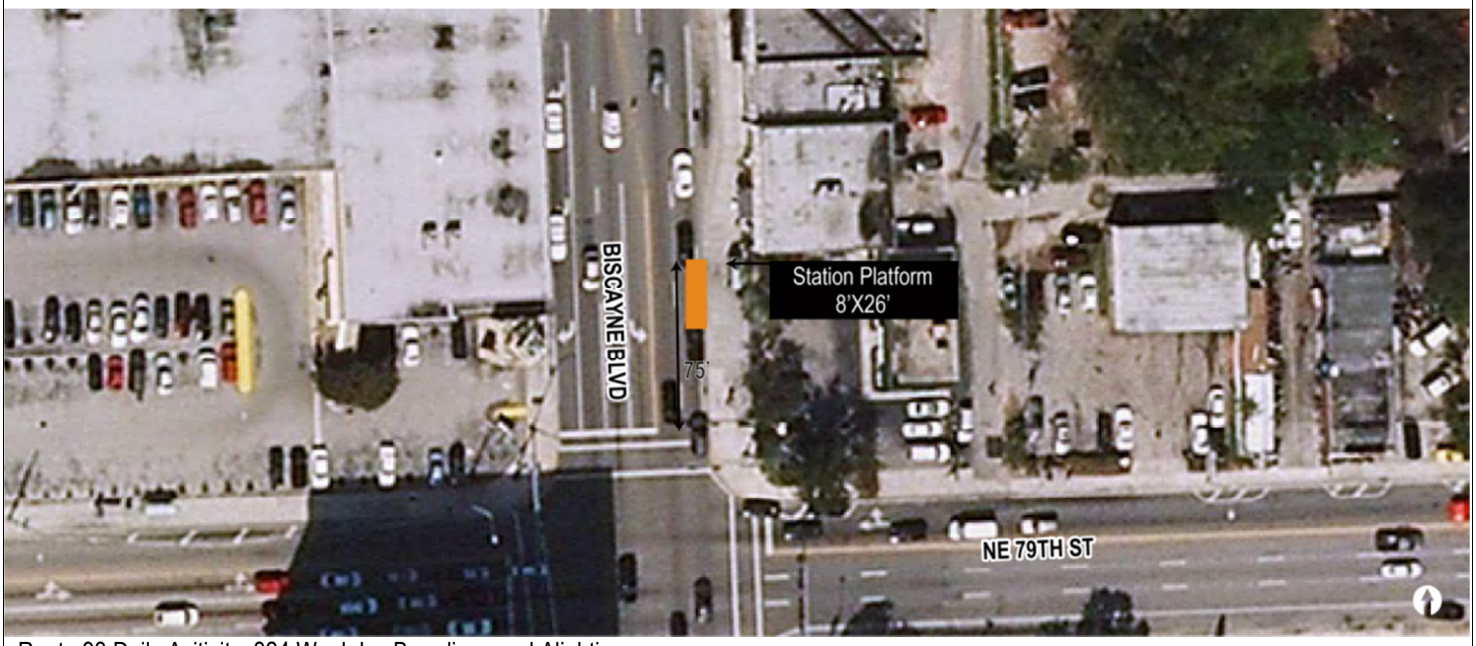
Photograph: In the Direction of Travel



• **Street**	Biscayne Boulevard
• **Cross-street**	NE 62 Street
• **Desired ROW**	15' x 25'
• **Available ROW (Preliminary)**	20' x 25'
• **Station Platform**	15' x 25'
• **Shelter Type**	Standard
• **Marker Type**	Standard
• **Other Considerations or Constraints**	The existing tree, which does not appear to be a native tree, will have to removed to accommodate the station area.
• **Other Recommended Improvements**	Crosswalk at the south leg of Biscayne Boulevard and NE 62nd Street is recommended.

6. MIAMI GATEWAY STATION – Northbound

Plan View



Route 93 Daily Acitivity: 324 Weekday Boardings and Alightings

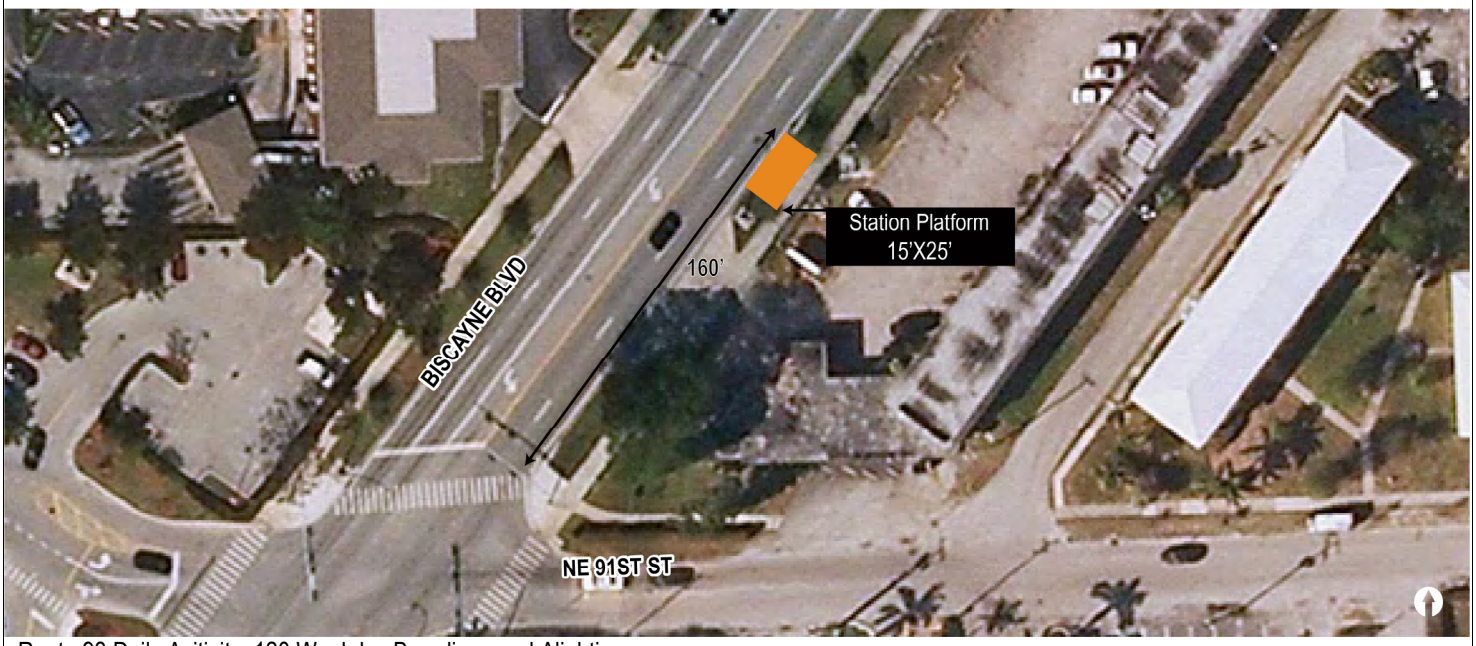
Photograph: Facing the Station Area

Photograph: In the Direction of Travel

• **Street**	Biscayne Boulevard
• **Cross-street**	NE 79 Street
• **Desired ROW**	15' x 25'
• **Available ROW (Preliminary)**	10' x 26'
• **Station Platform**	8' x 26'
• **Shelter Type**	Standard
• **Marker Type**	Standard
• **Other Considerations or Constraints**	The station area will cover frontage of an existing business (Folio # 01-3207-016-3430) and further coordination and accommodation is recommended.
• **Other Recommended Improvements**	The station is just 75 ft away from the intersection and therefore additional signage is recommended.

7. MIAMI SHORES STATION – Northbound

Plan View



Route 93 Daily Acitivity: 120 Weekday Boardings and Alightings

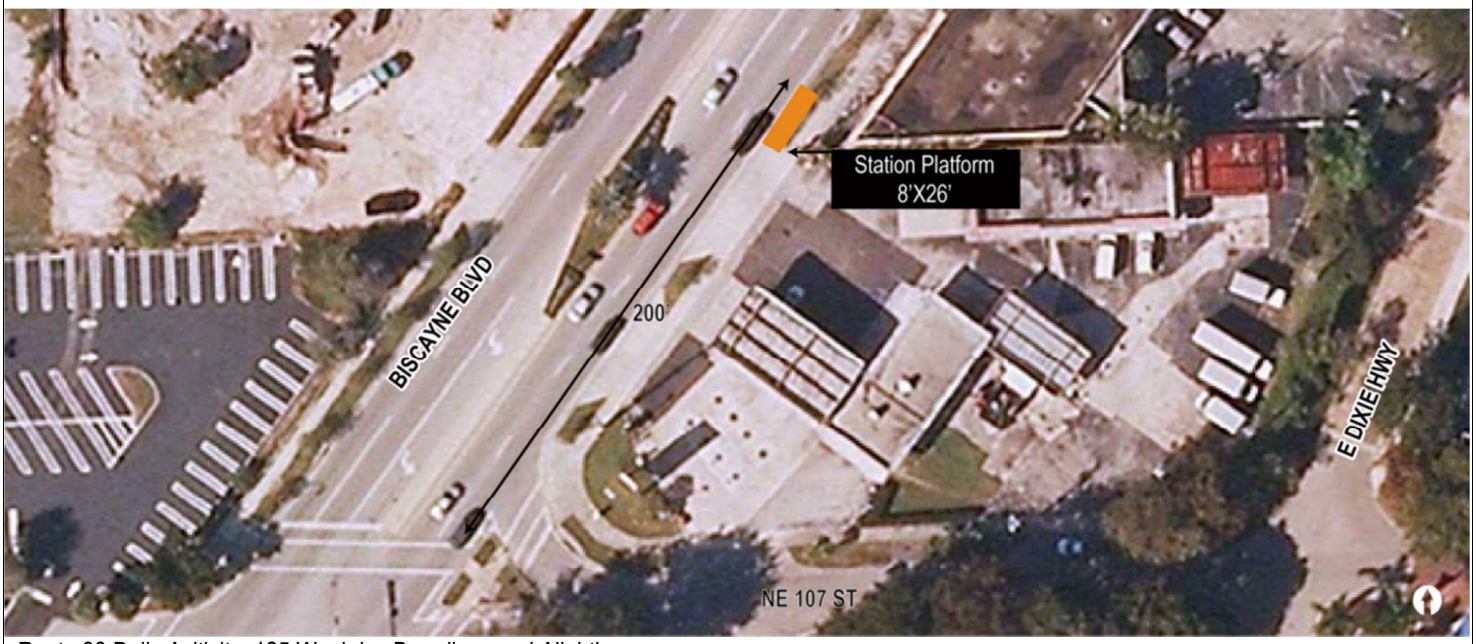
Photograph: Facing the Station Area

Photograph: In the Direction of Travel

• **Street**	Biscayne Boulevard
• **Cross-street**	NE 91 Street
• **Desired ROW**	15' x 25'
• **Available ROW (Preliminary)**	15' x 25'
• **Station Platform**	15' x 25'
• **Shelter Type**	None
• **Marker Type**	None
• **Other Considerations or Constraints**	The City of Miami Shores indicated that they do not want infrastructure improvements. MDT should conduct further coordination with the City.
• **Other Recommended Improvements**	Signage improvement is recommended to provide some visibility to the station. The station area should have the remaining elements such as a wider pad, etc.

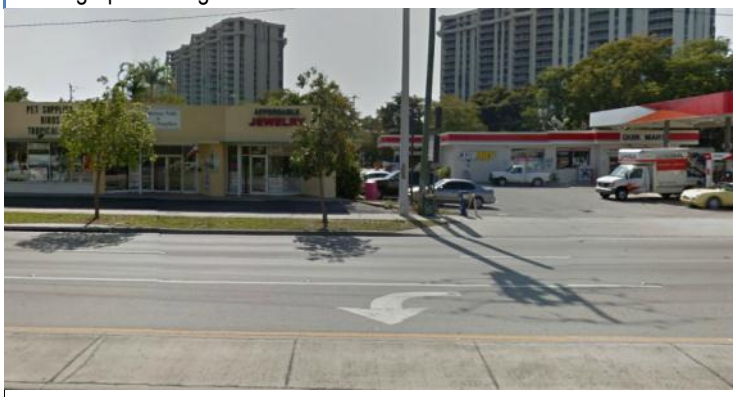
8. NE 108 ST STATION – Northbound

Plan View



Route 93 Daily Acitivity: 125 Weekday Boardings and Alightings

Photograph: Facing the Station Area

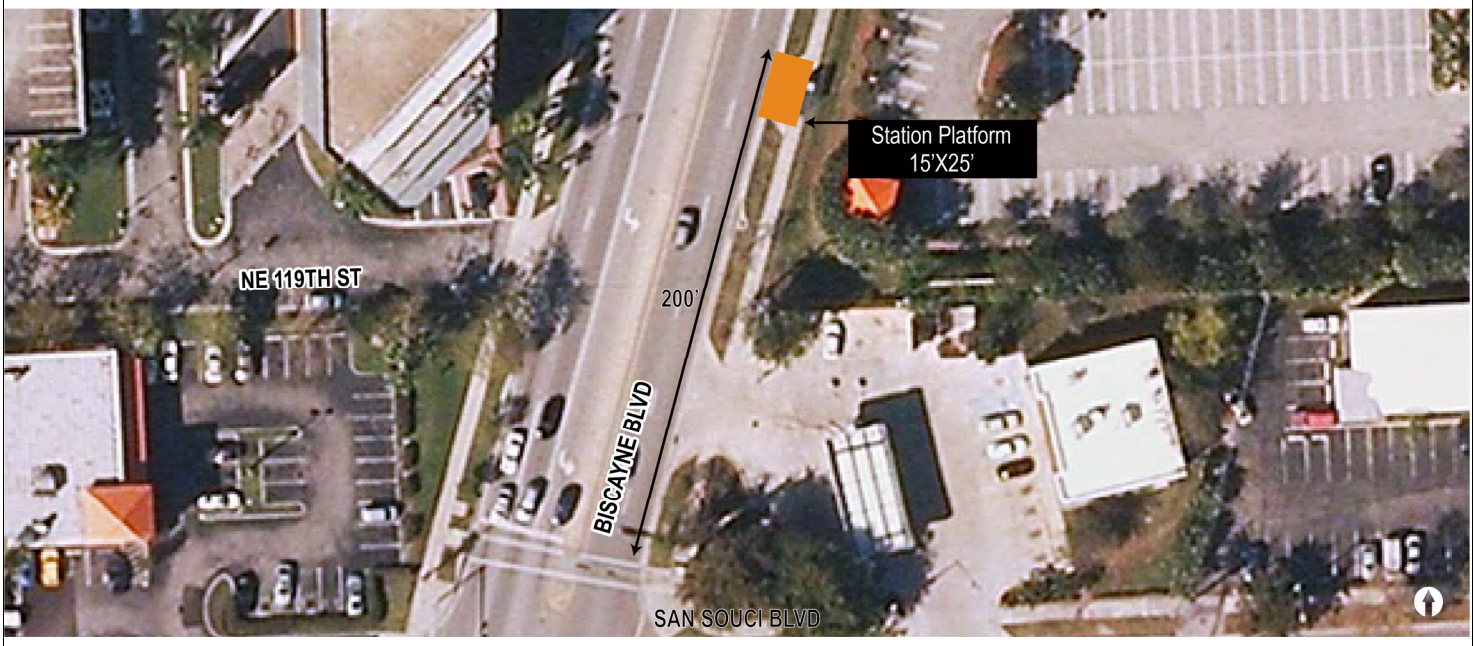


Photograph: In the Direction of Travel

• **Street**	Biscayne Boulevard
• **Cross-street**	NE 107 Street
• **Desired ROW**	15' x 25'
• **Available ROW (Preliminary)**	11.5' x 26'
• **Station Platform**	8' x 26'
• **Shelter Type**	Narrow
• **Marker Type**	Standard
• **Other Considerations or Constraints**	The station will block frontage of existing businesses and therefore, further coordination is required. A driveway in close proximity is ideal however, the width of the existing driveway can be reduced to improve safety.
• **Other Recommended Improvements**	Crosswalks are recommended at all legs of NE 107th and 108th St intersections.

9. SAN SOUCI STATION – Northbound

Plan View



Route 93 Daily Acitivity: 117 Weekday Boardings and Alightings

Photograph: Facing the Station Area

Photograph: In the Direction of Travel

• **Street**	Biscayne Boulevard
• **Cross-street**	NE 118 Street
• **Desired ROW**	15' x 25'
• **Available ROW (Preliminary)**	15' x 25'
• **Station Platform**	15' x 25'
• **Shelter Type**	Standard
• **Marker Type**	Standard
• **Other Considerations or Constraints**	None
• **Other Recommended Improvements**	None

10. NORTH MIAMI STATION – Northbound

Plan View

Route 93 Daily Acitivity: 202 Weekday Boardings and Alightings

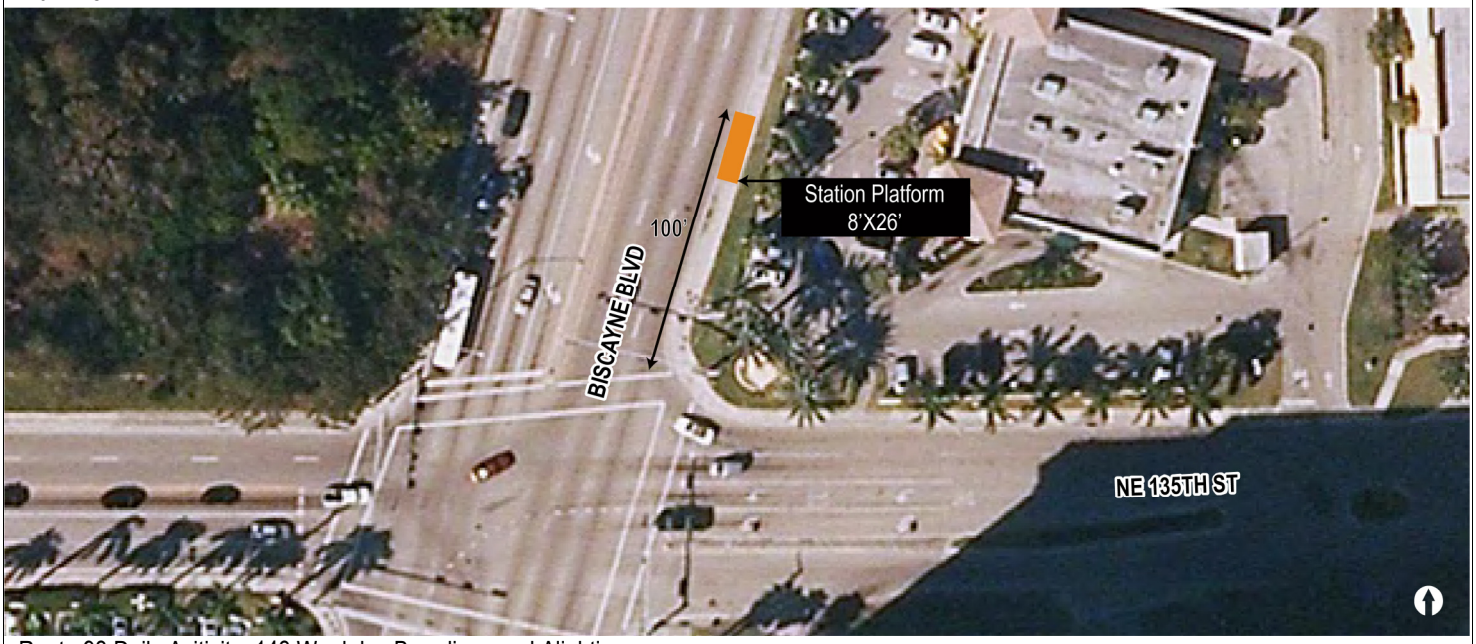
Photograph: Facing the Station Area

Photograph: In the Direction of Travel

• **Street**	Biscayne Boulevard
• **Cross-street**	NE 123 Street
• **Desired ROW**	15' x 25'
• **Available ROW (Preliminary)**	6' x 25'
• **Station Platform**	8' x 26'
• **Shelter Type**	Narrow
• **Marker Type**	Standard
• **Other Considerations or Constraints**	ROW is insufficient at this location. An easement with the property owner (Folio # 06-2220-014-0370) is recommended. The station will block frontage of existing businesses owner and therefore, further coordination is required.
• **Other Recommended Improvements**	None

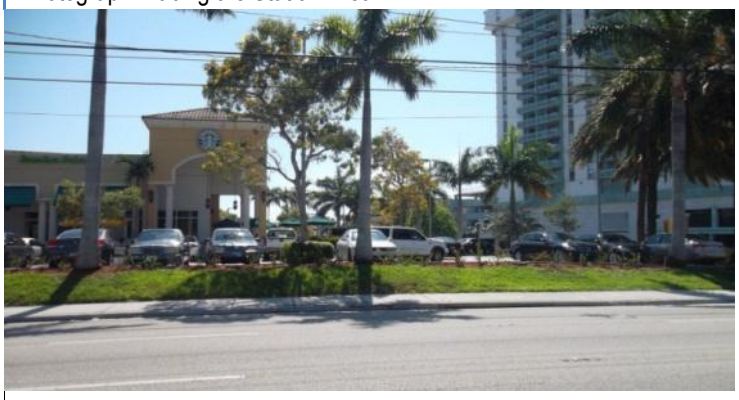
11. NE 135 ST STATION – Northbound

Plan View



Route 93 Daily Acitivity: 143 Weekday Boardings and Alightings

Photograph: Facing the Station Area



Photograph: In the Direction of Travel

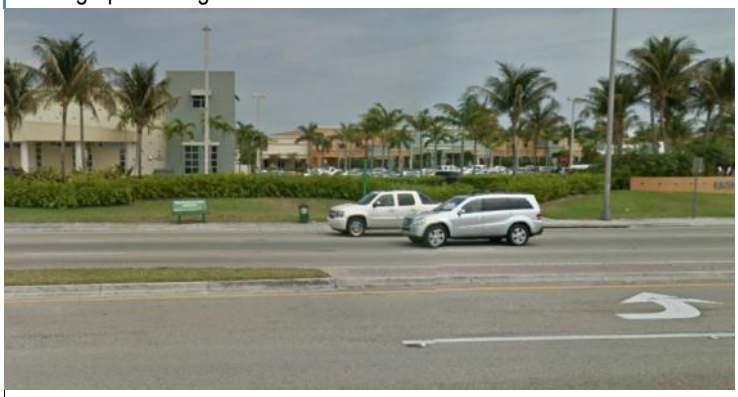
• **Street**	Biscayne Boulevard
• **Cross-street**	NE 135 Street
• **Desired ROW**	15' x 25'
• **Available ROW (Preliminary)**	6' x 25'
• **Station Platform**	8' x 26'
• **Shelter Type**	Narrow
• **Marker Type**	Small
• **Other Considerations or Constraints**	ROW is insufficient at this location. An easement with the property owner (Folio # 06-2220-014-0370) is recommended. The station will block frontage of existing businesses (e.g. Starbucks) and therefore, further coordination is required. Due to overhead utilities, marker height will have to be reduced.
• **Other Recommended Improvements**	None

12. NORTH MIAMI BEACH STATION – Northbound

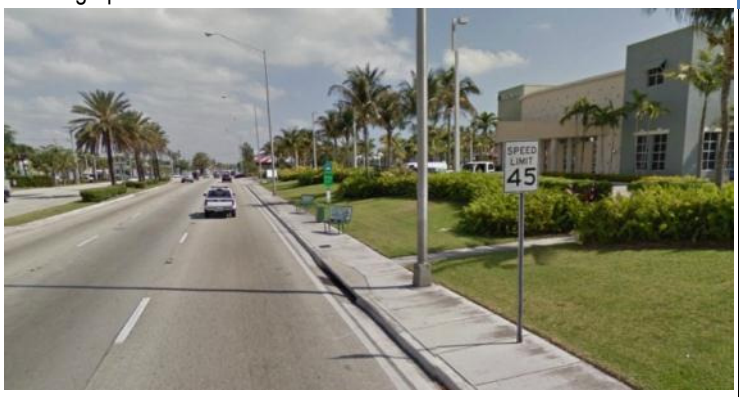
Plan View

Route 93 Daily Acitivity: 155 Weekday Boardings and Alightings

Photograph: Facing the Station Area



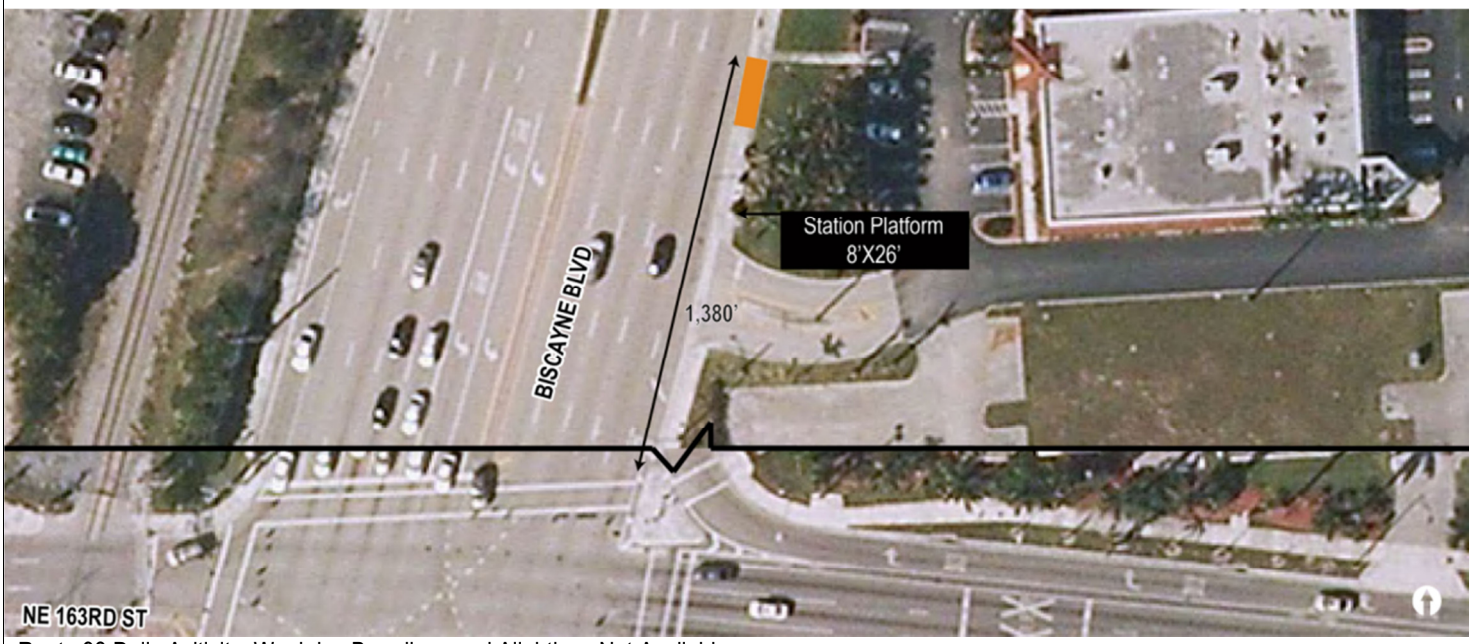
Photograph: In the Direction of Travel



• **Street**	Biscayne Boulevard
• **Cross-street**	NE 146 Street
• **Desired ROW**	15' x 25'
• **Available ROW (Preliminary)**	6' x 25'
• **Station Platform**	8' x 26'
• **Shelter Type**	Narrow
• **Marker Type**	Standard
• **Other Considerations or Constraints**	ROW is insufficient at this location. An easement with the property owner is recommended.
• **Other Recommended Improvements**	Evaluation for a pedestrian-only signal and a mid-block crosswalk is recommended at the entrance to Biscayne Commons Shopping Plaza.

13. NE 163 ST STATION – Northbound

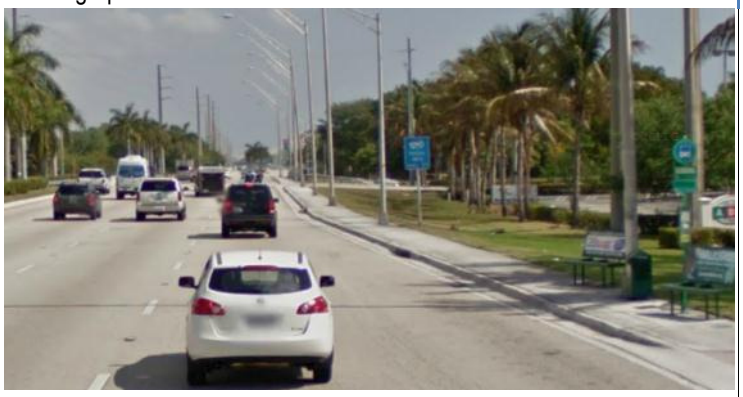
Plan View



Route 93 Daily Acitivity: Weekday Boardings and Alightings Not Available

Photograph: Facing the Station Area

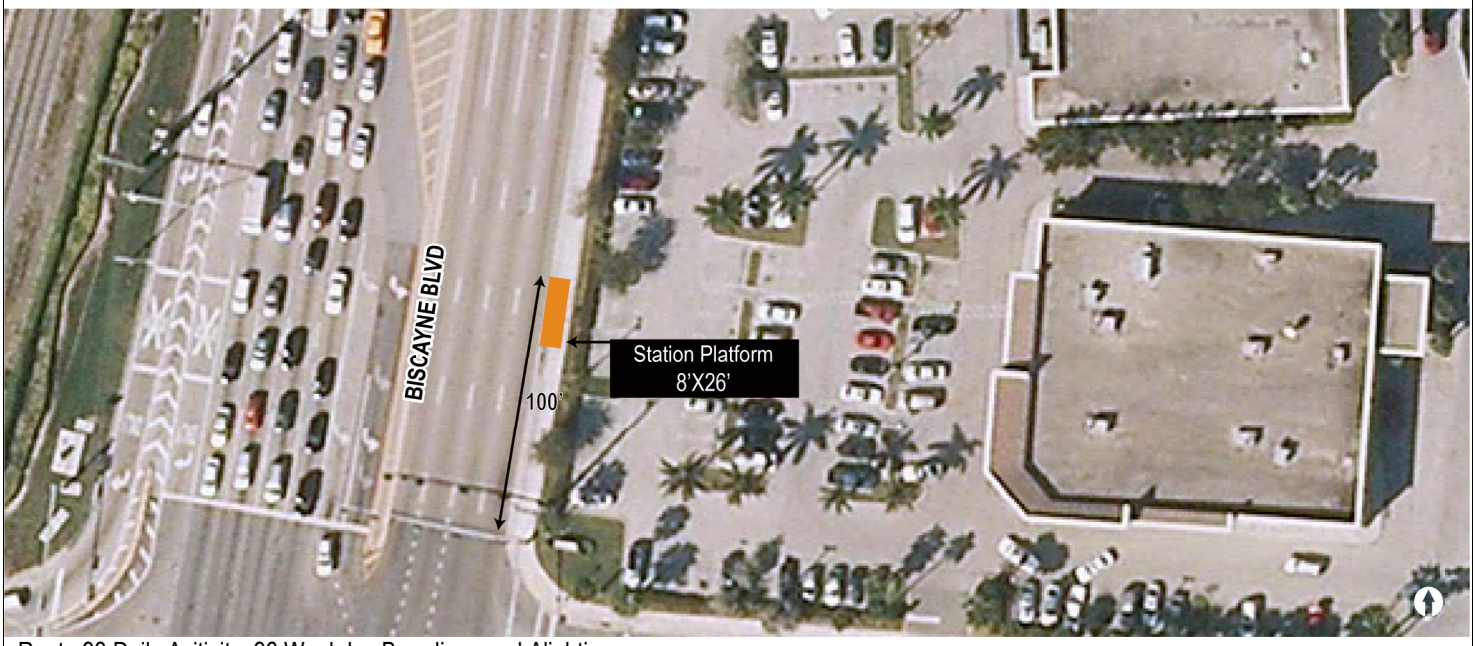
Photograph: In the Direction of Travel



• **Street**	Biscayne Boulevard
• **Cross-street**	NE 163 Street
• **Desired ROW**	15' x 25'
• **Available ROW (Preliminary)**	6' x 25'
• **Station Platform**	8' x 26'
• **Shelter Type**	Narrow
• **Marker Type**	Standard
• **Other Considerations or Constraints**	ROW is insufficient at this location. An easement with the property owner (Folio # 07-2216-042-0030) is recommended.
• **Other Recommended Improvements**	None

14. NE 183/186 ST STATION – Northbound

Plan View



Route 93 Daily Acitivity: 96 Weekday Boardings and Alightings

Photograph: Facing the Station Area

Photograph: In the Direction of Travel

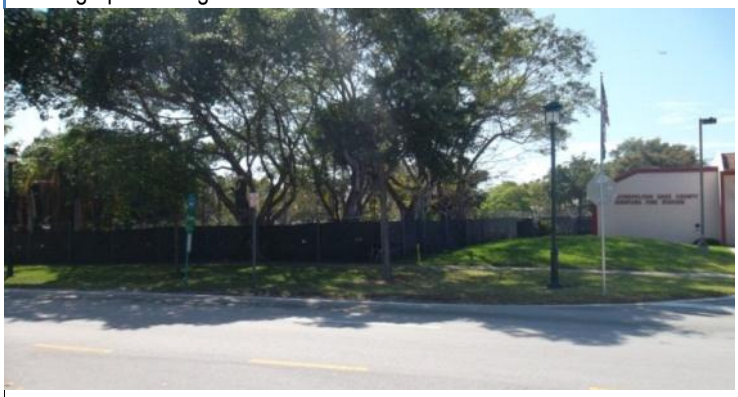
• **Street**	Biscayne Boulevard
• **Cross-street**	NE 183d/186 Street
• **Desired ROW**	15' x 25'
• **Available ROW (Preliminary)**	6' x 25'
• **Station Platform**	8' x 26'
• **Shelter Type**	Narrow
• **Marker Type**	Standard
• **Other Considerations or Constraints**	ROW is insufficient at this location. An easement with the property owner (Folio # 28-2203-059-0030) is recommended.
• **Other Recommended Improvements**	Crosswalks at all legs of Biscayne Boulevard and NE 186th Street are recommended.

15. AVENTURA STATION – Northbound

Plan View

Route 93 Daily Acitivity: 308 Weekday Boardings and Alightings

Photograph: Facing the Station Area

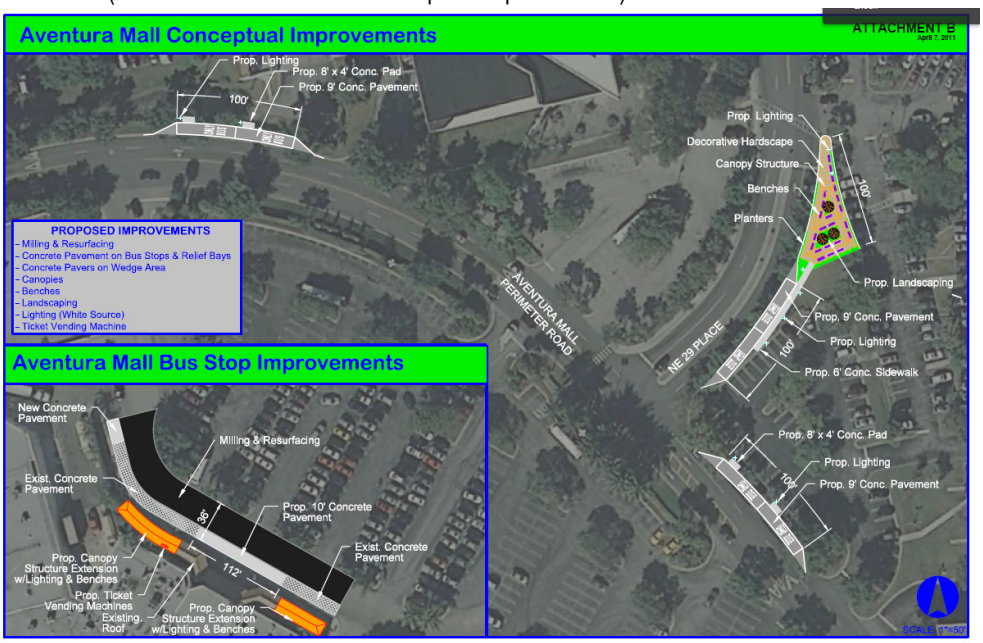


Photograph: In the Direction of Travel

• **Street**	Aventura Boulevard
• **Cross-street**	NE 29 Place
• **Desired ROW**	15' x 25'
• **Available ROW (Preliminary)**	15' x 25'
• **Station Platform**	15' x 25'
• **Shelter Type**	Standard
• **Marker Type**	Standard
• **Other Considerations or Constraints**	Improvements to this station will be made as part of MDT's Aventura Terminal Improvements project. A general location is shown for reference purposes only. The City of Aventura would like to maintain its shelters where they are installed. They may request installation of their branded shelter at this location also.
• **Other Recommended Improvements**	None

16. AVENTURA MALL STATION – Northbound and Southbound

Plan View (Per MDT's Aventura Mall Conceptual Improvements)



Route 93 Daily Acitivity: 634 Weekday Boardings and Alightings

Photograph: Facing the Station Area

Photograph: In the Direction of Travel

• **Street**	Mall Food Court
• **Cross-street**	
• **Desired ROW**	15' x 25'
• **Available ROW (Preliminary)**	15' x 25'
• **Station Platform**	15' x 25'
• **Shelter Type**	Standard
• **Marker Type**	Standard
• **Other Considerations or Constraints**	Improvements to this station will be made as part of MDT's Aventura Terminal Improvements project. A general location is shown for reference purposes only.
• **Other Recommended Improvements**	Bus bay for EBS is recommended to be separate from those for other services.

17. AVENTURA STATION – Southbound

Plan View

Route 93 Daily Acitivity: 140 Weekday Boardings and Alightings

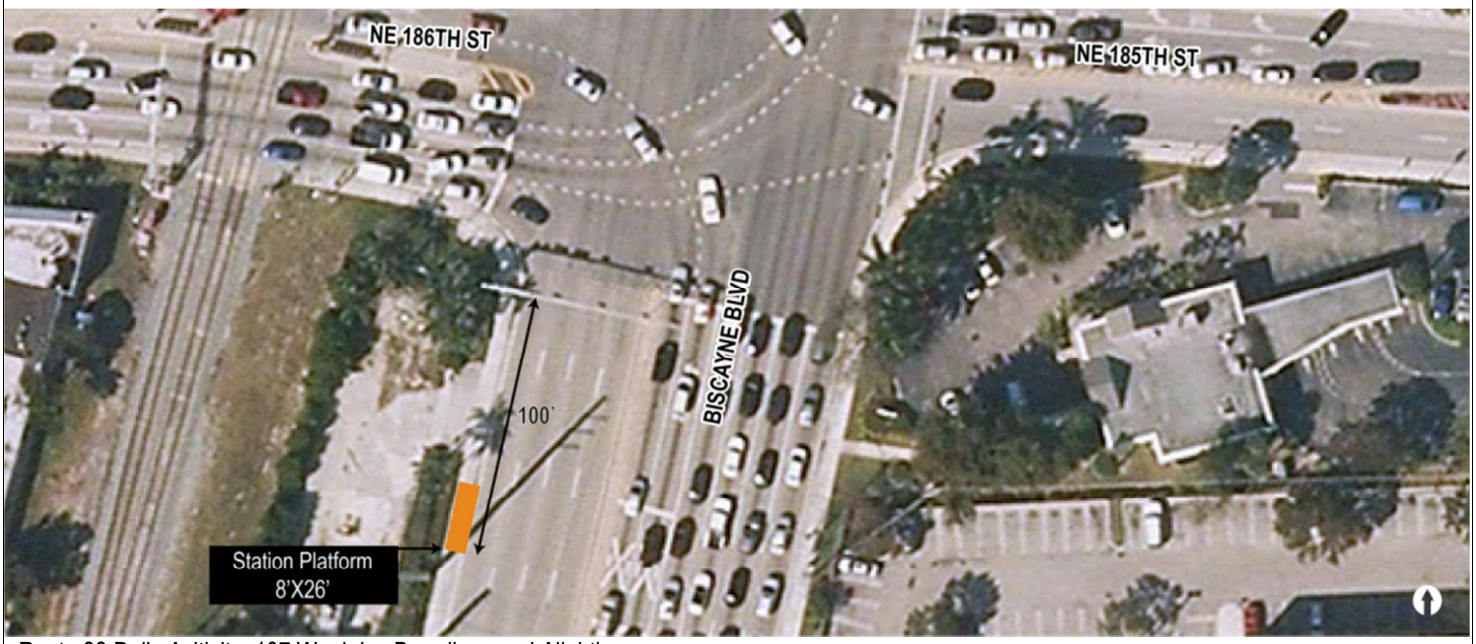
Photograph: Facing the Station Area

Photograph: In the Direction of Travel

• **Street**	Aventura Boulevard
• **Cross-street**	NE 29 Place
• **Desired ROW**	15' x 25'
• **Available ROW (Preliminary)**	15' x 25'
• **Station Platform**	15' x 25'
• **Shelter Type**	Standard
• **Marker Type**	Standard
• **Other Considerations or Constraints**	Improvements to this station will be made as part of MDT's Aventura Terminal Improvements project. A general location is shown for reference purposes only.
	The City of Aventura would like to maintain its shelters where they are installed.
	Eliminate Busbay to incorporate a station area. Relocate the existing shelter.
• **Other Recommended Improvements**	None

18. NE 183/186 ST STATION – Southbound

Plan View



Route 93 Daily Acitivity: 107 Weekday Boardings and Alightings

Photograph: Facing the Station Area

Photograph: In the Direction of Travel

• **Street**	Biscayne Boulevard
• **Cross-street**	NE 183/186 Street
• **Desired ROW**	15' x 25'
• **Available ROW (Preliminary)**	6' x 25'
• **Station Platform**	8' x 26'
• **Shelter Type**	Narrow
• **Marker Type**	Small
• **Other Considerations or Constraints**	ROW is insufficient at this location. An easement with the property is recommended.
• **Other Recommended Improvements**	Crosswalks at all legs of Biscayne Boulevard and NE 186th Street are recommended.

