Preliminary Engineering Report

For the

Beach Corridor Rapid Transit Project

Project Development and Environment (PD&E) Study

Prepared for:

MIAMI-DADE COUNTYDEPARTMENT OF TRANSPORTATION AND PUBLIC WORKS

Prepared by:

Parsons Transportation Group Inc.

July 2022

Table of Contents

List of Figures

List of Tables

LIST OF APPENDICES

List of Acronyms

ADA	American Disabilities Act
AGT	automated guideway transit
APM	automated people mover
BCT	Broward County Transit
BE	buried electric utility
BERT	Bus Express Rapid Transit
BRT	bus rapid transit
CBD	Central Business District
CFR	Code of Federal Regulations
CI	colored imprinted (sidewalks)
CPTED	Crime Prevention through Environmental Design
CRAS	Cultural Resources Assessment Survey
CSER	Contamination Screening Evaluation Report
CSRP	Conceptual Stage Relocation Plan
DTPW	Miami-Dade County Department of Transportation and Public Works
EFH	essential fish habitat
EST	environmental screening tool
ETDM	efficient transportation decision-making
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FEC	Florida East Coast (Railway)
FEMA	Federal Emergency Management Agency
FO	fiber optic utility
FMSF	Florida master site file
FTA	Federal Transit Administration
FWC	Florida Fish and Wildlife Conservation Commission
HAPC	Habitat Areas of Particular Concern
HCM	Highway Capacity Manual
HUD	U.S. Department of Housing and Urban Development
ICC	International Code Council
IPCD	intermodal passenger connectivity database
ITS	intelligent transportation systems
LEED	leadership in energy and environmental design
LEP	limited English proficiency
LOS	level of service
LOTTR	level of travel time reliability
LPA	locally preferred alternative
LRT	light rail transit
LRV	light rail vehicle
LWCF	National Park Service Land and Water Conservation Fund
MALAA	may affect, likely to adversely affect
MANLAA	may affect, not likely to adversely affect
MDX	Miami-Dade Expressway Authority
MSFCMA	Manguson-Stevens Fishery Conservation Management Act
MUTCD	Manual on Uniform Traffic Control Devices
NESHAP	national emissions standards for hazardous air pollutants
NFPA	National Fire Protection Association
NGVD	National Geodetic Vertical Datum
NMFS	National Marine Fisheries Service
NRE	Natural Resources Evaluation
NRHP	National Register of Historic Places

O&M	operations & maintenance
OE	overhead electric utility
OFW	Outstanding Florida Water
OGT	Office of Greenways and Trails
PAG	Project Advisory Group
PD&E	Project Development & Environment
PER	Preliminary Engineering Report
PIP	Public Involvement Plan
RCRA	Resource Conservation and Recovery Act
RER	Miami-Dade County Department of Regulatory and Economic Resources
SCE	Sociocultural Effects Evaluation
SFRCCC	Southeast Florida regional climate change compact
SFWMD	South Florida Water Management District
SFHA	special flood hazard area
SHGWE	seasonal high ground water elevation
SHPO	State Historic Preservation Office
SLD	Straight Line Diagram
SMART	Strategic Miami Area Rapid Transit
STOPS	Simplified Trips on Project Software
SWPPP	Stormwater Pollution Prevention Program
TPO	Transportation Planning Organization
TRB	Transportation Research Board
UAO	Utility Agency/Owner
UMAM	Uniform Mitigation Assessment Method
USCG	U.S. Coast Guard
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
VMF	vehicle maintenance facility
WBID	waterbody identification number
W/S	water or sewer utility
WASD	Water and Sewer Department

SECTION 1. PROJECT SUMMARY

1.1. INTRODUCTION

In 2016, the Miami-Dade County Transportation Planning Organization (TPO) adopted the Strategic Miami Area Rapid Transit (SMART) plan as the blueprint for developing premium transit services throughout Miami-Dade County. The overall plan is illustrated in **Figure 1-1.** Subsequently the Miami-Dade County Department of Transportation and Public Works (DTPW) initiated the Beach Corridor Rapid Transit Project, Project Development and Environment (PD&E) study in 2017, in collaboration with the Florida Department of Transportation (FDOT) and the cities of Miami and Miami Beach. This Preliminary Engineering Report (PER) summarizes the engineering and environmental analyses, public outreach, and alternatives evaluation results of the PD&E study.

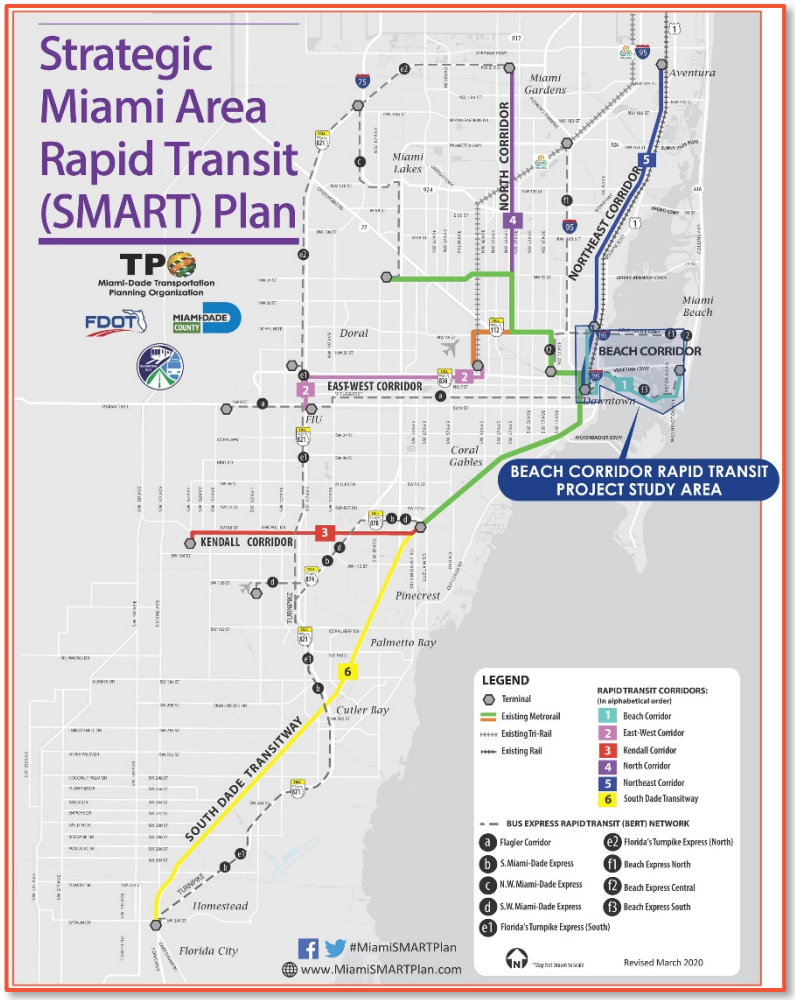


Figure 1-1 Smart Corridor Plan Map

The PER identifies DTPW's Recommended Alternative and the selection of a locally preferred alternative (LPA) for the Beach Corridor by the Miami-Dade County TPO Governing Board.

1.2. STUDY AREA

The project is located in the Cities of Miami and Miami Beach, Florida in Miami-Dade County. The Beach Corridor study area, shown on **Figure 1-2**, is located in the east central region of the SMART Corridor Plan and is generally bounded by I-195/Julia Tuttle Causeway on the north, I-395/MacArthur Causeway on the south, I-95 on the west, and Washington Avenue on the east.

Figure 1-2 Study Area

1.3. PURPOSE & NEED

The purpose of this project is to increase the person-throughput to the Beach Corridor's major origins and destinations via a rapid transit technology. The need for the project is the extensive population growth throughout the study area resulting in ever-increasing traffic congestion and the demand for enhanced access to the area's employment, facilities, and services.

The Beach Corridor traverses an area that is at the epicenter of population and economic growth within Miami-Dade County. The City of Miami Central Business District (CBD) area and Miami Beach have undergone rapid population and employment increases over the past decade, a trend that is projected to continue over the next 20 years. The population densities in the study area are among the highest in the nation, with the Miami CBD at 17,800 persons per square mile and Miami Beach at 11,500 persons per square mile, per the 2010 U.S. Census. The Miami CBD saw a dramatic 172 percent increase in population density over the last decade. The Miami Beach area includes major health facilities such as Mt. Sinai Medical Center, residential and retail uses, and major 24-hour hotels that provide service jobs for people residing throughout Miami-Dade County.

In addition to travel needs to accommodate future regional growth, tourism travel patterns exacerbate the existing roadway network conditions. Tourism travel patterns encompass visitors who are 'people not residing or working in the region'. These trips and patterns are outside of the typical commuter peak travel patterns. The region's appealing qualities, such as its temperate climate; attractive beaches; and convenient access to the Caribbean and Latin America, South Florida, and Miami-Dade County, has made the area an important tourist destination for both national and international visitors. The county hosts millions of annual visitors and seasonal residents. Visitors typically access the study area via tour bus, taxi, or rental car.

In 2018, Greater Miami and the Beaches attracted a record 16.5 million overnight visitors and an additional 6.8 million day-trippers. Miami Beach and Downtown Miami are the two most popular locations for overnight stays, lodging nearly 50 percent of all 2018 Greater Miami area visitors with approximately 6.1 million and 1.6 million overnight guests, respectively. Additionally, the most visited attractions, according to the Greater Miami Chamber, are in proximity to the Beach Corridor, including South Beach, the Beaches, Lincoln Road, Bayside Market Place, and Downtown Miami.

This high rate of tourism contributes significantly to the area's economy. Tourism generates additional demand for travel, produces additional trips within the area, and contributes to an overall increase in traffic congestion. Tourism related travel patterns are different from the regular weekday commute travel patterns. Hotels on the Beach are open 24 hours a day/7 days a week and service workers have shifts throughout the day. Weekend attractions are also more prevalent and less likely to follow commute patterns. As a result, the existing transportation infrastructure is unable to adequately accommodate the entirety of current and projected travel demand. On the Greater Miami Convention and Visitor's Bureau website, yearly visitor Industry Overview reports are found which includes results of a yearly survey they conduct of 15,000 visitors. Data collected from questions administered on the Bureau's Visitor Survey highlight that traffic congestion is considered the top negative aspect of trips to Greater Miami and Miami Beach and it has been the top-ranked problem in each of their last eight annual Visitor Surveys.

To meet the project's purpose and need, goals were established that would accommodate the high travel demand throughout the study area and provide relief to the extreme traffic congestion along the surface streets. The project goals are:

- Connect to and provide direct, convenient, and comfortable rapid-transit service via a new transit connection to the existing regional system in Miami to serve existing and future planned land uses which include additional residential and commercial uses in Downtown Miami as well as Miami Beach.

- Provide enhanced interconnections with Metrorail, Tri-Rail, Brightline, Metromover, and Metrobus routes; Broward County Transit (BCT) bus routes; Miami and Miami Beach circulators; jitneys; shuttles; taxis; Transportation Network Companies (TNCs) such as Uber and Lyft; and/or other supporting transportation services; and

- Promote pedestrian and bicycle friendly solutions in the corridors of the study area by incorporating bike share facilities at major transfer facilities and pedestrian infrastructure access to all new stations.

The development of project alternatives will seek to provide connections to existing transit systems for enhanced future commuter and tourism travel opportunities in the region. Each of the viable alternatives developed for this project will assure that bicycle and pedestrian accommodations can be incorporated.

1.4. PROJECT CORRIDOR AND SUB-AREAS

The study corridor is characterized by:

- Mixed-use development, including areas of high residential and employment density;
- A diverse population with a higher-than-countywide minority percentage and a lower median household income than county and national levels;
- Limited transportation pathways, with high average daily traffic volumes and congestion on the expressways and major roadways;
- Historic, cultural, and recreational resources;
- Wetlands and critical habitats for protected species;
- Land uses sensitive to noise and vibration effects;
- Special flood hazard area (SFHA) designation for nearly 50 percent of the corridor; and
- A navigable waterway (the Atlantic Intracoastal Waterway, aka Biscayne Bay).

The study area is comprised of three sub-areas along this project corridor, featuring distinct segments of travel demand and origin/destination pairs and varying in their land use and environmental characteristics. Therefore, each sub-area alternative will have logical termini and independent utility.

In discussing the three sub-areas and corridor alignments, the following terms are used frequently throughout this document:

Trunkline – The east-west segment crossing over Biscayne Bay via either McArthur Causeway or Julia Tuttle Causeway. The Trunkline always refers to the MacArthur Causeway crossing except for the Bus Rapid Transit (BRT) Alternative which includes options of utilizing either MacArthur Causeway or Julia Tuttle Causeway to cross over the bay.

Bay Crossing – Used interchangeably with the term Trunkline as defined above. Also refers to the Bay Crossing sub-area described below.

Bay Crossing Trunkline – Used interchangeable with the terms Trunkline and Bay Crossing.

I-395 – Interstate name for McArthur Causeway. References to I-395 and MacArthur Causeway are used interchangeably throughout the document.

I-195 – Interstate name for Julia Tuttle Causeway. References to I-195 and Julia Tuttle Causeway are used interchangeably throughout the document.

The Bay Crossing sub-area**,** an east–west corridor between Miami Beach and Downtown Miami that would form the "Trunkline" of the project. The travel demand in this corridor could be served directly via I-395/MacArthur Causeway, or less directly via I-95/Julia Tuttle Causeway.

5th Street – Street name east of MacArthur Causeway is also known as SR A1A. References to 5th Street and SR A1A are used interchangeably throughout the document.

The Midtown/Design District sub-area, a north–south corridor starting on the west side of North Miami Avenue at 15th Street, and then moving to the median of Miami Avenue from north of NW 19th Street to NW 41st Street in the City of Miami's Design District.

The Miami Beach sub-area is a north-south corridor extending from Washington Avenue and 5th Street to the Miami Beach Convention Center.

Key distinguishing characteristics are described further below in **Section 4.2.3. Contextual Considerations for Alternatives Development**.

1.5. PROJECT HISTORY

The Beach Corridor Rapid Transit PD&E study builds on prior studies dating back to 1988. **Figure 1-3** depicts the progression of these studies between 1988 and 2017. Considerations for this current study include addressing new sea level rise regulations, new existing conditions along the MacArthur Causeway (transit envelope preserved in median was used for Miami Tunnel construction) and additional congestion from major growth in both Miami and Miami Beach.

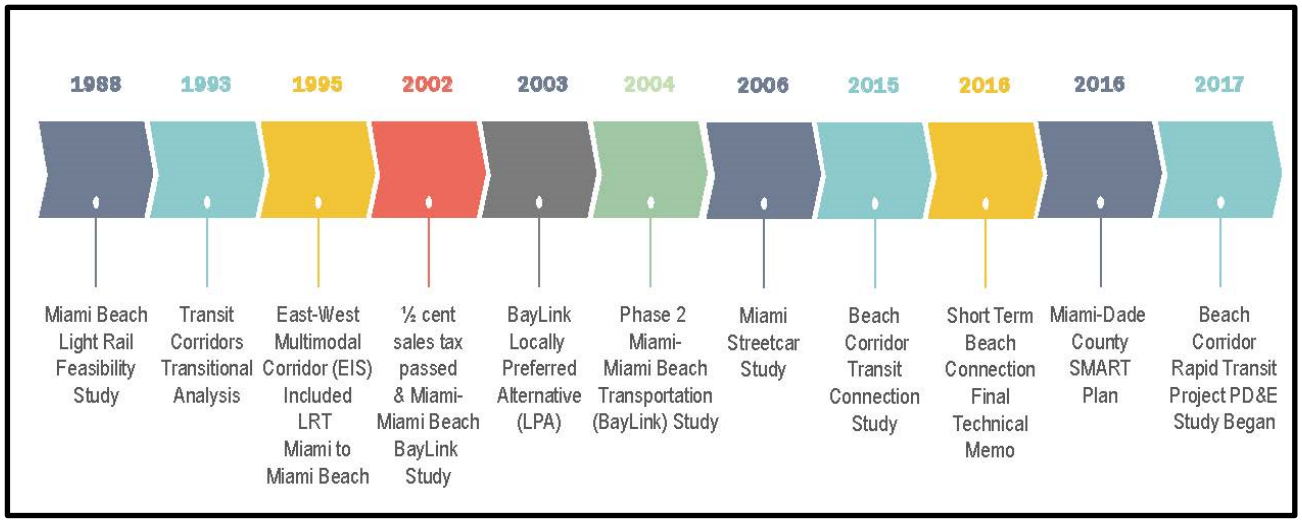


Figure 1-3 Project History

1.6. COMMITMENTS

The following commitments have been made during the project development process. Additional commitments may be added and/or modifications to the commitments listed below may be made in the latter phases of project development or in future project phases.

- Per the FTA Manual, elevated structure mass transit systems rarely cause vibration issues with building structures located more than 50 feet from the guideway support.
- The project will be conducted in accordance with Title VI of the Civil Rights Act of 1964 and Executive Order 12898 regarding environmental justice to ensure that there are no disproportionate effects on underrepresented population groups, including disabled/handicapped persons, minorities, persons with limited English proficiency (LEP), and low income.
- A Public Involvement Plan (PIP) will continue to be implemented. The PIP will include LEP accommodations.
- Public input on the aesthetic features of the transit guideway will be solicited during the design phase.
- If necessary, DTPW will carry out a Right of Way Acquisition and Relocation Assistance Program.
- If necessary, a Conceptual Stage Relocation Plan will be developed for the project.
- The Watson Island Baywalk Park is a National Park Service Land and Water Conservation Fund (LWCF) Act site and, therefore, will not be used as a staging area.
- A Stormwater Pollution Prevention Program (SWPPP) will be implemented to dictate the use of best management practices during construction to minimize impacts to Biscayne Bay.
- The fixed guideway system will operate in exclusive right-of-way to ensure system speed and reliability and to avoid conflicts with automobile and pedestrian traffic.
- A survey for Florida bonneted bat will be conducted prior to construction following the latest survey guidelines from the U.S. Fish and Wildlife Services (USFWS) in place at the time.
- The project will follow the *Standard Manatee Conditions for In-Water Work* (2011), the *Sea Turtle and Smalltooth Sawfish Construction Conditions* (2006) and the *Standard Protection Measures for the Eastern Indigo Snake* (2013) during construction.

- Best Management Practices for turbidity, erosion and sediment control will be utilized during construction to minimize impacts to the social, natural and physical environments and meet the no net increase in turbidity standards required for Biscayne Bay.
- Contamination sites with a High and Medium risk to the project will be reassessed during final design.
- Coordination and consultation with regulatory agencies, including U.S. Coast Guard (USCG), U.S. Army Corps of Engineers (USACE), USFWS, National Marine Fisheries (NMFS), South Florida Water Management District (SFWMD), Florida Department of Environmental Protection (FDEP), Florida Fish and Wildlife Conservation Commission (FWC), State Historic Preservation Officer (SHPO), and Miami-Dade County Department of Regulatory and Economic Resources (RER) will continue during the design, permitting and construction phases of the project.
- Once a preferred site has been selected for the Miami Extension Maintenance and Operations facility adjacent to North Miami Avenue, further coordination with SHPO will occur and a Cultural Resources Assessment Survey will be performed for that site.

1.7. LIST OF TECHNICAL DOCUMENTS

The following technical support documents were prepared in conjunction with this project:

- Existing Conditions Traffic/Design Traffic Technical Memorandum
- Maintenance and Operations Facility Sites Identification & Preferred Sites Evaluation Report
- Sustainability/Sea Level Rise Technical Memorandum
- Public Involvement Plan
- Public Involvement Summary Report
- Travel Demand and Ridership Report
- Capital Cost Report
- O&M Cost Report
- Location Hydraulics Report
- Geotechnical Report
- Utility Impact Assessment Memorandum
- Section 106 Effects Case Study Report
- Noise and Vibration Study Report
- Contamination Screening Evaluation Report (CSER)

- Conceptual Stage Relocation Technical Memorandum
- Natural Resources Evaluation Report
- Cultural Resource Assessment Survey Report (CRAS)
- Sociocultural Effects Evaluation (SCE) Technical Memorandum
- Visual and Aesthetic Conditions Report
- Station Locations Analysis Report
- Independent Utility Technical Memorandum
- Traction Power Load Flow Report
- Vehicle Maintenance Facility Site Title VI Analysis

SECTION 2. EXISTING CONDITIONS & ENVIRONMENTAL CONSIDERATIONS

2.1. INTRODUCTION

To establish a baseline for the analysis of alternatives, this section summarizes existing roadway and structures infrastructure; utilities; existing and projected future traffic conditions; transit service; and elements of the environment including social and economic, cultural, natural and physical.

2.2. EXISTING ROADWAY AND STRUCTURES INFRASTRUCTURE

2.2.1. Existing Roadway Characteristics

Table 2-1 summarizes the roadway characteristics for the study corridors. The roadway characteristics were collected from FDOT Straight Line Diagrams (SLDs) and field reviews. Additional roadway geometry details for roadway links are provided in the *Project Existing Conditions Traffic Report*. Existing traffic conditions, including channelization of traffic lanes and traffic signals are provided in **Section 2.5. Existing Traffic Conditions.** It should be noted that the table does not include Julia Tuttle Causeway since traffic analyses and other information was not collected for that corridor. Information pertinent to Julia Tuttle Causeway is provided in the traffic report for the Beach North Express Corridor of the Beach Express Rapid Transit study.

Table 2-1 Roadway Characteristics

Location and Approximate Limits	Median Treatment	Facility Type	# of Lanes	Posted Speed (MPH)	Side walks	Bike Lanes
41st Street						
N Miami Ave to NE 2nd Ave	Undivided	Collector	2	30	Y	N
39th Street						
N Miami Ave to NE 2nd Ave	Undivided	Collector	2	30	Y	N

Table 2-1 Roadway Characteristics						
Location and Approximate Limits	**Median Treatment**	**Facility Type**	**# of Lanes**	**Posted Speed (MPH)**	**Side walks**	**Bike Lanes**
NE 38th Street						
N Federal Hwy to Biscayne Blvd	One-way	Collector	2	30	Y	N
Biscayne Blvd to NE 6th Ave	Undivided		3			
36th Street						
West of N Federal Highway	Undivided	Minor Arterial	4	30	Y	N
N Fed Hwy to Biscayne Blvd	Painted Divided		4			Y(3)
Biscayne Blvd to I-195 EB Ramp	Raised Divided		2			Y(3)
US-1/Biscayne Boulevard						
NE 38th St to NE 41st St	Raised Divided	Principal Arterial	4	35	Y	N
NE 38th St to 34th St	Undivided			30		
North Federal Highway						
North of 36th St	Undivided	Local Road	4	30	Y	Y(1)
South of 36th St						N
NE 2nd Avenue						
N of 41st St	Undivided	Local Road	2	35	Y	Y(1)
41st St to 40th St	Painted Divided	Minor Arterial	2			
40th St to NE 36th St	Undivided		3			
North Miami Avenue						
N of 41st St	Painted Divided	Minor Arterial	4	40	Y	Y(2)
41st St to NW 39th St	Undivided			30		
NW 39th St to NE 36th St	Painted Divided					
NE 36th St to NE 29th St	Raised Divided					
NE 29th St to N 20th St	Undivided					N
N 20th St to NW 19th St	Painted Divided		2			Y(1)
NW 19th St to NE 17th St	Undivided		2			Y(1)
NE 17th St to NW 14th St	One-way		3			N
NW 14th St to NW 6th St.			3			N
NE 1st Avenue						
NE 17th St to NE 14th St	One-way	Major Collector	3	30	N	N
NE 7th Street						
N Miami Ave to NE 1st Ave	One-way	Major Collector	3	30	N	N
NE/NW 14th Street						
W of N Miami Ave	Undivided		2	30	Y	

Table 2-1 Roadway Characteristics						
Location and Approximate Limits	**Median Treatment**	**Facility Type**	**# of Lanes**	**Posted Speed (MPH)**	**Side walks**	**Bike Lanes**
N Miami Ave to NE 2nd Ave		Major Collector				Y
NE 2nd Ave to N Bayshore Drive			4			
NE 10th Street						
N Miami Ave to NE 2nd Ave	One-way	Major Collector	2	35	Y	N
NE 2nd Ave to US-1/Biscayne Blvd	Undivided		3	30		
SR A1A/MacArthur Causeway						
Biscayne Blvd to the Port Miami Tunnel	Raised Divided	Principal Arterial	8	45	N	N
E of the Port Miami Tunnel to West Ave			6			
Alton Road to West Ave			4	30	Y(3)	Y(2)
5th Street/SR A1A						
Alton Road to Lenox Ave	Raised Divided	Principal Arterial	4	35	Y	Y(1)
Lenox Ave to Washington Ave			6			
East of Washington Avenue			5			
4th Street						
East of Lenox Avenue to Meridian Avenue	Painted Divided	Minor Arterial	2	25	Y	N
6th Street						
East of Lenox Avenue to Meridian Avenue	Painted Divided	Minor Arterial	2	25	Y	N
17th Street						
West of Alton Rd	Undivided	Major Collector	2	30	Y	N
Alton Rd to Washington Ave	Painted Divided		4			
E of Washington Ave	Undivided		4			
Dade Boulevard, E of West Ave to 23rd St	Painted Divided	Minor Arterial	4			
Washington Avenue						
S of 5th St	Raised Divided	Major Collector	4	25	Y	Y(2)
N of 5th St to Dade Blvd				35		Y(2)
Alton Road						
5th St to 7th St	Raised Divided	Minor Arterial	4	35	Y	Y(2)
7th St to 9th St	Painted Divided					Y(2)
9th St	Raised Divided					Y(3)
9th St to 13 St	Painted Divided					Y(3)

Notes: (1) Dedicated Bike Lanes, (2) Designated Shared Use Lanes/Sharrows (3) Multi-Use Path

2.2.2. Aesthetics and Lighting Features

Existing aesthetics features vary throughout the study area. Examples of typical landscaping features on the major study alignments are shown in **Figure 2-1**.


Street trees along North Miami Avenue


Median landscaping on MacArthur Causeway


Median landscaping on Alton Road


Landscaping on Washington Avenue

Figure 2-1 Landscaping Features

An inventory of the existing landscape, hardscape, and lighting features on major alignments within the study area are listed in **Table 2-2.** Typical aesthetics, streetscape, and hardscape features that exist within the study area are highlighted in **Figure 2-2** and include, but are not limited to:

- Colored/Imprinted Sidewalks, Crosswalks, and Medians
- Gateway Monuments
- Street Furniture/Benches
- Light Pole-Mounted Banners
- Trash Receptacles
- Decorative Street Lighting
- Pedestrian-Scale Signage/Lighting
- Decorative Planters

Table 2-2 Existing Landscape, Aesthetics, and Lighting Features

Location	Landscaping		Aesthetic Features	Lighting		
	Sidewalk	Median		Standard	Decorative	Pedestrian
NE 38th Street	✓			✓	✓	
36th Street	✓		Planters		✓	
US-1/Biscayne Boulevard	✓	✓	Banners, Colored/Imprinted (CI) Medians	✓		
North Federal Highway				✓		
NE 2nd Ave (North)	✓				✓	
North Miami Avenue						
S of 41st St to NE 38th St			TBD	✓		
S of 38th St to NE 29th St	✓	✓	Planters, CI sidewalks (SW)	✓	✓	
S of NE 29th St to N 20th St	✓			✓		
S of N 20th St to NW 14th St	✓			✓		
S of 14th St to NW 6th St.	✓		Banners	✓		
NE 11th Street	✓			✓		
NW & NE 14th Street	✓			✓		
SR A1A/5th Street/MacArthur Causeway	✓	✓	Banners	✓		
17th Street	✓	✓				
Washington Avenue	✓	✓	CI SW, Crosswalks, Medians	✓	✓	✓
Alton Road	✓	✓	Monument, CI SW, Crosswalks, Medians	✓	✓	✓
Interstate-195				✓		
Julia Tuttle Causeway		✓	Monument	✓		

Figure 2-2 Aesthetics Features within the Study Area

2.2.3. Railroad Crossings

The Florida East Coast (FEC) Railway rail corridor is located within the study limits. This FEC Railway line provides freight train service from PortMiami. I-395 crosses over the FEC Railway, and there are two at-grade rail crossings within the study limits: North Miami Avenue at NW 19th Street and North Miami Avenue between NE 7th Street and NE 6th Street.

The train 2019 schedule published online by the FEC Railway indicates that FEC Railway Trains 222 and 226 typically run in the northbound direction departing PortMiami at noon and 6:00 p.m. seven days a week. The Brightline Trains USA Miami central station is located at 600 NW 1st Avenue. Based on train schedules provided at gobrightline.com, the train typically departs the Miami station (to either Fort Lauderdale or West Palm Beach) on an hourly basis Monday through Friday from 6:50 am until 11:50 pm. On Saturdays, trains typically depart Miami hourly between the hours of 8:50 am and 11:50 pm. On Sundays, typical departure times are from 9:50 am until 12:20 am the next morning. Some variations to the schedule occur in order to provide ample time to arrive at, and depart from, Miami HEAT basketball games. According to a December 2019

article in the Sun Sentinel, the railroad is expected to have revised passenger departure times in 2020, with more trains leaving its Miami, Fort Lauderdale and West Palm Beach stations.

2.3. EXISTING UTILITIES

Activities undertaken to identify public- and privately-owned utilities within the study limits since the inception of the project included field reviews and numerous Sunshine State One Call (Sunshine811®), which listed 33 utility agencies/owners (UAOs) with facilities within the study limits. Potentially affected UAOs were contacted for information relating to the size, type, and location of their facilities within the limits of the study. In addition, roadway and structures as-built plans were reviewed, and meetings with the I-395 contractor and the Miami-Dade Water and Sewer Department (WASD) to identify potential conflicts associated with the study alignments.

The locations of existing major utilities are summarized in **Table 2-3**, and **Figures 2-3** and **2-4**. Existing utilities identified during the PD&E Study are illustrated on the concept roll plots. For the purpose of this planning level analysis, "major" utilities were defined as:

- Vaults, manholes, valves, fire hydrants, and other identifiable utility structures
- Gas lines with a diameter of four inches or greater
- Water and sewer pipes/mains with a diameter of six inches or greater
- Buried and subaqueous power duct banks and aerial distribution and transmission power lines
- High-capacity fiber-optic cables and telecommunications/fiber-optic duct banks

Potential utility conflicts associated with the LPA are documented in the PD&E study Utility Assessment Memo concept plans and utility conflict matrices. The primary types of utility conflicts that have been identified are associated with station footprint and pier foundation conflicts with buried utilities and vertical clearance for both overhead and buried utilities.

Table 2-3 Utility Agency Owners

	Utility Agency/Owner (UAO) and Utility Type *Key: Buried Electric (BE), Cable TV (CATV), Fiber Optic (FO), High-Capacity (HC), Intelligent Transportation Systems (ITS), Overhead Electric (OE), Reclaimed Water (RCW), Sewer (S), Water (W)*		N Miami Ave	Biscayne Blvd	NW 1st Ave	NE 2nd St	NE 5th St	NE 8th St	NE 11th St	NE 13th St	NE 14th St	NE 17th St	NE 1st Ave	NE 41st St	NE 36th St (US27)	NE 38th St	NE 2nd Ave	MacArthur Cswy	Miami Beach		I-195 (Julia Tuttle Cswy)
																			NE 5th St	Washington Ave	
1	A T & T/ Distribution	Tel, FO	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●
2	AT&T Corporation (Transmission)	HC FO	●	●	●	●	●	●						●						●	
3	American Traffic Solutions	ITS	●											●	●						
4	Atlantic Broadband	FO	●		●	●	●	●	●	●	●	●		●			●	●	●	●	
5	CenturyLink	CATV/ FO	●		●	●	●	●			●		●	●	●	●					
6	City of Miami Beach Utilities	W/S/ RCW												●			●	●	●	●	●

Table 2-3 Utility Agency Owners

	Utility Agency/Owner (UAO) and Utility Type *Key: Buried Electric (BE), Cable TV (CATV), Fiber Optic (FO), High-Capacity (HC), Intelligent Transportation Systems (ITS), Overhead Electric (OE), Reclaimed Water (RCW), Sewer (S), Water (W)*		N Miami Ave	Biscayne Blvd	NW 1st Ave	NE 2nd St	NE 5th St	NE 8th St	NE 11th St	NE 13th St	NE 14th St	NE 17th St	NE 1st Ave	NE 41st St	NE 36th St (US27)	NE 38th St	NE 2nd Ave	MacArthur Cswy	Miami Beach		I-195 (Julia Tuttle Cswy)
																			NE 5th St	Washington Ave	
7	Comcast Cable	CATV/ FO	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
8	Crown Castle Fiber	FO								●				●				●		●	●
9	Crown Castle Ng	FO	●															●	●	●	●
10	FDOT District 6 ITS	FO	●	●	●	●	●	●	●	●		●		●	●	●	●	●			●
11	Fiberlight	FO	●	●	●	●	●	●													
12	Fibernet Direct	FO	●	●	●	●	●	●				●			●	●					
13	Florida Gas Transmission	Gas	●							●	●	●					●				
14	Florida Power & Light (FP&L) Distribution	OE/BE	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
15	FP&L Subaqueous & Transmission	BE	●	●	●	●	●	●	●		●	●					●	●	●		
16	Hotwire Communications	FO	●	●	●	●		●		●	●		●	●	●	●	●	●	●	●	
17	Intermetro Fiber	FO	●		●	●	●														
18	Level 3 Communications	FO	●	●	●	●	●	●			●		●		●	●					
19	Mastec Inc.	FO								●				●							●
20	MCI Communications	FO	●	●	●	●	●	●	●	●		●		●	●	●	●	●	●	●	●
21	Miami-Dade County Central Support	Cooling	●	●	●	●	●	●	●								●				
22	Miami- Dade Enterprise Technology	ITS	●	●	●	●	●	●									●				
23	Miami-Dade County Traffic	ITS	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●
24	Miami-Dade County Water & Sewer	W/S	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●				
25	Resurgence Infrastructure	FO																			
26	Sprint	FO	●					●			●		●	●	●	●					
27	Strome Networks	FO	●					●													
28	TECO Peoples Gas	Gas	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
29	Traffic Management Solutions	FO				●			●										●		
30	Windstream Communications	Tel, FO	●		●		●	●	●	●	●	●	●	●	●	●					
31	XO Communications	FO	●	●	●	●	●	●													
32	Zayo Group	FO	●	●	●	●	●	●													

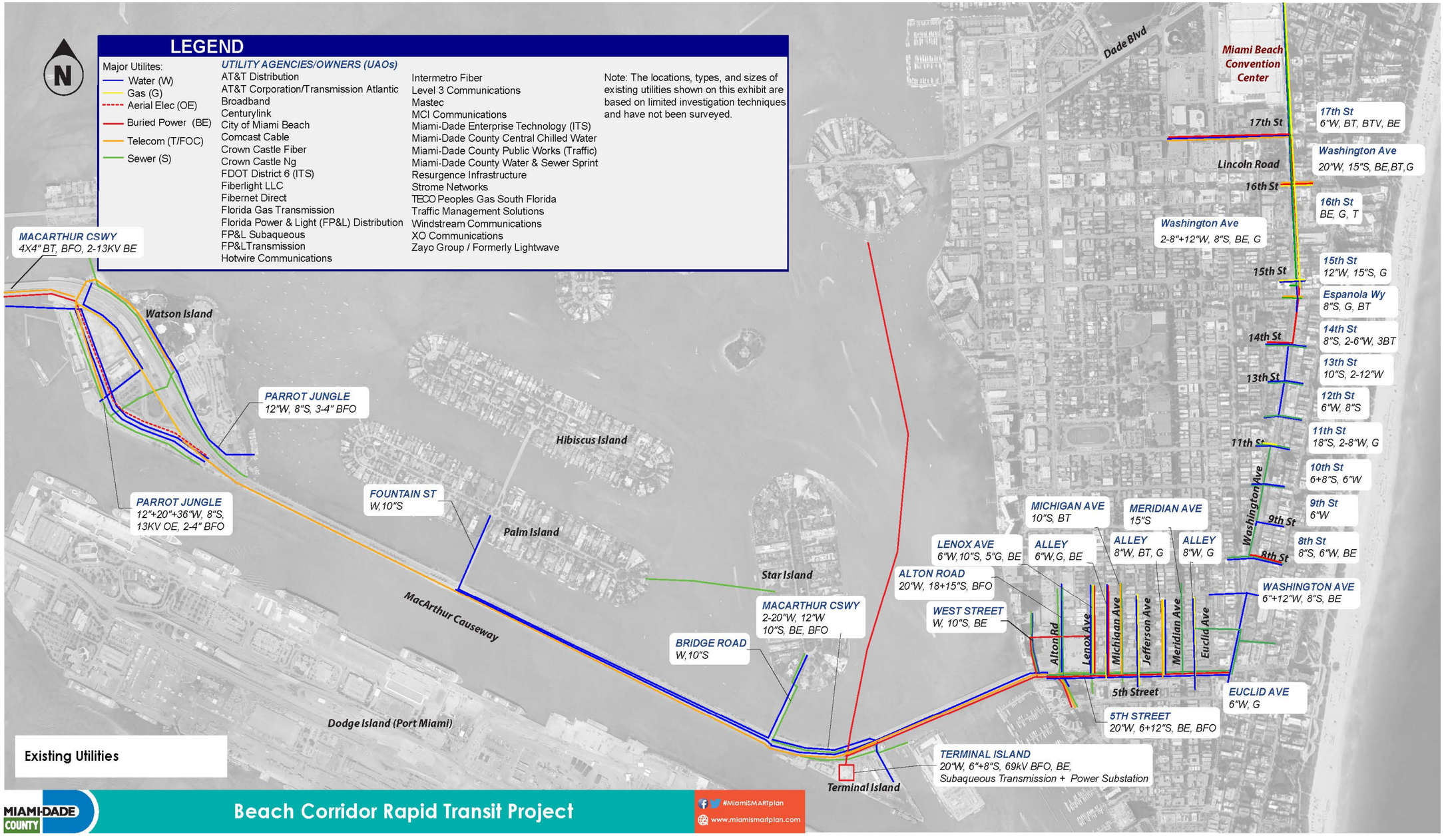


Figure 2-3 Existing Utilities – MacArthur Causeway/I-395 (Trunkline)

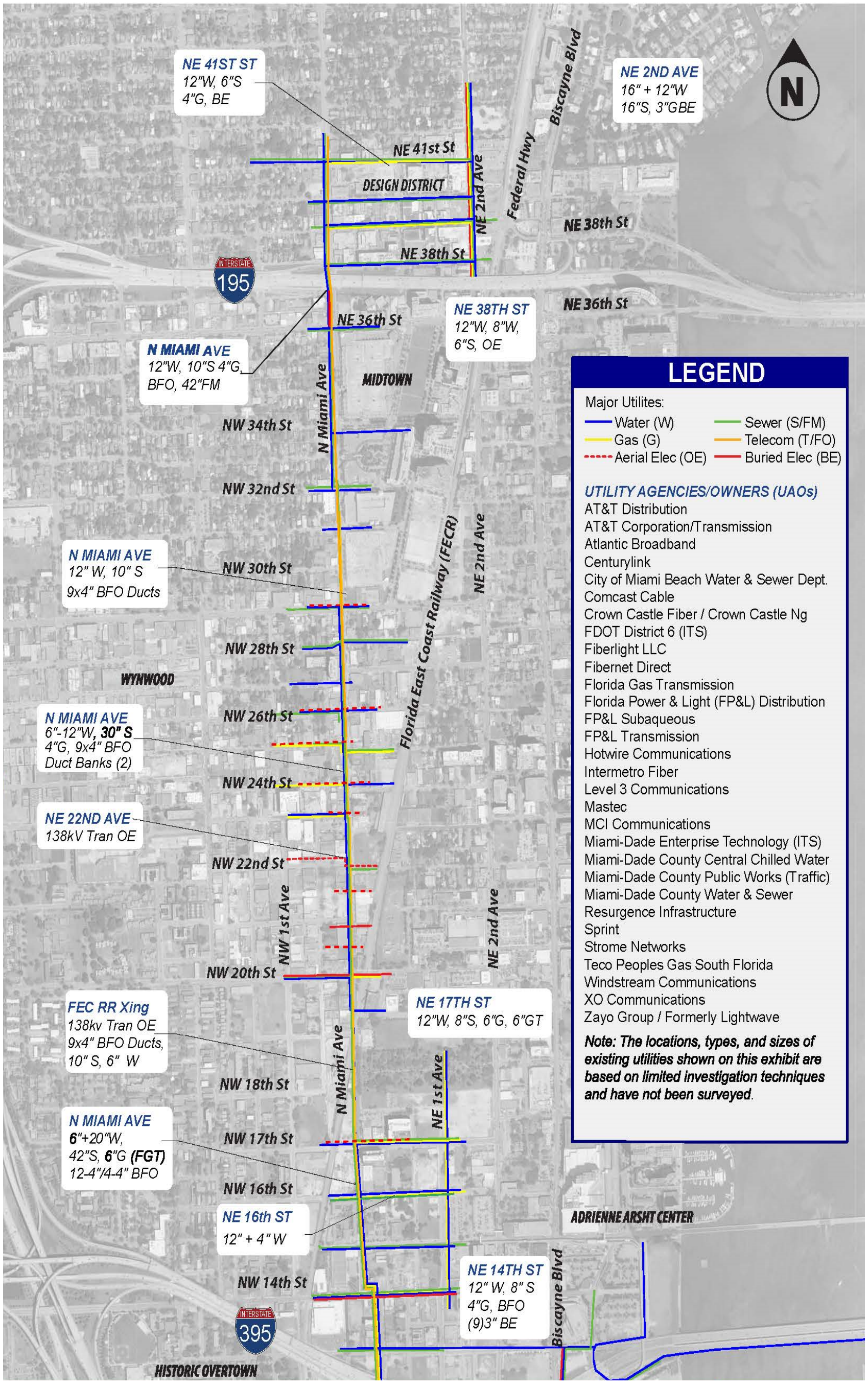


Figure 2-4 Existing Utilities – North Miami Avenue

2.4. STRUCTURAL CONSIDERATIONS--EXISTING BRIDGES AND CAUSEWAYS

Existing structures in the corridor that cross Biscayne Bay are key considerations in the evaluation of potential transit technologies and modes. The bridge crossings on the MacArthur Causeway consist of three structures. Bridge Nos. 870771 and 870772, which were completed in 1996 and 1995 respectively, were originally designed as three-lane bridges carrying westbound and eastbound traffic respectively over Biscayne Bay. Both bridges underwent superstructure and substructure widening in 2013 to add an additional lane of traffic to bring them to their current-day configuration of four traffic lanes in each direction. The third structure is Bridge No. 870077, designed in 1956, as a six-lane highway carrying both westbound and eastbound traffic over the east channel of MacArthur Causeway.

2.4.1. Bridge No. 870771 (WB MacArthur Causeway) and No. 870772 (EB MacArthur Causeway)

The overall lengths of the westbound and eastbound bridges are 2,467 feet, 8-5/8 inches and 2,454 feet, respectively. The westbound bridge superstructure consists of two, three-span continuous deck units and three, four-span continuous deck units, whereas the eastbound bridge superstructure consists of three, three-span continuous deck units, two, four-span continuous deck units, and a single simple span unit. Both bridges use post-tensioned Florida Bulb-T 72 beams. The end bents are founded on 42-inch drilled shafts and the piers on either 48-inch or 84-inch drilled shafts.

In 2013 these bridges were widened to the inside within the original median gap of 30 feet, 4 inches (see **Figure 2-5**). Single piers were constructed to accommodate the widening of both bridges. Exterior substructure and superstructure widening was also done on spans 15-18 for the eastbound bridge. The operational and inventory load ratings of the eastbound bridge are 1.32 and 1.02 respectively. The sufficiency rating for the westbound and eastbound bridges is 84 and 85 respectively.

2.4.2. Bridge No. 870077 (WB and EB MacArthur Causeway over East Channel)

The overall length of this bridge is 2,155 feet. The bridge superstructure consists of 15 spans of 45 feet, 19 spans of 65 feet, two spans of 70 feet, and a single 105-foot span. The bridge uses AASHTO Type II beams. The end bents and piers are founded on 20-inch precast concrete piles.

In 1978, the bridge underwent several repair procedures, including cleaning and resealing joints with elastomeric compression seals, repairing spalls with epoxy mortar, constructing steel saddle-beam supports on Pier 26, painting structural steel and shoe assemblies, and installing guardrails. The sufficiency rating for the bridge is 72.

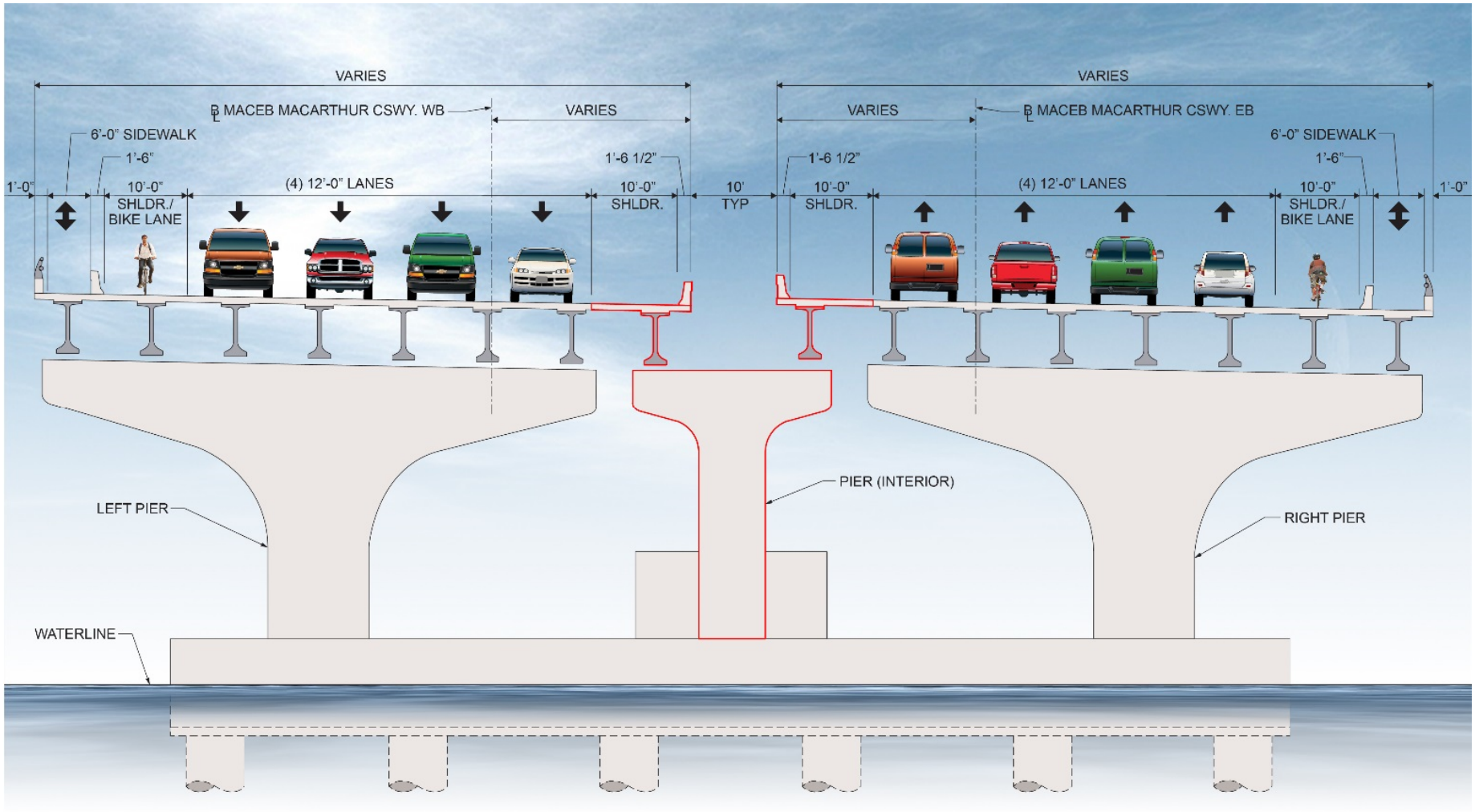


Figure 2-5 MacArthur Causeway Existing Typical Section (Bridge No. 870771 and No. 870772)

2.5. EXISTING TRAFFIC CONDITIONS

2.5.1. Overview of Existing Traffic Conditions Analysis

Existing conditions for traffic in the study area were analyzed to establish a baseline for the evaluation of the impacts of the alternatives on traffic. The analysis of existing traffic conditions is summarized here and detailed in the *Design Traffic/Travel Technical Memorandum* dated September 2019 – Revised May 2022 (Traffic Report). The Traffic Report provides a description of the Beach Corridor Rapid Transit Project traffic data collection and analysis of existing and future traffic conditions. The traffic data collection effort included traffic counts, parking data, travel-time/delay studies, and railroad crossing delay studies. The traffic data was collected during the period September 2018 to December 2018 and in April of 2021. Traffic operations were analyzed during the AM and PM peak hours at 38 study intersections and 12 supplemental intersections for a total of 50 intersections within the study segments using Synchro to identify intersection delay and Level of Service at select intersections along the proposed rapid transit alignments to ultimately facilitate a comparative assessment of alternative technologies. The Traffic Report also provides data on existing transit service and the operational performance of existing transit within the corridor. The major roadway segments within the study area as listed below:

- N. Miami Avenue (City of Miami)
- MacArthur Causeway/SR A1A
- 5th Street/SR A1A (City of Miami Beach)
- Washington Avenue (City of Miami Beach)
- 17th Street (City of Miami Beach)
- Dade Boulevard (City of Miami Beach)
- Alton Road/SR 907 (City of Miami Beach)
- Interstate 1-195/SR 112

a. *Traffic Data Collection*

Traffic data was collected during the period September 2018 to December 2018 and in April 2021. The collected data ultimately provides foundational information that is required for the Tier II analysis. The data collected include the following, with the sources of the data identified in brackets:

- Roadway Geometry (Field Data)
- Daily Traffic (24-hour) Field Counts (Field Data)
- FDOT Factor Data (Florida Traffic Online)
- Peak Hour Turning Movement Counts (Field Data)
- Travel Time (Field Data)
- Railroad Crossing Delay (Field Data)
- Queue Length (Field Data)
- On-Street Parking (Field Data)
- Signal Timing and Phasing (Miami-Dade County)

Figure 2-6 shows the respective count locations and Annual Average Daily Traffic (AADT) information for select sites on the major roadway corridors within the study area.

Figure 2-6 AADT – Select Locations

b. *Diurnal Traffic Distribution*

Figure 2-7, **Figure 2-8**, and **Figure 2-9** illustrate the daily distribution of traffic for sample locations within the study area. Each figure displays a distinctive travel pattern that is unique to its location within the study area as follows:

- **Mainland Corridor – Design District to Downtown Miami**

  Figure 2-7 illustrates the diurnal distribution charts for the daily counts done on N. Miami Avenue (north of northwest 30th Street) and Biscayne Boulevard (north of 11th Street).

  The charts show directional peaking that is characteristic of roadways that exhibit traffic flows during the morning and evening peak periods, with heavy morning southbound flows into Downtown Miami and much lighter northbound flows during the same period.

  The reverse happens during the evening peak period. The traffic in this sub-area tends to peak at around 8:30 am and around 6:00 pm.

- **The Causeways – MacArthur and Julia Tuttle**

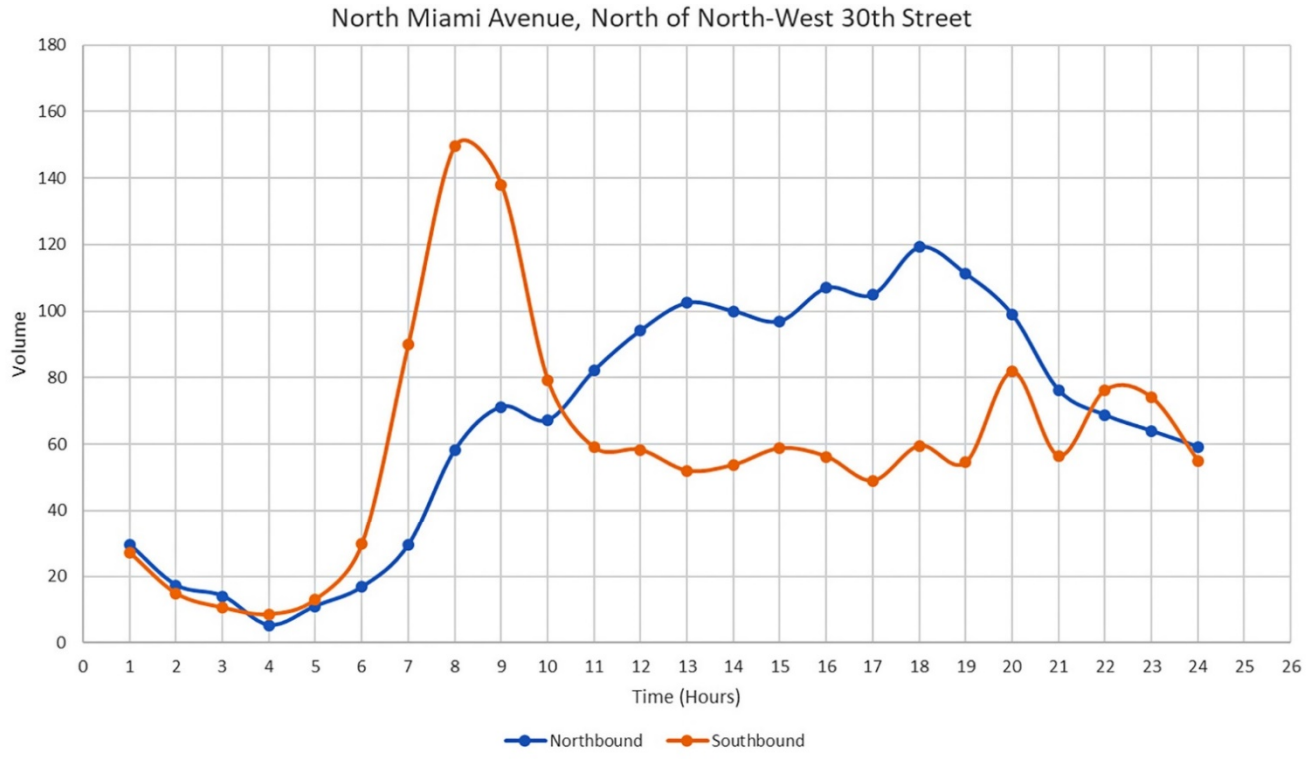
  Figure 2-8 illustrates the diurnal distribution charts for the daily counts for the study area causeways. Along the causeways directional flows tend to be more matched (equal) over the course of the day, but there still exists the typical morning and evening peaking characteristic. The traffic in this sub-area tends to peak at around 9:00 am and around 4:30 pm.

- **Miami Beach Corridor – Alton Road and Washington Avenue**

  Figure 2-9 illustrates the diurnal distribution charts for the daily counts for the counts conducted on Alton Road (south of 13th Street) and Washington Avenue (north of 12th Street).

  The Miami Beach area has unique weekday diurnal traffic characteristics with a delayed morning peak that is sustained until around 7:00 am, with weak peaking characteristics.

  The traffic in this sub-area tends to peak at anywhere from 9:30 am to noon, and around 5:00 pm.



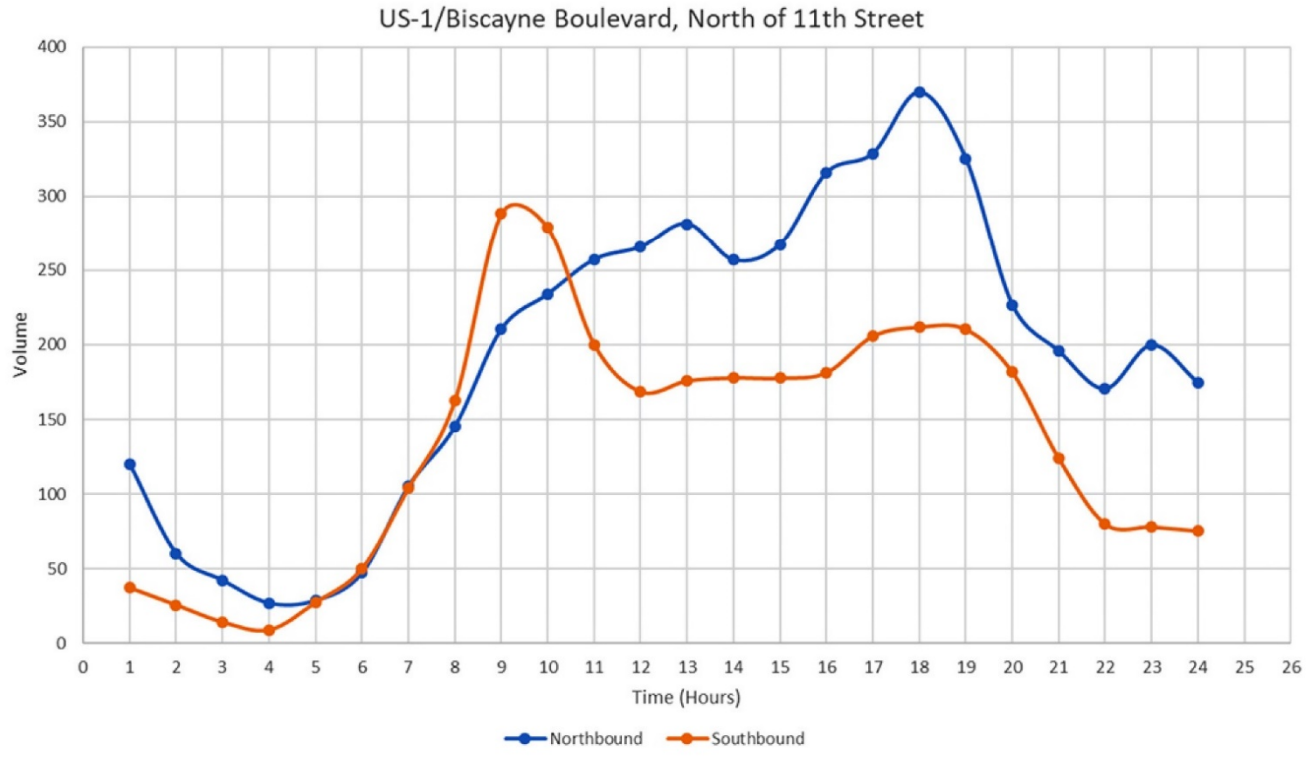


Figure 2-7 Mainland Corridor Selected Diurnal Distributions

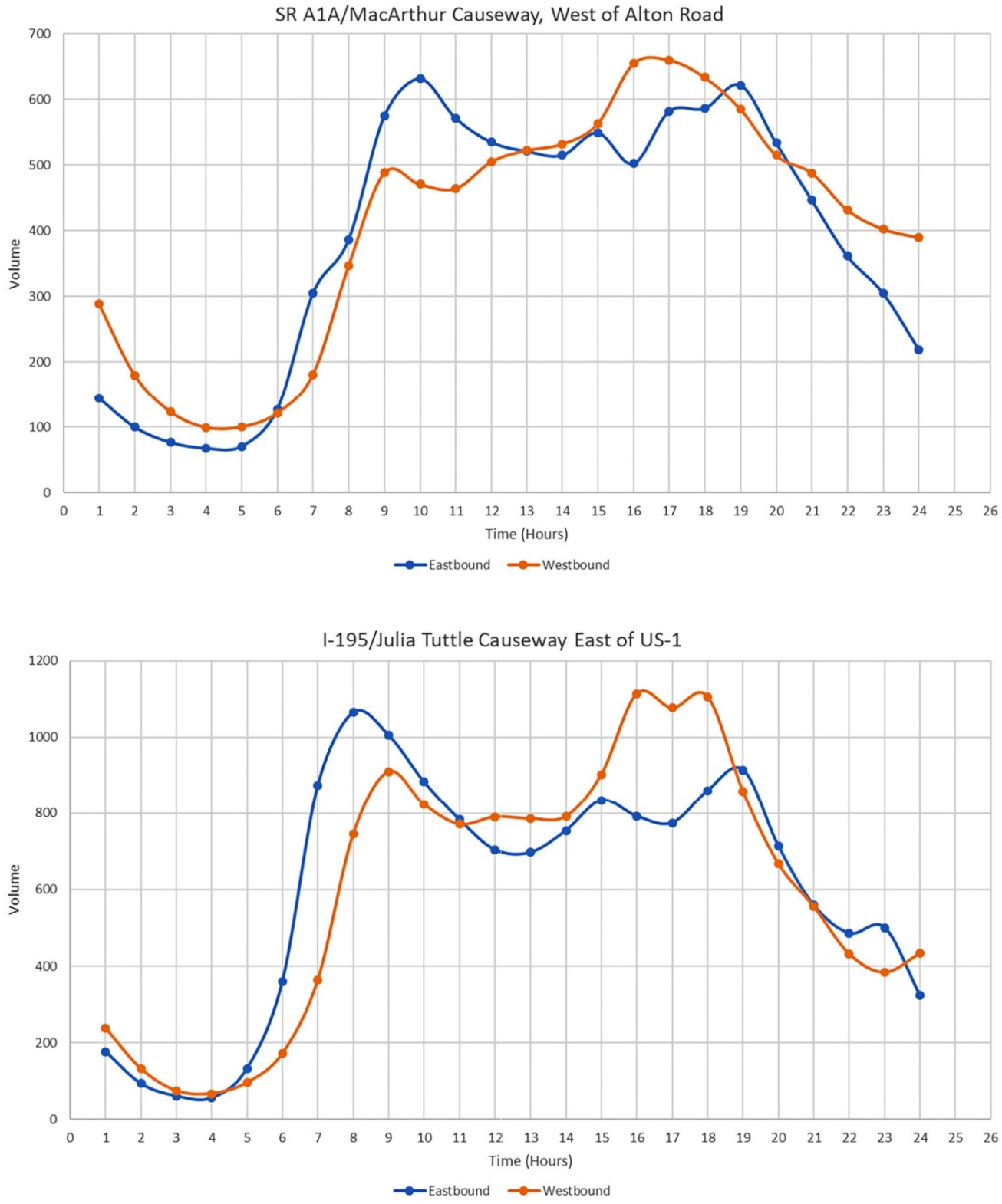
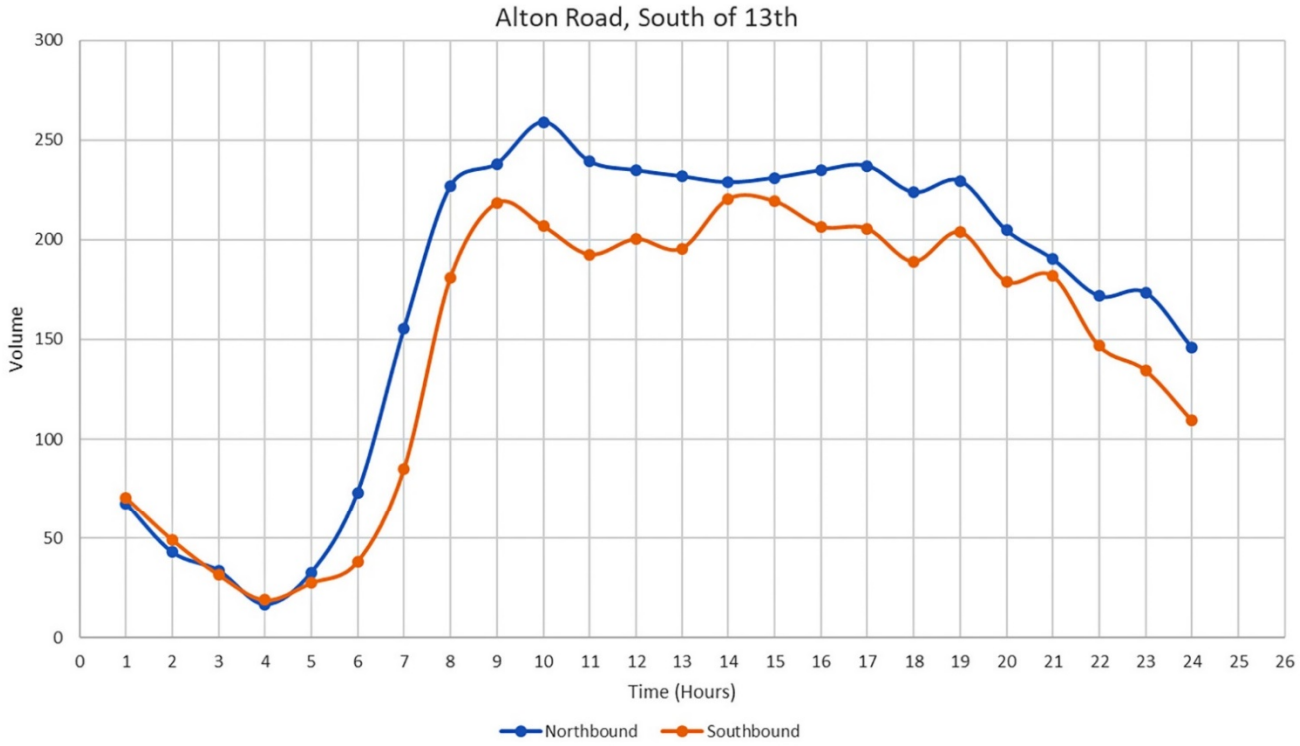


Figure 2-8 Causeways Corridor Selected Diurnal Distributions



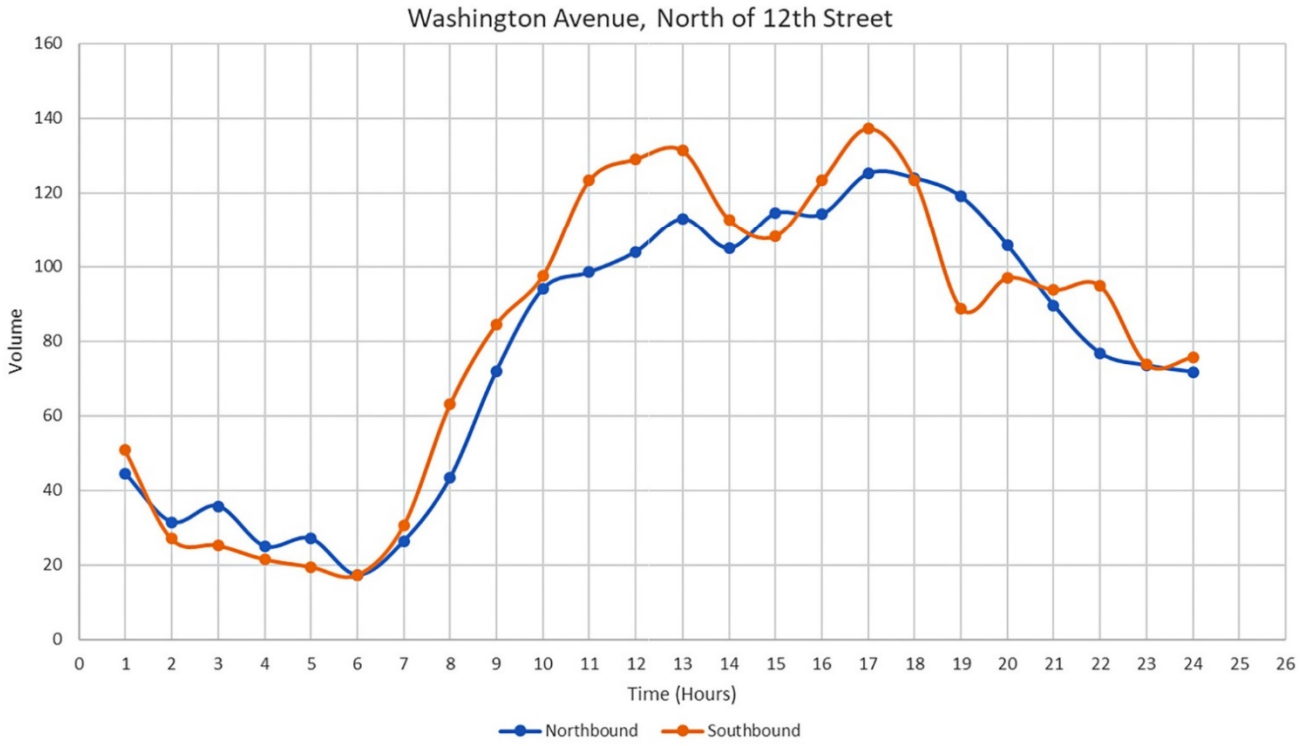


Figure 2-9 Miami Beach Corridor Selected Diurnal Distributions

c. *Travel Time Studies*

Figure 2-10 through **Figure 2-13** provides sample travel time chart information for eastbound and westbound travel, respectively, along MacArthur Causeway. This data was collected as part of the field data effort, with road sensors, during November 2018.

