TPO
Miami-Dade Transportation
Planning Organization

DOWNTOWN MIAMI

SMART CORRIDOR HUB

TRANSPORTATION MOBILITY & CONNECTIVITY STUDY

TABLE OF CONTENTS

Introduction.....4

Literature Review.....8

First/Last Mile State of the Practice.....26

Existing Conditions.....48

Accessibility and Connectivity Analysis.....62

Implementation Plan.....74

Few elements of the built environment have a greater impact on the wellbeing of an urban community more than the mobility options available to its residents and visitors. Historically, single-occupancy car use has overshadowed other modes of transportation in urban and suburban communities throughout the U.S. However, a wave of rising congestion rates, deteriorating air quality, exponential population growth, and a desire for improved quality of life has created an imperative need to level the playing field for alternative modes of travel including mass transit, active travel, and shared mobility.

This study examines connectivity and accessibility between the different transportation modes available to travelers in Greater Downtown Miami, as well as the land-uses that support these modes.

A network of 14 Mobility Hubs is identified to support multimodal travel within the context of the Strategic Miami Area Rapid Transit (SMART) Plan. Mobility hubs are envisioned as focal points that seamlessly integrate multiple systems of the transportation network in one physical location. The purpose of the Mobility Hubs Network is to create nodes in the community that promote multimodal lifestyles, walkability, and equity.

Recommendations for first and last mile improvements are provided for each hub in the network, according to the recognize needs and character of their surrounding communities.

In addition, two focus sites selected by the Study Advisory Committee are analyzed in detail: The Underline Hub and the MiamiCentral Hub.

1 INTRODUCTION

The study area, as presented in Figure 1, is located in Downtown Miami, between I-195 to the north, SW/SE 26th Road/Rickenbacker Causeway to the south, the Intracoastal Waterway to the east, and I-95 to the west. City of Miami neighborhoods within the study area include Brickell, Downtown, Overtown, Park West, Omni, Wynwood, Midtown and Edgewater.

The guiding goals and objectives of this study have been identified as follows.

1 Identify strategic SMART hubs that support transit and regional connectivity, promote active travel, create a seamless connection between modes, and serve as development centers in Greater Downtown Miami

Objective 1 Identify hubs near points of entry to Greater Downtown.

Objective 2 Identify hubs that serve as natural connectors in the transit/non-motorized network.

Objective 3 Identify hubs connecting to notable destinations and areas of high residential/ employment density.

2 Identify set of strategies to increase sphere of influence / attractiveness of hubs and maximize their use

Objective 1: Create pedestrian-first, high-quality, activated spaces that constitute a destination of their own.

Objective 2: Identify ways to integrate emerging technologies into SMART Hubs and position Greater Downtown ahead of the curve for an autonomous future.

Objective 3: Center development and redevelopment around SMART hubs.

3 Identify steps to successful implementation

Objective 1: Allow for flexibility in planning, design and uses, accounting for existing conditions and development pipeline.

Objective 2: Set strategies that capitalize on leading travel behavior trends to support Greater Downtown 2025 Master Plan Goals.

Objective 3: Identify barriers and constraints in the active travel network connecting to SMART hubs.

Figure 1. Study Area

2 LITERATURE REVIEW

FIRST MILE - LAST MILE OPTIONS WITH HIGH TRIP GENERATOR EMPLOYERS, 2017

PURPOSE

To introduce the concepts of First / Last Mile (FLM) mobility and provide practical, implementable strategies for deployment in the developed and planned corridors for the SMART Plan high-capacity transit investments.

What can FLM mobility options achieve?