19. NE 163 ST STATION – Southbound

Plan View

Route 93 Daily Acitivity: 94 Weekday Boardings and Alightings

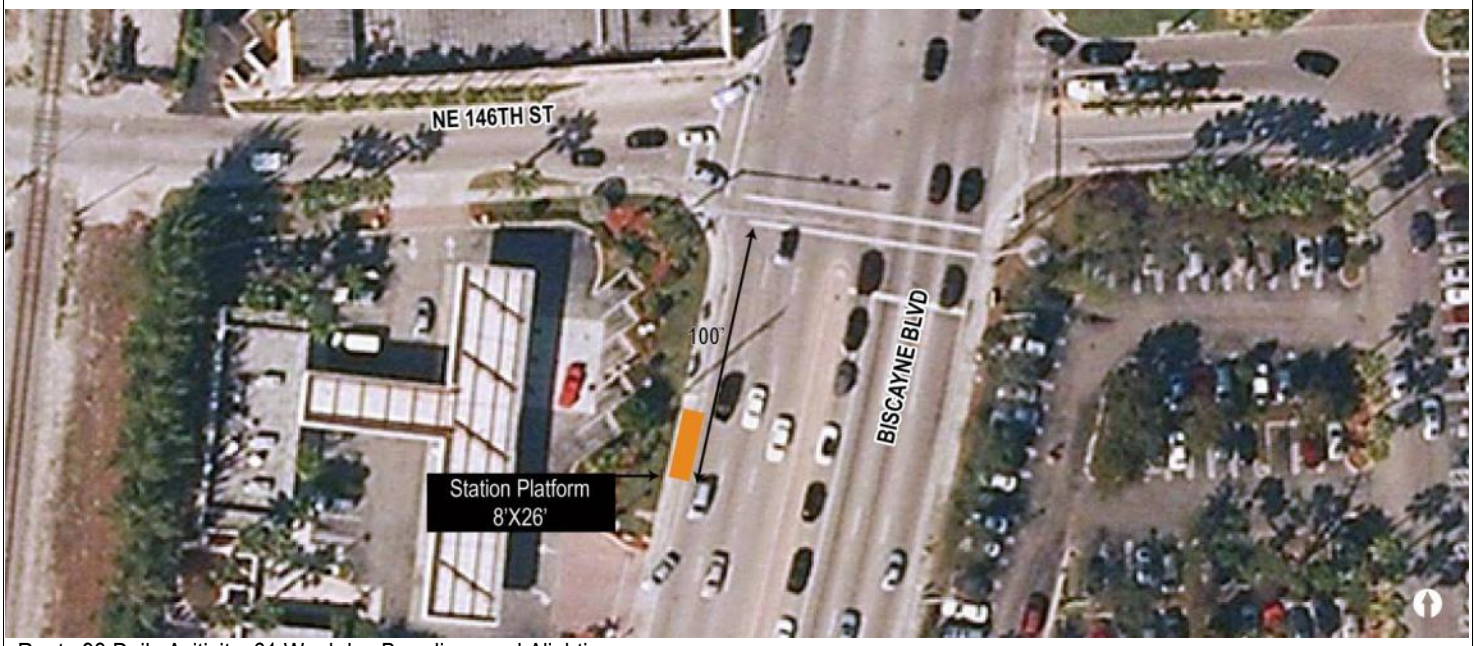
Photograph: Facing the Station Area

Photograph: In the Direction of Travel

• **Street**	Biscayne Boulevard
• **Cross-street**	NE 163 Street
• **Desired ROW**	15' x 25'
• **Available ROW (Preliminary)**	6' x 25'
• **Station Platform**	15' x 25'
• **Shelter Type**	Standard
• **Marker Type**	Small
• **Other Considerations or Constraints**	ROW is insufficient at this location. An easement with the property owner is recommended.
	A standard instead of a narrow station is recommended as ROW will be needed for either scenario.
	Due to overhead utilities, marker height will have to be reduced.
• **Other Recommended Improvements**	None

20. NORTH MIAMI BEACH STATION – Southbound

Plan View



Route 93 Daily Acitivity: 61 Weekday Boardings and Alightings

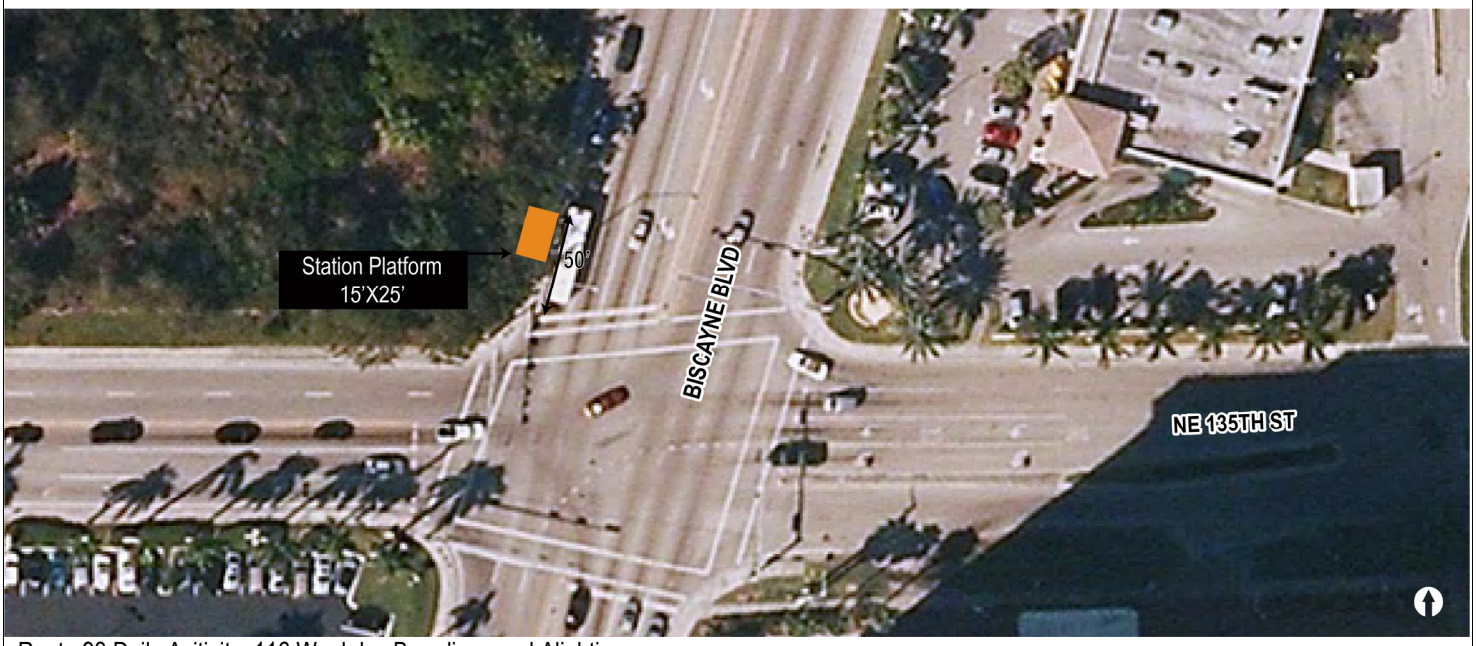
Photograph: Facing the Station Area

Photograph: In the Direction of Travel

• **Street**	Biscayne Boulevard
• **Cross-street**	NE 146 Street
• **Desired ROW**	15' x 25'
• **Available ROW (Preliminary)**	8' x 25'
• **Station Platform**	8' x 26'
• **Shelter Type**	Narrow
• **Marker Type**	Small
• **Other Considerations or Constraints**	Due to overhead utilities, marker height will have to be reduced.
• **Other Recommended Improvements**	Coordination with the property owner (Folio # 07-2221-033-0010) is recommended to ensure that the station design does not conflict with property redevelopment.

21. NE 135 ST STATION – Southbound

Plan View



Route 93 Daily Acitivity: 116 Weekday Boardings and Alightings

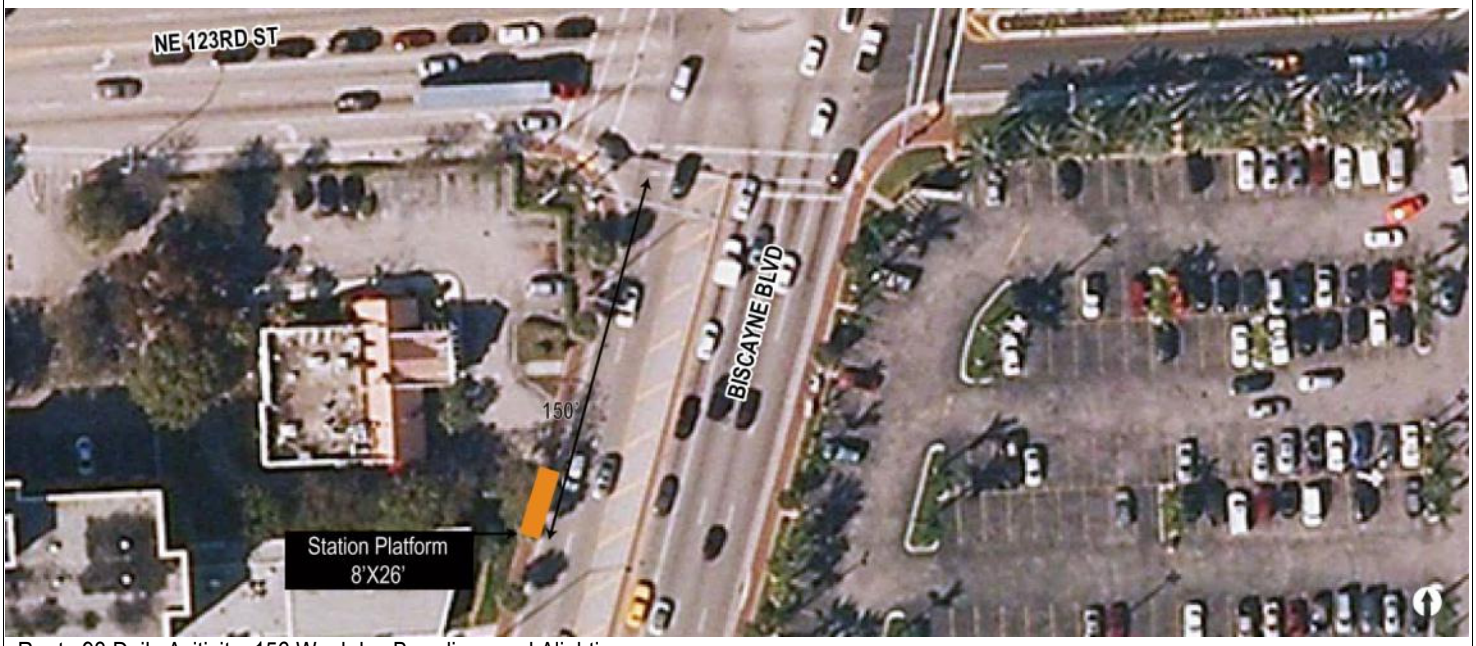
Photograph: Facing the Station Area

Photograph: In the Direction of Travel

• **Street**	Biscayne Boulevard
• **Cross-street**	NE 135 Street
• **Desired ROW**	15' x 25'
• **Available ROW (Preliminary)**	15' x 25'
• **Station Platform**	15' x 25'
• **Shelter Type**	Narrow
• **Marker Type**	Standard
• **Other Considerations or Constraints**	Coordination with the County Parks and Recreation Department is recommended to ensure necessary ROW is available.
• **Other Recommended Improvements**	None

22. NORTH MIAMI STATION – Southbound

Plan View



Route 93 Daily Acitivity: 156 Weekday Boardings and Alightings

Photograph: Facing the Station Area

Photograph: In the Direction of Travel

• **Street**	Biscayne Boulevard
• **Cross-street**	NE 123 Street
• **Desired ROW**	15' x 25'
• **Available ROW (Preliminary)**	6' x 25'
• **Station Platform**	8' x 26'
• **Shelter Type**	Narrow
• **Marker Type**	Standard
• **Other Considerations or Constraints**	ROW is insufficient at this location. An easement with the property owner (Folio # 06-2228-001-059) is recommended.
• **Other Recommended Improvements**	None

23. SAN SOUCI STATION – Southbound

Plan View

Route 93 Daily Acitivity: 108 Weekday Boardings and Alightings

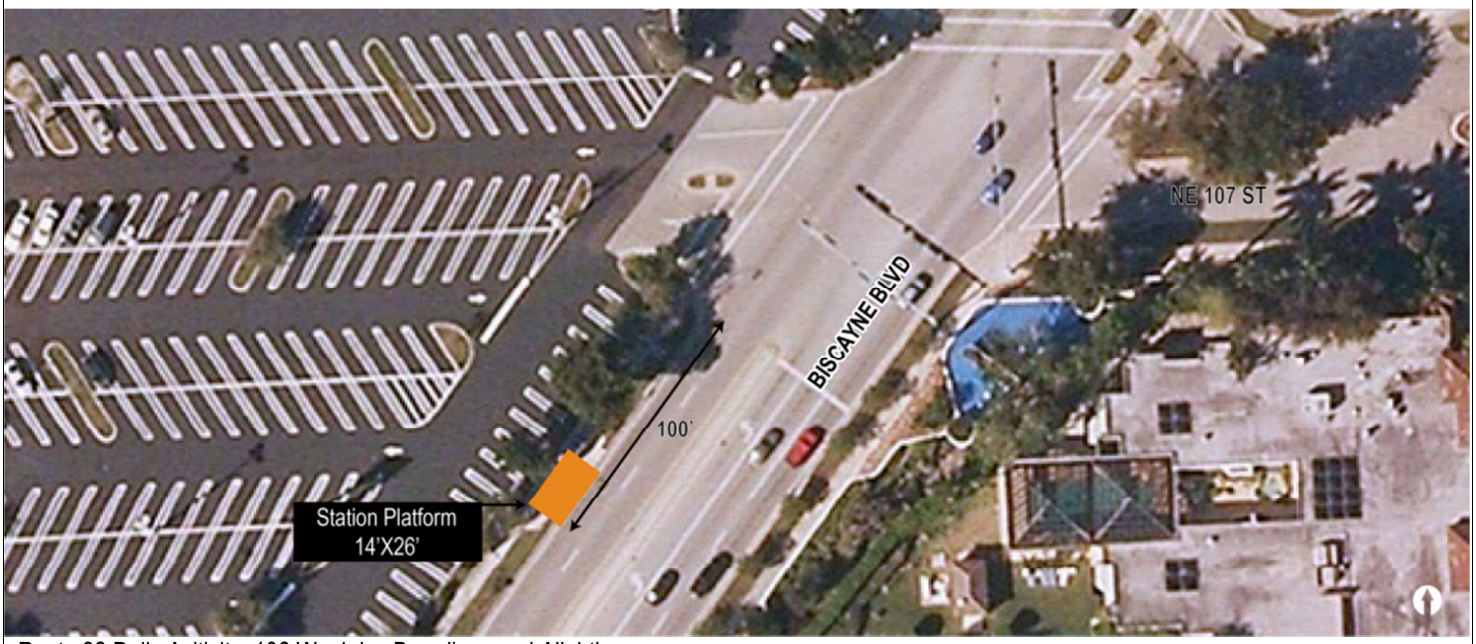
Photograph: Facing the Station Area

Photograph: In the Direction of Travel

• **Street**	Biscayne Boulevard
• **Cross-street**	NE 118 Street
• **Desired ROW**	15' x 25'
• **Available ROW (Preliminary)**	15' x 25'
• **Station Platform**	15' x 25'
• **Shelter Type**	Standard
• **Marker Type**	Standard
• **Other Considerations or Constraints**	None
• **Other Recommended Improvements**	None

24. NE 108 ST STATION – Southbound

Plan View



Route 93 Daily Acitivity: 106 Weekday Boardings and Alightings

Photograph: Facing the Station Area

Photograph: In the Direction of Travel

• **Street**	Biscayne Boulevard
• **Cross-street**	NE 107 Street
• **Desired ROW**	15' x 25'
• **Available ROW (Preliminary)**	14' x 25'
• **Station Platform**	14' x 26'
• **Shelter Type**	Standard
• **Marker Type**	Standard
• **Other Considerations or Constraints**	The platform size will be 14 feet to avoid ROW acquisition. Only one foot clearance will be provided behind a shelter.
• **Other Recommended Improvements**	Crosswalks are recommended at all legs of NE 107th and 108th St intersections.

25. MIAMI SHORES STATION – Southbound

Plan View

Route 93 Daily Acitivity: 91 Weekday Boardings and Alightings

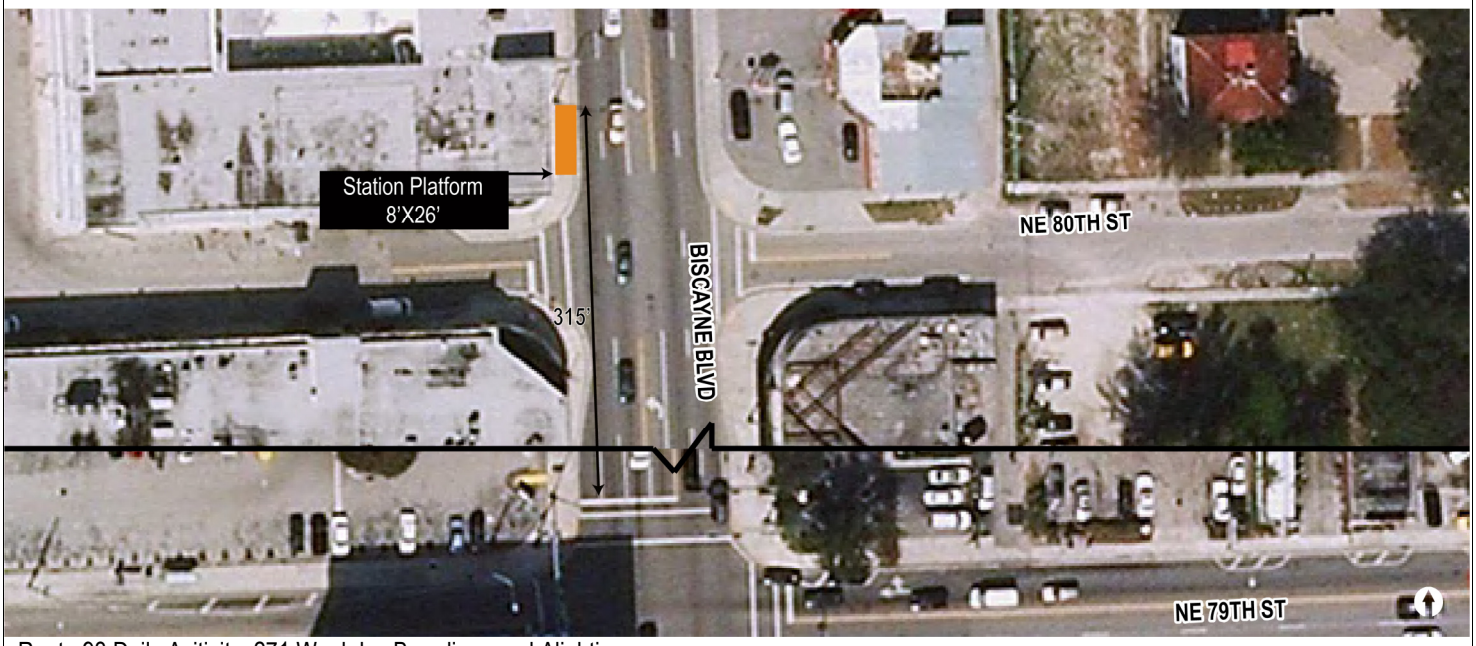
Photograph: Facing the Station Area

Photograph: In the Direction of Travel

• **Street**	Biscayne Boulevard
• **Cross-street**	NE 91 Street
• **Desired ROW**	15' x 25'
• **Available ROW (Preliminary)**	25' x 40'
• **Station Platform**	15' x 25'
• **Shelter Type**	None
• **Marker Type**	None
• **Other Considerations or Constraints**	The City of Miami Shores indicated that they do not want infrastructure improvements. MDT should conduct further coordination with the City.
• **Other Recommended Improvements**	Signage improvement is recommended to provide some visibility to the station. The station area should have the remaining elements such as a wider pad, etc.

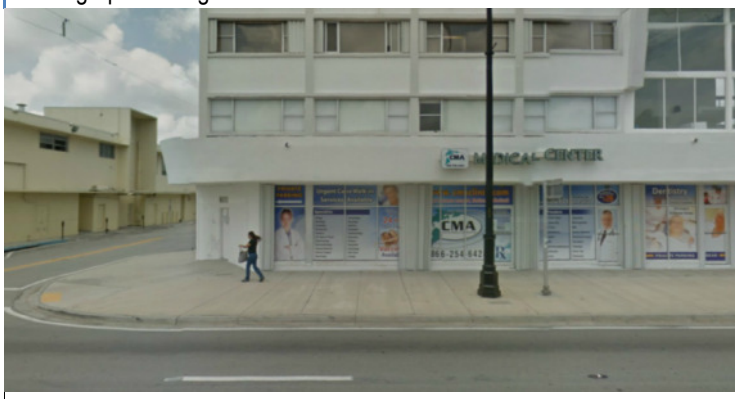
26. MIAMI GATEWAY STATION – Southbound

Plan View



Route 93 Daily Acitivity: 271 Weekday Boardings and Alightings

Photograph: Facing the Station Area

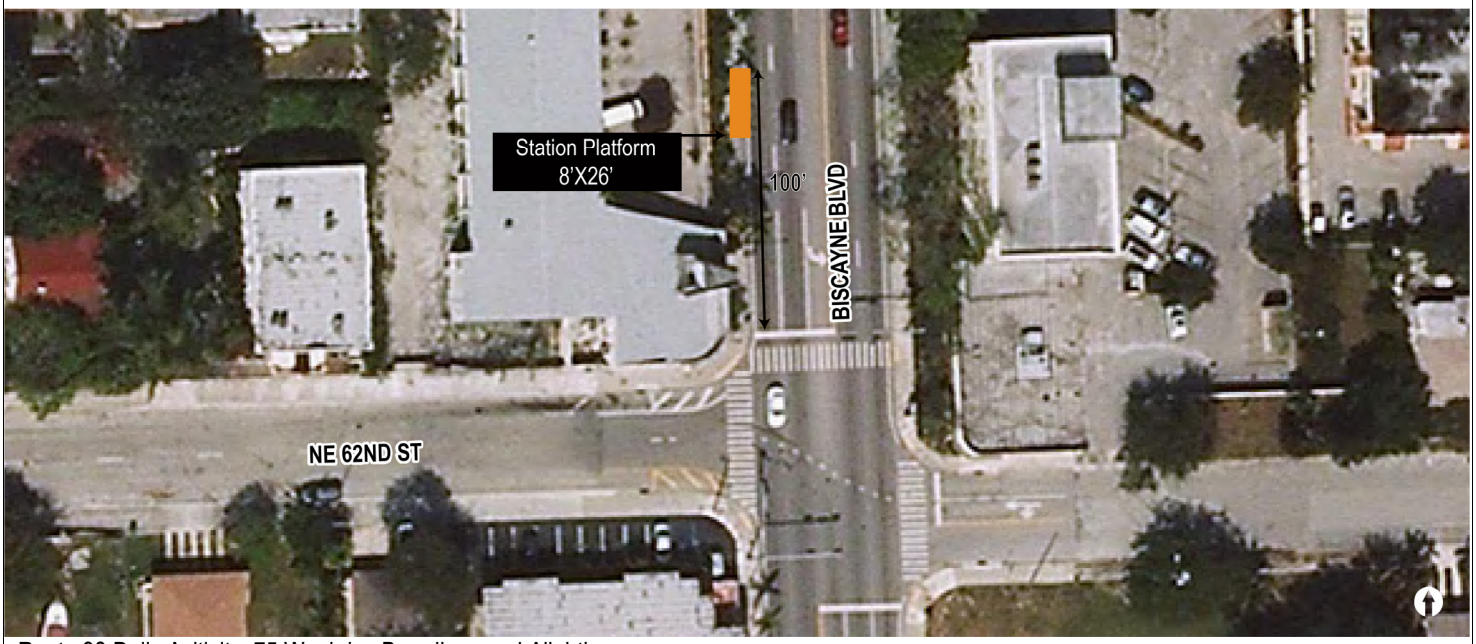


Photograph: In the Direction of Travel

• **Street**	Biscayne Boulevard
• **Cross-street**	NE 79 Street
• **Desired ROW**	15' x 25'
• **Available ROW (Preliminary)**	13' x 25'
• **Station Platform**	8' x 26'
• **Shelter Type**	Standard
• **Marker Type**	Standard
• **Other Considerations or Constraints**	The station will block frontage of existing unoccupied building and therefore, further coordination is required.
• **Other Recommended Improvements**	Pedestrian improvements to the shared park-and-ride lot (discussed later) are recommended.

27. LEGION PARK STATION – Southbound

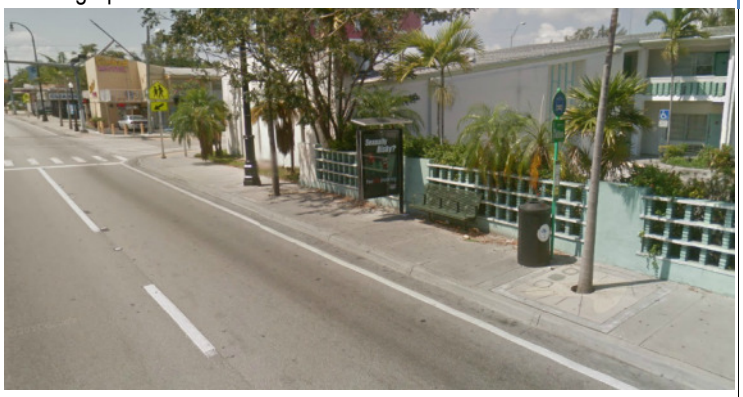
Plan View



Route 93 Daily Acitivity: 75 Weekday Boardings and Alightings

Photograph: Facing the Station Area

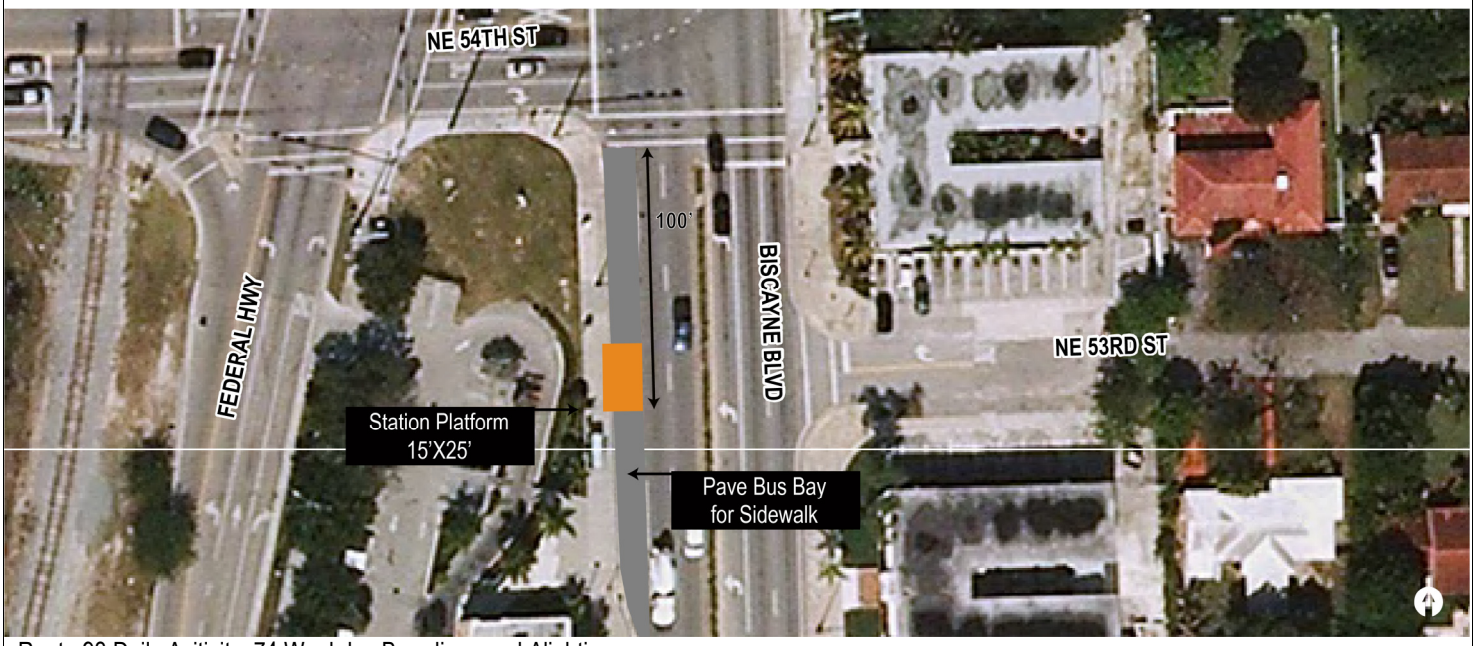
Photograph: In the Direction of Travel



• **Street**	Biscayne Boulevard
• **Cross-street**	NE 62 Street
• **Desired ROW**	15' x 25'
• **Available ROW (Preliminary)**	6' x 25'
• **Station Platform**	8' x 26'
• **Shelter Type**	Narrow
• **Marker Type**	Standard
• **Other Considerations or Constraints**	ROW is insufficient at this location. An easement with the property owner (Folio # 01-3218-024-0890) is recommended.
• **Other Recommended Improvements**	Crosswalk at the south leg of Biscayne Boulevard and NE 62nd Street is recommended.

28. MORNINGSIDE STATION – Southbound

Plan View



Route 93 Daily Acitivity: 74 Weekday Boardings and Alightings

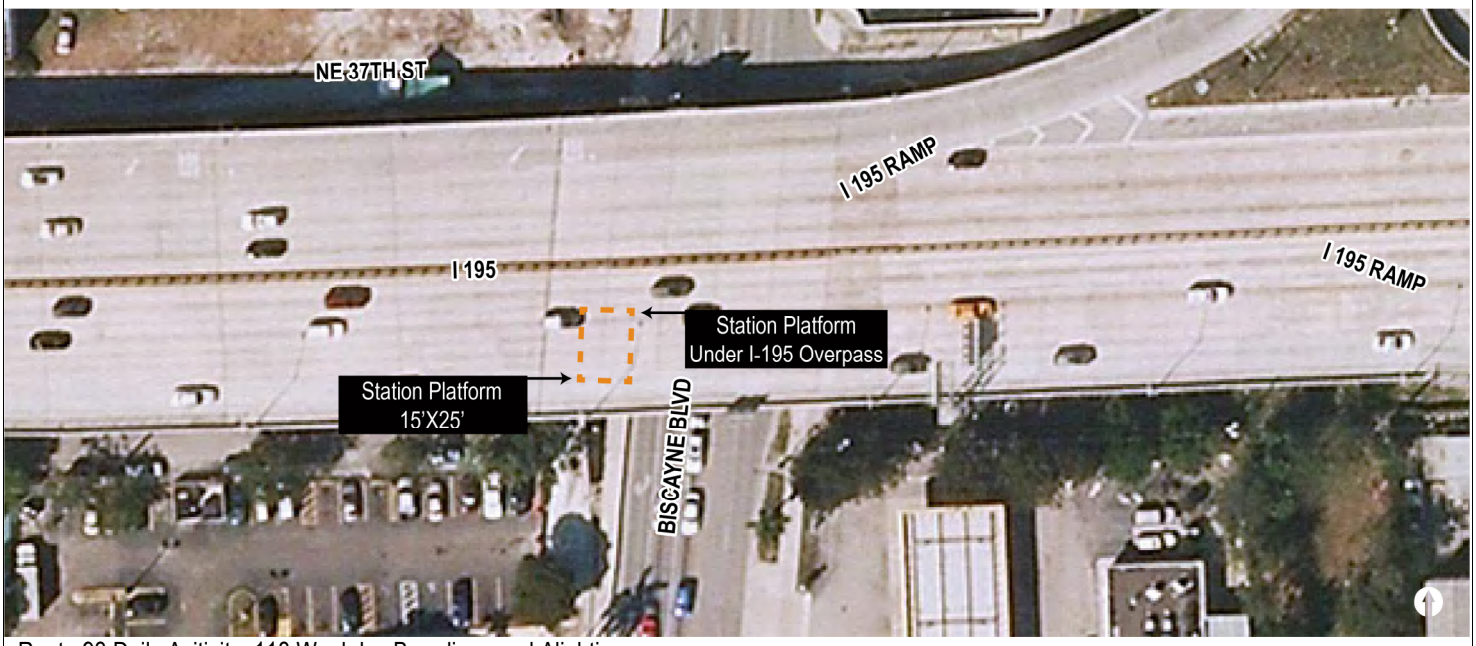
Photograph: Facing the Station Area

Photograph: In the Direction of Travel

• **Street**	Biscayne Boulevard
• **Cross-street**	NE 54 Street
• **Desired ROW**	15' x 25'
• **Available ROW (Preliminary)**	8' + [9' Bay] x 25'
• **Station Platform**	15' x 25'
• **Shelter Type**	Standard
• **Marker Type**	Standard
• **Other Considerations or Constraints**	Eliminate Busway to incorporate a station area. Coordinate with FDOT. Further coordination with the proposed development at 5501 Biscayne Boulevard is recommended.
• **Other Recommended Improvements**	Additional crosswalks at two legs of Biscayne Boulevard and NE 54th Street intersection are recommended.

29. MIDTOWN MIAMI STATION – Southbound

Plan View



Route 93 Daily Acitivity: 118 Weekday Boardings and Alightings

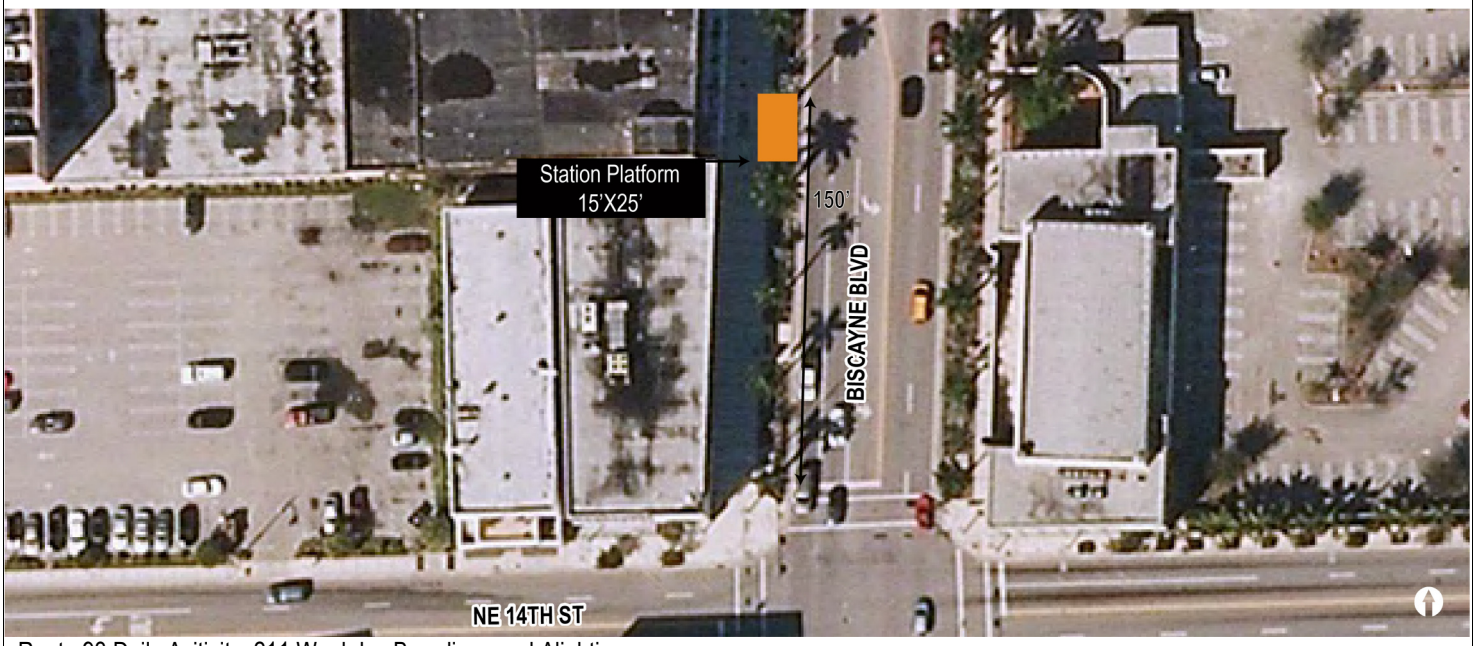
Photograph: Facing the Station Area

Photograph: In the Direction of Travel

• **Street**	Biscayne Boulevard
• **Cross-street**	NE 36 Street
• **Desired ROW**	15' x 25'
• **Available ROW (Preliminary)**	10' x 25'
• **Station Platform**	10' x 25'
• **Shelter Type**	None
• **Marker Type**	Standard
• **Other Considerations or Constraints**	Marker to be installed north of the overpass This station will not have a shelter
• **Other Recommended Improvements**	Additional lighting, painting, and clean-up is recommended.