The graphs provide travel time variation by time of day and cumulative frequency distribution of number of trips plotted against travel time measured in minutes over the course of the study period from 6:00 a.m. to 8:00 p.m.

Peak period travel times are generally twice as long as free-flow travel time across the causeway. It should be noted that vehicles traveling along the causeway are somewhat captive, with the absence of viable alternate routes should traffic congestion set in. Heavy traffic flows can thus trigger breakdown conditions more rapidly than it would for a grid-like roadway network. As such, on a day-to-day basis, a fairly high degree of travel-time variability was observed, and can be expected into the future, for travel across the bay crossing segments.

Figure 2-13 are direct outputs from HERE Technologies® (HERE) software and the reader should focus on the red shaded areas which depict slow travel times by hour. For example, the worst condition exhibited is westbound MacArthur Causeway at the exit to I-395 between 4 and 6 pm in 2017 and 2018.

HERE data speed heat maps shown in **Figure 2-14** demonstrate that slow speeds (orange and red) occur throughout much of the day – from 8:00 a.m. to 7:00 p.m. in both directions on the MacArthur causeway. The HERE data was obtained for the periods April 2017 and April 2018. In April 2017 there was a greater degree of westbound congestion in the pm peak period (starting at 4:00 p.m.) as compared to April 2018.

d. *Queue Length Data*

Intersection queue length data was collected during the peak am and pm. Queues were observed only at signalized intersections through a combination of ground level observations and aerial drone surveillance to capture video footage in the beach corridor where possible. Due to air traffic restrictions, use of the drone was not permitted on the mainland.

Approximate queue lengths were taken by observing the number of vehicles in the queues and converting into an equivalent length by using an average vehicle length of 25 feet. At intersections with heavy traffic volumes, where possible, through movement queues were recorded separately from turning movement queues. However, more often than not, through queues were indistinguishable from turning movement queues because of the extent of queuing.

.

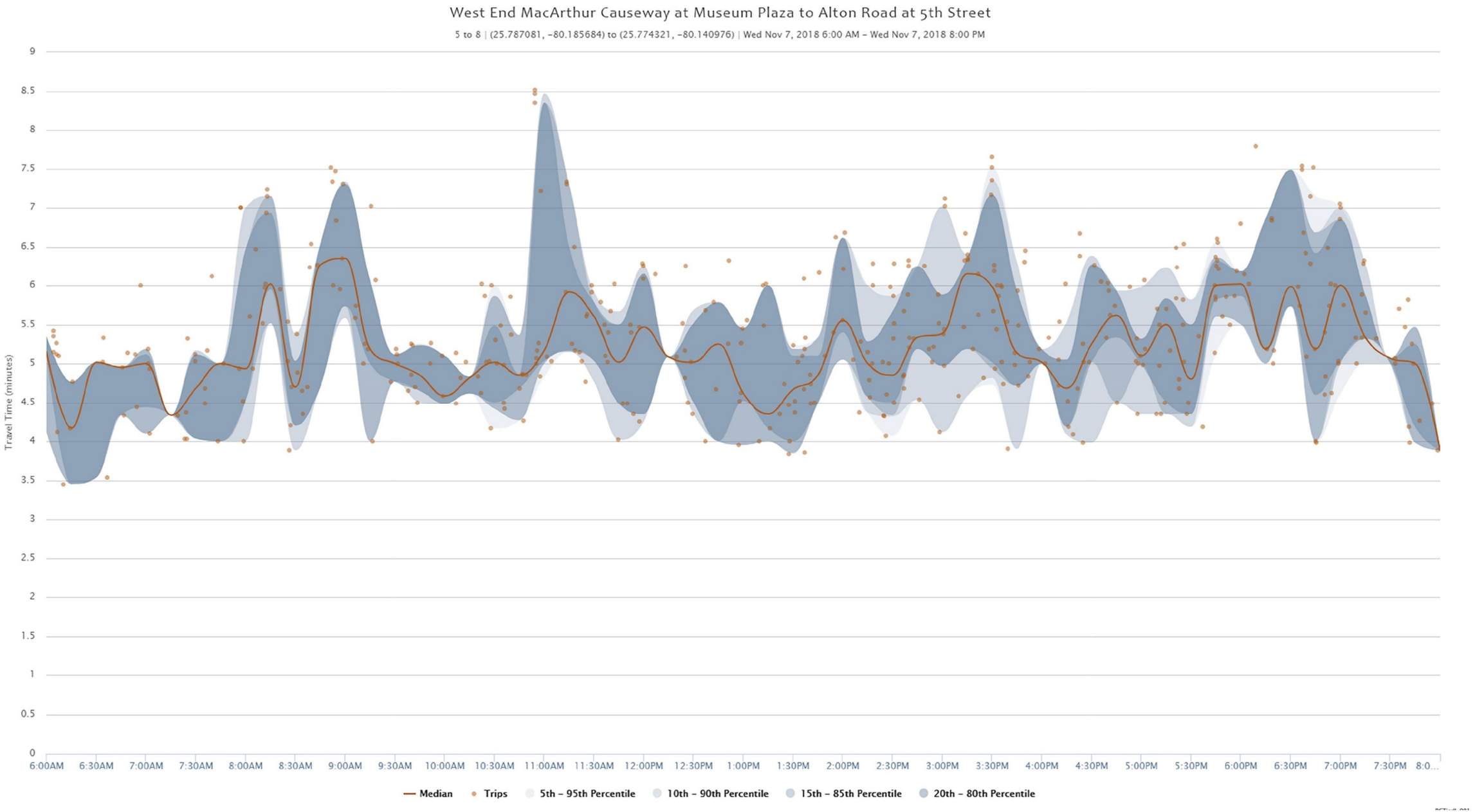


Figure 2-10 Eastbound – Macarthur Causeway Travel Time by Time of Day

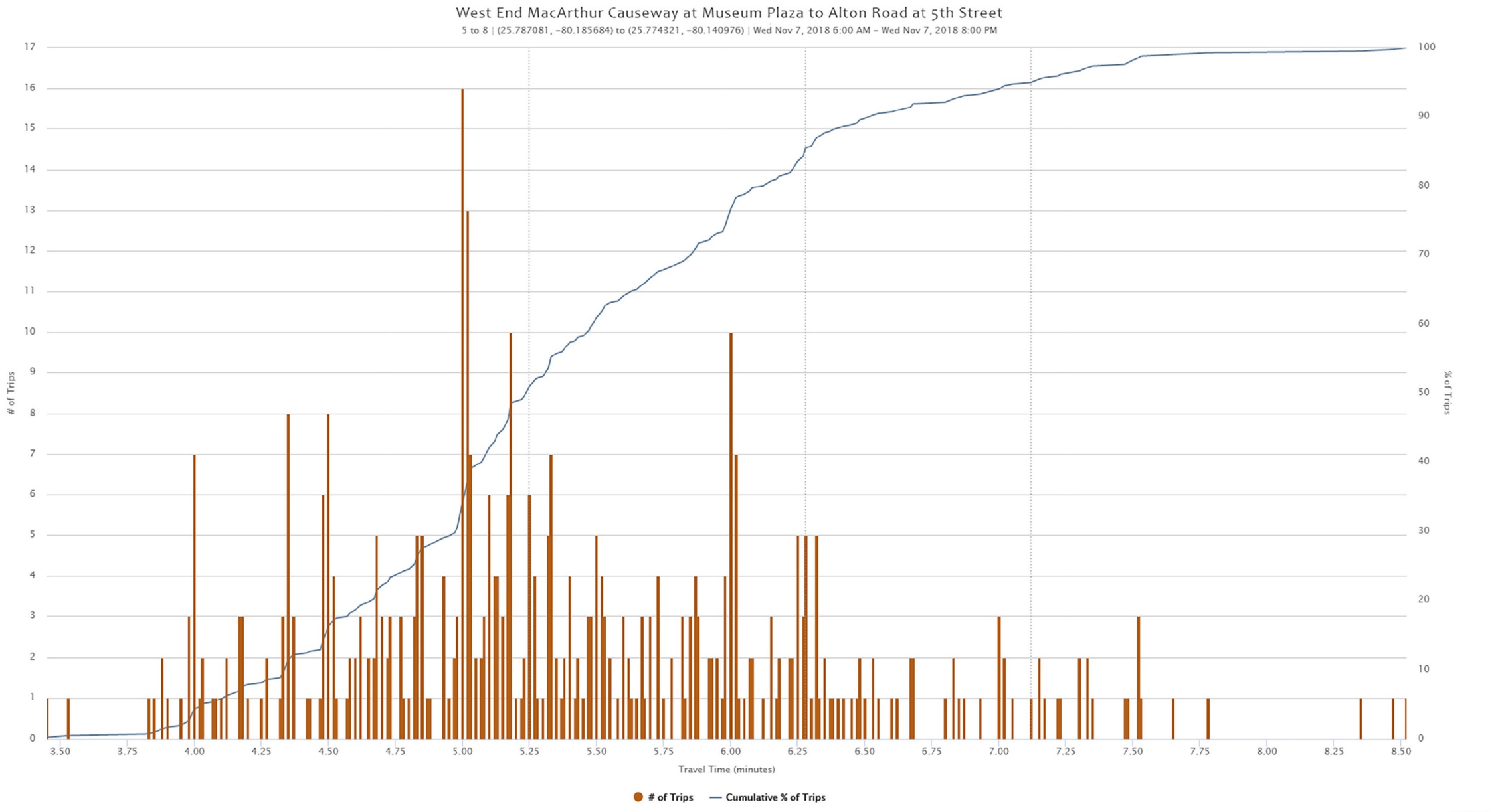


Figure 2-11 Eastbound – Macarthur Causeway Travel Time – Trips Frequency Distribution

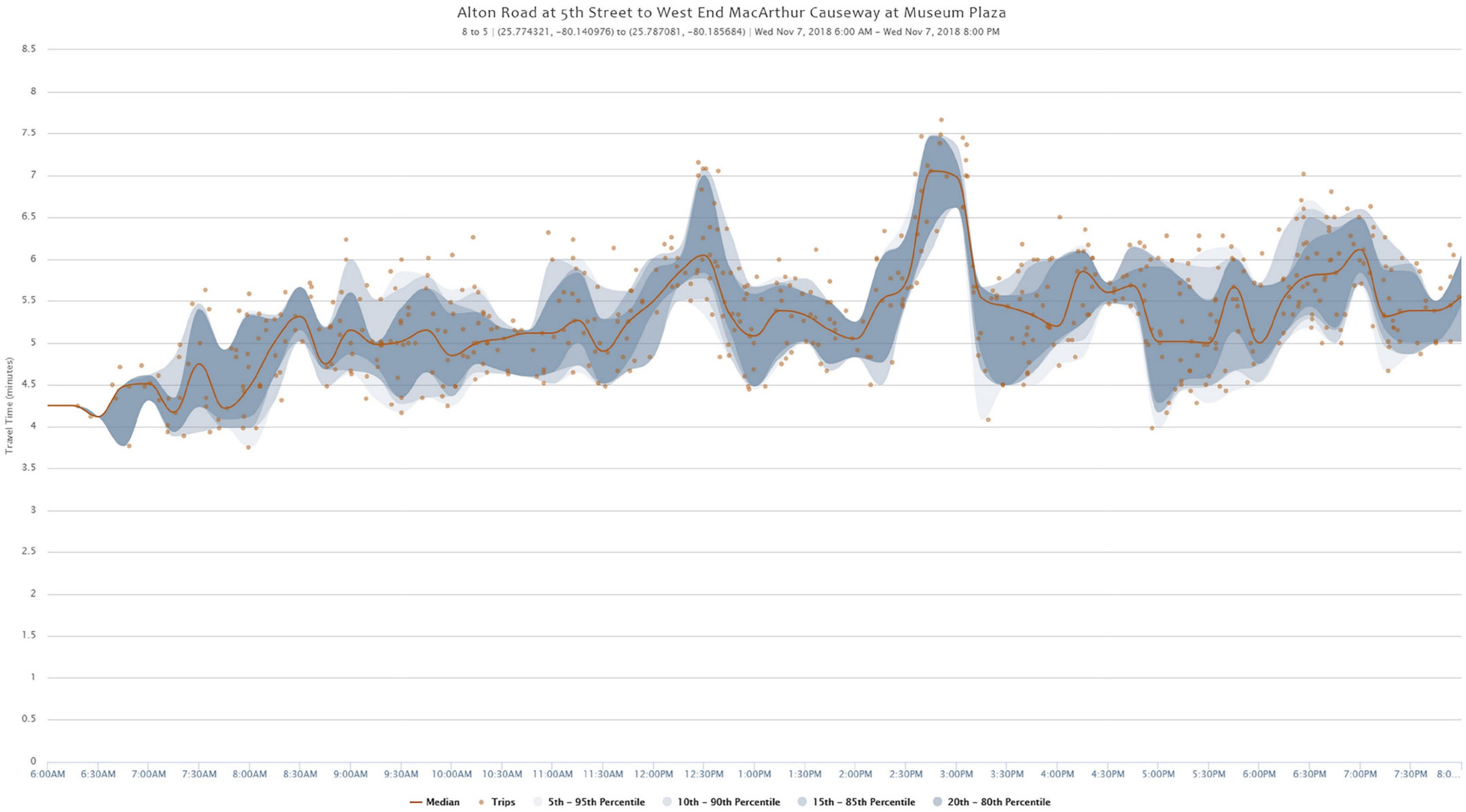


Figure 2-12 Westbound – Macarthur Causeway Travel Time by Time of Day

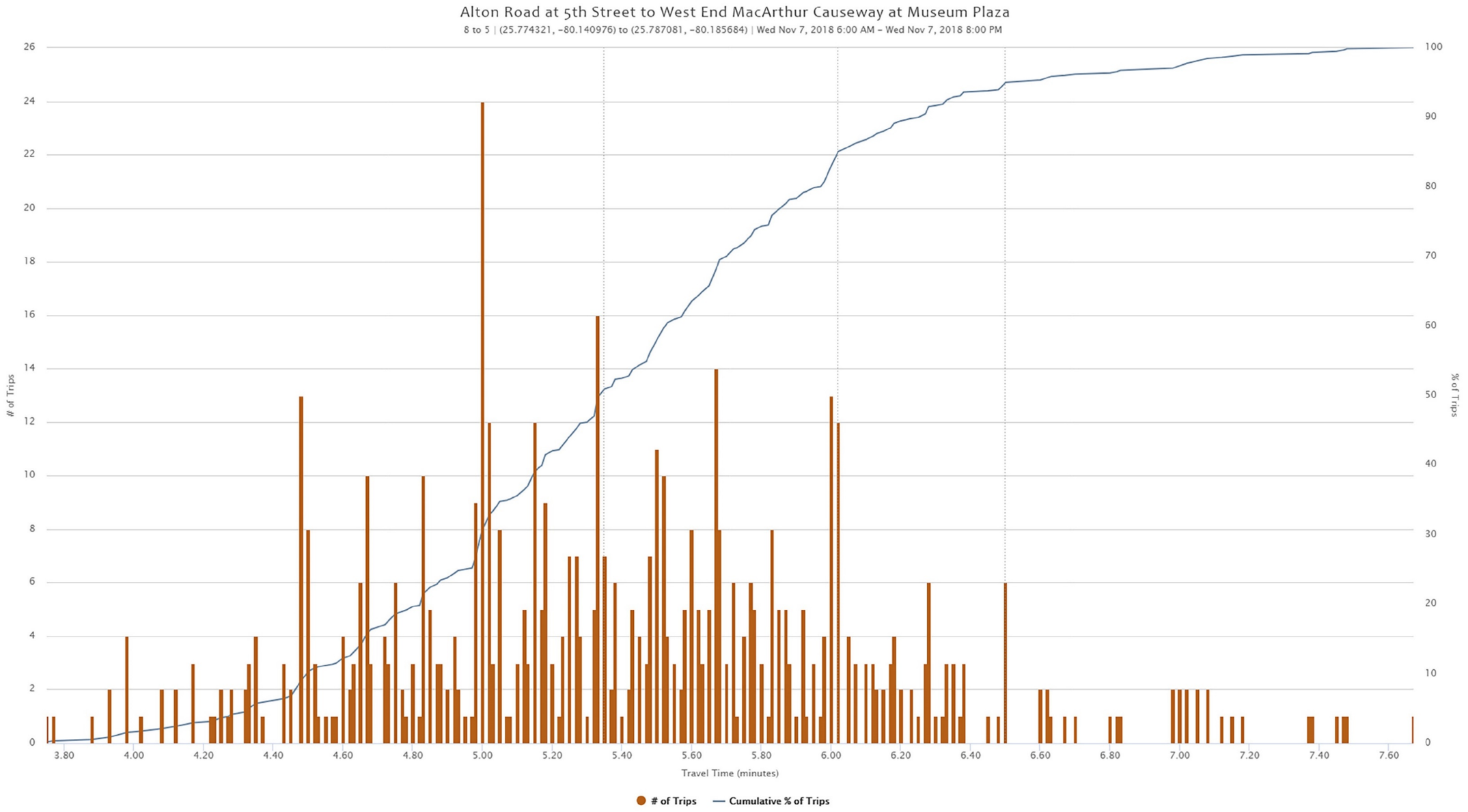


Figure 2-13 Westbound – Macarthur Causeway Travel Time – Trips Frequency Distribution

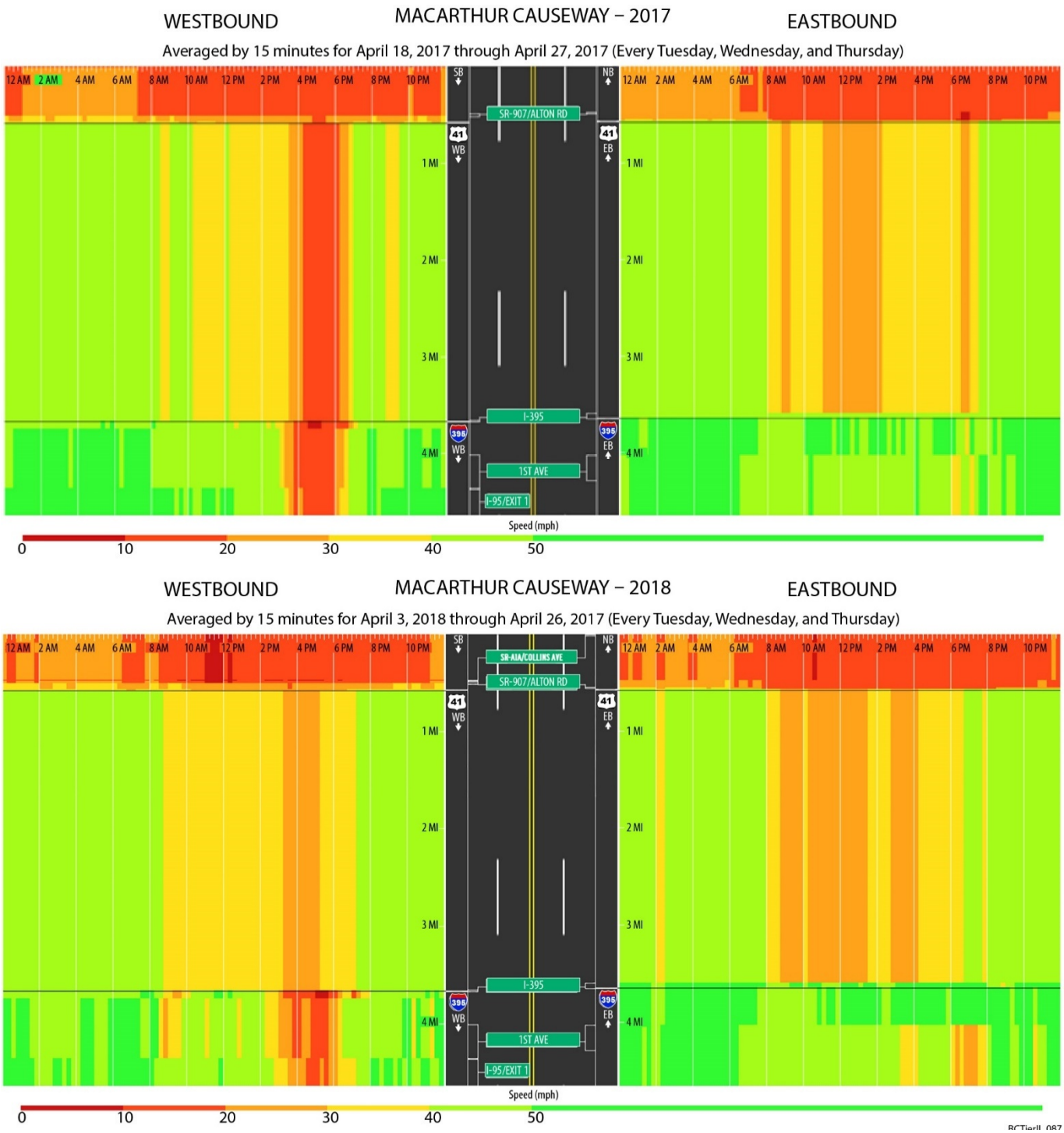


Figure 2-14 Speed for SR-A1A between MacArthur Causeway and SR-A1A/Collins Ave, US-41, and I-395

On the mainland areas, particularly long queues were observed along Biscayne Boulevard, both in the Design District and Downtown areas. Eastbound flows along NE 36th Street at its intersection with North Federal Highway also sees particularly heavy queueing, which is generally compounded by spillback from Biscayne Boulevard. North Miami Avenue generally showed shorter queues at the study intersections along the corridor.

On the beach area, Alton Road was observed to have longer queues and generally heavier traffic overall than Washington Avenue, especially at the 5th Street and Dade Boulevard intersections. Additionally, the southbound Alton Road corridor was observed to have heavy traffic volumes during both the am and pm peak periods. The queue length data for the main corridors within the study area will be utilized for calibration of traffic models for the analysis of existing conditions.

e. *Railroad Crossing Delay Data*

There are four intersections within the study area that are under the influence of railroad crossings. These are as follows:

- N. Federal Highway and NE 38th Street
- N. Federal Highway/NE 36th Street/NE 2nd Avenue
- N. Miami Avenue and N. 20th Street
- N. Miami Avenue and N. 19th Street

Video recordings were performed at railroad crossings to identify the number and duration of gate closures. Gate closures were attributed to four different types of events as follows:

- Brightline Trains USA
- FEC Trains
- Maintenance (track and equipment inspection)
- No apparent trigger

The majority of the crossings were by Brightline Trains USA, with 32 crossings per day. FEC freight trains cross once per day in each direction. Overall average Brightline Trains USA gate closure time was approximately one minute for the Federal Highway gates (at NE 36th Street and NE 39th Street), and approximately 1.25 minutes for the North Miami Avenue gates at NE 19th Street and NE 20th Street. By comparison, the average gate closure time for the FEC trains was two minutes at the Federal Highway gates, and four minutes at the Miami Avenue gates.

2.5.2. Existing Traffic Conditions

Traffic operations were analyzed for existing conditions using Synchro software. The results of this analysis are presented in **Tables 2-4** and **2-5** for the am and pm peak periods respectively. The tables show traffic operation level of service (LOS), movement delay (seconds per vehicle), and approach delay (seconds per vehicle).

Evaluation of the am period showed that, in the mainland portion of the study area, North Miami Avenue performs well along the corridor within the study area, with only the northbound approach at the intersection with North 36th Street performing at LOS E+50 (Miami-Dade County considers LOS E+50 to be acceptable). Biscayne Boulevard at NE 38th Street performs at LOS D, while the intersection at NE 36th Street performs at LOS E+50. NE 36th Street performs acceptably at North Miami Avenue and Biscayne Boulevard but sees the eastbound approach perform at LOS F at its intersection with North Federal Highway.

Moving across MacArthur Causeway, the eastbound movements perform within the LOS E+50 window at Terminal Island, consistent with the long queues often observed as a result of the intersection with Alton Road downstream. Alton Road and Washington Avenue see no movements perform worse than LOS E+50 and perform comparably well while advancing northbound towards Dade Boulevard, however, the side streets perform considerably worse at their Alton Road intersections than the Washington Avenue counterparts. This is particularly true of Dade Boulevard.

During the PM peak, North Miami Avenue again performs at acceptable conditions, with its movements performing at LOS D or better. Biscayne Boulevard sees better performance than during the AM conditions but is still subpar compared to North Miami Avenue in the Design District. NE 36th Street sees failing LOS eastbound at Biscayne Boulevard, with acceptable LOS by Miami-Dade County Standards at its approaches with North Federal Highway and westbound at Biscayne Boulevard, and LOS D at North Miami Avenue.

Alton Road and Washington Avenue perform similarly during the PM Peak. Alton Road at 5th Street sees heavier delays and heavy queueing, with better performance while moving northbound towards Dade Boulevard. The eastbound left turn at Washington Avenue and 5th Street sees a failing LOS F. The various side streets again perform worse at their intersections at Alton Road than with the Washington Avenue counterparts, leading to worse overall intersection performances.

Supplemental intersections along 4th, 5th, and 6th Streets in Miami Beach at Lenox, Michigan, Jefferson, and Meridian Avenues were added in 2021. Evaluation of both the AM and PM peak periods found that all 12 intersections performed at LOS C or better, with minimal delays along the 5th Street through movements.

It should be noted that the Transportation Research Board's Highway Capacity Manual (HCM) 6th edition was used for the evaluation of the intersection delays and LOS where applicable. Due to restrictions within Synchro and this methodology, some intersections were unable to be evaluated using HCM 6th edition due to their geometry or signal phasing. HCM 2000 was used where needed in order to evaluate intersections that did not comply with the latest HCM methodology.

Table 2-4 Existing Traffic Conditions – AM Peak Period													
Location		**Type**	**Direction**										
1	North Miami Avenue & 41st St.	Unsignalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	33.0	–	–	29.9	–	–	10.9	–	–	8.1	–	–
		Movement LOS	D	–	–	D	–	–	B	–	–	A	–	–
		Approach	D (33.0)			D (29.9)			A (0. 3)			A (0.2)		
		Intersection MOE	A (1.2)											
2	North-East 2nd Avenue & 41st Street	Unsignalized	**Eastbound**			**–**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**–**	**–**	**–**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	15.9	–	–	–	–	–	9.1	0.0	–	–	–	–
		Movement LOS	C	–	–	–	–	–	A	A	–	–	–	–
		Approach	C (15.9)			–			(0.6)			–		
		Intersection MOE	A (0.6)											
3	North Miami Avenue & 38th Street	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	–	–	–	86.3	0.0	0.0	4.4	2.0	2.0	0.0	5.8	5.8
		Movement LOS	–	–	–	F	A	A	B	A	A	A	A	A
		Approach	–			F (86.3)			A (2.8)			A (5.8)		
		Intersection MOE	A (7.4)											
4	North-East 2nd Avenue & 39th St	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	21.0	0.0	0.0	25.3	0.0	0.0	16.8	0.0	20.4	14.4	0.0	25.0
		Movement LOS	C	A	A	C	A	A	B	A	C	B	A	C
		Approach	C (21.0)			C (25.3)			C (20.3)			C (24.2)		
		Intersection MOE	C (23.2)											

Table 2-4 Existing Traffic Conditions – AM Peak Period														
Location		**Type**	**Direction**											
5	North-East 2nd Avenue & 38th St	Unsignalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	–	30.5	–	–	21.8	–	9.7	0	–	7.7	–	–
		Movement LOS	–	D	–	–	C	–	A	A	–	A	–	–
		Approach	D (30.5)			C (21.8)			A (0.8)			A (0)		
		Intersection MOE	A (3.1)											
6	North Federal Highway & 39th Street	Signalized (HCM 2000)	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	83.0	–	114.0	52.8	60.0	–	–	17.7	–	–	18.0	–
		Movement LOS	F	–	F	D	E	–	–	B	–	–	B	–
		Approach	F (102.2)			E (58.4)			B (17.7)			C (18.0)		
		Intersection MOE	D (39.1)											
7	Biscayne Boulevard & 38th Street	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	–	–	–	79.9	90.6	71.0	5.6	13.3	15.8	127.2	9.2	9.1
		Movement LOS	–	–	–	E	F	E	A	B	B	F	A	A
		Approach	–			F (81.9)			B (14.9)			D (45.9)		
		Intersection MOE	D (43.0)											
8	North Miami Avenue & 36th Street	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	23.7	39.6	39.5	28.8	29.9	26.2	81.6	63.6	60.5	51.8	53.4	53.5
		Movement LOS	C	D	D	C	C	C	F	E	E	D	D	D
		Approach	D (38.7)			C (28.9)			E (64.2)			D (53.1)		
		Intersection MOE	D (46.5)											

9		Signalized	**Eastbound**	**Westbound**	**Northbound**	**Southbound**	**Southeast bound**

Table 2-4 Existing Traffic Conditions – AM Peak Period														
Location		**Type**	**Direction**											
	North Federal Highway & 36th Street	(HCM 2000)	**Left**	**Thru**	**Thru**	**Left**	**Thru**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	
		Movement Delay	47.3	41.5	52.9	105.9	75.0	66.5	96.4	65.1	96.3	108.7	55.0	
		Movement LOS	D	D	D	F	E	E	F	E	F	F	D	
		Approach	D (42.4)		D (52.9)	F (114.5)		F (103.0)			F (98.9)			
		Intersection MOE	E (74.2)											
10	Biscayne Boulevard & 36th Street	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	71.7	94.1	62.0	123.2	130.0	63.3	31.9	45.0	34.5	34.5	31.9	37.7
		Movement LOS	E	F	E	F	F	E	C	D	C	C	C	D
		Approach	E (79.0)			F 98.7)			D (42.2)			D (36.5)		
		Intersection MOE	E (57.8)											
11	North Miami Avenue & 29th Street	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	50.0	0.0	43.0	103.8	0.0	29.6	25.0	0.0	25.0	33.8	0.0	34.6
		Movement LOS	D	A	D	F	A	C	C	A	C	C	A	C
		Approach	D (46.6)			E (56.7)			C (25.0)			C (34.2)		
		Intersection MOE	D (43.1)											
12	North Miami Avenue & NE 17th Street	Unsignalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	–	21.1	–	21.0	0	–	–	–	–	–	–	–
		Movement LOS	–	C	–	C	A	–	–	–	–	–	–	–
		Approach	C (21.1)			C (21.0)			–			–		
		Intersection MOE	A (0.1)											
13		Signalized	**Eastbound**			**Westbound**			**Southeast bound**			**Northwest bound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**

Table 2-4 Existing Traffic Conditions – AM Peak Period														
Location		**Type**	**Direction**											
	North Miami Avenue & 14th Street	Movement Delay	0	0	20.8	12.5	0	0	12.0	11.9	–	-	-	-
		Movement LOS	A	A	C	B	A	A	B	B	–	-	-	-
		Approach	C (20.8)			B (12.5)			B (11.9)					
		Intersection MOE	B (17.3)											
14	North-East 2nd Avenue & 14th Street	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	34.2	0.0	55.2	33.9	0.0	41.6	16.6	0.0	27.1	98.8	0.0	26.7
		Movement LOS	C	A	E	C	A	D	B	A	C	F	A	C
		Approach	D (50.4)			D (38.3)			C (26.6)			E (62.2)		
		Intersection MOE	D (45.8)											
15	Biscayne Boulevard & North-East 13th Street	Signalized (HCM 2000)	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	–	–	–	50.1	40.5	35.1	20.1	13.0	–	–	25.0	–
		Movement LOS	–	–	–	D	D	D	B	B	–	–	C	–
		Approach	–			D (43.7)			B (13.3)			C (25.0)		
		Intersection MOE	C (25.9)											
16	Biscayne Boulevard & 12th Street (Road now closed)	N/A	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	–	–	–	–	–	–	–	–	–	–	–	–
		Movement LOS	–	–	–	–	–	–	–	–	–	–	–	–
		Approach	–			–			–			–		
		Intersection MOE												
17		Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**

Table 2-4 Existing Traffic Conditions – AM Peak Period														
Location		**Type**	**Direction**											
	Biscayne Boulevard & 11th Street	Movement Delay	54.3	53.2	0.0	55.2	57.4	51.8	71.0	7.6	8.0	0.0	23.9	26.9
		Movement LOS	D	D	A	D	E	D	E	A	A	A	C	C
		Approach	D (53.8)			E (55.8)			B (13.0)			C (25.0)		
		Intersection MOE	C (22.4)											
18	MacArthur Causeway & Fountain St	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	92.7	8.1	–	–	13.9	7.3	–	–	–	87.6	–	0.0
		Movement LOS	F	A	–	–	B	A	–	–	–	F	–	A
		Approach	B (11.3)			B (13.8)						F (87.6)		
		Intersection MOE	B (13.8)											
19	MacArthur Causeway & Bridge Road	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	105.5	3.8	–	–	6.1	3.0	–	–	–	84.6	–	0.0
		Movement LOS	F	A	–	–	A	A	–	–	–	F	–	A
		Approach	A (5.1)			A (6.1)			–			F (84.6)		
		Intersection MOE	A (5.9)											
20	MacArthur Causeway & Terminal Island	Signalized (HCM 2000)	**Eastbound**			**Westbound**			**Northbound**		**Northwest bound**		**Northeast bound**	
			Thru	**Right**	**Right 2**	**Left**	**Thru**	**Right**	**Left**		**Left**		**Left**	
		Movement Delay	58.7	–	12.4	75.6	4.3	–	78.3		65.9		67.4	
		Movement LOS	E	–	B	E	A	–	F		E		E	
		Approach	E (56.9)			A (6.3)			F (78.3)		E (65.9)		E (67.4)	
		Intersection MOE	D (35.9)											
21	Alton Road & 5th Street	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**

Table 2-4 Existing Traffic Conditions – AM Peak Period														
Location		**Type**	**Direction**											
		Movement Delay	35.6	36.7	0.0	484.3	50.0	31.7	71.0	0.0	77.7	83.8	0.0	0.0
		Movement LOS	D	D	A	F	C	C	E	A	E	F	A	A
		Approach	D (36.1)			E (69.7)			E (73.6)			F (83.8)		
		Intersection MOE	E (57.9)											
22	Washington Avenue & 5th Street	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	77.1	6.2	6.2	76.6	9.4	9.6	65.0	0	59.5	65.2	59.7	68.6
		Movement LOS	E	A	A	E	A	A	E	A	E	E	E	E
		Approach	C (26.3)			B (10.3)			E (62.3)			E (65.1)		
		Intersection MOE	C (29.4)											
23	Alton Road & 11th Street	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	60.5	0.0	0.0	61.0	0.0	0.0	4.6	8.0	8.0	3.4	5.6	5.5
		Movement LOS	E	A	A	E	A	A	A	A	A	A	A	A
		Approach	E (60.5)			E (61.0)			A (7.9)			A (5.5)		
		Intersection MOE	A (9.1)											
24	Washington Avenue & 11th Street	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	21.2	0.0	0.0	21.8	0.0	0.0	12.6	11.0	11.0	11.2	0.0	11.4
		Movement LOS	C	A	A	C	A	A	B	B	B	B	A	B
		Approach	C (21.2)			C (21.8)			B (11.0)			B (11.3)		
		Intersection MOE	B (12.2)											
25	Alton Road & 15th Street	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**

Table 2-4 Existing Traffic Conditions – AM Peak Period														
Location		**Type**	**Direction**											
		Movement Delay	45.5	0.0	0.0	45.2	0.0	46.8	5.2	9.5	9.5	6.0	7.7	7.7
		Movement LOS	D	A	A	D	A	D	A	A	A	A	A	A
		Approach	D (45.5)			D (46.2)			A (9.4)			A (7.5)		
		Intersection MOE	B (13.4)											
26	Washington Avenue & 15th Street	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	29.8	–	0.0	–	–	–	9.6	9.7	–	–	9.5	9.6
		Movement LOS	C	–	A	–	–	–	A	A	–	–	A	A
		Approach	C (29.8)			–			A (9.6)			A (9.6)		
		Intersection MOE	B (12.3)											
27	Alton Road & 17th Street	Signalized (HCM 2000)	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	40.0	39.6	–	51.3	44.1	38.7	73.6	17.4	–	66.6	11.3	–
		Movement LOS	D	D	–	D	D	D	E	B	–	E	B	–
		Approach	D (39.7)			D (43.9)			C (22.6)			C (25.3)		
		Intersection MOE	C (27.8)											
28	Convention Center Drive & 17th Street	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	34.2	8.6	8.7	0.0	12.5	12.4	27.5	0.0	28.0	26.5	0.0	26.9
		Movement LOS	C	A	A	A	B	B	C	A	C	C	A	C
		Approach	A (9.3)			B (12.5)			C (27.7)			C (26.7)		
		Intersection MOE	B (12.3)											
29	Washington Avenue & 17th Street	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	51.3	29.4	29.7	38.2	34.9	35.0	82.8	8.2	8.2	13.7	15.4	15.5

Table 2-4 Existing Traffic Conditions – AM Peak Period														
Location		**Type**	**Direction**											
		Movement LOS	D	C	C	D	D	D	F	A	A	B	B	B
		Approach	C (31.8)			D (36.7)			C (31.7)			B (15.4)		
		Intersection MOE	C (28.0)											
30	Alton Road & Dade Boulevard	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	89.2	56.3	0.0	77.0	54.8	0.0	62.0	12.9	12.9	64.3	15.6	12.4
		Movement LOS	F	E	A	E	D	A	E	B	B	E	B	B
		Approach	E (74.2)			E (65.6)			B (17.6)			B (17.1)		
		Intersection MOE	C (28.2)											
31	North Michigan Avenue & Dade Boulevard	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	0.0	7.3	–	–	7.9	3.1	–	–	–	14.1	–	0.0
		Movement LOS	A	A	–	–	A	A	–	–	–	B	–	A
		Approach	A (7.3)			A (5.7)			–			B (14.1)		
		Intersection MOE	A (9.0)											
32	Washington Avenue & 19th Street	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	–	–	–	38.2	–	2.6	–	2.6	2.6	2.5	2.6	–
		Movement LOS	–	–	–	D	–	A	–	A	A	A	A	–
		Approach	–			D (38.2)			A (2.6)			A (2.6)		
		Intersection MOE	A (5.1)											
33	North Michigan	Signalized	**Eastbound**			**Southbound**			**Northeast bound**			**Southwest bound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**

Table 2-4 Existing Traffic Conditions – AM Peak Period														
Location		**Type**	**Direction**											
	Avenue & Alton Road	Movement Delay	58.1	0.0	0.0	61.1	0.0	0.0	13.1	17.6	0.0	79.8	2.8	2.8
		Movement LOS	E	A	A	E	A	A	B	B	A	E	A	A
		Approach	E (58.1)			E (61.1)			B (17.5)			C (23.5)		
		Intersection MOE	C (22.6)											
34	Convention Center Dr & Dade Boulevard	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	4.8	7.4	7.4	4.9	6.9	0.0	27.6	26.6	27.6	26.8	27.0	28.0
		Movement LOS	A	A	A	A	A	A	C	C	C	C	C	C
		Approach	A (7.3)			A (6.8)			C (27.6)			C (27.6)		
		Intersection MOE	A (8.7)											
35	Washington Avenue & Dade Boulevard	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	11.6	0.0	12.1	168.6	4.5	4.4	26.0	26.0	29.0	–	–	–
		Movement LOS	B	A	B	F	A	A	C	C	C	–	–	–
		Approach	B (11.8)			D (51.6)			C (27.1)			–		
		Intersection MOE	C (31.7)											
36	Alton Road & Chase Avenue	Signalized (HCM 2000)	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	33.8	31.6	–	33.7	–	33.5	–	14.8	9.6	–	38.3	–
		Movement LOS	C	C	–	C	–	C	–	B	A	–	D	–
		Approach	C (33.3)			C (33.6)			B (14.6)			D (38.3)		
		Intersection MOE	C (30.0)											
37	North Miami Avenue & 19th Street	N/A	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	–	–	–	–	–	–	–	–	–	–	–	–

Table 2-4 Existing Traffic Conditions – AM Peak Period														
Location		**Type**	**Direction**											
		Movement LOS	–	–	–	–	–	–	–	–	–	–	–	–
		Approach	–			–			–			–		
		Intersection MOE												
38	North Miami Avenue & 20th Street	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	61.8	26.4	23.7	37.1	0.0	19.4	13.4	0.0	0.0	13.7	0.0	27.2
		Movement LOS	E	C	C	D	A	B	B	A	A	B	A	C
		Approach	C (28.9)			D (34.5)			B (13.4)			C (25.1)		
		Intersection MOE	C (28.2)											
39	4th Street & Lenox Avenue	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	7.6	-	–	–	-	-	–	–	–	10.2	–	10.2
		Movement LOS	A	-	–	–	-	-	–	–	–	B	–	B
		Approach	-			-			–			B (10.2)		
		Intersection MOE	A (4.1)											
40	4th Street & North Michigan Avenue	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	8.4	8.4	8.4	8.2	8.2	8.2	8.4	8.4	8.4	8.4	8.4	8.4
		Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
		Approach	A (8.4)			A (8.2)			A (8.4)			A (8.4)		
		Intersection MOE	A (8.4)											
41	4th Street & Jefferson Avenue	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	8.7	8.7	8.7	8.4	8.4	8.4	8.2	8.2	8.2	8.6	8.6	8.6

Table 2-4 Existing Traffic Conditions – AM Peak Period														
Location		**Type**	**Direction**											
		Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
		Approach	A (8.7)			A (8.4)			A (8.2)			A (8.6)		
		Intersection MOE	A (8.5)											
42	4th Street & Meridian Avenue	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	8.8	8.8	8.8	9.0	9.0	9.0	9.2	9.2	9.2	9.2	9.2	9.2
		Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
		Approach	A (8.8)			A (9.0)			A (9.2)			A (9.2)		
		Intersection MOE	A (9.1)											
43	5th Street & Lenox Avenue	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	5.0	0.1	0.2	0.3	0.3	0.6	72.1	0.0	0.0	74.9	0.0	99.0
		Movement LOS	A	A	A	A	A	A	E	A	A	E	A	F
		Approach	A (1.0)			D (34.5)			E (72.1)			F (90.1)		
		Intersection MOE	B (11.3)											
44	5th Street & N. Michigan Avenue	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	108.1	0.3	0.5	5.4	0.3	0.5	83.6	0.0	0.0	73.4	0.0	77.6
		Movement LOS	F	A	A	A	A	A	F	A	A	E	A	E
		Approach	A (7.7)			A (0.4)			F (83.6)			E (76.1)		
		Intersection MOE	B (12.9)											
45	5th Street & Jefferson Avenue	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	1.3	0.2	0.3	0.1	0.2	0.3	84.8	0.0	0.0	75.8	0.0	86.3

Table 2-4 Existing Traffic Conditions – AM Peak Period														
Location		**Type**	**Direction**											
		Movement LOS	A	A	A	A	A	A	F	A	A	E	A	F
		Approach	A (0.4)			A (0.2)			F (84.8)			F (83.5)		
		Intersection MOE	B (10.4)											
46	5th Street & Meridian Avenue	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	1.0	0.1	0.3	3.6	4.0	4.1	83.0	0.0	0.0	72.5	0.0	74.5
		Movement LOS	A	A	A	A	A	A	F	A	A	E	A	E
		Approach	A (0.3)			A (4.0)			F (83.0)			E (73.6)		
		Intersection MOE	B (13.3)											
47	6th Street & Lenox Avenue	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	10.5	10.5	10.5	10.6	10.6	10.6	15.2	15.2	8.2	11.5	11.5	11.5
		Movement LOS	B	B	B	B	B	B	C	C	B	B	B	B
		Approach	B (10.5)			B (10.6)			B (14.1)			B (11.5)		
		Intersection MOE	B (12.3)											
48	6th Street & Michigan Avenue	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	9.4	9.4	9.4	9.1	9.1	9.1	10.0	10.0	10.0	9.2	9.2	9.2
		Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
		Approach	A (9.4)			A (9.1)			A (10.0)			A (9.2)		
		Intersection MOE	A (9.5)											
49	6th Street & Jefferson Avenue	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	9.6	9.6	9.6	9.3	9.3	9.3	11.0	11.0	11.0	9.5	9.5	9.5

Table 2-4 Existing Traffic Conditions – AM Peak Period														
Location		**Type**	**Direction**											
		Movement LOS	A	A	A	A	A	A	B	B	B	A	A	A
		Approach	A (9.6)			A (9.3)			B (11.0)			A (9.5)		
		Intersection MOE	B (10.1)											
50	6th Street & Meridian Avenue	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	16.1	0.0	0.0	14.7	0.0	0.0	5.6	0.0	0.0	5.0	0.0	0.0
		Movement LOS	B	A	A	B	A	A	A	A	A	A	A	A
		Approach	B (16.1)			B (14.7)			A (5.6)			A (5.0)		
		Intersection MOE	A (9.6)											

Table 2-5. Existing Traffic Conditions – PM Peak Period														
Location		**Type**	**Direction**											
1	North Miami Avenue & 41st St.	Unsignalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	33.5	–	–	95.2	–	–	8.4	–	–	11.4	–	–
		Movement LOS	D	–	–	F	–	–	A	–	–	B	–	–
		Approach	D (33.5)			F (95.2)			A (0.1)			A (0.0)		
		Intersection MOE	A (5.0)											
2	North-East 2nd Avenue & 41st Street	Unsignalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**–**	**–**	**–**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	15.8	–	–	–	–	–	8.2	0.0	–	–	–	–
		Movement LOS	C	–	–	–	–	–	A	A	–	–	–	–

Table 2-5. Existing Traffic Conditions – PM Peak Period													
Location		**Type**	**Direction**										
		Approach	C (15.8)			–			A (0.4)			–	
		Intersection MOE	A (1.4)										
3	North Miami Avenue & 38th Street	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**	
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	–	–	–	87.3	0.0	0.0	9.3	5.7	5.7	0.0	10.8	10.9
		Movement LOS	–	–	–	F	A	A	A	A	A	A	B	B
		Approach	–			F (87.3)			A (6.5)			B (10.9)	
		Intersection MOE	B (12.4)										
4	North-East 2nd Avenue & 39th St	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**	
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	65.7	0.0	0.0	83.0	0.0	0.0	7.7	0.0	12.9	8.8	0.0	10.8
		Movement LOS	E	A	A	F	A	A	A	A	B	A	A	B
		Approach	E (65.7)			F (83.0)			B (12.6)			B (10.6)	
		Intersection MOE	C (29.0)										
5	North-East 2nd Avenue & 38th St	Unsignalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**	
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	–	24.5	–	–	20.1	–	8.7	0	–	0	–	–
		Movement LOS	–	C	–	–	C	–	A	A	–	A	–	–
		Approach	C (24.5)			C (20.1)			A (0.4)			A (0)	
		Intersection MOE	A (3.2)										
6	North Federal Highway & 39th Street	Signalized (HCM 2000)	Eastbound			Westbound			Northbound			Southbound	
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
		Movement Delay	83.3	–	102.8	71.0	87.2	–	–	9.9	–	–	8.1	–
		Movement LOS	F	–	F	E	F	–	–	A	–	–	A	–
		Approach	F (96.2)			F (86.0)			A (9.9)			A (8.1)	
		Intersection MOE	C (34.0)										
7		Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**	

Table 2-5. Existing Traffic Conditions – PM Peak Period

Location		Type	Direction											
	Biscayne Boulevard & 38th Street	(HCM 2000)	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	–	–	–	87.6	87.3	64.6	21.9	46.5	–	170.3	9.3	–
		Movement LOS	–	–	–	F	F	E	C	D	–	F	A	–
		Approach	–			E (78.5)			D (46.0)			D (51.3)		
		Intersection MOE	E (55.5)											
8	North Miami Avenue & 36th Street	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	40.5	52.0	52.1	37.4	57.8	48.9	33.8	38.7	24.4	43.5	21.5	21.5
		Movement LOS	D	D	D	D	E	D	C	D	C	D	C	C
		Approach	D (49.7)			D (51.4)			D (37.3)			C (25.0)		
		Intersection MOE	D (38.8)											
9	North Federal Highway & 36th Street	Signalized (HCM 2000)	**Eastbound**		**Westbound**	**Northbound**		**Southbound**			**South eastbound**			
			Left	**Thru**	**Thru**	**Left**	**Thru**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	
		Movement Delay	263.0	55.2	85.0	87.3	54.1	82.9	98.5	81.4	96.7	105.8	70.2	
		Movement LOS	F	E	F	F	D	F	F	F	F	F	E	
		Approach	F (99.4)		F (85.0)	E (74.1)		F (88.8)			F (90.5)			
		Intersection MOE	F (86.6)											
10	Biscayne Boulevard & 36th Street	Signalized (HCM 2000)	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	119.6	106.2	68.7	118.6	119.8	75.2	24.5	40.2	32.0	46.1	27.9	–
		Movement LOS	F	F	E	F	F	E	C	D	C	D	C	–
		Approach	F (105.2)			F (97.2)			D (36.7)			C (33.1)		
		Intersection MOE	E (57.2)											
11	North Miami Avenue & 29th Street	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	31.7	0.0	26.4	28.4	0.0	22.1	20.9	0.0	21.5	18.8	0.0	19.3

Table 2-5. Existing Traffic Conditions – PM Peak Period														
Location		**Type**	**Direction**											
		Movement LOS	C	A	C	C	A	C	C	A	C	B	A	B
		Approach	C (29.0)			C (24.9)			C (21.2)			C (19.0)		
		Intersection MOE	C (24.4)											
12	North Miami Avenue & NE 17th Street	Unsignalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	–	12.3	–	12.3	0	–	–	–	–	–	–	–
		Movement LOS	–	B	–	B	A	–	–	–	–	–	–	–
		Approach	B (12.3)			B (12.3)			–			–		
		Intersection MOE	A (0.1)											
13	North Miami Avenue & 14th Street	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	0.0	0.0	15.6	13.8	0.0	0.0	–	–	–	13.9	13.5	0
		Movement LOS	A	A	B	B	A	A	–	–	–	B	B	A
		Approach	B (15.6)			B (13.8)			–			B (13.7)		
		Intersection MOE	B (14.3)											
14	North-East 2nd Avenue & 14th Street	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	23.3	0.0	38.1	23.9	0.0	29.5	14.6	0.0	32.1	58.1	0.0	24.2
		Movement LOS	C	A	C	C	A	C	B	A	C	E	A	C
		Approach	D (35.3)			C (27.7)			C (30.9)			D (40.6)		
		Intersection MOE	C (34.7)											
15	Biscayne Boulevard & North-East 13th Street	Signalized (HCM 2000)	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	–	–	–	119.5	36.3	35.7	10.0	16.1	–	–	17.4	–
		Movement LOS	–	–	–	F	D	D	B	B	–	–	B	–
		Approach	–			F (86.8)			B (15.8)			B (17.4)		

Table 2-5. Existing Traffic Conditions – PM Peak Period													
Location		**Type**	**Direction**										
		Intersection MOE	C (34.2)										
16	Biscayne Boulevard & 12th Street Road now closed	N/A	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	–	–	–	–	–	–	–	–	–	–	–	–
		Movement LOS	–	–	–	–	–	–	–	–	–	–	–	–
		Approach	–			–			–			–		
		Intersection MOE	-											
17	Biscayne Boulevard & 11th Street	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	55.3	48.9	0.0	48.9	51.3	50.3	74.8	9.2	9.8	0.0	18.2	18.9
		Movement LOS	E	D	A	D	D	D	E	A	A	A	B	B
		Approach	D (54.2)			D (50.6)			B (15.6)			B (18.5)		
		Intersection MOE	B (18.6)											
18	MacArthur Causeway & Fountain St	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	115.8	5.0	–	–	12.8	6.3	–	–	–	133.8	–	0.0
		Movement LOS	F	A	–	–	B	A	–	–	–	F	–	A
		Approach	A (9.3)			B (12.7)			–			F (133.8)		
		Intersection MOE	B (13.5)											
19	MacArthur Causeway & Bridge Road	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	89.0	3.1	–	–	5.6	2.7	–	–	–	78.0	–	0.0
		Movement LOS	F	A	–	–	A	A	–	–	–	E	–	A
		Approach	A (3.4)			A (5.6)			–			E (78.0)		
		Intersection MOE	A (5.1)											

Table 2-5. Existing Traffic Conditions – PM Peak Period

Location		Type	Direction										
20	MacArthur Causeway & Terminal Island	Signalized (HCM 2000)	**Eastbound**			**Westbound**			**Northbound**		**Northwest bound**		**Northeast bound**
			Thru	**Right**	**Right 2**	**Left**	**Thru**	**Right**	**Left**		**Left**		**Left**
		Movement Delay	26.5	–	11.5	57.3	2.7	–	–		62.8		55.2
		Movement LOS	C	–	B	E	A	–	–		E		E
		Approach	C (26.3)			A (3.3)			–		E (62.8)		E (55.2)
		Intersection MOE	B (17.6)										
21	Alton Road & 5th Street	Signalized	Eastbound			Westbound			Northbound			Southbound	
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
		Movement Delay	43.8	47.7	0.0	67.9	25.9	13.1	63.7	0.0	89.1	79.0	0.0	0.0
		Movement LOS	D	D	A	E	C	C	E	A	D	E	A	A
		Approach	D (45.6)			C (26.0)			E (73.1)			E (79.0)		
		Intersection MOE	D (45.2)											
22	Washington Avenue & 5th Street	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**	
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	206.9	0.7	0.7	77.6	15.4	15.9	59.9	0.0	52.4	61.1	49.2	53.1
		Movement LOS	F	A	A	E	B	B	D	A	D	D	D	D
		Approach	E (64.5)			B (15.9)			E (55.9)			D (52.8)		
		Intersection MOE	D (43.5)											
23	Alton Road & 11th Street	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**	
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	54.4	0.0	0.0	58.2	0.0	0.0	5.9	10.5	10.4	6.7	8.6	8.6
		Movement LOS	D	A	A	E	A	A	A	B	B	A	A	A
		Approach	D (54.4)			E (58.2)			B (10.3)			A (8.5)		
		Intersection MOE	B (14.3)											
24		Signalized	Eastbound			Westbound			Northbound			Southbound		

Table 2-5. Existing Traffic Conditions – PM Peak Period													
Location		**Type**	**Direction**										
	Washington Avenue & 11th Street		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
		Movement Delay	20.9	0.0	0.0	22.0	0.0	0.0	13.9	12.9	12.8	12.0	0.0	12.2
		Movement LOS	C	A	A	C	A	A	B	B	B	B	A	B
		Approach	C (20.9)			C (22.0)			B (12.9)			B (12.1)		
		Intersection MOE	B (13.3)											
25	Alton Road & 15th Street	Signalized	Eastbound			Westbound			Northbound			Southbound		
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
		Movement Delay	44.2	0.0	0.0	46.2	0.0	44.1	8.5	13.0	13.0	8.7	12.7	12.7
		Movement LOS	D	A	A	D	A	D	A	B	B	A	B	B
		Approach	D (44.2)			D (44.8)			B (12.8)			B (12.3)		
		Intersection MOE	B (18.0)											
26	Washington Avenue & 15th Street	Signalized	Eastbound			Westbound			Northbound			Southbound		
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
		Movement Delay	36.7	–	0.0	–	–	–	9.9	10.3	–	–	9.9	10.0
		Movement LOS	D	–	A	–	–	–	A	B	–	–	A	A
		Approach	D (36.7)			–			B (10.1)			A (9.9)		
		Intersection MOE	B (13.4)											
27	Alton Road & 17th Street	Signalized (HCM 2000)	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	50.6	51.5	–	52.1	51.6	40.9	23.7	22.7	–	22.2	15.3	–
		Movement LOS	D	D	–	D	D	D	C	C	–	C	B	–
		Approach	D (51.3)			D (47.7)			C (23.5)			B (16.6)		
		Intersection MOE	C (28.1)											
28	Convention Center Drive & 17th Street	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	4.0	3.7	0.0	0.0	6.9	6.9	0.0	0.0	0.0	21.9	0.0	22.0

Table 2-5. Existing Traffic Conditions – PM Peak Period														
Location		**Type**	**Direction**											
		Movement LOS	A	A	A	A	A	A	A	A	A	C	A	C
		Approach	A (3.7)			A (6.9)			(0.0)			C (22.0)		
		Intersection MOE	A (6.2)											
29	Washington Avenue & 17th Street	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	23.7	25.9	25.9	35.6	30.0	30.0	17.5	12.5	12.5	17.6	19.9	20.1
		Movement LOS	C	C	C	D	C	C	B	B	B	B	C	C
		Approach	C (25.7)			C (30.9)			B (14.3)			C (20.9)		
		Intersection MOE	C (22.5)											
30	Alton Road & Dade Boulevard	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	85.8	59.0	0.0	51.5	56.4	0.0	69.8	15.1	15.1	64.6	15.9	12.4
		Movement LOS	F	E	A	D	E	A	E	B	B	E	B	B
		Approach	E (75.2)			D (54.2)			C (20.2)			B (18.2)		
		Intersection MOE	C (31.3)											
31	North Michigan Avenue & Dade Boulevard	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	0.0	7.0	–	–	7.5	7.2	–	–	–	14.1	–	0.0
		Movement LOS	A	A	–	–	A	A	–	–	–	B	–	A
		Approach	A (7.0)			A (7.3)			–			B (14.1)		
		Intersection MOE	A (9.0)											
32	Washington Avenue & 19th Street	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	–	–	–	33.4	–	0.0	–	3.2	3.2	3.5	3.5	–
		Movement LOS	–	–	–	C	–	A	–	A	A	A	A	–
		Approach	–			C (33.4)			A (3.2)			A (3.5)		

Table 2-5. Existing Traffic Conditions – PM Peak Period														
Location		**Type**	**Direction**											
		Intersection MOE	A (5.9)											
33	North Michigan Avenue & Alton Road	Signalized	**Northbound**			**Southbound**			**Northeast bound**			**Southwest bound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	58.0	0.0	0.0	61.3	0.0	0.0	13.5	22.0	0.0	43.7	3.0	3.0
		Movement LOS	E	A	A	E	A	A	B	C	A	D	A	A
		Approach	E (58.0)			E (61.3)			C (22.0)			B (15.7)		
		Intersection MOE	B (19.2)											
34	Convention Center Dr & Dade Boulevard	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	8.5	12.3	12.3	8.8	12.4	0.0	27.9	24.2	24.4	31.9	31.6	33.5
		Movement LOS	A	B	B	A	B	A	C	C	C	C	C	C
		Approach	B (12.0)			B (12.3)			C (25.7)			C (32.8)		
		Intersection MOE	B (13.8)											
35	Washington Avenue & Dade Boulevard	Signalized (HCM 2000)	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	–	14.9	–	47.5	5.4	–	32.2	25.8	4.9	–	–	–
		Movement LOS	–	B	–	D	A	–	C	C	A	–	–	–
		Approach	B (14.9)			B (13.1)			C (21.3)					
		Intersection MOE	B (16.0)											
36	Alton Road & Chase Avenue	Signalized (HCM 2000)	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	44.4	35.7	–	37.0	–	52.6	–	17.4	5.6	–	11.6	–
		Movement LOS	D	D	–	D	–	D	–	B	A	–	B	–
		Approach	D (43.1)			D (49.5)			B (17.2)			B (11.6)		
		Intersection MOE	B (19.1)											

Table 2-5. Existing Traffic Conditions – PM Peak Period														
Location		**Type**	**Direction**											
37	North Miami Avenue & 19th Street	N/A	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	–	–	–	–	–	–	–	–	–	–	–	–
		Movement LOS	–	–	–	–	–	–	–	–	–	–	–	–
		Approach	–			–			–			–		
		Intersection MOE	-											
38	North Miami Avenue & 20th Street	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	118.3	23.6	20.9	36.2	0.0	21.3	18.7	0.0	0.0	18.1	0.0	15.8
		Movement LOS	F	C	C	D	A	C	B	A	A	B	A	B
		Approach	D (41.8)			C (32.7)			B (18.7)			B (16.4)		
		Intersection MOE	C (29.1)											
39	4th Street & Lenox Avenue	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	7.6	-	–	–	-	-	–	–	–	10.4	–	10.4
		Movement LOS	A	-	–	–	-	-	–	–	–	B	–	B
		Approach	-			-			-			B (10.4)		
		Intersection MOE	A (3.7)											
40	4th Street & N. Michigan Avenue	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	9.4	9.4	9.4	9.2	9.2	9.2	9.8	9.8	9.8	9.4	9.4	9.4
		Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
		Approach	A (9.4)			A (9.2)			A (9.8)			A (9.4)		
		Intersection MOE	A (9.5)											
41		Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		

Table 2-5. Existing Traffic Conditions – PM Peak Period													
Location		**Type**	**Direction**										
	4th Street & Jefferson Avenue		**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6	8.6
		Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
		Approach	A (8.6)			A (8.6)			A (8.6)			A (8.6)		
		Intersection MOE	A (8.6)											
42	4th Street & Meridian Avenue	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	9.3	9.3	9.3	10.1	10.1	10.1	9.2	9.2	9.2	10.5	10.5	10.5
		Movement LOS	A	A	A	B	B	B	A	A	A	B	B	B
		Approach	A (9.3)			B (10.1)			A (9.2)			B (10.5)		
		Intersection MOE	A (9.9)											
43	5th Street & Lenox Avenue	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	5.9	14.1	14.1	1.0	0.6	1.1	57.7	0.0	0.0	57.6	0.0	65.1
		Movement LOS	A	B	B	A	A	A	E	A	A	E	A	E
		Approach	B (13.2)			A (0.8)			E (57.0)			E (62.2)		
		Intersection MOE	B (13.6)											
44	5th Street & N. Michigan Avenue	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	85.7	0.4	0.8	73.6	5.2	5.7	61.9	0.0	0.0	52.3	0.0	54.1
		Movement LOS	F	A	A	E	A	B	E	A	A	D	A	D
		Approach	A (7.3)			A (6.0)			E (61.9)			D (53.4)		
		Intersection MOE	B (12.2)											
45		Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**

Table 2-5. Existing Traffic Conditions – PM Peak Period													
Location		**Type**	**Direction**										
	5th Street & Jefferson Avenue	Movement Delay	2.4	0.3	0.6	0.3	0.3	0.6	62.5	0.0	0.0	53.1	0.0	54.9
		Movement LOS	A	A	A	A	A	A	E	A	A	D	A	D
		Approach	A (0.6)			A (0.4)			E (62.5)			D (54.1)		
		Intersection MOE	A (7.1)											
46	5th Street & Meridian Avenue	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	3.1	0.3	0.5	0.8	0.3	0.6	60.4	0.0	0.0	51.2	0.0	49.7
		Movement LOS	B	B	B	B	A	B	E	A	A	D	A	D
		Approach	A (0.7)			A (0.4)			E (60.4)			D (50.6)		
		Intersection MOE	A (8.5)											
47	6th Street & Lenox Avenue	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	13.8	13.8	13.8	11.6	11.6	11.6	14.8	14.8	9.2	12.2	12.2	12.2
		Movement LOS	B	B	B	B	B	B	B	B	A	B	B	B
		Approach	B (13.8)			B (11.6)			B (13.4)			B (12.2)		
		Intersection MOE	B (13.0)											
48	6th Street & N. Michigan Avenue	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	10.7	10.7	10.7	10.2	10.2	10.2	10.8	10.8	10.8	10.1	10.1	10.1
		Movement LOS	B	B	B	B	B	B	B	B	B	B	B	B
		Approach	B (10.7)			B (10.2)			B (10.8)			B (10.1)		
		Intersection MOE	B (10.5)											
49	6th Street & Jefferson Avenue	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	11.8	11.8	11.8	10.9	10.9	10.9	11.1	11.1	11.1	10.7	10.7	10.7

Table 2-5. Existing Traffic Conditions – PM Peak Period														
Location		**Type**	**Direction**											
		Movement LOS	B	B	B	B	B	B	B	B	B	B	B	B
		Approach	B (11.8)			B (10.9)			B (11.1)			B (10.7)		
		Intersection MOE	B (11.2)											
50	6th Street & Meridian Avenue	Signalized	**Eastbound**			**Westbound**			**Northbound**			**Southbound**		
			Left	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**	**Left**	**Thru**	**Right**
		Movement Delay	16.0	0.0	0.0	14.5	0.0	0.0	7.2	0.0	0.0	6.8	0.0	0.0
		Movement LOS	B	A	A	B	A	A	A	A	A	A	A	A
		Approach	B (16.0)			B (14.5)			A (7.2)			A (6.8)		
		Intersection MOE	B (10.1)											

2.5.3. Existing Transit Conditions

The Project corridor connects two regional travel activity centers in South Florida (Downtown Miami and Miami Beach) which draw trips from across the region, have high population and employment densities, scarce and expensive parking, and experience extended periods of recurring congestion for many hours of a typical day. Over the past decades, these two areas have experienced significant growth in population, employment, and tourism.