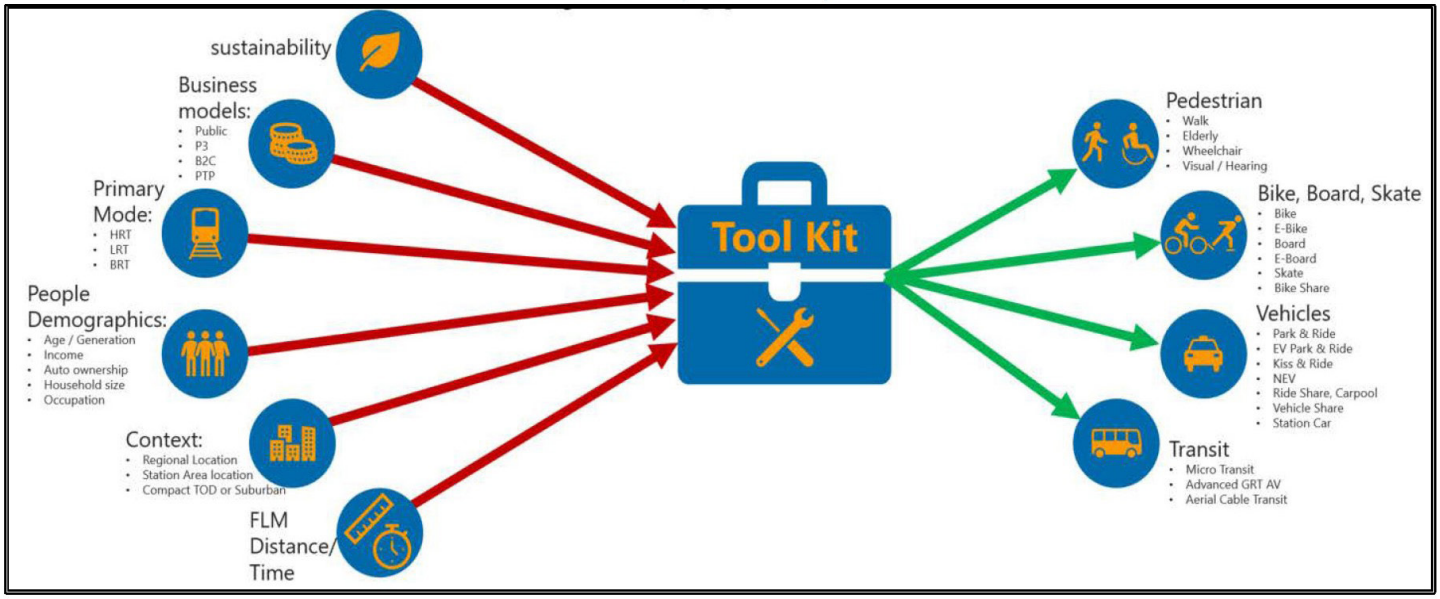
- Extend the service area for high capacity transit corridors from ¼-mile to ½-mile on each side of a fixed route transit line to 2 miles or more;
- Increase transit ridership potential;
- Reduce single occupant vehicle miles;
- Reduce roadway congestion;
- Reduce greenhouse gas emission;
- Improve the overall welfare of the community by reducing travel time;
- Stress and cost to commute;
- Be more competitive for federal funding

Recommendations

FLM Toolkit Package organized by modal groups was developed

The largest growth of FLM options is through the rapid expansion of networked car sharing (such as Uber, Lyft, Via), pod-based car sharing located at transit stations, and privately-owned and operated bicycle sharing in docked or dockless models with significant bike availability at transit stations.

Tool Kit Inputs and Outputs



MIAMI-DADE 2040 BICYCLE/PEDESTRIAN PLAN, 2014

Purpose

To presents a vision and improvement strategies to enhance the non-motorized transportation network of Miami-Dade County. This Plan serves as the non-motorized element of the 2040 Long Range Transportation Plan (LRTP).

Vision

To enhance the accessibility, safety, public health, social equity, environment, and overall quality of life within Miami-Dade County by creating interconnected bicycle and pedestrian friendly communities throughout the county.