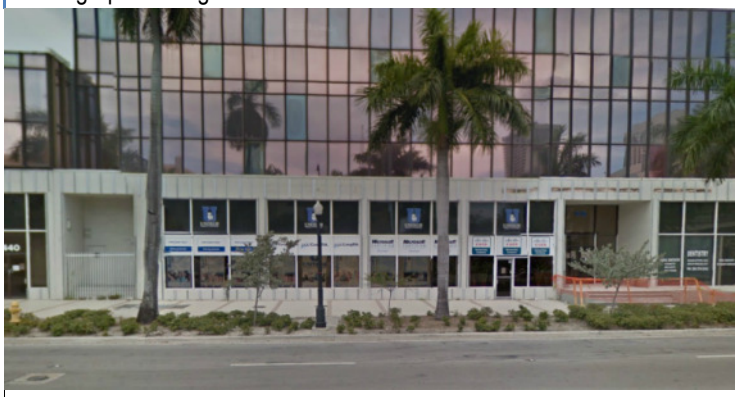
30. OMNI STATION – Southbound

Plan View



Route 93 Daily Acitivity: 211 Weekday Boardings and Alightings

Photograph: Facing the Station Area



Photograph: In the Direction of Travel

• **Street**	Biscayne Boulevard
• **Cross-street**	NE 15 Street
• **Desired ROW**	15' x 25'
• **Available ROW (Preliminary)**	17'/19' x 25'
• **Station Platform**	15' x 25'
• **Shelter Type**	Standard
• **Marker Type**	Standard
• **Other Considerations or Constraints**	None
• **Other Recommended Improvements**	None

31. MDC STATION – Southbound

Plan View

Route 93 Daily Acitivity: 147 Weekday Boardings and Alightings

Photograph: Facing the Station Area

Photograph: In the Direction of Travel

• **Street**	NE 2nd Avenue
• **Cross-street**	NE 4 Street
• **Desired ROW**	15' x 25'
• **Available ROW (Preliminary)**	15' x 25'
• **Station Platform**	15' x 25'
• **Shelter Type**	Standard
• **Marker Type**	Standard
• **Other Considerations or Constraints**	None
• **Other Recommended Improvements**	The station is close to the nearest intersection therefore additional signage is recommended.

4.3 POTENTIAL PARK-AND-RIDE SITES

Park-and-ride sites were identified and evaluated as part of this effort for the following reasons:

1. As the number of stops along a route is decreased, all efforts must be made to increase activity at locations where buses will make stops. One of the tested methods is to provide park-and-ride lots because they allow for an increase in auto access and egress modes.
2. A park-and-ride site can attract new choice-riders to the service. Trip and demographic characteristics of these riders are unknown because, based on the results of the on-board surveys, these choice-riders are less likely to be users of the existing services.
3. Finally, pedestrian access from certain residential areas remains a challenge along the corridor and park-and-ride sites/kiss-and-ride can provide a means to potential riders from those areas.

An initial survey of the corridor revealed that there were a significant number of sites along the corridor that had the potential for providing park-and-ride access. The following criteria were used to identify potential sites:

1. Southern Terminus: Given that the Miami Downtown area is the major attractor of trips, park-and-ride sites south of NE 74 Street, which is five miles away from the Downtown area, were not considered. Based on literature review and planning judgment, it was determined that such trip length would be too short to attract a meaningful number of park-and-ride riders.
2. Northern Terminus: Sites north of NE 173 Street were not evaluated because there are fewer residential areas between NE 186 Street and NE 173 Street. Aventura Mall is currently used for informal park-and-ride activities and therefore sites between NE 186 Street and NE 199 Street (Aventura Mall) would provide less value for investment.
3. Access: Sites two or three blocks east or west of Biscayne Boulevard were not considered because they would require route deviation, a practice not recommended for premium transit services. Therefore, only the sites either on Biscayne Boulevard or within a block from Biscayne Boulevard were considered.
4. Size of the Potential Site: Sites that had fewer than 20 spaces were not considered. Some of the larger sites, such as shopping plazas, were visited to identify usage of their spaces. Establishments or sites that did not appear to have “excess” parking were not considered. This was based on field reconnaissance surveys conducted on a Saturday afternoon and on a typical weekday morning and afternoon.
5. Current Usage: Non-commercial sites such as religious institutions or inactive businesses were considered, even if they were not ideal for park-and-ride operations in their current form. The reason for this was because it was assumed that owners of such sites will have greater willingness to discuss potential shared usage with MDT.
6. Proximity to a Preferred Station Location: A sites proximity to a preferred station location certainly adds to its desirability as a park-and-ride. However, if needed, a station can be moved or added close to a site. Therefore, proximity to a preferred station location was considered but not used as a determinant factor.
7. Shared- or Exclusive-Use: A shared-use site was given preference over a potential exclusive park-and-ride site. Biscayne Boulevard forms the core of many local communities and of the County. An exclusive park-and-ride site reduces activity along such a main artery. For shared-use, it was assumed that owners of some of the existing businesses would be willing to and, be allowed to by local ordinances, to share their parking. Owners were not contacted to solicit their interest.

A summary of the identified facilities and their desirability is included in the subsequent pages. Their locations are shown in Figure 31.

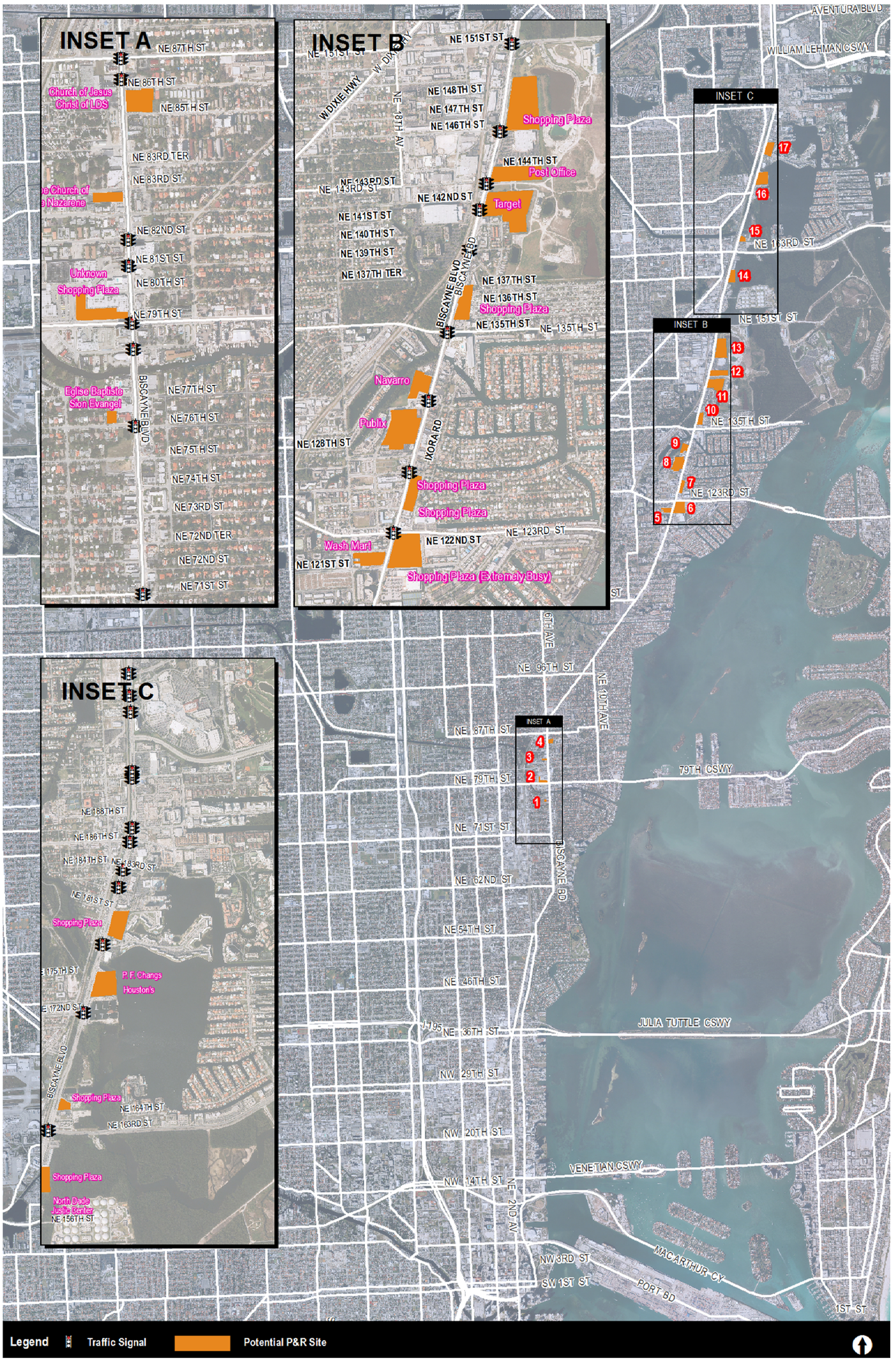
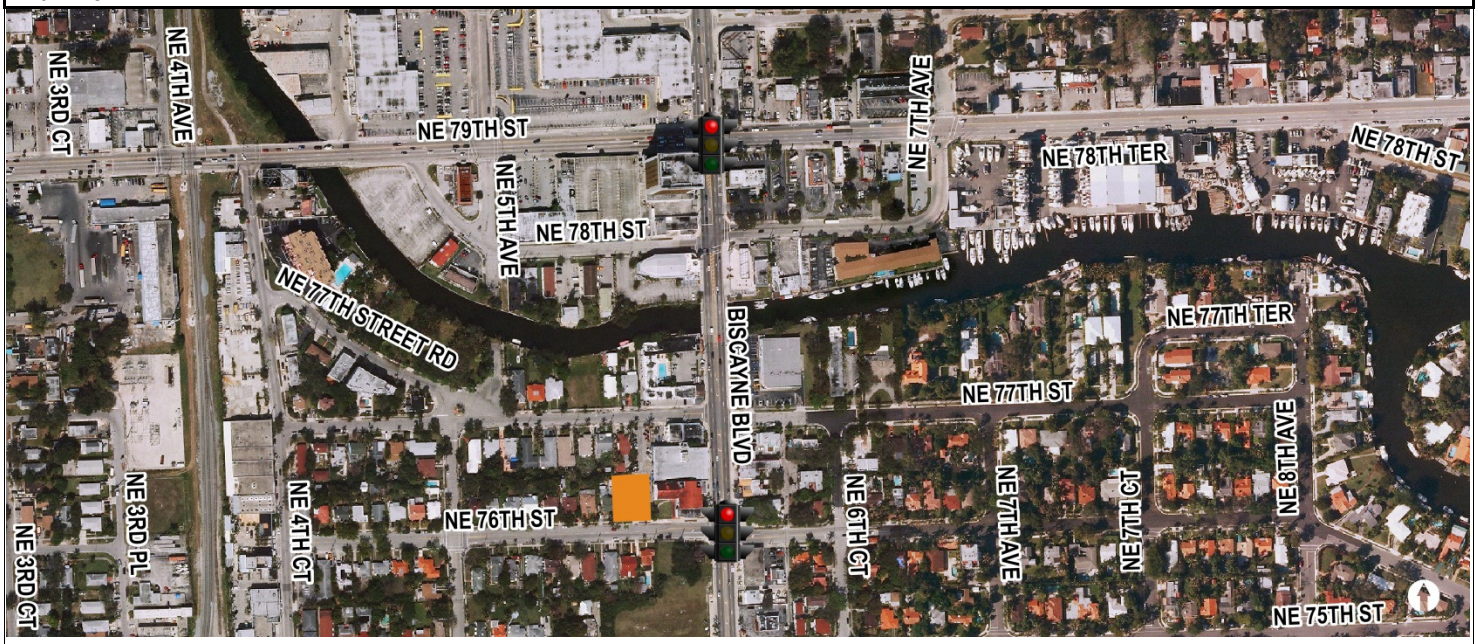
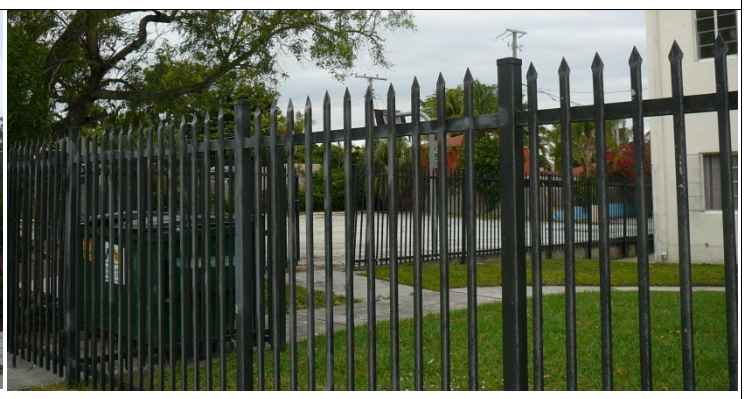


FIGURE 31: POTENTIAL PARK-AND-RIDE SITES

POTENTIAL PARK-AND-RIDE SITE 1: EGLISE BAPTISTE SION EVANGEL

Plan View

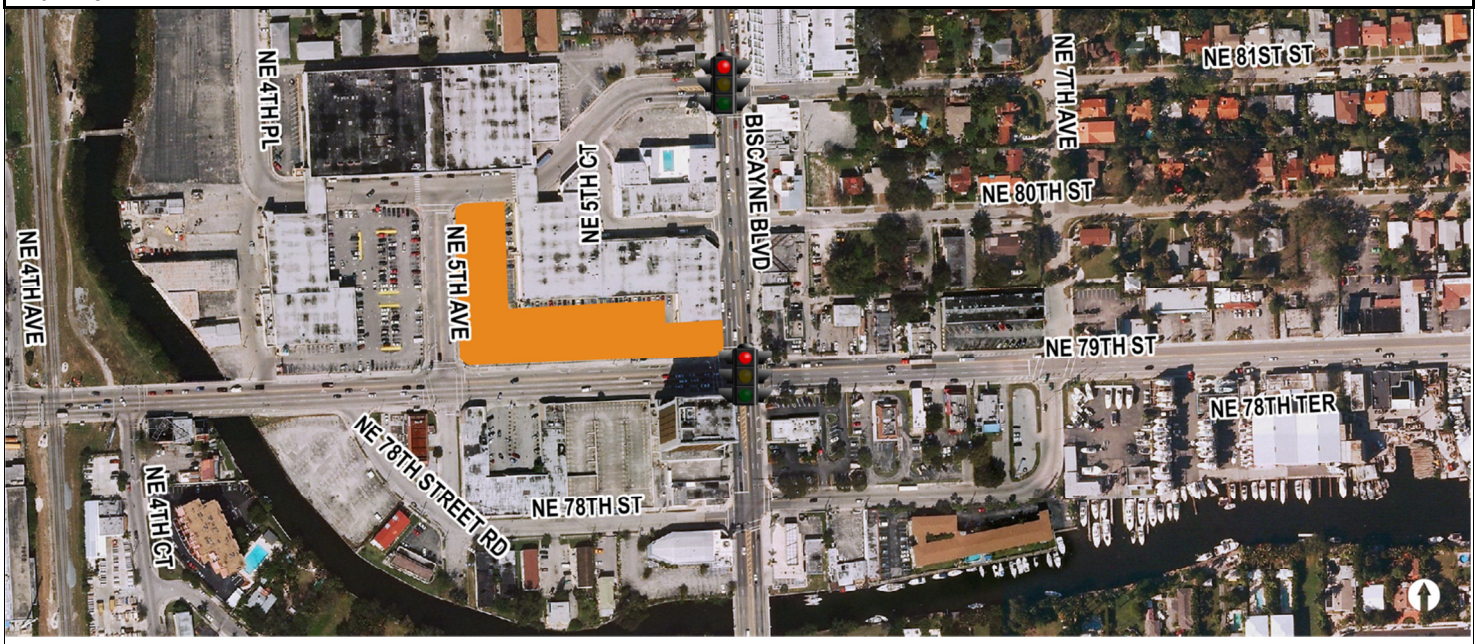




• **Current Owner / Display Sign**	Eglise Baptiste Sion Evangel
• **Active / Inactive**	Active
• **Street**	Biscayne Boulevard
• **Cross-street**	NE 76 Street
• **Quadrant**	Northwest corner
• **Folio Numbers(s)**	0132070400900
• **Desirability**	Medium
• **Comments**	1. It is half-a-block away from Biscayne Boulevard; 2. It is relatively close to a major east-west arterial, NE 79th Street; 3. The existing use appears to be less active during weekdays therefore, is better suited as a park-and-ride site; 4. It is at a signalized intersection; and, 5. it is not close to a preferred station location.

POTENTIAL PARK-AND-RIDE SITE 2: SHOPPING PLAZA

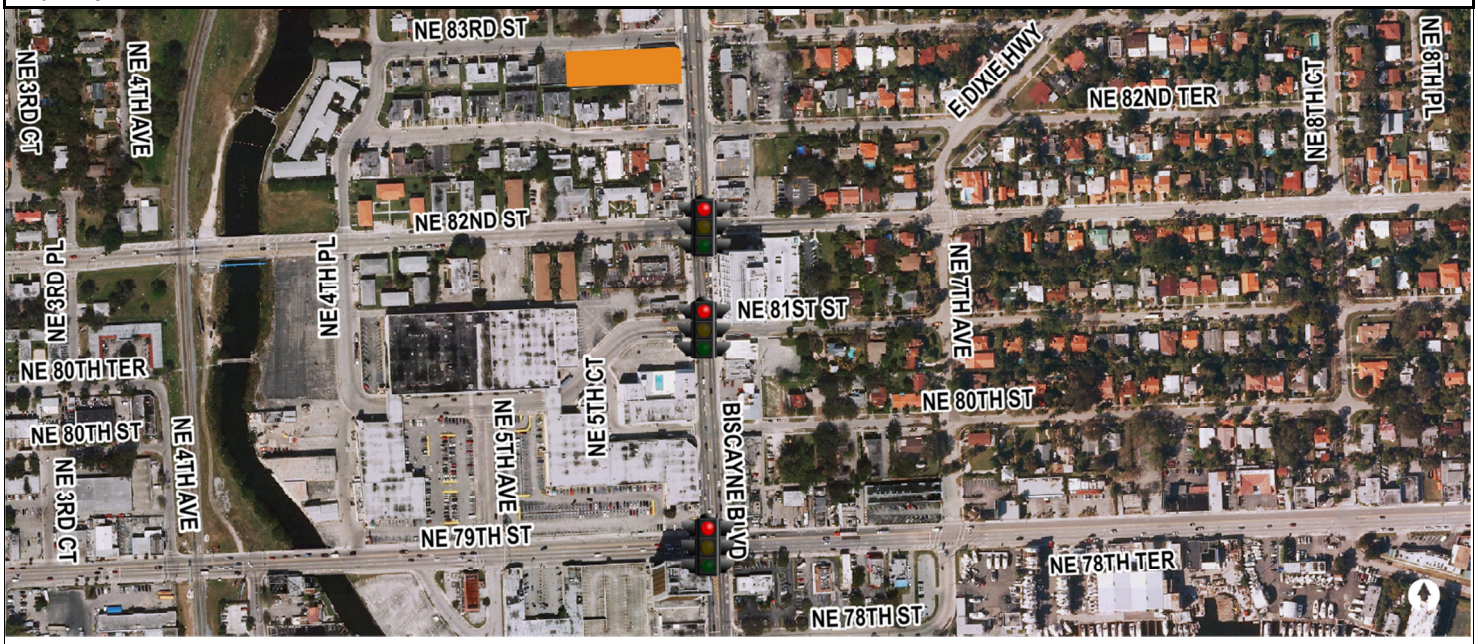
Plan View

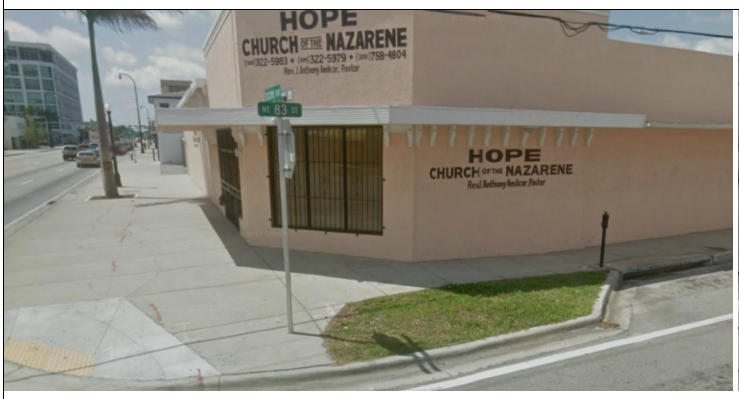


• **Current Owner / Display Sign**	Shopping Plaza
• **Active / Inactive**	Active
• **Street**	Biscayne Boulevard
• **Cross-street**	NE 79 Street
• **Quadrant**	Northeast corner
• **Folio Numbers(s)**	0132070220030
• **Desirability**	High
• **Comments**	1. It located on a major east-west arterial, NE 79th Street; 2. According to the City of Miami, the current owner is a willing party to negotiate a joint-use; 3. The location has some businesses that complement a park-and-ride use; 4. It is at a signalized intersection; and, 5. It is accessible from a preferred station location.

POTENTIAL PARK-AND-RIDE SITE 3: HOPE CHURCH OF THE NAZARENE

Plan View

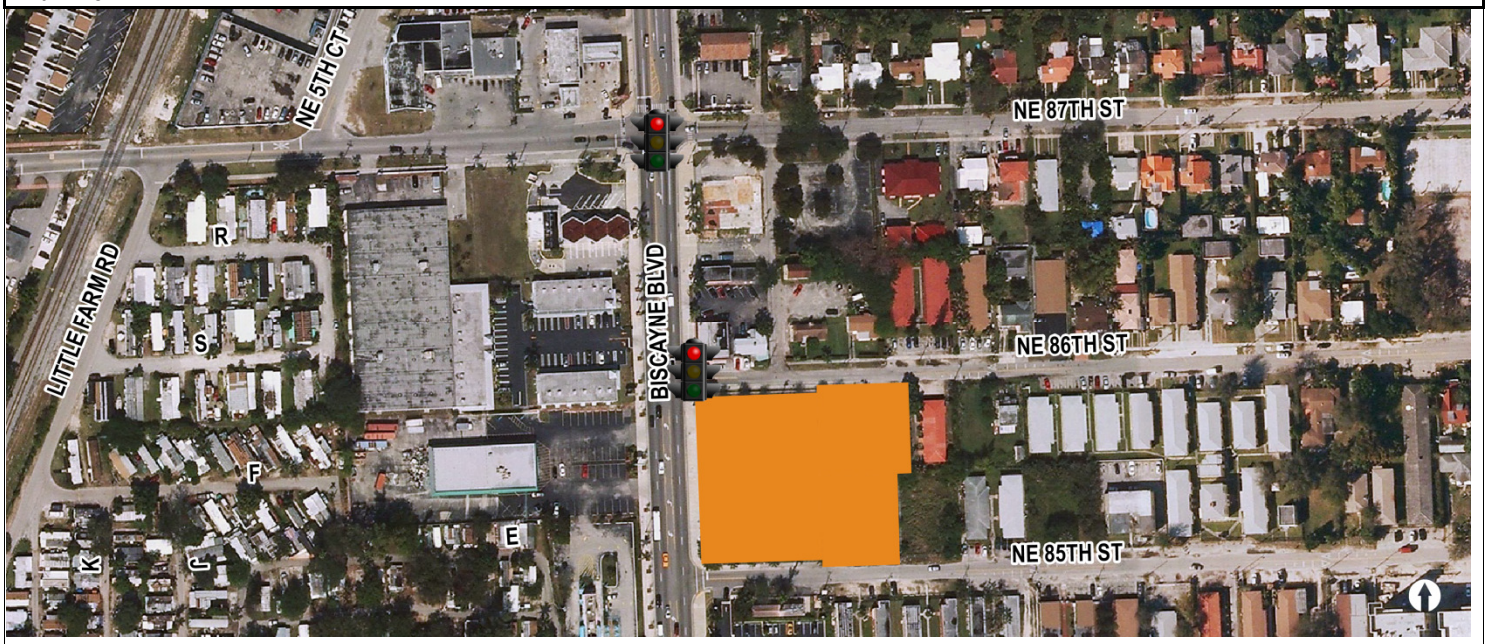




• **Current Owner / Display Sign**	Hope Church of the Nazarene
• **Active / Inactive**	Active
• **Street**	Biscayne Boulevard
• **Cross-street**	NE 83 Street
• **Quadrant**	Southwest corner
• **Folio Numbers(s)**	0132070150040
• **Desirability**	Medium
• **Comments**	1. It is relatively close to two major east-west arterial, NE 79th Street, NE 82nd Street; 2. It is not at a signalized intersection; 3. The existing use appears to be less active during weekdays therefore, is better suited as a park-and-ride site; and, 4. It is not close to a preferred station location.

POTENTIAL PARK-AND-RIDE SITE 4: CHURCH OF JESUS CHRIST OF LDS

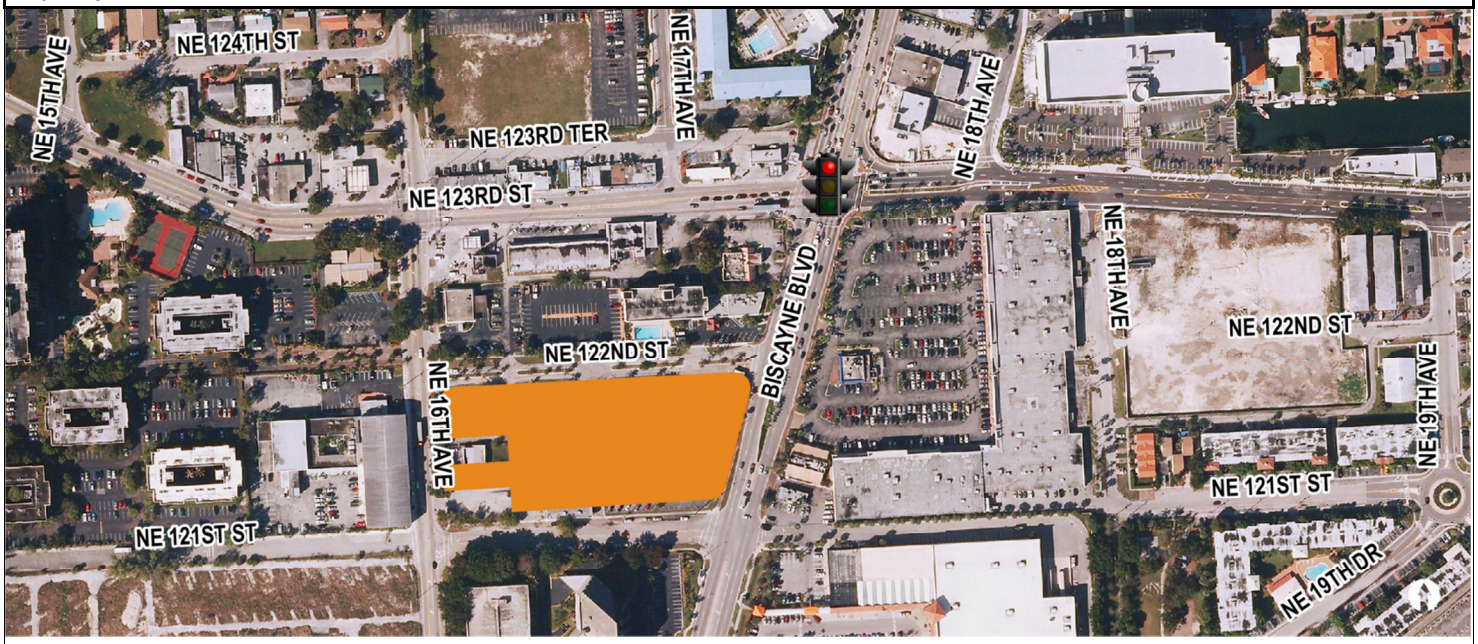
Plan View

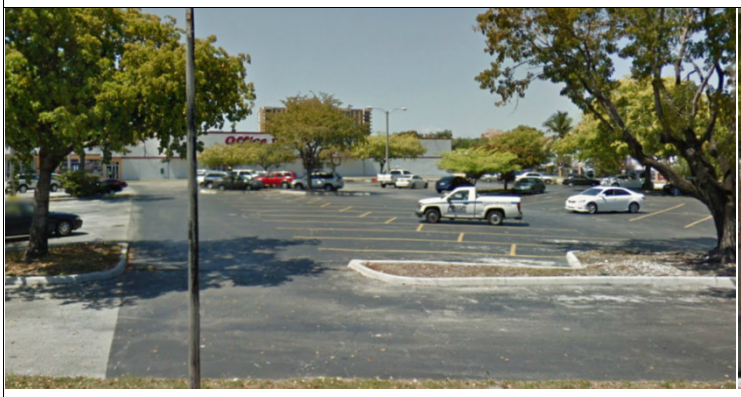


• **Current Owner / Display Sign**	Church of Jesus Christ of LDS
• **Active / Inactive**	Active
• **Street**	Biscayne Boulevard
• **Cross-street**	NE 86 Street
• **Quadrant**	Southeast corner
• **Folio Numbers(s)**	0132070030510; 0132070030500; 0132070030480
• **Desirability**	Low
• **Comments**	1. It is not close to a major east-west arterial; 2. It is at a signalized intersection; 3. The existing use appears to be less active during weekdays therefore, is better suited as a park-and-ride site; and, 4. It is not close to a preferred station location.

POTENTIAL PARK-AND-RIDE SITE 5: OFFICE DEPOT

Plan View

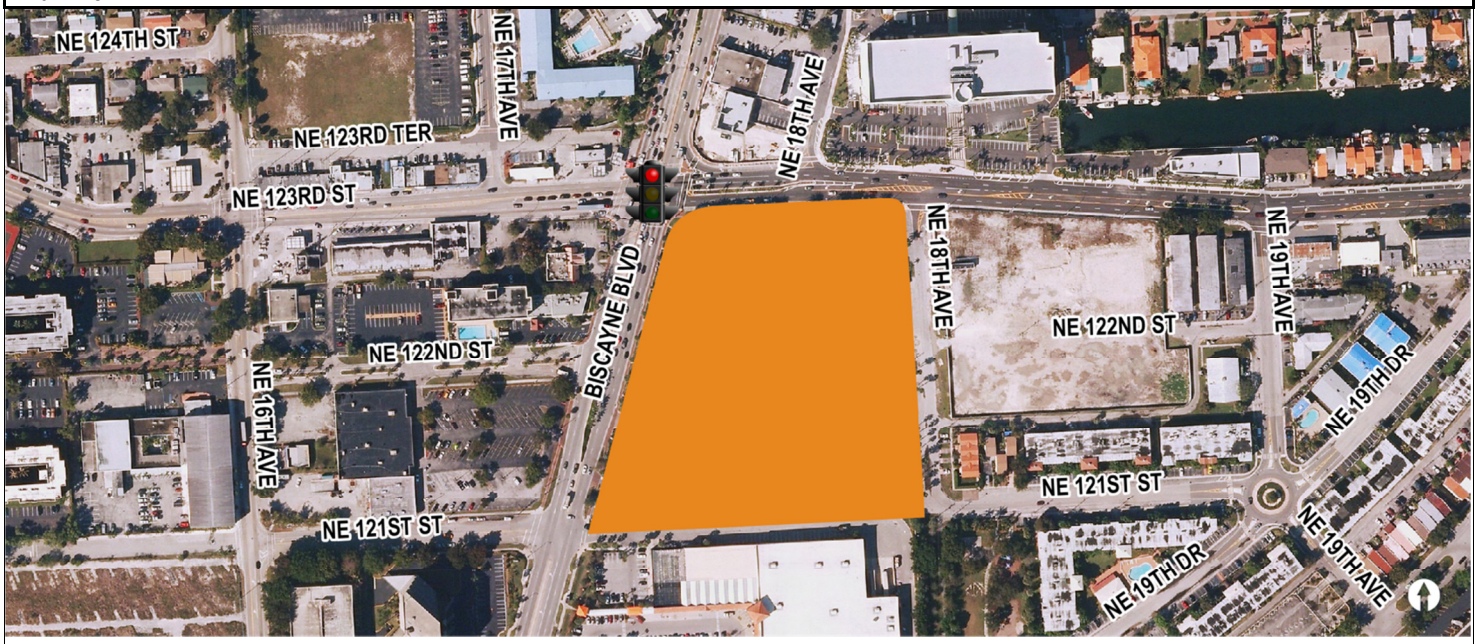




• **Current Owner / Display Sign**	Office Depot
• **Active / Inactive**	Active
• **Street**	Biscayne Boulevard
• **Cross-street**	NE 122 St
• **Quadrant**	Southwest corner
• **Folio Numbers(s)**	0622290560010
• **Desirability**	High
• **Comments**	1. It is close to a major east-west arterial, NE 123rd Street, and it is located south of the intersection which makes it more desirable; 2. It appears to have a large number of excess parking spaces; 3. It is not at a signalized intersection; and, 4. It is close to a preferred station location.

POTENTIAL PARK-AND-RIDE SITE 6: SHOPPING PLAZA

Plan View



• **Current Owner / Display Sign**	RK Town Centre
• **Active / Inactive**	Active
• **Street**	Biscayne Boulevard
• **Cross-street**	NE 123 Street
• **Quadrant**	Southeast corner
• **Folio Numbers(s)**	0622280010060
• **Desirability**	Medium
• **Comments**	1. It is close to a major east-west arterial, NE 123rd Street, 2. It is at a signalized intersection; 3. The location has some businesses that complement a park-and-ride use; 4. It is a very busy shopping plaza and likely does not have a large number of excess parking capacity; and, 5. It is close to a preferred station location.

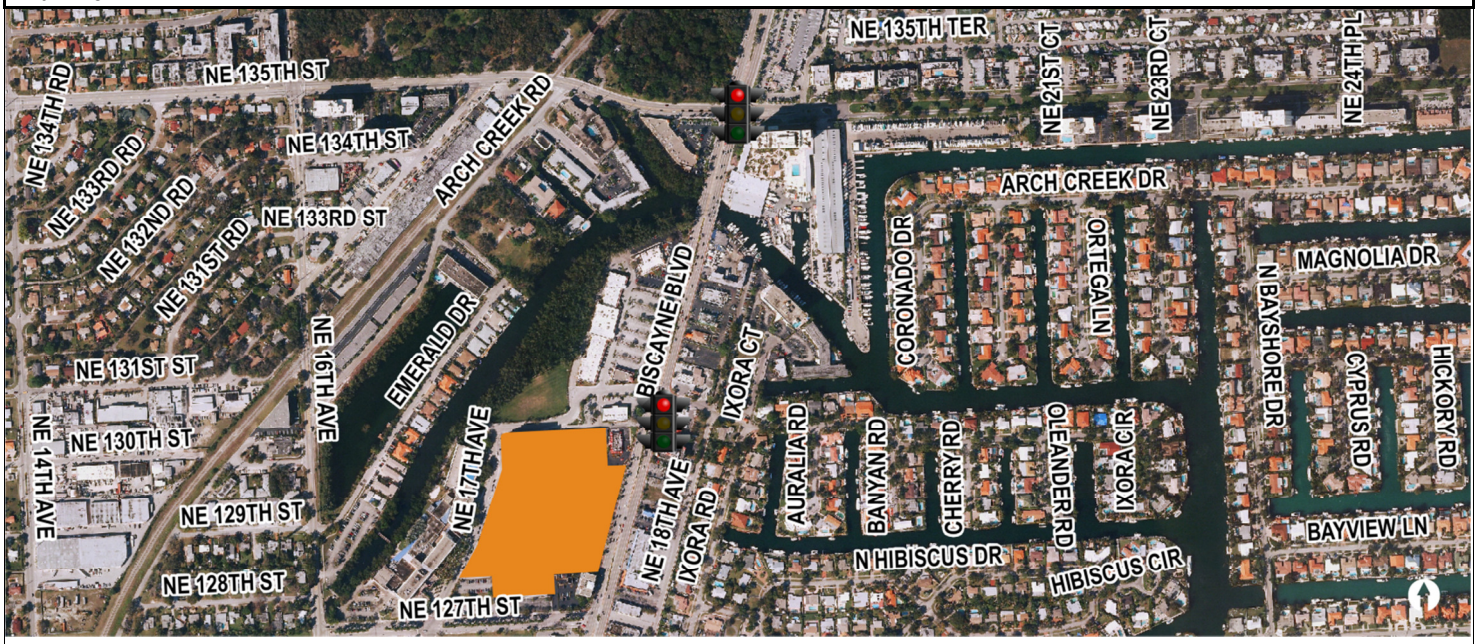
POTENTIAL PARK-AND-RIDE SITE 7: SHOPPING PLAZA

Plan View

• **Current Owner / Display Sign**	Shopping Plaza
• **Active / Inactive**	Active
• **Street**	Biscayne Boulevard
• **Cross-street**	NE 125 Street
• **Quadrant**	Southeast corner
• **Folio Numbers(s)**	0622290080100; 0622290080101
• **Desirability**	Medium
• **Comments**	1. It is close to a major east-west arterial, NE 123rd Street; 2. It is at a signalized intersection; 3. The location has some businesses that complement a park-and-ride use; and, 4. It is close to a preferred station location.

POTENTIAL PARK-AND-RIDE SITE 8: PUBLIX PLAZA

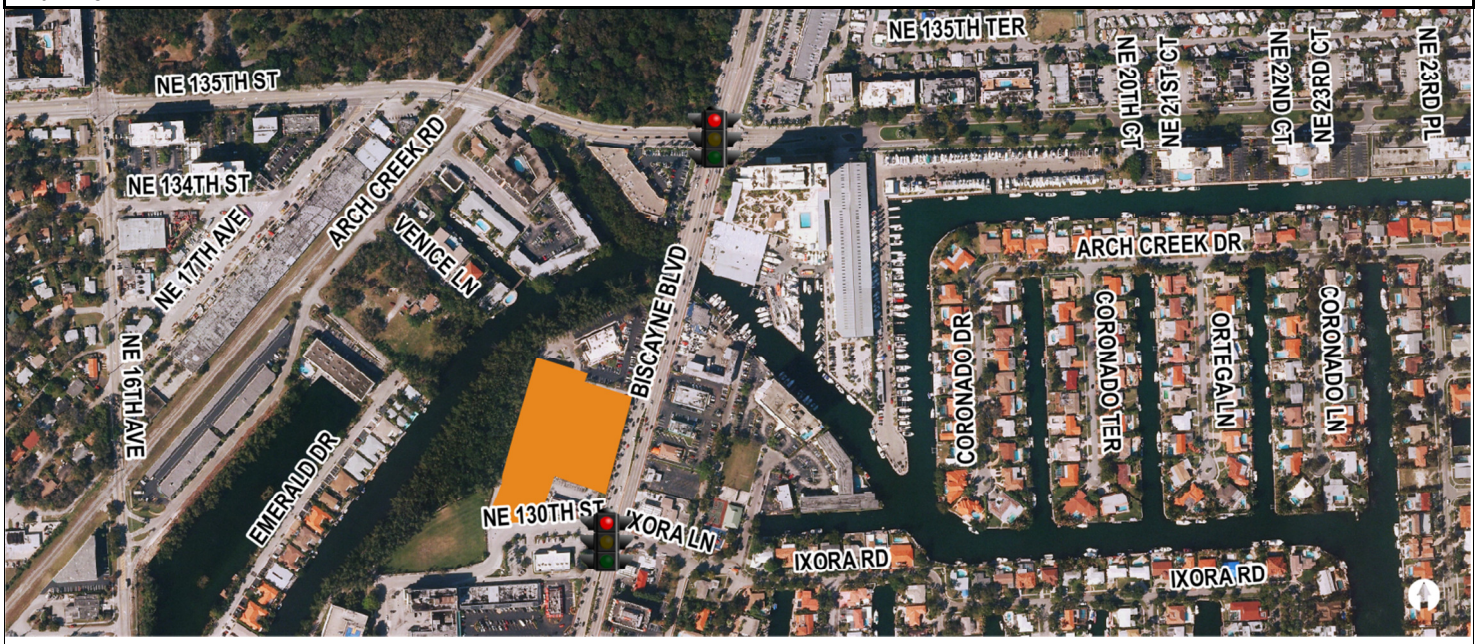
Plan View



• **Current Owner / Display Sign**	Publix
• **Active / Inactive**	Active
• **Street**	Biscayne Boulevard
• **Cross-street**	NE 127 St
• **Quadrant**	Northeast corner
• **Folio Numbers(s)**	0622290080551
• **Desirability**	High
• **Comments**	1. It is in between two major east-west arterial, NE 123rd Street and NE 135th Street; 2. It is at a signalized intersection; 3. The location has businesses that complement a park-and-ride use; and, 4. It is not close to a preferred station location.