Existing transit service in the Project area is provided to two distinct travel markets:

- East-west connectivity across Biscayne Bay between Downtown Miami and Miami Beach (~5 miles) serving mostly regional demand, and
- North-south connectivity on either side of the Bay – between the Design District/Midtown and Downtown Miami (~3 miles) on the mainland, and between Mid-Beach, Convention Center area and South Beach on the barrier Island.

This analysis evaluates existing transit conditions for each of these distinct travel markets.

a. *Summary of Existing Transit Service*

North-South Transit Service (Miami)

The market for travel between the Design District/Midtown and Downtown Miami is served by eight bus routes operating on NW 3rd Avenue, NW 2nd Avenue, NW 1st Avenue, North Miami Avenue, NE 2nd Avenue, and Biscayne Boulevard, providing peak hour headways ranging from 12 to 60 minutes. They are shown in **Table 2-6**.

On a typical weekday, approximately 590 buses provide service in this corridor, carrying about 29,300 passengers. It takes at least 20 minutes to travel from the Design District/Midtown to Downtown Miami by transit during peak hours which is about twice the time to travel by car.

The southern portion of this corridor is also served by Metromover which is comprised of three services which operate loops through the downtown:

- The **Outer / Omni Loop** connects Adrienne Arsht Center and Omni neighborhood with Downtown Miami with five-minute peak period headways and loops counterclockwise.
- The **Outer / Brickell Loop** connects Downtown Miami with Brickell area to the south with five-minute peak period headways and loops counterclockwise.
- The **Inner / Downtown Loop** serves Downtown Miami CBD with 1.5-minute peak period headways and loops clockwise.

Table 2-6 Mainland North-South Transit Services					
Route	Peak Hour Headway (min)	Ridership per day	Buses per day	Capacity	Capacity Consumption
Metromover	1.5 - 5	26,200	360	34,560	76%
2	20	2,400	96	5,760	56%
3	20	5,000	125	7,500	93%
9	12	5,100	113	6,780	75%
10	30	2,100	67	4,020	78%
32	30	2,200	64	3,840	57%
93	15	3,400	89	5,340	89%
211	45	65	16	960	9%
Total Bus	--	--	930	68,760	71%

Source: Miami-Dade Department of Transportation and Public Works, May 2018.

Note: The final column in the table above indicates an estimate of the service consumption, or ratio of riders to seats provided. Routes 3 (Biscayne Blvd.) and 93 (NE 2nd Ave) are highly productive routes, while Route 211 (Overtown circulator) sees very low ridership. Note that the capacity consumption is an average daily calculation: higher demand during peak hours result in higher ratio of capacity consumption, including times with many standing passengers, supporting the need for additional transit investment.

The Outer / Omni Loop of Metromover runs parallel with NE 2nd Avenue between NE 15th Street in the Omni neighborhood and NE 1st street in Downtown Miami and provides transfer access to Inner / Downtown Loop and Outer / Brickell Loop in Downtown Miami, as well as to Metrorail at Government Center and Brickell stations. The average weekday ridership of Metromover is about 26,200 passengers.

East-West Transit Service (to Miami Beach)

The market for east-west travel across Biscayne Bay is served by seven bus routes that travel across one of three causeways:

- Routes 110/J and 150 Airport Flyer traverse the Julia Tuttle Causeway (I-195)
- Route 101/A follows the Venetian Causeway
- Routes 103/C, 113/M, 119/S, and 120 Beach Max operate on the MacArthur Causeway

Peak hour headways for these routes range from 12 minutes to 45 minutes, resulting in 628 daily bus trips running in the corridor carrying approximately 20,000 passengers on a typical weekday, as shown in **Table 2-7**.

Table 2-7 East-West Transit Services					
Route	Peak Hour Headway (min)	Ridership per day	Buses per day	Capacity	Capacity Consumption
110 / J	20	2,400	86	3,440	70%
150 Flyer	20	1,600	102	4,080	39%
101/A	30	140	28	1,680	35%
103 / C	20	400	103	6,180	10%
113 / M	45	750	19	1,140	49%
119 / S	12	8,200	161	9,660	87%
120	12	6,000	129	7,740	78%
Total	--	19,490	628	30,820	63%

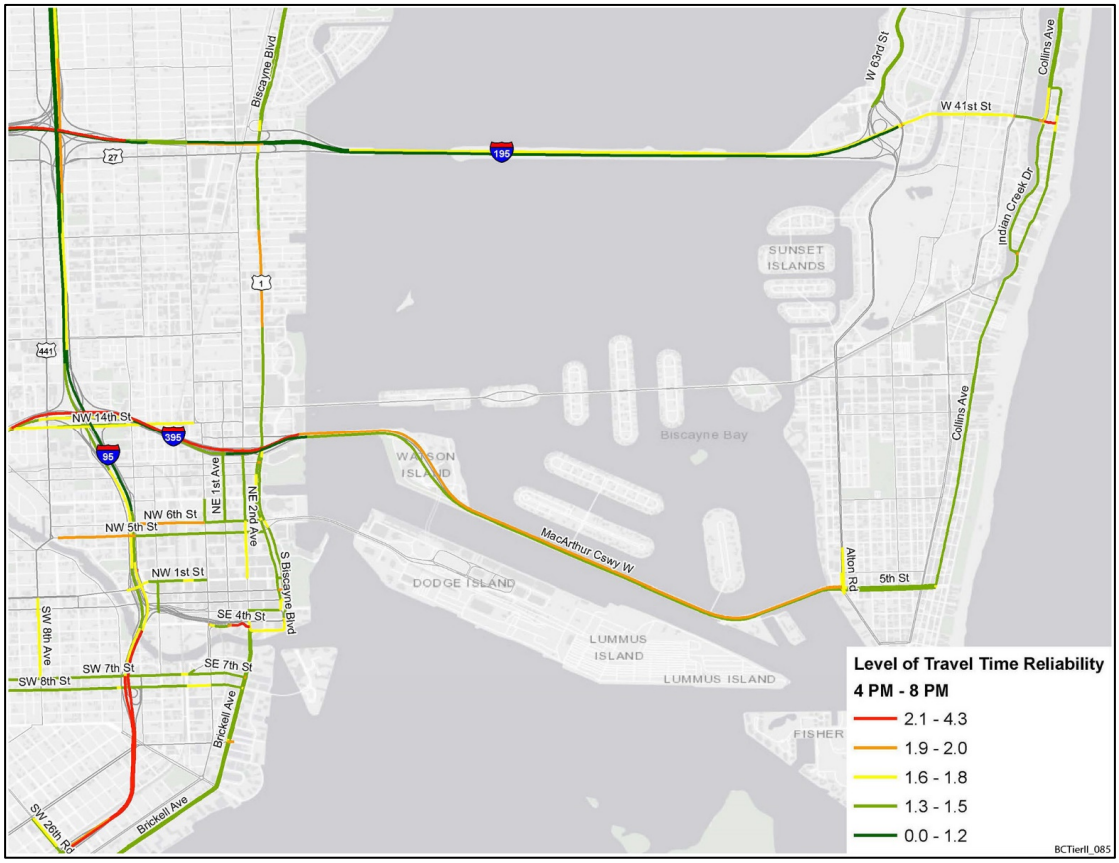
Source: Miami-Dade Department of Transportation and Public Works, May 2018.

The final column in the table above indicates an estimate of the service consumption, or ratio of riders to seats provided. Clearly Route S/119, with 12-minute peak headways, is a highly productive route, operating close to capacity. For the corridor as a whole, this ratio is lower, but still relatively high compared with the system overall.

Travel time is a significant challenge to transit in this corridor. It typically takes at least 30 minutes to travel from Downtown Miami to Miami Beach (5th Street at Washington Avenue) by transit during peak hours, which is about twice as long as driving. Moreover, Level of Travel Time Reliability (LOTTR) is low (see **Figure 2-15**). Congestion frequently causes additional delays to buses. This makes it unattractive to potential travelers, and it increases operating costs for the transit provider.

North-South Transit Service (Miami Beach)

The market for transit service in the north-south corridor is served by regional route bus, local bus and trolley-branded bus circulator service on Miami Beach as shown below in **Table 2-8**. These services carry almost 22,000 passengers per day on relatively frequent headways and have slightly lower productivity than the two areas shown in **Figure 2-15**.



Note: LOTTR is defined as the ratio of the longer travel times (80th percentile) to a "normal" travel time (50th percentile), calculated utilizing travel speed data from the National Performance Management Data Set (NPMRDS) average travel times on the National Highway System (NHS), reported every five (5) minutes and based on vehicle probe-based data from a number of sources including mobile phones, vehicles, and portable navigation devices.

Figure 2-15 Level of Travel Time Reliability (PM Peak)

Table 2-8 Miami Beach Circulator Services

Route	Peak Hour Headway (min)	Ridership per day	Buses per day	Capacity	Capacity Consumption
112 / L	10	7,100	160	6,400	74%
115	50	75	28	1,120	7%
Collins Trolley	20	3,600	110	4,400	82%
Mid B Trolley	15	3,700	146	5,800	63%
North B Trolley	15	2,500	146	5,800	43%
South B Trolley	8	4,000	272	5,440	74%
Total	--	--	862	32,240	65%

Source: Miami-Dade DTPW and City of Miami Beach, 2018.

Ridership activity along these corridors can be seen in **Figure 2-16**. Stop-level boarding and alighting is relatively evenly distributed along bus routes in the study area, with clear concentrations indicated at key transfer locations such as Downtown Government Center, OMNI and Lincoln Road.

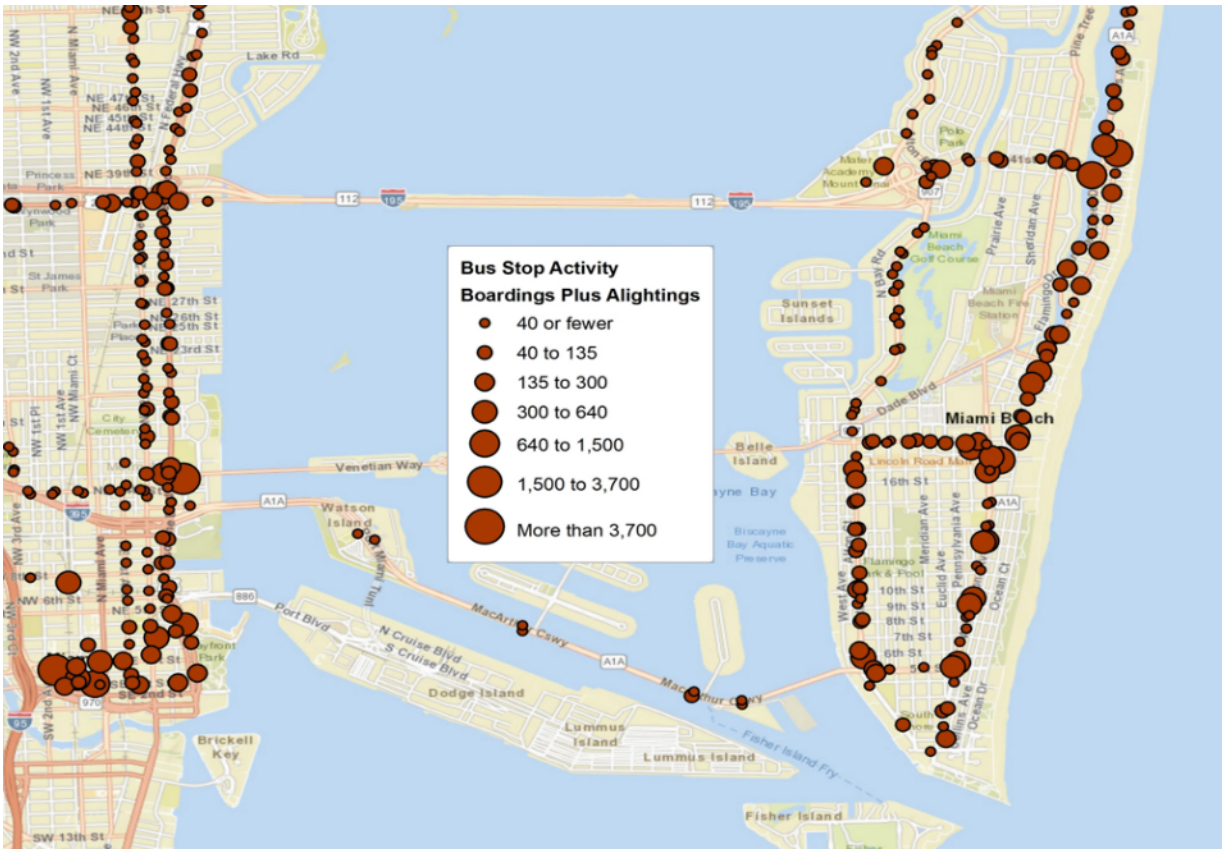


Figure 2-16 Boarding and Alighting Activity for each Bus Stop

b. *Existing Transit Travel Speeds*

The numerous bus routes serving the study area are severely constrained by sharing the roadway with heavy traffic volumes and congestion. While the average travel speed for a bus across the County is approximately 13 mph, buses traveling on downtown streets as well as 5th Street and Washington Avenue on Miami Beach travel at a daily average speed of only 8 mph (obtained from MDT automatic vehicle location device data).

This becomes particularly acute at certain times of the day, with the slowest bus operating speeds at the locations and times as summarized below:

- 8 mph eastbound on the MacArthur Causeway between 9:00 a.m. and 10:00 a.m.
- 5 mph eastbound on 5th Street between 7:00 p.m. and 8:00 p.m.
- 5 mph northbound on Washington Avenue between 4:00 p.m. and 5:00 p.m.

A dedicated guideway (at-grade or elevated) is necessary to remove transit vehicles from congested road conditions and improve transit travel times and reliability in order to provide a competitive and attractive alternative to the existing predominant automobile travel.

c. *Existing Transit Users*

There are no recent on-board transit user surveys to confirm trip purposes of existing transit riders in the study area, but the unique temporal travel patterns in the study area (from the Travel Market Analysis) as well as national and older local surveys suggest that the proposed Beach Corridor transit service will need to serve shift-work related to Beach entertainment employers as well as a wide range of trip types and purposes beyond commuting – including school, health, shopping, tourist and social trips.

d. *Existing Transit Service: OMNI Transfer Terminal*

The OMNI transit terminal (located immediately north of the Museum Park Metromover station) provides one important transfer opportunity for transit users heading to and from Miami Beach. Three routes serve this terminal from the north – Routes 3, 16 and 32. Boarding and alighting information was obtained from MDT passenger count data to estimate the number of passengers who may be transferring to and from Beach bus routes (101, 113, 119 and 120). It was estimated that approximately 600 passengers per day may transfer to and from routes serving the Beach at this terminal, with an estimate of three to five passengers per bus.

e. *Existing Transit Service: Findings*

The study area contains two of the highest density activity centers in South Florida, and experiences very high traffic volumes and highly congested traffic conditions for much of the typical weekday, with even greater congestion on weekends on some roadways, and particularly late at night, related to entertainment venues on Miami Beach. Both Miami and Miami Beach are in the midst of building booms, with dozens of high-rise projects under construction, and many more planned as residents and businesses continue to relocate to this area.

Both east-west and north-south road connections currently exhibit significant congestion, particularly at peak times and therefore impede reliable bus travel. As travel demand increases in the region and the study area, traffic conditions will become more congested unless additional travel capacity is provided via transit investments that makes better use of the existing road capacity, or by adding new transit guideway capacity.

Transit currently plays a large part in providing mobility in the Beach Corridor study area, with 21 bus routes providing extensive regular fixed route service which carry in excess of 66,000 daily transit riders. Further investment in transit via the Beach Corridor would build upon a solid existing market and meet both current demand and address future growth needs within the study area.

2.6. FUTURE TRAFFIC CONDITIONS

Traffic Operations were analyzed for the am and pm peak period future (2040) conditions using Synchro 10® software. Traffic growth rates were developed for mainline and cross-street approaches for each corridor using version 7 of the Southeast Regional Planning Model (SERPM) future and base year models. Interpolated annual growth was applied for the period 2018 to the horizon year 2040. Existing time of day schedules and signal operation plans, as obtained from Miami-Dade County and utilized for the existing traffic conditions analysis, were also used as a basis for the future conditions analysis. The detailed analysis is presented in the Traffic Report.

It should be noted that future traffic conditions for Julia Tuttle causeway are provided as a separate analysis for the Miami-Dade County Bus Express Rapid Transit (BERT) Beach North Project. There were no alternatives along Julia Tuttle beyond the Beach Express North concepts. The key findings of this analysis are presented for two basic future year scenarios as follows:

- Without a one-lane reduction in each direction of travel
- With a one-lane reduction in each direction of travel

The first scenario includes the elevated alternatives along North Miami Avenue, MacArthur Causeway and Washington Avenue, while the second scenario includes the at-grade alternatives with exclusive travel lanes along North Miami Avenue and Washington Avenue. The tables show traffic operation LOS, movement delay (seconds per vehicle), and approach delay (seconds per vehicle). Turning movement volumes for analysis in Synchro correspond to seasonally adjusted and balanced volumes based on the field turning movement counts which were subsequently grown using rates derived from the SERPM analysis for the study intersections. Signal cycle lengths were optimized for each individual intersection, and further optimized along the analyzed study corridors.

As previously noted, HCM 6th edition was used for the evaluation of the intersection delays and LOS where applicable. Due to restrictions within Synchro and this methodology, some intersections were unable to be evaluated using HCM 6th edition due to their geometry or signal phasing. HCM 2000 was used where needed in order to evaluate intersections that did not comply with the latest HCM methodology.

The results of the analysis for the am peak period for elevated alternatives is detailed in the Traffic Report. In the mainland portion of the study area, the intersections of North Miami Avenue with N 36th St and N 29th St show failing LOS F, with the southbound approach of N Miami Avenue showing LOS F. The intersection of North Miami Avenue and N 20th St show failing LOS on the southbound approaches; with acceptable LOS elsewhere throughout the corridor. Moving across MacArthur Causeway, the eastbound approach experiences high delay and a failing LOS F at Terminal Island, consistent with the queuing and delay observed in the existing conditions analysis. Alton Road sees some failing movements at certain intersections, while Washington

Avenue sees no failing movements. The supplemental intersections along 5th Street all see LOS C or better, with all 5th Street approaches seeing LOS A or B.

For the pm peak period for the elevated alternative scenarios, North Miami Avenue sees failing approaches at the N 38th ST, N 36th St, and N 29th St intersection and LOS E+50 at its northbound approach at the N 20th St intersection. MacArthur Causeway sees no failing through movements, similar to observations made in the existing conditions analysis, while Washington Avenue sees one movement with LOS E+50 at the southbound left turn at 5th Street. The eastbound left turn at 5th Street performs at LOS C. Supplemental intersections along 5th Street all see LOS C or better, similar to the AM peak period.

The Traffic Report also presents the analysis results for the am peak period at-grade alternative scenarios. North Miami Avenue has a failing northbound approach at N 38th St, failing SB approach at N 36th St, failing SB approach at N 29th St, and failing SB approach at N 20th St. MacArthur Causeway sees no changes and performs similarly to the elevated alternative scenario. Washington Avenue does not see reduced performance as a result of the lane reduction in this scenario, performing similarly to the elevated alternative condition with no failing movements. Supplemental intersections along 5th Street all perform at LOS C or better, with all eastbound and westbound movements performing at LOS C or better.

For the pm peak period under the at-grade alternative scenarios, North Miami Avenue sees a failing northbound approach at North 38th Street, failing northbound and southbound approaches at North 36th Street, failing northbound approach at North 29th Street, and failing northbound and southbound approaches at North 20th Street. MacArthur Causeway would only have an elevated alternative and is thus unaffected. Washington Avenue sees a failing SB left turn at its intersection with 5th Street, with the intersection performing at LOS E+50, but otherwise sees no failing movements. Supplemental 5th Street intersections all perform at LOS C or better, similar to the AM condition.

For both the elevated and at-grade alternatives, the Synchro results showed LOS improvements for the eastbound left movement at the Washington Avenue/5th Street intersection when a reduction from two lanes to one lane occurs utilizing protected+permissive phasing for the single left turn lane. The specific movement results are as follows:

- Elevated Alts AM peak: 33.3 (C) two lanes; 6.1 (A) one lane
- Elevated Alts PM Peak: 81.3 (F) two lanes; 21.4 (C) one lane
- At-Grade Alts AM Peak: 41.0 (D) two lanes; 17.5 (B) one lane
- At-Grade Alts PM Peak: 56.5 (C) two lanes; 54.6 (D) one lane

The tables below summarize the effects of the lane reduction for the a.m. and p.m. peak hours.

Table 2-9 Effect of Lane Reduction – AM Peak

Washington Ave @ 5th Street - AM Peak (Delay/LOS)

Movement	Existing Conditions	Future Elevated Alternatives (two EBL lanes)	Future At-Grade Alternatives (two EBL lanes)	Future Elevated Alternatives (one EBL lane)	Future At-Grade Alternatives (one EBL lane)
EBL	77.1 (E)	33.3 (C)	41.0 (D)	6.1 (A)	17.5 (B)
EBT	6.2 (A)	8.7 (A)	12.8 (B)	7.0 (A)	19.0 (B)
EBR	6.2 (A)	8.7 (A)	12.8 (B)	7.0 (A)	19.0 (B)
EB Approach	26.3 (C)	15.8 (B)	21.0 (C)	6.7 (A)	18.6 (B)
WBL	76.6 (E)	36.8 (D)	41.6 (D)	75.3 (E)	80.6 (F)
WBT	9.4 (A)	10.8 (B)	15.2 (B)	9.1 (A)	24.7 (C)
WBR	9.6 (A)	11.2 (B)	15.7 (B)	9.1 (A)	25.2 (C)
WB Approach	10.3 (B)	11.5 (B)	16.0 (B)	10.1 (B)	25.6 (C)
NBL	65.0 (E)	26.7 (C)	23.1 (C)	64.0 (E)	42.9 (D)
NBT	0.0 (A)	0.0 (A)	0.0 (A)	0.0 (A)	0.0 (A)
NBR	59.5 (E)	26.1 (C)	22.9 (C)	58.2 (E)	36.4 (D)
NB Approach	62.3 (E)	26.4 (C)	23.0 (C)	60.9 (E)	42.3 (D)
SBL	65.2 (E)	28.2 (C)	29.0 (C)	64.4 (E)	58.5 (E)
SBT	59.7 (E)	26.3 (C)	0.0 (A)	58.0 (E)	0.0 (A)
SBR	68.6 (E)	30.2 (C)	0.0 (A)	66.7 (E)	0.0 (A)
SB Approach	65.1 (E)	28.6 (C)	29.0 (C)	63.4 (E)	58.5 (E)
Int Total	29.4 (C)	18.1 (B)	21.3 (C)	21.1 (C)	29.3 (C)

Key:

EB – Eastbound | EBL – Eastbound Left | EBR – Eastbound Right
WB – Westbound | WBL – WB Left | WBR – WB Right
SB – Southbound | SBL – SB Left | SBR – SB Right
NB – Northbound | NBL – NB Left | NBR – NB Right

Table 2-10 Effect of Lane Reduction - PM Peak					
Washington Ave @ 5th Street - PM Peak Delay (LOS)					
Movement	**Existing Conditions**	**Future Elevated Alternatives (two EBL lanes)**	**Future At-Grade Alternatives (two EBL lanes)**	**Future Elevated Alternatives (one EBL lane)**	**Future Elevated Alternatives (one EBL lane)**
EBL	206.9 (F)	81.3 (F)	56.5 (E)	21.4 (C)	54.6 (D)
EBT	0.7 (A)	10.3 (B)	14.6 (B)	4.7 (A)	25.0 (C)
EBR	0.7 (A)	10.3 (B)	14.6 (B)	4.7 (A)	25.0 (C)
EB Approach	64.5 (E)	36.5 (D)	30.1 (C)	9.9 (A)	34.2 (C)
WBL	77.6 (E)	51.1 (D)	46.7 (D)	14.4 (B)	74.7 (D)
WBT	15.4 (B)	13.5 (B)	18.6 (B)	20.5 (C)	46.4 (D)
WBR	15.9 (B)	13.9 (B)	19.3 (B)	21.2 (C)	50.6 (D)
WB Approach	15.9 (B)	14.2 (B)	19.2 (B)	20.7 (B)	47.9 (D)
NBL	59.9 (D)	36.3 (D)	25.7 (C)	64.9 (E)	113.9 (F)
NBT	0.0 (A)	0.0 (A)	0.0 (A)	0.0 (A)	0.0 (A)
NBR	52.4 (D)	32.6 (C)	23.7 (C)	51.5 (D)	27.9 (B)
NB Approach	55.9 (E)	34.4 (C)	24.5(C)	57.7 (E)	108.9 (F)
SBL	61.1 (D)	38.2 (D)	31.9 (C)	61.0 (E)	669.0 (F)
SBT	49.2 (D)	30.3 (C)	0.0 (A)	47.6 (D)	0.0 (A)
SBR	53.1 (D)	33.2 (C)	0.0 (A)	52.4 (D)	0.0 (A)
SB Approach	52.8 (D)	32.9 (C)	31.9 (C)	51.9 (D)	669.0 (F)
Int Total	43.5 (D)	30.0 (C)	26.7 (C)	24.6 (C)	124.1 (F)

Key:

EB – Eastbound | EBL – Eastbound Left | EBR – Eastbound Right
WB – Westbound | WBL – WB Left | WBR – WB Right
SB – Southbound | SBL – SB Left | SBR – SB Right
NB – Northbound | NBL – NB Left | NBR – NB Right

Finally, the Traffic Report presents a summary matrix with the overall LOS and vehicle delay for each intersection under elevated alternative/no build scenarios and at-grade alternative/build scenarios. On the mainland, the intersections on North Miami Avenue that see lane reductions due to proposed alignments perform worse under these conditions, with high overall delays and failing LOS. On the beach, along Washington Avenue, all intersections perform well under both elevated alternative/no build scenarios and at-grade scenarios, with overall passing LOS at each intersection during the a.m. peak. During the PM peak, the intersection at 5th Street sees LOS E+50 under the at-grade conditions, with the eastbound left turn performing well throughout utilizing protected+permissive phasing, while all other intersections see passing Levels of Service. Supplemental intersections along 4th, 5th, and 6th Streets all perform at LOS C or better under all conditions.

In summary, the traffic impacts attributed to the alternative technologies studied on the roadway corridors are as follows:

a. Automated People Mover (APM)

This technology is proposed to serve the Bay Crossing Trunkline (MacArthur Causeway) and the Miami Extension (North Miami Avenue). There will be no impact to at-grade through traffic operations because it will operate on an elevated guideway. Column locations will be sited to minimize impacts to right-of-way and pedestrian crossings. Prior to completion of the 15 percent conceptual plans, it appeared that the only traffic impact was to the eastbound to northbound left turn movement at 5th Street and Washington Avenue since one of the dual left turns would be required for column placement. Subsequent to completing the 15 percent concept plans, additional impacts to turn lanes at 5th Street and Lenox, Michigan and Meridian intersections were deemed necessary in order to accommodate piers at those locations. Due to the reduction from two eastbound left turn lanes to one left turn lane at Washington Avenue at 5th Street under elevated alternative conditions, mitigation analysis to reduce potential deterioration of intersection performance was conducted analyzing potential rerouting alternatives and ultimately improving the performance of the left turn under future conditions. The analysis determined that to mitigate for the removal of one existing left turn lane at Washington Avenue, the remaining left turn lane would operate under protected+permissive signal phasing as opposed to the existing protected only phase required for the dual left turn. Intersections at Lenox, Michigan and Meridian Avenues saw no deterioration in level of service under the updated concept plan lane configurations.

The completion of the 15 percent concept plans for the recommended alternative along North Miami Avenue includes a lane reduction from four lanes to two lanes between North 20th Street and North 41st Street to accommodate stations in the median. A left turn storage lane will also be removed at North Miami Avenue and North 40th Street (Southbound left turn) and at North 41st Street (Northbound left turn). Existing geometry would be unchanged south of North 20th Street. Initial indications are that project stakeholders in the area support the access management improvements, and the overall project, as it enhances the pedestrian, bicycle and urban nature of the corridor.

The intersections along North Miami Avenue that would be affected by the roadway modifications were analyzed to determine their performance. The intersections subject to analyses were North Miami Avenue at North 20th, North 29th, North 36th, North 38th, and North 41st Streets.

At North Miami Avenue and North 20th Street, the intersection performs at LOS E+50 (within the Miami-Dade County window) during the AM peak period. All approaches perform at the same LOS under both configurations: LOS F for the southbound approach, LOS C for the northbound approach, and LOS D for both the eastbound and westbound approaches. During the PM peak, the overall intersection performs at LOS C, with LOS D for the SB approach, LOS E+50 (within the County window) for the northbound approach, LOS B for the westbound approach, and LOS D for the eastbound approach.

At North 29th Street, the overall intersection performance operates at LOS F under both configurations. The SB approach decreases from LOS E to LOS F (within the County window), while all other approaches maintain the same LOS (LOS E+50, LOS E+50, and LOS F for the northbound , eastbound, and westbound approaches respectively). During the PM peak, intersection LOS decreases from LOS C to LOS F . The northbound approach decreases from LOS D to LOS F, while the SB approach decreases from LOS C to LOS F. The eastbound and westbound approaches perform at LOS C under the two-lane or four-lane configuration.

At North 36th Street, overall intersection performance decreases from LOS E (within the County window) to LOS F during the AM peak. The northbound approach performs within the county window under both configurations (LOS E and LOS E+50), while the SB approach decreases from LOS E to LOS F. The westbound approach performs at LOS D under both configurations, while the eastbound approach decreases from LOS E to LOS F. During the PM peak, overall intersection performance decreases from LOS E to LOS F. The SB approach decreases from LOS D to LOS F, while all other approaches perform at LOS E+50 under both the two-lane and four-lane configuration.

At North 38th Street, the AM peak period overall intersection performance deteriorates from LOS C to LOS D under the updated configuration. The westbound approach performs at LOS E+50 within Miami-Dade County's acceptable window under either the two-lane or four-lane configuration. The northbound approach decreases from LOS C to LOS D, while the SB approach decreases from LOS C to LOS D. During the PM peak, intersection performance decreases from LOS C to LOS F under the two-lane configuration. The westbound approach performs at LOS C under either the two-lane or four-lane configuration, while the northbound and SB approaches decrease from LOS B and LOS C respectively to LOS F.

During the AM peak, the intersection at North 41st Street would operate at an overall intersection delay of 2.5 seconds/vehicle under the four-lane configuration and 3 seconds/vehicle under the two-lane configuration. The westbound approach is within the acceptable County window (Miami-Dade County considers LOS E+50 acceptable) the eastbound approach exceeds that limit at LOS F, albeit with minimal volume on both approaches. However, during the PM peak, overall intersection operations deteriorate from LOS D to LOS F (within Miami-Dade County's acceptable standard), with the westbound and eastbound approaches performing at LOS F under both configurations.

b. Light Rail Transit (LRT)/Streetcar

The LRT option is proposed to serve the Bay Crossing Trunkline, the Miami Extension and the Miami Beach Extension (Washington Avenue from 5th Street to 19th Street). The LRT option will be elevated along the Bay Crossing segment and thus will not impact through traffic operations. Similar to the APM Trunkline, subsequent to completing the 15 percent plans, impacts to turn lanes at the 5th Street and Lenox, Michigan and Meridian intersections were deemed necessary to accommodate the piers at those locations. Also, similar to the APM alternative, to mitigate for the removal of one existing left turn lane at Washington Avenue, the remaining left

turn lane would be allowed to operate under protected+permissive phasing rather than the existing protected phase required for the dual left turn. Intersections at Lenox, Michigan and Meridian Avenues saw no deterioration in level of service under the updated concept plan lane configurations.

Along both the Miami Extension and the Miami Beach Extension segments the LRT operates at-grade with exclusive transit lanes in each direction. The consequent lane reduction along both arterials reduces the traffic operational efficiency, especially along Miami Avenue, where five intersections perform worse during the am peak period and five intersections perform worse during the pm peak period.

c. Monorail

The Monorail option is proposed to serve the Bay Crossing Trunkline. There will be no impact to at-grade through traffic operations because it will operate on an elevated guideway. Similar to the other elevated Trunkline alternatives, prior to completing the 15 percent conceptual plans, it appeared that the only traffic impact was to the eastbound to northbound left turn movement at 5th Street and Washington Avenue since one of the dual left turns would be required for column placement. Subsequent to completing the 15 percent plans, impacts to turn lanes at the 5th Street and Lenox, Michigan and Meridian intersections were also deemed necessary to accommodate the piers at those locations. To mitigate for the removal of one existing left turn lane at Washington Avenue, the remaining left turn lane would be allowed to operate under protected+permissive phasing rather than the existing protected phase required for the dual left turn. Intersections at Lenox, Michigan and Meridian Avenues saw no deterioration in level of service under the updated concept plan lane configurations.

d. Bus Rapid Transit (BRT)

On arterial segments where travel lanes are dedicated to BRT, traffic operational efficiency is reduced along North Miami Avenue and Washington Avenue in a similar manner to the lane reductions for the LRT option, with five intersections performing worse during the am peak period and five intersections performing worse during the pm peak period.

Tables 2-11 through **2-14** show the results of the future conditions analysis, while **Table 2-15** displays the summary matrix.

Table 2-11 AM Future Traffic – Elevated Alternatives Scenario

Location		Type	Direction											
			EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
1	North Miami Avenue & 41st St.	Movement Delay	101.3	–	–	50.9	–	–	12.4	–	–	8.3	–	–
		Movement LOS	F	–	–	F	–	–	B	–	–	A	–	–

Table 2-11 AM Future Traffic – Elevated Alternatives Scenario

Location		Type	Direction											
		Approach	F (101.3)			F (50.9)			A (0.3)			A (0.2)		
		Intersection MOE	A (3.0)											
2	North-East 2nd Avenue & 41st Street	Unsignalized	EB			–			NB			SB		
			LT	T	RT	–	–	–	LT	T	RT	LT	T	RT
		Movement Delay	22.7	–	–	–	–	–	10.0	0.0	–	–	–	–
		Movement LOS	C	–	–	–	–	–	A	A	–	–	–	–
		Approach	C 22.7)			–			A (0.7)			–		
		Intersection MOE	A (0.7)											
3	North Miami Avenue & 38th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	–	–	–	78.0	-	-	136.9	0.0	1.6	0.0	0.0	38.1
		Movement LOS	–	–	–	E	-	-	F	A	A	A	A	D
		Approach	–			E(78.0)			D (46.1)			D (38.1)		
		Intersection MOE	D (43.9)											
4	North-East 2nd Avenue & 39th St	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	20.0	0.0	0.0	27.8	0.0	0.0	23.8	0.0	29.6	18.6	0.0	61.3
		Movement LOS	B	A	A	C	A	A	C	A	C	B	A	E
		Approach	B (20.0)			C (27.8)			C (29.3)			E (57.9)		
		Intersection MOE	D (40.1)											
5	North-East 2nd Avenue & 38th St	Unsignalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	–	142.0	–	–	35.5	–	11.1	0	–	7.9	–	–
		Movement LOS	–	F	–	–	E	–	B	A	–	A	–	–
		Approach	F (142.0)			D (35.5)			A (0.9)			A (0)		
		Intersection MOE	B (12.9)											
			EB			WB			NB			SB		

Table 2-11 AM Future Traffic – Elevated Alternatives Scenario

Location		Type	Direction											
6	North Federal Highway & 39th Street	Signalized (HCM 2000)	LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	40.9	–	73.5	31.4	43.8	–	–	19.3	–	–	19.3	–
		Movement LOS	D	–	E	C	D	–	–	B	–	–	B	–
		Approach	E (61.1)			D (41.0)			B (19.3)			C (19.3)		
		Intersection MOE	C (29.9)											
7	Biscayne Boulevard & 38th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	–	–	–	109.7	141.6	75.6	28.5	111.7	130.4	153.8	9.7	9.6
		Movement LOS	–	–	–	F	F	E	C	F	F	F	A	A
		Approach	–			F (113.7)			F (118.4)			D (54.6)		
		Intersection MOE	F (90.0)											
8	North Miami Avenue & 36th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	34.3	170.2	171.4	94.1	34.8	26.3	127.9	90.1	44.6	68.9	0.0	286.6
		Movement LOS	C	F	F	F	C	C	F	F	D	E	A	F
		Approach	F (163.6)			D (50.8)			F (85.5)			F (242.5)		
		Intersection MOE	F (163.5)											
9	North Federal Highway & 36th Street	Signalized (HCM 2000)	EB		WB	NB		SB			Southeast bound			
			LT	T	T	LT	T	LT	T	RT	LT	T	RT	
		Movement Delay	292.1	64	87.0	177.5	91.6	54.4	115.8	53.0	130.2	153.1	44.3	
		Movement LOS	F	E	F	F	F	D	F	D	F	F	D	
		Approach	F (98.8)		F (87.0)	F (139.4)		F (97.0)			F (124.0)			
		Intersection MOE	F (107.9)											
10	Biscayne Boulevar	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT

Table 2-11 AM Future Traffic – Elevated Alternatives Scenario

Location		Type	Direction											
	d & 36th Street	Movement Delay	70.0	131.1	64.3	70.7	0.0	334.0	185.0	98.7	44.0	116.7	71.0	75.4
		Movement LOS	F	F	E	E	A	F	F	F	D	F	E	F
		Approach	F (111.5)			F (205.7)			E (66.9)			F (85.8)		
		Intersection MOE	F (112.3)											
11	North Miami Avenue & 29th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	75.9	0.0	44.6	387.9	0.0	21.8	33.63	0.0	3736.7	501.1	0.0	0.0
		Movement LOS	F	A	D	F	A	C	CD	A	D	F	A	A
		Approach	E (59.9)			F (124.6)			D (37.6)			F (501.1)		
		Intersection MOE	F (198.8)											
12	North Miami Avenue & NE 17th Street	Unsignalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	–	27	–	29.9	0	–	–	–	–	–	–	–
		Movement LOS	–	D	–	D	A	–	–	–	–	–	–	–
		Approach	D (27)			D (29.9)			–			–		
		Intersection MOE	A (0.1)											
13	North Miami Avenue & 14th Street	Signalized	EB			WB			Southeast bound			Northwest bound		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	0	0	48.2	40.5	0.0	0.0	18.6	18.4	0.0	-	-	-
		Movement LOS	A	A	C	D	A	A	B	B	A	-	-	-
		Approach	D (48.2)			D (40.5)			B (18.5)			-		
		Intersection MOE	D (39.2)											
14	North-East 2nd Avenue & 14th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	31.2	0.0	67.0	42.2	0.0	44.6	24.2	0.0	115.1	999.1	0.0	139.2
		Movement LOS	C	A	E	D	A	D	C	A	F	F	A	F
		Approach	E (58.8)			D (43.5)			F (110.4)			F (480.1)		

Table 2-11 AM Future Traffic – Elevated Alternatives Scenario

Location		Type	Direction											
		Intersection MOE	F (264.3)											
15	Biscayne Boulevard & North-East 13th Street	Signalized (HCM 2000)	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	–	–	–	54.5	38.7	35.5	30.7	13.9	–	–	33.1	39.1
		Movement LOS	–	–	–	C	C	C	C	B	–	–	C	D
		Approach	–			D (50.2)			B (14.7)			D (35.2)		
		Intersection MOE	C (33.1)											
16	Biscayne Boulevard & 12th Street	N/A	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	–	–	–	–	–	–	–	–	–	–	–	–
		Movement LOS	–	–	–	–	–	–	–	–	–	–	–	–
		Approach	–			–			–			–		
		Intersection MOE	-											
17	Biscayne Boulevard & 11th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	49.8	48.4	0.0	48.3	48.3	50.6	65.5	8.1	8.6	0.0	56.6	66.2
		Movement LOS	D	D	A	D	D	D	E	A	A	A	E	E
		Approach	D (49.2)			D (49.6)			B (13.3)			E (60.0)		
		Intersection MOE	D (42.6)											
18	MacArthur Causeway & Fountain St	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	59.7	13.8	–	–	17.2	7.8	–	–	–	57.6	–	0.0
		Movement LOS	E	B	–	–	B	A	–	–	–	E	–	A
		Approach	B (15.4)			B (17.0)						E (57.6)		
		Intersection MOE	B (16.9)											
19	MacArthur	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT

Table 2-11 AM Future Traffic – Elevated Alternatives Scenario

Location		Type	Direction											
	Causeway & Bridge Road	Movement Delay	68.3	8.0	–	–	10.4	4.4	–	–	–	44.9	–	0.0
		Movement LOS	E	A	–	–	B	A	–	–	–	D	–	A
		Approach	A (8.7)			B (10.4)			–			D (44.9)		
		Intersection MOE	A (9.6)											
20	MacArthur Causeway & Terminal Island	Signalized (HCM 2000)	EB			WB			NB		Northwest bound	Northeast bound		
			T	RT	RT 2	LT	T	RT	LT		LT	LT		
		Movement Delay	134.7	–	13.1	139.2	5.4	–	66.5		56.4	55.2		
		Movement LOS	F	–	B	F	A	–	E		E	E		
		Approach	F (129.7)			A (9.0)			E (66.5)		E (56.4)	E (55.2)		
		Intersection MOE	E (78.1)											
21	Alton Road & 5th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	135.8	150.2	0.0	171.0	49.5	30.6	100.9	0.0	155.2	45.7	0.0	0.0
		Movement LOS	F	F	A	F	D	C	F	A	F	D	A	A
		Approach	F (142.7)			D (50.3)			F (121.6)			D (45.7)		
		Intersection MOE	F (97.1)											
22	Washington Avenue & 5th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	6.1	7.0	7.0	75.3	9.1	9.3	64.0	0.0	58.2	64.4	58.0	66.7
		Movement LOS	A	A	A	E	A	A	E	A	E	E	E	E
		Approach	A (6.7)			B (10.1)			E (60.9)			E (63.4)		
		Intersection MOE	C (21.1)											
23	Alton Road & 11th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	29.0	0.0	0.0	29.3	0.0	0.0	6.8	11.0	10.9	6.3	10.9	10.8
		Movement LOS	C	A	A	C	A	A	A	B	B	A	B	B

Table 2-11 AM Future Traffic – Elevated Alternatives Scenario														
Location		Type	Direction											
		Approach	C (29.0)			C (29.3)			B (10.8)			A (10.6)		
		Intersection MOE	B (11.6)											
24	Washington Avenue & 11th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	30.0	0.0	0.0	30.9	0.0	0.0	2.4	2.9	2.9	0.3	0.0	0.3
		Movement LOS	C	A	A	C	A	A	A	A	A	A	A	A
		Approach	C (30.0)			C (30.9)			A (2.9)			A (0.3)		
		Intersection MOE	A (4.3)											
25	Alton Road & 15th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	25.4	0.0	0.0	24.6	0.0	27.0	7.2	15.8	15.8	8.9	11.1	11.0
		Movement LOS	C	A	A	C	A	C	A	B	B	A	B	B
		Approach	C (25.4)			C (26.1)			B (15.5)			B (10.8)		
		Intersection MOE	B (15.0)											
26	Washington Avenue & 15th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	34.3	–	0.0	–	–	–	0.4	0.4	–	–	3.5	3.5
		Movement LOS	C	–	A	–	–	–	A	A	–	–	A	A
		Approach	C (34.3)			–			A (0.4)			A (3.5)		
		Intersection MOE	A (6.3)											
27	Alton Road & 17th Street	Signalized (HCM 2000)	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	28.0	24.1	24.2	28.9	24.5	26.1	36.5	24.0	28.1	38.1	17.7	17.6
		Movement LOS	C	C	C	C	C	C	D	C	C	D	B	B
		Approach	C (25.2)			C (26.4)			C (26.4)			C (22.9)		
		Intersection MOE	C (24.7)											
28	Convention	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT

Table 2-11 AM Future Traffic – Elevated Alternatives Scenario

Location		Type	Direction											
	Center Drive & 17th Street	Movement Delay	35.8	8.9	8.9	0.0	13.0	13.0	29.0	0.0	29.5	28.3	0.0	28.8
		Movement LOS	D	A	A	A	B	B	C	A	C	C	A	C
		Approach	A (9.7)			B (13.0)			C (29.2)			C (28.6)		
		Intersection MOE	B (13.0)											
29	Washington Avenue & 17th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	37.3	21.3	21.4	28.9	28.4	28.4	12.0	9.5	9.5	15.0	17.5	17.7
		Movement LOS	D	C	C	C	C	C	B	A	A	B	B	B
		Approach	C (23.1)			C (28.5)			B (10.3)			B (17.4)		
		Intersection MOE	C (20.1)											
30	Alton Road & Dade Boulevard	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	38.7	35.4	0.0	43.3	34.5	0.0	55.3	18.5	18.6	42.0	22.9	16.2
		Movement LOS	D	D	A	D	D	A	E	B	B	D	C	B
		Approach	D (37.2)			D (38.8)			C (22.0)			C (22.7)		
		Intersection MOE	C (25.8)											
31	North Michigan Avenue & Dade Boulevard	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	0.0	7.6	–	–	8.3	3.3	–	–	–	15.2	–	0.0
		Movement LOS	A	A	–	–	A	A	–	–	–	B	–	A
		Approach	A (7.6)			A (6.0)			–			B (15.2)		
		Intersection MOE	A (9.6)											
32	Washington Avenue & 19th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	–	–	–	35.4	–	0.0	–	2.9	2.9	2.8	2.9	–
		Movement LOS	–	–	–	D	–	A	–	A	A	A	A	–

Table 2-11 AM Future Traffic – Elevated Alternatives Scenario

Location		Type	Direction											
		Approach	–			D (35.4)			A (2.9)			A (2.9)		
		Intersection MOE	A (5.2)											
33	North Michigan Avenue & Alton Road	Signalized	EB			SB			Northeast bound			Southwest bound		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	36.4	0.0	0.0	38.2	0.0	0.0	15.4	23.0	0.0	43.1	5.7	5.6
		Movement LOS	D	A	A	D	A	A	B	C	A	D	A	A
		Approach	D (36.4)			D (38.2)			C (23.0)			B (14.1)		
		Intersection MOE	B (17.2)											
34	Convention Center Dr & Dade Boulevard	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	4.5	7.2	7.2	4.4	6.7	0.0	32.5	31.1	32.4	31.4	31.7	33.0
		Movement LOS	A	A	A	A	A	A	C	C	C	C	C	C
		Approach	A (7.0)			A (6.6)			C (32.4)			C (32.4)		
		Intersection MOE	A (8.8)											
35	Washington Avenue & Dade Boulevard	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	15.3	0.0	16.0	43.0	4.6	4.6	28.9	28.9	32.8	–	–	–
		Movement LOS	B	A	B	D	A	A	C	C	C	–	–	–
		Approach	B (15.6)			B (15.6)			C (30.3)			–		
		Intersection MOE	B (18.9)											
36	Alton Road & Chase Avenue	Signalized (HCM 2000)	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	45.5	41.9	–	45.3	–	45.3	–	13.0	7.9	–	40.3	–
		Movement LOS	D	D	–	D	–	D	–	B	A	–	D	–
		Approach	D (44.7)			D (45.3)			B (12.8)			D (40.3)		
		Intersection MOE	C (31.7)											

Table 2-11 AM Future Traffic – Elevated Alternatives Scenario														
Location		Type	Direction											
37	North Miami Avenue & 19th Street	N/A	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	–	–	–	–	–	–	–	–	–	–	–	–
		Movement LOS	–	–	–	–	–	–	–	–	–	–	–	–
		Approach	–			–			–			–		
		Intersection MOE	-											
38	North Miami Avenue & 20th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	207.7	33.7	26.8	46.5	0.0	20.9	28.5	0.0	0.0	374.7	0.0	130.8
		Movement LOS	F	C	C	D	A	C	C	A	A	F	A	F
		Approach	D (47.1)			D (43.2)			C (28.5)			F (165.9)		
		Intersection MOE	F (83.2)											
39	4th Street & Lenox Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	7.6	-	–	–	-	-	–	–	–	10.6	–	10.6
		Movement LOS	A	-	–	–	-	-	–	–	–	B	–	B
		Approach	-			-			–			B (10.6)		
		Intersection MOE	A (4.2)											
40	4th Street & N. Michigan Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	8.7	8.7	8.7	8.5	8.5	8.5	8.6	8.6	8.6	8.7	8.7	8.7
		Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
		Approach	A (8.7)			A (8.5)			A (8.6)			A (8.7)		
		Intersection MOE	A (8.6)											
41	4th Street & Jefferson Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	8.9	8.9	8.9	8.7	8.7	8.7	8.4	8.4	8.4	8.9	8.9	8.9

Table 2-11 AM Future Traffic – Elevated Alternatives Scenario

Location		Type	Direction											
		Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
		Approach	A (8.9)			A (8.7)			A (8.4)			A (8.9)		
		Intersection MOE	A (8.8)											
42	4th Street & Meridian Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	9.1	9.1	9.1	9.5	9.5	9.5	9.5	9.5	9.5	9.7	9.7	9.7
		Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
		Approach	A (9.1)			A (9.5)			A (9.5)			A (9.7)		
		Intersection MOE	A (9.5)											
43	5th Street & Lenox Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	12.3	10.1	10.1	9.3	9.7	9.6	60.8	0.0	0.0	115.8	0.0	65.2
		Movement LOS	B	B	B	A	A	A	E	A	A	F	A	E
		Approach	B (10.5)			A (9.6)			E (60.8)			F (84.0)		
		Intersection MOE	B (18.6)											
44	5th Street & N. Michigan Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	1.5	1.2	1.1	4.5	0.3	0.5	82.8	0.0	0.0	71.3	0.0	75.2
		Movement LOS	A	A	A	A	A	A	F	A	A	E	A	E
		Approach	A (1.2)			A (0.4)			F (82.8)			E (73.8)		
		Intersection MOE	A (9.5)											
45	5th Street & Jefferson Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	1.8	0.2	0.4	0.1	0.2	0.4	84.0	0.0	0.0	73.9	0.0	83.9
		Movement LOS	A	A	A	A	A	A	F	A	A	E	A	F
		Approach	A (0.5)			A (0.3)			F (84.0)			F (81.3)		
		Intersection MOE	B (10.3)											

Table 2-11 AM Future Traffic – Elevated Alternatives Scenario

Location		Type	Direction											
		Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
46	5th Street & Meridian Avenue	Movement Delay	8.7	4.7	4.9	5.1	5.2	5.2	81.9	0.0	0.0	70.3	0.0	72.2
		Movement LOS	A	A	A	A	A	A	F	A	A	E	A	E
		Approach	A (5.3)			A (5.2)			F (81.9)			E (71.4)		
		Intersection MOE	B (15.9)											
47	6th Street & Lenox Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	11.9	11.9	11.9	11.4	11.4	11.4	18.7	18.7	8.6	12.9	12.9	12.9
		Movement LOS	B	B	B	B	B	B	C	C	A	B	B	B
		Approach	B (11.9)			B (11.4)			C (17.1)			B (12.9)		
		Intersection MOE	B (14.3)											
48	6th Street & N. Michigan Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	10.0	10.0	10.0	9.6	9.6	9.6	10.7	10.7	10.7	9.5	9.5	9.5
		Movement LOS	A	A	A	A	A	A	B	B	B	A	A	A
		Approach	A (10.0)			A (9.6)			B (10.7)			A (9.5)		
		Intersection MOE	A (10.0)											
49	6th Street & Jefferson Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	10.3	10.3	10.3	9.9	9.9	9.9	12.2	12.2	12.2	10.1	10.1	10.1
		Movement LOS	B	B	B	A	A	A	B	B	B	B	B	B
		Approach	B (10.3)			A (9.9)			C (12.2)			B (10.1)		
		Intersection MOE	B (10.9)											
50	6th Street & Meridian Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	16.2	0.0	0.0	14.6	0.0	0.0	6.1	0.0	0.0	5.3	0.0	0.0

Table 2-11 AM Future Traffic – Elevated Alternatives Scenario

Location		Type	Direction											
		Movement LOS	B	A	A	B	A	A	A	A	A	A	A	A
		Approach	B (16.2)			B (14.6)			A (6.1)			A (5.3)		
		Intersection MOE	A (9.9)											

Key:

EB – Eastbound | WB – Westbound | SB – Southbound | NB – Northbound

LT – Left | T – Through | RT - Right

Table 2-12 PM Future Traffic – Elevated Alternatives Scenario

Location		Type	Direction											
1	North Miami Avenue & 41st St.	Unsignalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	849.1	–	–	659.5	–	–	8.8	–	–	13.1	–	–
		Movement LOS	F	–	–	F	–	–	A	–	–	B	–	–
		Approach	F (849.1)			F (659.5)			A (0.1)			A (0.0)		
		Intersection MOE	F (59.2)											
2	North-East 2nd Avenue & 41st Street	Unsignalized	EB			–			NB			SB		
			LT	T	RT	–	–	–	LT	T	RT	LT	T	RT
		Movement Delay	25.2	–	–	–	–	–	8.7	0.0	–	–	–	–
		Movement LOS	D	–	–	–	–	–	A	A	–	–	–	–
		Approach	D (25.2)			–			A (0.4)			–		
		Intersection MOE	A (2.1)											
3	North Miami Avenue & 38th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	–	–	–	32.6	0.0	0.0	206.9	0.0	223.8	-	-	184.0
		Movement LOS	–	–	–	C	C	C	F	A	F	-	-	F
		Approach	–			C (32.6)			F (220.1)			F (184.0)		

Table 2-12 PM Future Traffic – Elevated Alternatives Scenario

Location		Type	Direction											
		Intersection MOE	F (198.2)											
4	North-East 2nd Avenue & 39th St	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	29.8	0.0	0.0	38.5	0.0	0.0	10.1	0.0	22.6	13.7	0.0	15.4
		Movement LOS	C	A	A	D	A	A	B	A	C	B	A	B
		Approach	C (29.8)			D (38.5)			C (22.0)			B (15.3)		
		Intersection MOE	C (23.5)											
5	North-East 2nd Avenue & 38th St	Unsignalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	–	91.0	–	–	31.9	–	9.1	0	–	8.7	0	–
		Movement LOS	–	F	–	–	D	–	A	A	–	A	A	–
		Approach	F (91.0)			E (31.9)			A (0.4)			A (0.1)		
		Intersection MOE	B (11.0)											
6	North Federal Highway & 39th Street	Signalized (HCM 2000)	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	37.8	–	44.9	31.6	40.0	–	–	19.6	–	–	13.2	–
		Movement LOS	D	–	D	C	D	–	–	B	–	–	B	–
		Approach	D (42.5)			D (39.4)			B (19.6)			B (13.2)		
		Intersection MOE	C (24.4)											
7	Biscayne Boulevard & 38th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	–	–	–	137.6	137.7	59.6	24.7	151.4	-	146.9	9.3	-
		Movement LOS	–	–	–	F	F	E	C	F	-	F	A	-
		Approach	–			F (107.1)			F (148.8)			D (45.2)		
		Intersection MOE	F (104.8)											
8	North Miami	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT

Table 2-12 PM Future Traffic – Elevated Alternatives Scenario

Location		Type	Direction											
	Avenue & 36th Street	Movement Delay	198.4	84.8	84.7	146.9	130.1	61.3	549.5	417.4	23.4	254.8	-	109.1
		Movement LOS	F	E	E	F	F	D	E	F	C	F	-	F
		Approach	F (106.9)			F (112.6)			F (394.2)			F (132.1)		
		Intersection MOE	F (214.9)											
9	North Federal Highway & 36th Street	Signalized (HCM 2000)	EB		WB	NB		SB			Southeast bound			
			LT	T	T	LT	T	LT	T	RT	LT	T	RT	
		Movement Delay	607.8	52.9	143.3	400.7	139.0	58.7	71.3	57.6	72.4	81.3	49.3	
		Movement LOS	F	D	F	F	F	E	E	E	E	F	D	
		Approach	F (171.5)		F (143.3)	F (296.1)		E (63.5)			F (67.3)			
		Intersection MOE	F (186.8)											
10	Biscayne Boulevard & 36th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	89.9	79.0	49.3	74.7	75.0	114.6	57.5	128.9	41.3	41.3	179.4	45.7
		Movement LOS	F	E	D	E	E	F	E	F	D	D	F	D
		Approach	E (77.7)			F (94.7)			F (103.9)			F (84.6)		
		Intersection MOE	F (92.6)											
11	North Miami Avenue & 29th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	34.1	0.0	20.7	26.5	0.0	13.0	22.4	0.0	195.1	352.1	0.0	0.0
		Movement LOS	D	A	C	C	A	B	D	A	F	F	A	A
		Approach	C (27.2)			C (18.7)			F (188.0)			F (352.1)		
		Intersection MOE	F (120.5)											
12	North Miami Avenue & NE 17th Street	Unsignalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	–	13.4	–	13.9	0	–	–	–	–	–	–	–
		Movement LOS	–	B	–	B	A	–	–	–	–	–	–	–

Table 2-12 PM Future Traffic – Elevated Alternatives Scenario

Location		Type	Direction											
		Approach	B (13.4)			B (13.9)			–			–		
		Intersection MOE	A (0.1)											
13	North Miami Avenue & 14th Street	Signalized	EB			WB			Southeast bound			Northwest bound		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	0	0	18.3	17.6	0	0	11.6	11.2	–	-	-	-
		Movement LOS	A	A	B	B	A	A	B	B	–	-	-	-
		Approach	B (18.3)			B (17.6)			B (11.4)			-		
		Intersection MOE	B (15.2)											
14	North-East 2nd Avenue & 14th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	31.0	0.0	98.1	33.0	0.0	42.9	16.3	0.0	73.1	639.9	0.0	26.4
		Movement LOS	C	A	F	C	A	D	B	A	F	F	A	C
		Approach	F (85.1)			D (39.7)			E (69.2)			F (306.9)		
		Intersection MOE	F (153.0)											
15	Biscayne Boulevard & North-East 13th Street	Signalized (HCM 2000)	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	–	–	–	88.3	28.8	28.6	17.7	52.6	–	–	27.9	–
		Movement LOS	–	–	–	F	C	C	B	D	–	–	C	–
		Approach	–			E (64.9)			D (50.6)			C (27.9)		
		Intersection MOE	D (47.8)											
16	Biscayne Boulevard & 12th Street	N/A	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	–	–	–	–	–	–	–	–	–	–	–	–
		Movement LOS	–	–	–	–	–	–	–	–	–	–	–	–
		Approach	–			–			–			–		
		Intersection MOE	-											
	Biscayne Boulevar	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT

Table 2-12 PM Future Traffic – Elevated Alternatives Scenario

Location		Type	Direction											
17	d & 11th Street	Movement Delay	38.6	34.2	0.0	34.1	35.9	35.2	87.5	15.4	17.5	0.0	27.1	30.6
		Movement LOS	D	C	A	C	D	D	F	B	B	A	C	C
		Approach	D (37.9)			D (35.4)			C (22.9)			C (28.3)		
		Intersection MOE	C (25.5)											
18	MacArthur Causeway & Fountain St	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	45.7	7.4	–	–	20.5	7.5	–	–	–	48.7	–	0.0
		Movement LOS	D	A	–	–	C	A	–	–	–	D	–	A
		Approach	A (8.7)			C (20.3)						D (48.7)		
		Intersection MOE	B (15.0)											
19	MacArthur Causeway & Bridge Road	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	66.2	4.5	–	–	8.2	3.4	–	–	–	54.6	–	0.0
		Movement LOS	E	A	–	–	A	A	–	–	–	D	–	A
		Approach	A (4.7)			A (8.2)			–			F (54.6)		
		Intersection MOE	A (6.8)											
20	MacArthur Causeway & Terminal Island	Signalized (HCM 2000)	EB			WB			NB		Northwest bound	Northeast bound		
			T	RT	RT 2	LT	T	RT	LT		LT	LT		
		Movement Delay	51.4	–	11.3	57.4	3.2	–	0.0		61.3	43.6		
		Movement LOS	D	–	B	E	A	–	A		E	D		
		Approach	D (51.4)			A (3.8)			A (0.0)		E (61.3)	D (43.6)		
		Intersection MOE	B (31.6)											
21	Alton Road & 5th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	233.1	255.9	0.0	69.4	60.4	18.2	70.9	0.0	113.9	98.8	0.0	0.0
		Movement LOS	F	F	A	E	E	B	E	A	F	F	A	A