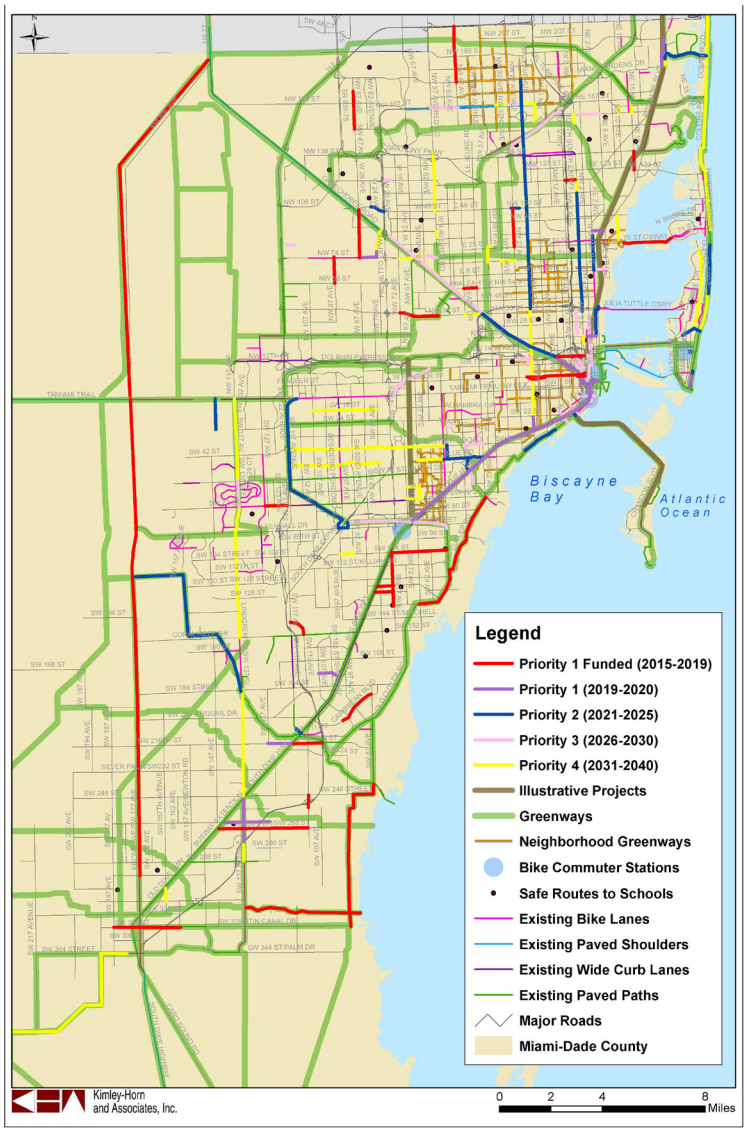
Recommendations

A critical review was conducted to identify projects that fill in gaps between proposed facilities or between a proposed facility and a key destination.

Within Study Area –

Biscayne Boulevard:

- Implement a grand boulevard concept
- Pedestrian promenade similar to the Paseo De Prado, Madrid
- Replace median parking with a pedestrian oriented green median
- Ensure the new boulevard is treated as both an open space and a well-designed roadway
- Create greenways and a network of tree-shaded streets safely linking parks and public spaces to one another
- Design roadways to calm automobile traffic and improve bicycle safety



APPLICATION OF INNOVATIVE STRATEGIES TO IMPROVE BICYCLE SAFETY AND MOBILITY, 2013

Purpose

To provide innovative strategies that emulate the Dutch bicycling experience and the facilities provided in "Urban Bikeway Design Guide" to increase bicycle mode share and reduce bicycle crash rates in Miami-Dade County. Identify transportation corridors and intersections that are not served by existing or planned bicycle facilities as well as existing and planned bicycle facilities that could benefit from a more robust and innovative design.

Recommendations

A toolbox of 34 innovative bicycle strategies was recommended and 26 Improvement Sites were identified.

Table 4: Toolbox Summary

ENGINEERING	
1.	Zig-Zag Lane Lines at Trail Crossings
2.	Right-Turn Only Except Bicycles
3.	Bike Boxes
4.	Two-Stage Turn Queue Boxes
5.	Traffic Signal with Bike Detection Loops
6.	Bicycle Wayfinding Signs
7.	Bicycle Surface Treatment on Open Grate Bridges
8.	Shared Space
9.	Shared Lane Markings (Sharrows)
10.	Bicycle Boulevard
11.	Pedestrian Streets
12.	Advisory Bike Lanes
13.	Green Bike Lanes
14.	Buffered Bike Lanes
15.	Cycle Tracks
16.	Low Speed Zone
17.	14-Foot Lane Treatments
18.	Contraflow Bike Lanes
19.	Grade Separation
20.	Road Diet
21.	Shared Bus and Bike Lane
ENCOURAGEMENT	
22.	Integration of Bikes and Transit
23.	Inclusion of Cycling Options in Non-Cycling Events
24.	Open Streets or Ciclovia Events
25.	Promotion Campaign Based on Fun and Joy of Cycling
26.	Online Bike Route Planner
27.	Bike Barometer
EDUCATION	
28.	Traffic Garden
29.	Anti-Dooring Campaign
30.	Courtesy Counts Campaign
ENFORCEMENT	
31.	Online Bicycle Registration
32.	Speed Enforcement on Bicycle Corridors
EVALUATION	
32.	Data Collection Plan
33.	Bike Program Progress Report