POTENTIAL PARK-AND-RIDE SITE 9: NAVARRO

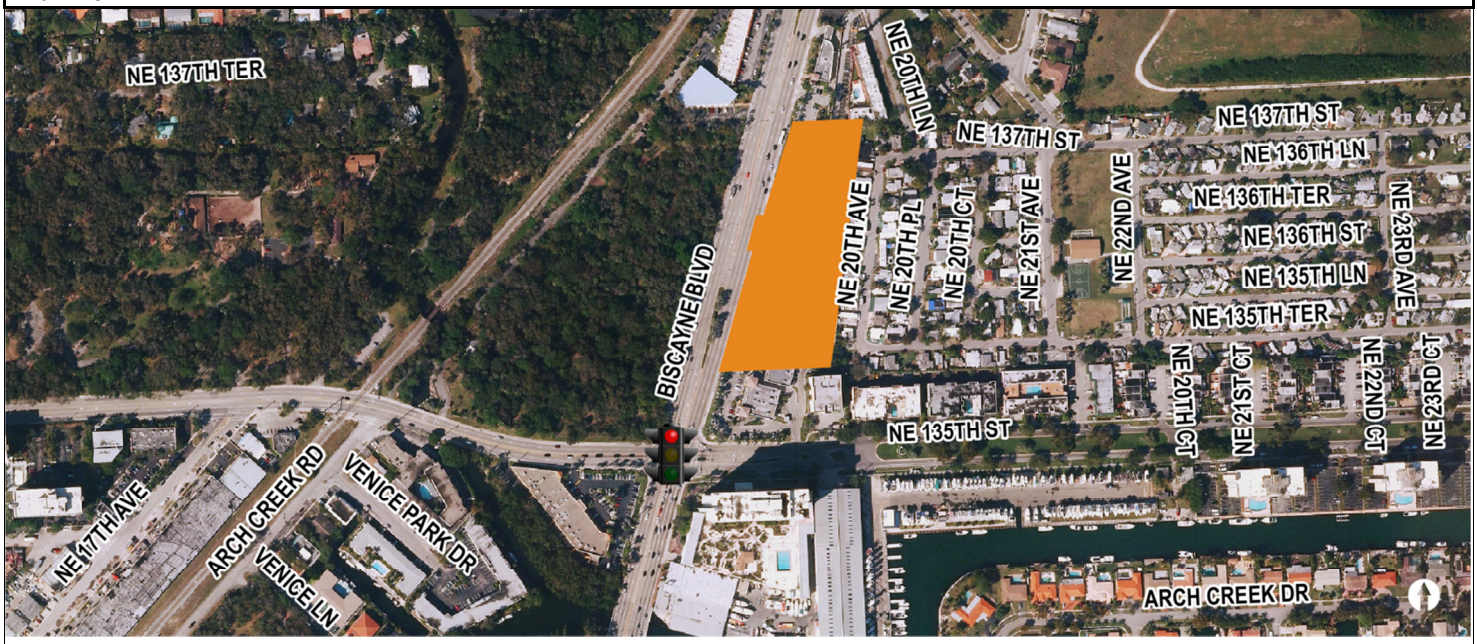
Plan View



• **Current Owner / Display Sign**	Navarro
• **Active / Inactive**	Active
• **Street**	Biscayne Boulevard
• **Cross-street**	NE 130 St
• **Quadrant**	Northwest corner
• **Folio Numbers(s)**	0622290080554
• **Desirability**	Medium
• **Comments**	1. It is close to a major east-west arterial, NE 135th Street; 2. It is at a signalized intersection; 3. It appears to have a large number of excess parking spaces; 4. The location has some businesses that complement a park-and-ride use; and, 5. It is not close to a preferred station location.

POTENTIAL PARK-AND-RIDE SITE 10: KEYSTONE PLAZA

Plan View



• **Current Owner / Display Sign**	Keystone Plaza
• **Active / Inactive**	Active
• **Street**	Biscayne Boulevard
• **Cross-street**	NE 135 Terrace
• **Quadrant**	Northeast corner
• **Folio Numbers(s)**	0722200140290
• **Desirability**	Low
• **Comments**	1. It is close to a major east-west arterial, NE 135th Street; 2. It is not at a signalized intersection; 3. It may only have a limited number of parking spaces to share; 4. The location has some businesses that complement a park-and-ride use; and, 5. It is adjacent to a northbound station location.

POTENTIAL PARK-AND-RIDE SITE 11: TARGET

Plan View

• **Current Owner / Display Sign**	Target
• **Active / Inactive**	Active
• **Street**	Biscayne Boulevard
• **Cross-street**	NE 143 Street
• **Quadrant**	Southeast corner
• **Folio Numbers(s)**	0722210310010
• **Desirability**	Low
• **Comments**	1. It is not close to a major east-west arterial; 2. It is at a signalized intersection; 3. It appears to have a large number of excess parking spaces; 4. The location has some businesses that complement a park-and-ride use; and, 5. It is not close to a preferred station location.

POTENTIAL PARK-AND-RIDE SITE 12: BISCAYNE COMMONS PLAZA

Plan View

• **Current Owner / Display Sign**	Biscayne Commons Plaza / Publix
• **Active / Inactive**	Active
• **Street**	Biscayne Boulevard
• **Cross-street**	NE 146 St
• **Quadrant**	Northeast corner
• **Folio Numbers(s)**	0722210210010
• **Desirability**	Low
• **Comments**	1. It is close to a minor east-west arterial, NE 151st Street; 2. It is at a signalized intersection; 3. It appears to have a large number of excess parking spaces; 4. The location has some businesses that complement a park-and-ride use; and, 5. It is not close to a preferred station location.

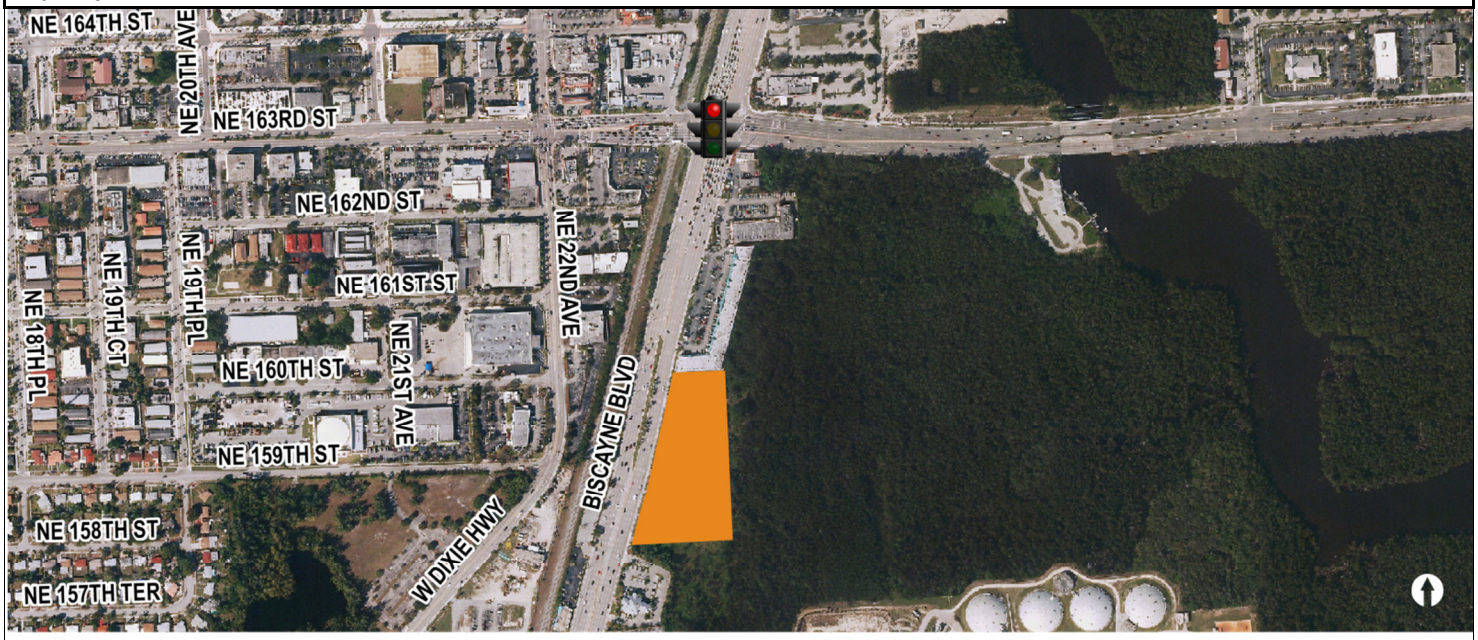
POTENTIAL PARK-AND-RIDE SITE 13: POST OFFICE

Plan View

• **Current Owner / Display Sign**	United States Post Office
• **Active / Inactive**	Active
• **Street**	Biscayne Boulevard
• **Cross-street**	NE 156Street
• **Quadrant**	Northeast corner
• **Folio Numbers(s)**	0622210000071
• **Desirability**	Low
• **Comments**	1. It is not close to a major east-west arterial; 2. It is at a signalized intersection; 3. It appears to have a limited number of excess parking spaces; and, 4. It is not close to a preferred station location.

POTENTIAL PARK-AND-RIDE SITE 14: SHOPPING PLAZA

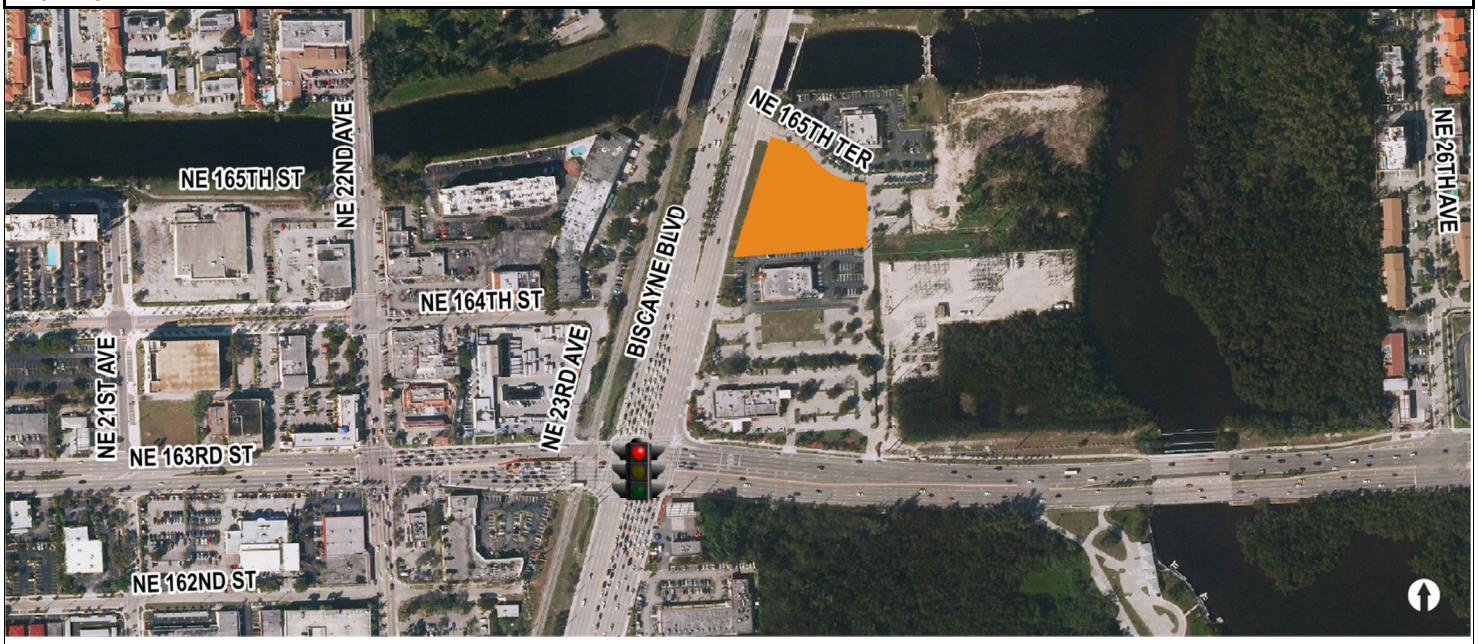
Plan View



• **Current Owner / Display Sign**	Shopping Plaza
• **Active / Inactive**	Active
• **Street**	Biscayne Boulevard
• **Cross-street**	NE 159 St
• **Quadrant**	Northeast corner
• **Folio Numbers(s)**	0722160430010
• **Desirability**	Medium
• **Comments**	1. It is close to a major east-west arterial, NE 163rd Street; 2. It is not at a signalized intersection; 3. The location has some businesses that complement a park-and-ride use; and, 4. It is not close to a preferred station location.

POTENTIAL PARK-AND-RIDE SITE 15: SHOPPING PLAZA

Plan View



• **Current Owner / Display Sign**	ABC Liquor
• **Active / Inactive**	Active
• **Street**	Biscayne Boulevard
• **Cross-street**	NE 165 Terrace
• **Quadrant**	Southeast corner
• **Folio Numbers(s)**	0722160420020
• **Desirability**	Low
• **Comments**	1. It is close to a major east-west arterial, NE 163rd Street; 2. It is not at a signalized intersection; 3. The business seems have excess number of parking spaces; and, 4. It is not close to a preferred station location.

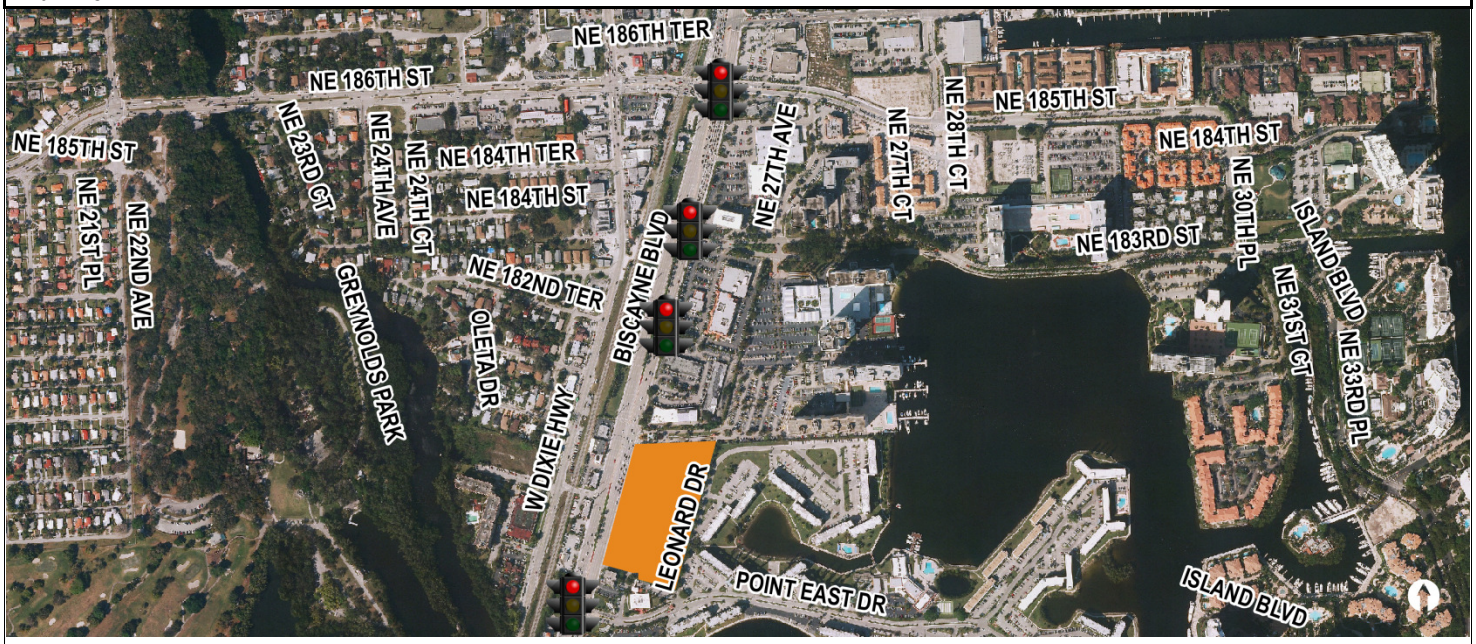
POTENTIAL PARK-AND-RIDE SITE 16: RESTAURANT PLAZA

Plan View

• **Current Owner / Display Sign**	P. F. Changs/Houston's/Morton's Steakhouse
• **Active / Inactive**	Active
• **Street**	Biscayne Boulevard
• **Cross-street**	NE 173 Street
• **Quadrant**	Northeast corner
• **Folio Numbers(s)**	0722090280030 / 0722090280010 / 0722090280020
• **Desirability**	Low
• **Comments**	1. It is not close to a major east-west arterial; 2. It is not at a signalized intersection; 3. Peak hours for theses businesses do not coincide with the anticipated park-and-ride hours; and, 4. It is not close to a preferred station location.

POTENTIAL PARK-AND-RIDE SITE 17: SHOPPING PLAZA

Plan View



• **Current Owner / Display Sign**	Shopping Plaza
• **Active / Inactive**	Active
• **Street**	Biscayne Boulevard
• **Cross-street**	NE 179 Street
• **Quadrant**	Northeast corner
• **Folio Numbers(s)**	2822100000090
• **Desirability**	Medium
• **Comments**	1. It is close to a major east-west arterial, NE 186th Street; 2. It is not at a signalized intersection; 3. The business seems have excess number of parking spaces; 4. It could be the northern terminal for several park-and-ride users; and, 5. It is not close to a preferred station location.

IMPACT OF PARK-AND-RIDE LOTS

For Phase 1 of the Biscayne EBS project, one park-and-ride lot at NE 79 Street is recommended. Additional park-and-ride lots can be considered after analyzing the impact of park-and-ride sites. Establishing new park-and-ride lots, either through out-right purchase or through joint-use, will have cost impacts. The exact location and associated costs will depend on the terms of negotiations. Therefore, the cost of such arrangement is not included.

4.4 VEHICLES

The transit vehicle is where transit riders spend most of their time as they interact with a transit system. Field observations during peak periods indicated that vehicles on Route 93 are full during peak hours. In some cases passengers had to be turned down because there was no standing room. Passenger loads show an average of over 30 passengers per vehicle during peak periods. Some of this can be relieved by improving headways - a subject addressed in the previous section. However, branding considerations and passenger demands indicate a need for larger vehicles. MDT is currently using 60-ft New Flyer vehicles on some of its routes. The agency has had much success with these vehicles as the cost of operating these new vehicles is significantly lower than other vehicles in the agency's fleet (Refer to Appendix 2).

An operating plan for the first set of buses will have to take into consideration operational details such as the headway, travel time, and route length to determine sufficiency of vehicles. It is expected that improved capital cost-effectiveness will be realized by reducing fleet requirements through better bus utilization. The following utilization measures are estimated to reduce the estimated vehicle needs:

1. Travel time savings due to the recommended TSP improvements (discussed in subsequent sections);
2. Travel time savings due to queue-jump / by-pass lanes (discussed in subsequent sections);
3. Travel time savings due to the recommended alignment; and,
4. Travel time savings due to the recommended reduction in the number of stops.

Table 19 lists estimated savings due to the above factors, resulting in a better fleet utilization. The travel time estimations based on the Travel Time and Delay Study show that the run will decrease by as much as 14 percent (Table 19). Articulated buses are usually configured in a specific way to decrease boarding times (through low-floor design and interior circulation). Savings from these are not reflected in the estimated 14 percent savings due to lack of data.

TABLE 19: **ESTIMATED TRAVEL TIME AND TRAVEL TIME SAVINGS FOR ENHANCED BUS SERVICE**

TIME PERIOD - DIRECTION	DISTANCE (MILES)	SCHEDULE TIME (MIN)	AVG OBSERVED TIME (MIN)	ESTIMATED TSP SAVINGS (MIN)	ESTIMATED QUEUE JUMP SAVINGS (MIN)	ESTIMATED ALIGNMENT SAVINGS (MIN)	ESTIMATED STOP SAVINGS (MIN)	ESTIMATED TRAVEL TIME (MIN)	ESTIMATED TRAVEL SPEED (MPH)	ESTIMATED TRAVEL TIME SAVINGS
AM-NB	14.7	60	63	0.8	1.5	1.1	2.8	57	15.5	8.8%
AM-SB	15.0	60	57	0.9	1.2	1.7	2.1	51	17.6	10.4%
PM-NB	14.7	71	71	1.1	1.5	3.2	2.5	62	14.1	11.6%
PM-SB	15.0	66	75	1.9	2.4	4.2	2.1	65	13.9	14.0%

1. These savings for the Biscayne EBS are measured over Route 93. For example, savings for 14 percent could be interpreted as that the Biscayne EBS will reduce travel time by 14 percent over the existing Route 93.
2. TSP Savings –It includes travel time savings due to the reduction of control delay at six intersections. Six intersections are recommended for TSP implementation. The delay was measured as part of the Travel Time and Delay Study conducted for this study.
3. Queue-Jump Lane Savings – It includes savings due to the elimination of average control delay at two intersections. Two intersections are recommended for queue-jump lane implementation. The delay was measured as part of the Travel Time and Delay Study conducted for this study.
4. Alignment Savings – It includes travel time savings due to elimination of the Omni loop. The delay due to this loop was measured as part of the Travel Time and Delay Study conducted for this study.
5. Stop Savings – It includes travel time savings due to the elimination of Route 93 stop locations. The delay due to average dwell time was measured as part of the Travel Time and Delay Study conducted for this study.

The Peak Vehicle Required (PVR) is based on the lowest average speed, which is estimated to be 14 miles per hour during the peak period which will have the most service (Table 20). Therefore, procurement of 18 new vehicles is recommended to meet the demands for Phase 1 and 2.

TABLE 20: **DETERMINATION OF VEHICLES NEEDED DURING PEAK PERIODS**

#	ITEM	MEASUREMENT	UNIT	SOURCE / FORMULA
A	Route Distance	30	Miles for a round-trip (north to south; south to north)	Miami-Dade County Roadway Shapefile
B	Average Speed	14	Miles per Hour	Table 19
C	Average Travel Time	129	Minutes	A / B
D	Average Layover Time	8	Minutes	Estimated
E	Delay Cushion	12.9	Minutes	Assumed to be 10 percent of travel time
F	Average Trip Time	149.43	Minutes	C + D + E
G	Headway	10.0	Minutes	Recommended Headway (15 minutes for Phase 1, 10 minutes for Phase 2)
H	Vehicles Need	15	Number of Vehicles	F / G
I	Spare Vehicles	3	Number of Vehicles	Assumed to be 20 percent of the required fleet
J	Total Vehicles	18		H + I

The number of vehicles needed during off-peak period has been determined for cost estimation purposes (Table 21)

TABLE 21: **DETERMINATION OF VEHICLES NEEDED DURING OFF-PEAK PERIODS**

#	ITEM	MEASUREMENT	UNIT	SOURCE / FORMULA
K	Distance	30	Miles for a round-trip (north to south; south to north)	Miami-Dade County Roadway Shapefile
L	Average Speed	15.4	Miles per Hour	Table 19, assumed to be 10 percent faster than peak-period travel speed
M	Average Travel Time	129	Minutes	K / L
N	Average Layover Time	8	Minutes	Estimated
O	Delay Cushion	12.9	Minutes (Assumed to be 10% of Travel Time)	Assumed to be 10 percent of travel time
P	Average Trip Time	149.4	Minutes	M + N +O
Q	Desired Headway	15.0	Minutes	Recommended Headway (20 minutes for Phase 1, 15 minutes for Phase 2)
R	Vehicle Need	10	Number of Vehicles	Q / R
S	Spare Vehicles	2.0	Number of Vehicles (Assumed to be 20%)	Assumed to be 20 percent of the required fleet
T	Total Vehicles	12.0		R + S

4.5 TRANSIT SIGNAL PRIORITIZATION

Transit Signal Priority (TSP) is an operational strategy that facilitates the movement of in-service buses through traffic signal controlled intersections. The strategy has been in existence since the 1960s in Europe and since the early 1970s in the United States. Prioritization occurs through a modification of the traffic signal's timing plan, which results in extending the existing green phase, or shortening other phases so as to return earlier to a green phase for the transit approach. By reducing the time that transit vehicles spend delayed at intersections, TSP can reduce transit delay and travel time and improve transit service reliability, thereby increasing the quality of transit service. It also has the potential of improving person throughput at an intersection. TSP provides these benefits with minimum impact to other facility users, including cross-traffic and pedestrians.

It is important to recognize that the MPO and MDT have taken a number of initiatives to implement TSP in the County. The TSP implementation has been evaluated as part of the MPO's Kendall Link Study which was completed in 2006. The MPO recently completed a study on TSP Deployment along Kendall Drive. The study looked at concepts of system operations and developed a communications plan.

MDT, for its part, has worked with Miami-Dade Public Works and Waste Management Department (PWWM) for the implementation of an Automatic Vehicle Location (AVL) based TSP system. Both, MDT and PWWM have agreed to implement a centrally-enabled TSP system. MDT is in the process of procuring a communications infrastructure. In short, systems engineering level decisions have already been made.

Given that a number of initiatives have been taken, this effort does not discuss "what is TSP" or the advantages and disadvantages of TSP implementation. It has been recognized as one of many effective tools for transit service improvements. This effort does not seek to readdress the decisions that have already been made but focuses on advancing the discussion on TSP and identifying candidate intersections for TSP implementation along Biscayne Boulevard.

Determining criteria for priority implementation remains a pending issue (Priority Acknowledgement Rules), something that was discussed at the SAC meetings and at a meeting with PWWM. At these meetings, PWWM expressed concerns about impacts of TSP on intersection level of service and on signal progression. FDOT and PWWM have outlined a detailed process for TSP and queue-jump lane implementation features. These two features are also the primary distinctive features for the Biscayne EBS. The requirements provided by FDOT (Appendix 3). A summary of TSP implementation related recommendations is in Table 22.

TABLE 22: **RECOMMENDATIONS FOR TRANSIT SIGNAL PRIORITY IMPLEMENTATION**

ITEM	RECOMMENDED APPROACH
TSP Method	Green extension and red truncation (early green) are two methods for TSP. For Phase 1, only green extension is recommended. Red truncation or early green is recommended to be evaluated for Phase 2 of the Biscayne EBS.
Eligible Route	On Biscayne Boulevard, only the Biscayne EBS will be eligible for TSP.
Eligible Stops	For a TSP-enabled intersection, direction with a near-side stop will not be eligible. A near-stop requires a more sophisticated method to predict intersection arrival time and yield inconsistent results.
Conditional Or Unconditional	Conditional priority based on "lateness"
Pedestrian Clearance Phase Truncation	Pedestrian clearance phase truncation is not recommended.
TSP For Turning Movements	The Phase 1 of the EBS will not have TSP for turning movements. It is recognized that left-turn movements have greater, although not necessarily severe, impacts on travel time and travel time reliability. Greater impacts are because the likelihood of the TSP occurrence is much higher for left-turn movements.
Directional Conflict	Occasionally services in opposite directions will send requests for priority. During peak-hours, TSP implementation is

ITEM	RECOMMENDED APPROACH
	recommended for peak-direction only. Southbound is the peak direction for the morning peak period and Northbound is the peak direction for the afternoon peak period. For a corridor like Biscayne Boulevard, this significantly reduces TSP's potential benefits however, it is a cautious and methodical approach to calibrate/optimize signal timing. During off-peak periods, services in both directions will become eligible for priority on degree of "lateness" instead of the traditional FIFO (first-in-first-out) approach.
Priority Signal Duration	The amount of permissible time to cross and intersection depends on intersection configuration and therefore a more detailed intersection-specific analysis is recommended. While an intersection like NE 186th Street will require five or more seconds to allow buses to traverse through an intersection, another intersection like NE 62nd Street may require less time.
Priority Gap / Re-Arm Timer Setting	Due to vehicle bunching (buses in close proximity of each other in the same direction), a "priority gap" of three signal cycles is recommended. This implies that once a vehicle gets priority through an intersection, the next "late" vehicle (which might also be from the opposite direction) will have to wait two signal cycles to become eligible. A typical cycle in the County is approximately 160 to 200 seconds which implies a wait of eight to nine minutes. This priority gap should work for a service with 15 minute peak headways. The recommended priority gap is applicable to peak-periods only. Priority gap will have to be reduced with any reduction in the headways.
Accommodation Of First-Responders	First-responders clearly have priority over other general use vehicles. It is a noteworthy issue given that some of the east-west arterials such as NE 123 Street and NE 163 Street are the primary streets to access Bal Harbour and Sunny Isles Beach. The recommended approach is that priority gap should come in to effect after any preemption for first-responders. Similarly, first-responders will be able to override eligible TSP requests.

4.5.1 IMPACT OF TSP ON TRAFFIC MOVEMENT AND INTERSECTION LEVEL OF SERVICE

Given that the MPO and other agencies evaluated TSP strategies several years ago, absence of a real-TSP application in the County is conspicuous. One of the primary reasons for absence of a wide-spread acceptance of the application of TSP in the County is the concern about the potential for disruption of traffic progression. This was identified as the key concern for PWWM that invested substantial amount of resources in optimizing signal timings throughout the County.

Recently, however, more rapid deployment has been occurring throughout the US and other countries because of the advancement of more affordable technology. A number of research publications have shown that TSP has some adverse traffic impact on intersecting streets however, few of these studies have shown impacts to the magnitude that could prevent TSP implementation. The MPO tested the impact of TSP improvements in its Kendall Link Study. Recently, one of the MPO studies, Congestion Management Process Implementation, has used VISSIM to identify impacts of TSP. The results show minimal impact on intersecting streets, without optimizing signals. Given PWWM's concerns, the recommended approach is a phased rollout of TSP improvements along the Biscayne Boulevard.

4.5.2 INTERSECTIONS RECOMMENDED FOR TSP IMPLEMENTATION (BY PHASE)

TSP improvements are recommended at 11 intersections along Biscayne Boulevard (Table 23). These locations were identified based on the Travel Time and Delay study. These locations were selected to provide meaningful benefits to transit but with appreciable distance between them to minimize impacts on signal progression. Other considerations included capacity of the roadway. For instance, Biscayne Boulevard has a narrower section at NE 62 Street and NE 82 Street. These two intersections along with NE 6 Street also have other signalized intersections in close proximity. Therefore, these intersections are recommended for Phase 2 of TSP implementation.

Some of these locations have queuing issues, a problem that cannot adequately be solved by extending green time or truncating red time. TSP, along with queue-jump / by-pass lanes, will be required at these locations. Significant queuing occurs at NE 36th Street, NE 23rd Street, and NE 186th Street. The intersections where TSP is combined with queue-jump lanes improvements are listed in the next sub-section.

TABLE 23: **INTERSECTIONS RECOMMENDED FOR TSP IMPLEMENTATION (BY PHASE)**

Intersections of Phase 1 TSP Implementation
1. NE 33 Street
2. NE 36 Street
3. NE 38 Street
4. NE 123 Street
5. NE 151 Street
6. NE 163 Street
Intersections of Phase 2 TSP Implementation
1. NE 6 Street
2. NE 62 Street
3. NE 82 Street
4. NE 191 Street
5. NE 186 Street

4.5.3 WILL TSP BENEFIT TRANSIT?

TSP will improve travel time and travel time reliability but, in absence of an unconditional priority, the benefits of TSP are somewhat limited. The VISSIM simulation completed for a recent MPO study (Application of Congestion Management Process Strategies) showed minor benefits to transit, in exchange for insignificant impacts to traffic on intersecting streets. Typically, actual TSP events were in the range of 20 to 30 percent of total possible events at a signal. A TSP enabled intersection at NE 36 Street will not reduce travel time or signal delay for every transit vehicle on every trip. TSP is a random event that relies on predictable arrival at an intersection within a certain cycle phase, thereby reducing the probability of benefits. On the other hand, it also implies that adverse impacts on intersecting streets are also minimal which should address the PWWM's concerns.

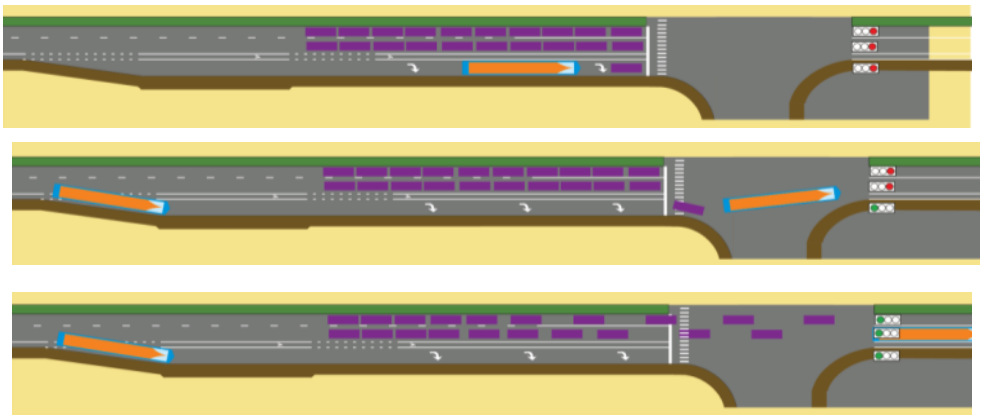
A limited-number of TSP improvements randomly dispersed throughout a corridor limits the potential benefit for transit because gains at one intersection can be lost downstream. These limitations should not prohibit the recommended implementation of TSP along Biscayne Boulevard. A dispersed TSP approach attacks the most severe spots to yield the greatest benefits. Similarly, TSP occurrence even at a 20 percent rate implies that one out of four buses in the peak-direction will benefit.

4.5.4 IMPACT OF TSP

For Biscayne EBS riders, the benefits of TSP will be more apparent on longer trips and trips with more passengers. A TSP enabled intersection at the northern most point along the route, the segment with lowest passenger loads, will benefit fewer passengers. On the other hand, a TSP enabled intersection at NE 123 Street or NE 36 Street will yield the largest cumulative travel time savings benefits as passenger loads are highest at those locations. The impacts, for the purpose of this analysis, are measured per vehicle, irrespective of its passenger load. These are included in Table 19.

4.7 QUEUE JUMP LANES

FIGURE 32: **CONCEPT OF QUEUE JUMP LANES**



Queue-jump lanes, in the simplest terms, are lanes to allow transit vehicles to bypass queues at congested points. Quite often these lanes are the right-most lanes, designed and designated for transit vehicles only (Figure 32). Occasionally, they are shared either between right-turning vehicles and transit vehicles or between bikes and transit vehicles.

Among the elements identified above, the placement and type of queue jump lanes was considered to be the most important infrastructure element, as this has the greatest influence on travel time and transit operating reliability, as well as capital costs. Based on physical inspection of the corridor (including land uses, road widths, and median type/existence), and identification of key physical constraints (structures such as utility poles and mast arms), a series of preliminary infrastructure strategies were presented at the project SAC meetings. Comments received became the basis for refining these strategies in order to arrive at the preferred infrastructure strategy described below.

Auxiliary lanes, turn or through lanes, at an intersection provide low-cost opportunities to implement queue-jump lanes. There are a number of such opportunities along Biscayne Boulevard. The MPO has evaluated queue-jump lanes in the past, in March and June of 2006. Both provided relevant recommendations that remain valid to date. The previous designs were considered in the development of queue-jump lanes for the Biscayne EBS, however, changes in design since 2006 have led to modified alternatives. For instance, it appears that the previous study's proposed realignment at NE 36 Street will not be needed due to implementation of an FDOT resurfacing project since then.

FDOT, a member of the SAC, recommended detailed analysis for each location wherever queue jump lanes are being considered. Clearly, the requirements are much higher where the transit agency plans to use existing auxiliary right-turn lanes as queue jump lanes. Requirements from FDOT's Design and Traffic sections are included in Appendix 3.

4.7.1 RECOMMENDED INTERSECTIONS WITH QUEUE-JUMP LANES (BY PHASE)

Given the FDOT requirements, the first phase of Biscayne EBS should use the existing infrastructure as the test case scenario for queue jump lanes. Two locations recommended for Phase 1 of EBS are:

NORTHBOUND AND SOUTHBOUND NE 36 STREET

At this location the queue jump lane is recommended to be combined with a bus bay upstream, under the I-195 overpass. (Figure 33)

NORTHBOUND AND SOUTHBOUND AT NE 163 STREET

At this location the northbound Biscayne Boulevard to westbound NE 163 Street right-turn is recommended to be included as part of the queue jump project. This is to provide an easier access to the EBS station located upstream, at the end of the merge lane. (Figure 34).