Table 2-12 PM Future Traffic – Elevated Alternatives Scenario														
Location		Type	Direction											
		Approach	F (246.1)			E (59.3)			E (86.8)			F (98.8)		
		Intersection MOE	F (134.7)											
22	Washington Avenue & 5th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	21.4	4.7	4.7	14.4	20.5	21.2	64.9	0.0	51.5	61.0	47.6	52.4
		Movement LOS	C	A	A	B	C	C	E	A	D	E	D	D
		Approach	A (9.9)			B (20.7)			E (57.7)			D (51.9)		
		Intersection MOE	C (24.6)											
23	Alton Road & 11th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	23.9	0.0	0.0	25.3	0.0	0.0	8.7	19.8	19.6	10.7	14.8	14.7
		Movement LOS	C	A	A	C	A	A	A	B	B	B	B	B
		Approach	C (23.9)			C (25.3)			B (19.3)			B (14.5)		
		Intersection MOE	B (17.8)											
24	Washington Avenue & 11th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	39.1	0.0	0.0	41.5	0.0	0.0	3.0	3.0	2.9	2.4	0.0	2.4
		Movement LOS	D	A	A	D	A	A	A	A	A	A	A	A
		Approach	D (39.1)			D (41.5)			A (3.0)			A (2.4)		
		Intersection MOE	A (6.0)											
25	Alton Road & 15th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	25.5	0.0	0.0	25.3	0.0	26.4	10.2	18.7	18.6	10.7	17.6	17.5
		Movement LOS	C	A	A	C	A	C	A	B	B	B	B	B
		Approach	C (25.5)			C (26.0)			B (18.3)			B (16.9)		
		Intersection MOE	B (19.0)											
26	Washington	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT

Table 2-12 PM Future Traffic – Elevated Alternatives Scenario

Location		Type	Direction											
	Avenue & 15th Street	Movement Delay	41.6	–	0.0	–	–	–	0.7	0.7	–	–	0.5	0.6
		Movement LOS	D	–	A	–	–	–	A	A	–	–	A	A
		Approach	D (41.6)			–			A (0.7)			A (0.6)		
		Intersection MOE	A (5.7)											
27	Alton Road & 17th Street	Signalized (HCM 2000)	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	37.6	37.9	–	40.4	40.0	30.3	41.7	31.1	–	41.1	18.2	–
		Movement LOS	D	D	–	D	D	C	D	C	–	D	B	–
		Approach	D (37.8)			D (36.4)			C (31.9)			C (22.7)		
		Intersection MOE	C (30.1)											
28	Convention Center Drive & 17th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	11.9	14.3	14.3	0.0	18.5	18.5	33.9	0.0	0.0	33.4	0.0	36.3
		Movement LOS	B	B	B	A	B	B	C	A	A	C	A	D
		Approach	B (14.2)			B (18.5)			C (33.9)			D (35.3)		
		Intersection MOE	B (19.8)											
29	Washington Avenue & 17th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	23.7	27.5	27.6	38.8	28.9	28.9	17.0	1.6	1.6	12.5	14.6	14.9
		Movement LOS	C	C	C	D	C	C	B	A	A	B	B	B
		Approach	C (27.1)			C (30.4)			A (7.3)			B (14.7)		
		Intersection MOE	B (19.4)											
30	Alton Road & Dade	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	40.4	27.1	0.0	28.4	28.6	0.0	45.5	24.4	24.6	34.0	22.2	14.9

Table 2-12 PM Future Traffic – Elevated Alternatives Scenario

Location		Type	Direction											
	Boulevard	Movement LOS	D	C	A	C	C	A	D	C	C	C	C	B
		Approach	D (35.1)			C (28.5)			C (26.4)			C (22.1)		
		Intersection MOE	C (26.2)											
31	North Michigan Avenue & Dade Boulevard	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	0.0	6.4	–	–	5.9	50.6	–	–	–	21.7	–	0.0
		Movement LOS	A	A	–	–	A	F	–	–	–	C	–	A
		Approach	A (6.4)			C (33.9)			–			C (21.7)		
		Intersection MOE	C (26.5)											
32	Washington Avenue & 19th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	–	–	–	47.7	–	0.0	–	0.3	0.3	3.2	3.3	–
		Movement LOS	–	–	–	D	–	A	–	A	A	A	A	–
		Approach	–			D (47.7)			A (0.3)			A (3.3)		
		Intersection MOE	A (5.7)											
33	North Michigan Avenue & Alton Road	Signalized	EB			SB			Northeast bound			Southwest bound		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	47.5	0.0	0.0	49.9	0.0	0.0	14.7	28.0	0.0	72.8	3.9	3.8
		Movement LOS	D	A	A	D	A	A	B	C	A	D	A	A
		Approach	D (47.5)			D (49.9)			C (27.9)			C (25.3)		
		Intersection MOE	C (26.9)											
34	Convention Center Dr & Dade	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	8.9	13.4	13.3	9.1	13.2	0.0	29.0	25.2	25.4	33.4	32.9	35.4

Table 2-12 PM Future Traffic – Elevated Alternatives Scenario

Location		Type	Direction											
	Boulevard	Movement LOS	A	B	B	A	B	A	C	C	C	C	C	D
		Approach	B (13.0)			B (13.1)			C (26.8)			C (34.5)		
		Intersection MOE	B (14.8)											
35	Washington Avenue & Dade Boulevard	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	17.7	17.7	17.7	42.5	5.8	5.8	32.4	11.2	23.3	–	–	–
		Movement LOS	B	B	B	D	A	A	C	B	C	–	–	–
		Approach	B (17.7)			B (12.5)			C (22.4)			–		
		Intersection MOE	B (17.1)											
36	Alton Road & Chase Avenue	Signalized (HCM 2000)	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	51.1	39.7	–	41.3	–	64.5	–	28.1	6.2	–	14.5	–
		Movement LOS	D	D	–	D	–	E	–	C	A	–	B	–
		Approach	D (49.4)			E (59.9)			C (27.6)			B (14.5)		
		Intersection MOE	C (26.4)											
37	North Miami Avenue & 19th Street	N/A	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	–	–	–	–	–	–	–	–	–	–	–	–
		Movement LOS	–	–	–	–	–	–	–	–	–	–	–	–
		Approach	–			–			–			–		
		Intersection MOE	-											
38	North Miami Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	88.1	11.9	10.6	19.8	0.0	10.8	59.4	0.0	0.0	56.6	0.0	30.8

Table 2-12 PM Future Traffic – Elevated Alternatives Scenario

Location		Type	Direction											
	& 20th Street	Movement LOS	F	B	B	B	A	B	E	A	A	E	A	C
		Approach	C (26.8)			B (17.7)			E (59.4)			D (37.1)		
		Intersection MOE	C (32.1)											
39	4th Street & Lenox Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	7.7	-	–	–	-	-	–	–	–	10.8	–	10.8
		Movement LOS	A	-	–	–	-	-	–	–	–	B	–	B
		Approach	-			-			–			B (10.8)		
		Intersection MOE	A (3.8)											
40	4th Street & N. Michigan Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	10.1	10.1	10.1	9.8	9.8	9.8	10.5	10.5	10.5	10.1	10.1	10.1
		Movement LOS	B	B	B	A	A	A	B	B	B	B	B	B
		Approach	B (10.1)			A (9.8)			B (10.5)			B (10.1)		
		Intersection MOE	B (10.1)											
41	4th Street & Jefferson Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	9.1	9.1	9.1	9.1	9.1	9.1	9.2	9.2	9.2	8.9	8.9	8.9
		Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
		Approach	A (9.1)			A (9.1)			A (9.2)			A (8.9)		
		Intersection MOE	A (9.1)											
42	4th Street & Meridian Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	10.0	10.0	10.0	11.3	11.3	11.3	9.9	9.9	9.9	12.2	12.2	12.2
		Movement LOS	A	A	A	B	B	B	A	A	A	B	B	B
		Approach	A (10.0)			B (11.3)			A (9.9)			B (12.2)		
		Intersection MOE	B (11.2)											

Table 2-12 PM Future Traffic – Elevated Alternatives Scenario

Location		Type	Direction											
		Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
43	5th Street & Lenox Avenue	Movement Delay	6.9	7.0	7.1	1.7	2.1	2.0	57.9	0.0	0.0	57.2	0.0	70.3
		Movement LOS	A	A	A	A	A	A	E	A	A	E	A	E
		Approach	A (7.0)			A (1.9)			E (57.9)			E (65.2)		
		Intersection MOE	B (11.6)											
44	5th Street & N. Michigan Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	5.5	2.7	2.5	6.0	0.4	0.8	61.7	0.0	0.0	50.5	0.0	52.4
		Movement LOS	A	A	A	A	A	A	E	A	A	D	A	D
		Approach	A (3.1)			A (0.6)			E (61.7)			D (51.6)		
		Intersection MOE	A (7.8)											
45	5th Street & Jefferson Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	3.0	0.3	0.5	0.3	0.4	0.7	62.3	0.0	0.0	49.9	0.0	51.5
		Movement LOS	A	A	A	A	A	A	E	A	A	D	A	D
		Approach	A (0.6)			A (0.5)			E (62.3)			D (50.8)		
		Intersection MOE	A (7.3)											
46	5th Street & Meridian Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	6.0	0.4	0.7	1.6	1.4	1.3	61.5	0.0	0.0	48.5	0.0	46.0
		Movement LOS	A	A	A	A	A	A	E	A	A	D	A	D
		Approach	A (1.2)			A (1.4)			E (61.5)			D (47.6)		
		Intersection MOE	A (9.2)											
47	6th Street & Lenox Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	17.1	17.1	17.1	13.2	13.2	13.2	18.0	18.0	9.9	14.2	14.2	14.2

Table 2-12 PM Future Traffic – Elevated Alternatives Scenario

Location		Type	Direction											
		Movement LOS	C	C	C	B	B	B	C	C	A	B	B	B
		Approach	C (17.1)			B (13.2)			C (15.9)			B (14.2)		
		Intersection MOE	C (15.4)											
48	6th Street & Michigan Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	11.8	11.8	11.8	11.0	11.0	11.0	11.9	11.9	11.9	11.0	11.0	11.0
		Movement LOS	B	B	B	B	B	B	B	B	B	B	B	B
		Approach	B (11.8)			B (11.0)			B (11.9)			B (11.0)		
		Intersection MOE	B (11.5)											
49	6th Street & Jefferson Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	13.6	13.6	13.6	12.3	12.3	12.3	12.9	12.9	12.9	11.9	11.9	11.9
		Movement LOS	B	B	B	B	B	B	B	B	B	B	B	B
		Approach	B (13.6)			B (12.3)			B (12.9)			B (11.9)		
		Intersection MOE	B (12.7)											
50	6th Street & Meridian Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	17.8	0.0	0.0	15.4	0.0	0.0	8.2	0.0	0.0	7.8	0.0	0.0
		Movement LOS	B	A	A	B	A	A	A	A	A	A	A	A
		Approach	B (17.8)			B (15.4)			A (8.2)			A (7.8)		
		Intersection MOE	B (11.4)											

Key:

EB – Eastbound | WB – Westbound | SB – Southbound | NB – Northbound

LT – Left | T – Through | RT - Right

Table 2-13 AM Future Traffic – One Lane Scenario															
Location		Type	Direction												
1	North Miami Avenue & 41st St.	Unsignalized	EB			WB			NB			SB			
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT	
		Movement Delay	101.3	–	–	50.9	–	–	12.4	–	–	8.3	–	–	
		Movement LOS	F	–	–	F	–	–	B	–	–	A	–	–	
		Approach	F (101.3)			F (50.9)			A (0.3)			A (0.2)			
		Intersection MOE	A (3.0)												
2	North-East 2nd Avenue & 41st Street	Unsignalized	EB			–			NB			SB			
			LT	T	RT	–	–	–	LT	T	RT	LT	T	RT	
		Movement Delay	22.7	–	–	–	–	–	10.0	0.0	–	–	–	–	
		Movement LOS	C	–	–	–	–	–	A	A	–	–	–	–	
		Approach	C (22.7)			–			A (0.6)			–			
		Intersection MOE	A (0.7)												
3	North Miami Avenue & 38th Street	Signalized	EB			WB			NB			SB			
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT	
		Movement Delay	–	–	–	-	92.9	-	-	453.4	-	-	7.9	-	
		Movement LOS	–	–	–	-	F	-	-	F	-	-	A	-	
		Approach	–			F (92.9)			F (453.4)			A (7.9)			
		Intersection MOE	F (231.7)												
4	North-East 2nd Avenue & 39th St	Signalized	EB			WB			NB			SB			
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT	
		Movement Delay	20.0	0.0	0.0	27.8	0.0	0.0	23.8	0.0	29.6	18.6	0.0	61.3	
		Movement LOS	B	A	A	C	A	A	C	A	C	B	A	E	
		Approach	B (20.0)			C (27.8)			C (29.3)			E (57.9)			
		Intersection MOE	D (40.1)												
5	North-East 2nd Avenue & 38th St	Unsignalized	EB			WB			NB			SB			
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT	
		Movement Delay	–	142.0	–	–	35.5	–	11.1	0	–	7.9	–	–	

Table 2-13 AM Future Traffic – One Lane Scenario

Location		Type	Direction											
		Movement LOS	–	F	–	–	D	–	B	A	–	A	–	–
		Approach	F (142.0)			D (35.5)			A (0.9)			A (0.0)		
		Intersection MOE	B (12.9)											
6	North Federal Highway & 39th Street	Signalized (HCM 2000)	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	49.9	–	89.4	31.4	43.8	–	–	19.3	–	–	19.0	–
		Movement LOS	D	–	F	C	D	–	–	B	–	–	B	–
		Approach	E (74.4)			D (35.7)			B (19.3)			B (19.0)		
		Intersection MOE	C (31.7)											
7	Biscayne Boulevard & 38th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	–	–	–	109.7	141.6	75.6	28.5	111.7	130.4	153.8	9.7	9.6
		Movement LOS	–	–	–	F	F	E	C	F	F	F	A	A
		Approach	–			F (113.7)			F (118.4)			D (54.6)		
		Intersection MOE	F (90.0)											
8	North Miami Avenue & 36th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	44.9	280.2	280.2	100.2	63.5	45.9	46.8	46.8	46.8	762.5	762.5	762.5
		Movement LOS	D	F	F	F	E	D	D	D	D	F	F	F
		Approach	F (267.9)			E (69.2)			D (46.8)			F (762.5)		
		Intersection MOE	F (389.0)											
9	North Federal Highway & 36th Street	Signalized (HCM 2000)	EB		WB	NB		SB			Southeast bound			
			LT	T	T	LT	T	LT	T	RT	LT	T	RT	
		Movement Delay	292.1	64.0	87.0	177.5	91.6	54.4	115.8	53.0	130.2	153.1	44.3	
		Movement LOS	F	E	F	F	F	E	F	D	F	F	D	
		Approach	F (98.8)		F (87.0)	F (139.4)		F (97.0)			F (124.0)			

Table 2-13 AM Future Traffic – One Lane Scenario

Location		Type	Direction											
		Intersection MOE	F (107.9)											
10	Biscayne Boulevard & 36th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	70.0	131.1	64.3	65.8	0.0	334.0	185.0	98.7	44.0	116.7	71.0	75.4
		Movement LOS	F	F	E	E	A	F	F	F	D	F	F	F
		Approach	F (95.1)			F (186.2)			F (98.4)			F (81.8)		
		Intersection MOE	F (111.9)											
11	North Miami Avenue & 29th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	198.8	0.0	95.3	1200.3	0.0	33.6	36.1	0.0	0.0	212.9	0.0	0.0
		Movement LOS	F	A	F	F	A	C	D	A	A	F	A	A
		Approach	F (143.6)			F (352.0)			D (36.1)			F (212.9)		
		Intersection MOE	F (194.6)											
12	North Miami Avenue & NE 17th Street	Unsignalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	–	27.0	–	29.9	0	–	–	–	–	–	–	–
		Movement LOS	–	D	–	D	A	–	–	–	–	–	–	–
		Approach	D (27.0)			D (29.9)			–			–		
		Intersection MOE	A (0.1)											
13	North Miami Avenue & 14th Street	Signalized	EB			WB			Southeast bound			Northwest bound		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	0.0	0.0	55.9	53.6	0.0	0.0	21.3	21.1	0.0	-	-	-
		Movement LOS	A	A	E	E	A	A	D	D	A	-	-	-
		Approach	E (55.9)			D (52.6)			C (21.2)			-		
		Intersection MOE	D (46.2)											
14	North-East 2nd	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT

Table 2-13 AM Future Traffic – One Lane Scenario														
Location		Type	Direction											
	Avenue & 14th Street	Movement Delay	38.2	0.0	67.0	40.8	0.0	29.5	264.1	0.0	0.0	401.4	0.0	0.0
		Movement LOS	D	A	E	D	A	C	F	A	A	F	A	A
		Approach	E (60.4)			C (34.3)			F (264.1)			F (401.4)		
		Intersection MOE	F (284.7)											
15	Biscayne Boulevard & North-East 13th Street	Signalized (HCM 2000)	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	–	–	–	54.5	38.7	35.5	30.7	13.9	0.0	0.0	33.1	39.1
		Movement LOS	–	–	–	D	D	D	C	B	A	A	C	D
		Approach	–			D (50.2)			B (14.7)			D (35.2)		
		Intersection MOE	C (33.1)											
16	Biscayne Boulevard & 12th Street	N/A	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	–	–	–	–	–	–	–	–	–	–	–	–
		Movement LOS	–	–	–	–	–	–	–	–	–	–	–	–
		Approach	–			–			–			–		
		Intersection MOE	-											
17	Biscayne Boulevard & 11th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	49.8	48.4	0.0	48.3	48.3	50.6	65.5	8.1	8.6	0.0	56.6	66.2
		Movement LOS	D	D	A	D	D	D	E	A	A	A	F	F
		Approach	D (49.2)			D (49.6)			B (13.3)			E (60.0)		
		Intersection MOE	D (42.6)											
18	MacArthur Causeway & Fountain St	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	59.7	13.8	-	-	17.2	7.8	–	–	–	57.6	–	0.0
		Movement LOS	E	B	–	–	B	A	–	–	–	E	–	A
		Approach	B (15.4)			B (17.0)			-			E (57.6)		

Table 2-13 AM Future Traffic – One Lane Scenario														
Location		Type	Direction											
		Intersection MOE	B (16.9)											
19	MacArthur Causeway & Bridge Road	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	68.3	8.0	–	–	10.4	4.4	–	–	–	44.9	–	0.0
		Movement LOS	E	A	–	–	B	A	–	–	–	D	–	A
		Approach	A (8.7)			B (10.4)			–			D (44.9)		
		Intersection MOE	A (9.6)											
20	MacArthur Causeway & Terminal Island	Signalized (HCM 2000)	EB			WB			NB		Northwest bound	Northeast bound		
			T	RT	RT 2	LT	T	RT	LT		LT	LT		
		Movement Delay	134.7	–	13.1	139.2	5.4	–	66.5		56.4	55.2		
		Movement LOS	F	–	B	F	A	–	E		E	E		
		Approach	F (129.7)			A (9.0)			E (66.5)		E (56.4)	E (55.2)		
		Intersection MOE	E (78.1)											
21	Alton Road & 5th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	135.8	150.2	0.0	171.0	49.5	30.6	100.9	0.0	155.2	45.7	0.0	0.0
		Movement LOS	F	F	A	F	D	C	F	A	F	D	A	A
		Approach	F (142.7)			D (50.3)			E (121.6)			D (45.7)		
		Intersection MOE	F (97.1)											
22	Washington Avenue & 5th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	17.5	19.0	19.0	80.6	24.7	25.2	42.9	0.0	36.4	58.5	0.0	0.0
		Movement LOS	B	B	B	F	C	C	D	A	D	E	A	A
		Approach	B (18.6)			C (25.6)			D (42.3)			E (58.5)		
		Intersection MOE	C (29.3)											
23	Alton Road &	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT

Table 2-13 AM Future Traffic – One Lane Scenario

Location		Type	Direction											
	11th Street	Movement Delay	29.0	0.0	0.0	29.3	0.0	0.0	6.8	11.0	10.9	6.3	10.9	10.8
		Movement LOS	C	A	A	C	A	A	A	B	B	A	B	B
		Approach	C (29.0)			C (29.3)			B (10.8)			B (10.6)		
		Intersection MOE	B (11.6)											
24	Washington Avenue & 11th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	30.0	0.0	0.0	30.9	0.0	0.0	3.7	0.0	0.0	0.8	0.0	0.0
		Movement LOS	C	A	A	C	A	A	A	A	A	A	A	A
		Approach	C (30.0)			C (30.9)			A (3.7)			A (0.8)		
		Intersection MOE	A (4.9)											
25	Alton Road & 15th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	25.4	0.0	0.0	24.6	0.0	27.0	7.2	15.8	15.8	8.9	11.1	11.0
		Movement LOS	C	A	A	C	A	C	A	B	B	A	B	B
		Approach	C (25.4)			C (26.1)			B (15.5)			B (10.8)		
		Intersection MOE	B (15.0)											
26	Washington Avenue & 15th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	34.3	–	0.0	–	–	–	0.8	0.0	–	–	0.0	4.5
		Movement LOS	C	–	A	–	–	–	A	A	–	–	A	A
		Approach	C (34.3)			–			A (0.8)			A (4.5)		
		Intersection MOE	A (7.0)											
27	Alton Road & 17th Street	Signalized (HCM 2000)	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	28.0	24.1	24.2	28.9	24.5	26.1	36.5	24.0	28.1	38.1	17.7	17.6
		Movement LOS	C	C	C	C	C	C	D	C	C	D	B	B

Table 2-13 AM Future Traffic – One Lane Scenario

Location		Type	Direction											
		Approach	C (25.2)			C (26.4)			C (26.4)			C (22.9)		
		Intersection MOE	C (24.7)											
28	Convention Center Drive & 17th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	35.8	8.9	8.9	0.0	13.0	13.0	29.0	0.0	29.5	28.3	0.0	28.8
		Movement LOS	D	A	A	A	B	B	C	A	C	C	A	C
		Approach	A (9.7)			B (13.0)			C (29.2)			C (28.6)		
		Intersection MOE	B (13.0)											
29	Washington Avenue & 17th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	37.6	21.5	21.7	29.1	28.6	28.7	12.2	0.0	0.0	12.5	0.0	0.0
		Movement LOS	D	C	C	C	C	C	B	A	A	B	A	A
		Approach	C (23.3)			C (28.7)			B (12.2)			B (12.5)		
		Intersection MOE	B (19.5)											
30	Alton Road & Dade Boulevard	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	38.7	35.4	0.0	43.3	34.5	0.0	55.3	18.5	18.6	42.0	22.9	16.2
		Movement LOS	D	D	A	D	C	A	E	B	B	D	C	B
		Approach	D (37.2)			D (38.8)			C (22.0)			C (22.7)		
		Intersection MOE	C (25.8)											
31	North Michigan Avenue & Dade Boulevard	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	0.0	7.6	–	–	8.3	3.3	–	–	–	15.2	–	0.0
		Movement LOS	A	A	–	–	A	A	–	–	–	B	–	A
		Approach	A (7.6)			A (6.0)			–			B (15.2)		
		Intersection MOE	A (9.6)											
32	Washington	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT

Table 2-13 AM Future Traffic – One Lane Scenario

Location		Type	Direction											
	Avenue & 19th Street	Movement Delay	–	–	–	35.4	–	0.0	–	0.0	3.9	2.8	2.9	–
		Movement LOS	–	–	–	D	–	A	–	A	A	A	A	–
		Approach	–			D (35.4)			A (3.9)			A (2.9)		
		Intersection MOE	A (5.7)											
33	North Michigan Avenue & Alton Road	Signalized	EB			SB			Northeast bound			Southwest bound		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	36.4	0.0	0.0	38.2	0.0	0.0	15.4	23.0	0.0	43.1	5.7	5.6
		Movement LOS	D	A	A	D	A	A	B	C	A	D	A	A
		Approach	D (36.4)			D (38.2)			C (23.0)			B (14.1)		
		Intersection MOE	B (17.2)											
34	Convention Center Dr & Dade Boulevard	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	4.5	7.2	7.2	4.4	6.7	0.0	32.5	31.1	32.4	31.4	31.7	33.0
		Movement LOS	A	A	A	A	A	A	C	C	C	C	C	C
		Approach	A (6.6)			A (6.6)			C (32.4)			C (32.4)		
		Intersection MOE	A (8.8)											
35	Washington Avenue & Dade Boulevard	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	15.3	0.0	16.0	43.0	4.6	4.6	28.9	28.9	32.8	–	–	–
		Movement LOS	B	A	B	D	A	A	C	C	C	–	–	–
		Approach	B (15.6)			B (15.6)			C (30.3)			–		
		Intersection MOE	B (18.9)											
36	Alton Road & Chase Avenue	Signalized (HCM 2000)	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	45.5	41.9	–	45.3	–	45.3	–	13.0	7.9	–	40.3	–
		Movement LOS	D	D	–	D	–	D	–	B	A	–	D	–
		Approach	D (44.7)			D (45.3)			B (12.8)			D (40.3)		

Table 2-13 AM Future Traffic – One Lane Scenario														
Location		Type	Direction											
		Intersection MOE	C (31.7)											
37	North Miami Avenue & 19th Street	N/A	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	–	–	–	–	–	–	–	–	–	–	–	–
		Movement LOS	–	–	–	–	–	–	–	–	–	–	–	–
		Approach	–			–			–			–		
		Intersection MOE	-											
38	North Miami Avenue & 20th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	800.4	44.5	35.4	97.4	0.0	27.8	29.2	0.0	0.0	205.1	0.0	0.0
		Movement LOS	F	D	D	F	A	C	C	A	A	F	A	A
		Approach	F (109.5)			F (88.5)			C (29.2)			F (205.1)		
		Intersection MOE	F (129.4)											
39	4th Street & Lenox Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	7.6	-	–	–	-	-	–	–	–	10.6	–	10.6
		Movement LOS	A	-	–	–	-	-	–	–	–	B	–	B
		Approach	-			-			–			B (10.6)		
		Intersection MOE	A (4.2)											
40	4th Street & N. Michigan Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	8.7	8.7	8.7	8.5	8.5	8.5	8.6	8.6	8.6	8.7	8.7	8.7
		Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
		Approach	A (8.7)			A (8.5)			A (8.6)			A (8.7)		
		Intersection MOE	A (8.6)											
41	4th Street &	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT

Table 2-13 AM Future Traffic – One Lane Scenario														
Location		Type	Direction											
	Jefferson Avenue	Movement Delay	8.9	8.9	8.9	8.7	8.7	8.7	8.4	8.4	8.4	8.9	8.9	8.9
		Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
		Approach	A (8.9)			A (8.7)			A (8.4)			A (8.9)		
		Intersection MOE	A (8.8)											
42	4th Street & Meridian Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	9.1	9.1	9.1	9.5	9.5	9.5	9.5	9.5	9.5	9.7	9.7	9.7
		Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
		Approach	A (9.1)			A (9.5)			A (9.5)			A (9.7)		
		Intersection MOE	A (9.5)											
43	5th Street & Lenox Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	16.7	11.7	11.7	17.7	21.6	22.2	58.0	0.0	0.0	104.7	0.0	60.6
		Movement LOS	B	B	B	B	C	C	E	A	A	F	A	E
		Approach	B (12.6)			C (21.7)			E (58.0)			E (76.9)		
		Intersection MOE	C (23.5)											
44	5th Street & N. Michigan Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	5.1	0.3	0.6	5.3	0.3	0.6	82.7	0.0	0.0	71.2	0.0	75.2
		Movement LOS	A	A	A	A	A	A	F	A	A	E	A	E
		Approach	A (0.8)			A (0.5)			E (82.7)			E (73.8)		
		Intersection MOE	A (9.3)											
45	5th Street & Jefferson Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	1.9	0.2	0.4	0.1	0.2	0.4	84.0	0.0	0.0	73.9	0.0	83.9

Table 2-13 AM Future Traffic – One Lane Scenario														
Location		Type	Direction											
		Movement LOS	A	A	A	A	A	A	F	A	A	E	A	F
		Approach	A (0.5)			A (0.3)			E (84.0)			F (81.3)		
		Intersection MOE	B (10.3)											
46	5th Street & Meridian Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	1.4	0.2	0.3	4.3	4.8	5.0	81.9	0.0	0.0	70.3	0.0	72.2
		Movement LOS	A	A	A	A	A	A	F	A	A	E	A	E
		Approach	A (0.4)			A (4.8)			F (81.9)			E (71.4)		
		Intersection MOE	B (13.5)											
47	6th Street & Lenox Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	11.9	11.9	11.9	11.4	11.4	11.4	18.7	18.7	8.6	12.9	12.9	12.9
		Movement LOS	B	B	B	B	B	B	C	C	A	B	B	B
		Approach	B (11.9)			B (11.4)			C (17.1)			B (12.9)		
		Intersection MOE	B (14.3)											
48	6th Street & Michigan Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	9.4	9.4	9.4	9.1	9.1	9.1	9.5	9.5	9.5	9.1	9.1	9.1
		Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
		Approach	A (9.4)			A (9.1)			A (9.5)			A (9.1)		
		Intersection MOE	A (9.3)											
49	6th Street & Jefferson Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	10.3	10.3	10.3	9.9	9.9	9.9	12.2	12.2	12.2	10.1	10.1	10.1
		Movement LOS	B	B	B	A	A	A	B	B	B	B	B	B
		Approach	B (10.3)			A (9.9)			B (12.2)			B (10.1)		

Table 2-13 AM Future Traffic – One Lane Scenario

Location		Type	Direction											
		Intersection MOE	B (10.9)											
50	6th Street & Meridian Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	16.1	0.0	0.0	14.7	0.0	0.0	5.8	0.0	0.0	5.1	0.0	0.0
		Movement LOS	B	A	A	B	A	A	A	A	A	A	A	A
		Approach	B (16.1)			B (14.7)			A (5.8)			A (5.1)		
		Intersection MOE	A (9.7)											

Key:
EB – Eastbound | WB – Westbound | SB – Southbound | NB – Northbound
LT – Left | T – Through | RT - Right

Table 2-14 PM Future Traffic – One Lane Scenario

Location		Type	Direction											
1	North Miami Avenue & 41st St.	Unsignalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	849.1	–	–	659.5	–	–	8.8	–	–	13.1	–	–
		Movement LOS	F	–	–	F	–	–	A	–	–	B	–	–
		Approach	F (849.1)			F (659.6)			A (0.1)			A (0.0)		
		Intersection MOE	F (59.2)											
2	North-East 2nd Avenue & 41st Street	Unsignalized	EB			–			NB			SB		
			LT	T	RT	–	–	–	LT	T	RT	LT	T	RT
		Movement Delay	25.2	–	–	–	–	–	8.7	0.0	–	–	–	–
		Movement LOS	D	–	–	–	–	–	A	A	–	–	–	–
		Approach	D (25.2)			–			A (0.4)			–		
		Intersection MOE	A (2.1)											
3	North Miami Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	–	–	–	-	196.7	0.0	-	1039.2	-	-	9.1	-

Table 2-14 PM Future Traffic – One Lane Scenario													
Location		**Type**	**Direction**										
	& 38th Street	Movement LOS	–	–	–	-	F	A	-	F	-	-	A	-
		Approach	–			F (196.7)			F (1039.2)			A (9.1)		
		Intersection MOE	F (694.1)											
4	North-East 2nd Avenue & 39th St	Signalized	**EB**			**WB**			**NB**			**SB**		
			LT	**T**	**RT**	**LT**	**T**	**RT**	**LT**	**T**	**RT**	**LT**	**T**	**RT**
		Movement Delay	29.8	0.0	0.0	38.5	0.0	0.0	10.1	0.0	22.6	13.7	0.0	15.4
		Movement LOS	C	A	A	D	A	A	B	A	C	B	A	B
		Approach	C (29.8)			D (38.5)			C (22.0)			B (15.3)		
		Intersection MOE	C (23.5)											
5	North-East 2nd Avenue & 38th St	Unsignalized	**EB**			**WB**			**NB**			**SB**		
			LT	**T**	**RT**	**LT**	**T**	**RT**	**LT**	**T**	**RT**	**LT**	**T**	**RT**
		Movement Delay	–	91.0	–	–	31.9	–	9.1	0	–	8.7	0	–
		Movement LOS	–	F	–	–	D	–	A	A	–	A	A	–
		Approach	F (91.0)			E (31.9)			A (0.4)			A (0.1)		
		Intersection MOE	B (11.0)											
6	North Federal Highway & 39th Street	Signalized (HCM 2000)	**EB**			**WB**			**NB**			**SB**		
			LT	**T**	**RT**	**LT**	**T**	**RT**	**LT**	**T**	**RT**	**LT**	**T**	**RT**
		Movement Delay	44.1	–	73.9	31.6	40.0	–	–	19.6	–	–	13.2	–
		Movement LOS	D	–	E	C	D	–	–	B	–	–	B	–
		Approach	E (63.6)			D (39.4)			B (19.6)			B (13.2)		
		Intersection MOE	C (27.4)											
7	Biscayne Boulevard & 38th Street	Signalized	**EB**			**WB**			**NB**			**SB**		
			LT	**T**	**RT**	**LT**	**T**	**RT**	**LT**	**T**	**RT**	**LT**	**T**	**RT**
		Movement Delay	–	–	–	137.6	137.7	59.6	24.7	151.4	-	146.9	9.3	-
		Movement LOS	–	–	–	F	F	E	C	F	-	F	A	-
		Approach	–			F (107.1)			F (148.8)			D (45.2)		
		Intersection MOE	F (104.8)											

Table 2-14 PM Future Traffic – One Lane Scenario

Location		Type	Direction											
8	North Miami Avenue & 36th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	280.4	142.1	-	276.1	228.5	74.3	-	454.6	-	-	885.9	-
		Movement LOS	F	F	-	F	F	E	-	F	-	-	F	-
		Approach	F (170.0)			F (191.2)			F (454.6)			F (885.9)		
		Intersection MOE	F (462.1)											
9	North Federal Highway & 36th Street	Signalized (HCM 2000)	EB		WB	NB		SB			Southeast bound			
			LT	T	T	LT	T	LT	T	RT	LT	T	RT	
		Movement Delay	607.8	52.9	143.3	400.7	139.0	58.7	71.3	57.6	72.4	81.3	49.3	
		Movement LOS	F	D	F	F	F	E	E	E	E	F	D	
		Approach	F (171.5)		F (143.3)	F (296.1)		E (62.9)			F (67.3)			
		Intersection MOE	F (186.8)											
10	Biscayne Boulevard & 36th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	89.9	79.0	49.3	74.7	75.0	114.6	57.5	128.9	41.3	41.3	179.4	45.7
		Movement LOS	F	E	D	E	E	F	E	F	D	D	F	D
		Approach	E (77.7)			F (94.7)			F (103.9)			F (84.6)		
		Intersection MOE	F (92.6)											
11	North Miami Avenue & 29th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	222.6	0.0	55.3	347.9	0.0	35.3	112.6	0.0	0.0	48.9	0.0	0.0
		Movement LOS	F	A	E	F	A	D	F	A	A	D	A	A
		Approach	F (134.1)			F (160.1)			F (112.6)			D (48.9)		
		Intersection MOE	F (119.7)											
12	North Miami Avenue & NE	Unsignalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	–	13.4	–	13.9	0	–	–	–	–	–	–	–

Table 2-14 PM Future Traffic – One Lane Scenario														
Location		**Type**	**Direction**											
	17th Street	Movement LOS	–	B	–	B	A	–	–	–	–	–	–	–
		Approach	B (13.4)			B (13.9)			–			–		
		Intersection MOE	A (0.1)											
13	North Miami Avenue & 14th Street	Signalized	**EB**			**WB**			**Southeast bound**			**Northwest bound**		
			LT	**T**	**RT**	**LT**	**T**	**RT**	**LT**	**T**	**RT**	**LT**	**T**	**RT**
		Movement Delay	0	0	33.7	37.3	0	0	14.6	14.3	–	-	-	-
		Movement LOS	A	A	C	D	A	A	B	B	–	-	-	-
		Approach	C (33.7)			D (37.3)			B (14.5)			-		
		Intersection MOE	C (26.3)											
14	North-East 2nd Avenue & 14th Street	Signalized	**EB**			**WB**			**NB**			**SB**		
			LT	**T**	**RT**	**LT**	**T**	**RT**	**LT**	**T**	**RT**	**LT**	**T**	**RT**
		Movement Delay	29.6	0.0	37.0	46.1	0.0	42.9	295.3	0.0	0.0	152.8	0.0	0.0
		Movement LOS	C	A	D	D	A	D	F	A	A	F	A	A
		Approach	D (35.6)			D (43.9)			F (295.3)			F (152.8)		
		Intersection MOE	F (191.2)											
15	Biscayne Boulevard & North-East 13th Street	Signalized (HCM 2000)	**EB**			**WB**			**NB**			**SB**		
			LT	**T**	**RT**	**LT**	**T**	**RT**	**LT**	**T**	**RT**	**LT**	**T**	**RT**
		Movement Delay	–	–	–	88.3	28.8	28.6	17.7	52.6	–	–	27.9	–
		Movement LOS	–	–	–	F	C	C	B	D	–	–	C	–
		Approach	–			E (64.9)			D (50.6)			C (27.9)		
		Intersection MOE	D (47.8)											
16	Biscayne Boulevard & 12th Street	N/A	**EB**			**WB**			**NB**			**SB**		
			LT	**T**	**RT**	**LT**	**T**	**RT**	**LT**	**T**	**RT**	**LT**	**T**	**RT**
		Movement Delay	–	–	–	–	–	–	–	–	–	–	–	–
		Movement LOS	–	–	–	–	–	–	–	–	–	–	–	–
		Approach	–			–			–			–		
		Intersection MOE	-											

Table 2-14 PM Future Traffic – One Lane Scenario

Location		Type	Direction											
17	Biscayne Boulevard & 11th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	38.6	34.2	0.0	34.1	35.9	35.2	87.5	15.4	17.5	0.0	27.1	30.6
		Movement LOS	D	C	A	C	D	D	F	C	C	A	C	C
		Approach	D (37.9)			D (35.4)			C (22.9)			C (28.3)		
		Intersection MOE	C (25.5)											
18	MacArthur Causeway & Fountain St	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	45.7	7.4	–	–	20.5	7.5	–	–	–	48.7	–	0.0
		Movement LOS	D	A	–	–	C	A	–	–	–	D	–	A
		Approach	A (8.7)			C (20.3)						D (48.7)		
		Intersection MOE	B (15.0)											
19	MacArthur Causeway & Bridge Road	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	66.2	4.5	–	–	8.2	3.4	–	–	–	54.6	–	0.0
		Movement LOS	F	A	–	–	A	A	–	–	–	D	–	A
		Approach	A (4.7)			A (8.2)			–			D (54.6)		
		Intersection MOE	A (6.8)											
20	MacArthur Causeway & Terminal Island	Signalized (HCM 2000)	EB			WB			NB		Northwest bound	Northeast bound		
			T	RT	RT 2	LT	T	RT	LT		LT	LT		
		Movement Delay	51.9	–	11.3	57.4	3.2	–	0.0		61.3	43.6		
		Movement LOS	C	–	B	E	A	–	A		E	D		
		Approach	D (51.4)			A (3.8)			A (0.0)		E (61.3)	D (43.6)		
		Intersection MOE	C (31.6)											
21	Alton Road & 5th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	233.1	255.9	0.0	69.4	60.4	18.2	70.9	0.0	113.9	98.8	0.0	0.0

Table 2-14 PM Future Traffic – One Lane Scenario														
Location		**Type**	**Direction**											
		Movement LOS	F	F	A	E	E	B	E	A	F	F	A	A
		Approach	F (246.1)			E (59.3)			F (86.8)			F (98.8)		
		Intersection MOE	F (134.7)											
22	Washington Avenue & 5th Street	Signalized	**EB**			**WB**			**NB**			**SB**		
			LT	**T**	**RT**	**LT**	**T**	**RT**	**LT**	**T**	**RT**	**LT**	**T**	**RT**
		Movement Delay	54.6	25.0	25.0	74.7	46.4	50.6	113.9	0.0	27.9	669.0	0.0	0.0
		Movement LOS	D	C	C	D	D	D	F	A	B	F	A	A
		Approach	C (34.2)			D (47.9)			F (108.9)			F (669.0)		
		Intersection MOE	F (124.1)											
23	Alton Road & 11th Street	Signalized	**EB**			**WB**			**NB**			**SB**		
			LT	**T**	**RT**	**LT**	**T**	**RT**	**LT**	**T**	**RT**	**LT**	**T**	**RT**
		Movement Delay	23.9	0.0	0.0	25.3	0.0	0.0	8.7	19.8	19.6	10.7	14.8	14.7
		Movement LOS	C	A	A	C	A	A	A	B	B	B	B	B
		Approach	C (23.9)			C (25.3)			B (19.3)			B (14.5)		
		Intersection MOE	B (17.8)											
24	Washington Avenue & 11th Street	Signalized	**EB**			**WB**			**NB**			**SB**		
			LT	**T**	**RT**	**LT**	**T**	**RT**	**LT**	**T**	**RT**	**LT**	**T**	**RT**
		Movement Delay	29.5	0.0	0.0	31.2	0.0	0.0	5.5	0.0	0.0	0.1	0.0	0.0
		Movement LOS	C	A	A	C	A	A	A	A	A	A	A	A
		Approach	C (29.5)			C (31.2)			A (5.5)			B (0.1)		
		Intersection MOE	A (5.5)											
25	Alton Road & 15th Street	Signalized	**EB**			**WB**			**NB**			**SB**		
			LT	**T**	**RT**	**LT**	**T**	**RT**	**LT**	**T**	**RT**	**LT**	**T**	**RT**
		Movement Delay	25.5	0.0	0.0	25.3	0.0	26.4	10.2	18.7	18.6	10.7	17.6	17.5
		Movement LOS	C	A	A	C	A	C	A	C	C	B	B	B
		Approach	C (25.5)			C (26.0)			B (18.3)			B (16.9)		
		Intersection MOE	B (19.0)											

Table 2-14 PM Future Traffic – One Lane Scenario														
Location		Type	Direction											
26	Washington Avenue & 15th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	32.2	–	0.0	–	–	–	1.9	0.0	–	–	0.0	7.5
		Movement LOS	C	–	A	–	–	–	A	A	–	–	A	A
		Approach	C (32.2)			–			A (1.9)			A (7.5)		
		Intersection MOE	A (8.1)											
27	Alton Road & 17th Street	Signalized (HCM 2000)	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	37.6	37.9	–	40.4	40.0	30.3	41.7	31.1	–	41.1	18.2	–
		Movement LOS	D	D	–	D	D	C	D	C	–	D	B	–
		Approach	D (37.8)			D (36.4)			C (31.9)			C (22.7)		
		Intersection MOE	C (30.1)											
28	Convention Center Drive & 17th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	11.9	14.3	14.0	0.0	18.5	18.5	33.9	0.0	0.0	33.4	0.0	36.3
		Movement LOS	B	B	B	A	B	B	C	A	A	C	A	D
		Approach	B (14.2)			B (18.5)			C (33.9)			D (35.3)		
		Intersection MOE	B (19.8)											
29	Washington Avenue & 17th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	36.4	51.8	52.1	60.3	39.9	40.0	51.2	-	-	14.0	-	-
		Movement LOS	D	D	D	E	D	D	D	-	-	B	-	-
		Approach	E (50.2)			D (43.0)			D (51.2)			B (14.0)		
		Intersection MOE	D (44.4)											
30	Alton Road & Dade	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	40.4	27.1	0.0	28.4	28.6	0.0	45.5	24.4	24.6	34.0	22.2	14.9

Table 2-14 PM Future Traffic – One Lane Scenario

Location		Type	Direction											
	Boulevard	Movement LOS	D	C	A	C	C	A	D	C	C	C	C	B
		Approach	D (35.1)			C (28.5)			C (26.4)			C (22.1)		
		Intersection MOE	C (26.2)											
31	North Michigan Avenue & Dade Boulevard	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	0.0	6.4	–	–	6.9	50.6	–	–	–	21.7	–	0.0
		Movement LOS	A	A	–	–	A	D	–	–	–	C	–	A
		Approach	A (6.4)			C (33.9)			–			C (21.7)		
		Intersection MOE	C (26.5)											
32	Washington Avenue & 19th Street	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	–	–	–	37.4	–	0.0	–	0.0	4.4	4.5	3.6	–
		Movement LOS	–	–	–	D	–	A	–	A	A	A	A	–
		Approach	–			D (37.4)			A (4.4)			A (4.0)		
		Intersection MOE	A (7.0)											
33	North Michigan Avenue & Alton Road	Signalized	EB			SB			Northeast bound			Southwest bound		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	47.5	0.0	0.0	49.9	0.0	0.0	14.7	28.0	0.0	72.8	3.9	3.8
		Movement LOS	D	A	A	D	A	A	B	C	A	F	A	A
		Approach	D (47.5)			D (49.9)			C (27.9)			C (25.3)		
		Intersection MOE	C (26.9)											
34	Convention Center Dr & Dade Boulevard	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	8.9	13.4	13.3	9.1	13.2	0.0	29.0	25.2	25.4	33.4	32.9	35.4
		Movement LOS	A	B	B	A	B	A	C	C	C	C	C	D
		Approach	B (13.0)			B (13.1)			C (26.8)			C (34.5)		
		Intersection MOE	B (14.8)											

Table 2-14 PM Future Traffic – One Lane Scenario														
Location		Type	Direction											
			EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
35	Washington Avenue & Dade Boulevard	Signalized												
		Movement Delay	-	19.5	-	33.0	6.3	-	26.2	13.5	23.6	–	–	–
		Movement LOS	-	B	-	C	A	-	C	B	C	–	–	–
		Approach	B (19.5)			B (11.2)			C (21.1)			–		
		Intersection MOE	B (17.0)											
36	Alton Road & Chase Avenue	Signalized (HCM 2000)												
		Movement Delay	51.1	39.7	–	41.3	–	64.5	–	28.1	6.2	–	14.5	–
		Movement LOS	D	D	–	D	–	E	–	C	A	–	B	–
		Approach	D (49.4)			E (59.9)			C (27.6)			B (14.5)		
		Intersection MOE	C (26.4)											
37	North Miami Avenue & 19th Street	N/A												
		Movement Delay	–	–	–	–	–	–	–	–	–	–	–	–
		Movement LOS	–	–	–	–	–	–	–	–	–	–	–	–
		Approach	–			–			–			–		
		Intersection MOE	-											
38	North Miami Avenue & 20th Street	Signalized												
		Movement Delay	183.6	23.9	21.3	35.5	0.0	21.7	65.2	0.0	0.0	531.4	0.0	0.0
		Movement LOS	F	C	C	D	A	C	E	A	A	F	A	A
		Approach	E (55.1)			C (32.3)			E (65.2)			F (531.4)		
		Intersection MOE	F (132.6)											
39	4th Street & Lenox Avenue	Signalized												
		Movement Delay	7.7	-	–	–	-	-	–	–	–	10.8	–	10.8

Table 2-14 PM Future Traffic – One Lane Scenario														
Location		**Type**	**Direction**											
		Movement LOS	A	-	–	–	-	-	–	–	–	B	–	B
		Approach	-			-			–			B (10.8)		
		Intersection MOE	A (3.8)											
40	4th Street & N. Michigan Avenue	Signalized	**EB**			**WB**			**NB**			**SB**		
			LT	**T**	**RT**	**LT**	**T**	**RT**	**LT**	**T**	**RT**	**LT**	**T**	**RT**
		Movement Delay	10.1	10.1	10.1	9.8	9.8	9.8	10.5	10.5	10.5	10.1	10.1	10.1
		Movement LOS	B	B	B	A	A	A	B	B	B	B	B	B
		Approach	B (10.1)			A (9.8)			B (10.5)			B (10.1)		
		Intersection MOE	B (10.1)											
41	4th Street & Jefferson Avenue	Signalized	**EB**			**WB**			**NB**			**SB**		
			LT	**T**	**RT**	**LT**	**T**	**RT**	**LT**	**T**	**RT**	**LT**	**T**	**RT**
		Movement Delay	9.1	9.1	9.1	9.1	9.1	9.1	9.2	9.2	9.2	8.9	8.9	8.9
		Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
		Approach	A (9.1)			A (9.1)			A (9.2)			A (8.9)		
		Intersection MOE	A (9.1)											
42	4th Street & Meridian Avenue	Signalized	**EB**			**WB**			**NB**			**SB**		
			LT	**T**	**RT**	**LT**	**T**	**RT**	**LT**	**T**	**RT**	**LT**	**T**	**RT**
		Movement Delay	10.0	10.0	10.0	11.3	11.3	11.3	9.9	9.9	9.9	12.2	12.2	12.2
		Movement LOS	A	A	A	B	B	B	A	A	A	B	B	B
		Approach	A (10.0)			B (11.3)			A (9.9)			B (12.2)		
		Intersection MOE	B (11.2)											
43	5th Street & Lenox Avenue	Signalized	**EB**			**WB**			**NB**			**SB**		
			LT	**T**	**RT**	**LT**	**T**	**RT**	**LT**	**T**	**RT**	**LT**	**T**	**RT**
		Movement Delay	6.9	7.0	7.1	0.5	0.8	1.5	57.8	0.0	0.0	57.1	0.0	66.6
		Movement LOS	B	A	A	B	B	B	E	A	A	E	A	E
		Approach	A (7.0)			B (1.0)			E (57.8)			E (62.9)		
		Intersection MOE	B (11.0)											

Table 2-14 PM Future Traffic – One Lane Scenario														
Location		Type	Direction											
44	5th Street & N. Michigan Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	14.6	0.5	1.0	7.8	33.8	34.3	61.0	0.0	0.0	50.4	0.0	52.2
		Movement LOS	B	A	A	A	C	C	E	A	A	D	A	D
		Approach	A (1.8)			C (33.8)			E (61.0)			D (51.4)		
		Intersection MOE	C (21.6)											
45	5th Street & Jefferson Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	4.2	0.4	0.7	0.3	0.4	0.5	62.3	0.0	0.0	49.9	0.0	51.5
		Movement LOS	B	A	A	A	A	A	E	A	A	D	A	D
		Approach	A (0.9)			A (0.6)			E (62.3)			D (50.8)		
		Intersection MOE	A (7.4)											
46	5th Street & Meridian Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	12.5	0.4	0.7	9.4	9.3	9.7	61.2	0.0	0.0	48.5	0.0	46.0
		Movement LOS	B	A	A	A	A	A	E	A	A	D	A	D
		Approach	A (2.1)			A (9.4)			E (61.2)			D (47.6)		
		Intersection MOE	B (12.9)											
47	6th Street & Lenox Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	17.1	17.1	17.1	13.2	13.2	13.2	18.0	18.0	9.9	14.2	14.2	14.2
		Movement LOS	C	C	C	B	B	B	C	C	A	B	B	B
		Approach	C (17.1)			B (13.2)			C (15.9)			B (14.2)		
		Intersection MOE	C (15.4)											
48	6th Street & Michigan Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	11.8	11.8	11.8	11.0	11.0	11.0	11.9	11.9	11.9	11.0	11.0	11.0

Table 2-14 PM Future Traffic – One Lane Scenario

Location		Type	Direction											
		Movement LOS	B	B	B	B	B	B	B	B	B	B	B	B
		Approach	B (11.8)			B (11.0)			B (12.0)			B (11.0)		
		Intersection MOE	B (11.5)											
49	6th Street & Jefferson Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	13.6	13.6	13.6	12.3	12.3	12.3	12.9	12.9	12.9	11.9	11.9	11.9
		Movement LOS	B	B	B	B	B	B	B	B	B	B	B	B
		Approach	B (13.6)			B (12.3)			B (12.9)			B (11.9)		
		Intersection MOE	B (12.7)											
50	6th Street & Meridian Avenue	Signalized	EB			WB			NB			SB		
			LT	T	RT	LT	T	RT	LT	T	RT	LT	T	RT
		Movement Delay	16.1	0.0	0.0	14.0	0.0	0.0	8.6	0.0	0.0	8.1	0.0	0.0
		Movement LOS	B	A	A	B	A	A	A	A	A	A	A	A
		Approach	B (16.1)			B (14.0)			A (8.6)			A (8.1)		
		Intersection MOE	B (11.1)											

Key:

EB – Eastbound | WB – Westbound | SB – Southbound | NB – Northbound

LT – Left | T – Through | RT - Right

Table 2-15 Future Traffic Summary Comparison Matrix

Location		AM Elevated Alternatives Scenario	AM At-Grade Alternatives/One Lane Scenario	PM Elevated Alternatives/No Build Scenario	PM At-Grade Alternatives/One Lane Scenario
1	North Miami Avenue & 41st Street	A (3.0)	A (3.0)	F (59.2)	F (59.2)
2	North-East 2nd Avenue & 41st Street	A (0.7)	A (0.7)	A (2.1)	A (2.1)
3	North Miami Avenue & 38th Street	D (43.9)	F (231.7)	F (198.2)	F (694.1)
4	North-East 2nd Avenue & 39th Street	D (40.1)	D (40.1)	C (23.5)	C (23.5)

Table 2-15 Future Traffic Summary Comparison Matrix

Location		AM Elevated Alternatives Scenario	AM At-Grade Alternatives/One Lane Scenario	PM Elevated Alternatives/No Build Scenario	PM At-Grade Alternatives/One Lane Scenario
5	North-East 2nd Avenue & 38th Street	B (12.9)	B (12.9)	B (11.0)	B (11.0)
6	North Federal Highway & 39th Street	C (29.9)	C (31.7)	C (24.4)	C (27.4)
7	Biscayne Boulevard & 38th Street	F (90.0)	F (90.0)	F (104.8)	F (104.8)
8	North Miami Avenue & 36th Street	F (163.5)	F (389.0)	F (214.9)	F (462.1)
9	North Federal Highway & 36th Street	F (107.9)	F (107.9)	F (186.8)	F (186.8)
10	Biscayne Boulevard & 36th Street	F (112.3)	F (111.9)	F (92.6)	F (92.6)
11	North Miami Avenue & 29th Street	F (198.8)	F (194.6)	F (120.5)	F (119.7)
12	North Miami Avenue & 17th Street	A (0.1)	A (0.1)	A (0.1)	A (0.1)
13	North Miami Avenue & 14th Street	D (39.2)	D (46.2)	B (15.2)	C (26.3)
14	North-East 2nd Avenue & 14th Street	F (264.3)	F (284.7)	F (153.0)	F (191.2)
15	Biscayne Boulevard & North-East 13th Street	C (33.1)	C (33.1)	D (47.8)	D (47.8)
16	Biscayne Boulevard & 12th Street	--	--	--	--
17	Biscayne Boulevard & 11th Street	D (42.6)	D (42.6)	C (25.5)	C (25.5)
18	MacArthur Causeway & Fountain Street	B (16.9)	B (16.9)	B (15.0)	B (15.0)
19	MacArthur Causeway & Bridge Road	A (9.6)	A (9.6)	A (6.8)	A (6.8)
20	MacArthur Causeway & Terminal Island	E (78.1)	E (78.1)	C (31.6)	C (31.6)

Table 2-15 Future Traffic Summary Comparison Matrix

Location		AM Elevated Alternatives Scenario	AM At-Grade Alternatives/One Lane Scenario	PM Elevated Alternatives/No Build Scenario	PM At-Grade Alternatives/One Lane Scenario
21	Alton Road & 5th Street	F (97.1)	F (97.1)	F (134.7)	F (134.7)
22	Washington Avenue & 5th Street	C (21.1)	C (29.3)	C (24.6)	F (124.1)
23	Alton Road & 11th Street	B (11.6)	B (11.6)	B (17.8)	B (17.8)
24	Washington Avenue & 11th Street	A (4.3)	A (4.9)	A (6.0)	A (5.5)
25	Alton Road & 15th Street	B (15.0)	B (15.0)	B (19.0)	B (19.0)
26	Washington Avenue & 15th Street	A (6.3)	A (7.0)	A (5.7)	A (8.1)
27	Alton Road & 17th Street	C (24.7)	C (24.7)	C (30.1)	C (30.1)
28	Convention Center Drive & 17th Street	B (13.0)	B (13.0)	B (19.8)	B (19.8)
29	Washington Avenue & 17th Street	C (20.1)	B (19.5)	B (19.9)	D (44.4)
30	Alton Road & Dade Boulevard	C (25.8)	C (25.8)	C (26.2)	C (26.2)
31	North Michigan Avenue & Dade Boulevard	A (9.6)	A (9.6)	C (26.5)	C (26.5)
32	Washington Avenue & 19th Street	A (5.2)	A (5.7)	A (5.7)	A (7.0)
33	North Michigan Avenue & Alton Road	B (17.2)	B (17.2)	C (26.9)	C (26.9)
34	Convention Center Dr & Dade Boulevard	A (8.8)	A (8.8)	B (14.8)	B (14.8)
35	Washington Avenue & Dade Boulevard	B (18.9)	B (18.9)	B (17.1)	B (17.0)
36	Alton Road & Chase Avenue	C (31.7)	C (31.7)	C (26.4)	C (26.4)
37	North Miami Avenue & 19th Street	--	--	--	--
38		F (83.2)	F (129.4)	C (32.1)	F (132.6)

Table 2-15 Future Traffic Summary Comparison Matrix

Location		AM Elevated Alternatives Scenario	AM At-Grade Alternatives/One Lane Scenario	PM Elevated Alternatives/No Build Scenario	PM At-Grade Alternatives/One Lane Scenario
	North Miami Avenue &				
39	4th Street & Lenox Avenue	A (4.2)	A (4.2)	A (3.8)	A (3.8)
40	4th Street & N. Michigan Avenue	A (8.6)	A (8.6)	B (10.1)	B (10.1)
41	4th Street & Jefferson Avenue	A (8.8)	A (8.8)	A (9.1)	A (9.1)
42	4th Street & Meridian Avenue	A (9.5)	A (9.5)	B (11.2)	B (11.2)
43	5th Street & Lenox Avenue	B (18.6)	C (23.5)	B (11.6)	B (11.0)
44	5th Street & N. Michigan Avenue	A (9.5)	A (9.3)	A (7.8)	C (21.6)
45	5th Street & Jefferson Avenue	B (10.3)	B (10.3)	A (7.3)	A (7.4)
46	5th Street & Meridian Avenue	B (15.9)	B (13.5)	A (9.2)	B (12.9)
47	6th Street & Lenox Avenue	B (14.3)	B (14.3)	C (15.4)	C (15.4)
48	6th Street & Michigan Avenue	A (10.0)	A (9.3)	B (11.5)	B (11.5)
49	6th Street & Jefferson Avenue	B (10.9)	B (10.9)	B (12.7)	B (12.7)
50	6th Street & Meridian Avenue	A (9.9)	A (9.7)	B (11.4)	B (11.1)

2.7. EXISTING ENVIRONMENTAL CONDITIONS

Existing environmental conditions were evaluated for the Beach Corridor. Socioeconomic factors, cultural resources, natural resources, and physical conditions were evaluated. The results of this evaluation are presented below.

2.7.1. Social and Economic

An analysis of land use, social and economic environment, mobility and aesthetic effects was conducted for the study area using information from the project Community Characteristic Inventory (CCI) and the Sociocultural Data Report from the Florida Department of Transportation (FDOT) Efficient Transportation Decision Making (ETDM) Environmental Screening Tool (EST), published in August 2019. The CCI is a comprehensive summary of the quantitative and qualitative data for each defined community within the study area and is used to help support the decisions made during the Sociocultural Effects (SCE) evaluation process.

The study area typically includes communities immediately surrounding the project; however, it may extend beyond the typical project corridor to account for specific communities affected by the project. The SCE study area, shown in **Figure 2-17,** extends 0.25 miles from the Beach Corridor alignment and an expanded area around Palm, Hibiscus and Star Islands because they have a singular point of access from MacArthur Causeway.

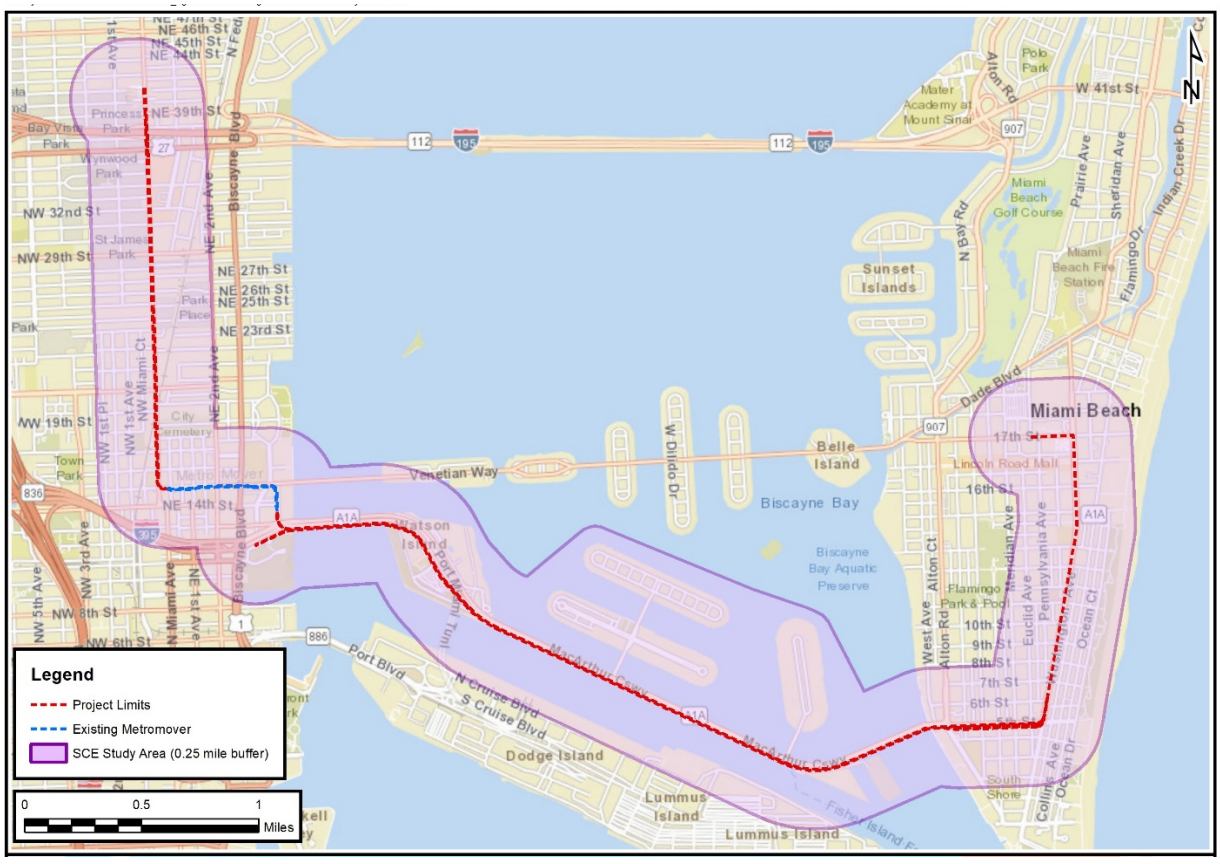


Figure 2-17 Location Map Used to Collect Social and Economic Data.

a. *Land Use*

The Adopted 2020 and 2030 Land Use Plan for Miami-Dade County substantially conforms to the future land use plans for the Cities of Miami and Miami Beach in the areas of the Beach Corridor.

The SMART Plan was developed by Miami-Dade County and the Miami-Dade TPO and adopted by the TPO Governing Board on April 21, 2016. The SMART Plan intends to advance six rapid transit corridors, along with a network system of BERT service, in order to implement premium mass transit projects in Miami-Dade County.

The predominant land uses adjacent to the corridor are Commercial and Services, Residential (either fixed single family units or multiple dwelling units), and Industrial, with almost one-third of the area within 500 feet of the project consisting of Embayments Opening Directly to Gulf or Ocean (Biscayne Bay). With increasing distance from the corridor, residential units, whether single family or multiple dwelling units, are an increased percentage of the land use, even though Commercial and Services and Embayments remain the two predominant land uses. While institutional and educational facilities are not a large percentage of the land use, the proposed project serves to connect major cultural, educational and government centers in Miami and Miami Beach.

Community focal points include Museum Park, the Miami Arena, the Adrienne Arsht Center for the Performing Arts, Ocean Drive, the Miami Beach City Hall, the Miami Beach Convention Center, Wynwood Walls, and businesses and community services in both Miami and Miami Beach.

According to data from the U.S. Decennial Census, the population within 0.25 miles of the SCE project area has decreased from 1990 (34,454) to 2000 (27,111). Data from the American Community Survey five-year estimates from 2006 through 2010 and 2013 through 2017 indicate that the population has remained relatively stable through 2010 (28,117) and 2017 (28,861).

b. *Social*

The project study area includes the City of Miami and the City of Miami Beach. Miami is a major transportation and business center with a population of approximately 400,000 in 2010 and estimated to be approximately 460,000 in 2017 by the U.S. Census Bureau. Miami is also a major center for tourism, culture, media, entertainment, the arts, finance, commerce, and international trade, designated as the "Gateway to the Americas". The Miami River and PortMiami, adjacent to the project corridor, are world leaders in international shipping and cruise ship operations and Downtown Miami is home to many large national and international banking companies. It is the seat of Miami-Dade County.

Miami Beach is a year-round, coastal resort city located on the barrier island east of Miami on the Atlantic Ocean and on man-made islands in Biscayne Bay. The population of Miami Beach was approximately 88,000 in 2010 and was estimated to be approximately 92,000 in 2017.