Table 5: Improvement Sites

Bicycle Mobility Need at an Intersection	
1.	Oak Avenue and Virginia Street – Coconut Grove
2.	SW 58th Avenue/SW 70th Street and US 1 – South Miami
Bicycle Safety Need in an Area with High Bike Demand	
3.	N Miami Avenue from N 17th Street to N 20th Street
Connection between Existing Facilities	
4.	Roberta Hunter Park and South Dade Trail
5.	Overtown Greenway to Museum Park
6.	MacArthur Causeway East Bridge
7.	NW 26th Street/Comstock Elementary
Corridor Treatment to Serve Key Trip Pattern	
8.	N Miami Avenue from N 5th Street to N 11th Street
9.	NW 17th Street from NW 3rd Avenue to NW 7th Avenue
10.	NW 17th Street from NW 7th Avenue to NW 9th Avenue
11.	NW 4th Street from NW 8th Avenue to NW 14th Avenue – Marlins Stadium
12.	SW 16th Street from SW 107th Avenue to SW 94th Avenue - FIU
13.	Brickell Key Drive Bridge
14.	Brickell to Health District
15.	Downtown Miami Buffered/Barriered Bike Lane Network
16.	Pine Tree Drive – Miami Beach
17.	S 1st Street from SW 17th Avenue to Biscayne Boulevard
Innovative Enhancement of an Existing Facility	
18.	MacArthur Causeway, East of Watson Island to Bridge Road
19.	SR A1A and 96th Street
20.	Snake Creek Trail at I-95/SFRC Crossing
Enhancement of a Planned Facility	
21.	S Miami Avenue and SW 26th Road
22.	Snapper Creek Phase 2 – SW 67th Avenue and SW 85th Street
Enhancement of Bike Access to Transit	
23.	Allapattah Metrorail Station
24.	Coconut Grove Metrorail Station
25.	Hialeah Metrorail Station
26.	Douglas Road Metrorail Station

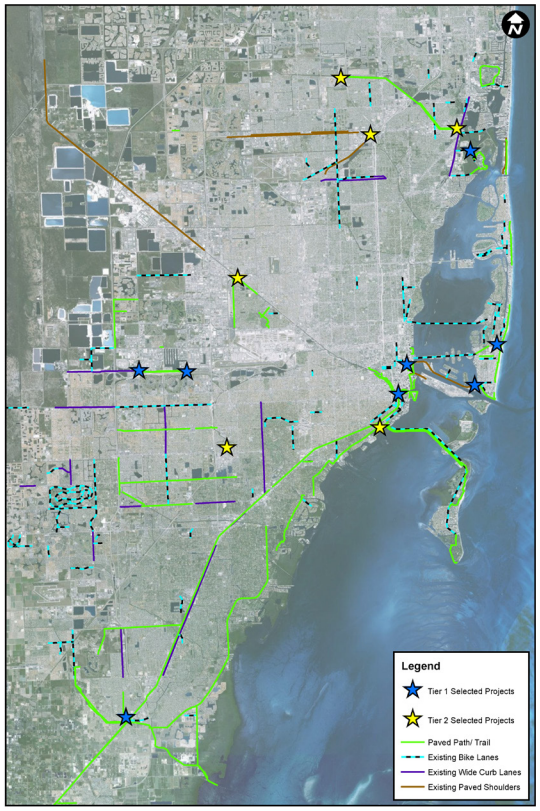
NON-MOTORIZED NETWORK CONNECTIVITY PLAN, 2015

Purpose

To identify and fill critical gaps in Miami-Dade County's non-motorized transportation network.