FIGURE 33: **PHASE 1 QUEUE-JUMP IMPROVEMENTS – AT NE 36 ST**

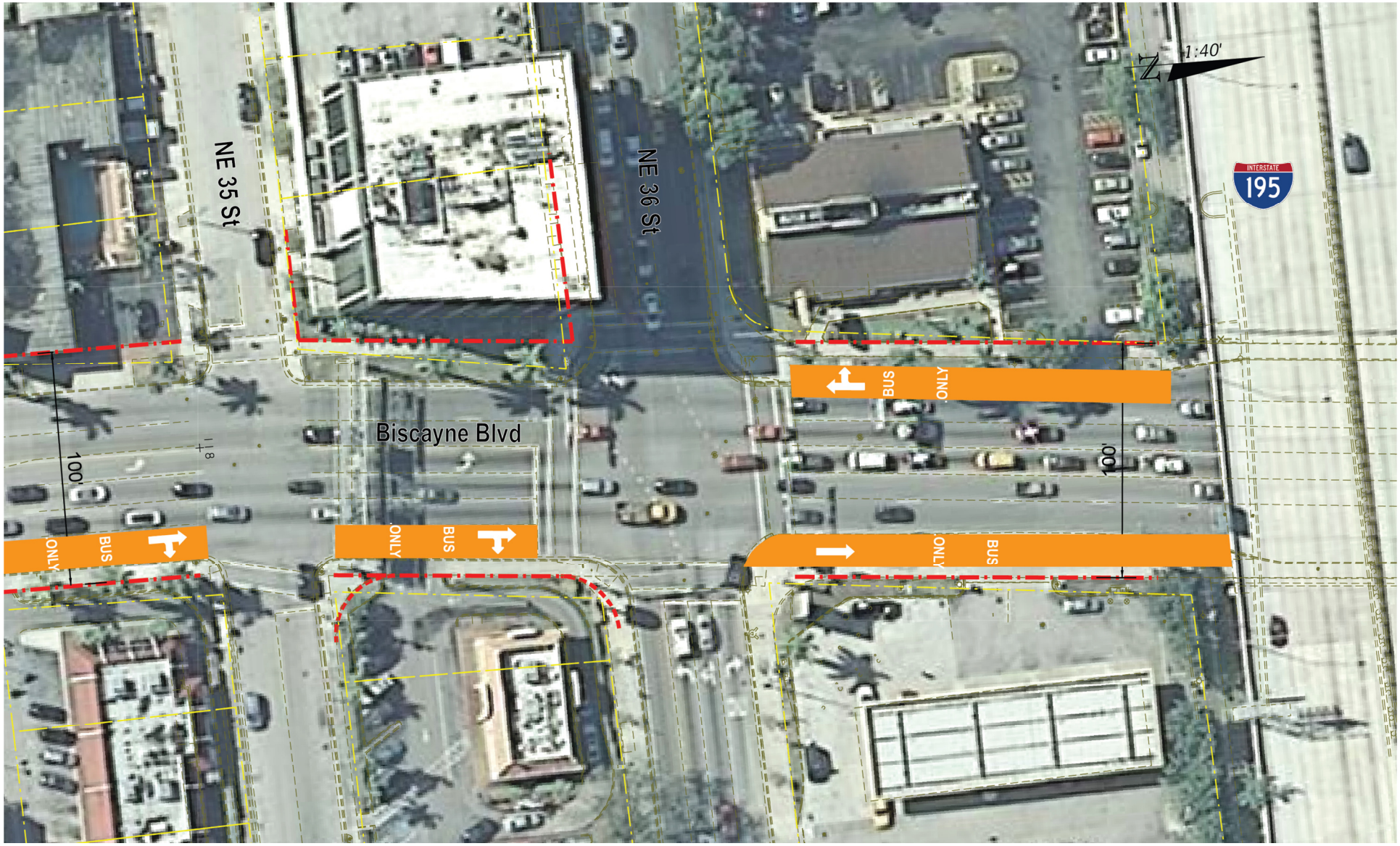
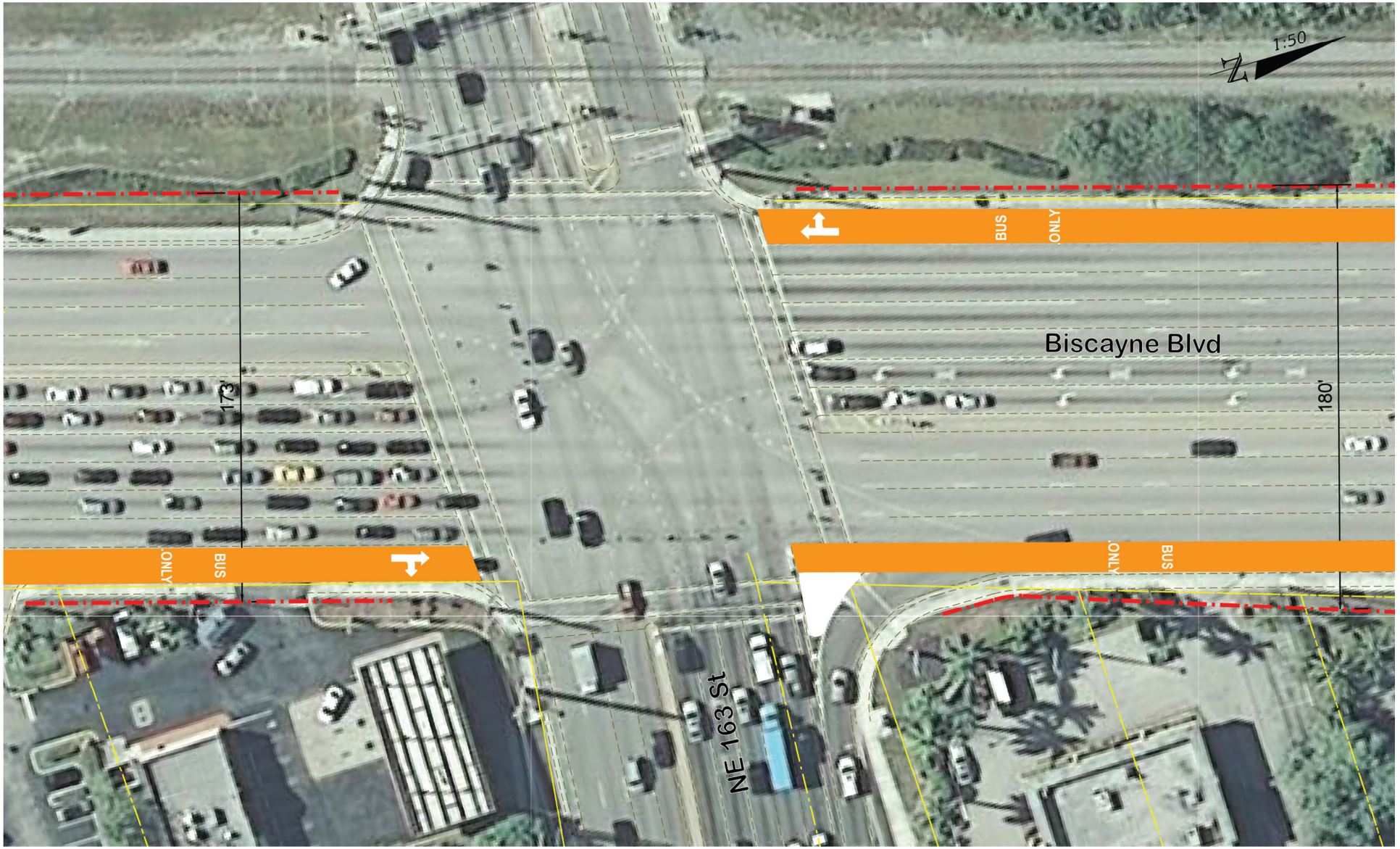


FIGURE 34: **PHASE 1 QUEUE-JUMP IMPROVEMENTS – AT NE 163 ST**



A number of queue-jump lanes are recommended for the second phase of the Biscayne EBS project. These are based on availability of right-of-way and the need, as determined by the Travel Time and Delay study. To yield the highest impact, queue-jump lanes between NE 79 Street and NE 146 should be prioritized because passenger loads are higher in that segment and therefore, more passengers will benefit from queue-jump lanes. The queue-jump locations for the Phase 2 of the EBS are:

1. **NORTHBOUND AND SOUTHBOUND LANES AT NE 5 STREET** (Figure 35)

   An auxiliary turn-lane does not exist at this intersection so a minor intersection redesign will be required. Right-of-way appears to be available for a bus-only queue-jump lane. This improvement will impact wide sidewalks however, it will also yield larger benefits to downtown commuters.
2. **NORTHBOUND AND SOUTHBOUND LANES AT NE 8 STREET** (Figure 36)

   Auxiliary turn-lanes do not exist at this intersection so a minor intersection redesign will be required. Right-of-way appears to be available for a bus-only queue-jump lane. This improvement will impact wide sidewalks however, it will also yield larger benefits to downtown commuters.
3. **NORTHBOUND AND SOUTHBOUND LANES AT NE 19 STREET** (Figure 37)

   Auxiliary turn-lanes do not exist at this intersection so a minor intersection redesign will be required. Right-of-way appears to be available for bus-only queue-jump lanes.
4. **NORTHBOUND AND SOUTHBOUND LANES AT NE 79 STREET** (Figure 38)

   For this movement, buses will utilize an existing right-turn only lane.
5. **NORTHBOUND AND SOUTHBOUND AT NE 91 STREET** (Figure 39)

   Auxiliary turn-lanes do not exist at this intersection so a minor intersection redesign will be required. Right-of-way appears to be available for bus-only queue-jump lanes.
6. **NORTHBOUND AND SOUTHBOUND AT NE 118 ST / SAN SOUCI BOULEVARD** (Figure 40)

   Auxiliary turn-lanes do not exist at this intersection so a minor intersection redesign will be required. Right-of-way appears to be available for bus-only queue-jump lanes. Additional traffic operations analysis is recommended due to proximity of a driveway access to the southbound bus-only queue-jump lane.
7. **NORTHBOUND AND SOUTHBOUND AT NE 146 STREET** (Figure 41)

   Auxiliary turn-lanes do not exist at this intersection so a minor intersection redesign will be required. Right-of-way appears to be available for bus-only queue-jump lanes.
8. **NORTHBOUND AND SOUTHBOUND LANES AT NE 151 STREET** (Figure 42):

   An auxiliary turn-lane exists at the southbound direction at this intersection. For the northbound movement, buses will utilize the existing right-turn only lane. A minor intersection redesign is recommended to incorporate a northbound bus-only queue-jump lane.
9. **SOUTHBOUND AT NE 172 STREET** (Figure 43)

   At this intersection, right-of-way is available in the southbound direction only. A southbound auxiliary turn-lane does not exist at this intersection so a minor intersection redesign will be required to incorporate a southbound bus-only queue-jump lane.
10. **SOUTHBOUND AT NE 186 STREET**

    An auxiliary turn-lane exists at the southbound direction at this intersection. For this movement, buses will utilize an existing right-turn only lane.
11. **SOUTHBOUND AT NE 192 STREET**

    An auxiliary turn-lane exists at the northbound direction at this intersection. However, given the visibly high turning movements, further traffic analysis is recommended.
12. **NORTHBOUND AT NE 195 STREET / AVENTURA BOULEVARD**

An auxiliary turn-lane exists at the northbound direction at this intersection. However, given the visibly high turning movements, further traffic analysis is recommended.

13. NORTHBOUND AT NE 197 STREET

An auxiliary turn-lane exists at the northbound direction at this intersection. However, given the visibly high turning movements, further traffic analysis is recommended.

4.7.2 WILL QUEUE-JUMP LANES BENEFIT TRANSIT?

Generally, transit speeds and reliability are significantly improved whenever the bus is able to flow independently from the general traffic. Queue-jump lanes at every intersection, if that was possible, will bring a transit system very close to a BRT configuration as often intersections are the delay points along a route. Queue-jump lanes can also be seen as intermittent bus lanes at locations with the highest needs.

The benefits of queue-jump lanes on transit speeds and reliability largely depend on the queue-jump lane design. The effectiveness of a bus to jump a queue will be severely limited if lanes are not longer than maximum observed queue for the design year.

FIGURE 35: **PHASE 2 QUEUE-JUMP IMPROVEMENTS – AT NE 5 ST**

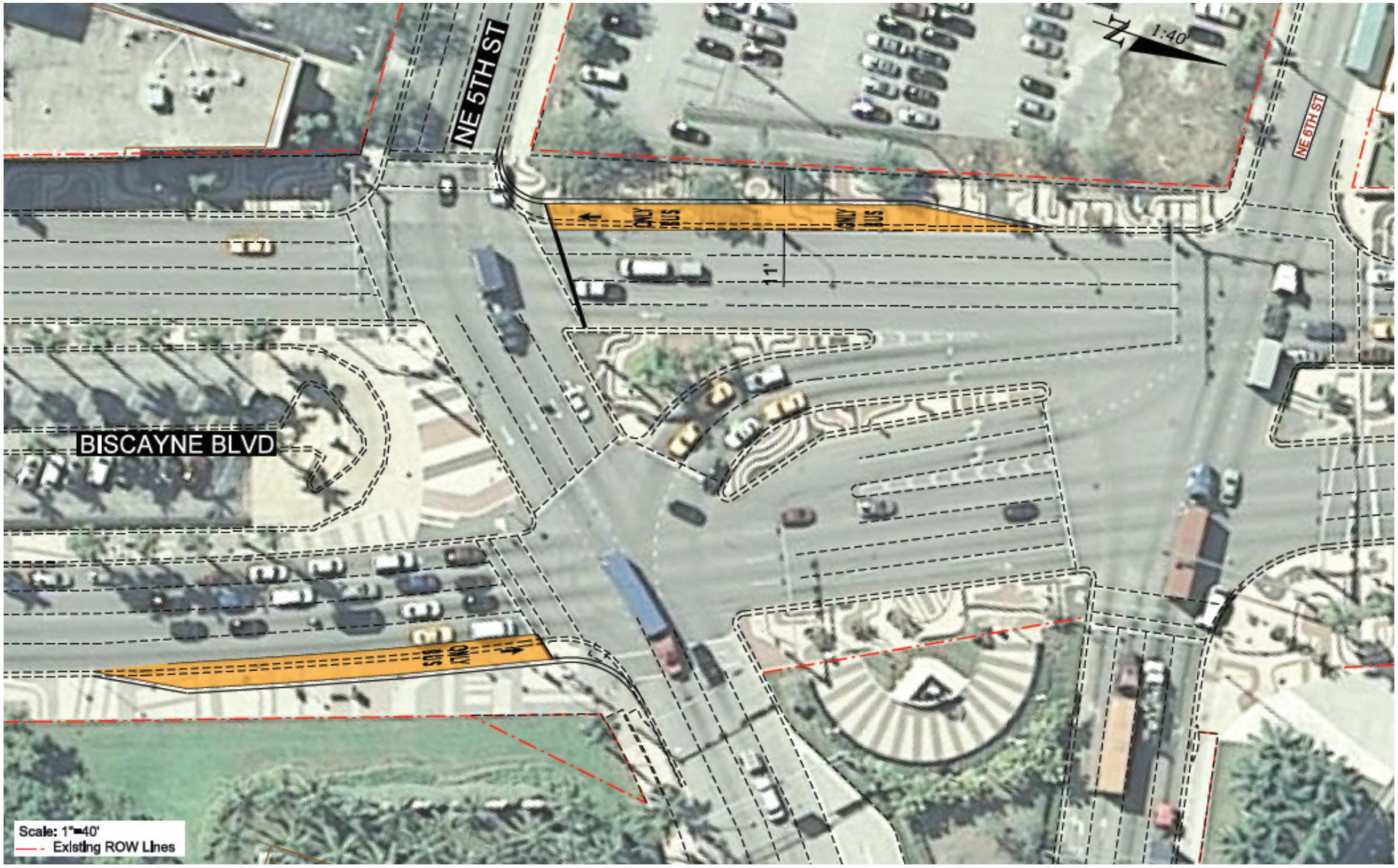


FIGURE 36: **PHASE 2 QUEUE-JUMP IMPROVEMENTS – AT NE 8 ST**

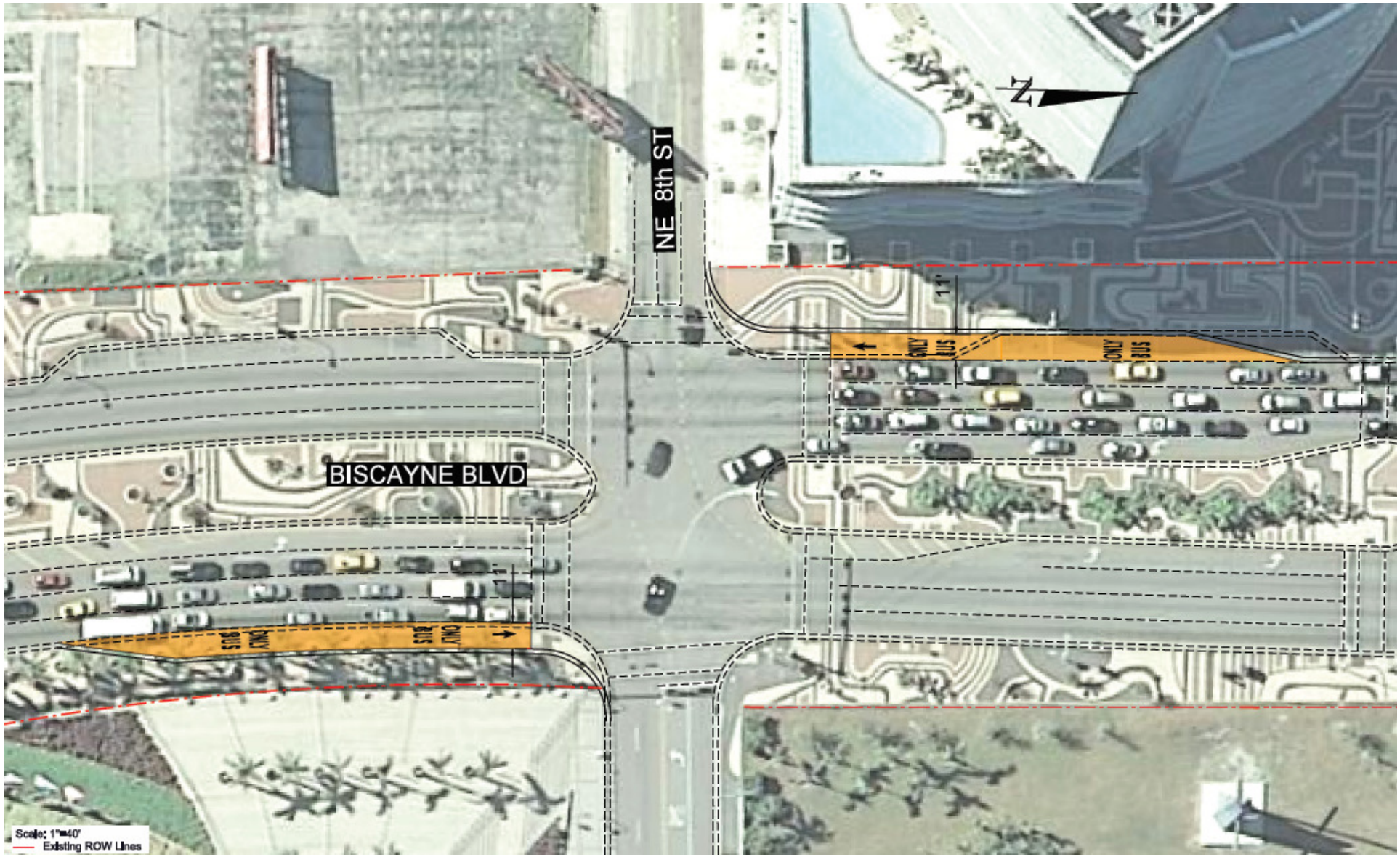


FIGURE 37: **PHASE 2 QUEUE-JUMP IMPROVEMENTS – AT NE 19 ST**

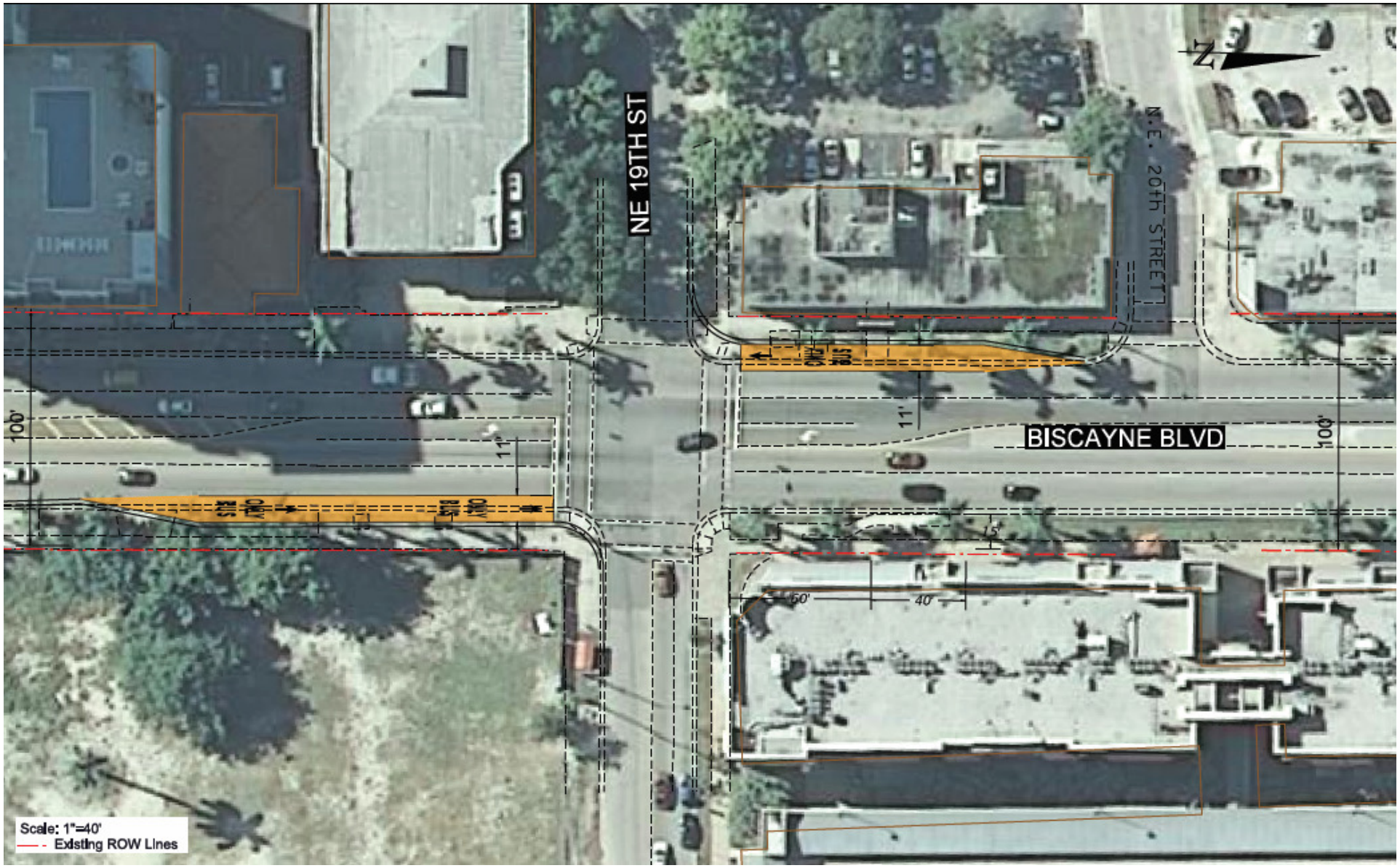


FIGURE 38: **PHASE 2 QUEUE-JUMP IMPROVEMENTS – AT NE 79 ST**

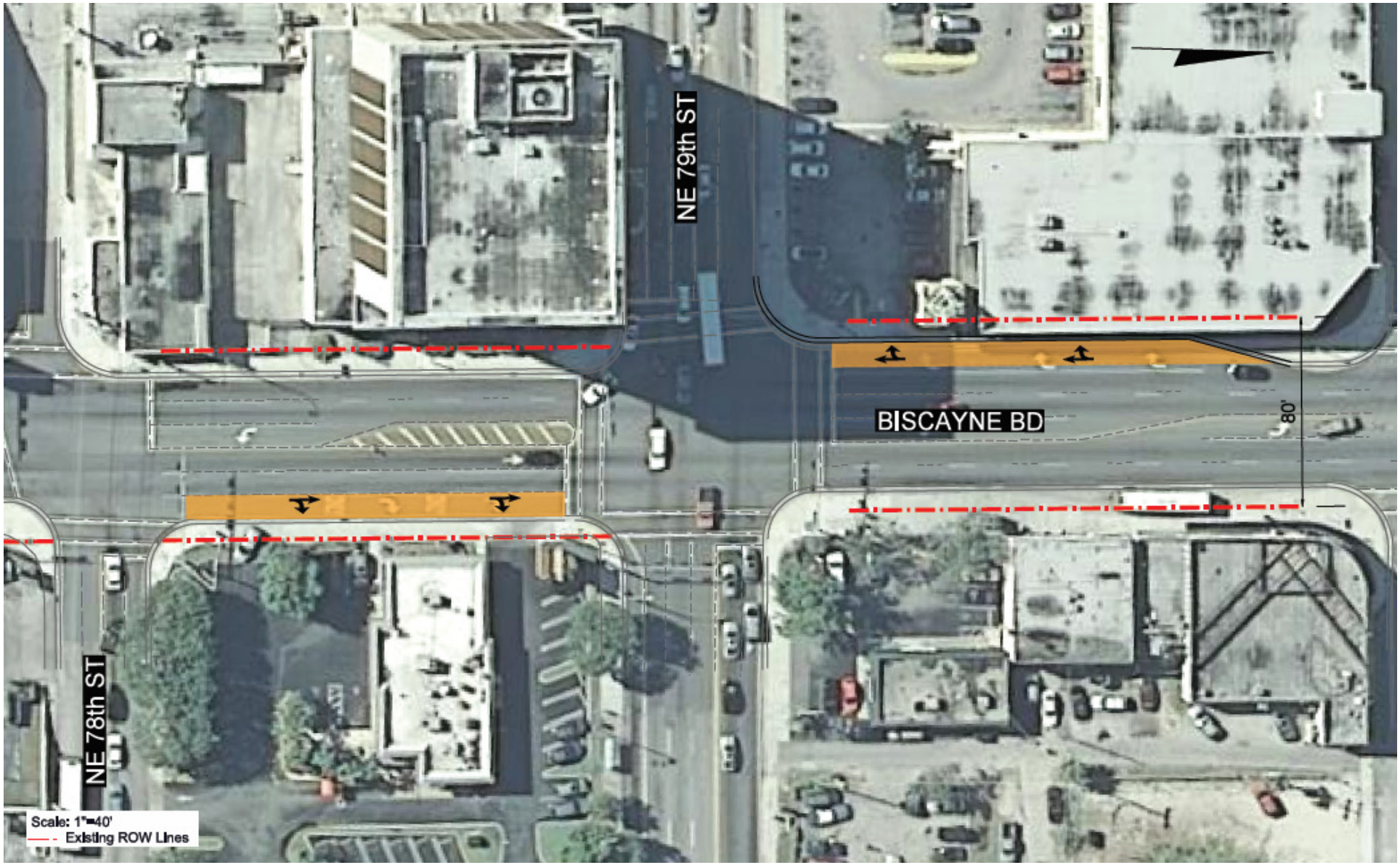


FIGURE 39: **PHASE 2 QUEUE-JUMP IMPROVEMENTS – AT NE 91 ST**

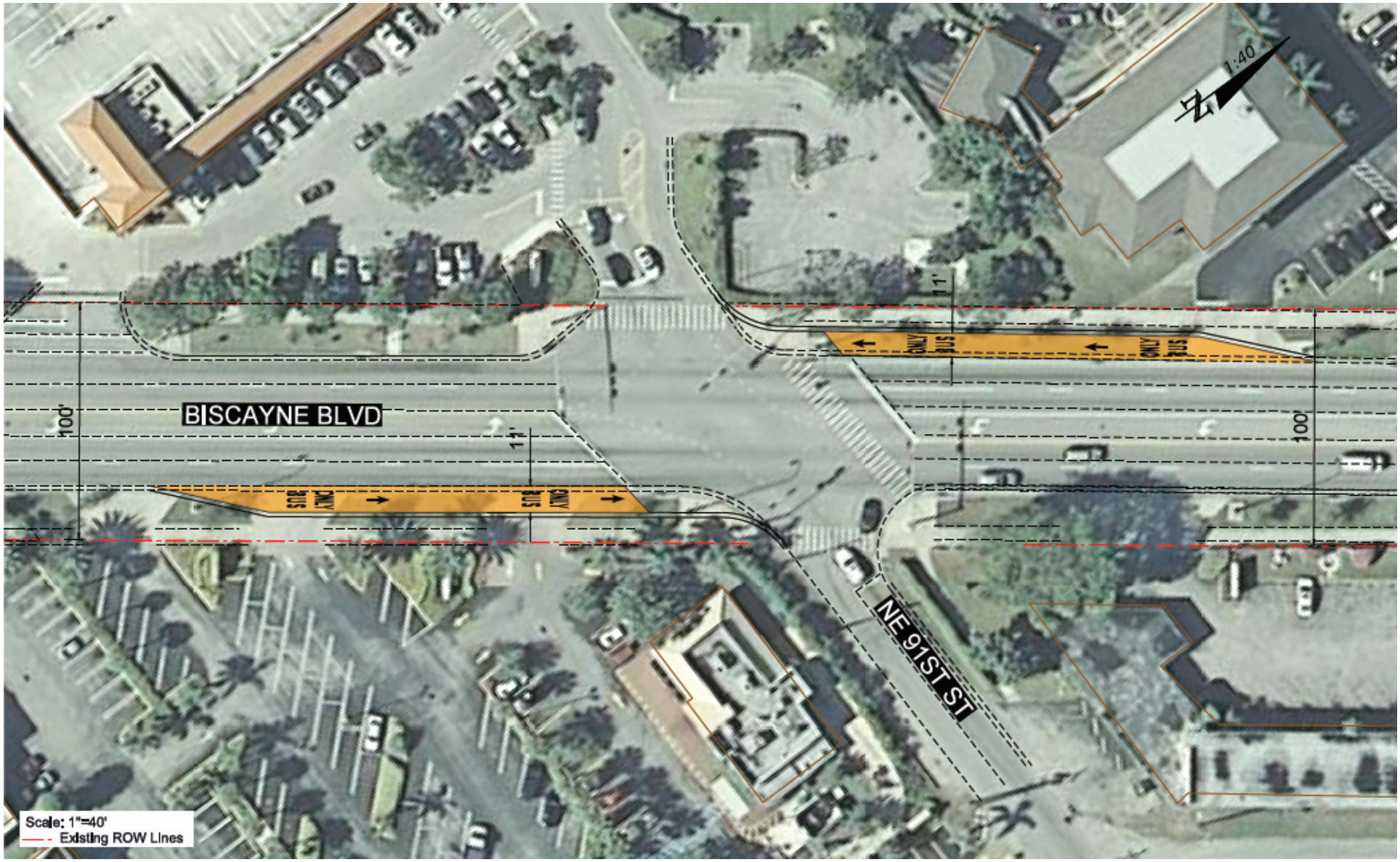


FIGURE 40: **PHASE 2 QUEUE-JUMP IMPROVEMENTS – AT NE 118 ST**

FIGURE 41: **PHASE 2 QUEUE-JUMP IMPROVEMENTS – AT NE 146 ST**

FIGURE 42: **PHASE 2 QUEUE-JUMP IMPROVEMENTS – AT NE 151 ST**

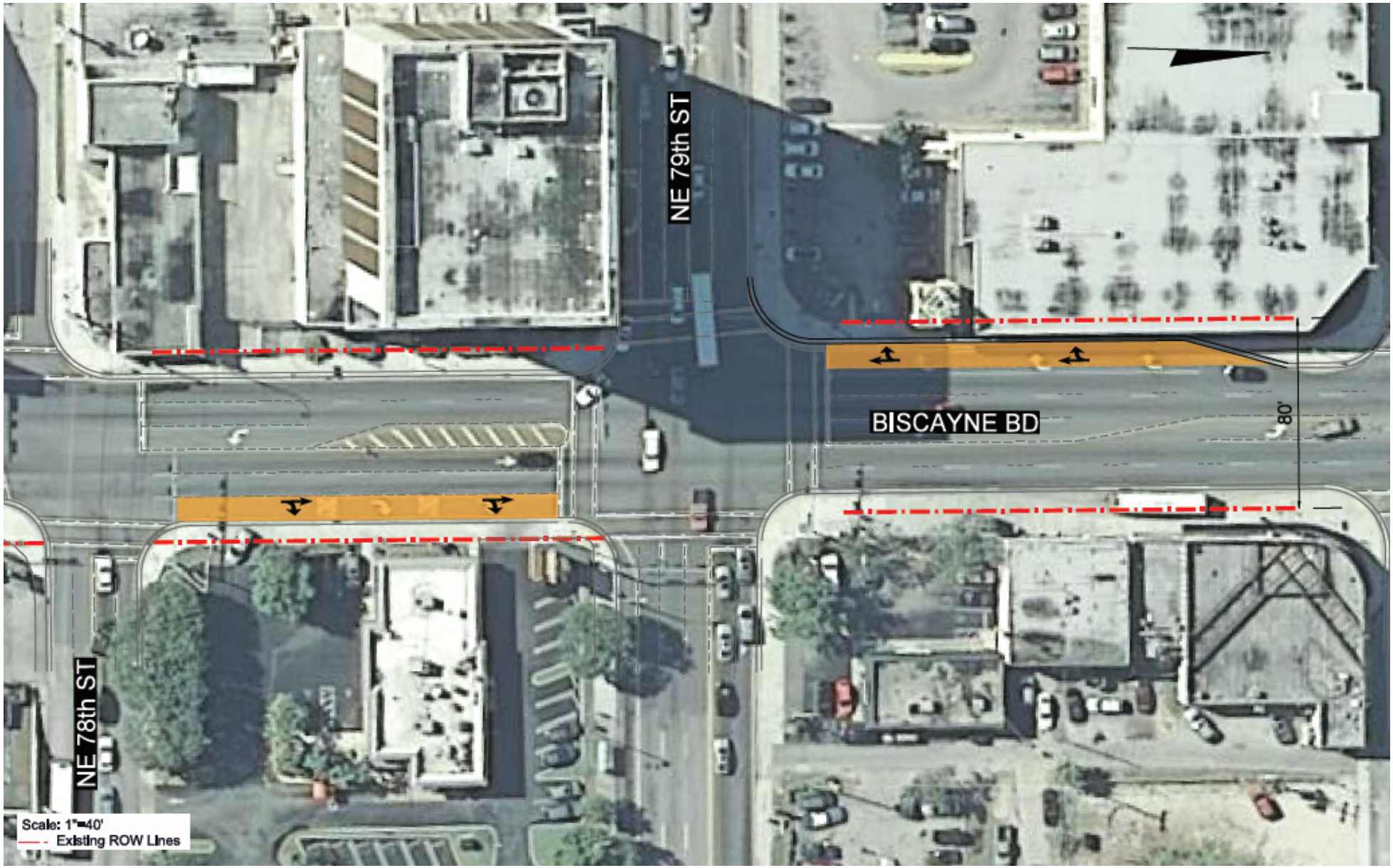


FIGURE 43: **PHASE 2 QUEUE-JUMP IMPROVEMENTS – AT NE 172 ST**

4.8 FARE COLLECTION STRATEGY

Off-board fare collection is key to any premium transit system. Dwell time at stops or stations account for nearly 20 percent of the existing Route 93 service. An off-board fare collection system reduces cash transactions between driver and passenger which, in turn, speeds up boarding times, reduces dwell times, and shortens overall vehicle travel times. Off-board fare collection, however, typically requires procurement of ticket vending machines (TVMs) to facilitate prepayment. Passengers then show their tickets or passes to drivers.

MDT, as part of the study coordination effort, expressed security concerns about having cash at stations as well as about their ability to collect cash at the end of a service day. Therefore, a phased off-board fare collection strategy is recommended. This strategy limits the benefits of an off-board fare collection system but, it provides a mechanism to gradually introduce the system to its users.

4.8.1 RECOMMENDED FARE COLLECTION STRATEGY BY PHASE

FIGURE 44: **EXAMPLE OF A TVM (ELECTRONIC TRANSACTIONS ONLY)**
Source: cubic.com

The Phase 1 off-board fare collection for Biscayne EBS is recommended to include off-board fare collection for electronic transactions only. Passengers without a monthly pass will be able to obtain the following: (1) Pass for one trip; (2) 1-day pass; (3) 7-day pass; (4) 30-day pass. Passes with discounts require verification and therefore will not be issued at the EBS stations. The provision of electronic transactions will address MDT's concerns about cash collection.

The Phase 2 off-board fare collection should expand the use of these machines to enable cash transactions. Full off-board fare collection would be implemented incrementally, contingent on: (1) availability of funds to purchase vending machines and hire staff for cash collection; (2) experience of the Biscayne EBS Phase 1; and, (3) MDT's tolerance for less than optimal operating speeds before full implementation of off-board fare collection.

These machines will be integrated in to markers at station areas and therefore, will be more protected from vandalism.

4.8.2 IMPACT OF OFF-BOARD FARE COLLECTION

Phase 1, where only electronic transactions will be accepted, is not expected to yield any measurable travel time or reliability benefits for the Biscayne EBS. However, it is an important first-step towards Phase 2 which is expected to result in travel time savings of three to five percent, based on the result of the Travel Time and Delay study. The off-board fare collection also has cost implications that are included in Section 5.

4.9 BRANDING PLAN

Branding a BRT or Enhanced Bus Service gives it a distinct identity, which results in clear and positive public recognition and improved acceptance of the service. In addition to creating or enhancing positive public acceptance of the service, creating a relevant and compelling brand for the EBS system can deliver the following benefits:

CLEARLY DIFFERENTIATED TRANSIT SERVICE

Branding can create a premium feel to a transit service, distinguishing it from standard or more conventional services such as local routes along Biscayne Boulevard.

ENHANCED OUTREACH EFFORTS

A united theme among the various components of the EBS system will simplify marketing efforts and will allow MDT to more effectively reach its target customers.

INCREASED CUSTOMER LOYALTY

A united theme will help customers navigate the system by making the EBS system easily identifiable and distinguishing it from other services. Consistent delivery of the brand promise will create loyal customers.

INCREASED BRAND VALUE

It is expected to increase brand value as measured by added revenue and increased market share. A 2010 APTA publication, "BRT Branding, Imaging and Marketing," found that branding and imaging alone can contribute to 10 to 20 percent ridership increases on recently deployed BRT services. In addition, branding and imaging have been identified by the Federal Transit Administration (FTA) as an element of premium BRT-like service that, absent a dedicated roadway, helps define candidate BRT or BRT-like projects as eligible for funding. A detailed branding plan, designed to be a stand-alone document for all potential EBS services in the County, is included as Appendix 4.

4.9.1 STATION DESIGN

Station design is a component of the branding effort and is included in Appendix 4. The conceptual station shelter layout allows free pedestrian movement for boarding and waiting. A wider shelter allows protection from the elements. Station concept designs have flexibility to fit the range of sidewalk conditions that exist along each corridor. Sidewalk width is the primary factor in determining the configuration; the shelter can be as narrow as three feet. In addition, the design provides the flexibility to easily add on an additional shelter module to increase the length, should the ridership warrant and site conditions allow expansion. Station areas will incorporate the following functional elements and amenities:

- A lighted marker, to establish the location;
- Bike racks;
- Litter receptacles, including one for recyclable material;
- Static signage for routes and transit system;
- Real-time vehicle arrival signage;
- Potential for security cameras; and,
- Station lighting.

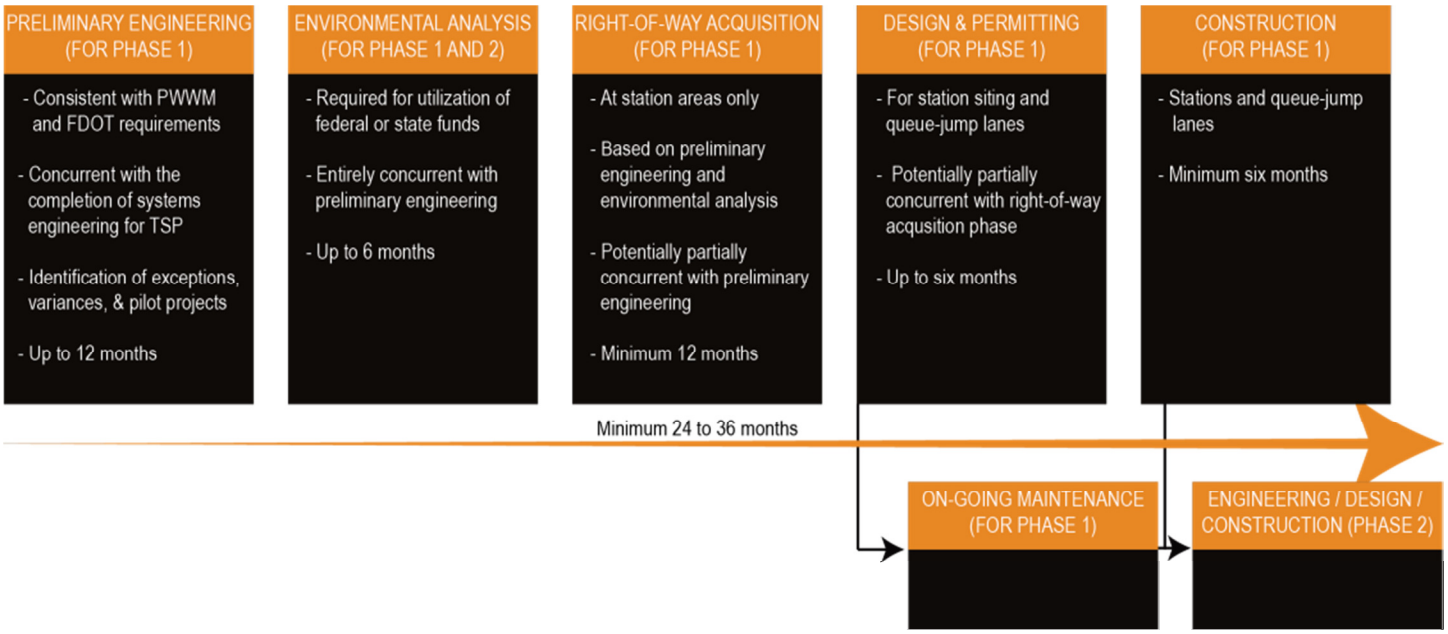
Section 5

IMPLEMENTATION PLAN

5.1 PROCESS

MDT will follow standard engineering and design processes which will include traffic engineering, roadway design, and potential environmental analysis (Figure 45). These items will be done in coordination with FDOT and PWWM. The extent of environmental analysis depends on funding sources and the types of improvements. For instance, usage of federal funds for right-of-way acquisition will require more analysis compared to usage of local funds. The right-of-way constraints along the Biscayne Corridor are expected to be the biggest risk factor for the schedule. At minimum, this process is expected to take a minimum of 24 months to 36 months (Figure 46). Other factors that can facilitate a faster implementation are: (1) scheduling items well in advance of Board of County Commissioners and other agency meetings; (2) maximizing overlap between different tasks to compress project critical paths; and, (3) coordination among different agencies.