Based on the 2017 data obtained from American Communities Survey (ACS) and the ETDM EST for the population within the SCE study area (defined as the Modified 0.25-mile buffer around the project area), 55.94% of the population is of Hispanic or Latino origin and 70.38% of the

population are persons belonging to a minority group. Of the total study area population, 15,903 are male (55%) and 12,958 are female (45%). The median age is 40. Of the total study area population, 19.77% speak English not well or not at all. In general, the race and ethnicity trends in the study area are similar in degree to those of Miami-Dade County.

Community features identified within 0.25 miles of the project include 11 assisted housing facilities, 13 community centers, 45 cultural centers, 21 existing parks and recreational facilities, five government buildings, 24 healthcare facilities, 23 schools, 23 religious centers, four social services, one veteran facility, one fire station, five law enforcement facilities, and one cemetery.

c. *Economic*

Transportation is the engine of economic development because it ensures the movement of products from the production place to the market or distribution centers and the movement of people for specific purpose trips. Major roadway segments in the Beach Corridor are lined with commercial/retail/office land uses and are within the Miami-Dade County Enterprise Zone. The Beach Corridor lies within the Miami-Dade County Enterprise Zone, designated E.Z. 1301. Approximately 38% of the area within 100 feet of the Beach Corridor alignment is within the enterprise zone, including the area around North Miami Avenue, Watson Island, 5th Street and Washington Avenue. Areas around sections of North Miami Avenue and on Watson Island are also within a U.S. Department of Housing and Urban Development (HUD) Empowerment Zone. These initiatives have been established to encourage business development, business expansion, and job creation through incentive programs to promote economic development of an area. Business incentives are also available through the Brownfields program.

The Downtown Miami Central Business District is a major employment center in the County. In addition, both Miami and Miami Beach are major tourist destinations for local, regional, national, and international visitors. There have been several Developments of Regional Impact in the area of the Beach Corridor over the past thirty to fifty years. Mount Sinai Medical Center, a major employer in the area, is located in the northwest quadrant of the I-195/Alton Road interchange.

d. *Mobility*

The Beach Corridor alignments are designed to offer rapid transit to major destinations from commonly used points of origin. The Beach Corridor alignments are also designed to provide enhanced interconnections with other modes of transit, including the Metromover in Downtown Miami, Tri-Rail and Brightline Trains USA on the FEC railway line, and local bus circulators in Miami and Miami Beach. The Intermodal Passenger Connectivity Database (IPCD) is a data table of transportation terminals that provides an estimate of the degree of intermodal connectivity in the transportation system. There are 10 IPCD locations within 100 feet of the corridor, 35 within 500 feet and 78 within a quarter mile.

Connection to major destinations also facilitates use of other modes of transportation or recreation, including vehicular, pedestrian, cycling, boating and paddling. Within 1,320 feet (one-quarter

mile) of the Beach Corridor, there are currently two airports, two aviation transportation facilities, two boat ramps, 79 bus transit routes, three existing recreational trails, 14 fixed-guideway transit network stations, 13 marinas, five Office of Greenways and Trails (OGT) multi-use trails opportunities, two OGT paddling trails opportunities, three potential navigable waterways, and the FEC Railway.

e. *Aesthetic Effects*

The project corridor is within two US Census designated places, the urbanized areas of Miami and Miami Beach. Each area has its own visual character and viewshed. Additionally, the study area is comprised of three sub-areas featuring distinct segments of travel demand and origin/destination pairs that vary in their land use and environmental characteristics.

The Bay Crossing sub-area on MacArthur Causeway has its own community character and viewshed due to Biscayne Bay, PortMiami and the residences on Hibiscus, Palm and Star Islands. It is noted that Hibiscus, Palm and Star Islands, along with Terminal Island, are part of the City of Miami Beach; Watson Island and Dodge Island (PortMiami) are in the City of Miami.

In the Midtown/Design District, Downtown Miami is characterized by skyscrapers and other commercial, institutional, and light industrial land uses. The project would connect with the existing elevated Metromover. Therefore, an elevated mode of transit would not be incompatible with the existing Downtown Miami city character.

Along the Miami Beach alignments, most of the buildings adjacent to the corridor are two or three stories high and the land uses are mainly residential, mixed-use commercial and entertainment. In addition, the Beach Corridor traverses several historic districts on Miami Beach and there are numerous potentially historic structures. Furthermore, the streets are landscaped.

f. *Environmental Justice*

A Sociocultural Effects Evaluation was conducted for the project. In addition, a comprehensive PIP was implemented by DTPW in coordination with the Miami-Dade TPO, City of Miami and City of Miami Beach to solicit input from residents and business owners on potential project effects related to community cohesion and social interaction as well as potential solutions to ensure that both the social and transportation needs of the surrounding communities are addressed.

Title VI is a statute of the Civil Rights Act of 1964 that provides that "no person in the United States shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance." Additionally, the 1994 EO 12898, Federal Actions to address Environmental Justice in Minority Populations and Low-Income Populations, provides that “Each recipient of federal funds shall make achieving environmental justice part of its mission by identifying and addressing as appropriate, disproportionately high and adverse human health or

environmental effects of its programs, policies, and activities on minority populations and low-income populations."

A Title VI Analysis Report was prepared in September 2021 to document the analysis of potential effects on Title VI populations of four preliminary Maintenance and Operations Facility (MOF) sites for the Beach Corridor Rapid Transit Project. Potential effects that were evaluated included land use changes, visual impacts, air quality, noise and vibration, and the temporary effects of construction (i.e., temporary access change, dust, noise, and vibration caused by construction equipment) for two alternative MOF sites on the Bay Crossing alignment and two alternative MOF sites on the Miami Extension alignment.

The LPA will provide new rapid transit facilities on existing rights-of-way and no residential displacements are anticipated for neither the Bay Crossing nor Miami Extension alignments and potential MOF sites. No population changes are anticipated as a result of the project. Public involvement has been conducted to ensure that the project meets the needs of the community and the populations that may be temporarily impacted by the project. The project will improve the ability of the resident populations to access important social, cultural and institutional facilities and community features.

Based on the above discussion and analysis, the Beach Corridor Rapid Transit Project is not anticipated to cause disproportionately high and adverse effects on any minority or low-income populations in accordance with the provisions of EO 12898 and FHWA Order 6640.23a. The project will continue to be conducted in accordance with Title VI regulations to ensure that there are no disproportionate effects on low-income or minority populations.

2.7.2. Cultural

a. *Historic and Archaeological Sites*

A preliminary desktop analysis to identify cultural resources within 2,000 feet of the project corridor was performed in December 2018. The preliminary analysis identified 3,254 pre-1974 buildings within the study area. Of those, 1,125 were previously recorded in the Florida Master Site File (FMSF). Sixty-four percent, or 722, of the resources had not been evaluated for eligibility on the National Register of Historic Places (NRHP). Based on this initial desktop analysis, the SHPO had determined that 58 of the structures are potentially eligible for listing and another 149 are eligible but not listed on the NRHP; 23 are listed on the NRHP.

In addition, there were nine (9) recorded bridges in the study area. The Alton Road Bridge (8DA12365), the MacArthur Causeway East Bridge (8DA14823), and the SR 907 (Alton Road) Flyover bridge (8DA14824) have been determined to be ineligible for listing in the NRHP. The Sunset Lake Canal (8DA05182), the West 23rd Street at Collins Canal (8DA06436), the Port of Miami (Seaport) Bascule Bridge (8DA12620), and the Washington Avenue/Collins Canal Bridge (8DA12623) have not yet been evaluated for their NRHP eligibility. The Venetian Causeway

(8DA04736) is listed in the NRHP and is also a designated local landmark. The Sunset Island Bridge Number 4 (8DA05829) has been determined to be eligible for listing in the NRHP by the SHPO.

The FMSF indicated that 19 historic resource groups were recorded within the Study Area, including eight historic districts, five designated historic landscapes, five linear resources, and one building complex. The Downtown Miami Historic District (8DA10001), the Miami Beach Architectural District (8DA01048), and Collins Waterfront Architectural District (8DA11867) are currently listed on the NRHP. The Beverly Terrace Historic District (8DA11265), Sunset Lake Historic District (8DA14383), and the 41st Street Historic District (8DA15151) have all been determined by SHPO to be eligible for listing in the NRHP. Neither the Buena Vista East Historic District (8DA15150) nor the Ocean Beach Historic District (8DA11415) have been evaluated by SHPO regarding their NRHP eligibility.

One of the designated historic landscapes, the Lincoln Road Pedestrian Mall (8DA11876), is listed in the NRHP. Flamingo Park and the Miami Beach Golf Club (8DA00568 and 8DA11431) have been determined eligible by the SHPO, while the Bayshore Municipal Par 3 Golf Course (8DA11432) is not eligible for listing, and Lummus Park (8DA00797) has not been evaluated for its NRHP eligibility status by SHPO. Two linear resources, the FEC Railway (8DA10107) and the Collins Canal (8DA11375), are eligible for the NRHP. Biscayne Boulevard (8DA06901) and the Collins Canal Seawall (8DA12366) are ineligible, while Pine Tree Drive (8DA06881) did not have sufficient information for an eligibility determination. The D&K Island Project (8DA11733), a building complex consisting of four two-story, multifamily, garden-style buildings with a total of 24 units, has been determined to be ineligible for listing in the NRHP.

One historic cemetery has been recorded within the study area. The City of Miami Cemetery (8DA01090) was established in 1897 and is currently well maintained. The City of Miami Cemetery is a NRHP-listed property, as well as a designated local landmark.

The review indicated that the Miami-Dade County Archaeological Conservation Area and the original Brickell Archaeological Zone overlap portions of the Study Area. The Brickell Resource Group (8DA05360) has also been identified outside, but near, the Study Area. The Brickell Resource Group is a multicomponent archaeological district that has not been evaluated for its eligibility for the NRHP by the Florida SHPO. However, it is part of an archaeological zone that consists of approximately 150 acres considered to have a high probability for archaeological resources.

Following the preliminary desktop analysis, a Cultural Resource Assessment Survey (CRAS) was conducted within the project Area of Potential Effect (APE), which was refined from the larger preliminary analysis considered by the desktop review. The project APE was developed to consider any visual, audible, and atmospheric effects that the project may have on historic properties. The APE was defined to include the existing right-of-way for the subject roads within

the project corridor for the recommended alignment. This APE was extended to the back or side property lines of parcels adjacent to the right-of-way, or a distance of either 328 feet from the right-of-way line for segments at-grade, or 984 feet for elevated segments of the project area. The architectural survey included the entire APE. The archaeological APE was defined as the roadway right-of-way and the proposed locations for maintenance yards and transit stations. The results of the CRAS are presented in Section 6 **(**Design Features of the Recommended Alternative) of this document,

b. *Recreation Areas*

Local Florida Parks and Recreational Facility Boundaries within 500 feet of the project corridor include Watson Island Baywalk & Boat Ramp (a Land and Water Conservation Fund Act site), Collins Park, Albert Pallot Park, Woodson Mini Park, Bicentennial Park (now called Maurice A. Ferre Park), Dorsey Park, Martell Park, Stearns Park, Watson Island Park, 21st Street Recreation Center, Miami Beach Golf Club, Soundscape Park, Biscayne Park, and Omni Park.

The All Aboard Florida Rail with Trail parallels the FEC Railway. The M-Path, which parallels the Metrorail, coincides with the East Coast Greenway in Miami. The M-Path is a 10-mile, urban trail only in Miami-Dade County underneath the Metrorail line, whereas, the East Coast Greenway is a 3,000-mile, mostly off-road trail from Key West, Florida to Calais, Maine. The East Coast Greenway is also present in Miami Beach and MacArthur Causeway is also listed as a Hiking Trail Priority. In addition, the Florida Circumnavigational Saltwater Paddling Trail crosses under bridges at both I-195 and the MacArthur Causeway.

c. *Section 4(f) and 6(f) Potential*

Section 4(f) of the U.S. Department of Transportation (USDOT) Act of 1966 prohibits the USDOT agencies (such as the FDOT) from using publicly owned land such as parks, recreation areas, wildlife and water fowl refuges, or historic properties for transportation uses, unless there is no feasible and prudent alternative to that use and the action includes all possible planning to minimize harm to the property resulting from such a use (23 CFR Part 774). Section 4(f) resources that could be affected by the project include the parks and recreation areas discussed in Section 2.7.2.b and the NRHP-eligible or -listed resources (historic sites) identified in Section 2.7.2.a above.

Section 6(f) of the Land and Water Conservation Fund (LWCF) Program provides federal matching funds in the form of grants to states or municipalities for acquisition, planning, or improvements to public outdoor recreation space. Any property in which LWCF money was used is considered a Section 6(f) resource. The Act prohibits the conversion of property acquired or developed through the LWCF to a non-recreational purpose without the approval of the U.S. Department of the Interior (DOI). The Watsons Island Baywalk Park is a Section 6(f) resource.

2.7.3. Natural

a. *Wetlands/Benthic Resources*

Presidential Executive Order (EO) 11990, entitled *Protection of Wetlands*, establishes a national policy to "avoid to the extent possible the long and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative". The U.S. Department of Transportation (USDOT) in implementing EO 11990 set forth its policy on wetlands in USDOT Order 5660.1A, *Preservation of the Nation's Wetlands*. A *Natural Resources Evaluation* (NRE) was prepared for the project, which includes a Wetland/Benthic Resources Evaluation, in accordance with Part 2, Chapter 9 of the FDOT PD&E Manual, Executive Order 11990 and USDOT Order 5660.1A. With the advancement of the Bay Crossing sub area of the project to permitting, the information included in the NRE regarding wetlands/benthic resources has been updated and refined. An *Environmental Permit Report* was prepared for submittal to the environmental regulatory agencies at the beginning of the permitting process. Since then, there has been further refinement of the wetland and benthic resources information, including impact calculation and mitigation. The most up-to-date information is presented in this report.

The following are the methods and results of the wetland, seagrass and benthic surveys that were conducted for the Bay Crossing sub area. The Bay Crossing sub area is described in three segments, the west bridge, MacArthur Causeway (the causeway segment) and the east bridge.

Seagrass

An underwater seagrass survey was conducted on September 17-21 and 26-28, 2018 during the optimal seagrass growing season. Transects were performed perpendicular to and south of the west and east bridges on SR A1A/MacArthur Causeway. The edges of seagrass beds were marked with buoys and their locations recorded with a sub-meter differential GPS unit. In addition, a reconnaissance survey was conducted south of the causeway segment.

Paddle grass (*Halophila decipiens*) was observed in four beds south of the existing west and east bridges. One seagrass bed (Bed 1), totaling 1.35 acres with 90% cover, was observed south of the west bridge. Three beds with 20 to 40% cover were observed south of the east bridge. From west to east, Bed 2 was 0.12 acres with 20% cover, Bed 3 was 0.41 acres with 40% cover and Bed 4 was 0.10 acres with 40% cover. No seagrass was observed south of the causeway and no other species (e.g., Johnson's seagrass) were observed.

Hardbottom and Coral

A detailed coral survey was conducted on August 6-9 and 13-15, 2019. Preliminary (30%) engineering design plans developed for the Bay Crossing permitting indicated that drilled shafts and piers would be placed at 56 locations along the causeway. A representative 25% of the total number of pier locations (15 locations) was surveyed. At each location, each hard coral and soft coral in a 20 by 20-foot area were identified and measured for length, width, and height, as

applicable. In addition, condition ratings, percent mortality and an estimate of percent lost biomass were recorded. Sponges were also identified by morphology.

There are two coral habitat types south of MacArthur Causeway: medium relief habitat on the large boulder riprap adjacent to the roadway and low relief hardbottom on the flats south of the riprap. A total of 2,891 hard coral and 108 soft coral were observed during the survey.

Mangroves

Mangroves have recruited on the riprap south of MacArthur Causeway. These are individual mangroves or mangrove clusters rather than a mangrove forest. During an interagency field review on October 23, 2019, the SFWMD and NMFS stated that the mangroves do not constitute wetlands because there is no soil and they are growing above the water line. Mangrove mitigation will, however, be required by Miami-Dade County Department of Regulatory and Environmental Resources.

b. *Water Quality and Drainage*

The Clean Water Act of 1972 establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. The majority of the project area falls within Waterbody ID (WBID) 3226H, which is verified impaired for nutrients (chlorophyll a). Sections of the Miami Design District and Downtown Miami sub-area also lie within WBID 3288, which is verified impaired for dissolved oxygen and copper and has a Total Maximum Daily Load (TMDL) for bacteria (Enterococci). Similarly, the southern section of the Downtown Miami sub-area is partially within WBID 3288B, which also has a State-adopted and EPA-approved TMDL for bacteria (Enterococci). The area around SR A1A/I-395/MacArthur Causeway is located within WBID 3226H3, which is verified impaired for nutrients (chlorophyll-a). The Trunkline is located in Biscayne Bay, a Florida Class III water, which is for fish consumption, recreation, propagation, and maintenance of a healthy, well-balanced population of fish and wildlife. Surface waters of the state are Class III waters. This Trunkline also lies within the Biscayne Bay Aquatic Preserves; all Aquatic Preserves are OFWs. The OFW designation carries with it the requirement that water quality cannot be degraded below ambient levels. In addition, the entire project is within the Biscayne Aquifer, which is an EPA designated sole source aquifer.

The existing drainage facilities within the limits of this study are divided into three (3) separate sub-areas:

- The Midtown/Design District sub-area contains several storm drain systems that discharge into Biscayne Bay. No formal water quality treatment was identified in this sub-area.
- The Bay Crossing Trunkline District sub-area contains a storm drain system with an exfiltration trench trunkline along the north side of the MacArthur Causeway, which provides water quality treatment.

- The Miami Beach sub-area contains several storm drain systems that discharge into Biscayne Bay. Numerous gravity wells are connected to the main trunklines of these systems and provide water quality treatment prior to discharge into Biscayne Bay.

The project will require Water Quality Certification granted through a state permit, in this case the SFWMD Conceptual Environmental Resource Permit that is being acquired for the Bay Crossing. The primary water quality concern is turbidity, which is the measure of the amount of light that is scattered by particles in the water when a light is shined through a water sample. Turbidity in estuarine waters can occur naturally, such as during a storm event, or from construction, when sediments are suspended in the water column due to soil-disturbing construction activities. Stormwater can also introduce pollutants from runoff.

c. *Floodplain*

Federal Emergency Management Agency (FEMA) digital flood hazard maps were reviewed for the project. SR A1A/MacArthur Causeway, starting at Biscayne Boulevard, and the roadways in Miami Beach are within Special Flood Hazard Area Zone AE, which signifies flood depths of greater than three feet during a 1 percent annual chance flood event, or a 100-year flood. Miami Avenue, from the Design District to Midtown Miami, is not within the 100-year floodplain or a Special Flood Hazard Area; it is within FEMA Flood Zone X.

d. *Protected Species and Habitat*

The project is located in a highly urbanized area in Miami and Miami Beach. Even so, the trees and urban structures (buildings, bridges) may provide habitat for the Florida bonneted bat (*Eumops floridanus*), a federally endangered species. No bat roosting was evident during a survey conducted in April 2019. The remaining habitat consists of open water areas of Biscayne Bay and connecting waters.

An evaluation of the potential occurrence of protected species and habitat was conducted in accordance with Part 2, Chapter 16 of the FDOT PD&E Manual, Protected Species and Habitat, to ensure compliance with the Endangered Species Act (ESA) of 1973, as amended, and the Florida Endangered and Threatened Species Act, Section 379.2291, Florida Statutes (F.S.). The evaluation was included in the NRE and is presented in this report. Under the ESA, species may be listed as either endangered or threatened. "Endangered" means a species is in danger of extinction throughout all or a significant portion of its range. "Threatened" means a species is likely to become endangered within the foreseeable future.

Two federal agencies evaluate a project's effect on endangered and threatened species under the ESA, the U.S. Fish and Wildlife Service (USFWS) and NMFS. The USFWS has primary responsibility for terrestrial and freshwater organisms, while the responsibilities of NMFS are mainly marine wildlife. The law requires federal agencies, in consultation with the USFWS and/or the NMFS, to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of

designated critical habitat of such species. The law also prohibits any action that causes a "taking" of any listed species of endangered plants and animals. The Florida Fish and Wildlife Conservation Commission (FWC) regulates and manages State-listed fish and wildlife.

The likelihood of a species occurring in the project area was based on literature review and observed habitats in the project area during field reviews. A summary of listed species and their federal and State status is provided below in **Table 2-16**. The probability of occurrence was rated as High, Moderate or Low depending on the presence of preferred habitat in the project area and observations or records of occurrence.

Table 2-16 Listed Species Potentially Present in the Project Area

Common Name	Scientific Name	Federal Status	State Status	Probability of Occurrence
Birds				
Rufa red knot	*Calidris canutus rufa*	T	T	Low
Piping plover	*Charadrius melodus**	T	T	Low
Snowy plover	*Charadrius nivosus*	N	T	Low
Little blue heron	*Egretta caerulea*	N	T	Moderate
Tricolored heron	*Egretta tricolor*	N	T	Moderate
Reddish egret	*Egretta rufescens*	N	T	Moderate
Wood stork	*Mycteria americana*	T	T	Low
Roseate spoonbill	*Platalea ajaja*	N	T	Low
Least tern	*Sternula antillarum*	N	T	Moderate
Fish				
Smalltooth sawfish	*Pristis pectinata*	E	E	Moderate
Invertebrates				
Staghorn coral	*Acropora cervicornis*	T	T	Low
Elkhorn coral	*Acropora palmata*	T	T	Low
Pillar coral	*Dendrogyra cylindricus*	T	T	Low
Rough cactus coral	*Mycetophyllia ferox*	T	T	Low
Lobed star coral	*Orbicella annularis*	T	T	Moderate
Mountainous star coral	*Orbicella favolata*	T	T	Moderate
Boulder star coral	*Orbicella franksi*	T	T	Moderate
Mammals				
Florida bonneted bat	*Eumops floridanus**	E	E	Moderate
West Indian manatee	*Trichechus manatus**	T, CH	T	High
Plants				
Johnson's seagrass	*Halophila johnsonii*	T, CH	T	High

Table 2-16 Listed Species Potentially Present in the Project Area

Common Name	Scientific Name	Federal Status	State Status	Probability of Occurrence
Reptiles				
American alligator	*Alligator mississippiensis*	SAT	T(S/A)	Low
Loggerhead sea turtle	*Caretta*	T	T	Moderate
Green sea turtle	*Chelonia mydas*	T	T	Moderate
American crocodile	*Crocodylus acutus**	T	T	Low
Leatherback sea turtle	*Dermochelys coriacea*	E	E	Moderate
Eastern indigo snake	*Drymarchon couperi*	T	T	Low
Hawksbill sea turtle	*Eretmochelys imbricata*	E	E	Moderate
Kemp's ridley sea turtle	*Lepidochelys kempii*	E	E	Low

Notes: Species: * = Project falls within USFWS Consultation Area for this species;
Status: E = Endangered, T = Threatened, SAT and T(S/A) = Threatened due to Similarity of Appearance to a listed species, CH = Critical Habitat, N = Not Listed.
Probability of Occurrence: High = preferred habitat exists within project limits and species have been observed or reported in the project area; Moderate = some preferred habitat exists within the project limits and there is a potential for the species to be present, but it has not been observed in the project area; Low = preferred habitat is limited or lacking within the project limits and species have not been observed in the project area.

e. *Essential Fish Habitat*

An Essential Fish Habitat (EFH) Assessment was performed in accordance with the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), as amended in 1996 by the Sustainable Fisheries Act, and Part 2, Chapter 17 of the FDOT PD&E Manual as presented here. EFH are those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. The MSFCMA mandated regional Fishery Management Councils to identify, describe, map and protect EFH in their region and create and amend Fishery Management Plans (FMPs) for EFH for either an individual species or an assemblage of species. This project is located within the South Atlantic Fishery Management Council (SAFMC). The FMPs are described in the *Final Habitat Plan for the South Atlantic Region* (SAFMC, 1998).

The identification of EFH in the project area was based on benthic surveys conducted during the seagrass growing season in 2018 and 2019. A list of managed species was developed in coordination with the NMFS.

EFH in the Bay Crossing sub area include submerged aquatic vegetation (seagrasses), live/hardbottom (sponges, hard coral and soft coral), unconsolidated bottom (sand/shell bottom and mud bottom) and estuarine water column. Habitat Areas of Particular Concern (HAPC) are subsets of EFH that are rare, particularly susceptible to human-induced degradation, especially ecologically important or located in an environmentally sensitive area. The seagrass beds in the project area are HAPC for members of the snapper-grouper complex and hardbottom habitat is

HAPC for members of the snapper-grouper complex and spiny lobster. Biscayne Bay is a geographically designated HAPC for spiny lobster and coral.

Based on email communication with NMFS on August 5, 2019, a list of managed fishery species and life stages for each species with the potential to have EFH in the project area was developed. **Table 2-1** details the life stages of managed species that may be present in the project area, the EFH present in the project area for each life stage and the HAPC present for each Fishery Management Plan (shrimp, snapper-grouper complex, spiny lobster and coral).

Table 2-17 Managed Species, EFH and HAPC Present in the Project Area

Common Name	Scientific Name	Life Stage	EFH	HAPC
Shrimp Fishery Management Plan				
White Shrimp	*Litopenaeus setiferus*	postlarvae/ juvenile	SAV	--None--
		subadults	SAV	
Brown Shrimp	*Farfantepenaeus aztecus*	postlarvae/ juvenile	SAV	
		subadults	mud bottoms	
Pink Shrimp	*Pandalus borealis*	postlarvae/ juvenile	SAV, sand/shell bottoms	
		subadults	SAV, sand/shell bottoms	
Snapper - Grouper Complex Fishery Management Plan				
Goliath Grouper	Epinephelus itajara	juvenile	SAV, lagoons, structure	nearshore hardbottom areas, seagrass habitat
Gag Grouper	Mycteroperca microlepis	larval	water column, SAV	
		juvenile	SAV	
Gray Snapper	Lutjanus griseus	postlarvae/ juvenile	SAV, mud	
		adult	hardbottom < 77m, SAV	
Mutton Snapper	Lutjanus analis	juvenile	SAV, sand, mud	
		adult	hardbottom, sand	
White Grunt	Haemulon plumierii	juvenile	hardbottom, SAV	
		adult	hardbottom, SAV	
Spiny Lobster Fishery Management Plan				
Spiny Lobster	Panulirus argus	juvenile	sponge, algae, coral, hardbottom	Biscayne Bay, hardbottom habitat
		adult	sponge, algae, coral hardbottom, crevices	
Coral, Coral Reef and Live/Hardbottom Habitat Fishery Management Plan				
Coral	Stony Corals, Octocorals	Not applicable	substrate is rough, hard, exposed and stable	Biscayne Bay

f. *Sole Source Aquifer*

This project is located within the Biscayne Aquifer which is a sole source aquifer. The EPA defines a sole source aquifer as one where the aquifer supplies at least 50% of the drinking water in its service area and there are no reasonably available drinking water sources should the aquifer become contaminated. The sole source aquifer program is authorized by Section 1424€ of the Safe Drinking Water Act of 1974 (Public Law 93-523, 42 U.S.C. 300 et. seq). No commitment for federal financial assistance may be provided for any project which may contaminate the aquifer through its recharge area so as to create a significant hazard to public health. Coordination with the EPA Ground Water Section is required for projects that involve new transit construction within a sole source aquifer.

g. *Wild and Scenic Rivers*

Based on databases for the National Wild and Scenic Rivers Act of 1968, as amended, there are no Wild and Scenic Rivers, Study Rivers or segments of Nationwide Rivers Inventory Rivers in the vicinity of the project, nor are there any Wild and Scenic Rivers in Miami-Dade County.

h. *Coastal Barrier Resources*

While the proposed project does connect to a coastal barrier island, it is neither in the vicinity of, nor connected to, a designated unit of the Coastal Barrier Resources System pursuant to the Coastal Barrier Resources Act of 1982, which was later amended by the Coastal Barrier Improvement Act of 1990.

i. *Land and Water Conservation Fund*

Watson Island Baywalk Park and Boat Ramp, which is on the northeast side of MacArthur Causeway on Watson Island, is a Land and Water Conservation Fund Act site. Any conversion of a LWCF protected facility under 54 USC 200305(f) (formerly Section 6(f)(3) of the LWCFA) to a use other than public outdoor recreation would require providing replacement property that is not only equal or greater in fair market value to the converted site, but also is of reasonable equivalent usefulness. The transit guideway, Children's Museum station and a potential Maintenance and Operation Facility (MOF) are proposed south of MacArthur Causeway and no impact to or use of Watson Island Baywalk Park is anticipated by the project.

j. *National Marine Sanctuary Act and Marine Protected Areas*

There are no National Marine Sanctuaries in the vicinity of the project. The proposed project crosses Biscayne Bay Aquatic Preserves, which is considered a State-managed Marine Protected Area by the NMFS. NMFS is an agency within the National Oceanic and Atmospheric Association (NOAA) under the U.S. Department of Commerce. The Biscayne Bay Aquatic Preserves is managed by FDEP. Extensive coordination with NMFS and FDEP staff occurred between August 2020 and May 2021 regarding the development of the seagrass and coral mitigation plans for this

project (8/10/20, 11/2 - 4/20, 1/28/21, 2/3/21, 3/3/21, 3/12/21, 3/17/21, 3/25/21, 4/19/21, 5/14/21). Discussions in the seagrass and coral sections of this report address Marine Protected Areas.

k. *Marine Mammal Protection Act*

The Marine Mammal Protection Act of 1972 prohibits take of all marine mammals and is jointly administered by the USFWS and NMFS. As this project is located within an estuary in South Florida, the only marine mammals in the project area are West Indian manatee and dolphins. No take of dolphins is anticipated as they are able to move out of the construction zone and will not be impacted by the project. The West Indian manatee is discussed in the Endangered and Threatened Species section of this report.

l. *Migratory Bird Treaty Act*

The Migratory Bird Treaty Act of 1918 is intended to ensure the sustainability of populations of protected migratory bird species. It prohibits the take of protected migratory bird species without prior authorization from the USFWS. Most birds are protected under the Migratory Bird Treaty Act. Executive Order 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*, was issued on January 10, 2001. The Executive Order directs federal agencies to work with the USFWS and other federal agencies to promote the conservation of migratory bird populations. The proposed project is not anticipated to result in the take of migratory bird species.

m. *Bald Golden Eagle Protection Act*

Even though bald eagles are no longer a protected species under the Endangered Species Act, this law, originally passed in 1940, provides for the protection of the bald eagle and the golden eagle by prohibiting the take, possession, sale, purchase, barter, offer to sell, purchase or barter, transport, export or import, of any bald or golden eagle, alive or dead, including any part, nest, or egg, unless allowed by permit (16 U.S.C. 668(a); 50 CFR 22). Based on FWC's Eagle Nest Locator, there are no active or inactive eagle nests in the project area.

n. *Invasive Species*

Executive Order 13112 of February 3, 1999, Safeguarding the Nation from the Impacts of Invasive Species, called upon executive departments and agencies to take steps to prevent the introduction and spread of invasive species, and to support efforts to eradicate and control invasive species that are established. EO 13112 also created a coordinating body, the National Invasive Species Council, to oversee implementation of the order, The proposed project is not anticipated to introduce invasive species or result in the spread of invasive species in the area.

2.7.4. Physical

a. *Noise and Vibration*

A Noise and Vibration study was conducted for the Beach Corridor PD&E Study. Noise-sensitive receptors that may be affected by the project include multi-family residences, hotels/motels, and schools located near the project corridor. The primary source of existing noise along the proposed

project corridor is local traffic on surface roads, primarily Miami Avenue, Biscayne Boulevard, I-395 and I-195, as well as local mass transit noise from the existing Metromover and Metrorail.

b. *Air Quality*

The project corridor is located within the Southeast Florida Airshed. According to the US Environmental Protection Agency (EPA) Green Book, the project area is in attainment for all of the National Ambient Air Quality Standards (NAAQS) under the criteria provided in the Clean Air Act of 1967, as amended, including carbon monoxide and particulate matter. In addition, the mode of transit for the LPA uses an electric vehicle and is, therefore, a clean technology that will not increase air pollutants.

c. *Contamination*

A Level 1 contamination screening evaluation was conducted for the project to identify potential contamination from properties or operations located within the vicinity of the project. A search of potentially contaminated sites was conducted using the FDOT Efficient Transportation Decision Making Environmental Screening Tool, the FDEP Map Direct tool which includes EPA Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and National Priority Listing (NPL) sites, and Miami-Dade County Environmental Considerations GIS mapping tool to identify properties within the project area and vicinity as having present or past contamination concerns, are under investigation, or are regulated by local, state or federal environmental regulatory agencies for contamination issues. A regulatory file review of selected sites identified within the search buffers was conducted using the FDEP OCULUS Database and the Miami-Dade County Online Records System.

A review of historical aerial photographs was conducted to ascertain land development patterns and assess the area for other potential contamination sources that may not have been identified in the public record. A field reconnaissance was conducted on April 11, 2019 to verify regulatory information reviewed and to identify potential other contamination sources within the vicinity of the project based upon visual observations.

The contamination screening evaluation revealed the presence of 8 No risk sites, 15 Low risk sites, 10 Medium risk sites and 9 High risk sites for the locally preferred alternative. No landfills were identified within 1,000 feet of the corridor. No CERCLA or Superfund sites were identified within one-half mile of the corridor. A Contamination Screening Evaluation Report (CSER) has been prepared to determine the risk potential for involvement with contaminated sites. Measures to avoid or minimize involvement with contaminated sites will be developed based on the findings of the CSER

d. *Navigation*

The Bay Crossing on SR A1A/MacArthur Causeway crosses two navigable waterways, the Intracoastal Waterway at the west bridge and the “Meloy Channel” at the east bridge. The project must meet U.S. Coast Guard (USCG) horizontal and vertical clearances for new bridge crossings

of navigable waterways. In addition, the Miami Channel for PortMiami lies south of MacArthur Causeway and the USCG Base Miami Beach is located on Causeway Island east of Terminal Island, both of which enforce restrictions on navigation.

SECTION 3. DESIGN CONTROLS & CRITERIA

3.1. INTRODUCTION

The conceptual engineering of the alternatives and preliminary engineering of the Recommended Alternative were developed consistent with the Florida Design Manual and TCRP Report 155-Track Design Handbook for Light Rail Transit, and informed by all applicable Federal national, state and local regulations, codes, criteria and standards. During the conceptual and preliminary engineering phase, these design controls will provide guidance and the basis of design. As the design advances toward final design plans for construction, this basis of design is confirmed at each design milestone to ensure compliance with all applicable requirements. There may be overlapping jurisdictional oversight for some aspects of the Recommended Alternative. The codes and standards of local jurisdictions shall govern design to the greatest extent possible, as long as they do not violate federal or state law. As applicable, the project's design features will be consistent with the design controls & criteria listed in the following sections.

3.2. FEDERAL OR NATIONAL REGULATIONS, CODES, AND STANDARDS

American Association of State Highway and Transportation Officials (AASHTO)

- Guide Specifications for LRFD Seismic Bridge Design, 2nd Edition, 2015 Interim.
- Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals, 2015
- A Policy on Geometric Design of Highways and Streets ("Green Book"), 7th Edition, 2018
- LRFD Bridge Design Specifications (LRFD), 7th Edition, with 2016 interim
- Guide Specifications for Bridge Temporary Works, 2nd Edition, 2017
- Guide Specifications for Structural Design of Sound Barriers, with 1992 and 2002 Interim Revisions
- Manual for Bridge Evaluation, 2nd Edition
- Standard Specifications for Highway Bridges, 17th Edition, 2002
- LRFD Bridge Construction Specifications, 3rd Edition, 2016 Interim Revisions
- Highway Design and Operational Practices Related to Highway Safety ("Yellow Book")
- Guide for the Design of High Occupancy Vehicle Facilities (2004)
- Roadside Design Guide, 4th Edition (2011)

- A Policy on Design Standards – Interstate System, January 2005
- 14. Guide Specifications for Design and Construction of Segmental Concrete Bridges, Revision 2, 2003

Americans with Disabilities Act (ADA) 42 U.S. Code (USC) 12101 et seq.

- Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities
- Americans with Disabilities Act Accessibility Guidelines for Transportation Vehicles
- Proposed Accessibility Guidelines for Pedestrian Facilities in Public Right-of-Way, July 26, 2011

Subsurface Investigations

- Geotechnical Site Characterization (Publication No. FHWA-NHI-01-031)

United States Department of Transportation (DOT)

- ADA Standards for Accessible Design, 2006

American Society of Mechanical Engineers (ASME)

- A 17.1 Safety Code for Elevators and Escalators

American Concrete Institute (ACI)

- 318 Building Code Requirements for Reinforced Concrete, Oct 2014
- 347.3R Guide to Formed Concrete Surfaces, Feb 2014

American National Standards Institute (ANSI) C2, National Electric Safety Code (NESC)

American Railway Engineering and Maintenance-of-Way Association (AREMA)

American Society of Civil Engineers (ASCE)

- Minimum Design Loads for Buildings and Other Structures, ASCE 7-10
- Automated People Mover Standards, ANSI/ASCE/TD&I 21-13

Code of Federal Regulations (CFR)

- Title 40, Volume 5, Parts 61 to 71. National Emission Standards for Hazardous Air Pollutants (NESHAP)
- 48 CFR 659, Rail Fixed Guideway Systems, State Safety Oversight – Final Rule

American Public Transportation Association

- Crime Prevention Through Environmental Design (CPTED), APTA SS-SIS-RP-007-10

Federal Highway Administration (FHWA)

- Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD), 2009 Edition with Revisions 1 and 2 (May 2012)
- NHI-10-024 Geotechnical Engineering Circular No. 11 – Design and Construction of Mechanically Stabilized Earth Walls and Reinforced Slopes – Volume 1, Nov 2009

- NH-14-007 Geotechnical Engineering Circular No. 7 – Soil Nails Walls – Reference Manual, Feb 2015
- NHI-10-034 Technical Manual for Design and Construction of Road Tunnels – Civil Elements, Dec 2009

Federal Transit Administration (FTA)

- Transit Noise and Vibration Impact Assessment, FTA, May 2006
- 49 CFR 622 – Environmental Impact and Related Procedures
- 49 CFR 661 – Buy America Requirements, as amended Sept. 28, 2007
- Safety and Security Management Guidance for Major Capital Projects, Final FTAC5800.1, August 2007
- Handbook for Transit Safety and Security Certification, FTA, November 2002
- A Guide for Geometric Design of Transit Facilities on Highways and Streets, 1st Edition

International Code Council (ICC) with published or adopted state and local amendments including:

- International Building Code (IBC) with adopted state and local amendments, 2015
- International Fire Code with adopted state and local amendments, 2015
- International Fuel Gas Code (IFGC) with adopted state and local amendments, 2015
- International Mechanical Code (IMC) with adopted state and local amendments, 2015
- International Green Construction Code (IGCC), 2015

Institute of Transportation Engineers (ITE) guidelines for traffic engineering, traffic impact studies, analyses, and signalization, including:

- Traffic Engineering Handbook, 7th Edition, 2009
- Manual of Traffic Engineering Studies, 2nd Edition, 2010

National Electric Code (NEC)

National Fire Protection Association (NFPA) standards, including but not limited to:

- NFPA 130 Standard for Fixed Guideway Transit and Passenger Rail Systems, 2020

Transportation Research Board (TRB)

- Highway Capacity Manual, 2016
- National Cooperative Highway Research Program (NCHRP) Report 350

United States Access Board

- Public Rights-of-Way Accessibility Guidelines (PROWAG), 2011 and 2013 supplement
- ADA Accessibility Guidelines, 2010

U.S. Green Building Council (USGBC)

- Leadership in Energy and Environmental Design (LEED) v4 Building Design and Construction (BD+C) Rating System

3.3. STATE REGULATIONS, CODES, AND STANDARDS

- Manual of Uniform Minimum Standards for Design, Construction and Maintenance (Florida Greenbook), 2016 - for off-system roadways
- FDOT Design Manual
- FDOT Drainage Manual
- Florida Statutes (F.S.) Title XXVI Public Transportation (Chapters 335-344)
- F.S. Title XXVII Railroads and Other Regulated Utilities (Chapters 350-368)

3.4. LOCAL JURISDICTIONAL CODES, REQUIREMENTS, AND ORDINANCES

3.4.1. Stormwater Management Design Standards and Criteria

The design control elevation in Miami-Dade County is based on the average October groundwater elevation for the project corridor, which is 2.8 feet relative the National Geodetic Vertical Datum of 1929 (ft.-NGVD). The average October groundwater elevation was derived from the Miami-Dade County Public Works Standards WC 2.2. Additionally, the average yearly highest groundwater elevation in Miami-Dade County is 4.0 ft.-NGVD, per Miami-Dade County Public Works Standards WC 2.1.

Additionally, the Miami-Dade County Flood Criteria Elevation is the criteria used for the 10-year design by Miami-Dade County. The Miami-Dade County Flood Criteria Elevation for this project varies from 6.0 to 6.5 ft.-NGVD.

3.4.2. Water Quality

Miami-Dade County requires that all projects meet the State of Florida water quality standards. To assure that this criterion is met, 100 percent of the first one inch of runoff from the furthest hydrologic point must be retained on site. Additionally, Miami-Dade County Public Works does not accept vortex structures in order to meet the Miami-Dade County water quality criteria.

The SFWMD requires that all projects meet State of Florida water quality standards. In order to meet these water quality standards, the SFWMD has set the criteria in the SFWMD Permit Volume IV. The criteria set forth require project to meet the following volumetric retention/detention requirements:

- For wet detention systems:

  - A wet detention system is a system where the control elevation is less than one foot above the seasonal high ground water and does not bleed-down more than one-half inch of detention volume in 24 hours.
  - The greater of the following volumes must be detained onsite:
    - the first one inch of runoff times the total project area
    - the total runoff from 2.5 inches times the impervious area
- Dry detention systems must provide 75 percent of the required wet detention volume. Dry detention systems maintain the control elevation at least one foot above the seasonal high ground water elevation (SHGWE).
- Retention systems must provide at least 50 percent of the wet detention volume.
- For projects with impervious areas accounting for more than 50 percent of the total project area, discharge to receiving water bodies must be made through baffles, skimmers, or other mechanisms suitable of preventing oil and grease from discharging to or from the retention/detention areas.

Since exfiltration trenches are designed to retain the required stormwater quality volume, the retention reduction credit outlined above applies. Exfiltration trenches with the perforated pipe located at or above the SHGWE are considered dry retention systems, and when these systems are considered, the dry retention credit outlined above applies.

3.4.3. Sea Level Rise – Resolution R-451-14 and Ordinance 14-79

In 2014 the Miami-Dade County Board of County Commissioners adopted Resolution R-45-14 and Ordinance No. 14-79, which require that all county projects consider sea level rise projections, i.e. , "*all County infrastructure projects .../... shall consider sea level rise projections and potential impacts as best estimated at the time of the project, using the regionally consistent unified sea level rise projections, during all project phases including but not limited to planning, design, and construction, in order to ensure that infrastructure projects will function properly for fifty years or the design life of the project, whichever is greater.*"

SECTION 4. ALTERNATIVES ANALYSIS

4.1. ALTERNATIVES CONSIDERED

4.1.1. Phased Development of Alternatives – Tier One and Tier Two

Alternatives were developed in two project phases—Tier One, a transit technology screening, and Tier Two, Preliminary Engineering and Environmental Assessment.

The Tier One evaluation considered seven alternative technologies to provide rapid-transit connections between the Midtown Miami/Design District, Downtown Miami, and Miami Beach. Automated transit analysis was included with each technology assessment.

In association with input received from the public, DTPW identified the following transit technologies (modes) for consideration in the Beach Corridor Rapid Transit Project Tier One Evaluation:

- Automated guideway transit (Metromover)
- Streetcar/light rail transit (LRT)
- Heavy rail transit (Metrorail)
- Bus rapid transit (BRT)
- Aerial cable transit
- Monorail
- Personal Rapid Transit

The Tier One Evaluation included a summary of these transit technologies and modes, the development of representative alignments, public involvement and the evaluation of the potential modes with respect to transit performance, economic and community development, environmental effects, and cost/feasibility. Transit technologies considered for other SMART Plan corridors, such as MagLev and Hyperloop, were not part of the public process nor deemed applicable to the Beach Corridor. Therefore, based on the results of the evaluation, three transit modes were not recommended to advance for further analysis in the Tier Two Evaluation:

- Heavy Rail Transit – due to potential large right-of-way impacts in downtown
- Aerial Cable Transit – due to low capacity and speed
- Personal Rapid Transit – due to low capacity and speed

To support the Tier One Evaluation of transit technologies, representative alignments were developed for each mode to demonstrate how the general characteristics of the technology would be applied to the study area.

The purpose of the Tier One representative alignments was to provide enough specificity about the application of each mode to the corridor to allow for a comparative evaluation of the modes. The Tier One analysis concluded that dedicated lanes in the downtown Central Business District for an at-grade technology would not be considered further in the Tier Two analysis as it would contribute to congestion and duplicate existing transit infrastructure in downtown. The technologies to consider in Tier Two would be those that could connect to the existing transit infrastructure in downtown.

Based on the results of the Tier One analysis, DTPW determined that the following technologies had the potential to meet the project purpose and need and would be advanced for further development in Tier Two.

- Automated People Mover (APM)

- Light Rail Transit/Streetcar (LRT)
- Monorail
- Bus Rapid Transit (BRT)

Figure 4-1 shows a comparison of the transit modes. The specifications will vary by manufacturer.

	Automated People Mover (APM)	Light Rail Transit (LRT)/Streetcar	Monorail	Bus Rapid Transit (BRT)
				
Average Operating Speed	30 MPH	20 MPH (Semi-Exclusive)/ 30 MPH (Exclusive)	30 MPH	20 MPH (Semi-Exclusive)/ 30 MPH (Exclusive)
Passenger Capacity	210-300/Train	240 / Train	180-250/Train	100 / Bus
Right of Way	Exclusive	Semi-Exclusive & Exclusive	Exclusive	Semi-Exclusive & Exclusive
Typical Stop Spacing	0 .5 1.0 1.5 0.25 - 0.75 miles	0 .5 1.0 1.5 0.25 - 0.50 miles	0 .5 1.0 1.5 0.25 - 0.75 miles	0 .5 1.0 1.5 0.25 - 1.0 miles
Guideway	Elevated Guideway	Embedded Tracks at Street Level & Elevated Guideway	Elevated Guideway	Dedicated Lanes
Other Infrastructure	Elevated Stations	Stop Platforms at Street Level & Elevated Stations	Elevated Stations	Stop Platforms at Street Level & Freeway Median Stations
System Example	Miami-Dade Metromover Jacksonville Skyway	Houston METRO Nice, France Tramway	Seattle Monorail Las Vegas Monorail	Cleveland Healthline BRT Orlando LYNX LYMMO

Figure 4-1 Transit Modes Comparison

4.1.2. No-Build Alternative

The No-Build Alternative assumes that existing bus/trolley transit service continues to operate in the study area with no additional improvements to speed, reliability or capacity.

4.1.3. Automated People Mover (APM) Alternative

a. *Technological features*

APM is a fully-automated transportation system with driverless vehicles operating on fixed guideways and exclusive rights-of-way (elevated in urban areas or in tunnels at airports). APM trains operate on a two-rail guideway system with rubber tires on concrete or steel guideway. Miami's existing Metromover is an example of this system, featuring concrete columns that support a steel guideway.

Typically, APMs, regardless of the technology or manufacturer, are defined by the following characteristics:

- Driverless/fully automated
- Operate on fixed guideway (usually elevated)
- Vehicles have rubber tires on concrete or steel surface

Miami-Dade County currently has an APM system in place, which is known as the Metromover. The existing vehicles have an overall body length of 39 feet, 8 inches, and body width of 9 feet, 4 inches. The minimum turning radius of the CX100 vehicle is 75 feet, and the maximum grade is 10 percent. The maximum operating speed is 25 miles per hour (mph), but newer vehicles are expected to be able to achieve speeds of 35 mph. In Downtown Miami, curves and stop spacing limit the Metromover to average operating speeds of 10 mph, but APM would be able to travel at or near the maximum operating speed for the Bay Crossing Trunkline. Available modern APM technology can reach up to 50 mph.

b. *Proposed Alignment*

The APM Alternative alignment is shown on **Figure 4-2**. In the Bay Crossing sub area (Trunkline), the APM alternative would extend from the existing Downtown Metromover Omni Extension then along MacArthur Causeway to 5th Street near Washington Avenue. The Museum Metromover Station is an existing station. New elevated stations would be provided at the Herald Plaza, Children's Museum and at 5th Street and Washington Avenue, with a transfer station at 5th Street and Lenox Avenue. The consideration of all proposed station locations included the enhancement of bicycle and pedestrian accessibility. A new maintenance facility of three acres or less would be required to accommodate the additional vehicles for the Trunkline. The new facility could be on Watson Island or on the mainland.

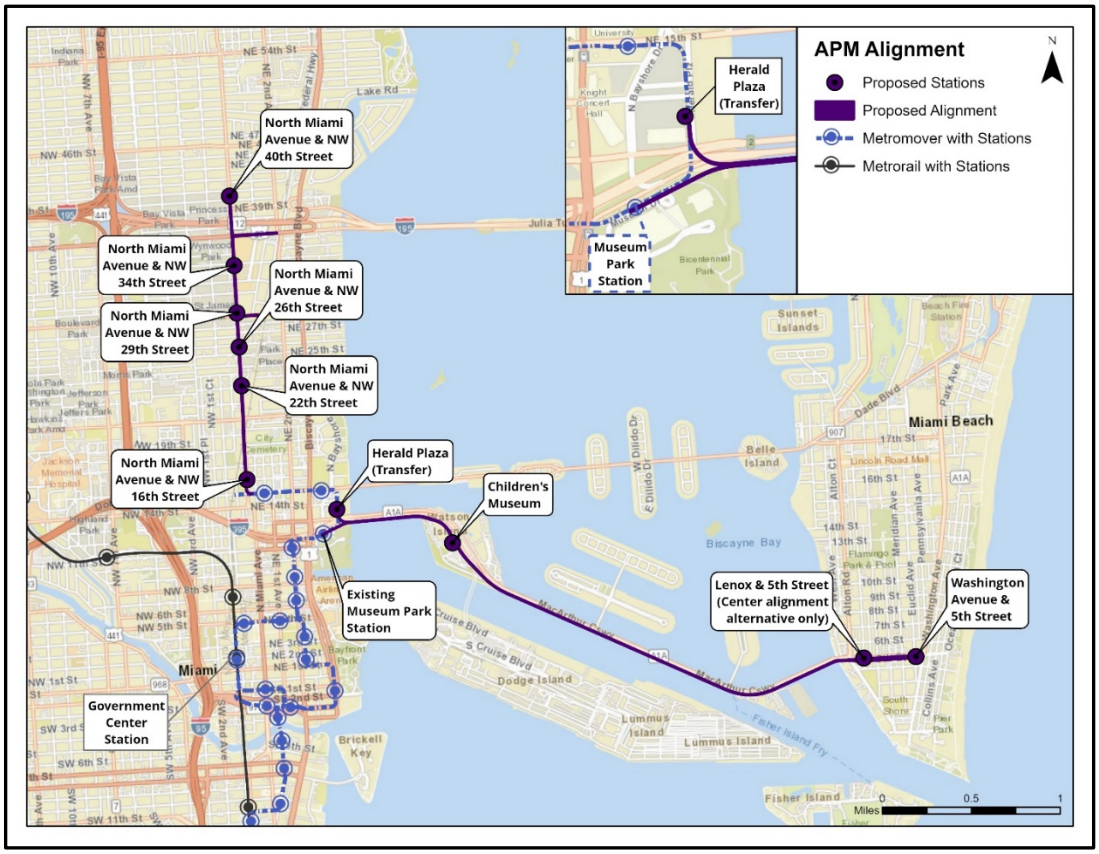


Figure 4-2 APM Alignment

The APM alternative would terminate at 5th Street & Washington Avenue, where passengers could transfer to bus/trolley service in a dedicated bus lane extending along Washington Avenue to the Miami Beach Convention Center.

A bus transit hub facility will be provided across from the new Herald Plaza station. The guideway structure would be elevated with a minimum of 16.5-foot clearance above the roadway and would be supported on oblong-shaped columns with a typical spacing of 130 feet and typical diameter of four to six feet. The elevated station platforms would have approximate dimensions of 94 feet by 20 feet, typically supported by two columns.

In the Midtown/Design District sub-area, the APM alternative would extend from the existing School Board Metromover Station on NE 15th Street to North Miami Avenue, with a two-track elevated alignment (mostly in the median) extending to a terminus at NW 41st Street and stations located at North Miami Avenue, NW 16th, 22nd, 26th, 29th, 34th and 40th Streets. The guideway structure would be elevated with a minimum 16.5-foot clearance above the roadway and would be supported on oblong-shaped columns with a typical spacing of 90 feet to 120 feet and typical diameter of four to six feet. The elevated station platforms would have approximate dimensions of 94 feet by 20 feet, typically supported by two columns. A new maintenance facility of three acres or less would be required in order to accommodate the additional vehicles for the Trunkline and

design district extension. Renderings of the APM Alternative and station concept are depicted on **Figures 4-3** and **4-4**, respectively. Typical sections are depicted on **Figures 4-5** and **4-6**.

Figure 4-3 APM Rendering

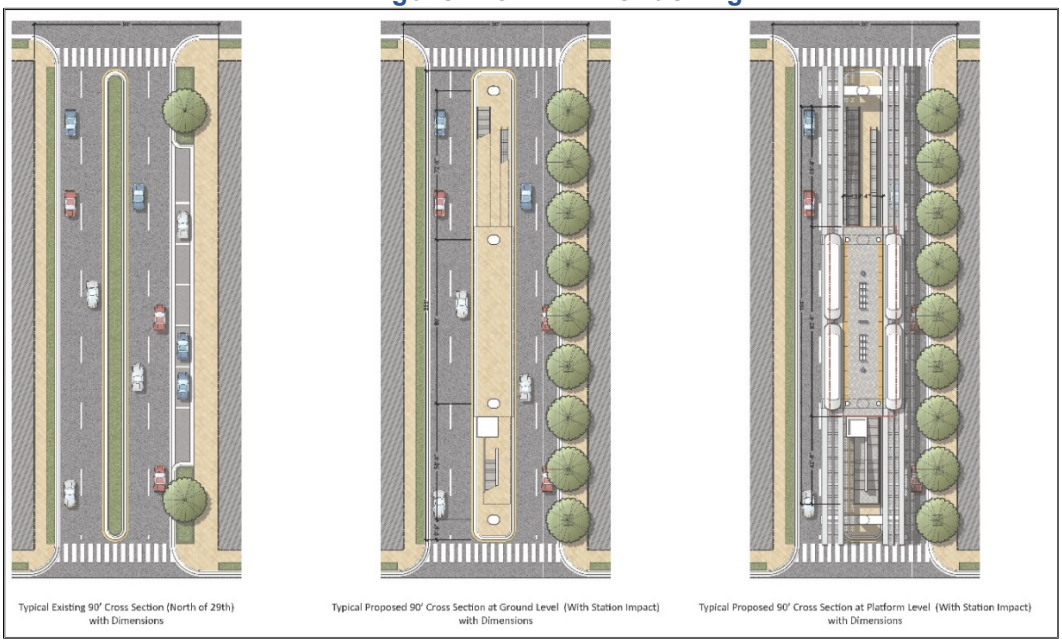


Figure 4-4 APM Station Conceptual Design

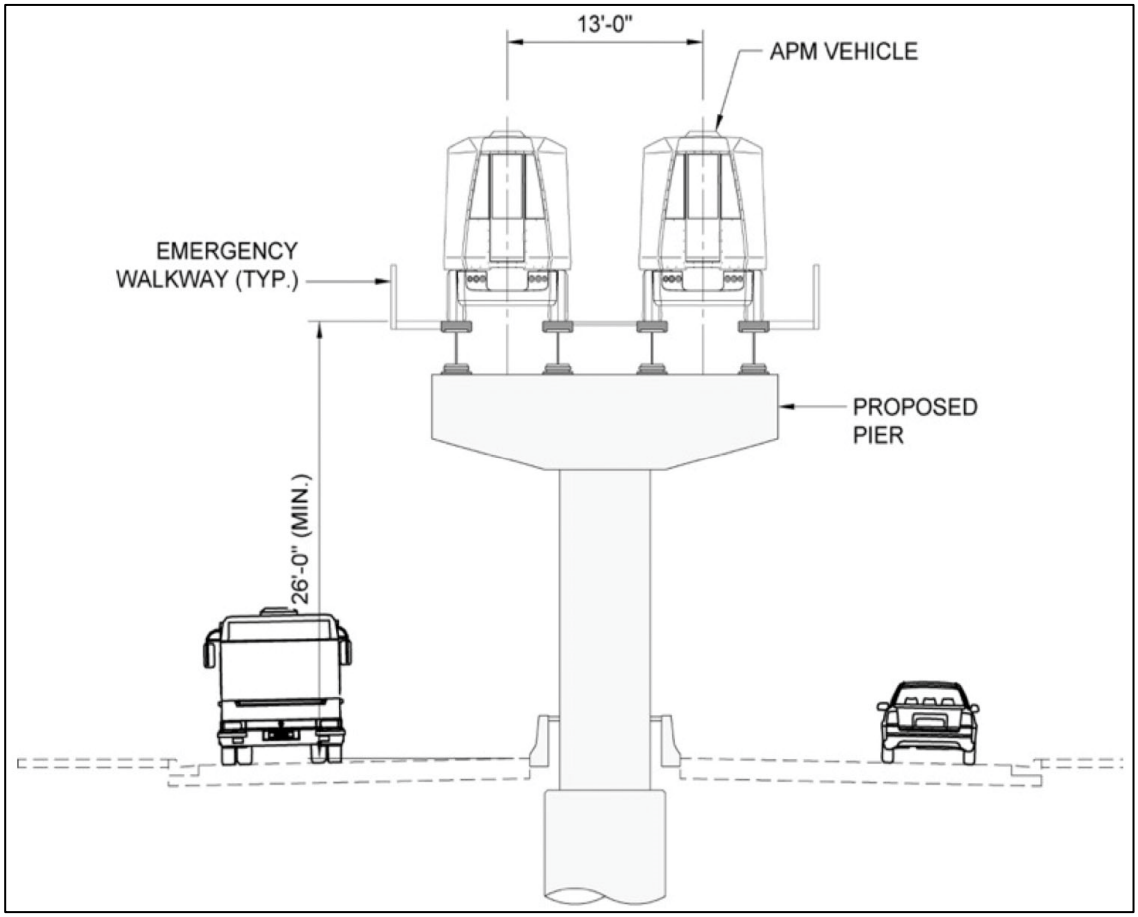


Figure 4-5 APM Typical Sections North Miami Avenue and 5th Street

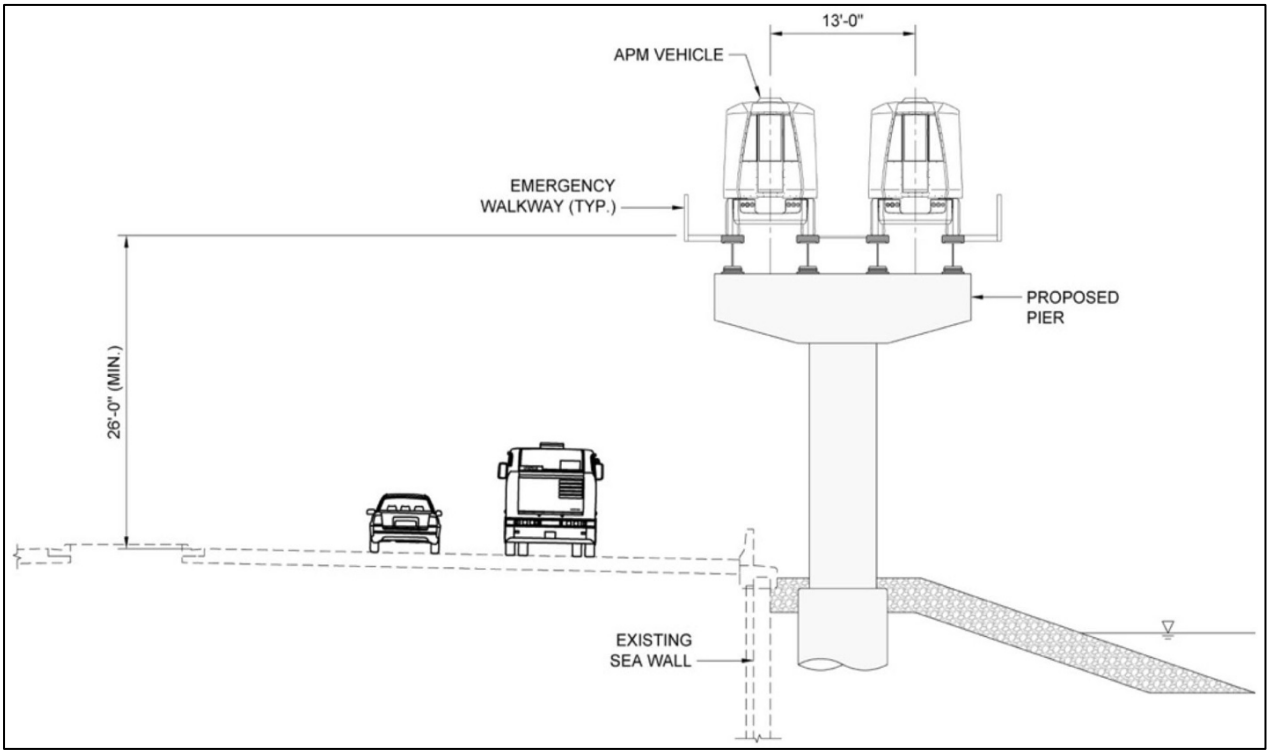


Figure 4-6 APM Bay Crossing Trunkline Typical Section

4.1.4. Light Rail Transit (LRT)/Streetcar

a. *Technological Features*

Light rail vehicle (LRV) technology features railcars that operate on steel wheels/rails with electric propulsion, level boarding, air-conditioning, passenger information systems, and double-leaf doors. LRV railcars are often characterized in terms of sections, units, and trainsets. Railcars that have articulated joints to allow them to navigate through tight-radius curves are comprised of several "sections" that are permanently joined together by the articulation. Modern railcars are articulated and may be comprised of 3 to 7 sections. Railcars that can be joined together with mechanical and electrical couplings at either end of the railcar are individual "units" of a trainset. A trainset is a set of railcars that is coupled together into multiple units so that the lead car can provide the control of propulsion, breaking, door operations, etc. of all of the units in the trainset. A railcar that operates without coupling to other units is considered a "single-unit train.

LRVs range from 8 to 10 feet in width and from 66-foot, three-section, single-unit trains (modern streetcar) to 400-foot, four-car trainsets (light rail transit or LRT) in length. Trams, as implemented in Europe, are typically five- to seven-section, single-unit trains ranging from 98 to 155 feet in length. LRVs also vary in their minimum turning radius and maximum grade capabilities and can be powered via an overhead contact, battery power, or embedded third-rail power system (the latter limited to trams comprised of at least five sections because of requirements for the length of the train).

Streetcars and trams are now offered with a variety of off-wire technologies, allowing them to operate off-wire in some segments with power supplied via on-board rechargeable batteries or in-ground power systems. The off-wire capability can be applied to avoid overhead obstacles such as low-clearance bridges, or in areas where overhead wires are not locally acceptable for visual/aesthetic reasons. These vehicles offer "hybrid" operation, so they can operate with power from an overhead wire in segments where off-wire is not required. The battery-drive systems have significant range (for example, streetcars in Seattle travel off-wire for three (3) miles on each round trip). The in-ground systems have unlimited range but require a somewhat longer, tram-style vehicle to provide adequate spacing of the in-ground electrical relays. This allows the power system to be safely turned on while the train passes over the power source and off when the train is not present. For the Beach Corridor Rapid Transit Project, a 40-meter vehicle that can be operated with an in-ground, off-wire power system on Washington Avenue and N Miami Avenue was assumed, consistent with previous Miami Beach streetcar proposals that assumed an off-wire system on Washington Avenue.

b. *Proposed Alignment*

The LRT/Streetcar alignment would offer a one-seat ride from the Design District to the convention center area and is shown on **Figure 4-7**. The LRT/Streetcar Alternative would be comprised of a combination of at-grade and elevated segments. The alternative would extend from an at-grade station adjacent to the Museum Park Metromover station, continue east on a new elevated guideway structure on the south side of the MacArthur Causeway, with stations at the Children's Museum and at 5th Street and Lenox Avenue, then transition to grade at the 5th Street and Washington Avenue intersection and continue at grade on Washington Avenue to the convention center area. The consideration of all proposed station locations included the enhancement of bicycle and pedestrian accessibility.