Recommendations

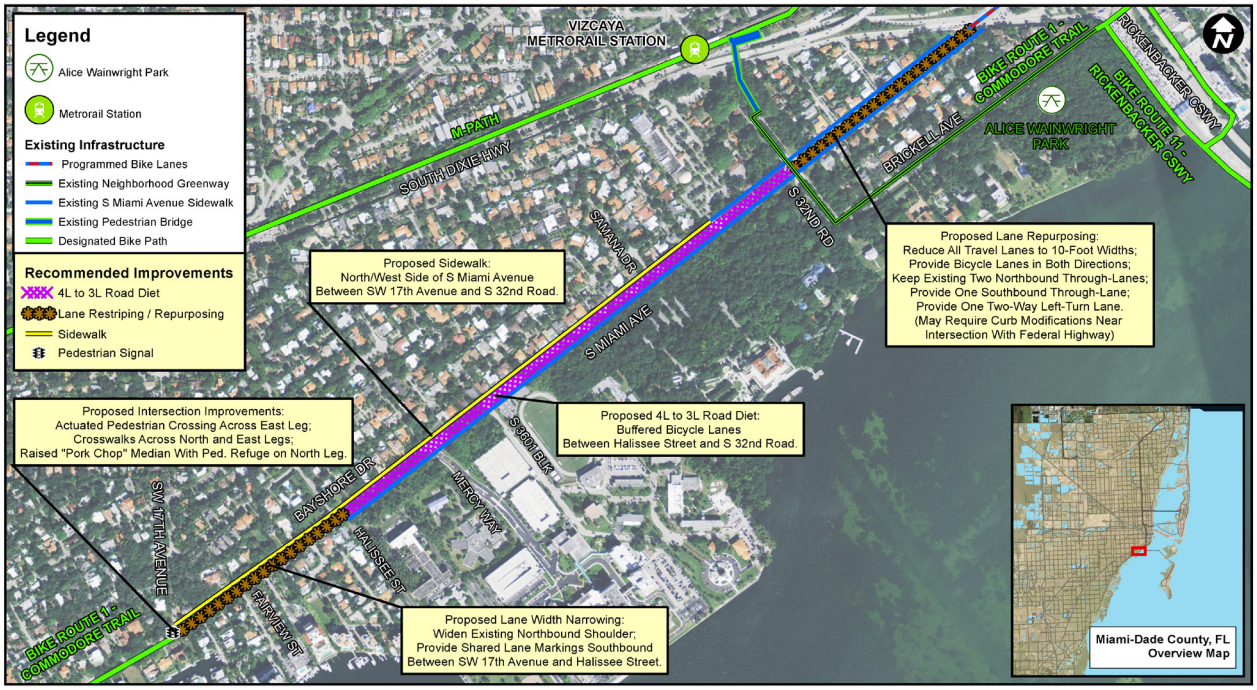
A review of existing facilities in Miami-Dade County was conducted, a preliminary list of fourteen potential projects was developed. Of the fourteen "Tier 1" projects that were identified, six were selected for further study "Tier 2".



Within Study Area –

Commodore Trail connection to the Rickenbacker Causeway:

- Connect Commodore Trail (Bike Route 1) in Coconut Grove with the Rickenbacker Causeway (Bike Route 11);
- Create a more pedestrian- and bicycle-friendly Bayshore Drive;
- Implement a road diet/lane reduction on S Bayshore Drive/S Miami Avenue from Halissee Street to S 32nd Road to allow for the provision of bicycle facilities;
- Provide bicycle lane on S Miami Avenue between S 32nd Road and Federal Highway (US Hwy. 1); provide pedestrian crossing improvements at S Bayshore Drive and SW 17th Avenue.



BICYCLE/PEDESTRIAN MOBILITY PLAN FOR THE MIAMI DOWNTOWN DEVELOPMENT AUTHORITY AREA, 2011

Purpose

To promote a green urban environment where pedestrian and bicycle mobility are the transportation priorities. This Plan presents improvement strategies to enhance the non-motorized transportation network of Downtown Miami and develops a bicycle and pedestrian mobility plan for the Miami Downtown Development Authority (DDA) area. An additional focus includes improving multimodal access to public transportation to promote regional connectivity.