FIGURE 45: **PROCESS FOR BISCAYNE EBS IMPLEMENTATION**



5.1.1 PRELIMINARY ENGINEERING

FDOT and PWWM have outlined a detailed process for TSP and queue-jump lane implementation features. These two features are also the primary distinctive features for the Biscayne EBS. The requirements for preliminary engineering were provided by FDOT (Appendix 4) and they include the following major items:

1. FDOT's requirement for traffic analysis
    a. Impacts of signal timing changes through queuing analysis, intersection level of capacity analysis, person/vehicle throughput analysis, etc;
    b. Safety impacts (crash potential, conflicts with bikes and pedestrians);
    c. Compliance with existing standards and guidelines;
    d. Impacts to signal progression and traffic flow;
2. FDOT's requirement for roadway design considerations
    a. Roadway base and surface clearance over underground utilities;
    b. Feasibility for geometric point-of-view;
    c. Drainage analysis due to addition of impervious area;
    d. Maintenance of minimum sidewalk width requirement;
    e. Impacts to existing physical features such as existing trees, signs, structures, traffic signal poles, and utilities with possible relocations;
    f. Impacts to pedestrian curb ramps;
    g. Impacts to maintenance agreements with different entities; and,
    h. Public outreach and education efforts to support engineering improvements.

Additionally, during SAC meetings, PWWM said that they would like to see intersection specific analysis completed for TSP and queue-jump signal improvements. There is some overlap between PWWM's and FDOT's traffic engineering requirements.

5.2 COST ESTIMATES

5.2.1 CAPITAL COST ESTIMATES

Capital costs include the one-time expenditures to build a system. Capital costs for the Biscayne EBS include stations, TSP and queue-jump lane improvements, signalization and communications systems, vehicles, and right-of-way acquisition. Also included are "soft costs" for items such as engineering, construction services, insurance, and owner's costs, as well as contingencies for uncertainty in both the estimating process and the scope of the project. Some of these costs are measurable and have been included in this section. Other costs, such as right-of-way acquisition, overhead, and park-and-ride etc. are unknown and therefore reasonable estimates cannot be developed at this time.

At this early study stage, there is not sufficient definition or detail to prepare detailed construction cost estimates for the various EBS elements under consideration. Rather, the capital cost estimates were developed using representative typical unit costs or allowances on a per-unit basis that are consistent with this level of review.

Capital cost estimates for stations of two different types are included in Table 24. The desired station area, which will include a larger shelter, is estimated to cost, including contingency, around $363,000 in the current year dollars. A station with a smaller footprint is estimated to cost, including contingency, around $290,000 per station area. An intersection with northbound and southbound stations will cost between $580,000 and $726,000.

Detailed station-level estimates are provided in Table 24. Total cost for station construction along the Biscayne EBS will cost approximately $7.9 million dollars. Estimated design and engineering cost, which will be in addition to construction cost, is approximately $1.2 million dollars (Table 26).

TABLE 24: **PRELIMINARY CAPITAL COST FOR A TYPICAL STATION**

ITEM	PRELIMINARY CAPITAL COST ESTIMATES		NOTES
	Standard Station	Limited ROW Station	
Shelter	$85,000	$35,000	A pre-fabricated shelter is assumed for the limited ROW station. It is assumed to have an option for solar powered lighting.
Marker	$60,000	$60,000	
Platform	$8,500	$7,000	
Trash Receptacle and Recycling	$5,400.	$5,400	Estimate assumes $3000 for a regular receptacle, $2,400 for a recycle receptacle, includes a solar powered compacter.
Bench	$3,000	$3,000	
Landscape	$4,000	$0	Estimate assumes soft and hard landscape at and immediately adjacent to the station area
Lighting	$10,000	$10,000	Estimate includes grounding rod/mechanism for the marker, shelter lighting is built in, assumes connection to a nearby electrical line
Communication	$9,000	$9,000	Estimate assumes a connection to an existing communications line and includes a real-time bus arrival sign ($6,000 to $7,000 for each real-time sign).
Demolition, clearing, earthwork	$12,000	$12,000	Estimate includes minor street work
Site utilities, utility relocation	$12,500	$12,500	The estimate does not include major utility relocation.
Site structures, retaining walls	$10,000	$10,000	Estimate assumes grade change from the adjacent areas
Pedestrian accommodations	$10,000	$10,000	Sidewalk connections, matching existing adjacent streetscape (pavers, etc.)
Driveway, roads and parking	$15,000	$15,000	A minor item for relocating on-street parking. Driveway relocation would be much more costly but this is used as a catch-all item for such expenses
Ticket vending machine	$25,000	$25,000	A typical vending machine can cost as little as $13,000 but the cost of allowing different passes is unknown and therefore, a higher estimate is used.
STATION TOTAL	**$269,000**	**$214,000**	
Contingency	$54,000	$43,000	Assumed to be 20 percent of the estimate total.
MOT, Mobilization	$40,000	$32,000	Assumed to be 15 percent of the estimate total.
STATION TOTAL + CONTINGENCY + MOT	$363,000	$290,000	All amounts are in 2012 dollars. Amounts rounded to the nearest hundred or thousand. Estimate assumes a typical location; specific site locations may require more or less work. Estimate assumes some savings due to economies of scale.

TABLE 25: **PRELIMINARY CAPITAL COST FOR STATION IMPROVEMENTS, BY ELEMENT**

#	STATION NAME	CROSS-STREET	DIRECTION	SHELTER TYPE	MARKER	COST ESTIMATES BY STATION ELEMENT (IN 2012 DOLLARS)																
						Shelter	Marker	Platform	Trash Receptacles	Bench	Landscape	Lighting	Communication	Demolition	Utilities	Structures	Ped Imp.	Misc. Imp.	Ticket Vending Machine	Subtotal	Contingency	MOT, Mobilization	ESTIMATED TOTAL
1	Downtown Terminal		Bidirectional	N/A	N/A	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		$0	$0	$0	$0
2	Bayside Station	NE 4 Street	NB	Standard		$85,000	$60,000	$8,500	$5,400	$3,000	$4,000	$10,000	$9,000	$12,000	$12,500	$10,000	$10,000	$15,000	$25,000	$269,000	$54,000	$40,000	$363,000
			SB	Standard		$85,000	$60,000	$8,500	$5,400	$3,000	$4,000	$10,000	$9,000	$12,000	$12,500	$10,000	$10,000	$15,000	$25,000	$269,000	$54,000	$40,000	$363,000
3	Omni Terminal	NE 15 Terrace	NB	Standard		$85,000	$60,000	$8,500	$5,400	$3,000	$4,000	$10,000	$9,000	$12,000	$12,500	$10,000	$10,000	$15,000	$25,000	$269,000	$54,000	$40,000	$363,000
			SB	Standard		$85,000	$60,000	$8,500	$5,400	$3,000	$4,000	$10,000	$9,000	$12,000	$12,500	$10,000	$10,000	$15,000	$25,000	$269,000	$54,000	$40,000	$363,000
4	Midtown Miami	NE 36 Street	NB	N/A		$0	$50,000	$8,500	$5,400	$3,000	$4,000	$10,000	$9,000	$12,000	$12,500	$10,000	$10,000	$15,000	$25,000	$174,000	$35,000	$26,000	$235,000
			SB	N/A		$0	$50,000	$8,500	$5,400	$3,000	$4,000	$10,000	$9,000	$12,000	$12,500	$10,000	$10,000	$15,000	$25,000	$174,000	$35,000	$26,000	$235,000
5	Morningside	NE 54 Street	NB	Standard		$85,000	$60,000	$8,500	$5,400	$3,000	$4,000	$10,000	$9,000	$12,000	$12,500	$10,000	$10,000	$15,000	$25,000	$269,000	$54,000	$40,000	$363,000
			SB	Standard		$85,000	$60,000	$8,500	$5,400	$3,000	$4,000	$10,000	$9,000	$12,000	$12,500	$10,000	$10,000	$15,000	$25,000	$269,000	$54,000	$40,000	$363,000
6	Legion Park	NE 62 Street	NB	Standard		$85,000	$60,000	$8,500	$5,400	$3,000	$4,000	$10,000	$9,000	$12,000	$12,500	$10,000	$10,000	$15,000	$25,000	$269,000	$54,000	$40,000	$363,000
			SB	Narrow		$35,000	$60,000	$8,500	$5,400	$3,000	$0	$10,000	$9,000	$12,000	$12,500	$10,000	$10,000	$15,000	$25,000	$215,000	$43,000	$32,000	$290,000
7	Miami Gateway	NE 79 Street	NB	Narrow		$35,000	$60,000	$8,500	$5,400	$3,000	$0	$10,000	$9,000	$12,000	$12,500	$10,000	$10,000	$15,000	$25,000	$215,000	$43,000	$32,000	$290,000
			SB	Narrow		$35,000	$60,000	$8,500	$5,400	$3,000	$0	$10,000	$9,000	$12,000	$12,500	$10,000	$10,000	$15,000	$25,000	$215,000	$43,000	$32,000	$290,000
8	Miami Shores	NE 91 Street	NB	N/A			$60,000	$8,500	$5,400	$3,000	$0	$10,000	$9,000	$12,000	$12,500	$10,000	$10,000	$15,000	$25,000	$180,000	$36,000	$27,000	$243,000
			SB	N/A			$60,000	$8,500	$5,400	$3,000	$0	$10,000	$9,000	$12,000	$12,500	$10,000	$10,000	$15,000	$25,000	$180,000	$36,000	$27,000	$243,000
9	NE 108 St	NE 108 Street	NB	Narrow		$35,000	$60,000	$8,500	$5,400	$3,000	$0	$10,000	$9,000	$12,000	$12,500	$10,000	$10,000	$15,000	$25,000	$215,000	$43,000	$32,000	$290,000
			SB	Standard		$85,000	$60,000	$8,500	$5,400	$3,000	$4,000	$10,000	$9,000	$12,000	$12,500	$10,000	$10,000	$15,000	$25,000	$269,000	$54,000	$40,000	$363,000
10	San Souci	Sans Souci Boulevard	NB	Standard		$85,000	$60,000	$8,500	$5,400	$3,000	$4,000	$10,000	$9,000	$12,000	$12,500	$10,000	$10,000	$15,000	$25,000	$269,000	$54,000	$40,000	$363,000
			SB	Standard		$85,000	$60,000	$8,500	$5,400	$3,000	$4,000	$10,000	$9,000	$12,000	$12,500	$10,000	$10,000	$15,000	$25,000	$269,000	$54,000	$40,000	$363,000
11	North Miami	NE 123 Street	NB	Narrow		$35,000	$60,000	$8,500	$5,400	$3,000	$0	$10,000	$9,000	$12,000	$12,500	$10,000	$10,000	$15,000	$25,000	$215,000	$43,000	$32,000	$290,000
			SB	Narrow		$35,000	$60,000	$8,500	$5,400	$3,000	$0	$10,000	$9,000	$12,000	$12,500	$10,000	$10,000	$15,000	$25,000	$215,000	$43,000	$32,000	$290,000
12	NE 135 St	NE 135 Street	NB	Narrow		$35,000	$60,000	$8,500	$5,400	$3,000	$0	$10,000	$9,000	$12,000	$12,500	$10,000	$10,000	$15,000	$25,000	$215,000	$43,000	$32,000	$290,000
			SB	Standard		$85,000	$60,000	$8,500	$5,400	$3,000	$4,000	$10,000	$9,000	$12,000	$12,500	$10,000	$10,000	$15,000	$25,000	$269,000	$54,000	$40,000	$363,000
13	North Miami Beach	NE 146 Street	NB	Narrow		$35,000	$60,000	$8,500	$5,400	$3,000	$0	$10,000	$9,000	$12,000	$12,500	$10,000	$10,000	$15,000	$25,000	$215,000	$43,000	$32,000	$290,000
			SB	Narrow		$35,000	$60,000	$8,500	$5,400	$3,000	$0	$10,000	$9,000	$12,000	$12,500	$10,000	$10,000	$15,000	$25,000	$215,000	$43,000	$32,000	$290,000
14	NE 163 St	NE 163 Street	NB	Narrow		$35,000	$60,000	$8,500	$5,400	$3,000	$0	$10,000	$9,000	$12,000	$12,500	$10,000	$10,000	$15,000	$25,000	$215,000	$43,000	$32,000	$290,000
			SB	Standard		$85,000	$60,000	$8,500	$5,400	$3,000	$0	$10,000	$9,000	$12,000	$12,500	$10,000	$10,000	$15,000	$25,000	$265,000	$53,000	$40,000	$358,000
15	NE 183/186 St	NE 186 Street	NB	Narrow		$35,000	$60,000	$8,500	$5,400	$3,000	$0	$10,000	$9,000	$12,000	$12,500	$10,000	$10,000	$15,000	$25,000	$215,000	$43,000	$32,000	$290,000
			SB	Narrow		$35,000	$60,000	$8,500	$5,400	$3,000	$0	$10,000	$9,000	$12,000	$12,500	$10,000	$10,000	$15,000	$25,000	$215,000	$43,000	$32,000	$290,000
16	Aventura	NE 29 Place	NB	N/A	N/A	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		$0	$0	$0	$0
			SB	N/A	N/A	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		$0	$0	$0	$0
17	Aventura Terminal		Bidirectional	N/A	N/A	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		$0	$0	$0	$0
						$1,440,000	$1,660,000	$238,000	$151,200	$84,000	$52,000	$280,000	$252,000	$336,000	$350,000	$280,000	$280,000	$420,000	$700,000	$5,823,200	$1,164,640	$873,480	$7,861,000

Note: All amounts are in the current year dollars.

TABLE 26: **ESTIMATE OF ENGINEERING AND DESIGN COSTS FOR STATIONS**

ITEM	ESTIMATED COST	NOTES OR SOURCE
Survey, design, permitting, CEI for Stations	$1,179,000	It is assumed to be 15% of construction cost.

Note: All amounts are in the current year dollars

The construction costs for TSP and queue-jump improvements are expected to vary significantly by intersection. TSP improvements are estimated to cost nearly $77,000 per intersection and queue-jump lane improvements are expected to cost approximately $153,000 per intersection (Table 27). It is assumed that systems engineering tasks will be completed to allow intersection-specific improvements.

TABLE 27: **PRELIMINARY CAPITAL COST FOR TSP AND QUEUE-JUMP IMPROVEMENTS PER INTERSECTION**

ITEM	COST	NOTES / SOURCE
Queue-jump Improvements per Location	$153,000	
Pavement improvements	$50,000	Estimate assumes about a quarter mile of pavement improvements for a bus lane.
Signage	$3,000	Estimate assumes two single pole-mounted signs and two signs on mast arms.
Communications	$50,000	
Priority equipment	$6,000	The current Approved Product List does not include such system. It is based on estimate in other states.
Miscellaneous ITS Improvements	$25,000	
Markings	$9,000	Estimate assumes marking improvements in both directions.
Training	$10,000	
TSP Improvements per Location	$77,000	
Signage	$1,500	Estimate assumes two mast arm mounted signs.
Communications per signal	$50,000	
Miscellaneous ITS Improvements	$25,000	

Note: All amounts are in the current year dollars.

As discussed previously, infrastructure improvements are divided into two phases. The first phase will act as a trial or pilot case before improvements along the entire length of the corridor can be made. Phase 1 on the Biscayne EBS project is estimated to cost nearly $768,000 and Phase 2 is estimated to cost nearly $2.7 million (Table 28).

TABLE 28: **PRELIMINARY CAPITAL COST FOR TSP AND QUEUE-JUMP IMPROVEMENTS BY PHASE**

ITEM	NUMBER	ENGINEERING COST PER INTERSECTION	TOTAL	NOTES / SOURCE
Phase 1			$768,000	
Queue-jump Lanes	2	$153,000	$306,000	At NE 36 Street and NE 186 Street
TSP Improvements	6	$77,000	$462,000	At locations identified in Table 23.
Phase 2			$2,680,000	
Queue-jump Lanes	15	$153,000	$2,295,000	The number for Phase 2 is undetermined and depends on the results of Phase 1. Total 15 locations are assumed.
TSP Improvements	5	$77,000	$385,000	At locations identified in Table 23.
TOTAL			$3,448,000	

Note: All amounts are in the current year dollars.

As mentioned previously, FDOT and PWWM have specified a number of requirements to evaluate feasibility of TSP and queue-jump lanes. Costs for preliminary engineering were estimated to be $25,000 per for signals and additional $30,000 for design, if a queue-jump lane is proposed (Table 29).

TABLE 29: **ESTIMATE OF ENGINEERING AND DESIGN COSTS PER INTERSECTION**

ITEM	COST PER INTERSECTION	NOTES OR SOURCE
Preliminary Traffic Engineering per Intersection (TSP and Queue-jump Intersections)	$25,000	The level of detail expected by FDOT and PWWM is not available in sufficient detail to develop more reliable estimates. For instance, data collection per intersection can vary from $5,000 to $10,000. It is expected that analysis using VISSM will cost a minimum of $15,000 to $20,000 per intersection. This does not include analysis required to measure the impact of signal improvements on signal progression which is undefined.
Preliminary Design Analysis per Intersection (Queue-jump Intersections Only)	$30,000	This is based on limited available information and includes costs for data collection (e.g. as-built plans), utility identification and impact analysis (to pedestrians, drainage, etc.).

Note: All amounts are in the current year dollars.

Total engineering costs for the Phase 1 of the Biscayne EBS project are expected to be nearly $260,000 and approximately $950,000 for Phase 2 (Table 30). These are preliminary estimates and significant cost savings can be achieved if a corridor-level analysis is performed. Intersection-specific studies are expected to require higher costs.

TABLE 30: **ESTIMATE OF ENGINEERING AND DESIGN COSTS BY PHASE**

ITEM	NUMBER	ENGINEERING COST PER INTERSECTION	TOTAL	NOTES / SOURCE
Phase 1			$260,000	
Queue-jump Lanes	2	$55,000	$110,000	At NE 36 Street and NE 186 Street
TSP Improvements	6	$25,000	$150,000	At locations identified in Table 23.
Phase 2			$950,000	
Queue-jump Lanes	15	$55,000	$825,000	The number for Phase 2 is undetermined and depends on the results of Phase 1. Total 15 locations are assumed.
TSP Improvements	5	$25,000	$125,000	At locations identified in Table 23.
TOTAL			$1,210,000	

Note: All amounts are in the current year dollars.

MDT recently purchased New Flyer articulated buses and provided $1 million as an estimate for procurement cost (Table 31). The estimate includes costs of TSP and APC hardware, wi-fi equipment, and decal installation.

TABLE 31: **PRELIMINARY CAPITAL COST FOR VEHICLES**

ITEM	COST	NOTES OR SOURCE
Number of Vehicles Needed	18	Total 12 vehicles are needed for Phase 1 and the remaining to implement Phase 2.
Cost per Vehicle	$1,000,000	60-foot New Flyer. Includes cost of decal installation, wi-fi, TSP hardware. Source: MDT.
Total Capital for Vehicle Procurement	$18,000,000	

Note: All amounts are in the current year dollars.

If the agency seeks to acquire right-of-way for stations and seeks to use Federal funds, then detailed environmental analysis will be required. It is estimated that the cost of such analysis will be approximately $50,000 for the entire corridor (Table 32). This is based on HNTB's recent experience on a similar project for MDT.

TABLE 32: **ESTIMATE OF ENVIRONMENTAL ANALYSIS**

ITEM	COST PER INTERSECTION	NOTES OR SOURCE
Environmental Analysis	$50,000	Environmental analysis for the entire corridor, assumed to be required for Federal participation. Based on a recent study conducted for MDT.

Note: All amounts are in the current year dollars.

In total, Phases 1 and 2 of the Biscayne EBS project are estimated to cost around $32 million. This is consistent with similar projects across the country where costs have ranged from $28 million to close to $50 million. It is noteworthy that there are a number of unknown factors and these preliminary estimates should be used for order-of-magnitude estimation purposes only. The costs for park-and-ride/kiss-and-ride lots are not included in this estimate.

TABLE 33: **ESTIMATED TOTAL PROJECT COST**

ITEM	ESTIMATE TOTAL AMOUNTS
Vehicles	$18,000,000
Station	
Construction	$7,861,320
Survey, Design, Permitting, CEI	$1,179,198
Infrastructure (Phase 1)	
Construction	$768,000
Preliminary Design and Traffic Eng.	$260,000
Infrastructure (Phase 2)	
Construction	$2,680,000
Preliminary Design and Traffic Eng.	$950,000
Environmental	$50,000
Total Estimated Project Capital Cost	$31,748,518

Note: All amounts are in the current year dollars.

Different elements of the Biscayne EBS project are expected to be completed at different points in time. For instance, vehicle procurement, which typically takes a couple of years, is expected to be completed by FY 2014. MDT, in May 2012, entered in a Joint Participation Agreement (JPA) with FDOT, which will allow the agency to get matching funds through the State Transit Corridor Program. The agency, with matching funds, has a committed funding to the tune of $18,000,000 for vehicle procurement. The remaining elements of the projects are unfunded at this point. It is expected that the agency can utilize CITT funds for a portion of the project. Additional JPAs, especially for O&M costs through FDOT's Transit Service Development Program remain a possibility for the first three years of the EBS service.

It is assumed that Phase 1 infrastructure improvements (TSP and queue-jump lanes) will be completed by FY 2015. Phase 1 will act as a pilot case and therefore, Phase 2 is estimated to be completed by FY 2017.

TABLE 34: **FUNDING SHORTFALL / SURPLUS**

	BASE YEAR (REFERENCE ONLY)	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018
Assumed Inflation		2%	2%	2%	2%	2%	2%	2%
ESTIMATED CAPITAL COST								
Stations								
Construction	$7,861,000				$8,342,000			
Survey, Design, Permitting, CEI	$1,179,000			$1,227,000				
Infrastructure (Phase 1)								
Construction	$768,000				$815,000			
Preliminary Design and Traffic Eng.	$260,000			$271,000				
Infrastructure (Phase 2)								
Construction	$2,680,000							$3,018,000
Preliminary Design and Traffic Eng.	$950,000						$1,049,000	
Vehicles	$18,000,000	$0	$0	$0	$18,000,000			
Environmental Documentation	$50,000		$50,000					
AVAILABLE FUNDING								
Stations								
Infrastructure (Phase 1)								
Infrastructure (Phase 2)								
Vehicles (FDOT contribution + MDT match)		$1,056,000	$13,083,000	$3,861,000				
Environmental Documentation								
FUNDING SHORTFALL / SURPLUS								
Stations				($1,227,000)	($8,342,000)			
Infrastructure (Phase 1)				($271,000)	($815,000)			
Infrastructure (Phase 2)							($1,049,000)	($3,018,000)
Vehicles		$1,056,000	$14,139,000	$18,000,000				
Environmental Documentation			($50,000)					

Note: All amounts in the year of expenditure dollars.

5.2.2 OPERATIONS AND MAINTENANCE COST ESTIMATES

O&M cost estimates incorporate costs that are anticipated for general bus operations and maintenance, and additional costs related to station maintenance. Signal and roadway maintenance costs will be assumed by respective owner agencies, PWWM and FDOT.

Service variables driving the cost model include vehicle miles and the maximum number of buses in service during the peak and off-peak periods. Discontinuation of Route 93 is expected to yield some savings. According to MDT, each vehicle in service is estimated to have an O&M cost of $1.74 per mile. Therefore, savings for an average weekday are estimated to be approximately $2,500, which amounts to $636,000 in annual O&M savings (Table 35).

TABLE 35: **ESTIMATED O&M SAVINGS DUE TO DISCONTINUATION OF ROUTE 93**

	ESTIMATED O&M COST BY HOUR															
	Hour 1	Hour 2	Hour 3	Hour 4	Hour 5	Hour 6	Hour 7	Hour 8	Hour 9	Hour 10	Hour 11	Hour 12	Hour 13	Hour 14	Deadhead	Total
	Morning Peak Period			Mid-day Off-peak Period						Afternoon Peak Period						
Number of Vehicles	9	9	9	6	6	6	6	6	6	9	9	9	9	9	9	
Miles per Hour Per Vehicle	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	
Route Miles Per Hour	111.6	111.6	111.6	74.4	74.4	74.4	74.4	74.4	74.4	111.6	111.6	111.6	111.6	111.6	111.6	
Vehicle O&M Savings per Mile	$1.74	$1.74	$1.74	$1.74	$1.74	$1.74	$1.74	$1.74	$1.74	$1.74	$1.74	$1.74	$1.74	$1.74	$1.74	
Route Operations Savings per Hour	$194	$194	$194	$129	$129	$129	$129	$129	$129	$194	$194	$194	$194	$194	$194	$2,524
Weekdays per Year																252
Vehicle O&M Savings per Year																$636,00 0

Note: All amounts are in the current year dollars.

Phase 1 of the Biscayne EBS project is estimated to have a total of 10 buses during peak periods. According to MDT, each New Flyer vehicle is estimated to have an O&M cost of $1.24 per mile. Therefore, the O&M cost per weekday is estimated to be nearly $2,300 and an annual O&M cost estimated to be nearly $577,000. Phase 2 of the project will utilize 15 vehicles during peak periods and 10 vehicles during off-peak periods resulting in an average weekday O&M cost of $3,400 and an annual O&M cost of nearly $850,000 (Table 36).

TABLE 36: **ESTIMATED O&M COST FOR THE PROPOSED SERVICE BY PHASE**

	ESTIMATED O&M COST BY HOUR															
	Hour 1	Hour 2	Hour 3	Hour 4	Hour 5	Hour 6	Hour 7	Hour 8	Hour 9	Hour 10	Hour 11	Hour 12	Hour 13	Hour 14	Deadhead	Total
PHASE 1	Morning Peak Period			Mid-day Off-peak Period						Afternoon Peak Period						
Number of Vehicles	10	10	10	7	7	7	7	7	7	10	10	10	10	10	10	
Miles per Hour Per Vehicle	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	
Route Miles Per Hour	140	140	140	98	98	98	98	98	98	140	140	140	140	140	140	
Vehicle O&M Cost per Mile	$1.24	$1.24	$1.24	$1.24	$1.24	$1.24	$1.24	$1.24	$1.24	$1.24	$1.24	$1.24	$1.24	$1.24	$1.24	
Route Operations Cost per Hour	$174	$174	$174	$122	$122	$122	$122	$122	$122	$174	$174	$174	$174	$174	$174	$2,292
Weekdays per Year																252
Vehicle O&M Cost per Year																$577,000
PHASE 2	Morning Peak Period			Mid-day Off-peak Period						Afternoon Peak Period						
Number of Vehicles	15	15	15	10	10	10	10	10	10	15	15	15	15	15	15	
Miles per Hour Per Vehicle	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	
Route Miles Per Hour	210	210	210	140	140	140	140	140	140	210	210	210	210	210	210	
Vehicle O&M Cost per Mile	$1.24	$1.24	$1.24	$1.24	$1.24	$1.24	$1.24	$1.24	$1.24	$1.24	$1.24	$1.24	$1.24	$1.24	$1.24	
Route Operations Cost per Hour	$260	$260	$260	$174	$174	$174	$174	$174	$174	$260	$260	$260	$260	$260	$260	$3,385
Weekdays per Year																252
Vehicle O&M Cost per Year																$853,000

Note: All amounts are in the current year dollars.

The EBS service is assumed to start in FY 2016. With an assumed two percent annual inflation rate, the service is estimated to cost $626,000 in its first year. However, due to savings resulting from the discontinuation of Route 93, the agency is estimated to have net savings in the initial years. Station maintenance costs are assumed to be 10 percent of total construction cost per year. A detailed 10-year O&M cost schedule is included in Table 37.

TABLE 37: ESTIMATED PROJECT O&M SAVINGS COSTS PER YEAR

		ESTIMATED PROJECT O&M COST PER YEAR											
	Base Year (Reference only)	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Assumed Inflation		2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Vehicle O&M Cost (Phase 1)	$577,000					$625,000	$638,000	$651,000	$664,000				
Vehicle O&M Cost (Phase 2)	$853,000									$999,000	$1,019,000	$1,039,000	$1,060,000
Vehicle O&M Savings (Rt 93 Discontinuation)	$636,000					$688,427	$702,195	$716,239	$730,564	$745,175	$760,079	$775,280	$790,786
Net Change in O&M Cost per Year						$63,427	$64,195	$65,239	$66,564	($253,825)	($258,921)	($263,720)	($269,214)
Station Maintenance Cost (10% of construction)	$786,000					$850,792	$867,808	$885,164	$902,867	$920,924	$939,343	$958,130	$977,292
Total O&M Expenditure			$0	$0	$0	$1,475,792	$1,505,808	$1,536,164	$1,566,867	$1,919,924	$1,958,343	$1,997,130	$2,037,292
Net O&M Expenditure (Excluding savings)	($636,000)		$0	$0	$0	$787,365	$803,612	$819,924	$836,303	$1,174,749	$1,198,264	$1,221,849	$1,246,506

Note: All amounts in the year of expenditure dollars.

Section 6

RECOMMENDATIONS

Improvements to transit services and infrastructure need to fit under the current policy framework. A number of changes need to occur to make the Biscayne EBS project a success and a template for similar future endeavors. Some of the key issues are discussed and preliminary recommendations are provided in this section.

6.1 ULTIMATE CONFIGURATION

As mentioned previously, the Biscayne EBS is envisioned as the first step towards a potential BRT service with dedicated lanes along the entire, or a portion of Biscayne Boulevard. Towards that end, a preliminary, sketch level planning exercise was conducted to identify availability of right-of-way for such an effort. Preliminary drawings are included as Appendix 5. Bus-only lanes are certainly feasible in some areas, and should be considered for any future resurfacing efforts.

6.2 LEVEL BOARDING

Level boardings were discussed during Biscayne EBS SAC meetings. However, right-of-way restrictions at most stations areas did not permit its inclusion in station area design. Also, platform ramps for level boarding can add significant length to the station area, affecting parking and driveways.

However, it is recommended that all future park-and-ride sites, terminals, and designated Transit Centers include level boarding. These areas typically observe heavy passenger volumes and, while travel time savings may not be achieved, the initiative can potentially improve fleet utilization. Often, level boarding is implemented using a combination of low-floor vehicles and raised platforms, as well as sophisticated guidance equipment.

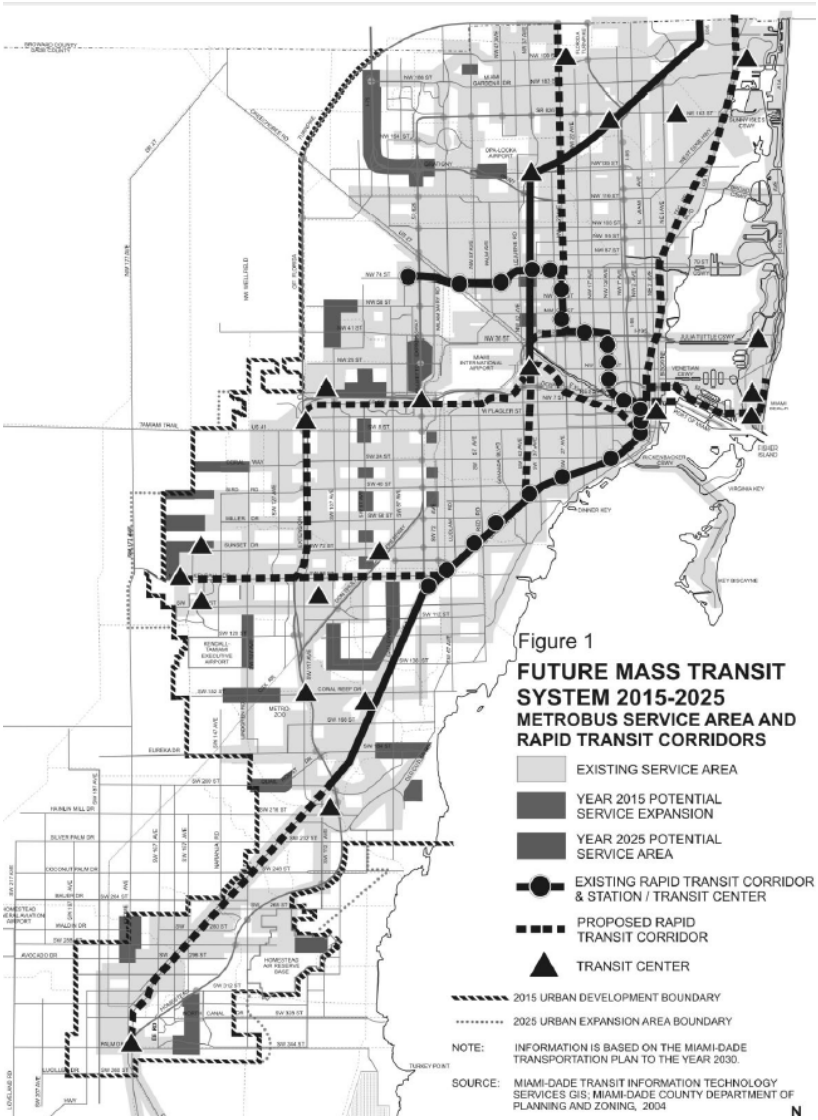
6.3 TERMINALS

Currently Aventura Mall and the Government Center stop are designated terminals along Route 93. However, these two facilities lack infrastructure and amenities of a terminal. It is recommended that designated terminals with adequate facilities are provided to ensure services for transit patrons as well as for drivers.

6.4 LAND USE AND ZONING POLICIES

A majority of the Biscayne Corridor lies within municipalities, and therefore, land use and zoning policies vary along the corridor. However, they are still under the umbrella of the County's Comprehensive Development Master Plan (CDMP). Miami-Dade Regulatory and Economic Resources (RER) were a member agency on the SAC and provided information on its adopted and planned policy initiates. The Transportation Element of the adopted CDMP includes a number of policy objectives that support the planned EBS services, including the one along Biscayne Boulevard. Some of the key policy objectives are: TE-1F, TE-2D, TE-3B, TE-6D, MT-8B, and MT-8C, to list a few.

FIGURE 46: **FUTURE MASTER TRANSIT SYSTEM INCLUDED IN THE COUNTY'S CDMP**



The adopted policy objective MT-2B states, "The area surrounding future rapid transit stations not yet sited and depicted on the Land Use Plan map shall be designed and developed, at a minimum, as community urban centers, containing land use and development designs that promote transit use as defined in the Land Use Element." Aventura Mall, the northern terminus of the Biscayne EBS, and the Downtown Terminal, the southern terminus of the Biscayne EBS, are designated transit centers.

This is an encouraging start for the Biscayne EBS project. The Biscayne EBS project is also depicted on the Future Master Transit System Map (Figure 46). The next logical step is to designate stations and urban centers along the Biscayne EBS route. Therefore, it is recommended that the stations recommended as part of this effort be designated such in the next Evaluation and Appraisal Report (EAR) cycle. Based on the existing trip and passenger characteristics, it is also recommended to evaluate the intersection of Biscayne Boulevard and NE 79th Street as a potential transit center.

While land use planning is an important component, zoning changes at the local level will also be needed. It is recommended that MDT, in close coordination with the RER, spearhead that effort. A majority of the proposed route alignment is within the City of Miami's jurisdiction. The City of Miami's Miami 21 includes a number of transit-supportive development regulations. However, it is recommended that the Biscayne Corridor should be closely evaluated and the appropriate changes should be made.

6.5 URBAN FORM AND DESIGN

Integrating transit- and pedestrian-oriented design around transit stations is critical for transit riders to feel comfortable making last-mile connections from the station to their destination. Efforts similar to Miami 21, a form-based code, are needed for areas along the Biscayne Boulevard Corridor.

All transit riders walk for some portion of their trip. As discussed previously, an overwhelmingly large percentage of existing transit riders along Biscayne Boulevard walk to a bus stop. Therefore, pedestrian and bicycle access enhancements at and near station areas are recommended. This includes wider sidewalks, pedestrian signals, crosswalks at all legs of the nearest intersection (currently missing at some intersections), measures to eliminate or reduce pedestrian – motorist conflicts such as right-turn restrictions, and signalized mid-block crosswalks are recommended.

6.6 COORDINATION WITH OTHER AGENCIES

Broward County Transit (BCT) is planning an enhanced bus service along Biscayne Boulevard. The agency also has other services that end at Aventura Mall. Further coordination with BCT is recommended to ensure system connectivity.

6.7 MONITORING PROGRAM

It is recommended that a monitoring program to identify impacts of TSP, queue-jump and by-pass lanes, and other service improvements is developed. The purpose would be to use the recommended improvements as the base to continually enhance the proposed service.

6.8 MARKETING CAMPAIGN

A marketing campaign at the time of the launch is recommended to create awareness of the EBS and its features. MDT has successfully conducted campaigns for 95 Express, Kendall Cruiser and some other services. Similar strategies should be deployed at launch of this service.

6.9 COMMUNITY OUTREACH

The key to the success of the brand plan is community outreach to increase awareness of the service and its unique features. Biscayne EBS specific measures are recommended to be included in the MPO's Public Participation Plan. The Biscayne EBS specific measures are also recommended to be included in MDT's Public Involvement Initiative Plan. These efforts may include:

1. Offering free trial and tourist passes;
2. Contacting major employers and universities along the route;
3. Conducting transit specific marketing and branding campaigns; and,
4. Building partnerships with local associations through South Florida Commuter Services.

APPENDIX 1: **STUDY ADVISORY COMMITTEE MEMBERS**

AGENCY	CONTACT	E-MAIL	PHONE
MPO	Larry Foutz	lfoutz@miamidade.gov	305-375-1522
MPO	Jesus Guerra	jdgr@miamidade.gov	305-375-2069
MDT	Bob Pearsall	rpear@miamidade.gov	786-469-5163
MDT	Monica Cejas	mcejas@miamidade.gov	786-469-5290
MDT	Nilia Cartaya	cartayn@miamidade.gov	786-469-5283
CITT	Kelly Cooper	kcooper@miamidade.gov	305-375-1357
FDOT	Ed Carson	edward.carson@dot.state.fl.us	305-470-5255
FDOT	Aileen Boucle	aileen.boucle@dot.state.fl.us	305-470-5201
MD-PWWM	Rolando Jimenez	rjimen@miamidade.gov	
RER	Napoleon Somoza	NVS@miamidade.gov	
RER	Shailendra Singh	singhs@miamidade.gov	
City of North Miami Beach	Shari Kamali	shari.kamali@citynmb.com	305-948-2983
City of Miami	Lilia Medina	limedina@miamigov.com	305.416.1080
City of Miami	Carlos Cruz-Casas	cruz-casas@miamigov.com	305-416-1092
City of North Miami	John O' Brien	jobrien@northmiamifl.gov	
City of Aventura	Joanne Carr	carrj@cityofaventura.com	305-466 8943
City of Miami Shores	David Dacquisto	DacquistoD@miamishoresvillage.com	

APPENDIX 2: **OPERATIONS AND MAINTENANCE COSTS BY VEHICLE TYPE (SOURCE: MDT)**

FLEET TYPE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	FYTD AVG
Gillig DEF										$0.79	$1.01		$0.90
Gillig 10	$1.13	$1.06	$1.00	$1.02	$1.02	$1.03	$0.98	$0.97	$0.79	$1.46	$1.26		$1.07
MCI 06	$1.78	$1.92	$1.38	$1.51	$1.86	$1.84	$1.51	$1.63	$2.16	$1.88	$1.75		$1.75
NABI 00	$1.81	$1.92	$1.38	$1.89	$1.78	$1.99	$1.78	$1.72	$1.83	$1.89	$1.80		$1.80
NABI 02	$1.69	$1.33	$1.31	$1.37	$1.72	$1.65	$1.57	$1.62	$1.54	$1.53	$1.66		$1.54
NABI 03	$1.62	$1.81	$1.55	$1.61	$1.79	$1.79	$1.84	$1.64	$1.50	$1.95	$1.74		$1.71
NABI 04	$2.19	$2.03	$1.89	$1.87	$1.98	$1.84	$1.80	$1.66	$1.55	$1.68	$1.78		$1.84
NABI 05	$1.95	$1.79	$1.57	$1.62	$1.76	$1.72	$1.76	$1.61	$1.59	$1.91	$1.86		$1.74
NABI 06	$1.81	$1.41	$1.42	$1.59	$1.78	$1.58	$1.69	$1.54	$1.40	$1.79	$1.69		$1.61
NABI 99	$1.76	$1.81	$1.64	$1.75	$1.82	$1.88	$1.93	$1.65	$1.70	$1.65	$1.83		$1.76
NABI HYBRID	$1.20	$1.17	$0.90	$0.94	$0.99	$1.09	$1.09	$0.94	$0.85	$1.14	$1.15		$1.04
NEW FLYER	$1.15	$1.14	$0.89	$1.02	$1.06	$1.24	$1.13	$1.08	$1.05	$1.17	$1.24		$1.11
OPTIMA 07	$1.94	$1.93	$1.78	$1.87	$2.08	$2.31	$2.11	$1.63	$1.72	$2.00	$1.95		$1.94

APPENDIX 3: ENGINEERING REQUIREMENTS FOR TSP AND QUEUE-JUMP/BY-PASS LANE CONSIDERATIONS SPECIFIED BY FDOT

Jitender Ramchandani

From: Carson, Edward <Edward.Carson@dot.state.fl.us>
Sent: Monday, July 23, 2012 11:17 AM
To: Jitender Ramchandani; 'lfoutz@miamidade.gov'
Cc: Boucle, Aileen; Tavella, Chris
Subject: FW: MPO Biscayne EBS - Potential Locations for Queue Jumpers
Attachments: BusesMakeTheJump.pdf; 36_St.pdf; 62_St.pdf

Jitender & Larry: Please see the input in red below from the D6 District Design Engineer on the Biscayne EBS project study you are conducting. EdC.