Westbound from the MacArthur Causeway, the alternative continues to the Midtown/Design District sub-area, operating at grade along 11th Street until reaching NE 2nd Avenue, where the tracks split. The westbound-to-northbound track turns at NE 2nd Avenue. The at-grade guideway would be comprised of steel-rail standard gauge track embedded in a concrete track slab at the roadway surface grade. Where the LRT alignment is elevated, the guideway structure would be at a minimum clearance of 16.5 feet above the roadway and would be supported on oblong-shaped columns with a typical spacing of 130 feet and typical diameter of four to six feet. The elevated stations would have approximate dimensions of 150 feet by 40 feet, typically supported by two columns.

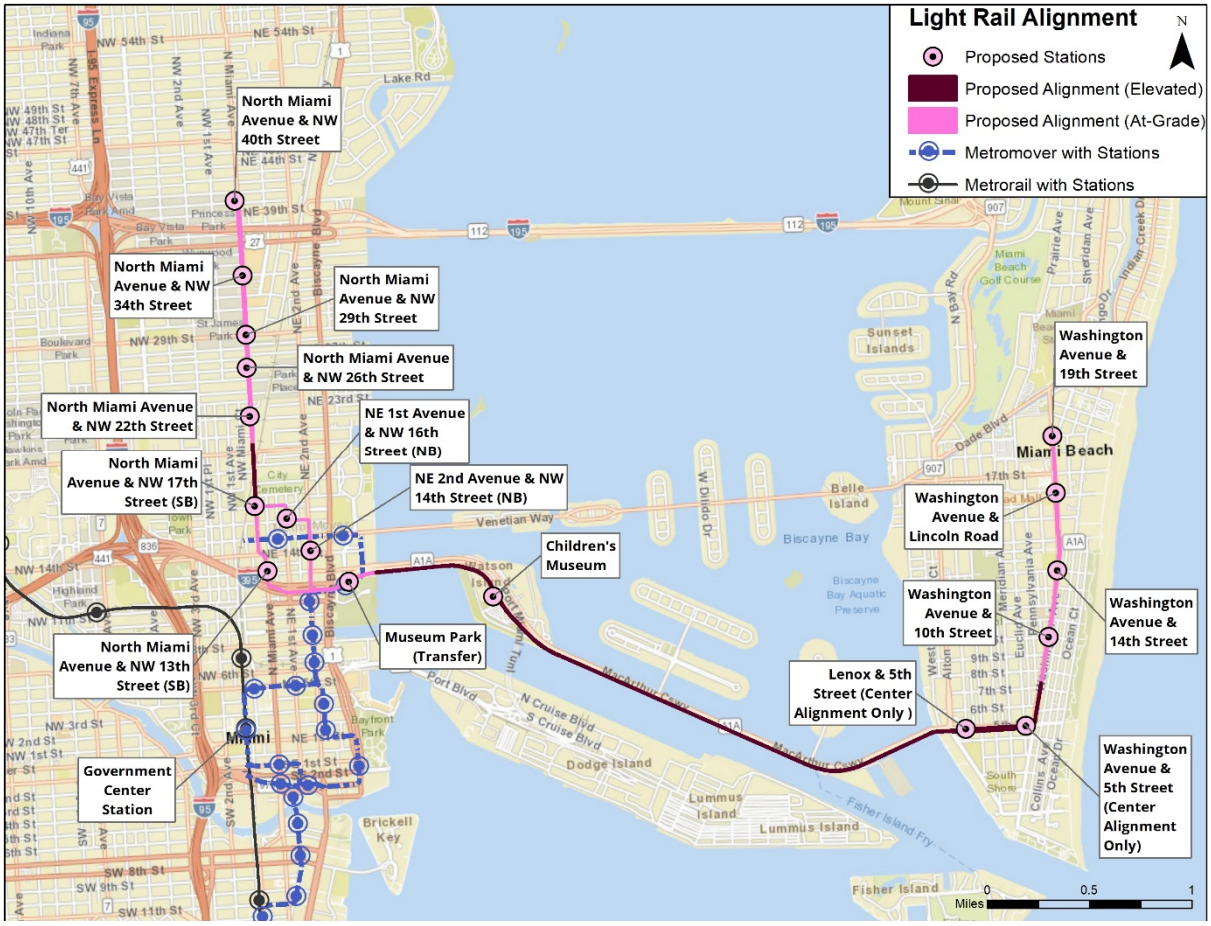


Figure 4-7 LRT/Streetcar Alignment

In the Midtown/Design District sub-area, the LRT/Streetcar Alternative would replace the current outside travel lanes on North Miami Avenue north of NW 20th Street. Between NW 20th Street and NW 17th Street, the guideway will be elevated to cross over the existing FEC Railway rail corridor. The southbound tracks would then continue at-grade south along North Miami Avenue to NE 11th Terrace. The northbound tracks will turn east on 17th Street, and move back to at-grade level, turn south on NE 1st Avenue, turn east on NW 16th Street, and south on 2nd Avenue and meet the southbound tracks at 2nd Avenue and NE 11th Terrace. The LRT guideway will replace existing travel lanes on these local roads. A new maintenance facility of approximately 5.4 acres would be required to accommodate the entire alignment. Renderings of the LRT/Streetcar Alternative and station concept are depicted on **Figures 4-8** and **4-9**, respectively. Typical sections are depicted on **Figures 4-10** and **4-11**.

Figure 4-8 LRT/Streetcar Rendering Elevated

In the Miami Beach subarea, the LRT/Streetcar Alternative would be comprised of steel-rail standard gauge track embedded in a concrete track slab at the roadway surface grade. This LRT/Streetcar guideway would be located along the centerline of Washington Avenue and terminate at the Miami Beach Convention Center, with stations at 6th, 10th and 14th Streets, Lincoln Road, and 19th Street.

Figure 4-9 LRT/Streetcar Station Concept Design Rendering-Street Running

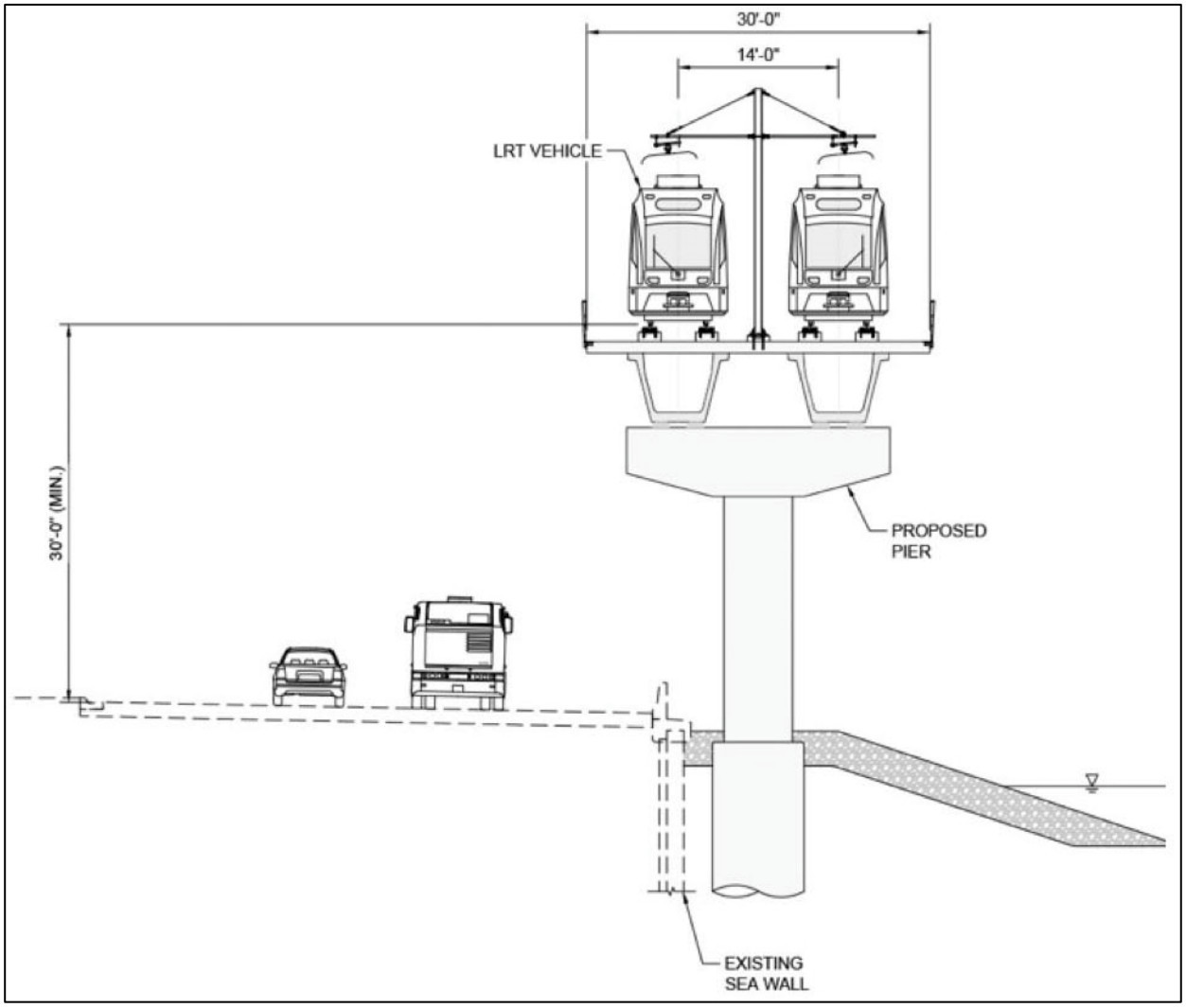


Figure 4-10 LRT Typical Section Elevated

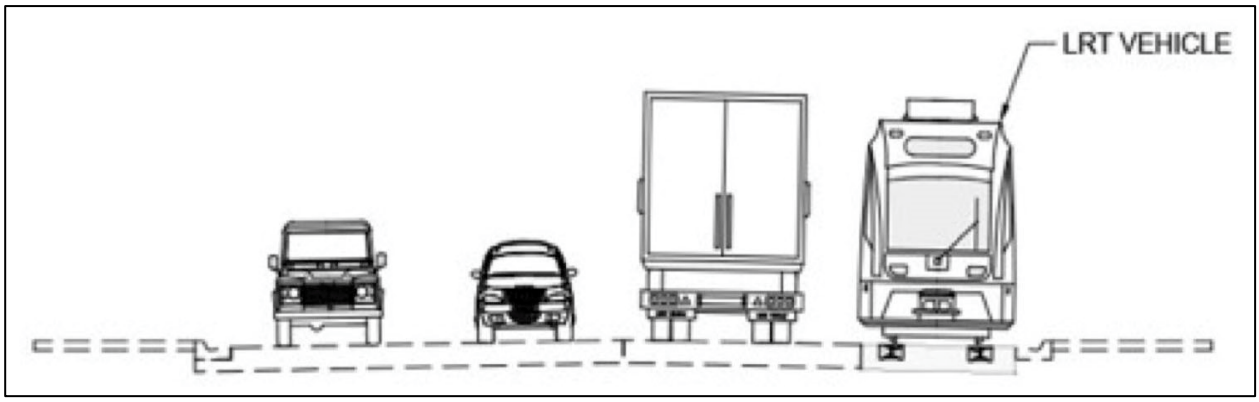


Figure 4-11 LRT Typical Section - North Miami Ave At Grade

4.1.5. Monorail

a. *Technological Features*

Monorail technology features rail cars that operate on concrete beam guideways, with rubber drive wheels that run on the top of the beam and guide wheels running along the two sides. Traction power is supplied by a trolley wire mounted on the sides of the guideway beam, and electricity is picked up by shoes on the vehicle. Monorail vehicles are 10 feet wide and roughly 35 feet to 45 feet long (can vary by manufacturer) and may be operated in two- to eight-car trainsets. Monorails have a minimum turning radius of 130 feet to 150 feet and can handle grades as steep as 10 percent. Similar to APM, modern Monorails systems are driverless and fully automated. Although some older Monorail systems are comprised solely of columns, monorail beams, and power rails, modern Monorail systems require additional structure to support a continuous emergency walkway along the alignment. Available Monorail technology can reach up to 50 mph and have superior aesthetics in terms of lighter vehicles and sleeker columns.

b. *Proposed Alignment*

The Monorail alignment is shown on **Figure 4-12**. In the Bay Crossing sub-area, the Monorail Alternative would extend from a new station at Herald Plaza offering a direct seamless transfer to a Metromover platform within the same station house and continue east on a new elevated guideway structure along the south side of the MacArthur Causeway. The station at Herald Plaza has connectivity with the Omni Bus Terminal to facilitate transfers to and from existing and future bus routes. New stations would be provided at Herald Plaza, at the Children's Museum and at 5th Street and Washington Avenue, with a potential additional station at 5th Street and Lenox Avenue. The consideration of all proposed station locations included the enhancement of bicycle and pedestrian accessibility.

The Monorail Alternative would terminate at 5th Street & Washington Avenue, where passengers could transfer to bus/trolley service extending along Washington Avenue to the Miami Beach Convention Center. A bus/trolley transfer facility would be provided at the termini location. The guideway structure would be elevated with a minimum clearance of 16.5 feet above the roadway and would be supported on oblong-shaped columns with a typical spacing of 130 feet and typical diameter of four to six feet. The elevated station platforms would have approximate dimensions of 94 feet by 20 feet, typically supported by two columns. A new maintenance facility, of 3 acres or less, would be required at a potential Watson Island location. Renderings of the Monorail and station concept are depicted on **Figures 4-13** and **4-14**, respectively and typical sections are shown on **Figures 4-15 and 4-16**.

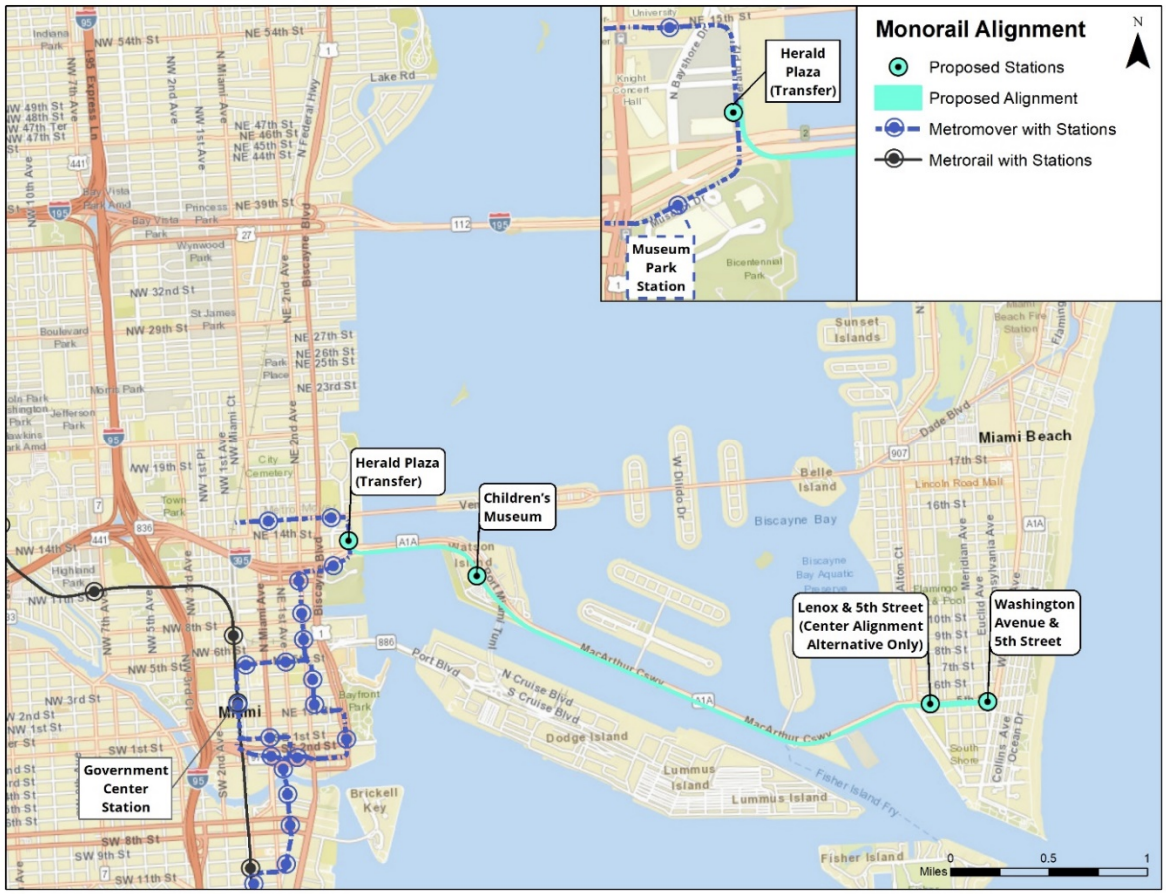


Figure 4-12 Monorail Alignment

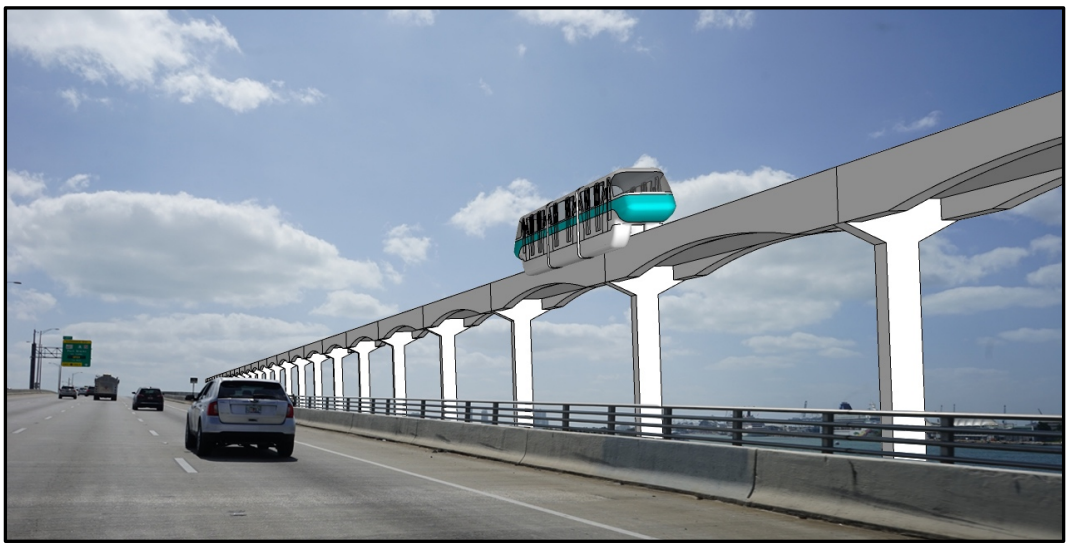


Figure 4-13 Monorail Rendering

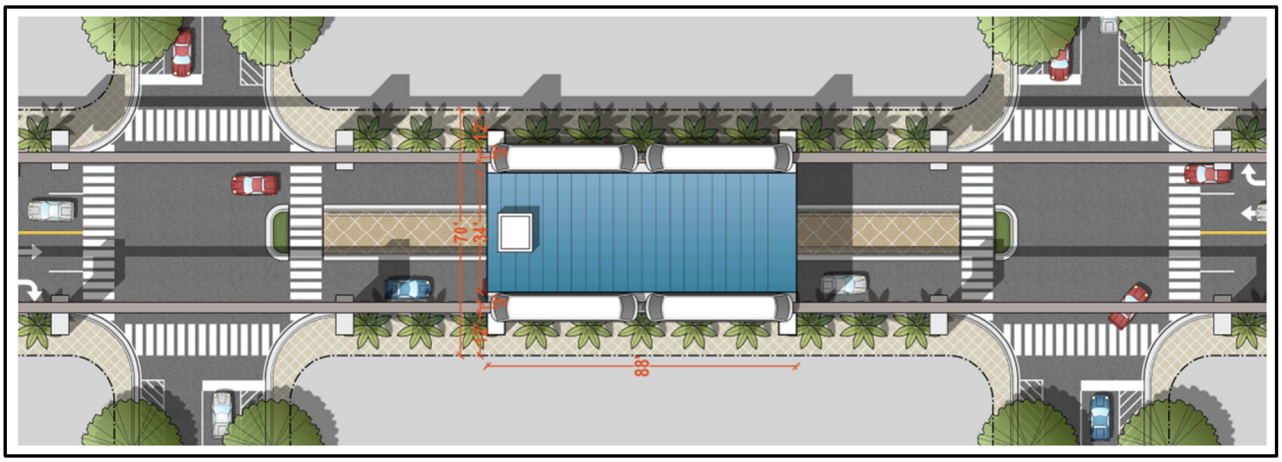


Figure 4-14 Monorail Station Conceptual Design – Typical Station Plan

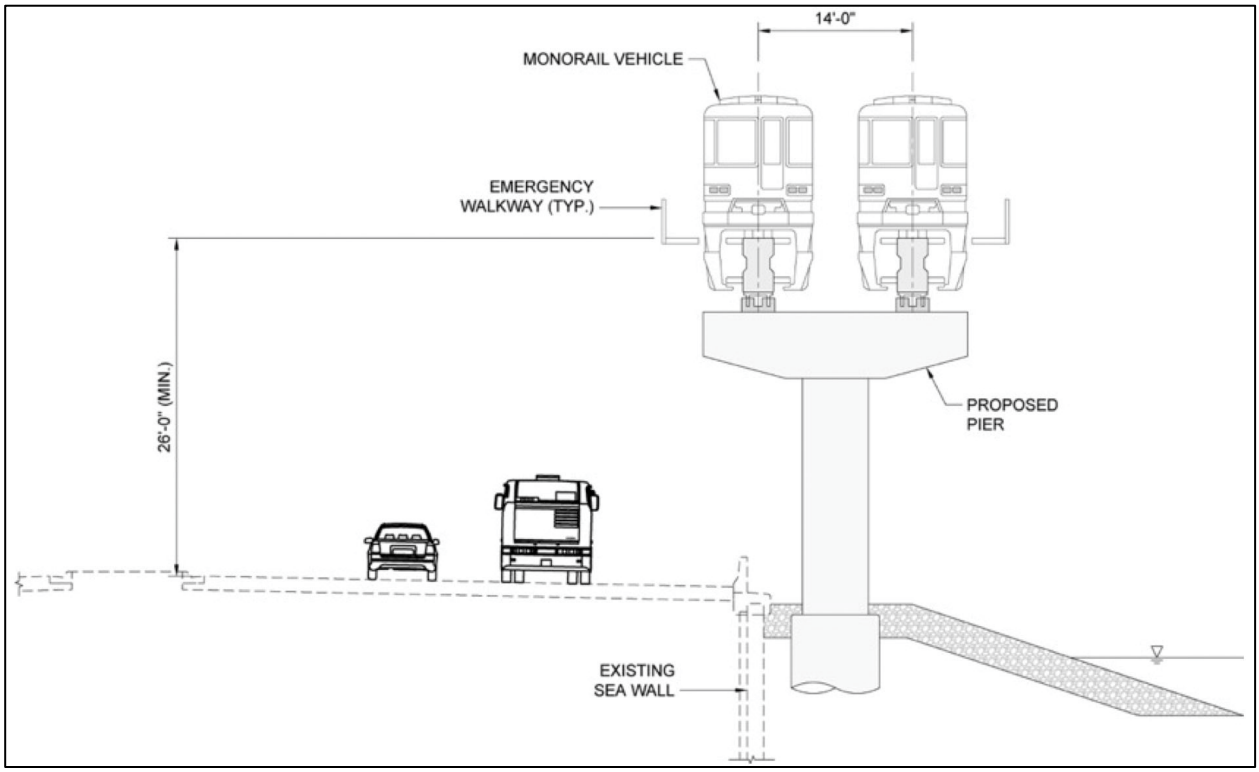


Figure 4-15 Monorail Typical Section – Bay Crossing Trunkline

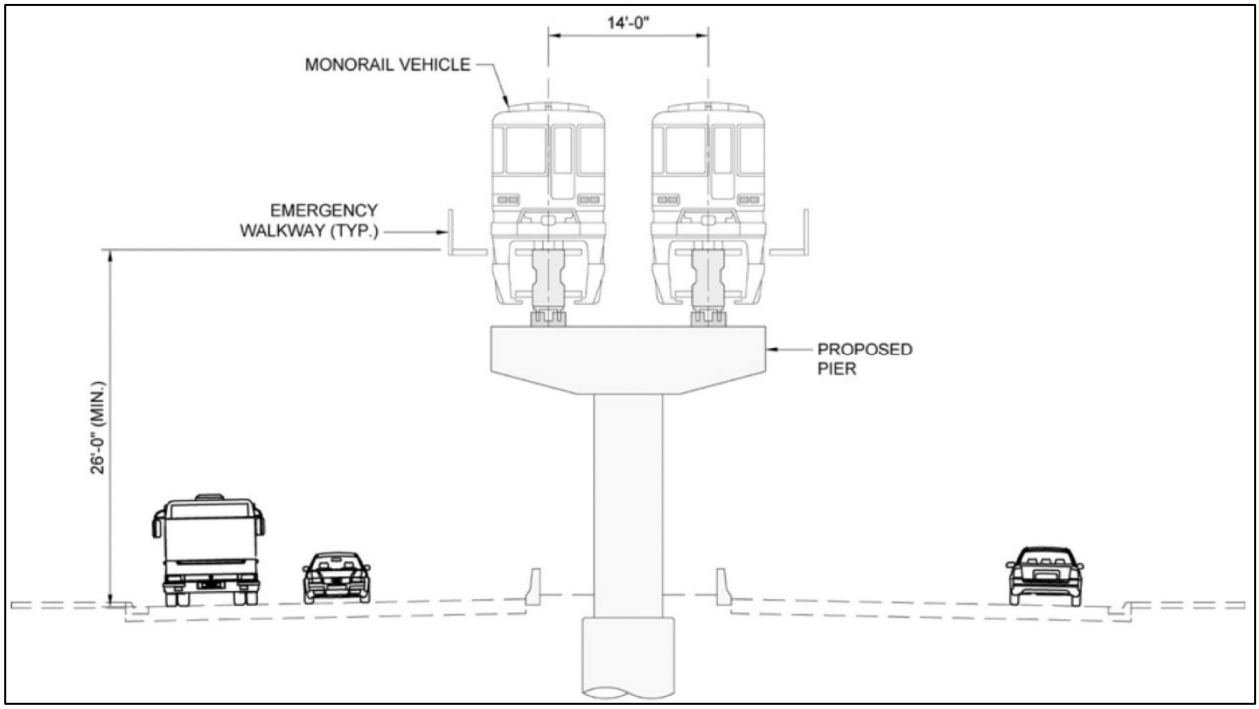


Figure 4-16 Monorail Typical Section - 5th Street

4.1.6. Bus Rapid Transit (BRT) (I-395 & I-195 Sub-Alternatives)

a. *Technological Features*

Bus rapid transit (BRT) typically features 60-foot articulated buses, raised platforms at stations for near-level boarding, station amenities such as off-board fare payment and real-time arrival information, and some level of priority for operations, such as bus-only lanes and transit signal priority. Some BRT projects feature a "busway," with exclusive, grade-separated operations. Some BRT vehicles feature left-sided doors to accommodate center-running alignments and center-platform stations. BRT vehicles may be traditional diesel-powered buses or may be powered with compressed natural gas, or battery-electric propulsion systems. The bus batteries can be charged during short station stops (station charging) or during longer layovers at terminus stations/maintenance facilities (depot charging).

b. *Proposed Alignments*

Bus Rapid Transit (BRT)/I-395 Alignment

The BRT alignments are shown on **Figure 4-17**. The I-395 BRT Alternative would begin at Overtown Transit Village Station, continuing east along NE/NW 8th Street to Biscayne Boulevard and turning north on Biscayne Boulevard and continuing on to I-395 and MacArthur Causeway, as shown in **Figure 4-17**. The BRT will operate in mixed flow in existing travel lanes from Overtown to Biscayne Boulevard. The consideration of all proposed station locations included the enhancement of bicycle and pedestrian accessibility.

Figure 4-17 BRT I-395 Alignment and BRT I-195 Alignment

The alternative would run east/west across Biscayne Bay on dedicated bus lanes across the bridges and MacArthur Causeway to Miami Beach. The proposed typical section will require the widening of the bridges and the Causeway. The characteristics of fixed guideway—including relatively closely spaced "track centers" and the dynamic loading characteristics—allow for the guideway deck to be supported on a series of single columns, resulting in a relatively small footprint at the waterway/ seawall level, whereas BRT would be subject to highway design requirements, resulting in a much wider deck that would require more columns. These issues would be exacerbated at each end of the trunkline where ramp structures would be necessary to connect the BRT guideway to the surface roadway system.

On the east side of the MacArthur Causeway the alternative continues east along 5th Street and north along Washington Avenue, utilizing dedicated bus lanes to the Miami Beach Convention Center (re-purposing an existing travel lane in each direction).

Bus Rapid Transit (BRT)/I-195 Alignment

The BRT/I-195 Alignment is an alternative corridor that would utilize the I-195 Julia Tuttle Causeway as the connection between the City of Miami and Miami Beach.

Beginning at the Overtown Transit Village Station, the BRT would run west along NE/NW 8th Street to the I-95 on-ramp. The BRT would operate in mixed traffic (including travel in the express lanes) on I-95 north to I-195, continuing onto the Julia Tuttle Causeway. The consideration of all proposed station locations included the enhancement of bicycle and pedestrian accessibility.

Along the Julia Tuttle Causeway, BRT would operate in dedicated bus lanes; the proposed typical section will require the widening of the bridges and the Causeway.

From the east side of the Julia Tuttle Causeway, this alternative continues on 41st Street in dedicated lanes, east to Indian Creek Drive, and south on Indian Creek Drive to 17th Street and loop around Miami Beach Convention Center, with the northbound return route in dedicated lanes on Collins Avenue. A rendering of the BRT station plan is depicted on **Figure 4-18** and the typical section is depicted on **Figure 4-19.**

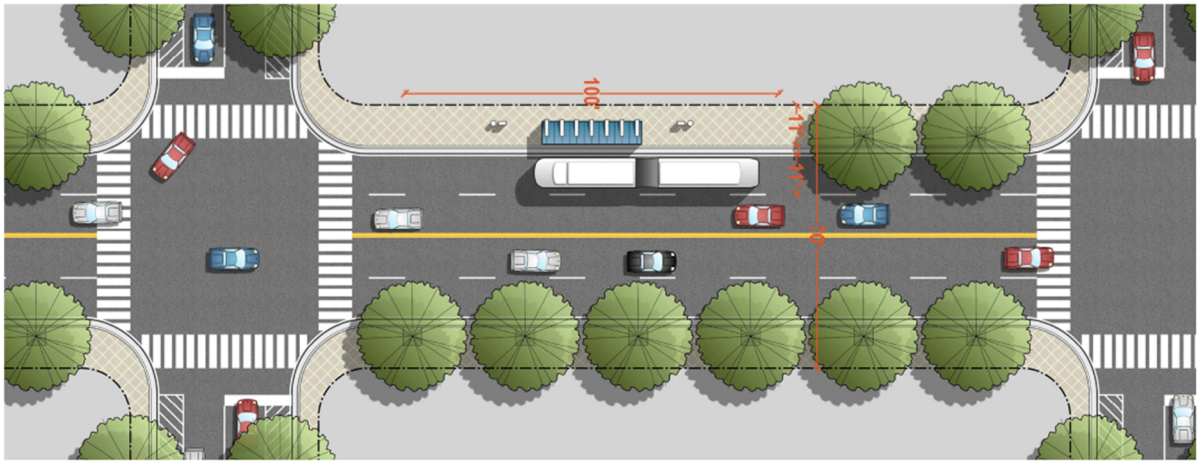


Figure 4-18 BRT Rendering - Typical Station Plan

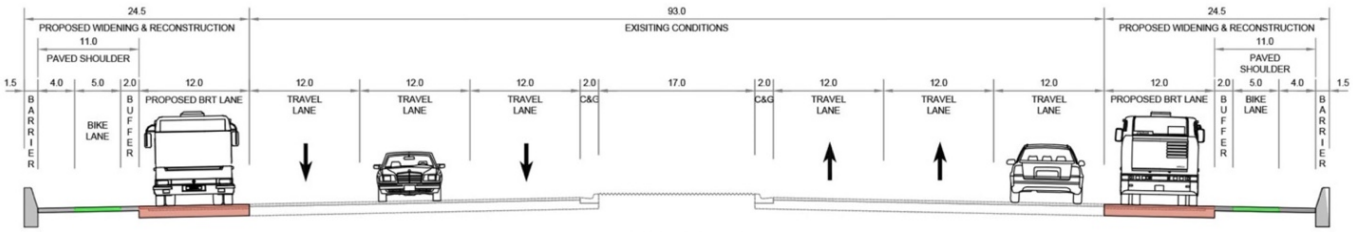


Figure 4-19 BRT Typical Section

Each of the rail transit modes was assumed to require siting and construction of a new facility to support system operations and vehicle maintenance/storage. For the BRT modes, it was assumed

that additional buses acquired to support the BRT operation would be dispatched from and maintained at an existing DTPW bus facility.

Bus Express Rapid Transit (BERT)

Independent of the Beach Corridor Rapid Transit Project, DTPW is developing the BERT project. BERT would serve the north end of Miami Beach. An express bus lane would be provided by reconstructing the inside shoulder along I-195; this express service would terminate at the Miami Beach Convention Center.

4.1.7. Maintenance and Operations Facilities

MOF site identification and evaluation is summarized in the *Maintenance and Operations Facility Sites Identification & Preferred Sites Evaluation Report.* Facility program requirements were developed based on the operations plan and fleet requirements for each of the modes. Potential sites within the study area that would satisfy the site area requirements of the facility program were identified and evaluated with respect to:

- Hazardous Materials/Site Contamination
- Historic & Archaeological Site Impacts
- Proximity to Alignment
- Site Configuration/Operational Compatibility
- Acquisition Cost & Complexity
- Compatibility with Urban Context, Land Use & Zoning.
- Potential for Noise Impact
- Title VI Considerations

MOF program requirements were developed to identify the minimum site area required to meet the operating plan and fleet requirements for each rail alternative as shown on **Table 4-1**.

Table 4-1 MOF Program Requirements

	APM (2-Section Trains in 2-Car Trainsets)	LRT (3-section Trains in 2-Car Trainsets)	LRT (5-Section Trains in Single Trainset)	Monorail (4-Section Trains in Single Trainset)
Support Spaces (Office/Training/Locker Rooms/Storage)	10,000 sf	15,000 sf	15,000 sf	10,000 sf
Fleet Size (Updated to Tier two Analysis)	20	30	15	8
Vehicle Length& Access Buffers	90	102	141	174
Maintenance Positions	3	3	3	3
Maintenance Position Width & Access Buffers	30	30	30	30

Table 4-1 MOF Program Requirements				
	APM (2-Section Trains in 2-Car Trainsets)	LRT (3-section Trains in 2-Car Trainsets)	LRT (5-Section Trains in Single Trainset)	Monorail (4-Section Trains in Single Trainset)
Subtotal, Maintenance Positions	**8,100 sf**	**9,180 sf**	**12,690 sf**	**15,660 sf**
Storage Track Width & Access Buffers:	26	26	26	26
Subtotal, Storage Tracks	**39,780 sf**	**71,604 sf**	**43,992 sf**	**22,620 sf**
Parking Space & Per Space Access Allowance	200	200	200	200
Non-Revenue Vehicles	6	6	6	6
Employee Parking Spaces	25	50	50	25
Subtotal, Parking	**6,200 sf**	**11,200 sf**	**11,200 sf**	**6,200 sf**
Subtotal	**64,080 sf**	**106,984 sf**	**82,882 sf**	**54,480 sf**
100% Allowance for Access/Site Config.	64,080 sf	106,984 sf	82,882 sf	54,480 sf
Total (sf)	**128,160 sf**	**213,968 sf**	**165,764 sf**	**108,960 sf**
Total (Acres)	**3.0 acres**	**5.0 acres**	**4.0 acres**	**3.0 acres**

- This analysis indicated that the MOF requirements of the APM or Monorail alternatives could be accommodated on a site of three (3) acres or less. Two approaches to the fleet for the Light Rail/Streetcar alternative were evaluated, with the more conservative fleet assumption requiring a site of approximately five (5) acres.
- The capital cost estimates for the alternatives also take into consideration the actual parcel sizes available within close proximity to the alignment alternatives, which may lead to a requirement to acquire parcels larger than the minimum required site area. Sites that meet the APM or Monorail criteria are available and in public ownership within the Bay Crossing sub-area (on Watson Island), whereas the larger site requirements for the LRT/Streetcar alternative are less readily available, and the smallest potentially available site that meets the minimum criteria is nearly eight acres.
- The capital costs of the alternatives include right-of-way acquisition costs for the MOF sites, and costs to construct and equip the MOF, including administrative, heavy maintenance and yard/yard track elements (support facilities). The facility cost estimates for the APM ($44.5 M) and Monorail ($52.4 M) alternatives were based on the size of the existing Metromover VMF and current unit costs for industrial facilities. The facilities cost estimate for the LRT alternative ($121.6 M) was based on the upper end of the range of LRT VMF costs reported in the FTA historical cost database.

Separate noise and vibration screening and Title VI Analyses were completed for the alternative MOF locations. Four potential locations were evaluated. Two of the four potential MOF locations are in the historic Overtown neighborhood in the City of Miami. The other two proposed locations

are on Watson Island on the south side of the MacArthur Causeway between Miami and Miami Beach.

The noise and vibration screening assessment concluded that the potential MOF locations are not expected to generate any operational "severe impact" noise levels since the MOF operations will be located in areas with high existing noise levels and are farther than 190 feet from noise sensitive land uses. In addition, noise levels estimated at three of the four MOFs are well below the threshold for "Moderate Impact". The MOFs are also not anticipated to generate any vibration impacts, since rubber-tire traffic typically does not produce perceptible vibration and because there are no high-sensitivity land uses adjacent to the proposed MOFs. Therefore, The MOFs are not expected to generate noise and vibration levels that would trigger the need for consideration of mitigation measures.

The Title VI analysis for the potential MOF locations was conducted using Federal Transit Administration (FTA) Circular 4702.1B, as a guidance document, and the U.S. Census (2010) data at the block level. Low-income, minority, and LEP populations were identified in the block level touched by the four potential MOF sites. These populations were compared to the Miami-Dade County average for each metric to assess if the amenity provided by the Beach Corridor maintenance facilities disproportionately affect Title VI target populations.

As a majority-minority county, Miami-Dade has higher than typical minority population representation and reflects the diverse population. **Table 4-2** shows the County averages, the Beach Corridor service area results, and the ratio between them for the three Title VI measures.

Table 4-2 Population Characteristics Per Title VI Measures

Geography Level	Low-Income Population (at/or under 150% Poverty Level)	Minority Population	Households with Limited English Proficiency (LEP)
County Average	20.4%	24.25% (non-white) 65.62% (Hispanic)	10.7%
Beach Corridor Locally Preferred Alternative Alignments	25.8%	26.31% (non-white) 55.7% (Hispanic)	11.8%

Source: Miami-Dade County TPO Transportation Planner Tool Census Reports

4.2. APPROACH TO ALTERNATIVES DEVELOPMENT

4.2.1. Trunkline and Extensions

The Tier One evaluation demonstrated that the modes recommended for additional study differ in their suitability to sub-areas of the study area. Therefore, the comparative alternatives evaluation would benefit from the identification of distinct project sub-areas to allow for evaluation of the alternatives by project sub-area as well as by complete project sets that may be comprised of one or more sub-areas. As previously described, the Tier One report identified four distinct sub-areas based on the representative alignments which traversed the Design District, Downtown Miami (later eliminated), Bay Crossing and Miami Beach. The sub-areas were subsequently simplified as the "Trunkline" and "extensions" during alternatives development. The extensions have their origins in projects that were initially studied as independent projects by the City of Miami and the City of Miami Beach. This PD&E study incorporates the extensions to allow for a full-corridor evaluation of needs and opportunities in the study area. In addition, the BRT Alternatives were developed to serve the origins and destinations of all the subareas using the trunkline and serving the north-south travel on either side of the causeway via existing expressways.

a. *Bay Crossing Trunkline*

All project alternatives include a Bay Crossing (Trunkline) which offers independent utility, as defined in the National Environmental Policy Act (NEPA) and described further below.

The Bay Crossing (Trunkline) limits are from the vicinity of the existing Omni Bus Terminal, Herald Plaza site (with a new station at Herald Plaza), in the City of Miami to a transit hub/stop at Washington Avenue and 5th Street in the City of Miami Beach. The logical termini for the project connect to major activity centers/destinations and existing transit. On the west end it connects to Miami's central business district and on the east end it connects to Miami Beach's entertainment and employment district. The City of Miami Beach has designated exclusive transit lanes along 5th Street and Washington Avenue in their Transportation Master Plan. The City of Miami Beach also operates an extensive trolley system that would distribute/circulate trips from the Bay Crossing project termini to other parts of the City. The Bay Crossing project is approximately four miles long and of sufficient length to address environmental impacts with viable mitigation options.

Assuming no additional transportation improvements in the area are made, this project has independent utility as it connects two major activity centers across a body of water which constrains cross-city travel. As indicated in the travel market analysis, the cities of Miami and Miami Beach have the largest share of population and employment within Miami-Dade County. The project is independently significant as it can provide seamless accessibility between these two vibrant cities. Moreover, a premium transit enhancement across the bay would be less impactful to the environment than any traditional roadway enhancement.

The project would not restrict consideration of transit expansion plans in either City. Extensions to Midtown in Miami and Mid Beach in Miami Beach could continue with context sensitive technology that may or may not be similar to that at the Bay Crossing.

Further confirmation of the Trunkline's independent utility is documented in the *Logical Termini Independent Utility Memorandum* prepared for this project and concurred with by FTA.

b. *Design District/Midtown Miami Extension*

The APM and LRT modes can also be extended through Midtown Miami to the Design District (in the vicinity of NW 41st Street and Miami Avenue). Project alternatives that consider the APM and LRT modes, comprised of both the Bay Crossing Trunkline and Design District/Midtown Miami extension, were evaluated. An APM alternative that extends the existing Metromover system to the Design District/Midtown Miami, without an APM extension to serve the Bay Crossing, was also evaluated to allow for its consideration as a complement to a Bay Crossing Trunkline alternative using the LRT or Monorail mode. BRT and Monorail technologies were not considered in a Midtown only extension evaluation as the BRT was serving this market via an alternative north-south route, and an elevated rubber tire extension of an existing APM was more feasible from an operations perspective.

c. *Miami Beach Extension*

The BRT and LRT modes can also be extended from 5th Street and Washington Avenue to the vicinity of the Miami Beach Convention Center at 19th Street and Washington Avenue. This sub-area is served by both of the BRT alternatives (I-395 and I-195 bay crossings) and in two LRT alternatives, one that includes the Bay Crossing and Miami Beach sub-areas and another that includes all three sub-areas. Elevated technologies were minimized in the Beach area due to its incompatibility with existing National Register of Historic Places District areas north of 5th Street.

4.2.2. Corridor Alternatives

In addition to being sensitive to the context and needs of each subarea, full end to end corridor alternatives were developed for evaluation. These alternatives would maximize opportunities to meet the project's purpose and need by providing a rapid transit connection between two heavily travelled areas resulting from population, employment, and tourism growth. Connections to existing transit systems were prioritized and future bicycle and pedestrian accessibility was considered in all proposed station locations.

Alternatives that serve all three of the sub-areas along the project corridor were developed with transfers between modes to allow for evaluation of alternatives that could serve the travel demand of the entire corridor, recognizing that many desired trips have origins and destinations that span two or all three of the sub areas. In addition, all of the alternatives meet the goal of promoting pedestrian and bicycle friendly solutions.

The Corridor Alternatives were defined as follows:

a. *APM Corridor Alternative*

Extension of Omni Loop Metromover to Midtown and Bay Crossing (Trunkline); Bus/Trolley connections via Washington Avenue to Miami Beach Convention Center. The full project service plan for the APM Corridor Alternative is shown on **Figure 4-20**.

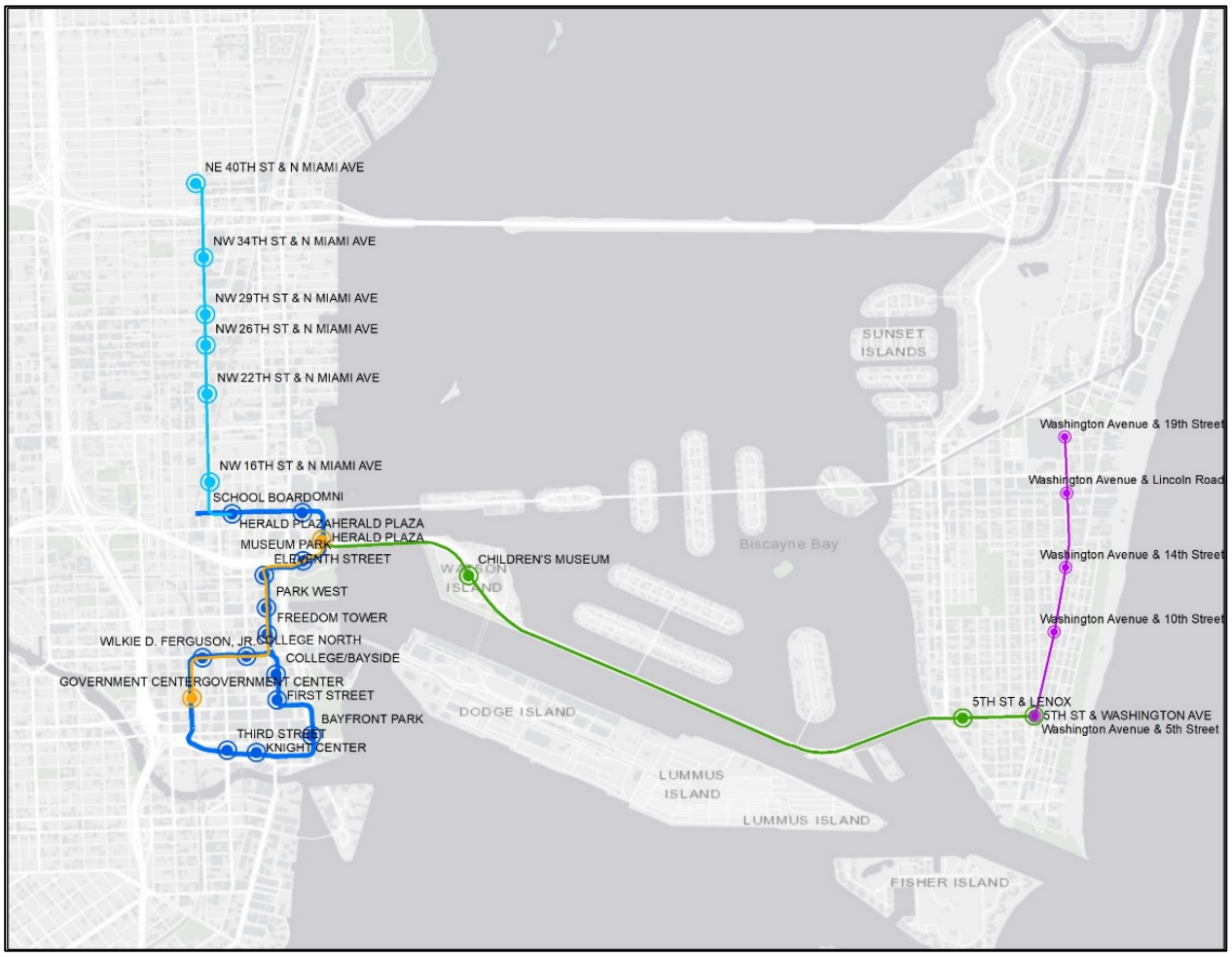


Figure 4-20 APM Full Project Service Plan

b. *LRT/Streetcar Corridor Alternative*

Continuous LRT system from Midtown/Design District to Bay Crossing Trunkline to Miami Beach Convention Center. The full project service plan for the LRT/Streetcar Corridor Alternative is shown on **Figure 4-21.**

Figure 4-21 LRT/Streetcar Full Project Service Plan

c. *Monorail Corridor Alternative*

Monorail Bay Crossing Trunkline with APM extension to Midtown/Design District and Bus/Trolley connections via Washington Avenue to Miami Beach Convention Center. The full project service plan for the Monorail Corridor Alternative is shown on **Figure 4-22.**

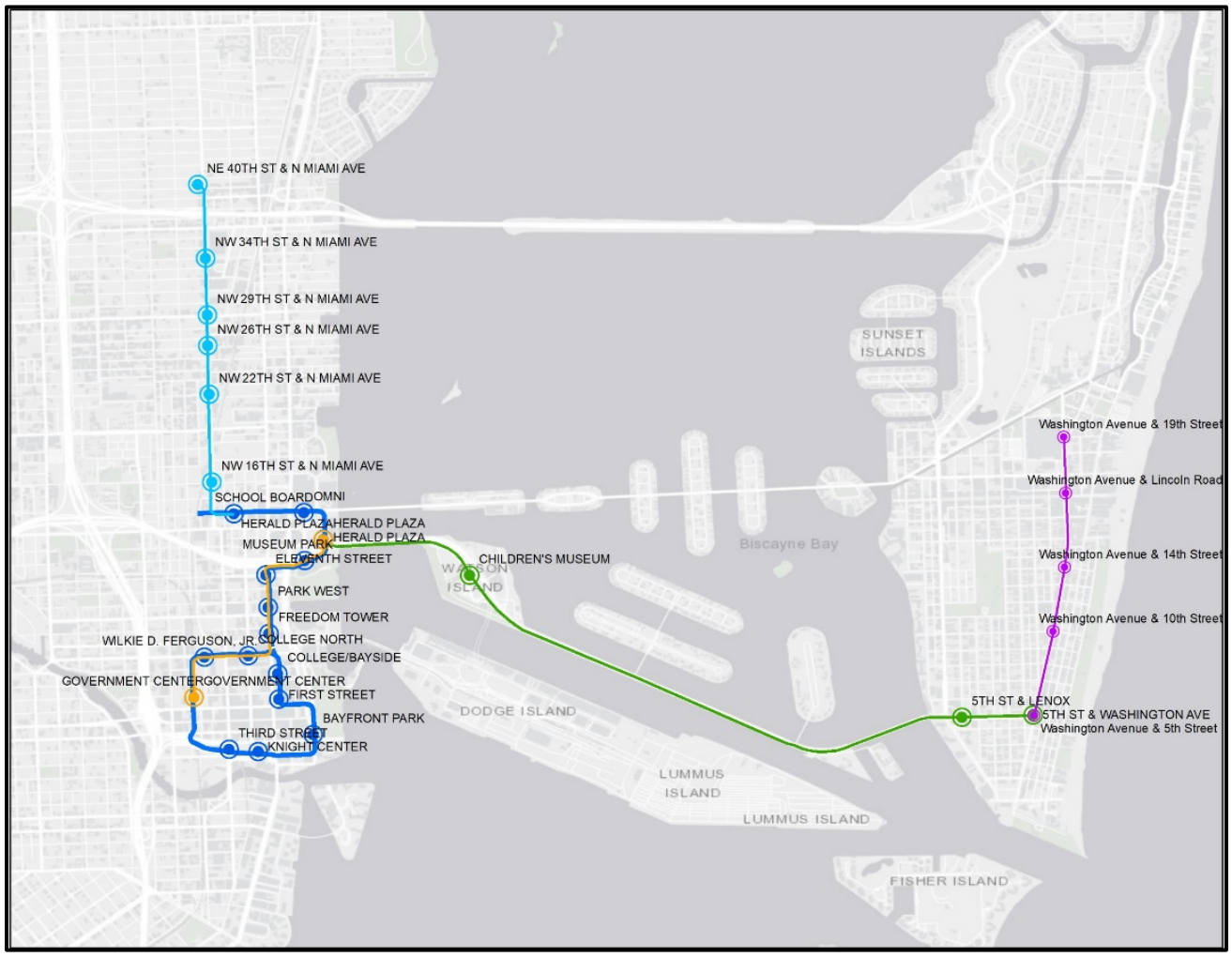


Figure 4-22 Monorail Full Project Service Plan

d. *BRT Corridor Alternatives*

Continuous BRT system from Downtown to Miami Beach Convention Center, via I-395/Washington Avenue or I-195/Collins Avenue. The full project service plans for the 395/Washington Avenue and I-195/Collins Avenue Corridor Alternatives are shown on **Figures 4-23 and 4-24**.

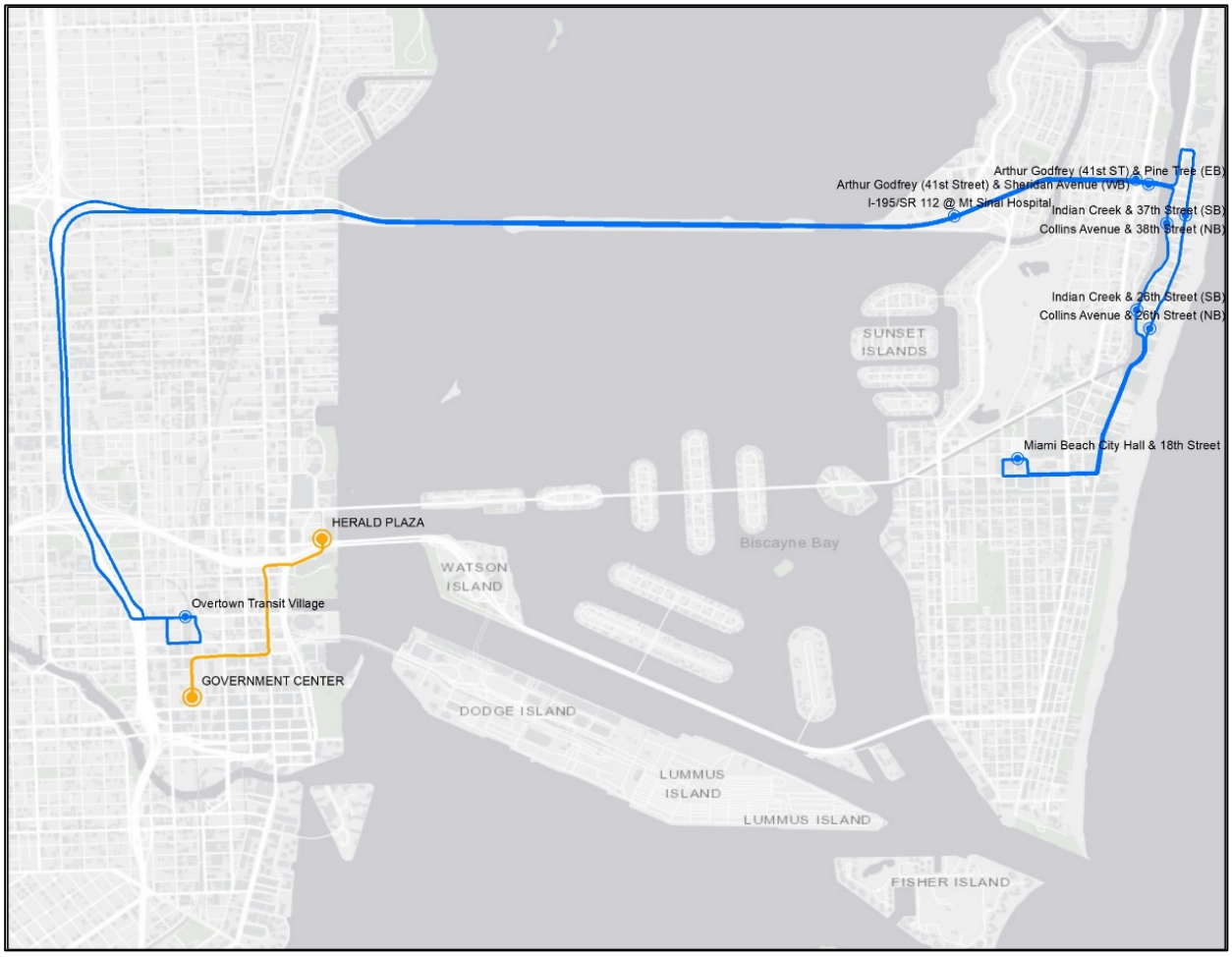


Figure 4-23 BRT – I-195 Full Project Service Plan

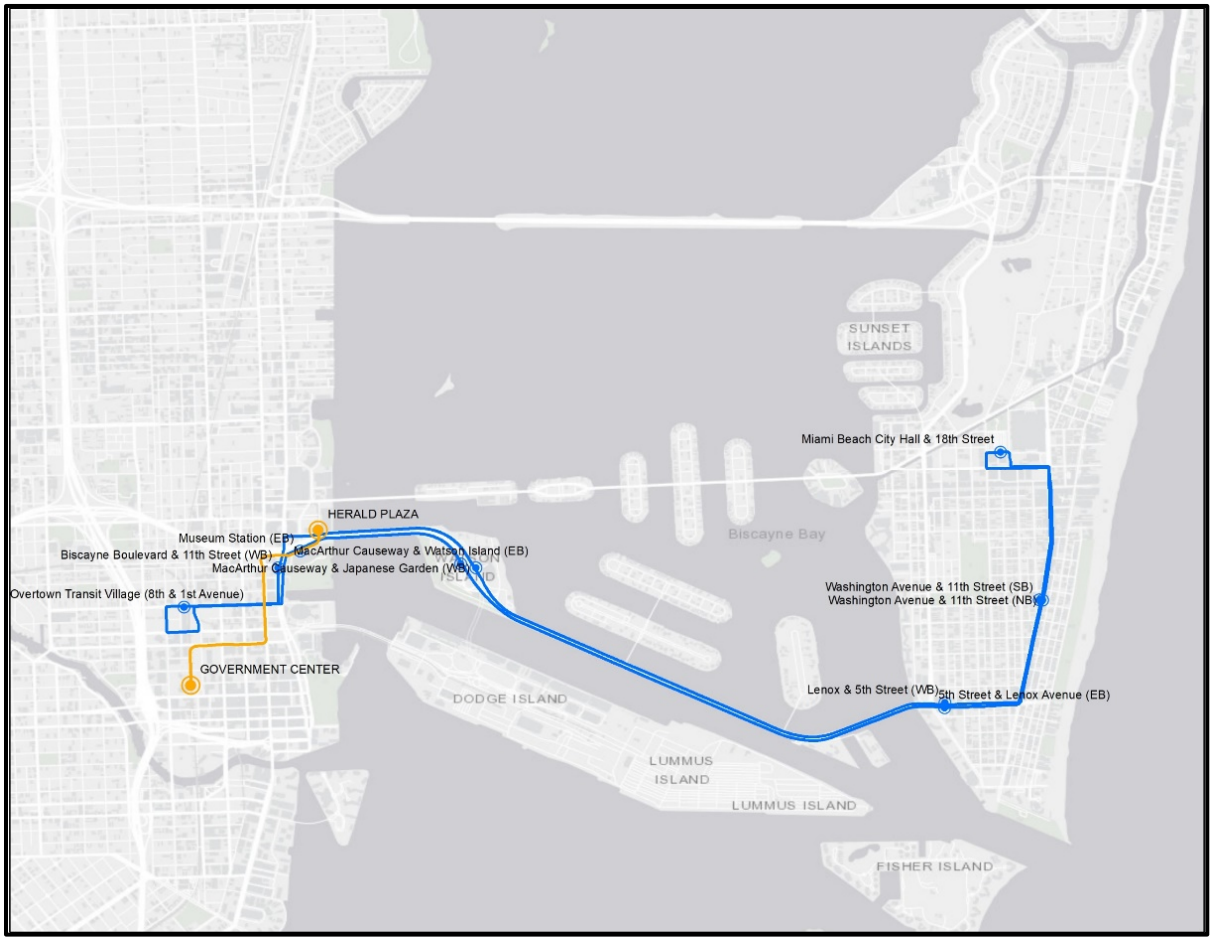


Figure 4-24 BRT – I-395 Full Project Service Plan

4.2.3. Contextual Considerations for Alternatives Development

The selection of transit modes and definition of the Trunkline and extensions supported refinement and further development in Tier Two of the representative alignments that had been developed initially during Tier One. Contextual considerations, at the corridor, sub-area, alignment and station location level, were applied in the alternative's development process.

a. *Corridor*

The project purpose (increasing person-throughput to the Beach corridor's major origins and destinations via rapid-transit technology), informed the identification of the most important areas to serve within the study area, including the establishment of the termini for each sub-area.

b. *Sub-area*

Within the three sub-areas associated with the Trunkline and extensions, major characteristics of the natural and built environment, such as views/aesthetics, natural resources, cultural resources, and major infrastructure, informed the determination of suitability of elevated or at-grade alternatives.

The Bay Crossing sub-area is characterized by sweeping view corridors, monumental scale, sensitive natural resources, and signature architecture. The built and natural environment in this sub-area can accommodate the introduction of an elevated transit guideway, but the guideway alignment and structural components must be sensitively located to minimize impacts.

The Midtown/Design District sub-area is characterized by a mix of warehouse and retail uses. Redevelopment featuring loft-style apartments and nightlife uses is beginning to occur. The current land use and redevelopment of the corridor make it suitable for the introduction of new transit infrastructure.

The Miami Beach sub-area includes the Collins/Washington Avenue Historic District, which is part of the District extending from 6th to 23rd Streets and listed on the NRHP. As such, federal, state and local regulations constrain the alternatives that would likely be considered "reasonable" and permissible under applicable environmental law; for this reason, elevated alternatives were not considered for the Miami Beach sub-area.

c. *Alignment*

For both elevated and at-grade alternatives, compatibility with existing and planned infrastructure and road/highway operations was a key consideration.

In the Bay Crossing sub-area, the limits of the existing seawall on the south side of the MacArthur Causeway Bridge were an important consideration for both horizontal and vertical alignment. To fit the guideway within this horizontal envelope, the structure is elevated to allow for the guideway to extend above the existing roadway.

An additional key consideration in the Bay Crossing Sub-area is coordination with a pedestrian bridge that is proposed as a public benefit feature of a residential tower at 5th Street and Alton Road. The bridge constrains the vertical and horizontal envelope for the elevated transit alternatives, which also impacts the options for station locations. The preliminary design of the Beach Corridor Project alternatives has been coordinated with the design of the proposed pedestrian bridge. As a result of this coordination, the Beach Corridor Project rail alternatives are anticipated to be at an elevation of approximately 65 feet as they pass over the proposed pedestrian bridge.

In the Design District/Midtown Miami sub-area, an alignment on North Miami Avenue was identified following a comparative analysis of North Miami Avenue, NE 2nd Avenue and Biscayne Boulevard as potential alignments for the connection from the Bay Crossing Sub-area to the Design District. The analysis addressed environmental impacts, ridership potential, and engineering feasibility. This analysis found that horizontal and vertical geometric constraints of the NE 2nd Avenue alignment presented significant challenges to engineering feasibility, while a Biscayne Boulevard alignment would result in the most significant environmental impacts.

Additional detail is provided in the *Miami Corridor Analysis Report* for the Beach Corridor Rapid Transit PD&E Study.

Other key considerations in the Design District/Midtown Miami sub-area include coordination with the I-395/SR/836/I-95 Design-Build Project, featuring a reconstruction of the Midtown Interchange to the MacArthur Causeway with a signature bridge and community features beneath I-395, and the FEC Railway. For the BRT and LRT alignments, a feasible alignment envelope through the Midtown Interchange was identified through coordination with the design-build project team. Additionally, the LRT alignment incorporates grade separation over the FEC Railway to ensure safe operations and avoid impacts to freight and intercity passenger rail traffic.

In the Miami Beach sub-area, prior transit project development studies by the Miami-Dade Transportation Planning Organization recommended a light rail/modern streetcar system on Washington Avenue, featuring exclusive transit lanes accommodated by removal of the existing planted median. The LRT/Streetcar alternative for this sub-area is based on the prior City and TPO studies.

d. *Station Locations*

Stations are distributed at locations that are spaced at roughly even intervals between the termini of each sub-area, at a stop spacing appropriate to the transit mode. Ideally, stations are proposed at locations convenient to significant origins/destinations of trips within the corridor, based on adjacent land uses and/or transfer opportunities from existing transit services. Where significant trip generators may not be present, the opportunity for the station to support or serve as a catalyst for future development was considered.

The stop spacing and trip generation characteristics of potential station locations were balanced against site constraints on the ability to meet the geometric requirements of the station while minimizing impacts to traffic and bicycle/pedestrian facilities and maximizing the efficiency of the transit operation.

4.3. EVALUATION CATEGORIES & CRITERIA

To comparatively evaluate the ability of each alternative to meet the project purpose and need, three evaluation categories were identified:

- Transit and Multimodal Performance
- Environmental Effects
- Cost and Feasibility

These categories further relate to the purpose and need project goals in terms of travel demand to accommodate future growth, interconnections with existing transit and environmental impacts to existing and future land use.