The key goals outlined in the master plan are:

- Complete Baywalk and Riverwalk
- Elevate Brickell Avenue to Iconic Status
- Create a Grand Promenade Along Biscayne Boulevard
- Promote Flagler Street as Miami's Pedestrian Oriented Main Street
- Reinforce Connectivity to Brickell Village Center
- Enhance Connectivity to Surrounding Neighborhoods
- Promote Transit Connectivity
- Rebalance Roadways Towards Transit, Pedestrians, and Bicyclists

Recommendations

37 Project Recommendations most of which are capital improvement projects.

Area Wide Improvements

Project 1: Modal Priority Zone
Project 2: Low-Speed Design Principles
Project 3: One-Way to Two-Way Street Conversion
Project 4: Festival Streets
Project 5: Pedestrian Throughway Zone
Project 6: Pedestrian Shade Corridors
Project 7: Pedestrian Lighting
Project 8: Pedestrian Signalization Improvements
Project 9: Automated Pedestrian Detection
Project 10: Miami River Greenway Improvements
Project 11: Bike Route 1 Improvements
Project 12: Other Bicycle Improvements

Metromover Improvements

Project 13: Financial District Metromover Station
Project 14: Brickell Metromover Station
Project 15: Tenth Street Metromover Station
Project 16: Fifth Street Metromover Station
Project 17: Third Street Metromover Station
Project 18: First Street Metromover Station
Project 19: College/Bayside Metromover Station

Segment Improvements

Project 20: Biscayne Boulevard Median Improvements
Project 21: Pedestrian Mobility Improvements – Biscayne Blvd.–North
Project 22: Pedestrian Mobility Improvements – Biscayne Blvd.–South
Project 23: Pedestrian Mobility Improvements – Brickell Avenue
Project 24: Pedestrian Mobility Improvements – Miami Avenue
Project 25: Pedestrian Mobility Improvements – S Miami Avenue
Project 26: Pedestrian Mobility Improvements – NE 2nd Avenue–North
Project 27: Pedestrian Mobility Improvements – NE 2nd Avenue–South
Project 28: Pedestrian Mobility Improvements – SE/NE 2nd Avenue
Project 29: Pedestrian Mobility Improvements – SW 1st Avenue
Project 30: Pedestrian Mobility Improvements – Brickell Bay Drive
Project 31: Court House Pedestrian Improvements
Project 32: High Density Bicycle Parking
Project 33: NW 1st Street Transit Mall

Non-Engineering Improvements

Project 34: Education Improvements
Project 35: Encouragement Improvements
Project 36: Enforcement Improvements
Project 37: Evaluation and Monitoring

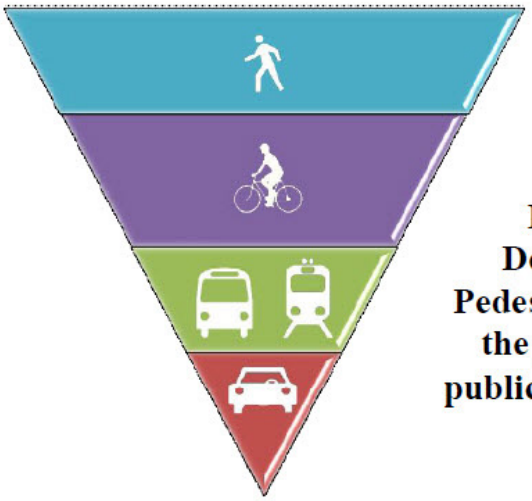


Figure 17: Potential Modal Priority Designation within downtown Miami – Pedestrians would be prioritized at the top of the pyramid followed by bicycles, then by public transportation, and finally personal car

EPA GUIDE TO SUSTAINABLE TRANSPORTATION PERFORMANCE MEASURES, 2011

Purpose

To introduce environmental, economic, and social sustainability performance measures into decision-making process.

Recommendations

This guidebook presents Description, Application, Metrics, Analytical Methods, Data Sources, and Examples for 12 performance measures that can be readily applied in transportation sector. In the programming phase of decision-making, performance measures can be used to prioritize among candidate projects submitted for funding.