Ed Carson
Transit Programs Administrator
INTERMODAL SYSTEMS PLANNING OFFICE
FLORIDA DEPARTMENT OF TRANSPORTATION- DISTRICT SIX
ADAM LEIGH CANN BUILDING
1000 NW 111th AVENUE - ROOM 6111
MIAMI, FL 33172
TEL: 305-470-5255
FAX: 305-470-5205
E-MAIL: edward.carson@dot.state.fl.us

From: Tavella, Chris
Sent: Sunday, July 22, 2012 5:26 PM
To: Carson, Edward
Cc: Boucle, Aileen; Bustamante, Javier; Bjorneboe, David; Iglesias, Daniel; Tuli, Vinod; Nunez, Pedro; Maarouf, Khalil; Meitin, Omar; Alonso, Pablo
Subject: RE: MPO Biscayne EBS - Potential Locations for Queue Jumpers

Ed:

Please forward my comments to those involved.

- Design: If a right-turn lane is present, then it can be utilized for turning vehicle movement and, for through transit vehicle movement. The Department will have to allow such usage and we would like to know what the Design section would like to see towards that. Typically, such cases do not require design modifications and are the easiest to implement (assuming traffic considerations work out and storage length is sufficient). If a right-turn lane does not exist then one will have to be put in. The design for such lanes (i.e. storage capacity) is typically dependent on traffic analysis. It is like design of an auxiliary lane and we would like to confirm that such lanes will be treated like auxiliary lanes. There may be unique conditions that may require a little more detailed geometric analysis. We would like to confirm the design section's expectations.

The Design Office would not object to the use of right turn lanes by buses for queue jumping on Biscayne Blvd. If an existing right turn lane is not present, then a new right turn lane shall be designed based on FDOT's PPM using new construction criteria. The width of the right turn lane shall be based on Table 2.1.1., with the auxiliary lane as wide as practical, up to 12 feet; however an 11 feet and possibly a 10 feet width might be justified if certain conditions exists. Since designing a new right turn lane creates a new curb line, a bike lane must be considered and a design variation justified if not provided as per Chapter 8 of the PPM and Florida Statutes.
Other concerns due to a new right turn lane are:

- Drainage (additional impervious area, spread, and low points)
- sidewalk width (6 feet minimum adjacent to a curb),
- back of sidewalk elevations (tie down or handrails),

- existing trees, signs, structures, traffic signal poles, and utilities with possible relocations and associated minimum horizontal clearance requirements,
- pedestrian curb ramps,
- decorative crosswalks and maintenance agreements,
- roadway base and surface clearance over underground utilities
- the pavement design for the right turn lane must match or exceed the pavement thickness and structural strength of the existing pavement,
- RW acquisition

In addition, a design variation for exceeding the maximum deflection for a through lane through an intersection must be documented.

NE 36th Street already has right turn lanes on Biscayne Blvd in both directions. Why does the attached exhibit show changes in the curb line?

Sincerely,

Chris Tavella, PE
District Design Engineer
Florida Department of Transportation - District 6
Adam Leigh Cann Building
1000 NW 111th Avenue - Room 6102-A
Miami, FL 33172
office (305) 470-5103 fax (305) 470-5380
e-mail: Chris.Tavella@dot.state.fl.us

From: Meitin, Omar
Sent: Friday, July 20, 2012 4:58 PM
To: Carson, Edward; Nunez, Pedro; Maarouf, Khalil
Cc: Boucle, Aileen; Tavella, Chris; Bustamante, Javier; Bjorneboe, David
Subject: RE: MPO Biscayne EBS - Potential Locations for Queue Jumpers

FYI - Attached is information on the pilot program which is going to **run for 2 weeks only** in D4. The pilot will be taking place at one intersection SR 7 and Prospect Road.

Omar M. Meitin, P.E.
District Traffic Operations Engineer
1000 NW 111th Avenue
Miami, Florida 33172
(305) 470-5335
Fax: (305) 470-5815

From: Carson, Edward
Sent: Friday, July 20, 2012 11:27 AM
To: Nunez, Pedro; Maarouf, Khalil
Cc: Boucle, Aileen; Tavella, Chris; Bustamante, Javier; Meitin, Omar; Bjorneboe, David
Subject: FW: MPO Biscayne EBS - Potential Locations for Queue Jumpers

Pedro and Khalil: Here is the input the MPO is requesting from the Department on locations we feel queue jumpers will work. I have copied Design and ROW as it appears their input will also be needed. Thank you. EdC.

Ed Carson

Transit Programs Administrator
INTERMODAL SYSTEMS PLANNING OFFICE
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E-MAIL: edward.carson@dot.state.fl.us

From: Jitender Ramchandani [mailto:jramchandani@HNTB.com]
Sent: Thursday, July 19, 2012 8:22 AM
To: Carson, Edward
Cc: 'lfoutz@miamidade.gov'; Boucle, Aileen
Subject: RE: MPO Biscayne EBS - Potential Locations for Queue Jumpers

Hi Ed,

We are working on an implementation plan so at this point the first thing we have to confirm is that the District's will allow queue jumpers on Biscayne and on some other corridors. As Larry mentioned, District Four recently implemented a pilot queue jump project along State Road 7.

A queue jumper typically has two components: a dedicated curb-side lane (which is also often shared with turning vehicles) and a dedicated signal phase. Typically agencies go through the following steps:

- Traffic Analysis: Buses will most likely have a protected phase in a typical signal cycle. Therefore, typically owner agencies are interested in determining the impact of signal timing changes through queuing analysis, intersection level of capacity analysis, person/vehicle throughput analysis, etc. To accomplish that one may have to do 24-hour counts, turn movement counts, may be queuing observations, bike-ped counts, and some micro-simulation analysis using that data. These are typical considerations but some owner agencies do not require transit agencies to go through such lengthy and costly process for each intersection. We would like to know the level of analysis expected by the department.

- Design: If a right-turn lane is present, then it can be utilized for turning vehicle movement and, for through transit vehicle movement. The Department will have to allow such usage and we would like to know what the Design section would like to see towards that. Typically, such cases do not require design modifications and are the easiest to implement (assuming traffic considerations work out and storage length is sufficient). If a right-turn lane does not exist then one will have to be put in. The design for such lanes (i.e. storage capacity) is typically dependent on traffic analysis. It is like design of an auxiliary lane and we would like to confirm that such lanes will be treated like auxiliary lanes. There may be unique conditions that may require a little more detailed geometric analysis. We would like to confirm the design section's expectations.

- ROW: Once an approval has been granted and a design is finalized, your ROW section will be involved in acquisition, if any. Of course, MDT will be involved in all these phases in the coming years.

- Construction: A typical MOT is expected.

Some practical issues can be expected during this process. From what I know, there are no approved products for bus signals and a typical equipment approval process is lengthy. District Four did their project as a pilot project and for which, I believe, they received a temporary permit. Secondly, new equipment increases the load on mast arm so structural calculations have to be done to confirm that the load will be within the range. These issues are out in the future. At this point we just have to know the next steps expected by the Department because they will have an impact on the costs and schedules of such express bus projects – two items that we have to develop as part of our study. The actual work outlined above and/or by the Department may or may not be done as part of our study.

Please let me know if I missed anything.

Thank you,

- Jitender

From: Carson, Edward [mailto:Edward.Carson@dot.state.fl.us]
Sent: Wednesday, July 18, 2012 1:09 PM
To: Jitender Ramchandani
Cc: 'lfoutz@miamidade.gov'; Boucle, Aileen
Subject: RE: MPO Biscayne EBS - Potential Locations for Queue Jumpers

Jitender: Traffic Operations staff is asking me what specific areas you want comments on. Thanks. EDC.

Ed Carson
Transit Programs Administrator
INTERMODAL SYSTEMS PLANNING OFFICE
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E-MAIL: edward.carson@dot.state.fl.us

From: Jitender Ramchandani [mailto:jramchandani@HNTB.com]
Sent: Monday, July 16, 2012 2:41 PM
To: Carson, Edward
Cc: 'lfoutz@miamidade.gov'; Boucle, Aileen
Subject: Re: MPO Biscayne EBS - Potential Locations for Queue Jumpers

Hi Ed,

Thank you. We are evaluating other locations and will have those to you soon. We want to get a few more opinions on those ones. The list below would be a good place to start the discussion as conceptually its the same idea.

Regards,

- Jitender

Sent from a mobile device

From: Carson, Edward [mailto:Edward.Carson@dot.state.fl.us]
Sent: Monday, July 16, 2012 11:56 AM
To: Jitender Ramchandani
Cc: lfoutz@miamidade.gov <lfoutz@miamidade.gov>; Boucle, Aileen <Aileen.Boucle@dot.state.fl.us>
Subject: RE: MPO Biscayne EBS - Potential Locations for Queue Jumpers

Jitender: The list provided only has eight locations. What are the other locations? Thanks. EdC.

Ed Carson
Transit Programs Administrator
INTERMODAL SYSTEMS PLANNING OFFICE
FLORIDA DEPARTMENT OF TRANSPORTATION- DISTRICT SIX

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FAX: 305-470-5205
E-MAIL: edward.carson@dot.state.fl.us

From: Jitender Ramchandani [mailto:jramchandani@HNTB.com]
Sent: Friday, July 13, 2012 1:39 PM
To: Carson, Edward
Cc: lfoutz@miamidade.gov
Subject: MPO Biscayne EBS - Potential Locations for Queue Jumpers

Good afternoon, Ed,

Thanks again for making time to discuss this effort. There are about 70 signalized intersections along Biscayne Boulevard. We are looking at about 10-11 locations for potential queue jumpers. The top ones are listed in the table below. To start the discussion, I have attached two preliminary sketches for your information. Due to the file size restriction, I will have to send the third sketch in my next email. These are preliminary sketches based on some readily available data.

Cross Street	Number of Lanes			Average Vol	
	Biscayne	Cross Street (East)	Cross Street (West)	Biscayne	Cross Stree
NE 36 St	5	2	4	39,000	
NE 38 St	5	2	2	30,500	
NE 62 St	4	2	2	37,500	N.A. (Loca
NE 123 St	4 Southside/6 Northside	4	4	52,000	
NE 186/185 St	8	4	6	76,500	N.A. (Loca
NE 191 St	8	4	Doesn't Continue	76,500	N.A. (Loca
NE 195 St	8	4		76,500	N.A. (Mall E
NE 196 St	8	4		76,500	N.A. (Mall E

Please let us know your thoughts.

Thank you,

Jitender Ramchandani, AICP
Senior Transportation Planner
HNTB Corporation
Tel (305) 551-8100
Direct: (305) 222-1499
Fax (305) 551-2800
jramchandani@hntb.com
www.hntb.com

Jitender Ramchandani

From: Carson, Edward <Edward.Carson@dot.state.fl.us>
Sent: Monday, July 16, 2012 3:12 PM
To: Jitender Ramchandani
Cc: 'lfoutz@miamidade.gov'; Boucle, Aileen
Subject: RE: MPO Biscayne EBS - Potential Locations for Queue Jumpers

Jitender: I have forwarded the information you sent me to Traffic Operations, Internal Design & ROW. EdC.

Ed Carson
Transit Programs Administrator
INTERMODAL SYSTEMS PLANNING OFFICE
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E-MAIL: edward.carson@dot.state.fl.us

From: Jitender Ramchandani [mailto:jramchandani@HNTB.com]
Sent: Monday, July 16, 2012 2:41 PM
To: Carson, Edward
Cc: 'lfoutz@miamidade.gov'; Boucle, Aileen
Subject: Re: MPO Biscayne EBS - Potential Locations for Queue Jumpers

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Sent: Monday, July 16, 2012 11:56 AM
To: Jitender Ramchandani
Cc: lfoutz@miamidade.gov <lfoutz@miamidade.gov>; Boucle, Aileen <Aileen.Boucle@dot.state.fl.us>
Subject: RE: MPO Biscayne EBS - Potential Locations for Queue Jumpers

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Ed Carson
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E-MAIL: edward.carson@dot.state.fl.us

From: Jitender Ramchandani [mailto:jramchandani@HNTB.com]
Sent: Friday, July 13, 2012 1:39 PM
To: Carson, Edward
Cc: lfoutz@miamidade.gov
Subject: MPO Biscayne EBS - Potential Locations for Queue Jumpers

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Thanks again for making time to discuss this effort. There are about 70 signalized intersections along Biscayne Boulevard. We are looking at about 10-11 locations for potential queue jumpers. The top ones are listed in the table below. To start the discussion, I have attached two preliminary sketches for your information. Due to the file size restriction, I will have to send the third sketch in my next email. These are preliminary sketches based on some readily available data.

Cross Street	Number of Lanes			Average Volume	
	Biscayne	Cross Street (East)	Cross Street (West)	Biscayne	Cross Street (East)
NE 36 St	5	2	4	39,000	21,500
NE 38 St	5	2	2	30,500	27,202
NE 62 St	4	2	2	37,500	N.A. (Local Street)
NE 123 St	4 Southside/6 Northside	4	4	52,000	20,100
NE 186/185 St	8	4	6	76,500	N.A. (Local Street)
NE 191 St	8	4	Doesn't Continue	76,500	N.A. (Local Street)
NE 195 St	8	4		76,500	N.A. (Mall Entrance)
NE 196 St	8	4		76,500	N.A. (Mall Entrance)

Please let us know your thoughts.

Thank you,

Jitender Ramchandani, AICP
Senior Transportation Planner
HNTB Corporation
Tel (305) 551-8100
Direct: (305) 222-1499
Fax (305) 551-2800
jramchandani@hntb.com
www.hntb.com

Jitender Ramchandani

From: Carson, Edward <Edward.Carson@dot.state.fl.us>
Sent: Wednesday, August 01, 2012 3:46 PM
To: Jitender Ramchandani; 'lfoutz@miamidade.gov'
Subject: FW: MPO Biscayne EBS - Potential Locations for Queue Jumpers

Jitender & Larry: Attached below are some comments from D6 Traffic Operations on what they will be looking to see in your analysis. EdC.

Ed Carson
Transit Programs Administrator
INTERMODAL SYSTEMS PLANNING OFFICE
FLORIDA DEPARTMENT OF TRANSPORTATION- DISTRICT SIX
ADAM LEIGH CANN BUILDING
1000 NW 111th AVENUE - ROOM 6111
MIAMI, FL 33172
TEL: 305-470-5255
FAX: 305-470-5205
E-MAIL: edward.carson@dot.state.fl.us

From: Nunez, Pedro
Sent: Tuesday, July 31, 2012 5:09 PM
To: Carson, Edward
Cc: Meitin, Omar; Maarouf, Khalil; Boucle, Aileen; Tavella, Chris; Bustamante, Javier; Bjorneboe, David
Subject: RE: MPO Biscayne EBS - Potential Locations for Queue Jumpers

Ed:

- Traffic Analysis: Buses will most likely have a protected phase in a typical signal cycle. Therefore, typically owner agencies are interested in determining the impact of signal timing changes through queuing analysis, intersection level of capacity analysis, person/vehicle throughput analysis, etc. To accomplish that one may have to do 24-hour counts, turn movement counts, may be queuing observations, bike-ped counts, and some micro-simulation analysis using that data. These are typical considerations but some owner agencies do not require transit agencies to go through such lengthy and costly process for each intersection. We would like to know the level of analysis expected by the department.

In addition to the comments highlighted above (which are essential to determine operational impacts), see the following concerns regarding bus queue jump lanes:

- safety impacts, crash potential, conflicts with pedestrian/bikes
- signage, clear interaction among road users, visibility (vehicles behind buses)
- Will bus stops have to be relocated?
- impacts on any overlap phases
- bus frequency (activation of bus phase results in time lost for other phases)
- In case of multiple buses, will bus signal timing be extended or given additional cycle?
- Location of bus signal? (post-mounted, mast-arm) additional loading to mast-arms will require structure analysis
- Detection (loops, camera, manual, auto?)
- larger intersections will require longer green phase for buses (additional delay)
- How will bus phasing operate if there is a jump queue lane at both approaches of same intersection?

- How are locations selected? (LOS? signal phasing? geometry?) Some locations already at LOS F
- Progression/coordination of signals will be disturbed
- Impact on entire segment along Biscayne Blvd…traffic flow, delay
- coordination and input from Miami-Dade County Public Works and Waste Management Department (area traffic signal operations engineer) is essential
- Have queue jump lanes been implemented at other locations? Success rate? Challenges?
- Public education/outreach

Please let us know if you have any questions or require additional assistance.

Thank you.

Pedro P. Nuñez, E.I.
Traffic Operations Analyst
Florida Department of Transportation, District 6
1000 NW 111th Avenue, Room 6206A
Miami, FL 33172

pedro.nunez@dot.state.fl.us
(305)470-5335 (office)
(305)470-5815 (fax)

From: Meitin, Omar
Sent: Friday, July 20, 2012 4:58 PM
To: Carson, Edward; Nunez, Pedro; Maarouf, Khalil
Cc: Boucle, Aileen; Tavella, Chris; Bustamante, Javier; Bjorneboe, David
Subject: RE: MPO Biscayne EBS - Potential Locations for Queue Jumpers

FYI - Attached is information on the pilot program which is going to **run for 2 weeks only** in D4. The pilot will be taking place at one intersection SR 7 and Prospect Road.

Omar M. Meitin, P.E.
District Traffic Operations Engineer
1000 NW 111th Avenue
Miami, Florida 33172
(305) 470-5335
Fax: (305) 470-5815

From: Carson, Edward
Sent: Friday, July 20, 2012 11:27 AM
To: Nunez, Pedro; Maarouf, Khalil
Cc: Boucle, Aileen; Tavella, Chris; Bustamante, Javier; Meitin, Omar; Bjorneboe, David
Subject: FW: MPO Biscayne EBS - Potential Locations for Queue Jumpers

Pedro and Khalil: Here is the input the MPO is requesting from the Department on locations we feel queue jumpers will work. I have copied Design and ROW as it appears their input will also be needed. Thank you. EdC.

Ed Carson
Transit Programs Administrator
INTERMODAL SYSTEMS PLANNING OFFICE
FLORIDA DEPARTMENT OF TRANSPORTATION- DISTRICT SIX
ADAM LEIGH CANN BUILDING

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MIAMI, FL 33172
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FAX: 305-470-5205
E-MAIL: edward.carson@dot.state.fl.us

From: Jitender Ramchandani [mailto:jramchandani@HNTB.com]
Sent: Thursday, July 19, 2012 8:22 AM
To: Carson, Edward
Cc: 'lfoutz@miamidade.gov'; Boucle, Aileen
Subject: RE: MPO Biscayne EBS - Potential Locations for Queue Jumpers

Hi Ed,

We are working on an implementation plan so at this point the first thing we have to confirm is that the District's will allow queue jumpers on Biscayne and on some other corridors. As Larry mentioned, District Four recently implemented a pilot queue jump project along State Road 7.

A queue jumper typically has two components: a dedicated curb-side lane (which is also often shared with turning vehicles) and a dedicated signal phase. Typically agencies go through the following steps:

- Traffic Analysis: Buses will most likely have a protected phase in a typical signal cycle. Therefore, typically owner agencies are interested in determining the impact of signal timing changes through queuing analysis, intersection level of capacity analysis, person/vehicle throughput analysis, etc. To accomplish that one may have to do 24-hour counts, turn movement counts, may be queuing observations, bike-ped counts, and some micro-simulation analysis using that data. These are typical considerations but some owner agencies do not require transit agencies to go through such lengthy and costly process for each intersection. We would like to know the level of analysis expected by the department.

- Design: If a right-turn lane is present, then it can be utilized for turning vehicle movement and, for through transit vehicle movement. The Department will have to allow such usage and we would like to know what the Design section would like to see towards that. Typically, such cases do not require design modifications and are the easiest to implement (assuming traffic considerations work out and storage length is sufficient). If a right-turn lane does not exist then one will have to be put in. The design for such lanes (i.e. storage capacity) is typically dependent on traffic analysis. It is like design of an auxiliary lane and we would like to confirm that such lanes will be treated like auxiliary lanes. There may be unique conditions that may require a little more detailed geometric analysis. We would like to confirm the design section's expectations.

- ROW: Once an approval has been granted and a design is finalized, your ROW section will be involved in acquisition, if any. Of course, MDT will be involved in all these phases in the coming years.

- Construction: A typical MOT is expected.

Some practical issues can be expected during this process. From what I know, there are no approved products for bus signals and a typical equipment approval process is lengthy. District Four did their project as a pilot project and for which, I believe, they received a temporary permit. Secondly, new equipment increases the load on mast arm so structural calculations have to be done to confirm that the load will be within the range. These issues are out in the future. At this point we just have to know the next steps expected by the Department because they will have an impact on the costs and schedules of such express bus projects – two items that we have to develop as part of our study. The actual work outlined above and/or by the Department may or may not be done as part of our study.

Please let me know if I missed anything.

Thank you,

- Jitender

From: Carson, Edward [mailto:Edward.Carson@dot.state.fl.us]
Sent: Wednesday, July 18, 2012 1:09 PM
To: Jitender Ramchandani
Cc: 'lfoutz@miamidade.gov'; Boucle, Aileen
Subject: RE: MPO Biscayne EBS - Potential Locations for Queue Jumpers

Jitender: Traffic Operations staff is asking me what specific areas you want comments on. Thanks. EDC.

Ed Carson
Transit Programs Administrator
INTERMODAL SYSTEMS PLANNING OFFICE
FLORIDA DEPARTMENT OF TRANSPORTATION- DISTRICT SIX
ADAM LEIGH CANN BUILDING
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MIAMI, FL 33172
TEL: 305-470-5255
FAX: 305-470-5205
E-MAIL: edward.carson@dot.state.fl.us

From: Jitender Ramchandani [mailto:jramchandani@HNTB.com]
Sent: Monday, July 16, 2012 2:41 PM
To: Carson, Edward
Cc: 'lfoutz@miamidade.gov'; Boucle, Aileen
Subject: Re: MPO Biscayne EBS - Potential Locations for Queue Jumpers

Hi Ed,

Thank you. We are evaluating other locations and will have those to you soon. We want to get a few more opinions on those ones. The list below would be a good place to start the discussion as conceptually its the same idea.

Regards,

- Jitender

Sent from a mobile device

From: Carson, Edward [mailto:Edward.Carson@dot.state.fl.us]
Sent: Monday, July 16, 2012 11:56 AM
To: Jitender Ramchandani
Cc: lfoutz@miamidade.gov <lfoutz@miamidade.gov>; Boucle, Aileen <Aileen.Boucle@dot.state.fl.us>
Subject: RE: MPO Biscayne EBS - Potential Locations for Queue Jumpers

Jitender: The list provided only has eight locations. What are the other locations? Thanks. EdC.

Ed Carson
Transit Programs Administrator
INTERMODAL SYSTEMS PLANNING OFFICE
FLORIDA DEPARTMENT OF TRANSPORTATION- DISTRICT SIX
ADAM LEIGH CANN BUILDING
1000 NW 111th AVENUE - ROOM 6111
MIAMI, FL 33172

TEL: 305-470-5255
FAX: 305-470-5205
E-MAIL: edward.carson@dot.state.fl.us

From: Jitender Ramchandani [mailto:jramchandani@HNTB.com]
Sent: Friday, July 13, 2012 1:39 PM
To: Carson, Edward
Cc: lfoutz@miamidade.gov
Subject: MPO Biscayne EBS - Potential Locations for Queue Jumpers

Good afternoon, Ed,

Thanks again for making time to discuss this effort. There are about 70 signalized intersections along Biscayne Boulevard. We are looking at about 10-11 locations for potential queue jumpers. The top ones are listed in the table below. To start the discussion, I have attached two preliminary sketches for your information. Due to the file size restriction, I will have to send the third sketch in my next email. These are preliminary sketches based on some readily available data.

Cross Street	Number of Lanes			Average Vol	
	Biscayne	Cross Street (East)	Cross Street (West)	Biscayne	Cross Stree
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NE 38 St	5	2	2	30,500	
NE 62 St	4	2	2	37,500	N.A. (Loca
NE 123 St	4 Southside/6 Northside	4	4	52,000	
NE 186/185 St	8	4	6	76,500	N.A. (Loca
NE 191 St	8	4	Doesn't Continue	76,500	N.A. (Loca
NE 195 St	8	4		76,500	N.A. (Mall E
NE 196 St	8	4		76,500	N.A. (Mall E

Please let us know your thoughts.

Thank you,

Jitender Ramchandani, AICP
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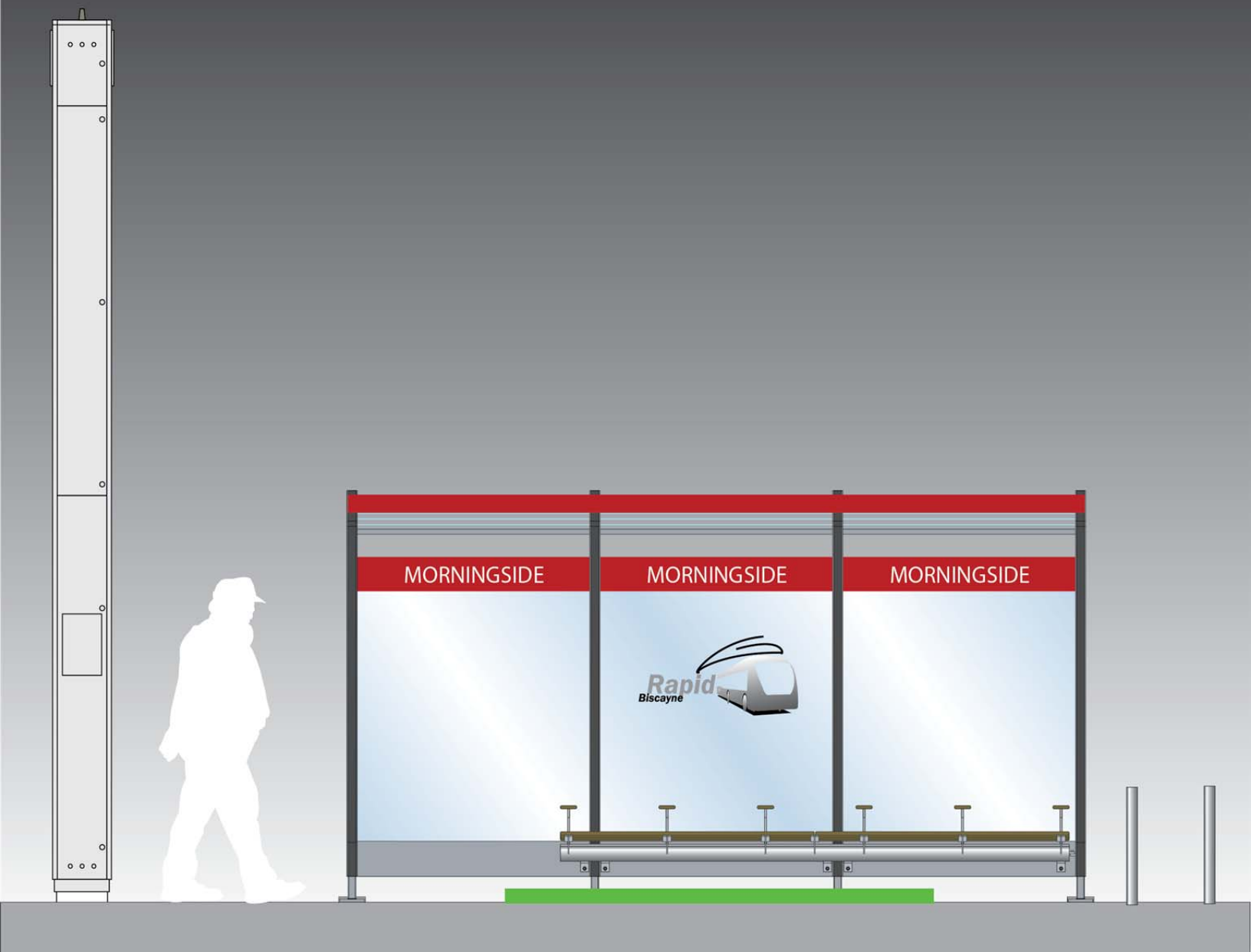
APPENDIX 4: RECOMMENDED BRANDING / VISUAL IDENTITY GUIDELINES FOR THE EBS PROJECTS

Rapid
Biscayne

VISUAL IDENTITY GUIDELINES

PREPARED FOR: MIAMI-DADE METROPOLITAN PLANNING ORGANIZATION

PREPARED BY: HNTB CORPORATION



ENHANCED BUS SERVICE

VISUAL IDENTITY GUIDELINES

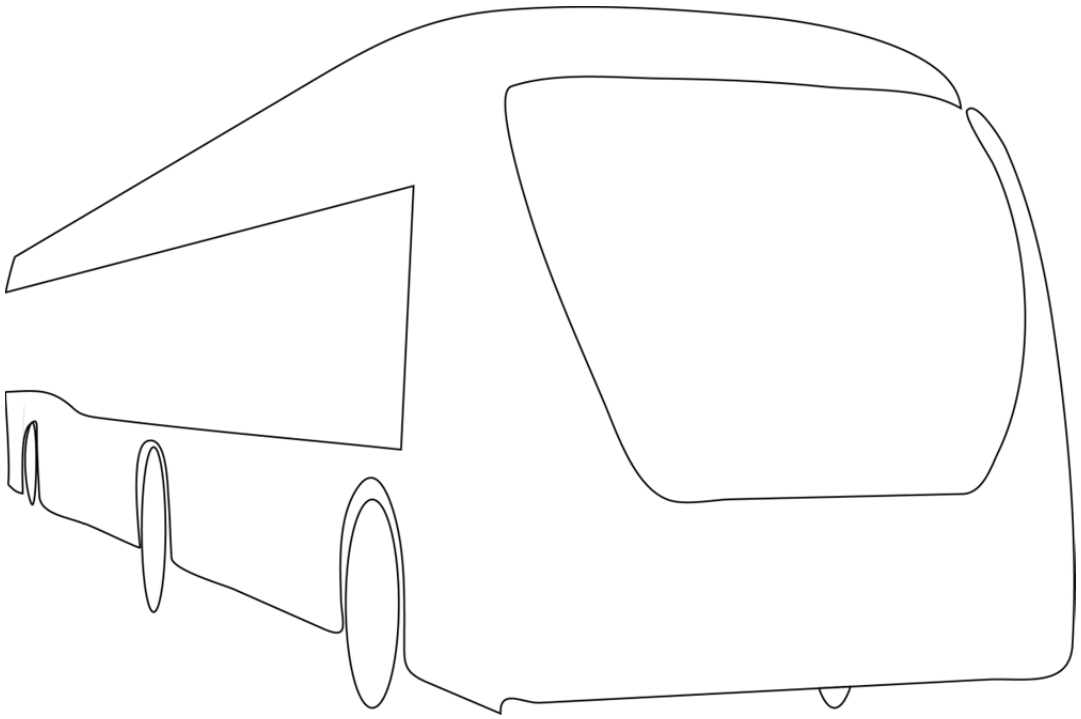
Prepared for Miami-Dade Metropolitan Planning Organization

Prepared by HNTB Corporation

February, 2013

The preparation of this report has been financed in part from the U.S. Department of Transportation (USDOT) through the Federal Highway Administration (FHWA) and/or the Federal Transit Administration (FTA), the State Planning and Research Program (Section 505 of Title 23, U.S. Code) and Miami-Dade County, Florida. The contents of this report do not necessarily reflect the official views or policy of the U.S. Department of Transportation.

APPENDIX 4 - CONTENTS



WHY HAVE BRAND IDENTITY GUIDELINES?

Clear Brand Identity = Consistency

All individuals, places, services, and businesses have identities. Some identities are stronger than others. Some identities are shaped with a clear purpose by the brand owner and others are shaped by everyone but the owner. Strong identities help establish a relationship with customers. Identity for transit services must reflect the experience of using the service, its purpose, key attributes, and differentiators. As Miami-Dade Transit (MDT) prepares to launch Enhanced Bus Services, MDT must broadcast identity of Enhanced Bus Service (EBS) to amplify the service's key attributes. The definition of brand identity goes beyond a visual image or a logo. It is to create and communicate a uniform theme that proliferates across all mediums.

Brand Identity for MDT Enhanced Bus Services is based on a promise: Enhanced Bus Services will offer faster, reliable, safe, and convenient travel experience. This document provides guidelines to be used for graphics, decals, and material.

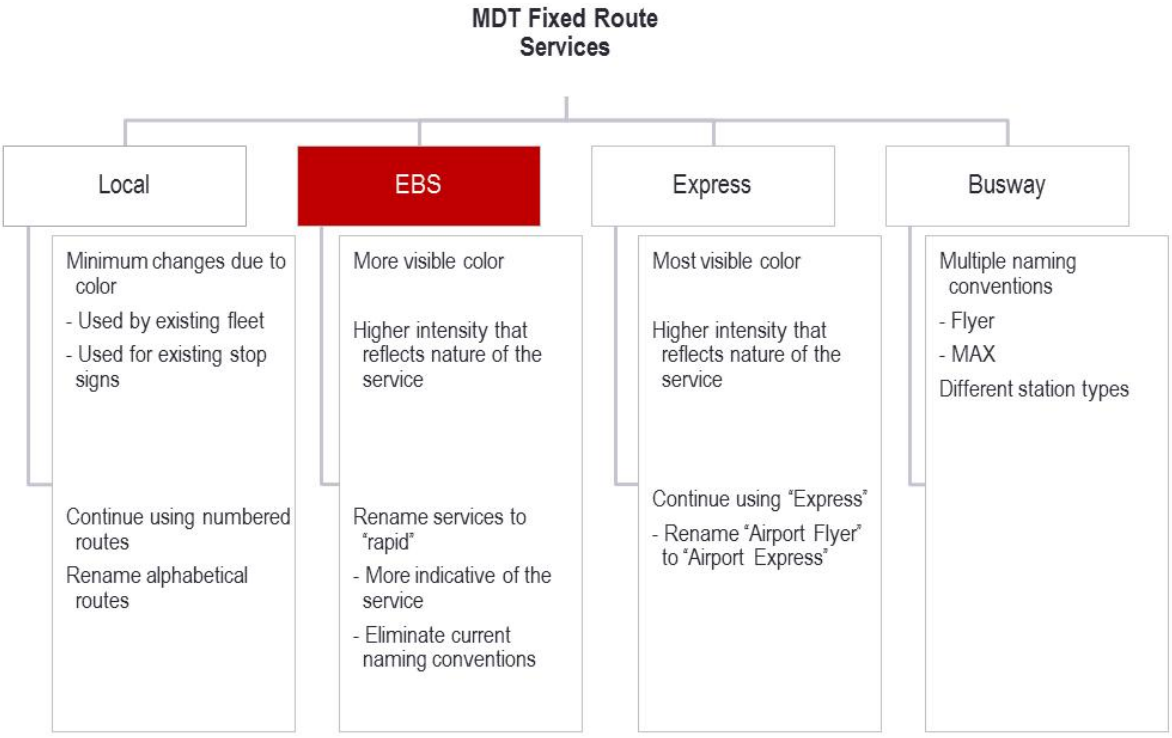
THE BRAND - RAPID

The Study Advisory Committee for "Biscayne Boulevard Enhanced Bus Service Implementation Plan" approved the word "RAPID" for the planned services due to the following reasons:

- It conveys the key attribute of the proposed service – Speed.
- It is associated with travel.
- The Spanish word "Rápido" is very similar to the English word for "RAPID".
- The term's usage in other parts of the country (e.g. Los Angeles, California; Grand Rapids, Michigan) conveys that the term is tested for similar transit applications.

Brand Positioning

RAPID Brand is positioned to provide safe, faster, reliable, and convenient travel experience that is comparable to auto travel while providing cost savings to travelers.



VISUAL DIFFERENTIATION – IS THAT MY BUS?

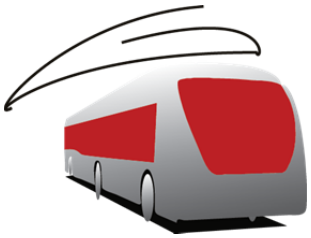
Differentiation between various MDT services is not clear to many users. Currently local services use numerical and alphabetical route names. Limited-stop services use a number of naming conventions (e.g. MAX, KAT, CRUISER). Limited-stop route numbers are typically in the 200s (e.g. 277, 288) with a considerable number of exceptions (e.g. 51, 73, 97).

Establishing brand identity becomes a more challenging task in an bi-lingual environment. Therefore, differentiation through color is the most effective way to visually differentiate services. Colors are proven to impact people's ability to concentrate and learn. They help establish mental associations. It is advantageous for a brand to have its own color, which provides an additional recognition cue. Given that Enhanced Bus Services will use articulated buses, a color-based identity system using the color Red should be operationally manageable for dispatchers. Reinforcement of Enhanced Bus Service will, to a greater extent, depend on establishing identities for other types of services. A color-based differentiation strategy is illustrated above.

THE PIECES THAT MAKE THE WHOLE

The following terminology is established for clarity and consistent use across mediums. Each term is defined and illustrated below. It will be important, in both written correspondence and oral discussion related to design, to use these terms accurately and consistently. It is recommended, therefore, that the reader make themselves "fluent" in the technical language of this document. Where appropriate, these definitions are repeated in the text for ease of reference.