Within these categories there are many potential measures of performance. As such, the evaluation focused on those measures that were expected to best differentiate among the alternatives. This was based on preliminary results from the Tier One phase of evaluation and on draft findings of the environmental investigations and analyses undertaken to support the Tier Two evaluation.

To further support the differentiation of alternatives, the evaluation criteria were categorized as either Primary or Secondary Measures (see **Figure 4-26**). Secondary measures provide additional information within categories that are most differentiated by the primary measures.

Criteria were rated on scale ranging from lower performing to higher performing as shown in **Figure 4-25**, where higher performance is always represented by the preferred project outcomes (for example, higher ridership, or lower cost).

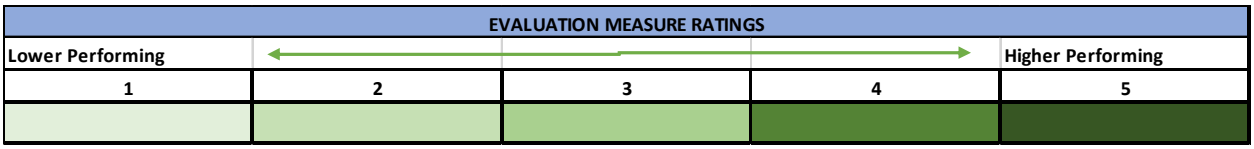


Figure 4-25 Rating Scale for Evaluation Measures

A description of the measures of performance considered in each category is provided below.

4.3.1. Transit & Multimodal Performance

a. *Primary Measures*

Ridership

The ridership that each of the alternatives would attract was estimated to allow comparison of performance, as measured in average daily riders.

Travel demand modeling was conducted using the FTA's Simplified Trips on Project Software (STOPS). STOPS is a stand-alone ridership software tool that is used across the U.S. and has been calibrated for the SMART Plan by the Miami-Dade TPO, ensuring a consistent approach across SMART corridors. The model supports funding recommendations for FTA's Capital Investment Grant Program. Travel time, station locations, and transfers are key model inputs that determine the attractiveness of different modes and alignments to potential transit riders. STOPS utilizes a modified four-step (trip generation, trip distribution, mode choice, and trip assignment) model structure to produce estimated transit project ridership. The forecast process utilizes readily available data and is calibrated to match both local and national experience related to fixed guideway transit ridership. Key model elements include: transit supply, highway supply, and travel demand, while key model input files include station files, U.S. Census and CTPP data, demographic data, travel times, and transit Services

Travel Time

Travel Time (Minutes) - Travel time (which includes transfer times) measured in minutes from end to end of each sub-area, was estimated based on the alignments, station locations, and the

technical capabilities of the transit modes (considering factors such as acceleration rates and operating speed in straight and curved sections of an alignment, as well as traffic conditions for at-grade sub-areas that interface with other traffic.

Interoperability/Modal Integration

The compatibility of the proposed mode with other existing and proposed transit modes, including the availability of one-seat rides between significant origins and destinations, the number of transfers required for trips between significant origins and destinations, and the horizontal and vertical separation between modes at significant transfer points.

- Interoperability: The ability to operate contiguously as an extension of an existing technology/mode, offering one-seat rides, economies of scale in operations and maintenance, and the potential for a shared fleet/operations and maintenance facility.
- Modal integration: Because there are several existing modes in operation in Miami, and because of limitations on the transit mode options that the City of Miami Beach is willing to consider, the Beach Corridor Rapid Transit Project will feature some transfers between modes for many of the possible trip origins and destinations. The quality of these intermodal connections in terms of ease and location of transfer will influence the ridership of both the selected beach corridor technology and the overall transit system ridership.

b. *Secondary Measure*

Passenger Capacity

Passenger capacity is considered as a secondary measure, to take into consideration the ability to serve ridership growth to 2040 and visitor/culture & recreation ridership. Ridership is evaluated based on the base year, and is modeled based on journey to work data, which may not capture visitor/culture & recreation travel demand. The capacity of each mode to serve passenger demand in the corridor is measured in peak-hour, peak direction passengers.

4.3.2. Environmental Effects

The PD&E Study considered the effects of the project on the environment by evaluating existing conditions and resources and evaluating how the physical and operational characteristics of the alternatives would affect the environment. For the evaluation of alternatives, emphasis was placed on those elements of the environment that were identified as potentially having impacts that would differentiate between the alternatives. Those elements include:

a. *Primary Measures*

Natural Resources

Potential impacts to natural resources, such as wetland and other surface waters; protected species and habitat; coastal resources; and floodplains.

Cultural Resources

Potential impacts to historic historic/archaeological resources

Aesthetics & Visual

Potential impacts to aesthetics and viewshed: Views and streetscape character

Noise & Vibration

The technical characteristics of the modes were used to model noise and vibration impact areas and determine the extent of impact to sensitive receptors within a modeled impact distance; the impacts are identified by type of use and severity of impact (using Federal criteria for assessing severity).

Traffic Impacts

Potential impacts to level of service and delay for general purpose traffic and transit operating in existing traffic lanes and at existing intersections.

b. *Secondary Measure*

Construction Impacts

Qualitative assessment of the magnitude and duration of traffic, noise and habitat impacts associated with the construction activities, as informed by the conceptual engineering of the alternatives.

4.3.3. Cost & Feasibility

The cost and feasibility of the alternatives were evaluated using the following measures:

a. *Primary Measures*

Capital Cost

The total capital cost in 2019 dollars.

Operations & Maintenance (O&M) Cost

The annual cost in 2019 dollars to operate and maintain the alternative

b. *Secondary Measures*

Lifecycle Cost (30-year present value of capital, O&M, and major maintenance costs)

Lifecycle cost analysis considers the initial cost to design and build the project alternatives; the annual cost to operate and maintain the new transit system over a thirty-year period; and periodic major maintenance and capital replacement costs for both fleet (transit vehicles) and infrastructure during that thirty-year period. All of these costs are then discounted to a present value representing the total cost of ownership of the system. Lifecycle cost is comprised mostly of the cost identified in the capital cost and O&M cost measures but offers a different way of looking at the costs of the alternatives which in some cases may differ from the primary cost measures.

Resilience (impacts of sea level rise)

Miami Beach, being a barrier island, is susceptible to flooding from king tides, hurricane surge and sea level rise. As such it is important that the project consider the impacts of potential road

reconstruction or elevating guideways to mitigate future weather events associated with sea level rise. Considering the anticipated impacts of climate change on South Florida, the resilience of the proposed alternatives to flooding and sea level rise were evaluated, based primarily on the vertical alignment of the infrastructure and the Southeast Florida Regional Climate Change Compact (SFRCCC) Unified Sea Level Rise projections (through the year 2100) and the United States Army Corps of Engineers (ACE) Sea-Level Change Curve Calculator (for years beyond 2100).

Time to Construct

Although the construction impacts of the alternatives are described and differentiated in the environmental effects category, time to construct, as measured in the estimated months assuming a convention (design-bid-build) project delivery method, is a simplified measure of project impact that focuses on duration.

4.4. EVALUATION METHODOLOGY

To support evaluation of the alternatives, conceptual architecture and engineering was developed for each mode and sub-area (with the Monorail Alternative limited to the Bay Crossing sub-area and the APM Alternative limited to the Bay Crossing and Design District/Midtown sub areas as described in **Section 4.2,** *Approach to Alternatives Development*. Costs estimates were developed at the segment level for each mode; cost of the mixed-mode Corridor Alternatives are comprised of these segment-level cost estimates. Operating characteristics, including travel time and operations and maintenance cost, were also analyzed at the segment level and then incorporated into Corridor Alternative measures.

4.4.1. Ridership Forecasting

For estimating additional ridership options, express service links to the Beach and Design District were modeled for the APM/Monorail Alternatives. These express services would skip stations between the Government Center and new Herald Plaza stop. These express services would be possible once the ongoing upgrade to the Metromover systems and communications was completed. Refinement of these potential services would be completed after selection of a locally preferred alternative.

Further detail on the ridership forecasting and cost estimating methodologies is provided in the *Travel Demand, Capital Cost and Operations & Maintenance Cost Technical Memoranda*.

4.4.2. Service Plan and O&M Cost Estimating

Following general industry practice, a simplified cost allocation model was developed to estimate O&M cost for the Beach Corridor alternatives considering characteristics such as travel at the segment level and then incorporate into corridor alternative measure.

To develop the O&M cost estimates, service plan assumptions were developed as follows:

- Service every five (5) minutes during Peak Periods

- Service every 10 minutes Off Peak
- Same Service Plan applied to each mode

The vehicle technology specifications, stop locations, and guideway geometry were then applied to estimate the travel time and fleet requirements (including peak period vehicles in operation) associated with each mode and sub-area. Costs were then calculated in four categories:

- Number of revenue hours
- Number of revenue miles
- Number of peak vehicles
- Number of guideway miles

4.4.3. Capital Cost Estimating

Conceptual engineering of the fixed facility components (guideway) and historical costs were used to define a preliminary cost estimate for each of the transit modes. Costs developed for Trunkline and extensions for each mode, with the total cost of corridor alternatives comprised of the component elements proposed for each sub-area of the corridor alternatives.

Unit costs used in the estimates were based on FDOT and FTA data as applicable. The estimates are comprised of the following cost components:

- Guideway/Structures & Track
- Stations
- Systems
- Maintenance Facility
- Right-of-way
- Site Work
- Rolling Stock (Transit Vehicles)
- Professional Services & Contingencies
- Switches as Needed for APM Connection to Existing Metromover

Additional detail on the cost estimating methodology is provided in the *Cost Estimates Technical Memorandum.*

4.4.4. Resilience/Sea Level Rise

Using regionally and locally applicable sustainability and resilience plans, policies, and guidelines as context, and based on the SFRCCC Unified Sea Level Rise Projection, supplemented by the United States Army Corps of Engineers (ACE) Sea Level Change Curve Calculator, a recommended set of design surface water elevations was developed as a means for evaluation corridor alternatives. More specifically, all options considered sea level rise in the 75-year required horizon along MacArthur Causeway and the need to elevate options between 5 feet and 7 feet. Additional detail

on the sea level rise analysis methodology is provided in the *Sustainability/Sea Level Rise Technical Memorandum*.

4.5. EVALUATION RESULTS & RECOMMENDED ALTERNATIVE

Corridor alternatives that serve all three of the sub-areas along the project corridor were developed in order to evaluate total project impacts. The complete project sets are:

APM Corridor Alternative

Extension of Omni Loop Metromover to Midtown/Design District and Bay Crossing (Trunkline); bus/trolley connections via Washington Avenue to Miami Beach Convention Center.

LRT/Streetcar Corridor Alternative

Continuous LRT system from Midtown/Design District to Bay Crossing Trunkline to Miami Beach Convention Center.

Monorail Corridor Alternative

Monorail Bay Crossing Trunkline with APM extension to Midtown/Design District and bus/trolley connections via Washington Avenue to Miami Beach Convention Center

BRT Corridor Alternatives

Continuous BRT system from Downtown to Miami Beach Convention Center, via I-395/Washington Avenue or I-195/Collins Avenue.

These alternatives were evaluated, and the results are presented in the evaluation matrix shown on **Figure 4-26.** A narrative summary of the evaluation results for each corridor alternative and a comparison of the key differentiators relative to one another follows below. Additionally, because it has been determined that the Bay Crossing Trunkline would have independent utility, a summary comparison of the ridership, capital cost and O&M cost of the Trunkline-only alternatives is presented in **Table 4-3.**

Table 4-3 Key Evaluation Factors-Trunkline Alternatives

Alternative	Capital Cost (millions) (2019 dollars)	Operations and Maintenance Cost (annual/millions) (2019 dollars)	Average Daily Ridership (2040 baseline/ thousands)
APM (One-Seat Ride)	$631.6	$9.90	13.0 to 19.4
APM (Transfer)			10.2 to 15.4
Monorail	$671.7	$7.20	10.2 to 15.4
LRT*	$732.3	$7.10	8.0 to 12.0

*For comparison of the Trunkline, capital cost of each alternative includes a MOF estimate for construction/ROW. However, for LRT there is no adequate MOF site within the Trunkline sub-area only.

Detailed Evaluation Results-Corridor Alternatives

Total Project Elements:									
APM		Primary Mode: Extension of Omni Loop Metromover to Midtown and Bay Crossing Trunk Line - 5.4 miles ; in combination with Premium Bus connections via Washington Avenue to Miami Beach Convention Center - 1.6 miles							
LRT		Continuous LRT system from Design District to Midtown to Bay Crossing Trunk Line to Miami Beach Convention Center -7.0 miles							
Monorail		Primary Mode: Monorail Bay Crossing Trunk Line - 3.7 miles; in combination with APM extension to Midtown/Design District 1.7 miles and Premium Bus connections via Washington Avenue to Miami Beach Convention Center - 1.6 miles							
BRT		Continuous BRT system from Downtown to Miami Beach Convention Center, via I-395/Washington Avenue or I-195/Collins Avenue							
	Evaluation Categories and Measures		**APM**		**LRT/Streetcar**		**Monorail**		**BRT I-395 (MacArthur CSWY)** *or* **BRT I-195 (Julia Tuttle CSWY)**
									 
			5.4 miles/10 stations		7.0 miles/17 stations		3.7 miles/4 stations		6.6 Miles/11 Stations / 10.8 miles/12 stations
	TRANSIT AND MULTIMODAL PERFORMANCE								
Primary Measures	**Ridership 2040**	Average Weekday Ridership	27,900 - 41,900		24,800 - 37,200		27,900 - 41,900		11,500-21,400 / 11,500-21,400
Primary Measures	**Travel Time**	Minutes-End to End	22		24		22		21 / 23
Primary Measures	**Interoperability/ Modal Integration**	One-Seat Rides	To/from Downtown		From Midtown to Beach		Most Trip Pairs Require Transfer		From Downtown to Beach / From Downtown to Beach
Secondary Measure	**Passenger Capacity**	Peak Hour Per Direction (5 Minute Peak Headways) ***Capacity varies based on manufacturor and specifications**	2,400		2,880		2,140		1,200 / 1,200
			2 car train		single articulated train		2 car train		Articulated bus / Articulated bus
	ENVIRONMENTAL EFFECTS								
Primary Measures	**Natural Resources**	Water Resources, Habitat and Animals	Direct Impacts to seagrass, coral and mangrove; small increase in impervious surface		Direct Impacts to seagrass, coral and mangrove; additional indirect (shading) impacts; greater increase in impervious surface		Direct impacts to seagrass, coral and mangroves		Significant impacts to coral. Permitting and mitigation would be challenging-significant risk to cost & duration of project. / Bridge widening on I-195 would result in seagrass impacts that would require permitting and mitigation.
Primary Measures	**Cultural Resources**	# of Listed/Eligible Historic/Archaeological Resources	34		144		33		2 / 0
Primary Measures	**Aesthetics and Visual**	Views and Streetscape	Elevated guideway / stations impact views and streetscape		Elevated guideway / stations impact views in Bay Crossing segment; less impact in at-grade segments		Elevated guideway / stations impact views and streetscape		Buses/stops will have limited impact on view shed / Buses/stops will have limited impact on view shed
Primary Measures	**Noise and Vibration**	Number and Severity of Impacts by Type of Property/Use	2 Moderate Residential Impacts		5 Moderate/24 Severe Residential Impacts, 3 Moderate/3 Severe Institutional Impacts		No Impacts		9 Moderate/1 Severe Residential Impacts / No Impacts
Primary Measures	**Traffic Impacts**	Impact to Existing Traffic Lanes	No impacts to at-grade traffic due to elevated guideway		At-grade segments impact traffic by dedicating lanes to transit		No impacts to at-grade traffic due to elevated guideway		Arterial segments impact traffic by dedicating lanes to transit / Arterial segments impact traffic by dedicating lanes to transit
Secondary Measure	**Construction Impacts**	Traffic, Noise and Habitat Impacts	Some intermittent lane closures, navigational impacts, noise and habitat impacts.		Long-Duration Lane Closures for Utility Relocation, Roadway Excavation, Track Installation and Paving		Some intermittent lane closures, navigational impacts, noise and habitat impacts.		Short-duration lane closures for pavement striping, signage and stop platform installation / Short-duration lane closures for pavement striping, signage and stop platform installation
	COST AND FEASIBILITY								
Primary Measures	**Capital Cost**	Total 2019 $	$1,022,250,000		$1,136,900,000		$1,079,300,000		$265,900,000 / $174,250,000
Primary Measures		Trunkline	APM		LRT		Monorail		N/A / N/A
Primary Measures		Beach Extension	Bus		LRT		Bus		N/A / N/A
Primary Measures		Midtown Extension	APM		LRT		APM		N/A / N/A
Secondary Measures	**Operations and Maintenance Cost**	Annual Total (2019 $)	$19,100,000		$17,600,000		$16,500,000		$5,500,000 / $6,100,000
Secondary Measures	**Lifecycle Cost**	30 Year Discounted Capital, O&M & Major Maintenance	$1,444,000,000		$1,506,000,000		$1,440,000,000		$499,000,000 / $392,000,000
Secondary Measures	**Resiliency**	Mitigation of Sea Level Rise Impacts	Elevated guideway and stations provide mitigation of predicted sea level rise.		Limited opportunity to mitigate sea level rise outside of Bay Crossing		Elevated guideway and stations provide mitigation of predicted sea level rise.		No mitigation of sea level rise risks / No mitigation of sea level rise risks
Secondary Measures	**Time to Construct**	Design-Bid-Build Delivery (Months)	48		54		48		33 - 36 / 33 - 36

Figure 4-26 Detailed Evaluation Results-Corridor Alternatives
(Note: Traffic impact category for APM and Monorail applies to through-traffic only)

4.5.1. APM Corridor Alternative Evaluation Summary

The APM Corridor Alternative is comprised of an extension of the Omni Loop Metromover to Midtown and Bay Crossing (Trunkline); and Bus/Trolley connections via Washington Avenue to Miami Beach Convention Center. Key results of the evaluation of this alternative follow below by evaluation category.

a. Transit & Multimodal Performance

- Highest ridership for Trunkline & total project
- Possible "one-seat ride" opportunities from Midtown/Design District to Miami Beach
- Reduced connectivity to Omni Transit Center hub as compared with Monorail
- Sufficient capacity for future growth

b. Environmental Effects

- Natural resource impacts and permitting complexities are similar for APM and Monorail and less than for other alternatives
- More cultural resources and visual impacts in Miami/Midtown extension as compared with LRT
- Visual and aesthetics impacts higher as compared to at-grade alternatives
- Noise and vibration impacts are less than LRT and BRT I-395, but greater than other alternatives
- Other physical impacts similar or less than for other alternatives

c. Cost & Feasibility

- Lower Bay Crossing cost per rider
- Extension of existing system
- Higher O&M than Monorail

4.5.2. LRT/Streetcar Corridor Alternative Evaluation Summary

The LRT/Streetcar Corridor Alternative is comprised of a continuous LRT system from the Design District to Midtown to the Bay Crossing Trunkline to the Miami Beach Convention Center.

Key results of the evaluation of this alternative follow below by evaluation category.

a. Transit & Multimodal Performance

- Medium-high ridership for Trunkline & total project
- Longer travel time than other alternatives for Miami extension
- "One-Seat Ride" opportunities for Midtown/Design District to Miami Beach
- Sufficient capacity for future growth

b. *Environmental Effects*

- More natural resource impacts and therefore more mitigation, permitting complexities than APM or Monorail. Less impacts and permitting complexities than BRT I-395
- More impact to cultural and natural resources than other alternatives
- Less aesthetic/visual impacts than APM or Monorail, but more than for BRT
- Most noise/vibration impacts as compared to other alternatives
- Most impact to traffic in Miami/Midtown and Miami Beach
- Most construction impacts as compared to other alternatives
- At-grade and prone to flooding effects

c. *Cost & Feasibility*

- Highest Bay Crossing Trunkline cost
- Longest construction duration
- Maintenance of overhead catenary wires due to hurricanes
- Cost and constructability challenges associated with sea level rise mitigation

4.5.3. Monorail Corridor Evaluation Summary

The Monorail Corridor Alternative is comprised of a Monorail Bay Crossing Trunkline with an APM extension to Midtown/Design District and Bus/Trolley connections via Washington Avenue to Miami Beach Convention Center. Key results of the evaluation of this alternative follow below by evaluation category.

a. *Transit & Multimodal Performance*

- High ridership for Trunkline & total project
- Good connectivity to Omni Transit Center for bus transfers
- Sufficient capacity for future growth

b. *Environmental Effects*

- Natural resource impacts and permitting complexities are similar for APM and Monorail and less than other alternatives
- More cultural resources and visual impacts in Miami/Midtown extension as compared with LRT and similar to APM
- Visual and aesthetics impacts higher compared to at-grade alternatives
- Less noise and vibration impacts than other alternatives, and same as I-195 BRT
- Other physical impacts similar or less than for other alternatives

c. *Cost & Feasibility*

- Capital & operating cost of Bay Crossing Trunkline similar to APM, but lower operating and maintenance cost for Monorail

4.5.4. BRT Corridor Alternatives Evaluation Summary

The BRT Corridor Alternatives are comprised of a continuous BRT system from Downtown to Miami Beach Convention Center, via I-395/Washington Avenue or I-195/Collins Avenue. Key results of the evaluation of these alternatives follow below by evaluation category.

a. *Transit & Multimodal Performance*

- Lowest capacity/lowest ridership
- May not meet purpose & need for project

b. *Environmental Effects*

- Most natural resource impacts and permitting complexities than for other alternatives due to I-395 widening for BRT
- Less cultural resource impacts as compared with other alternatives
- Less visual and aesthetic impacts than other alternatives
- Noise impacts to residential properties along I-395 greater than APM or Monorail, but less than LRT
- Traffic impacts similar to LRT, greater than for APM or monorail
- Construction impacts similar to APM and Monorail, but less than for LRT

c. *Cost & Feasibility*

- Lowest capital & operating cost
- No feasible mitigation of vulnerability to sea level rise

4.5.5. Evaluation Summary-Key Differentiators Between Modal Alternatives

The key differentiators between the modal alternatives are as follows:

a. *Transit & Multimodal Performance*

- Rail options have similar ridership, capacity, speed and cost for Bay Crossing
- BRT options have lower ridership and capacity than the rail options
- LRT/Streetcar has the highest vehicle capacity and highest cost

b. *Environmental Effects*

- Monorail and APM modes are similar for the Bay Crossing (rubber tires = less noise)
- BRT on widened MacArthur Causeway has greatest impact to natural resources
- LRT/Streetcar has more traffic, noise and construction impacts in Miami/Midtown and Miami Beach
- LRT transitions from elevated to at-grade creating physical barriers
- APM and Monorail have more visual and cultural impacts in Miami/Midtown than at-grade LRT

c. *Cost & Feasibility*

- APM & Monorail cost approximately equal, lower operating and maintenance cost for Monorail
- LRT cost higher but similar range
- BRT has significantly lower cost

4.5.6. Evaluation Summary-Key Findings

Overall, the key findings of the evaluation of the alternatives are as follows:

- Rail modes are higher performing & higher cost than BRT
- BRT capacity & ridership may not meet purpose & need
- LRT impacts are higher than APM/Monorail
- APM/Monorail has similar Bay Crossing Trunkline performance

As a result of the evaluation process, two of the rail modes (APM and Monorail) are higher performing, have less environmental impacts, and lower cost for crossing the Trunkline. At-grade LRT would be subject to flood vulnerability. Cost impact and community/business disruption would occur if roadways, sidewalks, and utilities along the alignment and at all crossroads had to be raised. The LRT option has higher cost (larger maintenance facility needs), less ridership, increased impacts to the environment (seagrass, historic resources, noise, vibration), longer construction time, and more conflicts with traffic (crashes, increased travel time).

4.6. RECOMMENDED ALTERNATIVE AND REASONS FOR SELECTION

The natural and built environment differ significantly by sub-area. These differences influenced the development of alternatives and the performance of the alternatives with respect to the evaluation criteria. Therefore, DTPW has identified recommended alternatives for each of the sub-areas as described below and summarized in **Figure 4-27**.

4.6.1. Bay Crossing Sub-Area (Trunkline): Elevated Automated Rail Transit (APM or Monorail)

The fixed-guideway modes offer similar transit performance for the Bay Crossing Trunkline, with lower costs and impacts for the automated, rubber-tire modes (APM and Monorail) than for the LRT/Streetcar mode. The BRT alternatives, while lower cost, lack sufficient capacity to meet the project purpose and need, and present significant environmental impacts associated with the widening of the causeways. Therefore, an elevated, automated rubber tire vehicle rail transit system (APM or Monorail) is the recommended alternative for the Trunkline service in the Bay Crossing sub area. If federal funds are pursued, funding analysis for the APM and Monorail technologies will be completed in the Engineering phase of the project.

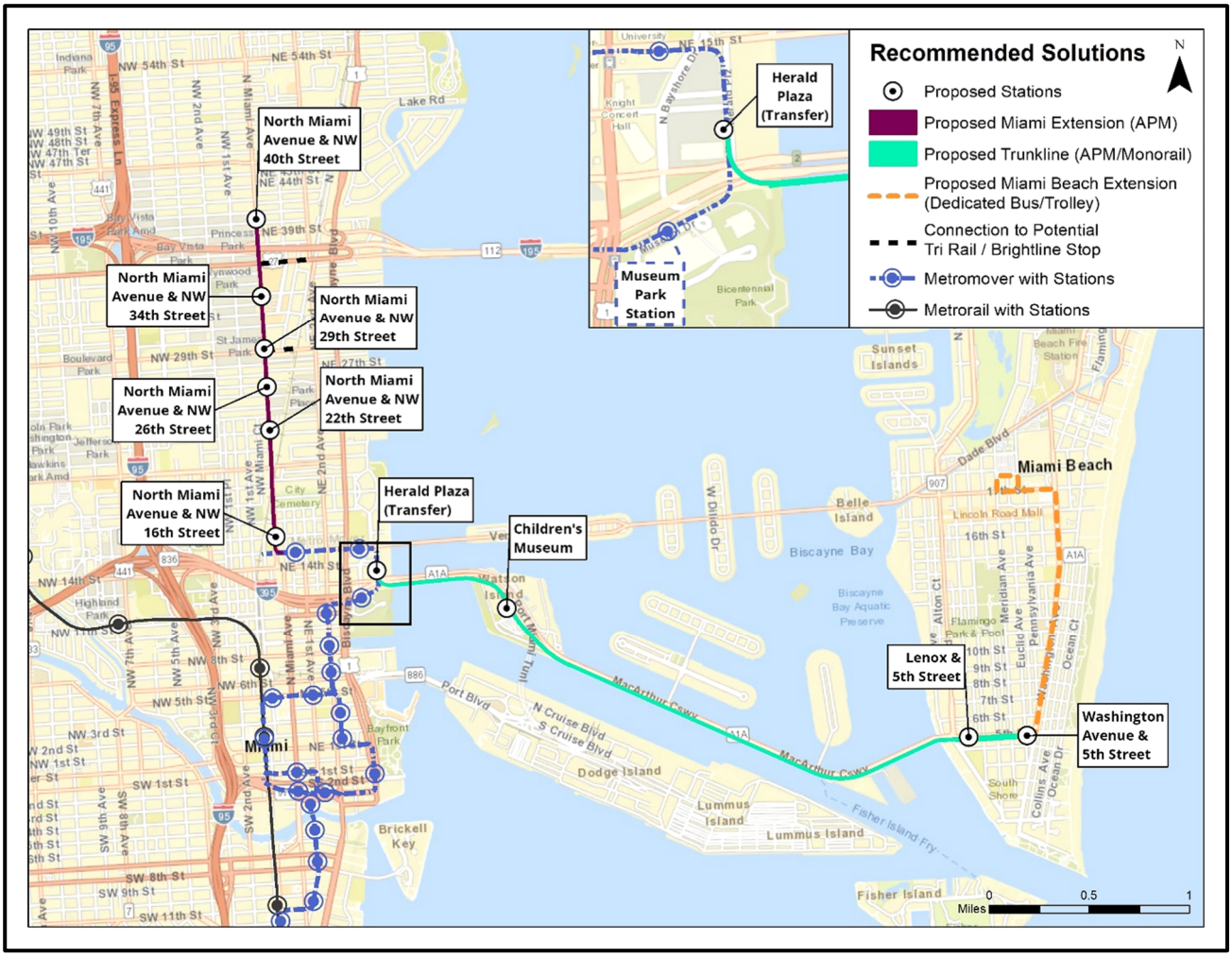


Figure 4-27 Recommended Alternative

4.6.2. Midtown/Design District: Automated People Mover

In the Midtown/Design District sub-area, the APM is the Recommended Alternative because it provides better travel time and ridership than the LRT/Streetcar Alternative, with less impact to general traffic, more resilient infrastructure, and less construction impact.

4.6.3. Miami Beach: Bus/Trolley in Dedicated Lanes

The Recommended Alternative in the Miami Beach sub-area is a connection to enhanced bus/trolley service in dedicated bus lanes in each direction from Washington and 5th to Miami Beach Convention Center. Some adjustments to routing and service plans of existing bus/trolley service may be implemented to enhance connections to the high-capacity rail system. This dedicated lane recommendation along Washington Avenue will be implemented separately as part of the Bus Express Rapid Transit (BERT) Beach South project which has been fully funded. Although Section 2.6 indicates that reduction of lanes along Washington Avenue does not appear to have a negative impact on travel along Washington Avenue, additional traffic analysis will be conducted as part of the BERT Beach South project to determine impacts to alternate north/south routes such as Collins Avenue.

The LRT/Streetcar Alternative is not recommended as a stand-alone project for the Miami Beach sub-area given its lack of resiliency to sea-level rise, high cost, and difficulty of siting an operations and maintenance facility in this sub-area. Moreover, a bus has the ability to divert from flooded conditions, whereas a fixed LRT rail would not.

4.7. APPROVAL OF LOCALLY PREFERRED ALTERNATIVE

On January 30, 2020, the Miami-Dade Transportation Planning Organization (TPO) unanimously selected the Recommended Alternative (shown on Figure 4-27) as the Locally Preferred Alternative. Specifically, the TPO recommended:

- An extension of the existing Metromover system north along North Miami Avenue;
- An APM or Monorail along the Bay Crossing /Trunkline; and
- Dedicated bus/trolley lanes within the existing right-of-way of Washington Avenue (implemented separately).

A copy of the TPO Resolution #03-2020 is attached as Appendix A.

Note: Subsequent to completion of the alternatives analysis, project costs were updated from 2019 dollars to 2022 dollars for the Locally Preferred Alternative. Based on 2022 dollars, capital costs for the locally preferred alternative are estimated to range from $1.132 billion to $1.176 billion. O&M costs for the preferred alternative are estimated to range from $18 million to $21.3 million.

SECTION 5. PROJECT COORDINATION & PUBLIC INVOLVEMENT

5.1. INTRODUCTION

Input from the public was an integral part of the PD&E Study. A PIP was developed at the outset of the study to outline an engagement process that would help to ensure that the study reflects the values and needs of the communities it is designed to benefit. The public outreach process was designed to share information, obtain feedback and build consensus for an LPA among all community stakeholders.

Public input was gathered at several milestones in the study process, providing residents, business owners, elected officials and government agencies with the opportunity to inform the development and screening of the alternatives and the evaluation. The project began with a public kick off meeting in 2017, followed by studies of different applicable modes and corridors. Once these studies were completed, another kick off public meeting was held in 2018 to communicate the results of completed studies and initiate the Tier 2 Alternatives Analysis. Public Workshops and agency briefings were held in 2019 culminating in the endorsement of the Locally Preferred Alternative by the TPO Board in January 2020. Since that time final engineering and environmental documentation and permitting have been completed and a final public meeting is scheduled for Summer 2022.

5.2. TIER ONE EVALUATION

The Tier One Screening public involvement activities included one agency/elected officials kick-off meeting, one public kick-off meeting (held in two locations) and more than 20 one-on-one meetings with elected officials and community stakeholders. The elected officials meeting as well as one of the public kick-off meetings was held on July 25, 2019 at the Culmer Community Center in Miami, the other was held on July 27, 2019 at the New World Symphony in Miami Beach.

During public outreach for the Tier One Evaluation, some stakeholder comments included a desire to evaluate other potential transit corridors, and an assessment of logical termini points on Miami Beach instead of 5th Street and Alton Road. Additionally, in February 2018 the Mayor and City Commission of the City of Miami Beach passed a resolution requesting that DTPW equally consider both I-1-95 and I-395 as potential corridors for rapid transit to and from Miami Beach.

As a result of this stakeholder input, the DTPW expanded the study area to include both Bay crossings and a stop at the Miami Beach Convention Center. To address the requests for consideration of additional corridors within the City of Miami, a Corridor Analysis Report was

completed in August 2018. For the Corridor Analysis, North Miami Avenue, NE 2nd Avenue and Biscayne Boulevard were examined for potential transit improvements. Based on the Corridor Analysis, it was determined that due to various environmental, engineering and ridership factors, North Miami Avenue would be the recommended corridor for implementation of a rapid transit mode.

The Tier One Analysis confirmed that there is no singular mode suitable for the different sub areas of the Beach Corridor project. There may be multiple technologies within one LPA that can best fit the various segments of the corridor. The following four distinct segments were identified for consideration in Tier Two: Design District, Downtown Miami, Bay Crossings and Miami Beach. The recommended Tier Two study areas for alignment alternatives by mode are as follows:

- **Monorail:** Recommended for study of alignment alternatives in the Design District, Downtown Miami, and Bay Crossing segments.
- **Metromover:** Recommended for study of alignment alternatives in all four segments Design District, Downtown Miami, Bay Crossing, and Miami Beach.
- **BRT/Express Bus:** Recommended for study of BRT and/or Express Bus from Downtown to the Convention Center (with a re-purposed typical section along the Causeway and a dedicated lane in Miami Beach) and Express Bus along a freeway loop alignment using I-95, I-195, I-395 in Miami and 5th Street, Washington Avenue, and Alton Road in the Miami Beach segment.
- **LRT/Modern Streetcar:** Recommended for study of alignment alternatives in the Design District, Bay Crossing, and Miami Beach segments.

5.3. TIER TWO EVALUATION

The public involvement opportunities during Tier Two of the study included an additional public-kick off meeting, an Alternatives Workshop held on the Miami side and Miami Beach side to present initial alternatives. A second series of Alternatives Workshops were held to present the evaluation and refinement of alternatives, again in both a Miami and Miami Beach location. A Project Advisory Group (PAG) composed of local stakeholders having an active role in the community was also established during Tier Two. Presentations to municipalities and a series of one-on-one briefings were also conducted.

A summary of the public involvement opportunities and input received is presented in this section. Documentation of the public involvement opportunities and comments received are provided in the PD&E Study Comments and Coordination Report.

5.4. KICK-OFF MEETINGS

The Tier One kick-off meetings, which were separated into three separate functions serving elected officials, Downtown/Midtown Miami residents and Miami Beach residents respectively, announced the start of the PD&E to address the Beach Corridor Rapid Transit Project as part of the overall SMART plan. During the meetings attendees reviewed boards, drone footage and given an activity timeline of the upcoming Alternatives Workshop and creation of a PAG.

- The elected official kick-off meeting was held on July 25, 2017 at the Culmer Community Action Center in Miami. Throughout the month of July one-to-one briefings were held with officials informing them of the project and inviting them to the meeting. Official invitations were emailed on July 10 inviting representatives and/or staff to the meeting which saw 31 attendees.
- Public kick-off meeting 1 was held on July 25, 2017 at the Culmer Community Action Center in Miami directly following the elected official kick-off. It was advertised through newspaper ads, social media, mailers, and flyer distribution and saw 37 attendees. A brief discussion period took place after the presentation and interested parties were invited to sign up for the PAG.
- Public kick-off meeting 2 was held on July 27, 2017 at the New World Symphony in Miami Beach. It was advertised through newspaper ads, social media, mailers, and flyer distribution and saw 78 attendees. A brief discussion period took place after the presentation and interested parties were invited to sign up for the PAG.
- The Tier Two meeting to kick off the Miami Beach study area portion was held on December 17, 2018 at the Miami Beach Regional Library, to inform of changes to the project area and the inclusion of both the Julia Tuttle Causeway and MacArthur Causeway and mid Miami Beach. There were 28 attendees at the meeting.

5.5. PROJECT ADVISORY GROUP (PAG)

A PAG composed of local stakeholders engaged in an active role in their respective communities, such as representatives from impacted cities, regional agencies, neighborhood associations or other groups within the project area was established. Recommendations for appointees were solicited at both the public and officials/agency kick-off meeting as well as at one-on-one briefings with elected officials. Formal requests for appointments were sent to elected officials and stakeholder groups; it consists of 20 members.

- The first PAG meeting, which was held on May 30, 2019 at Marriott Biscayne Bay in Miami Beach, informed the newly established group of their role in the project. As local representatives they were given project information with the aim to guide the DTPW on community issues and offer input.

- The second PAG meeting was held on August 29, 2019 at the Miami-Dade Main Library and presented Tier two analysis of alternatives, including transit modes comparison, alternatives analysis process, and evaluation criteria and methodology.
- The third PAG meeting was held on November 2019 and was held at the Miami Beach Public Library present the LPA to the PAG. Attendees were brought up to speed on the next phase of the process including TPO recommendations.

5.6. ALTERNATIVES WORKSHOPS

The Alternatives workshops were opportunities for the public to provide input to the DTPW in their effort to reach their project goal, to connect the Miami Design District/Midtown and Downtown Miami, along I-395/SR A1A (MacArthur Causeway) or I-195/SR112 (Julia Tuttle Causeway), to the Miami Beach Convention Center area.

To maximize the level and diversity of feedback, a variety of methods were used to notify the public including email blasts, flyer distribution, mailers, social media and newspaper advertisements. Elected officials were also invited to contribute to the analysis process. Each workshop was held in two locations to better serve the Miami and Miami Beach communities, respectively.

- Alternatives workshop 1, held on June 20, 2019 at the Marriott Biscayne Bay in Miami, saw 35 attendees evaluate the Tier One results. The open-house format allowed attendees to review alignments and ask questions followed by a brief presentation and question and answer period.
- Alternatives workshop 2, held on September 12, 2019 at the New World Center in Miami Beach, saw 57 attendees evaluate the Tier two results. The open-house format allowed attendees to review alignments and ask questions followed by a brief presentation and question and answer period.
- Alternatives workshop 2, held on September 16, 2019 at the Marriott Biscayne Bay in Miami, saw 58 attendees evaluate the Tier two results. The open-house format allowed attendees to review alignments and ask questions followed by a brief presentation and question and answer period.

SECTION 6. DESIGN FEATURES OF THE RECOMMENDED ALTERNATIVE

6.1. ENGINEERING DETAILS OF THE RECOMMENDED ALTERNATIVE

The major components of both APM and Monorail transit systems include:

- Elevated guideway structures
- Stations

- Systems
- A Maintenance and Operations facility

The alignment of the recommended alternative (identified in **Section 4.6**) and the engineering details of these components are summarized below, followed by a summary of the ridership forecasts and service plan for the system. The concept plans and typical sections for the recommended alternative are attached as Appendix B.

6.2. ALIGNMENT

Within the Bay Crossing sub-area, the Trunkline of the project would extend from the existing Downtown Metromover Omni Extension with a new station at Herald Plaza, then eastward along MacArthur Causeway to 5th Street near Washington Avenue. The transit line terminus transitions to a single track in order to minimize impacts. This is similar to the current configuration at the last station on Brickell Avenue which also transitions down to single track. However, if there is a need to double track in the future, there is room to do so on 5th Street without impacting right-of-way. Furthermore, from a station safety and security standpoint, operations would also be similar to that which currently exists at Brickell station and would comply with all applicable County codes and ordinances. A new Y-crossover would allow Inner Loop trains to continue east on a new elevated guideway structure on the south side of the MacArthur Causeway, approximately 15 feet south of the Causeway, with similar column alignment as MacArthur and no impacts to navigational channels. A station would be provided at the Children's Museum on Watson Island. The alignment would continue onto Miami Beach, passing over the proposed pedestrian bridge at 5th Street and Alton Road and continue along 5th Street in a center alignment with stations at Lenox Avenue and at Washington Avenue which would serve as the APM's eastern terminus. From there, bus/trolley service would be provided and extend northward along Washington Avenue to the Miami Beach Convention Center. The bus/trolley service would be within dedicated outside travel lanes in the existing right of way. Construction of these lanes are locally funded by the county and FDOT.

Within the Design District/Midtown subarea, the project alignment would extend from the existing School Board Metromover Station on NE 15th Street to N Miami Avenue, with a two-track elevated alignment extending to a terminus at NW 41st Street and stations located at North Miami Avenue, NW 16th, 22nd, 26th, 29th, 34th and 40th Streets.

6.3. ELEVATED GUIDEWAY STRUCTURES

The recommended alternative would feature an elevated guideway structure both for the Trunkline in the Bay Crossing sub-area and the extension in the Midtown/Design District sub-area. The guideway structure would be comprised of reinforced concrete columns of an oblong shape, typically 4 feet to 6 feet in diameter, supporting a guideway deck with a minimum of 16.5 feet clearance above the roadway. The typical column spacing would be 130 feet in the Bay

Crossing sub-area and would vary from 90 feet to 120 feet in the Midtown/Design District sub-area (where at-grade intersections present additional constraints on column spacing). The structure would be similar for the APM or Monorail technology. The guideway deck for the APM would be a steel deck similar to the existing Metromover, whereas the Monorail would feature concrete guideway beams to provide a running surface for the trains and a lightweight steel and aluminum emergency walkway. The roadway typical section with APM guideway structure is shown on **Figure 6-1**.

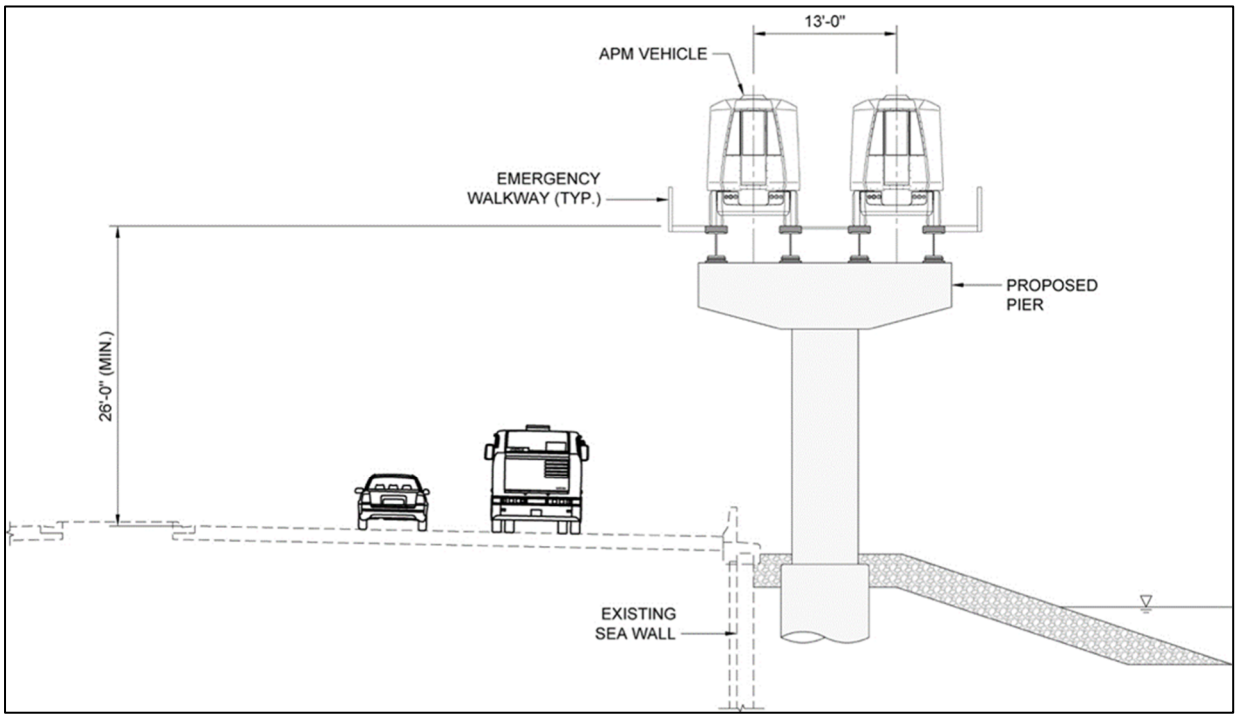


Figure 6-1 Typical Section with APM Guideway Structure

6.4. STATIONS

Final station recommendations relied on detailed station area analysis that included walksheds, existing and future land use, and bicycle and pedestrian accessibility (see Station Location Analysis Report). The Recommended Alternative features passenger stations at the follow locations:

6.4.1. Bay Crossing (Trunkline) Stations

- Herald Plaza
- Children's Museum
- 5th Street at Lenox Avenue
- 5th Street at Washington Avenue

The Herald Plaza station would be a new facility closer in proximity to the Omni Bus Transfer Terminal and would allow for seamless transfer to cross the Bay. The station has the ability to provide more transfer opportunities and the transfer would occur within the same building. The Museum Park existing Metromover station is physical constrained to serve the anticipated ridership and potential transfers from Omni.

6.4.2. Design District/Midtown Stations

- North Miami Avenue at NW 16th Street
- North Miami Avenue at NW 22nd Street
- North Miami Avenue at NW 26th Street
- North Miami Avenue at NW 29th Street
- North Miami Avenue at NW 34th Street
- North Miami Avenue at NW 40th Street

The footprint of these stations are located mid-block on Miami Avenue and would require a lane reduction for approximately one block. However, as the traffic analysis indicated, the elevated alternative does not negatively impact traffic operations along North Miami Avenue. The County will coordinate with FDOT's future Julia Tuttle Causeway PD&E with respect to traffic analysis in the area of N. Miami Avenue and JTC.

6.4.3. Miami Beach Stations

Options are being considered for the transfer facility between the elevated rail and the dedicated bus on Miami Beach. Two stations are proposed on 5th Street in Miami Beach. A transfer station at 5th and Lenox Avenue; and the terminus station at 5th and Washington Avenue. The Lenox station will be the major transit transfer station for the system in Miami Beach.

The terminus at 5th Street and Washington Avenue would provide another transfer opportunity to the bus/trolley service extending along Washington Avenue to the Miami Beach Convention Center. Trolley stops on 5th Street at Washington Avenue, as well as Washington Avenue at 5th Street would be accommodated by the City of Miami Beach in coordination with the City of Miami to facilitate the additional transfer options.

The station at 5th and Washington Avenue is depicted on **Figure 6-2**. The station concept plan for the terminus station provides for the station to be in the median of 5th Street setback from the intersection with Washington Avenue. The main access to the station platform will be from the intersection of Washington Avenue to where the main stairs and escalators from the station will lead.

The station's 5th street median location will serve as a pedestrian refuge for persons crossing 5th Street. A pedestrian promenade will extend on the median from the 5th Street Station to Meridian Avenue to the west. The pedestrian promenade on the median will be attractively designed to encourage pedestrian traffic to and from the station.

Figure 6-2 Station at 5th Street and Washington Avenue

Direct stairway access and elevator access from the west side of the 5th and Washington Station to the median pedestrian promenade are provided. The pedestrian promenade will extend the service reach of the 5th and Washington Station by allowing easier pedestrian access from the residential areas to the west both north and south of 5th Street. as well as providing easier pedestrian access from either side of 5th Street to the station platform.

The transfer station at 5th and Lenox Avenue is depicted on **Figures 6-3 through 6-5**. The station at 5th and Lenox allows easy access to the proposed Miami Beach Trolley and Miami-Dade Transportation Department bus stops at 5th Street. The station will be located on the center of the median between Michigan Avenue on the east and Lenox Avenue on the west. The main access to the station platform will be from the intersection of Lenox Avenue to where the main stairs and escalators from the station will lead. The present median will provide a pedestrian promenade to link the station to both Lenox Avenue and Michigan Avenue and thus expand the pedestrian reach of this station. Pedestrian crossing improvements will be provided.

Four bus bays are shown for each side of the street for a total of eight bus bays. The present 20 feet sidewalks will allow the inclusion of the bus bays and still provide a six feet minimum sidewalk for pedestrian movement. The bus bays will serve both Miami-Dade Transit buses and City of Miami Beach trolley buses.

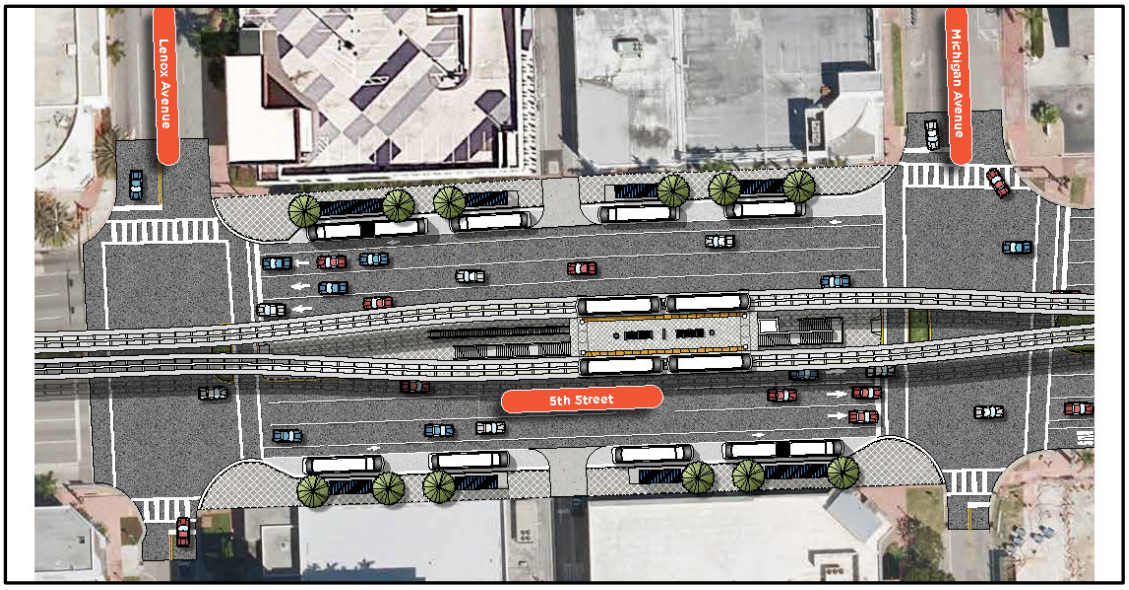


Figure 6-3 Transfer Station Option at 5th Street and Lenox Avenue

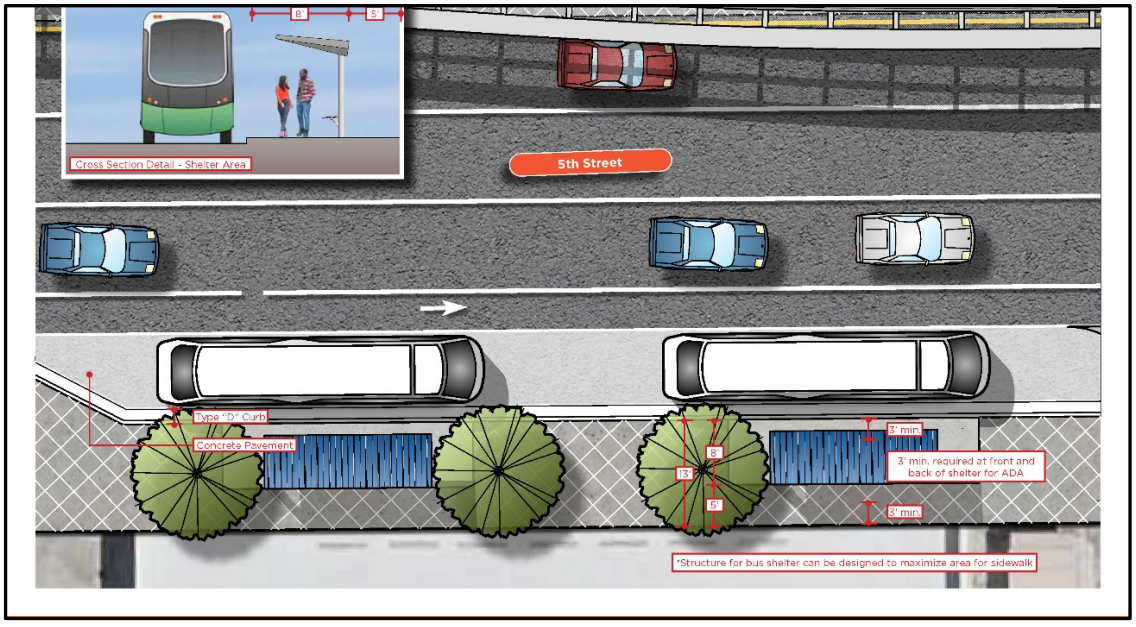


Figure 6-4 Transfer Station at 5th Street and Lenox Avenue Bus Shelter

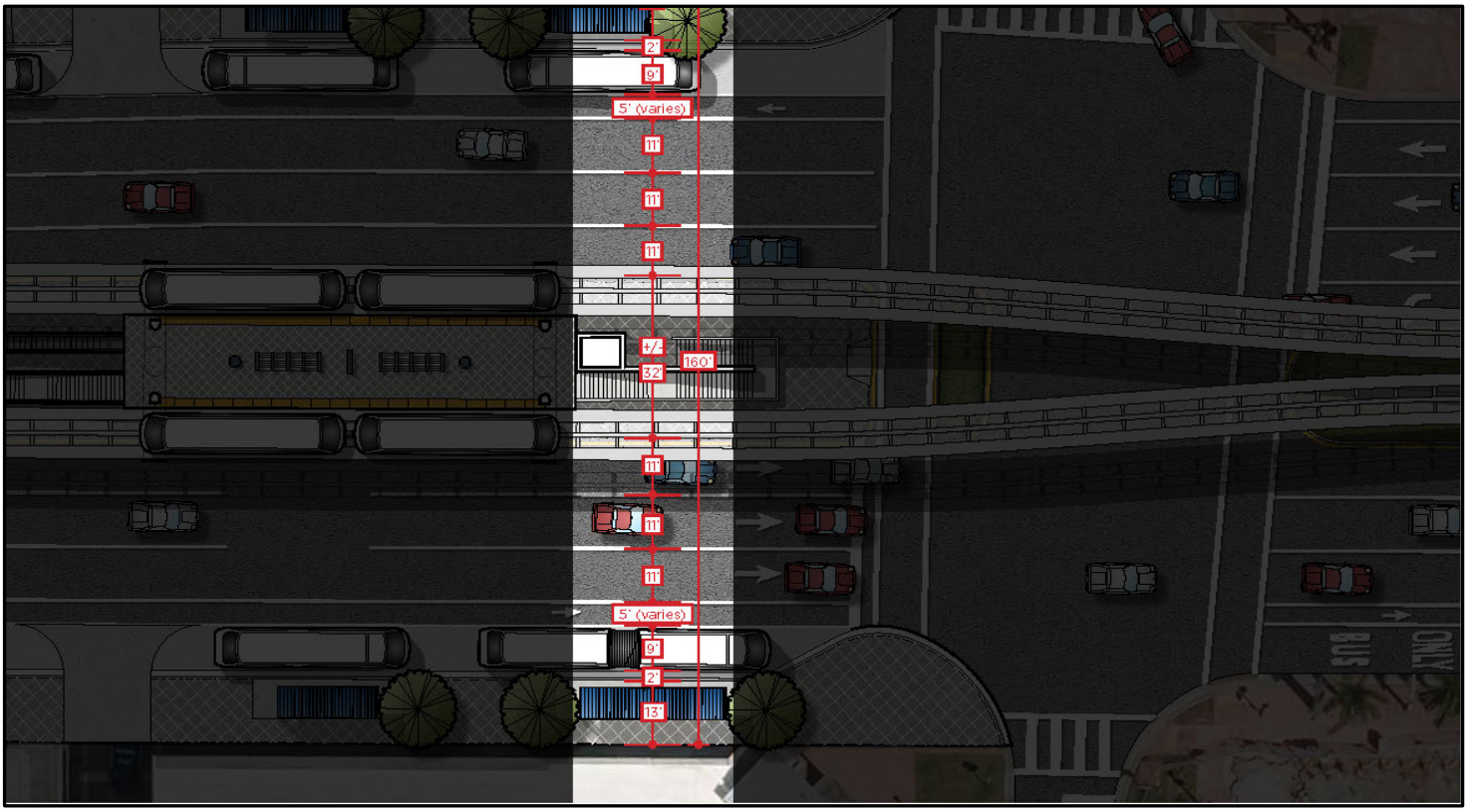


Figure 6-5 Transfer Station Option at 5th Street and Lenox Avenue Detail Plan

The bus bays will also allow dwell time for Miami-Dade Transit buses that provide service to the north areas of Miami Beach. For each side of 5th Street, two bus bays will provide stops for the Miami Beach Trolley and two bays will be provided for Miami-Dade Transit. Bus station stops along Washington Avenue will be at existing locations. Upgrades and stops will be further refined after the locally preferred alternative is selected.

All Beach Corridor project stations will be designed for ease of access, convenience and comfort and bicycle and pedestrian accessibility. All station design will meet and exceed the standards of the American Disabilities Act (ADA) to allow universal accessibility to the transit system.

The recommended station type will be center-platform stations, for ease of access and transfer to change direction of travel. Platforms will provide level-boarding and ADA-compliant minimal gap between the platform and vehicle. A tactile warning surface will be installed at the platform edge in the boarding zones. The length and width of passenger platforms will be refined during the Engineering phase of the project to provide for coordination with the requirements of the selected vehicle technology and to provide enough capacity to serve the demand as identified in the final approved ridership forecast.

To ensure that the station platforms could accommodate the anticipated ridership and meet acceptable standards for queueing rider spacing, a platform capacity queuing LOS analysis was performed based on the *Transit Capacity and Quality of Service Manual* (TCQSM) – *3rd Edition.*

To attain a conservative estimate, the analysis used peak conditions for the station with the highest ridership levels. This is the Herald Plaza Station under 2040 conditions at peak 15 minute ridership. The TCQSM suggests that typical design should aim for LOS C or D for platform queue spacing.

For platform queueing LOS, the TCQSM recommends applying a safety factor if necessary. To further ensure a conservative estimate, a safety factor of 10% was used. After applying the safety factor, the average pedestrian area is between 6 and 7 square feet per person. This falls within LOS D. Although this reflects relatively cramped conditions, it also represents the worst fifteen minutes of the peak hour and is noted as typically acceptable for peak conditions (see Memorandum and associated analysis results dated 12-19-2020 in project file).

A rendering of the typical station design concept is shown on **Figure 6-6.**

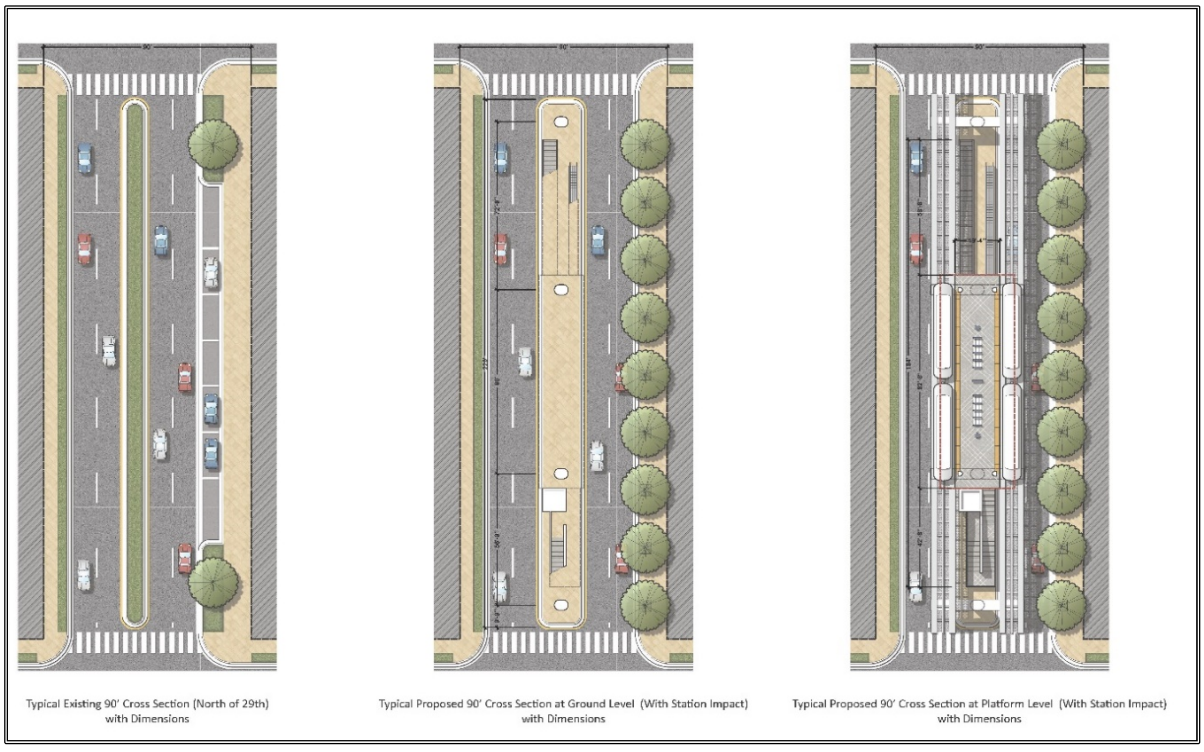


Figure 6-6 Typical Station Design Concept

The stations will feature escalators, elevators, and emergency egress stairways to meet ADA and National Fire Protection Association standards. The stations will include directional and emergency information signage and passenger information systems for audio/visual announcements and train arrival information. The platforms will be attractively illuminated for

safety and aesthetics. Security will include closed circuit TV (CCTV), emergency telephones, and security personnel. CPTED (Crime Prevention Through Environmental Design) principles will be incorporated in the design of the stations.

The stations and the vertical access system, stairs, escalators and elevators will be covered by a canopy structure to protect passengers from the sun and rain. The canopy will provide an opportunity for an iconic architectural presence that integrates the stations into their urban setting.

6.5. SYSTEMS

The APM and Monorail technologies feature similar systems elements that include:

- DC traction power, supplied from traction power substations spaced at intervals of 0.5 to one (1) mile along the alignment and distributed via a power rail and power distribution conduits along the guideway.
- Automated train control systems for driverless operation and efficient management of train spacing that allows for trains to arrive as frequently as every 75 seconds.
- Passenger information systems on the trains and in the stations providing arrival and next stop information and other informational and, as needed, emergency announcements and visual displays.

Manufacturers of APM and Monorail systems typically supply the systems elements together with the vehicles as a complete, integrated package.

A traction power load flow study was conducted to obtain a preliminary indication of the traction power requirements, including traction power substation size and locations for the project. Based on the analysis parameters, it was determined that the APM system could be operated with four new traction power substations located at new passenger stations. The details of the analysis and findings is provided in the Traction Power Load Flow Report located in the project file.

6.6. MAINTENANCE AND OPERATIONS FACILITY

The Recommended Alternative will require the siting and construction of an MOF to provide for storage of the vehicle fleet, preventative maintenance and running repairs, and office/shop space for maintenance and operational staff functions. Three acres or less will be required to accommodate the MOF building and the lead track for connection to the operational track. An MOF would be located in the Design District/Midtown sub-area for the Miami Extension, and on Watson Island for the Trunkline.

For the Miami Extension MOF, two alternative site locations are under consideration along the North Miami Avenue corridor. Their locations are shown on **Figure 6-7** and labeled AGT/APM 16 and AGT/APM 13. Site layouts for these MOFs are shown on **Figures 6-8 and 6-9**. The sites are in an area surrounded by single and multi-family residences, institutional facilities, commercial uses, utilities, and parks. The MOF sites, themselves, are either vacant or have low

occupancy. The lots would be cleared of any existing structures and redeveloped to meet the needs of the elevated transit corridor to include a spur of elevated railway, MOF building, and parking.

It should be noted that the northern portion of AGT/APM 13 is owned by TECO Peoples Gas and is the site for a major natural gas compressor station. Based on National Pipeline Mapping Service maps, Florida Gas Transmission's (FGT) natural gas pipeline, which runs along the western edge of North Miami Avenue between 15th and 17th Streets and turns west on 17th Street, also connects to this compression station. The cost of a natural gas compressor station, depending upon the size, ranges from $2 Million for the smallest station to $25 Million for a major transmission station. This does not include the cost of relocating both FGT's pipeline (approximately $20M per mile) and TECO's pipeline. The high cost of utility relocations associated with the use of this site may render it non viable as an MOF.