Sustainability Performance Measures

1. Transit accessibility
2. Bicycle and pedestrian mode share
3. Vehicle miles traveled per capita
4. Carbon intensity
5. Mixed land uses
6. Transportation affordability
7. Distribution of benefits by income group
8. Land consumption
9. Bicycle and pedestrian activity and safety
10. Bicycle and pedestrian level of service
11. Average vehicle occupancy
12. Transit productivity

FHWA SEPARATED BIKE LANE PLANNING AND DESIGN GUIDE, 2015

Purpose

Outlines planning considerations for separated bike lanes and provides design options covering typical one and two-way scenarios.

Recommendations

- Design flexibility – identify specific data elements to collect before and after implementation to enable future analysis across facilities and effective project evaluation.
- A Project Evaluation Checklist was developed based on Safety, Mobility, and Economic Vitality/Street Vitality and Quality of Life indicators. It is mean to be used in conjunction with the Data Collection Protocol.
- Equity – Use separated bike lanes to promote cycling as an option for commuting to transit-dependent or carless households. Facilities can also improve connections to transit, jobs, schools, and essential services through safer first / last mile trips.
- Accessibility – Ensure that the interface of the SBL with pedestrian facilities at crosswalks, parking spaces, transit stops and other locations is accessible and in compliance with the Americans with Disabilities Act and other local requirements.

Within Study Area – BID Support for Separated Bike Lanes

The Downtown Development Authority (DDA) led the planning and concept development of several separated facilities to attract "interested but concerned" riders and draw potential shoppers to its commercial district. BID in Miami will assume responsibility for cleaning and regular maintenance of the separated bike lanes and buffers.

Minimum Data Collection Before and After Construction of Separated Bike Lane

Before and After Construction of Separated Bike Lane	Data Element	Minimum	Preferred	After Construction Data Consideration	Notes
Volume of Bicyclists	Manual count duration/day	4 hours/day	All Daylight Hours	Ensure compatible time periods as before counts	Suggested times: 4 hours in a row; do not split morning and evening
	Manual count days	3 days	14 Days	Ensure comparable weather conditions and days of the week as before counts	
	Automatic count duration	24 hours/day	24 hours/day	Ensure compatible time periods as before counts	
	Automatic count days	7 days	14 Days	Ensure comparable weather conditions and days of the week as before counts	
	Documentation of count locations	All	All	Same count locations as before counts	Adequate documentation of all count locations (see document text)
Travel Characteristics	Traveling direction	All bicyclists in any direction	Each direction separately		
	Wrong way riding	Not counted separately	"Wrong" and "Right" directions separately		Which side of the road the wrong way riders were on is essential, so there might be two counts (wrong way in each direction)
	Facility on which bicyclists are traveling	All lanes together	Each lane separately		e.g. Shared Lane, Bike Lane, Sidewalk
Crashes	Identify and compile all available crash records in the project vicinity	All available	All available		Ideally data will include coded locations of crashes, date/time of crashes, severity of crash, and documentation of circumstances

FHWA GUIDEBOOK FOR DEVELOPING PEDESTRIAN & BICYCLE PERFORMANCE MEASURES, 2016

Purpose

This report highlights resources for developing measures to facilitate high quality performance based planning and prioritization. It is intended to help communities specifically account for walking and bicycling in their performance management approach to achieve connected networks, improve safety, and promote equity, while also encouraging people of all ages and abilities to walk and bike for transportation.

Recommendations

Decide what to measure in order to capture the current state of the system, set targets to improve those measures, and use the measures to evaluate and compare the effects of proposed projects and policies.

Identifies community goals supported by transportation:

- Connectivity
- Economic
- Environment
- Equity
- Health
- Livability
- Safety

Identifies Transportation Measures to support Community Goals:

- Accessibility: Refers to access for people with disabilities to programs, services, and activities.
- Compliance: Conforming to a requirement, e.g., a statute or regulation.
- Demand: The amount of existing and potential future walking and bicycling activity.
- Reliability: Refers to the degree of certainty and predictability in travel times on the transportation system.
- Mobility: The ability to travel or move from place to place.
- Infrastructure: All the relevant elements of the environment in which a transportation system operates, including streets, signals, bridges, transit, bike facilities, shared use paths, and sidewalks.