RAPID LOGO



RAPID LOGOTYPE

Rapid

RAPID SIGNATURE

RAPID TAGLINE

the smarter, quicker way to travel

RAPID TAGLINE SIGNATURE

RAPID SUB-BRAND LOGO SIGNATURE (EXAMPLE)

RAPID SUB-BRAND TAGLINE SIGNATURE

BRAND

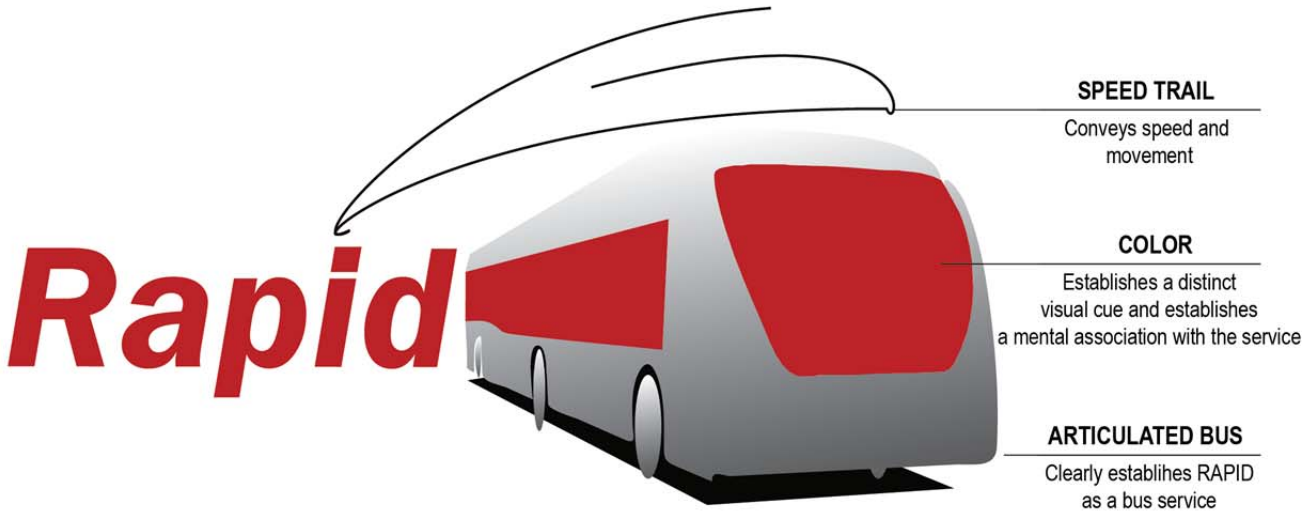
A name, term, design, symbol, or any other feature that identifies one seller's good or service as distinct from those of other sellers. The legal term for brand is trademark. A brand may identify one item, a family of items, or all items of that seller. If used for the firm as a whole, the preferred term is trade name.

(Source: American Marketing Association;
http://www.marketingpower.com/mg-dictionary-view329.php - 2007-05-07)

THE MESSAGE – COMMUNICATING IDENTITY

The brand identity system relies on choosing the key attributes to convey the core identity. RAPID Logo and RAPID Signature are designed to associate the color Orange with the service.

LOGO



LOGOTYPE

GUIDELINES FOR USING THE LOGO

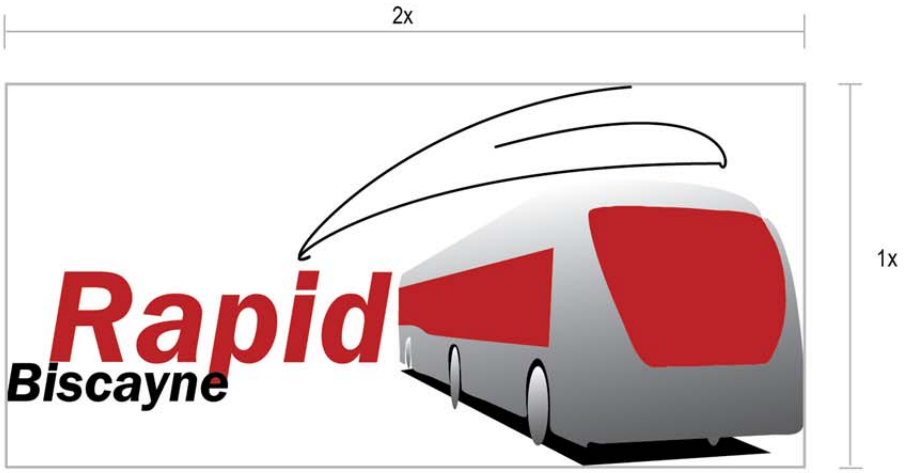
The sub-brand signature is recommended to be used in these colors schemes only.

GRAYSCALE - WHITE BACKGROUND

GRAYSCALE - BLACK BACKGROUND

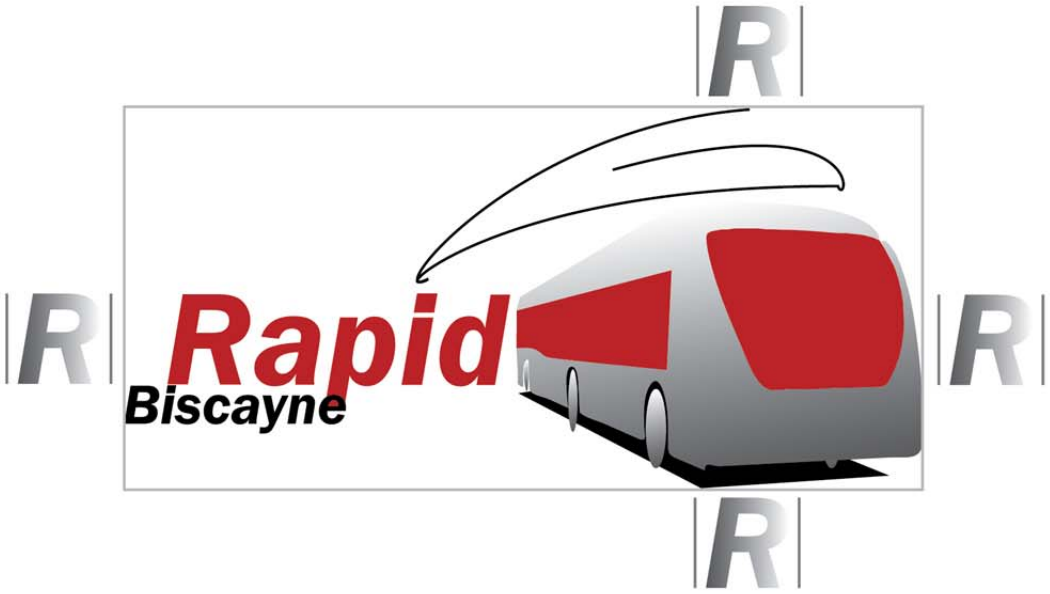
COLOR - ORANGE BACKGROUND

Proportions



The signature should always have one-to-two ratio.

Safe Area



There should always be at least the distance of one “R” around the logo.

Combinations

The tagline is only to be used for public service announcements. For all other purposes, the following combinations are recommended.

1. Logo and logotype
2. Logo, logotype, and sub-brand
3. Logotype and sub-brand

Not Recommended

Do not use different colors or background except the ones recommended.

Do not change proportions or skew the logo or any associated components

COLOR PALETTE AND FORMULAS

The specific colors listed below have been chosen for the Enhanced Bus Service color palette. The extended color palette is used in combination with the logo colors. The extended palette is currently used by MDT for different purposes and therefore, can be incorporated for secondary uses.

Please note that the colors shown throughout this manual are not necessarily accurate representations due to limitations of the printer. Always refer to actual color swatches when matching colors.

MAIN PALETTE

R	232
G	125
B	30
C	19
M	99
Y	98
K	91

PANTONE Cool Gray 11C

R	113
G	112
B	115
C	0
M	2
Y	0
K	68

SUPPORT PALETTE

PANTONE 576 CVC

R	79
G	134
B	54
C	73
M	26
Y	100
K	11

PANTONE 7461 C

R	1
G	148
B	211
C	78
M	28
Y	0
K	0

RICH BLACK

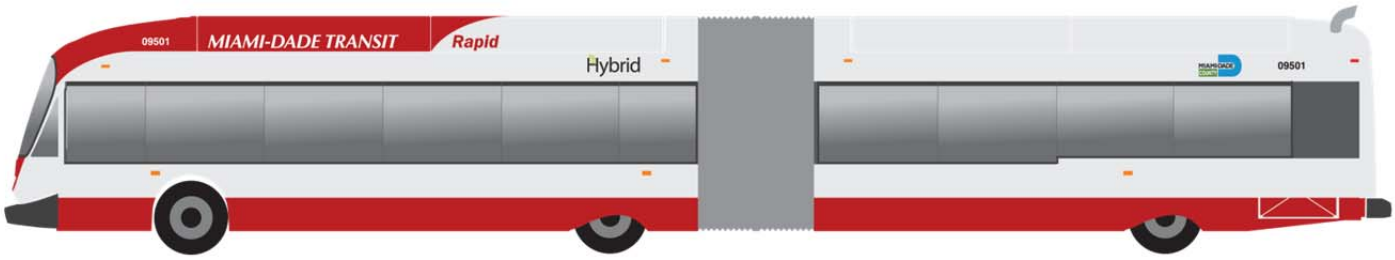
R	5
G	0
B	0
C	50
M	50
Y	50
K	100

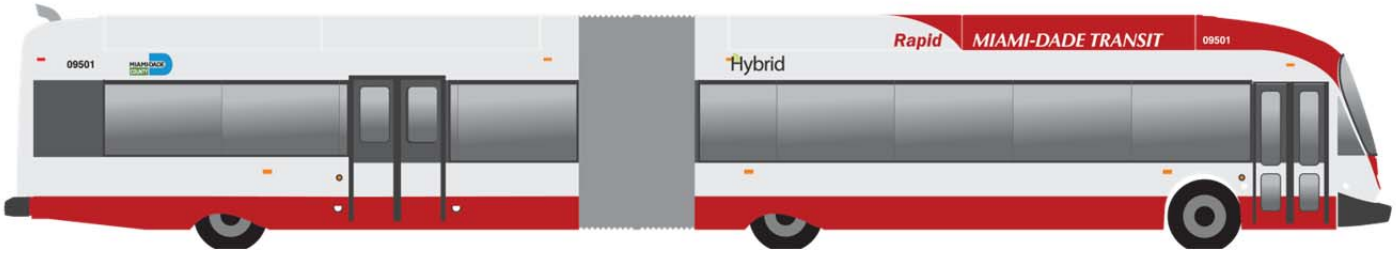
VEHICLE DECAL

One of the most important purposes for developing a brand identity is to allow users to recognize their vehicles. More importantly, it is to provide them with a clear visual distinction between the RAPID and other services.

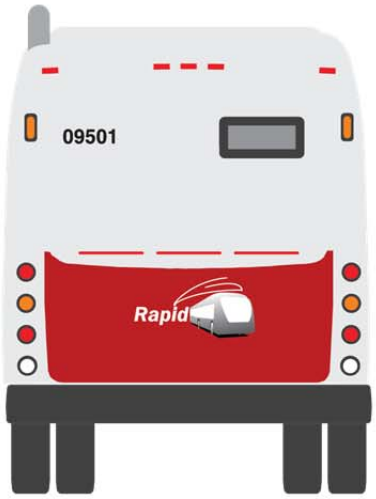
The vehicle decals are developed for a standard New Flyer bus, similar to the ones currently in use by MDT. The minimalistic design ensures that as vehicles age, they display the least amount of wear and tear.

Side Elevations

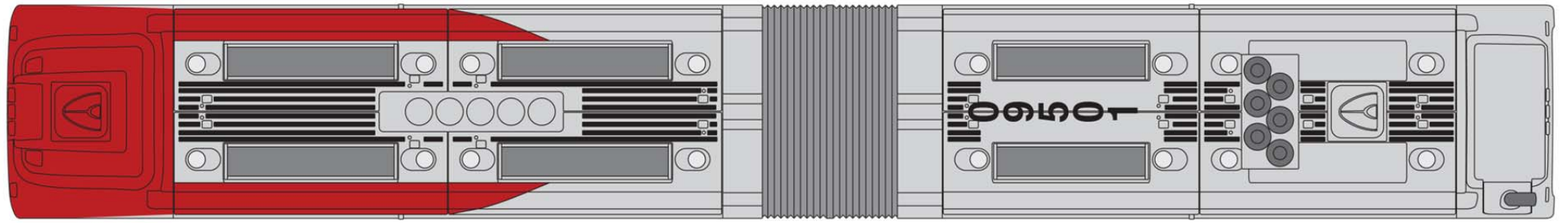


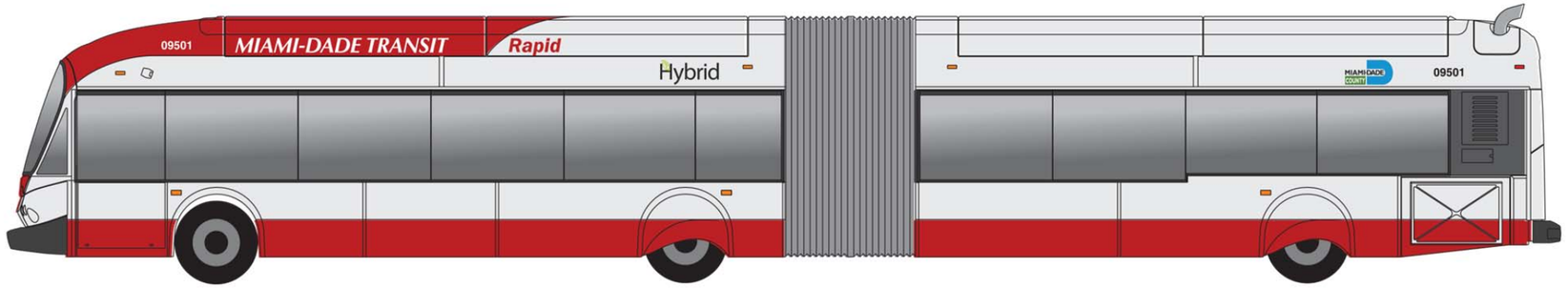


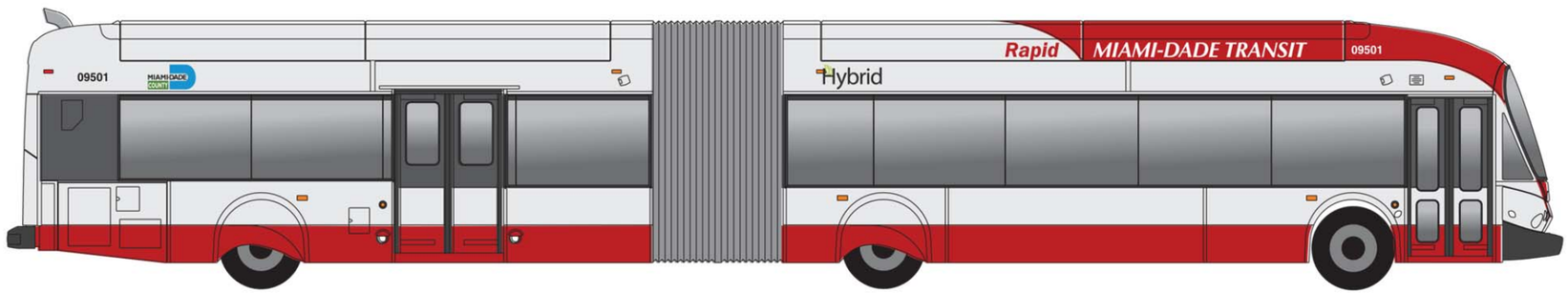
Front and Back Elevations



Detail for Installation







STATIONS

Transit stations are the first contact point between passengers and the BRT service, and thus a major determinant for the acceptance of the transit service. Also, research has indicated that travelers tend to consider out-of-vehicle travel time (walking, waiting, transferring, etc.) to be substantially more burdensome than in-vehicle travel time. Therefore, attracting new travelers or commuters to transit in significant numbers requires a sharp focus on improving transit users' experience outside of their vehicles – walking, waiting, and transferring.

Walking involves using public roadways from a trip origin to the nearest station. This is part of engineering recommendations. From brand identity point of view, stations are critical as they mark the first impression for a potential traveler. They area also waiting areas therefore, perceived and actual safety at stations and user comfort is of paramount importance. Stations can also help differentiation the RAPID service from MDT's other services. A clear and distinguishable station can act as a 24x7 advertisement board for the service and the transit agency.

The proposed station design is adopted from HNTB Corporation's recent successful Bus Rapid Transit (BRT) project in the Kansas City area. HNTB's client has agreed to share preliminary information to be adopted and modified by MDT.

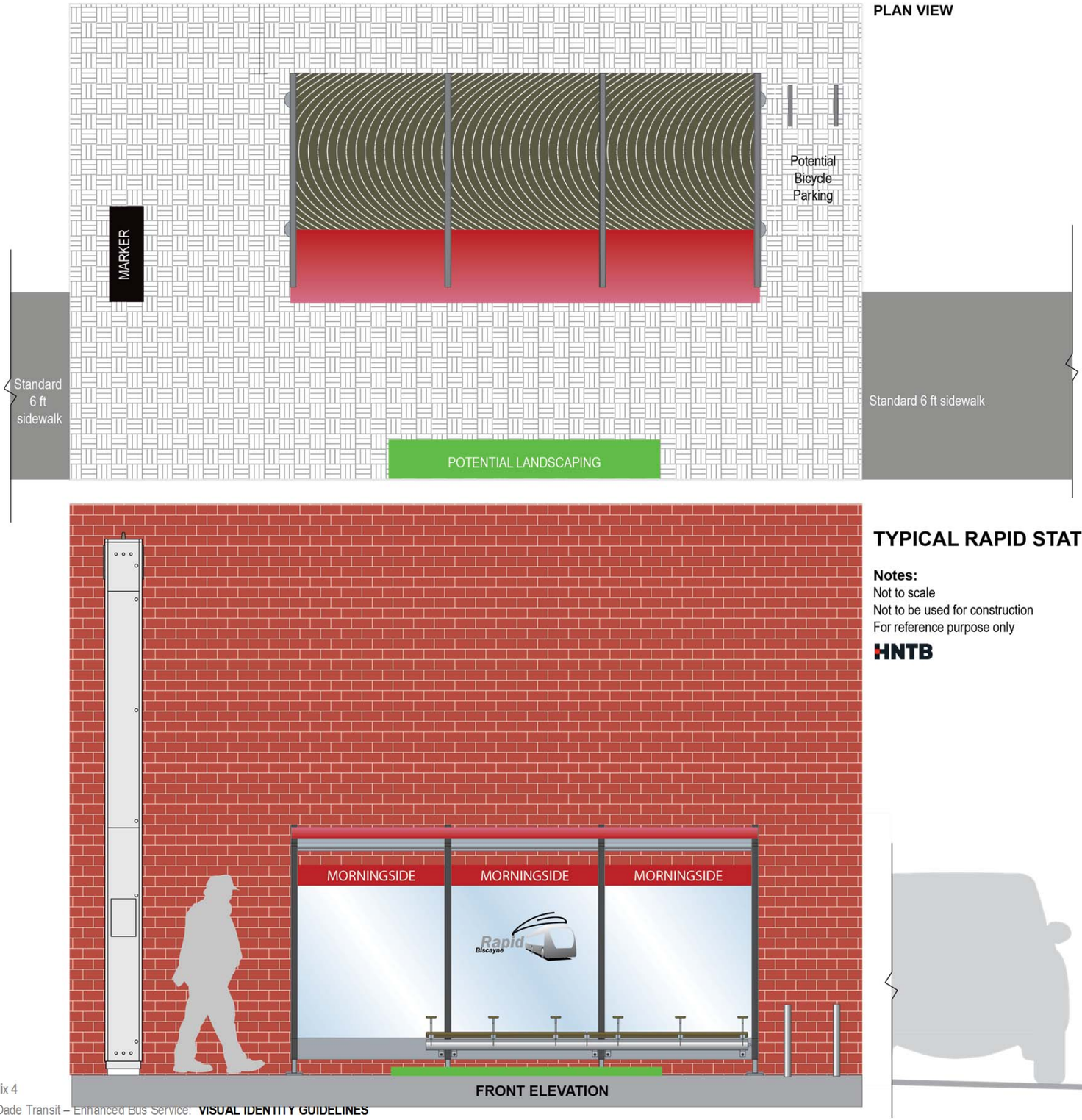
The station area will have the following components and features:

1. A large station platform to ensure a comfortable wait area without causing conflicts with passing pedestrians
    a. Shelter platform provides the required 8 ft by 5 ft landing platform for passengers on wheelchairs
2. A signature shelter that protects passengers from all natural elements
    a. The shelter canopy is large enough to provide meaningful protection from rain

b. Built-in lighting (lighting fixtures in the shelter structure) to minimize vandalism and to minimize direct contact with lighting fixtures

3. A signature marker that reinforces the presence of the Enhanced Bus Service and provides a visual landmark
    a. Marker includes real-time bus arrival information – to allow passing private vehicles to see the high frequency of the Enhanced Bus Service
    b. A display case for maps
    c. Lighting and built-in grounding rod to protect from lightning
4. Trash and recycle receptacles with solar-powered compacters to minimize maintenance
5. Potential hard- and soft-landscape

It is recognized that large shelters cannot be accommodated at all potential stations. Therefore, a narrower shelter that requires a smaller station platform is also included.



TYPICAL RAPID STATION AREA

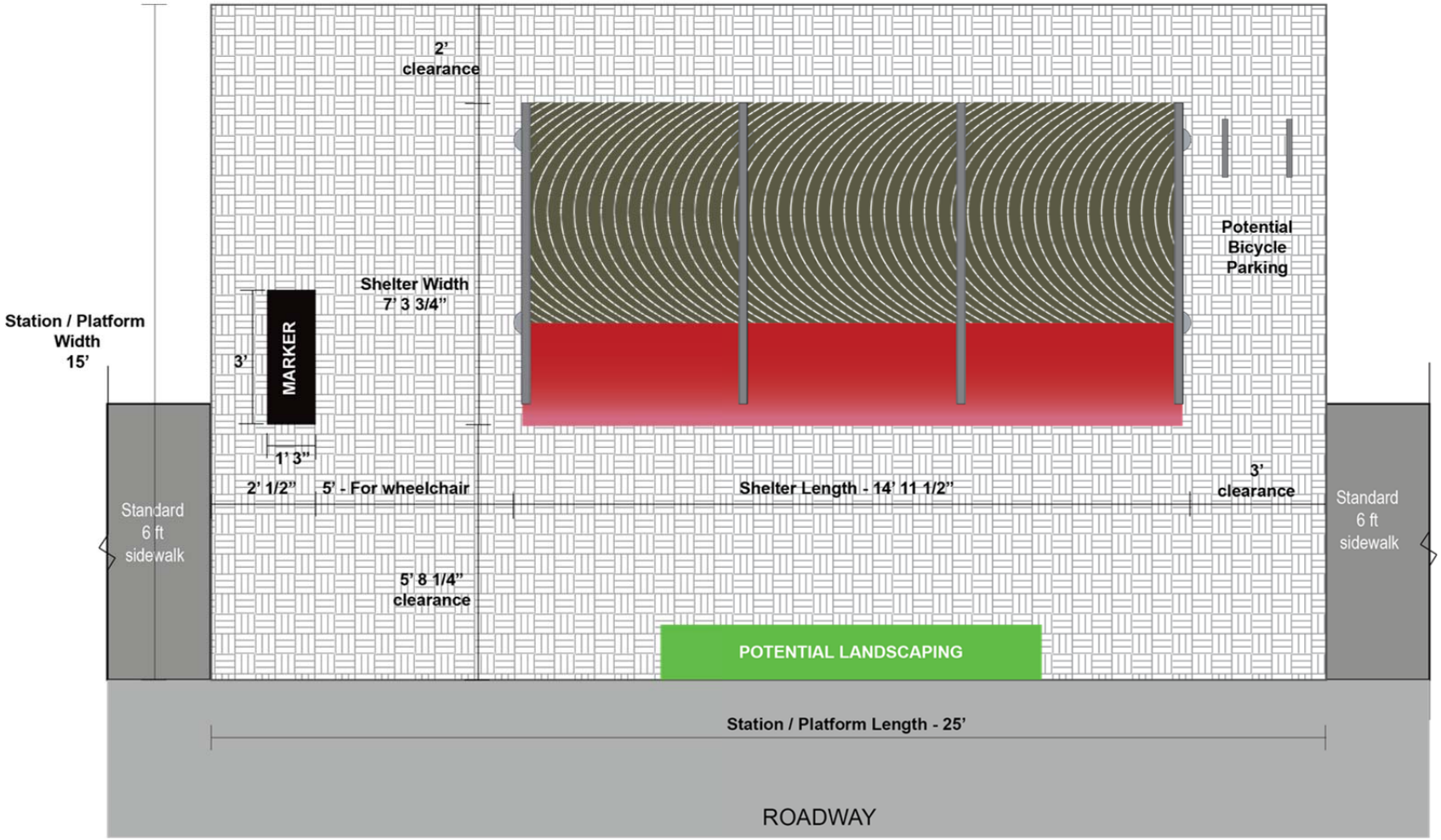
Notes:
Not to scale
Not to be used for construction
For reference purpose only

HNTB

TYPICAL RAPID STATION AREA
PLAN VIEW

Notes:
Not to scale
Not to be used for construction
For reference purpose only

HNTB

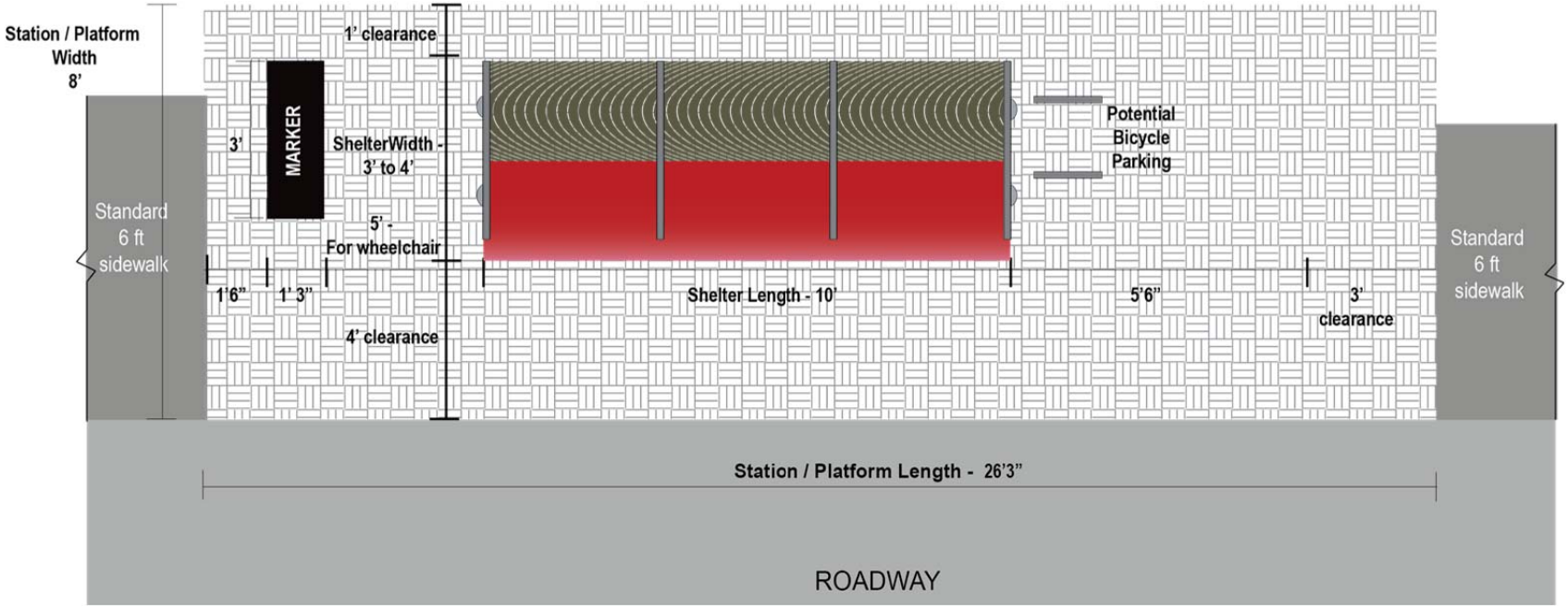


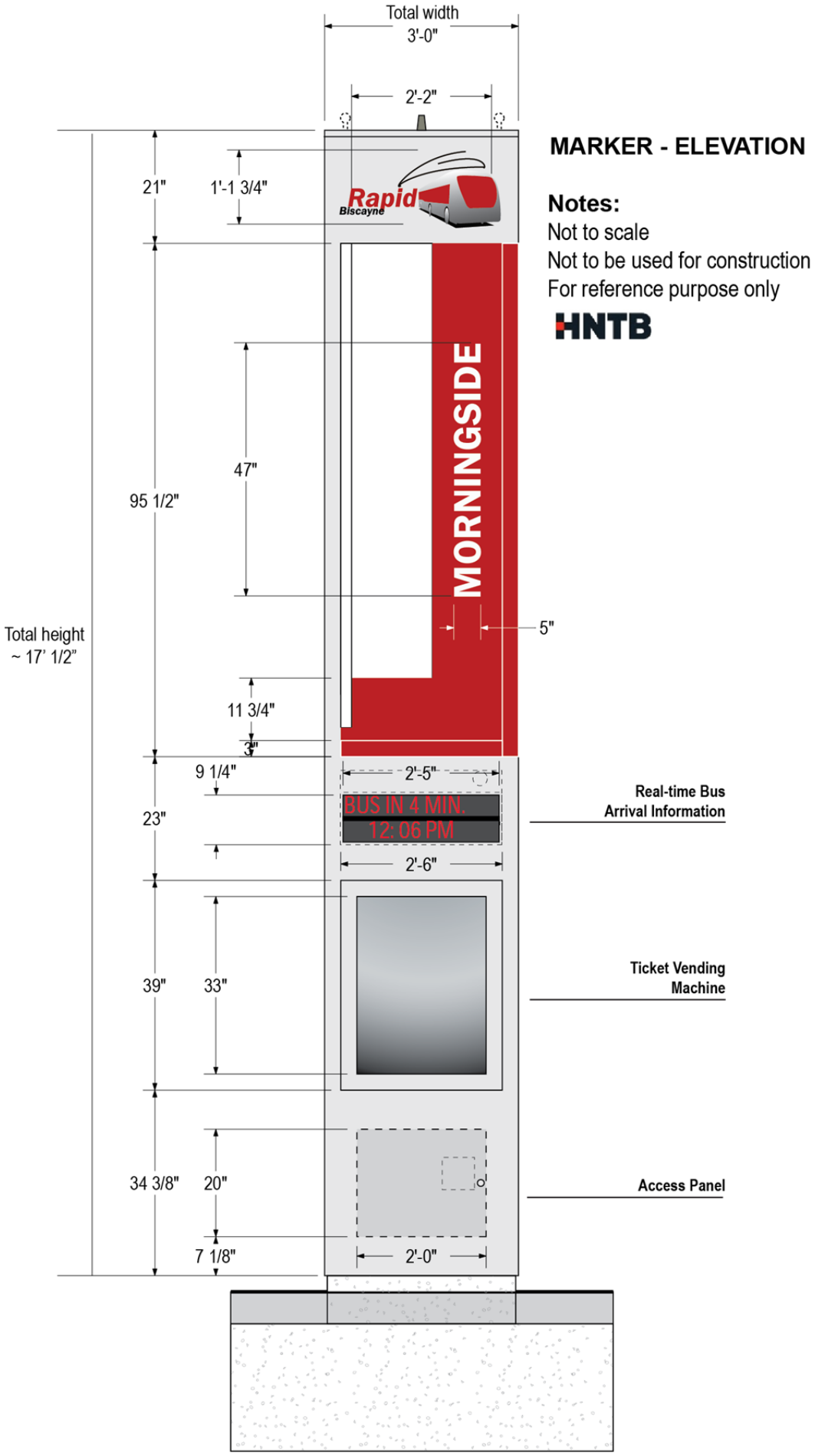
RAPID STATION AREA - NARROW STATION FOR CONSTRAINED ROW

PLAN VIEW

Notes:
Not to scale
Not to be used for construction
For reference purpose only

HNTB





MARKER - ELEVATION

Notes:

Not to scale

Not to be used for construction

For reference purpose only

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WILL THE BRANDING WORK?

Developing a brand is a long-term exercise. Private corporations spend millions of dollars to achieve that goal. With scarce resources, MDT must ensure that it is consistent with the RAPID brand. As mentioned previously, a meaningful differentiation for the RAPID brand can only be achieved by clearly branding other transit services as well. A few recommendations, beyond the scope of this effort, are included below:

MDT should consider incorporating RAPID brand on its website, similar to its other premium services like Metrorail and Metromover. The RAPID brand should not be merged with other services.

MDT should provide clear distinction between its Express, Limited-Stop, and Enhanced services. Some preliminary recommendations are included in this document. However, a much more deliberate branding effort is needed for Express and Limited-Stop services.

RAPID brand should not be diluted with advertisements at stations or on vehicles. Advertisement can be considered inside the vehicles. MDT may consider providing LCD screens through interested vendors inside the vehicles. The Los Angeles Metro Orange Line includes such vehicles. Similar efforts are being considered by Coral Gables Trolley and Miami Trolley.

Branding can achieve the desired results, an increase in ridership, only if it is supported by meaningful improvements in the service. The Branding plan should be closely coordinated with infrastructure and service improvements to ensure that the RAPID brand is associated with positive experiences.

PREPARED BY:

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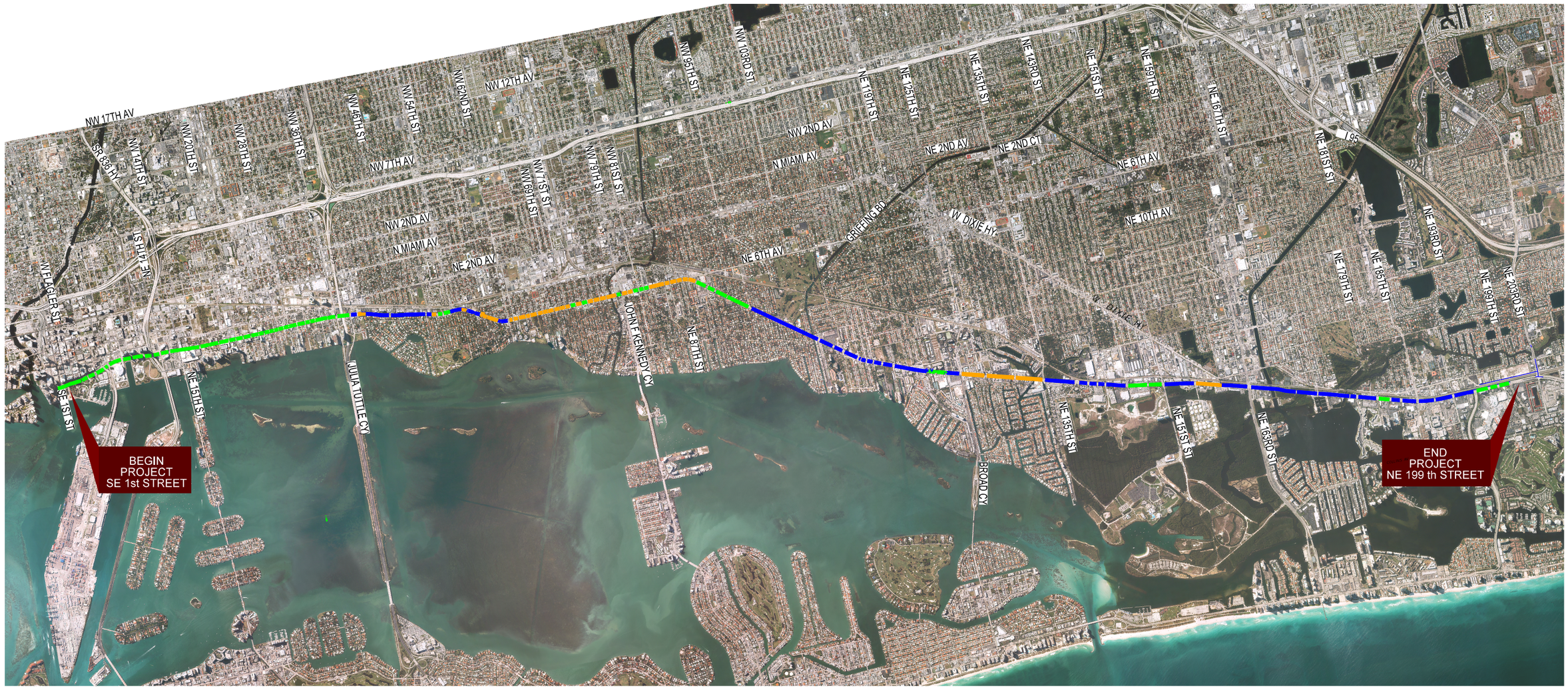


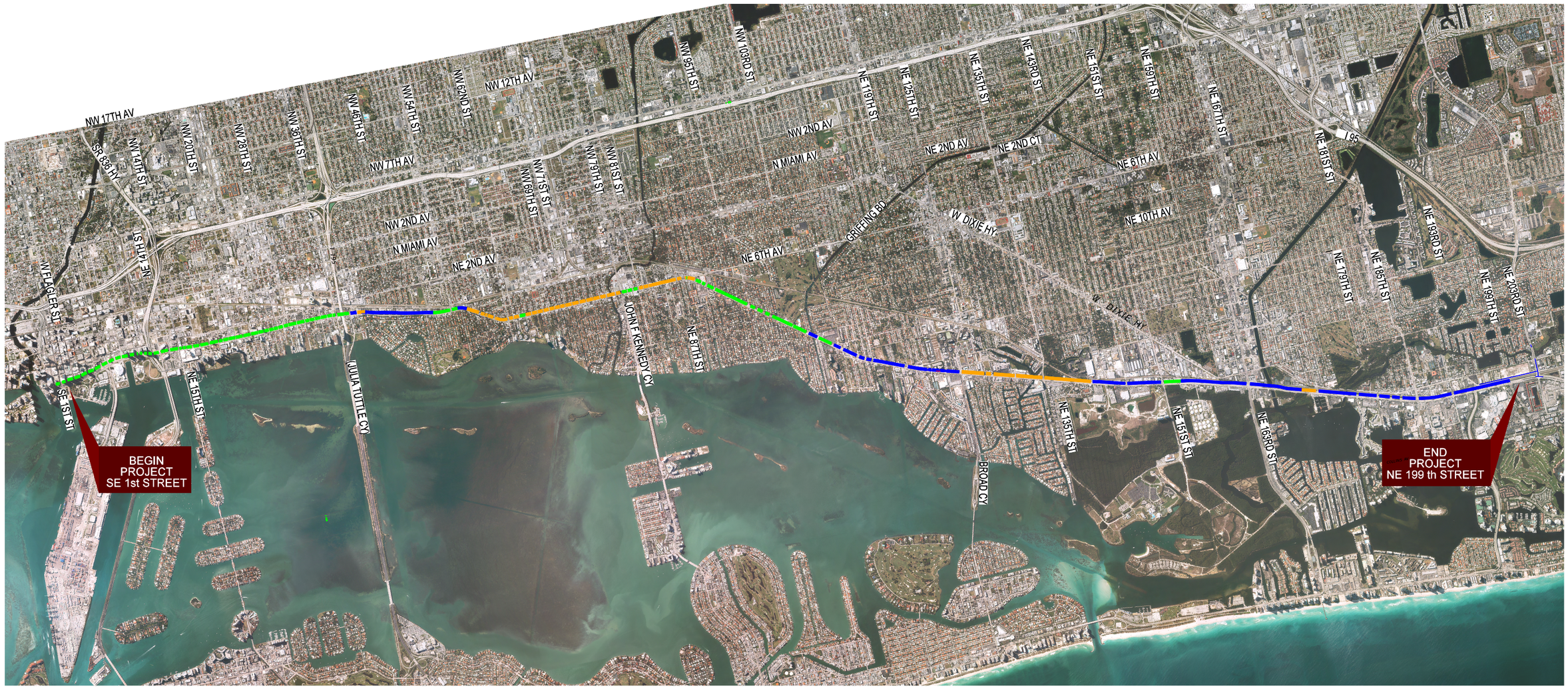
6 LANE	5 LANE	5 LANE	5 LANE	5 LANE	6 LANE	8 LANE
DIVIDED	UNDIVIDED	DIVIDED	UNDIVIDED	DIVIDED	DIVIDED	DIVIDED

No ROW taken
Sidewalk reduced to 6' min.

No ROW taken
Realigment of exiting lane configuration
Sidewalk reduced to 6' min.

ROW aquisition required

NORTHBOUND



6 LANE	5 LANE	5 LANE	5 LANE	5 LANE	6 LANE	8 LANE
DIVIDED	UNDIVIDED	DIVIDED	UNDIVIDED	DIVIDED	DIVIDED	DIVIDED

No ROW taken
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NORTHBOUND