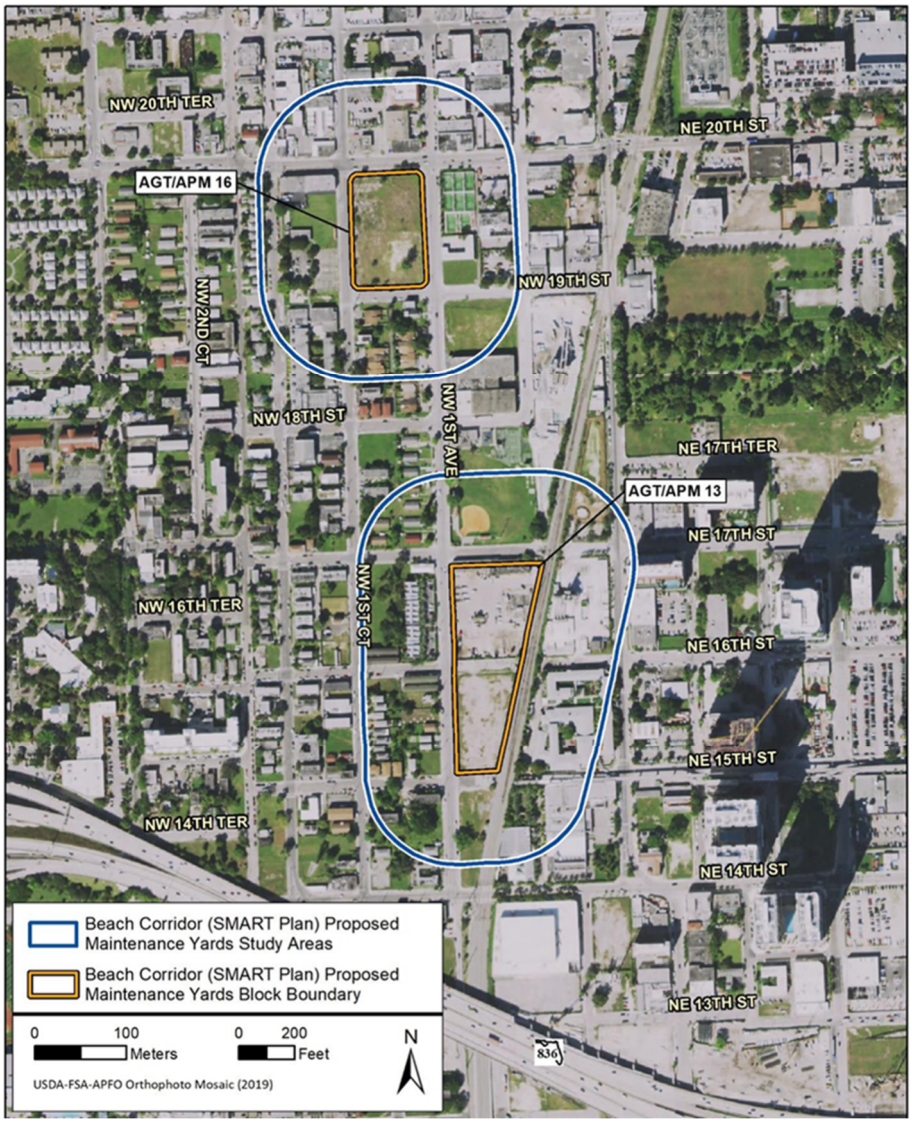


Figure 6-7 Miami Extension MOF Location Alternatives

Figure 6-8 MOF Site Layout AGP/APM 16

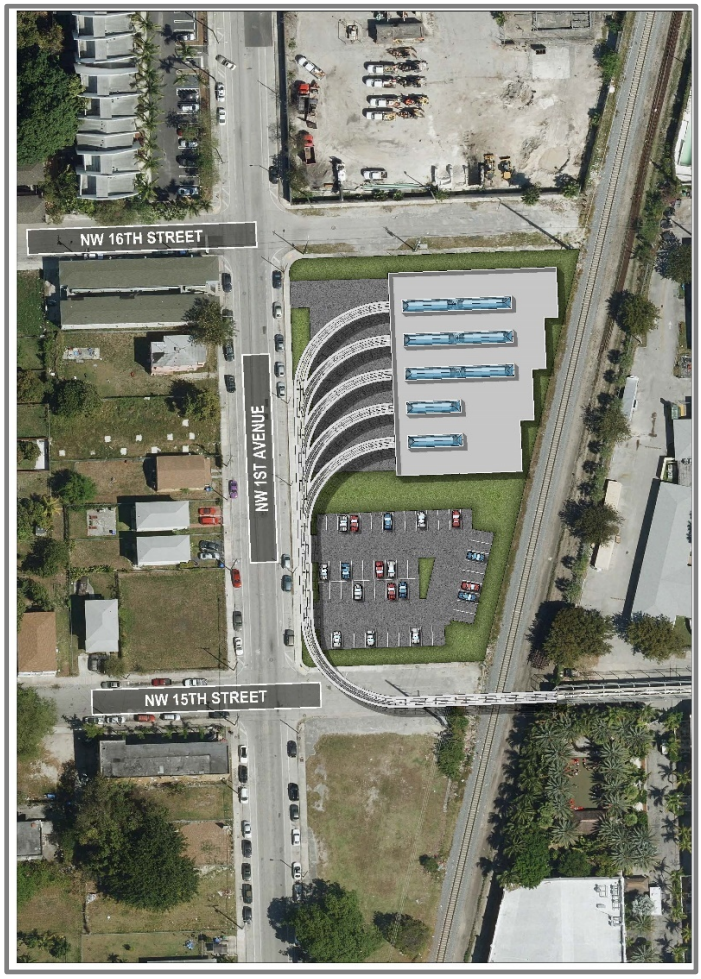


Figure 6-9 MOF Site Layout AGP/APM 13

For the Watson Island MOF, two alternative site locations, are under consideration adjacent to the MacArthur Causeway corridor. Their locations, identified as Trunklines 1 and 2, are shown on **Figure 6-10**.

Figure 6-10 Watson Island MOF Location Alternatives

The two alternative locations for the Watson Island MOF are currently owned by the City of Miami and are in an area currently utilized for commercial, institutional, and government-owned facilities, along with parks, preserves, conservation areas, and PortMiami. Based on Miami-Dade County Property Appraiser records, the land use designation for the Trunkline 1 site is "Municipal", and Trunkline 2 site is "Restaurant: Retail Outlet". There are no residential properties in the vicinity of either sites.

The MOFs will be a two-story structure specifically designed to meet the program requirements of the vehicle technology. Contingent on programmatic and design decisions the structure may house on the ground level mechanical equipment, offices and parking. The upper level will contain the maintenance functions and additional office as required. The elevated guideway will lead directly into the second floor. The building will be designed to meet zoning, building code, and federal FEMA building ground level flood elevation requirements.

Site building placement will respect the immediate surrounding context. The maintenance function will be an enclosed space and where required appropriate sound and visual buffers to the surrounding area will be provided as may be necessary. The architectural design of the structure will be aesthetically pleasing and contribute to the overall character and livability of the surrounding area.

Sustainability will form an integral part of the MOF design and construction. The project will seek U.S. Green Building Council certification. The building will meet, at a minimum, the LEED requirements for the Certified category for LEED V4.1 BD+C.

A desktop CRAS analysis specific to the four alternative MOF locations was conducted in April 2021. The analysis concluded that no previously recorded archaeological resources are documented within the Miami Extension MOF buffer areas. However, none of the locations for the Miami Extension MOF have been subject to Phase I archaeological testing. The analysis also found that nine historic resources have not been evaluated for NRHP eligibility by SHPO, 10 have been determined ineligible, and two were determined NRHP-eligible by the SHPO. Therefore, it is recommended that a more detailed survey be conducted as part of the CRAS for the selected Miami Extension MOF location.

For the Trunkline, the analysis concluded that the alternative MOFs on Watson Island have no potential to affect historic properties. And that archaeological testing is not required in this area because the island is man-made with no potential for unidentified archaeological sites. Therefore, no additional cultural survey is necessary for either of the alternative maintenance yard locations on Watson Island.

SHPO has concurred with the MOF CRAS analysis in a letter dated July 13, 2021, which can be found in the project file. .

6.7. SERVICE PLAN & OPERATIONS

Service plans, operating characteristics, and annual operations and maintenance costs estimates were developed for the two technologies advanced as technology options for the recommended alternatives. The operation of the APM technology was developed as two operational alternatives, one that considers a shuttle service for the Bay Crossing sub-area and another that considers two extensions of the existing Metromover to serve both the Bay Crossing and Design District/Midtown sub-areas. The operation of the Monorail technology was developed only for the Bay Crossing sub-area.

6.7.1. Operational Concepts

a. *APM Shuttle Operational Concept*

- a new service to connect Museum Park station and Miami Beach via MacArthur Causeway (APM Shuttle).

APM Downtown-to Beach and APM Omni Extension Operational Concept:

- A new service to connect Government Center station and Miami Beach using the existing Metromover track and MacArthur Causeway (APM Downtown – Beach), and
- An extension of the existing Metromover Omni loop from the School Board Station to connect the Government Center and the Design District via Miami Avenue (APM Omni Extension).
- Note that the planned communication and systems upgrade of the Metromover is assumed in this operational concept; it provides the system capability necessary for this operation.

b. *Monorail Operational Concept*

- A new service to connect the Herald Plaza at the mainland and 5th Street &Washington Avenue on Miami Beach via MacArthur Causeway.

The weekday and weekend service plans for the Recommended Alternative are identical regardless of technology and sub-area, as shown below in **Tables 6.1** and **6.2**.

Table 6-1 Alternative-Weekday Service Plan

Schedule	Early Morning		AM Peak		Midday		PM Peak		Evening		Late Night	
	from	*to*	*From*	*to*	*from*	*to*	*From*	*to*	*from*	*to*	*from*	*to*
	5:00 AM	7:00 AM	7:00 AM	9:00 AM	9:00 AM	4:00 PM	4:00 PM	6:00 PM	6:00 PM	9:00 PM	9:00 PM	12:00 AM
Headway	10	min	5	min	10	min	5	min	10	min	20	min

Table 6-2 Recommended Alternative-Weekend Service Plan

Schedule	Early Morning		AM Peak		Midday		PM Peak		Evening		Late Night	
	from	*to*	*From*	*to*	*from*	*to*	*from*	*to*	*from*	*to*	*from*	*to*
	5:00 AM	7:00 AM	7:00 AM	9:00 AM	9:00 AM	4:00 PM	4:00 PM	6:00 PM	6:00 PM	9:00 PM	9:00 PM	12:00 AM
Headway	20	Min	20	min	10	min	10	min	10	min	20	min

The operating characteristics of the APM and Monorail technologies are very similar. A 15-second dwell time at stations is assumed for each APM and Monorail alternative, given that they will be able to take advantage of multi-door boarding, level boarding, and off-vehicle payment system.

Layover/recovery time is considered as the time between the end of revenue service on one trip and the resumption of revenue service on the next trip at a common terminus. This allows the vehicle operator to take a break and allows any service running behind schedule to catch up (Federal Transit Administration). Driverless trains/vehicles often require less layover time as compared to service that requires transit operators. In addition, service running on elevated guideways usually have better on-time performance as compared to service running at-grade or in mixed traffic. APM and Monorail trains are driverless and running on fully elevated guideways. Given these service characteristics, we have assumed an additional 10 percent layover/recovery time added to the total travel time for each APM and Monorail alternative. This is more efficient than the 20 percent layover/recovery time that would be required for LRT or BRT alternatives. Key operating characteristics of the APM and Monorail are summarized in **Table 6.3**. **Figure 6-11** depicts the full service plan for the Recommended Alternative.

Table 6-3 Recommended Alternative-Operating Characteristics

Technology	APM - Trunkline	APM Miami Extension	APM - Beach Express	Monorail
Length (mile)	3.8	4.0 (1.7 new)	5	3.8
Calculated Average Speed (mph)	35	13	23	35
One-way Travel Time (min)	6	19	14	6

Table 6-3 Recommended Alternative-Operating Characteristics				
Dwell Time (sec)	15	15	15	15
Layover / Recovery Time	10%	10%	10%	10%
Vehicle per Train	2	2	2	2

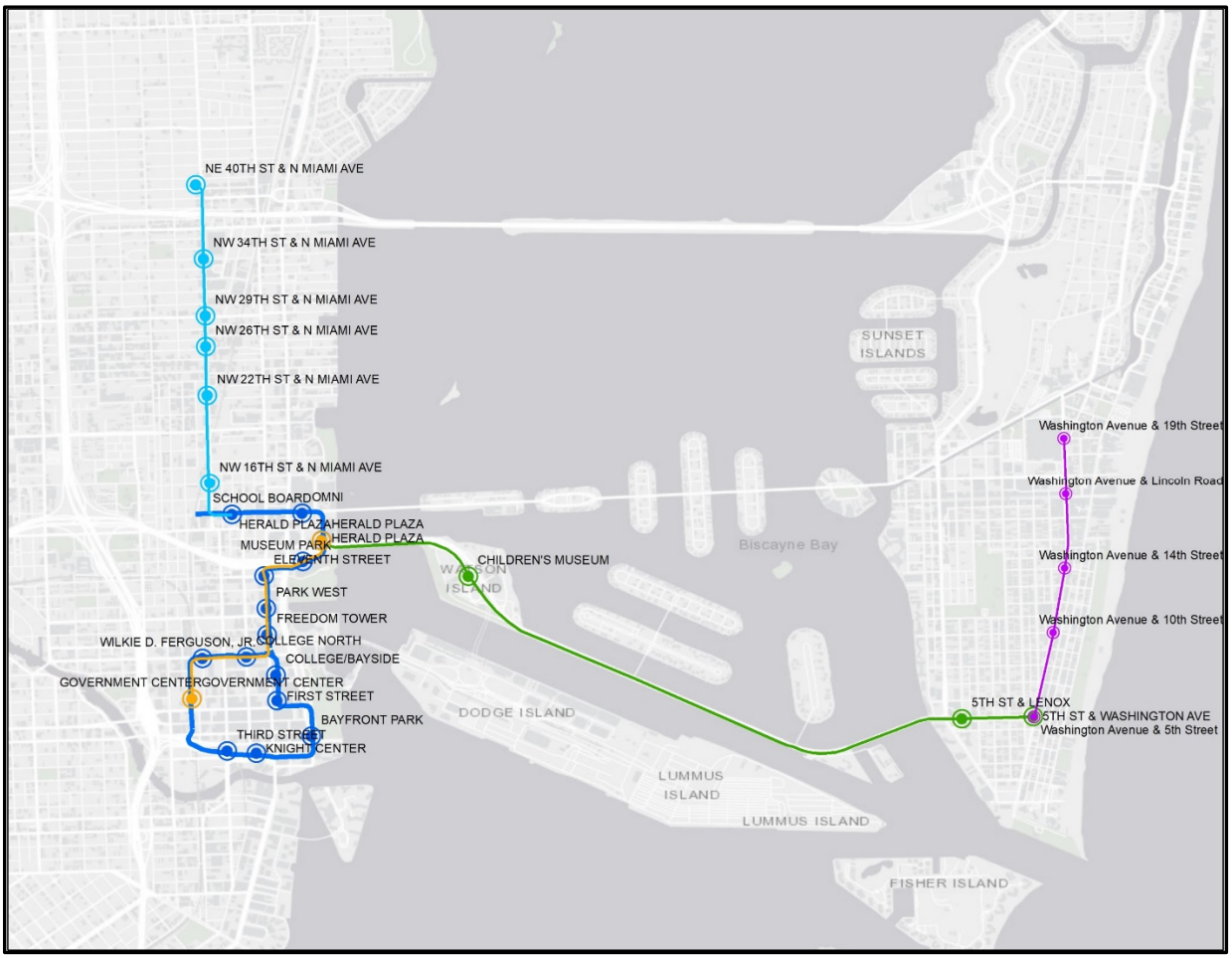


Figure 6-11 Recommended Alternative Service Plan

6.8. RIDERSHIP FORECASTS

Ridership forecasts for 2040 ridership levels for both the Bay Crossing Trunkline and full Corridor Alternative and for the two operational concepts are summarized in **Table 6.4.**

As mentioned previously, any express service options analyzed for ridership purposes will need to be further refined as track improvements are necessary along the existing Metromover to accommodate the service. . Therefore, more detailed analysis will be required prior to implementing the express service feasibility.

Table 6-4 Average Weekday Ridership Forecasts-Trunkline & Corridor Alternatives		
Technology	Bay Crossing / Trunkline (Herald/Museum Park-Beach)	Bay Crossing + Miami Extension + Beach Extension
APM (One-Seat Ride)[1]	13,000 - 19,400	32,300 - 48,500
APM (Transfer)[1]	10,200 - 15,400	27,900 - 41,900
Monorail[1]	10,200 - 15,400	27,900 - 41,900
LRT[2]	8,000 - 12,000	24,800 - 37,200
BRT I-395[3]	N/A	11,500 - 21,400
BRT I-195[3]	N/A	11,500 - 21,400
1 May add 3,000 – 5,400 riders from parallel/duplicate routes 113, 119, 120 2 Added ridership would be lower due to walk distance from Omni/Herald bus terminal 3 See project alignment description		

6.9. DESIGN EXCEPTIONS AND VARIANCES

Design Exceptions and/or Variances for the Bay Crossing Trunkline, specifically along 5th street, are as follows:

- Design Variance for Lateral Offset
- Design Variance for Length of Need for Development of Concrete Barrier Wall
- Design Variance for Cross Slope
- Design Variance for Border Width
- Design Variance for Shoulder Width
- Design Variance for Lane Width

6.10. SUMMARY OF ENVIRONMENTAL IMPACTS OF THE PREFERRED ALTERNATIVE

6.10.1. Land Use Changes

Based on the Future Land Use Plans for Miami, Miami Beach and Miami-Dade County, the land uses along the corridor and in the surrounding areas are anticipated to remain relatively unchanged. The proposed project is consistent with the land use vision of the area as identified in the comprehensive plans of the Cities of Miami and Miami Beach and Miami-Dade County. DTPW has coordinated with the Cities of Miami and Miami Beach, Miami-Dade County, and the TPO to ensure that the project is consistent with local government comprehensive plans. While

institutional and educational facilities are not a large percentage of the land use, the proposed project serves to connect major cultural, educational and government centers in Miami and Miami Beach.

The Beach Corridor Rapid Transit Project will enhance intermodal connectivity in the region, including access to community features such as Museum Park, the Miami Arena, the Adrienne Arsht Center for the Performing Arts, Ocean Drive, the Miami Beach City Hall, the Miami Beach Convention Center, Wynwood Walls, and businesses and community services in both Miami and Miami Beach. The project proposes to provide direct, convenient, and comfortable rapid transit to serve existing and future land uses as well as enhanced interconnections with other transit and non-transit modes of transportation. The project's connection to major focal points also facilitates use of other modes of transportation or recreation, including vehicular, pedestrian, cycling, boating, and paddling.

6.10.2. Social Impacts

During the Project Development phase, a PIP was implemented by DTPW in coordination with the Miami-Dade TPO, City of Miami, and City of Miami Beach in accordance with Part 1, Chapter 11 (effective January 14, 2019) of the PD&E Manual. The PIP goal was to solicit input from residents and business owners on potential project effects related to community cohesion and social interaction as well as potential solutions to ensure that both the social and transportation needs of the surrounding communities are addressed. Public outreach activities included transportation disadvantaged and Limited English Proficiency populations in accordance with applicable Acts and Executive Orders. While there are vulnerable populations and numerous social facilities in the vicinity of the project corridor, disproportionate adverse effects to Environmental Justice populations are not anticipated, and the project is expected to enhance access to social, cultural, and institutional facilities.

The new rapid transit will occur on existing rights-of-way and a separate transit structure south of MacArthur Causeway. No residential displacements are anticipated. Furthermore, no population changes are anticipated as a result of the project. The Overtown neighborhood has previously been adversely affected by the construction of public highways in the 1950s and 1960s. Therefore, public involvement has been conducted to provide that the project meets the needs of the community and the populations that may be temporarily impacted by the project. The project will improve the ability of the resident populations to access important social, cultural, and institutional facilities and community features. The project will continue to be conducted in accordance with Title VI of the Civil Rights Act and Executive Order 12898 regarding Environmental Justice to ensure that there are no disproportionate effects on low-income or minority populations.

The project is not anticipated to negatively affect community cohesion. The new rapid transit will occur on existing rights-of-way and a separate transit structure south of MacArthur Causeway

and will not result in any barriers dividing neighborhoods. The project is anticipated to increase neighborhood interaction and connectivity by improving the ability of the resident populations to access important social, cultural, and institutional facilities and community features. The project is intended to improve the people-carrying capacity with rapid transit throughput to the sub-areas along the project corridor and promote and support a multi-modal, multi-user transportation network that is pedestrian and bicycle friendly. No changes in traffic patterns through established neighborhoods are anticipated as a result of this project.

The project will not result in the creation of isolated areas and is anticipated to increase neighborhood interaction and connectivity by improving safe access to community activity centers and facilities. The project will not jeopardize emergency services response time, as the project will be constructed in or above the existing rights-of-way and on a separate transit guideway crossing Biscayne Bay. It is anticipated to reduce on-street vehicular congestion, which should result in fewer collisions. Further, this alternative transit option will provide increased capacity for evacuation in the event of severe storm events.

Overall, the project is consistent with the social values and vision of the communities involved and compatible with their plans, goals, and objectives. The project will serve all community populations equitably and is anticipated to have a positive effect on quality of life in the Miami and Miami Beach communities. The project has the potential to incentivize new development along major project corridors that are zoned for medium to high intensity mixed-use development.

6.10.3. Economic

The main objective of the project is to enhance mobility in Miami and Miami Beach by promoting and supporting a multimodal and multiuser transportation corridor that is also pedestrian and bicycle friendly. Major roadway segments in the Beach Corridor are lined with commercial/retail/office land uses and are within the Miami-Dade County Enterprise Zone. Therefore, economic development activities will continue to be supported along the corridor in both Miami and Miami Beach.

The FDEO stated that the project will offer and enhance the provision of an alternative mode of travel via rapid transit technology and new development is likely to benefit from the project. The City of Miami Beach provided that the project has the potential to incentivize new development along major project corridors that are zoned for medium to high intensity mixed-use development. The FDEO also noted that the Beach Corridor Rapid Transit Project will allow greater diversification and growth of business development in the project area. The sustaining and continued growth of tourism can be facilitated by the non-auto integration of travel modes between Miami and Miami Beach with a strong potential to generate jobs.

It is expected that this project will enhance access to businesses and employment through improved connectivity, and any impediments to business access or visibility during construction

will be temporary. There will be no permanent changes to traffic patterns, business access or visibility, and increases in local and regional employment opportunities are expected.

The project is not anticipated to have adverse effects on the tax base of Miami-Dade County or the other affected municipalities. The increased connectivity could attract businesses to the study area, thereby increasing the area's contribution to the tax base.

This project will increase connectivity to commercial hubs of economic importance and there will be no permanent changes to traffic patterns. The project will improve accessibility to major employment hubs by providing alternative routes between Miami and Miami Beach, and among neighborhoods within the two cities. Traffic patterns for people living or working in the area due to construction will not be permanently impacted.

Current economic activities will continue to be supported in the area and the land use character will remain relatively unchanged. The project will provide an alternative mode of transportation to access commercial and employment hubs in Miami and Miami Beach. The project will enhance access to local businesses and increase the mobility of people and goods to and from the surrounding commercial areas. Access to adjacent businesses may temporarily be affected during project construction. However, the project does not propose to permanently move or change access to local businesses.

Access for special needs patrons, as well as the general population, is anticipated to ultimately be improved as a result of this project. This project is not anticipated to impact access to transportation modes or services that serve special needs patrons and will increase transportation options for those without motor vehicle access.

6.10.4. Mobility

The typical sections for each of the four modes of transit under study include pedestrian facilities on the arterial roadways (North Miami Avenue, Washington Avenue) and bicycle lanes on both of the arterial roadways and the Bay Crossing. The proposed project will enhance mobility by 1) increasing the person-throughput to the Beach Corridor's major origins and destinations via rapid transit technology; 2) connecting to and providing interconnections with Metrorail, Tri-Rail, Brightline, Metromover, Metrobus routes, Miami and Miami Beach circulators, jitneys, shuttles, taxis and Transportation Network Companies; and 3) promoting pedestrian and bicycle friendly solutions in the Beach Corridor.

The project proposes to provide direct, convenient, and comfortable rapid transit to serve existing and future land uses as well as enhanced interconnections with other transit and non-transit modes of transportation. Connection to major destinations also facilitates use of other modes of transportation or recreation, including vehicular, pedestrian, cycling, boating, and paddling. The Beach Corridor Rapid Transit Project will enhance intermodal connectivity in the region.

The project will improve accessibility to major employment hubs and community activity centers and services by providing alternative routes between Miami and Miami Beach, and among neighborhoods within the two cities. The project is anticipated to increase connectivity by improving the ability of the resident populations to access important social, cultural, and institutional facilities and community features. The project is intended to improve the people-carrying capacity with premium rapid transit throughout the sub-areas along the project corridor and promote and support a multi-modal, multi-user transportation network that is pedestrian and bicycle friendly. The project is anticipated to improve traffic circulation in the surrounding areas by alleviating on-street vehicular traffic. The project is not expected to decrease public parking facilities within the study area.

6.10.5. Aesthetic Effects

The land use character in each of the sub-areas is anticipated to remain relatively unchanged. The project appears to be consistent with the future land use vision of the area. However, it is anticipated that new rapid transit will have a visual effect on the corridor.

In the Bay Crossing sub-area, an elevated mode of transit is being proposed. The transitway is proposed on the south side of MacArthur Causeway, which will allow causeway access to the residences on Hibiscus, Palm and Star Islands to be maintained. Median landscaping will remain undisturbed. PortMiami is south of MacArthur Causeway across the channel. By elevating the transit guideway, views of the Miami Channel and PortMiami will be available for vehicles traveling across MacArthur Causeway. The new transit is not anticipated to affect the view of residents on Hibiscus, Palm and Star Islands. Aesthetic features of the transit guideway will be further explored during design.

In the Midtown/Design District, Downtown Miami is characterized by skyscrapers and other commercial, institutional, and light industrial land uses. The project would connect with the existing elevated Metromover. Therefore, an elevated mode of transit would not be incompatible with the existing downtown Miami city character.

In Miami Beach sub-area, only at-grade modes of transit are proposed due to its aesthetic character. However, the landscaping may be removed to accommodate a dedicated transit lane, which would alter the aesthetics of the streets.

6.10.6. Relocation Potential

The Beach Corridor rapid transitway is proposed to be located within existing state and county rights-of-way, including highways and arterial roadways, therefore, no right-of-way acquisition or relocations are anticipated for the corridor alignment. Potential locations of other transit-related facilities, such as maintenance facilities, will require acquisition of commercial property.

6.10.7. Historic and Archaeological Sites

The historic and architectural survey resulted in the identification and evaluation of 441 historic resources within the project area of potential effect (APE), of which 57 are currently NRHP-listed/eligible or recommended NRHP-eligible in the project CRAS. Following the CRAS, an Effects Evaluation was prepared to assess project-related effects to the NRHP-listed and -eligible resources identified within the APE.

The NRHP-listed City of Miami Cemetery (8DA01090) and Fire Station No. 2 (8DA01176) are located within the APE for the elevated APM along Miami Avenue. The NRHP-eligible F.E.C. Railway (8DA10107), Big Time Equipment (8DA10520), and 71 Northwest 14th Street (8DA10858) are also located within the APE along Miami Avenue. The SHPO concurred that the project would have no adverse effect to these resources in January 2021.

The Ocean Beach Certified Historic District (8DA11415) is located within the APE along 5th Street in Miami Beach. Based on the Effects Evaluation, together with additional information provided during an interagency conference call in April 2021 and an additional information memorandum dated May 2021, the SHPO concurred that the project would have no adverse effect to the historic district in June 2021.

Provided that the route for the proposed dedicated bus lane from Washington Avenue and 5th Street to Convention Center is limited to the repurposing of an existing traffic lane in the existing right-of-way to a dedicated bus lane, there is no potential to cause effects to the NRHP-listed Miami Beach Architectural District (8DA01040) and its contributing resources along the bus lane segment of the APE.

The recommended solution will introduce a new visual element into the viewshed of NRHP-eligible resources. However, it is not anticipated to cause severe or moderate noise or vibration impacts within the project area and will result in decreased traffic congestion resulting in no impacts to air quality. The SHPO concurred in a letter dated June 10, 2021, “that the proposed undertaking will have no adverse effect to historic properties.”

6.10.8. Recreation Areas

No impacts to any of the local parks and recreational facilities are expected to occur as a result of the project. Additionally, none of the aquatic or land-based trails within the study area are expected to be impacted by the project.

6.10.9. Section 4(f) and 6(f) Potential

No permanent use of any Section 4(f) resources is anticipated; however, temporary occupancy of Section 4(f) resources may occur during construction but would be minimal. Temporary occupancies would be short in duration, the nature and magnitude of the changes to the Section 4(f) resource would be minor, no permanent adverse physical impacts or interference of protected activities would occur, the resources would be fully restored to pre-project condition, and the

officials with jurisdiction would provide a documented agreement to the above conditions. When these conditions are met, the temporary occupancy does not constitute a use under Section 4(f).

As previously indicated, the Watson Island Baywalk Park is a Section 6(f) resource and any use of this park other than for public outdoor recreation would trigger a conversion of an LWCF Act resource per federal regulations and require replacement lands. Therefore, this Section 6(f) resource will not be used as a staging area.

6.10.10. Wetlands/Benthic Resources

A wetland evaluation was conducted in accordance with Executive Order 11990, Protection of Wetlands, US Department of Transportation Order 5660.1A, Preservation of the Nation's Wetlands, and Part 2, Chapter 9 of the January 14, 2019 FDOT PD&E Manual, Wetlands and Other Surface Waters. An underwater benthic resources survey for seagrass, coral and sponges was conducted on September 17-21, and 26-28, 2018 and a tree survey was conducted on August 16, 2019. Wetlands and benthic resources are discussed in further detail below.

Seagrass

A total of 0.185 acres of paddle grass are anticipated to be impacted from the project. Impacts to seagrass were estimated from 30% design plans and conceptual construction methodology. Seagrass impacts from installation of the foundations (drilled shafts and pile caps) were based on the area within a cofferdam at each pier location overlaid on the seagrass bed locations. Impacts from barge spudding during construction were based on two barges spudding down at each pier location near a seagrass bed seven times. A shading study was also conducted to analyze impacts from shading. All impacts were considered to be permanent.

Bed 1 will be impacted directly by two cofferdams. It was estimated that Bed 1 would be impacted from barge spudding near six locations. Due to the east-west orientation and the proposed height of the west bridge, no impacts from shading were anticipated. At the east bridge, Bed 2 would be impacted by one cofferdam and Bed 3 would be impacted by two cofferdams. The seagrass beds (Beds 2, 3 and 4) may be impacted from barge spudding at four pier locations. The east bridge is oriented southwest to northeast and is not as high as the west bridge. Therefore, shading impacts to Bed 2 were anticipated from the transit guideway. Because Bed 2 is small in size and has only 20% coverage of paddle grass, the total area of Bed 2 (0.12 acres) was included in the impact calculations.

Seagrass Mitigation

DTPW is proposing two seagrass mitigation plans to satisfy differing State and Federal seagrass mitigation requirements. Seagrass mitigation to satisfy the State requirement for seagrass mitigation to occur within Biscayne Bay Aquatic Preserves is proposed at Matheson Hammock County Park. Several meetings were held with the relevant Marine Protected Area representatives at FDEP between August 2020 and May 2021 to ensure that this plan was consistent with the goals and objectives of Biscayne Bay Aquatic Preserves. The Matheson Hammock County Park

Seagrass Mitigation Plan is incorporated into the SFWMD ERP. The seagrass mitigation plan proposes preservation and enhancement of two shoal areas with severe propeller scarring. NMFS required targeted restoration of seagrass sites for mitigation rather than preservation/enhancement and suitable restoration sites within Biscayne Bay Aquatic Preserves were not available. Therefore, restoration of propeller scars/blowholes at shoal areas in Biscayne National Park is proposed to satisfy NMFS.

Hardbottom and Coral

Impacts to hard coral, soft coral and sponges were extrapolated from the 2019 coral survey using a Resource Equivalency Analysis (REA) developed in coordination with NMFS. The REA tool allows calculation of the coral colony yearly loss (CCYL) based on inputs of species expected to be impacted by a project. For corals, it was estimated that 504 spawners, 5,132 brooders, and 393 branching corals of all size classes will be impacted. For octocorals and sponges, it was estimated that 2,846 organisms will be impacted. Per coordination with NMFS, sponges were grouped with octocorals because life history information is not as well defined for sponges. The results of the REA predicted a total loss of 8,875 corals from direct impacts; however, due to the low service value of the majority of organisms to be impacted, the CCYL was anticipated to be 6,996 organisms.

Hardbottom and Coral Mitigation

The amount of mitigation required to offset the impacts can then be calculated using the REA. To theoretically estimate mitigation at this time, outplanting of certain species of coral in specific years was entered into the REA. The REA is a working tool and will be updated as mitigation occurs. Mitigation for coral and hardbottom impacts is proposed in two forms, relocation to a site within Biscayne Bay Aquatic Preserves and outplanting of corals to offshore reefs from nursery stock. Prior to construction, relocation of corals from the impact area is proposed to minimize impacts to corals. The relocated corals will be entered into the REA and thereby reduce the number of corals that need to be outplanted from nursery stock. In addition, as per a request from FWC, corals from the impact area may be donated to entities conducting coral restoration-related activities such as research, gene banking, and propagation.

Mangroves

A total of 96 red mangrove (*Rhizophora mangle*), five black mangrove (*Avicennia germinans*) and 20 white mangrove (*Laguncularia racemosa*) were observed in the riprap south of MacArthur Causeway. The mangroves are above the water line except during high tide and, therefore, not considered wetland or Essential Fish Habitat (EFH). Mitigation for impacts to individual mangroves, however, is required by the County even if they are not wetlands. Conceptual mitigation includes planting mangroves at a recipient site in Biscayne Bay. There are also other species of trees along the causeway and in uplands that will require replacement canopy mitigation per county and city codes.

6.10.11. Water Quality and Drainage

The project will include drainage analyses and design of stormwater management systems that meet State of Florida water quality and stormwater discharge criteria for impaired waters and OFWs. Additionally, a Stormwater Pollution Prevention Program will be implemented to dictate the use of best management practices during construction to minimize impacts to Biscayne Bay. The Children's Museum Station will be located on Watson Island and will impact the west corner of one of two interconnected dry retention ponds. The ponds were permitted under the Miami Tunnel Project – Watson Island (ERP No. SI 13-0267159-004). Pond recovery is via two existing drainage wells, WW-6 and WW-3 Pond W-B will be reconfigured to account for the new station and the proposed transit guideway piers. In addition, the existing well in Pond W-A will need to be capped and replaced by a new well in the reconfigured pond. The reconfigured pond will contain the runoff from the 25-year/72-hour storm event within the confines of the reconfigured pond and meet the water quality requirements.

Water quality evaluations have been completed with the SFWMD and the project's water quality certification has been obtained through the issuance of the SFWMD Conceptual Environmental Resource Permit, included in the project file.

6.10.12. Sole Source Aquifer

DTPW received a letter from the EPA Region 4 Groundwater Section on June 5, 2020 indicating that the Beach Corridor project may cause a significant impact to the aquifer system when the bridge foundations are installed and/or construction dewatering is undertaken. However, with proper implementation of best management practices (BMPs) contained in FDOT's *Standard Specifications for Road and Bridge Construction* and from the *U.S. Bureau of Reclamation Engineering Geology Field Manual* , these potential impacts can be adequately reduced or properly mitigated.

6.10.13. Floodplains

The Recommended Alternative is not expected to impact floodplains. EO 11988, *Floodplain Management*, directs federal agencies to avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. In accomplishing this objective, "each agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities".

According to Digital Flood Insurance Rate Maps (DFIRM) from the Federal Emergency Management Agency (FEMA), the Bay Crossing is located within Flood Zone AE, a designated Special Flood Hazard Area with flood depths greater than three feet. However, the installation of drill shafts, pile caps and piers is not considered an encroachment into the base floodplain by the USCG. Thus, the proposed project will not affect flood heights or base floodplain limits.

Additionally, the project will not increase flood risks or damage; and there will be no significant change in the potential for interruption or termination of emergency service or emergency evacuation routes. Therefore, it has been determined that this encroachment is not significant.

6.10.14. Protected Species and Habitat

a. *Protected Species*

Eight federally listed species under the purview of the USFWS were evaluated to determine if the proposed project would adversely affect these species. Based on review of available data, in conjunction with field reconnaissance, the following effects determinations were made and submitted to USFWS (**Table 6-5**).

Table 6-5 Effect Determinations for USFWS Listed Species

Species	Status	Effects Determination
Calidris canutus rufa (Rufa red knot)	T	No Effect
Charadrius melodus* (Piping plover)	T	No Effect
Mycteria americana (Wood stork)	T	No Effect
Eumops floridanus* (Florida bonneted bat)	E	MANLAA
Trichechus manatus* (West Indian manatee)	T, CH	MANLAA
Alligator mississippiensis (American alligator)	SAT	MANLAA
Crocodylus acutus* (American crocodile)	T	MANLAA
Drymarchon couperi (Eastern indigo snake)	T	MANLAA

Notes: Species: * = Project falls within USFWS Consultation Area for this species.
Status: E = Endangered, T = Threatened,
SAT = Threatened due to Similarity of Appearance to a listed species,
CH = Critical Habitat.
Effects Determination: MANLAA = May affect, not likely to adversely affect

The USFWS concurred with the effects determinations by stamping the first page of the concurrence request letter on October 25, 2020.

Fourteen federally listed species under the purview of NMFS were evaluated to determine if the proposed project would adversely affect these species. Based on review of available data, in conjunction with field and benthic surveys, the following effects determinations were made and submitted to NMFS (**Table 6-6**).

Table 6-6 Effect Determinations for NMFS Listed Species

Species	Status	Effects Determination
Pristis pectinata (Smalltooth sawfish)	E	MANLAA
Epinephelus striatus (Nassau grouper)	T	MANLAA
Manta birostris (Giant manta ray)	T	MANLAA
Acropora cervicornis (Staghorn coral)	T	MANLAA
Acropora palmata (Elkhorn coral)	T	MANLAA
Dendrogyra cylindricus (Pillar coral)	T	No Effect
Mycetophyllia ferox (Rough cactus coral)	T	No Effect
Orbicella annularis (Lobed star coral)	T	MANLAA
Orbicella favolata (Mountainous star coral)	T	MANLAA
Orbicella franksi (Boulder star coral)	T	MANLAA
Caretta caretta (Loggerhead sea turtle)	T	MANLAA
Chelonia mydas (Green sea turtle)	T	MANLAA
Dermochelys coriacea (Leatherback sea turtle)	E	MANLAA
Eretmochelys imbricate (Hawksbill sea turtle)	E	MANLAA
Lepidochelys kempii (Kemp's ridley sea turtle)	E	MANLAA
Halophila johnsonii (Johnson's seagrass)	T, CH	No Effect
Johnson's seagrass Critical Habitat	CH	MALAA

Notes: Status: E = Endangered, T = Threatened, CH = Critical Habitat
Effects Determination: MANLAA = May affect, Not Likely to Adversely Affect, MALAA = May Affect, Likely to Adversely Affect

Because a "*May Affect, Likely to Adversely Affect"* (MALAA) determination was made for Johnson's seagrass Critical Habitat, formal consultation with NMFS was initiated, requiring NMFS to perform a Biological Opinion for the listed species/critical habitat under their purview. NMFS concurred with the effects determinations for fishes and sea turtles with implementation of the *Sea Turtle and Smalltooth Sawfish Construction Conditions* (NMFS 2006); however, they made a "*Not Present*" effect determination for the corals and Johnson's seagrass. The NMFS concluded that the proposed project is likely to adversely affect, but will not destroy or adversely modify, Johnson's seagrass designated critical habitat.

b. *Essential Fish Habitat*

The project has the potential to impact EFH, HAPC and managed species in the project area. Impacts to the estuarine water column and unvegetated bottoms (sand/shell or mud) are anticipated to be minimal. Impacts to Submerged Aquatic Vegetation (SAV) and hardbottom communities are anticipated to be more than minimal but less than substantial based on the amount of SAV and live/hardbottom habitat in the project area. Potential impacts to EFH/HAPC may occur from installation of the piers for the transitway and barge spudding during construction.

Consultation and Mitigation

Consultation with NMFS for EFH was initiated by the USCG and a letter with Conservation Recommendations was received on October 14, 2020. The project will comply with all of the Conservation Recommendations as stated in a response to the October 14, 2020 letter. NMFS provided an EFH close-out letter for this phase of the project on December 16. Coordination with NMFS will continue during the next phases of the project to clarify outstanding items in the EFH close-out letter.

6.10.15. Noise and Vibration

a. *Vibration Impacts*

FTA Vibration Impact Criteria were used to identify locations where potential impact may occur based on existing land use activities. The FTA vibration impact criteria are not based upon the existing vibration levels measured at adjacent structures to the proposed alignment. They are instead based on the frequency of the proposed transit service and the type of proposed transit vehicle only.

The FTA manual states that rubber tire mass transit systems do not cause vibration issues with building structures unless there is discontinuity or spurs in the rail guide that could cause vibrations. Rubber wheel APM's or monorails are, therefore, unlikely to cause vibration impacts while LRT would generate higher noise levels due to their steel wheels. Furthermore, APM's with rubber wheels on elevated structures are not expected to exceed 65 VdB beyond 10 feet,

b. *Noise Impact Analysis Methodology*

An operational noise assessment was conducted using the FTA guidelines spreadsheet and procedures. Project-related noise levels were calculated using FTA reference sound levels for rail transit. Potentially noise-sensitive land uses were identified.

c. *Operation Parameters*

As stated in the draft service plan, the fixed guideway system will operate in exclusive right-of-way to ensure system speed and reliability and to avoid conflicts with automobile and pedestrian traffic. The analysis was based on operations between 5 a.m. and 11 p.m., with a train arriving in each direction at each station every five minutes during peak operation hours and every 10 minutes during non-peak hours. Trains will achieve an average speed of 30 mph. **Table 6-7** shows the project train operation characteristics for alternative rail technologies.

Table 6-7 Projected Train Operating Characteristics

All Technology Alternatives	
Total Number of Daily Trains	264
Number of Trains – Day	228
Number of Trains – Night	36
Number of Peak Hour Trains	24
Average Operating Speed (mph)	15 to 45

Noise effects from the project were determined by comparing the project-generated noise exposure level at each representative receptor in the corridor to the appropriate FTA criterion, given the land use and existing noise levels. If the project-generated noise is below the level for moderate impact, no impact will occur. If the noise level is between the level for moderate impact and severe impact, a moderate impact will occur. If the project noise level is equal to or above the severe impact level, a severe impact will occur.

d. *Operational Impacts*

The APM has rubber wheels and is on an elevated guideway. This technology will cause no severe noise impacts for schools, public parks, or residential area, and two (2) moderate impacts to residential locations; and is one of the lesser intrusive rail technologies. Monorail is also rubber tire wheel technology and has no impacts. **Table 6-8** shows the residential and institutional noise impacts for each alternative technology.

The FTA guidelines do not consider the anticipated noise levels to be a strong justification for mitigation and no mitigation measures are proposed. No vibration impacts are projected; therefore, no vibration mitigation measures are necessary or proposed. FTA daytime and nighttime construction noise level thresholds for 8-hour and 30-day average noise levels will be applied. Also, FTA guidelines on allowable construction-induced vibration levels will be applied.

Minimization measures, such as monitoring noise and vibration levels, will be further evaluated during the final design phase and implemented during construction.

A complete discussion of the noise and vibration impact analysis can be found in the *Noise and Vibration Study Report.*

Table 6-8 Noise Impacts for each Alternative Technology

Technology	Residential Impact		Institutional Impact		Total
	Moderate	Severe	Moderate	Severe	
APM	2	0	0	0	2
Monorail	0	0	0	0	0
LRT	5	24	3	3	35
BRT (Option 1)	9	1	0	0	10
BRT (Option 2)	0	0	0	0	0

6.10.16. Air Quality

The project will result in decreased traffic congestion, reduced gasoline powered vehicular traffic, and reduced emissions. Therefore, air quality impacts are not expected to occur and the project is expected to have a beneficial effect on air quality.

6.10.17. Contamination

A preliminary evaluation of the project was conducted to identify potential contamination within the proposed project limits from properties or operations located within the vicinity of the project. The services were performed using procedures generally conforming to, and as specified in FDOT PD&E Manual guidelines (Part 2, Chapter 20, effective January 14, 2019).

A search of potentially contaminated sites was conducted using the FDOT ETDM EST, the FDEP Map Direct tool, and Miami-Dade County Environmental Considerations GIS to identify properties within the project area and vicinity as having present or past contamination concerns, are under investigation, or are regulated by local, state or federal environmental regulatory agencies.

A search of regulated facilities was conducted to include the following: a) known solid waste sites such as recycling facilities, transfer stations, and debris placement areas within 1,000 feet of the corridor; b) petroleum and dry-cleaning contaminated sites within 500 feet of the corridor; and c) CERCLA, EPA Superfund, and landfill sites within one-half mile of the corridor. We note that it is anticipated that the existing drainage system will be used, so separate pond sites were not evaluated as part of this study. A regulatory file review of selected sites identified within the

search buffers was conducted using the FDEP OCULUS Database and the Miami-Dade County Online Records System.

Risk ratings were assigned based on the contaminated sites' risk of impacting the project construction. The rating system is divided into four degrees of concern: High, Medium, Low and No Concern. The known presence of contamination may not necessarily represent a high cause for concern if the regulatory agencies are aware of the situation and corrective actions, where necessary, are either complete or are underway, and the contamination will not have a substantial impact on the proposed project. The following ratings were assigned:

- "No": A review of available information on the property and a review of the conceptual or design plans indicate there is no potential for contamination impact to the project. It is possible that contaminants had been handled on the property. However, findings from the contamination screening evaluation or sampling and testing results indicate that contamination impacts are not expected.
- "Low": A review of available information indicates that the site has a hazardous waste generator ID number, or the site stores, handles or manufactures hazardous materials. However, based on the review of conceptual or design plans or findings from the contamination screening evaluation, it is not likely that the site would cause contamination impacts to the project.
- "Medium": After a review of conceptual or design plans and findings from a contamination screening evaluation, a potential contamination impact to the project has been identified. If there is insufficient information (such as regulatory records or site historical documents) to make a determination as to the potential for contamination impact, and there is reasonable suspicion that contamination may exist, the property was rated at least a Medium. Properties used historically as gasoline stations and which have not been evaluated or assessed by regulatory agencies, sites with abandoned in place underground petroleum storage tanks, or currently operating gasoline stations receive this rating. As this project is proposed to be constructed within current ROW, sites received a Medium rating if there has been documented contamination on the site but not in the ROW, but tanks or other continued sources of contamination remain on-site.
- "High": After a review of all available information and conceptual or design plans, there is appropriate analytical data that shows contamination may substantially impact construction activities, have implications to ROW acquisition, or have other potential transfer of contamination related liability to the project. Sites in proximity to the project that have contamination not fully delineated within the site boundaries or documented contamination within the ROW received a High rating.

After a review of available data, several sites of potential concern were identified for the Recommended Alternative. **Table 6-9** presents the number of sites identified for each contamination risk rating category.

Table 6-9 Preliminary Contamination Screening Evaluation				
Contamination Risk Ratings				
No	Low	Medium	High	Total
8	15	10	9	42

No CERCLA, EPA Superfund, or landfill sites were identified within one-half mile of the corridor. **Table 6-10** presents a summary of the identified High and Medium risk-rated contamination sites. Contamination site locations for the Recommended Alternative are shown on **Figure 6-12**. Detailed information about these contamination sites, as well as information about sites identified as having Low and No contamination risk, is contained in the Contamination Screening Evaluation Report prepared separately for this project.

Table 6-10 Summary of Sites with High and Medium Contamination Risk Ratings		
Site Number and Name	Contamination of Concern	Risk Rating
2. FDOT – MacArthur Causeway 1191 Biscayne Blvd./NE Bayshore Dr., Miami	Petroleum in soil	HIGH
3. Miami Herald Publishing Co / Resorts World Miami Brownfield Site 1 Herald Plaza, Miami	Chlorinated solvents, arsenic, manganese, and ammonia in groundwater and soil	HIGH
7. Fleet Management Green Reuse Area / Miami Beach City – Fleet Management Facility 140 MacArthur Causeway, Miami Beach	Petroleum in soil and groundwater	HIGH
10. Sunshine 129 945 5th St., Miami Beach	Petroleum in soil and groundwater	HIGH
12. Stan's Shell 845 5th St., Miami Beach	Petroleum in groundwater	HIGH
14. Cemex – Downtown Miami Ready-Mix /Rinker Materials/Peoples Gas 1600 N. Miami Ave, Miami	Petroleum and coal tar in soil and groundwater	HIGH
18. Waste Management, Inc. of Florida (WM Recycling – Sun 6) 2000 N. Miami Ave., Miami	Iron, sulfate, and total dissolved solids in groundwater	HIGH
32. Grayline Bus Tours/Five Star Tours, Inc. 65 NE 27 St., Miami	Petroleum and solvents in soil and groundwater	HIGH
37. Washington Squared Owner LLC, Former Frankie's Valet 619 Washington Ave., Miami Beach	Solvents in groundwater	HIGH

Table 6-10 Summary of Sites with High and Medium Contamination Risk Ratings		
Site Number and Name	**Contamination of Concern**	**Risk Rating**
8. Mansur Parking Area – Former Sun Terminal 120 MacArthur Causeway, Miami Beach	Petroleum in soil	**MEDIUM**
11. OK Shamrock Corp. 524 Jefferson Ave., Miami Beach	Petroleum (MTBE) in groundwater	**MEDIUM**
20. FPL - Overtown Substation 77 NE 20 St., Miami	Lead and arsenic in soil	**MEDIUM**
24. Former Brahman Motors 2201 N. Miami Ave., Miami	Arsenic in soil	**MEDIUM**
25. Wynwood Hotel Brownfield Site 2215, 2217, 2233, 2235 NW Miami Ct., Miami	Petroleum and arsenic in soil and petroleum in groundwater	**MEDIUM**
26. Kurzban Marvin Trustee (Vacant Lot) /Proposed Wynwood Square Development 2245 N. Miami Ave.,	Petroleum (Benzo(a)pyrene and TRPH) and arsenic in soil and Benzene and Isopropyl benzene in groundwater.	**MEDIUM**
35. FL East Coast (FEC) Railway Seaboard Marine Ltd/Buena Vista Railroad Facility 100 NE 36th St., Miami	Petroleum and arsenic in soil and groundwater	**MEDIUM**
38. Baylis Corp. 501-507 12th St., Miami Beach	Petroleum in soil and groundwater	**MEDIUM**
39. One Hour Valetone (1 Hr. Valet One Cleaners) 1361 Washington Ave., Miami Beach	Chlorinated solvents (tetrachloroethene) in soil	**MEDIUM**
42. Convention Center Brownfield Site, including Miami Beach City -Miami Beach Convention Center and Miami Beach City – Jackie Gleason Theater 1700 Washington Ave., 1700 Convention Center Dr., 1901 Convention Center Dr., Miami Beach	Arsenic in soil, nitrate in groundwater	**MEDIUM**

During the design phase of this project, a Level II assessment will be conducted on Medium and High-rated contaminated sites identified, unless project design changes or updated contamination or hazardous material information shows that the site does not pose a risk to the project. The Level II assessment will further evaluate each Medium and High-rated site in the context of updated information, changes in design, design details, and right-of-way requirements. Depending on the design and updated information available for each Medium and High-rated site, a Level II assessment may include updated regulatory agency file review and/or sampling and testing of soil and groundwater to further ascertain the type, location, and potential involvement with contamination, as well as to aid in further development of approaches to address contamination during design.

Figure 6-12 Contamination Site Locations for the Recommended Alternative

It should be emphasized that High-rated sites where the contaminant plumes are not fully defined may have contamination that extends beyond the site boundaries. If a High-rated site is selected for construction of a transit station, or other subsurface project work is proposed near a High site, it is anticipated that the project will need to be coordinated closely with DERM to design and construct in a manner that will avoid impacting contamination as much as practicable. A soil management plan may be required, particularly if soil contamination has been documented and will be disturbed. For sites with documented groundwater contamination, avoidance of impacts may involve designing drainage to avoid exfiltration of stormwater to the site and avoiding dewatering if possible. If a dewatering permit from Miami-Dade County is required, a dewatering plan outlining provisions to avoid and properly manage contamination impacts will be required.

6.11. CONSTRUCTION METHODS

The transit guideway structure south of MacArthur Causeway comprises three sections that would need to be constructed adjacent to or over water. Construction will likely involve separate operations for each of the major structural components comprising; drilled shaft foundations, sub-structure and superstructure. Based on limitations to lane closures on MacArthur Causeway and due to the size and operating requirements for the equipment, constructing certain portions adjacent to bridges and shoreline with land-based cranes is precluded. Other portions of the guideway are located over land and can be constructed with land-based cranes and equipment.

The following summarizes the proposed construction method(s) and equipment required for the construction operations that cannot be conducted by land.

Borings: Prior to construction, it will also be necessary to conduct a geotechnical investigation requiring borings at each proposed pier location. This work will require marine based equipment for the sections adjacent to bridges and shoreline. To obtain the borings required at each proposed pier location, a small barge can be deployed. A conventional drill rig would be positioned on the barge to conduct the borings and the barge would be secured by two spuds. The barge will also have an excavator to remove rip-rap along the causeway at discrete pier locations prior to boring operations.

General Drilled Shaft Construction Methods: The proposed guideway structure is anticipated to have drilled shaft foundations at all piers. The drilled shafts are expected to have permanent casings driven to rock to create a seal at the bottom of the casing to prevent intrusion or extrusion of water or other materials into or from the shaft excavation. It will likely be necessary to install a temporary driving template to support the steel casings while advancing the excavations of the shafts. It is anticipated that water will be used as the drilling fluid and that no slurry will be required during the concrete placement.

Construction of the drilled shaft foundations by water will comprise a hybrid approach where construction will either be performed from barges or from temporary trestle structures. For portions of the transit guideway that cannot be constructed from barge mounted operations, the structure type and construction methods for each component will be the same, but everything will be performed from temporary trestle structures. With the possible exception of the foundations constructed from the trestle, placement of the concrete for the drilled shafts can be done with a pump truck located in the outside lane of MacArthur Causeway during nighttime closures.

Substructure Construction: The components of the substructure construction may include templates, drilled shafts, cofferdams, formworks, pile caps, piers and pier caps. In some cases, the substructure construction can take place from the same barge with the support crane being used for the drilled shaft operations. Similarly, for the portion of structure being constructed from temporary trestle, the crane supporting the drilled shaft operations can be used for substructure operations.

The operations assume that no nighttime work is performed with vibro-hammers, impact hammers or other devices that can generate a level of noise posing a risk for the marine life in Biscayne Bay. Studies have shown that the level of noise produced by impact hammers is higher than that generated by vibro-hammers. For this reason, it is recommended to use vibro-hammers during daytime operations.

Also, during the installation of permanent shafts and the installation/removal of the template and the cofferdam sheet piles, the work zone will be surrounded by floating turbidity curtains. Any turbid water will need to be contained and treated according to accepted standards before releasing it into Biscayne Bay.

Superstructure: Girder Erection: For a steel girder option, it is anticipated that the superstructure will comprise two pairs of steel girders connected by cross-frames and horizontal bracing. To avoid placing temporary towers in the water, the girders will be erected in preassembled pairs utilizing two crane picks. These operations will require two barges, each with a dedicated crane of approximately 300-ton maximum lift capacity and secured with two spuds. The two cranes will be positioned adjacent to the completed piers. A material barge will be located adjacent to the working barges. The girders will be preassembled in pairs on the material barge such that the first pick will result in a length of framing exceeding the total span length of the piers. The second pick will comprise a section where the total length of the preassembled girders will extend from a splice location close to the inflection point on the span to either the next pier or beyond. It is anticipated that the girders will be erected at a rate of approximately one span per week.

Superstructure: Concrete Running Pads and System: The finishing works for the superstructure construction include placement of the concrete running pads and systems integration. In order to expedite construction, these operations can be done from two separate equipment setups using smaller equipment. For these operations it is anticipated to use two barges each with a support crane. Each of these cranes will be secured with two spuds and be serviced by a material barge that does not have spuds. Concrete for the running pads will be delivered at night using a pump truck set up in the outside lane of the bridge or causeway. It is anticipated that installation of the running pads will be performed at a rate of one span per week and likewise, system installation will be done at a rate of one span per week. These two operations will be conducted simultaneously with the system installation lagging by one span.

Maintenance of traffic during construction on the landward side of 5th Street (just west of Alton Road to Washington Avenue) will occur in phases as depicted in Figures 6-13 and 6-14. Phase 1 will close one through eastbound lane and right turn lane to Alton Road south in order to set up construction zones for pier construction. A sub-phase to phase 1 would continue with foundation and pier construction moving east. This would require closure of Alton Road to the south. The typical section on 5th Street would remain as two lanes. Phase 2 would consist of construction of all piers/columns in the median. This would require closing one inside lane in both directions, restricting through traffic to two lanes plus turn lanes at intersections. Note that the contractor can only close one intersection at a time.

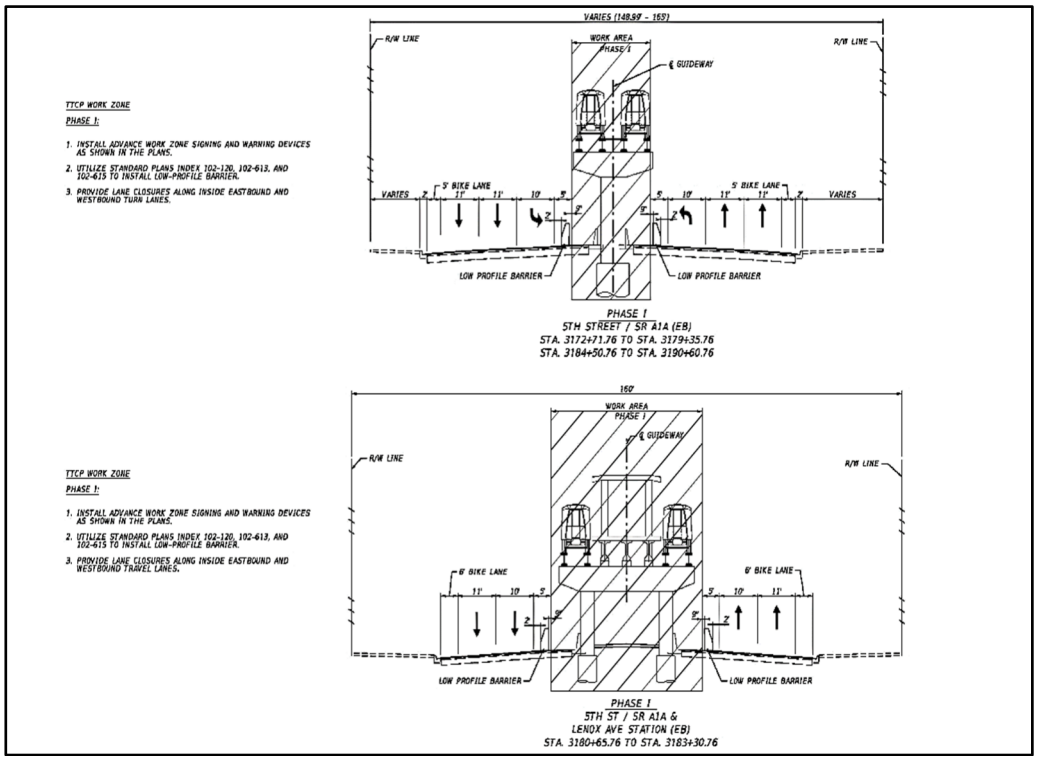


Figure 6-13 MOT Typical Sections-Phase 1 Mainline and Lenox Avenue Station

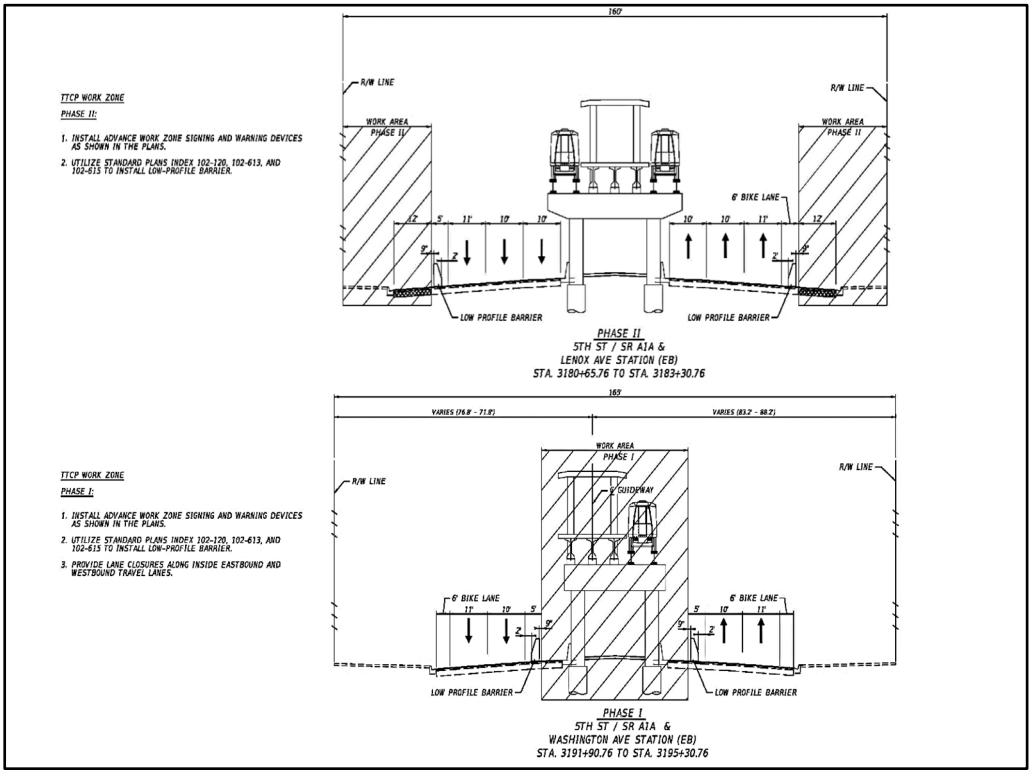


Figure 6-14 MOT Typical Sections–Phase 2 Lenox Avenue Station and Phase 1 Washington Avenue Station

SECTION 7. FINDINGS AND CONCLUSIONS

Due to the increasing traffic congestion and the demand for enhanced access to the area's facilities and services, the preliminary engineering study evaluated alternatives to increase the person-throughput to the Beach Corridor's major origins and destinations via a rapid transit technology.

The study found that the project area contains two of the highest density activity centers in South Florida, and experiences very high traffic volumes and highly congested traffic conditions for much of the typical weekday, with even greater congestion on weekends on some roadways, and particularly late at night. Both east-west and north-south road connections are constrained. Providing additional roadway capacity is unlikely due to physical and cost constraints.

Since transit currently plays a large part in providing mobility in the Beach Corridor study area, further investment in transit via the Beach Corridor would build upon a solid existing market and meet both current demand and address future growth needs within the study area.

As discussed throughout this document, transit technology and alignment options were evaluated by defined sub-areas within the total project area in order to address the distinct characteristics and needs of each sub-area. As a result of the evaluation process (which included planning, engineering, and public outreach activities), the study concluded that the following alternatives should be recommended.

7.1.1. Bay Crossing (Trunkline) Sub-Area

- Transit Technology: Automated, elevated rubber tire (APM or Monorail)
- Alignment: Begin a new station at Herald Plaza and terminate at 5th Street & Washington Avenue.

7.1.2. Midtown/Design District Sub-Area

- Transit Technology: APM
- Alignment: The alignment would extend from the existing School Board Metromover Station on NE 15th Street to North Miami Avenue, with a two-track elevated alignment extending to a terminus at NW 41st Street.

7.1.3. Miami Beach Sub-Area

- Transit Technology: Dedicated bus lanes in each direction. This is consistent with the Miami Beach Master Transportation Plan and is a locally funded improvement.
- Alignment: From 5th Street & Washington Avenue to the Miami Beach Convention Center.

APPENDICES

APPENDIX A

TPO RESOLUTION #3-2020 SELECTION OF LOCALLY PREFERRED ALTERNATIVE

APPENDIX B

CONCEPT PLANS AND TYPICAL SECTIONS FOR RECOMMENDED ALTERNATIVE