TABLE 5 GOALS APPLICABLE TO PERFORMANCE MEASURES

PERFORMANCE MEASURES	GOALS						
	CONNECTIVITY	ECONOMIC	ENVIRONMENT	EQUITY	HEALTH	LIVABILITY	SAFETY
Access to Community Destinations	X	X	X	X	X	X	X
Access to Jobs	X	X		X			
Adherence to Accessibility Laws	X	X		X	X	X	X
Adherence to Traffic Laws					X		X
Average Travel Time	X	X		X		X	X
Average Trip Length	X	X		X		X	X
Connectivity Index	X	X		X		X	X
Crashes				X	X	X	X
Crossing Opportunities	X			X	X	X	X
Delay				X		X	X
Density of Destinations	X	X		X	X	X	X
Facility Maintenance	X			X		X	X
Job Creation		X					
Land Consumption		X	X			X	
Land Value		X					

PERFORMANCE MEASURES	GOALS						
	CONNECTIVITY	ECONOMIC	ENVIRONMENT	EQUITY	HEALTH	LIVABILITY	SAFETY
Level of Service				X		X	X
Miles of Pedestrian/Bicycle Facilities	X			X	X	X	X
Mode Split			X	X	X	X	
Network Completeness	X	X	X	X	X	X	X
Pedestrian Space		X		X		X	X
Person Throughput		X		X			
Physical Activity and Health				X	X	X	
Population Served by Walk/Bike/Transit	X			X	X	X	X
Retail Impacts		X					
Route Directness	X	X	X	X		X	X
Street Trees			X		X	X	X
Transportation-Disadvantaged Population Served	X			X			
User Perceptions					X	X	X
Vehicle Miles Traveled (VMT) Impacts			X		X	X	X
Volume			X		X		X

EVALUATION OF MULTIMODAL MOBILITY OPTIONS IN THE SOUTH MIAMI-DADE AREA, 2016

Purpose

Examines mobility in South Miami-Dade County (south of 88th St), by examining the roadway, transit, bicycle and pedestrian networks to increase transit ridership, make the SMART corridors more competitive for funding, and relieve neighborhood streets of congestion.

Recommendations

Recommends 92 multimodal transportation projects that are interconnected and support and enhance transit by focusing on transit-supportive land uses, including "first mile/last mile" projects in development nodes. Includes more than 30 additional transit projects to support the SMART Plan, which represent a shift in investments from roads to transit to provide multi-modal transportation capacity in the future.

Within Study Area – West Kendall to Downtown Miami:

Although the recommended projects are not directly within our study area, many seek to enhance transit options to the Downtown. Transportation alternatives for automobile, public transportation, bike, and potential BRT were analyzed for travel time savings between Kendall Drive/SW 88th Street and Downtown Miami. Review of these transportation alternatives available for commuters destined to Downtown Miami indicate that transit with TSM improvements on the Busway and bus rapid transit (BRT) is highly competitive with the automobile.

Table 4. Travel Time Comparison, West Kendall to Downtown Miami

Trip	Total Time (Max Congestion)	Average Speed (Max Congestion) MPH
Automobile		
AM Trip	55 min (100 min)	26 (14)
PM Trip	55 min (110 min)	27 (13)
**AM Trip	55 min (130 min)	22 (9)
**PM Trip	60 min (140 min)	19 (8)
Public Transportation		
AM Trip	81 min*	15
PM Trip	82 min*	14
Bike		
AM Trip	127 min	10
PM Trip	126 min	10

^Downtown Miami location used was Government Center
*Time added to reflect transfer at Dadeland South Station
**Trip via non-tolled roadway (Kendall Dr., US-1 & I-95)
Source: The Corradino Group

Table 5. West Kendall to Downtown Miami (Potential Improvement/ BRT Kendall)

Route	Current Conditions			Improved Conditions		
	Travel Time (min)	One Way Travel Time (min)	Average Speed (MPH)	Travel Time (min)	One Way Travel Time (min)	Average Speed (MPH)
Public Transportation						
88	150	75	9	79	40	17
288	100	50	14	53	26	26

Obtained by using a factor between the two current travel times and applied to route 88 improvements.

Source: BRT Implementation Plan along Transit Corridors 2015, HNTB

SMART PLAN CORRIDOR INVENTORY NORTHEAST CORRIDOR, 2017

Purpose

The NE Corridor Inventory report was focused on collecting all available demographic and socioeconomic data for a preliminary inventory of the current transportation and land use along the corridor.

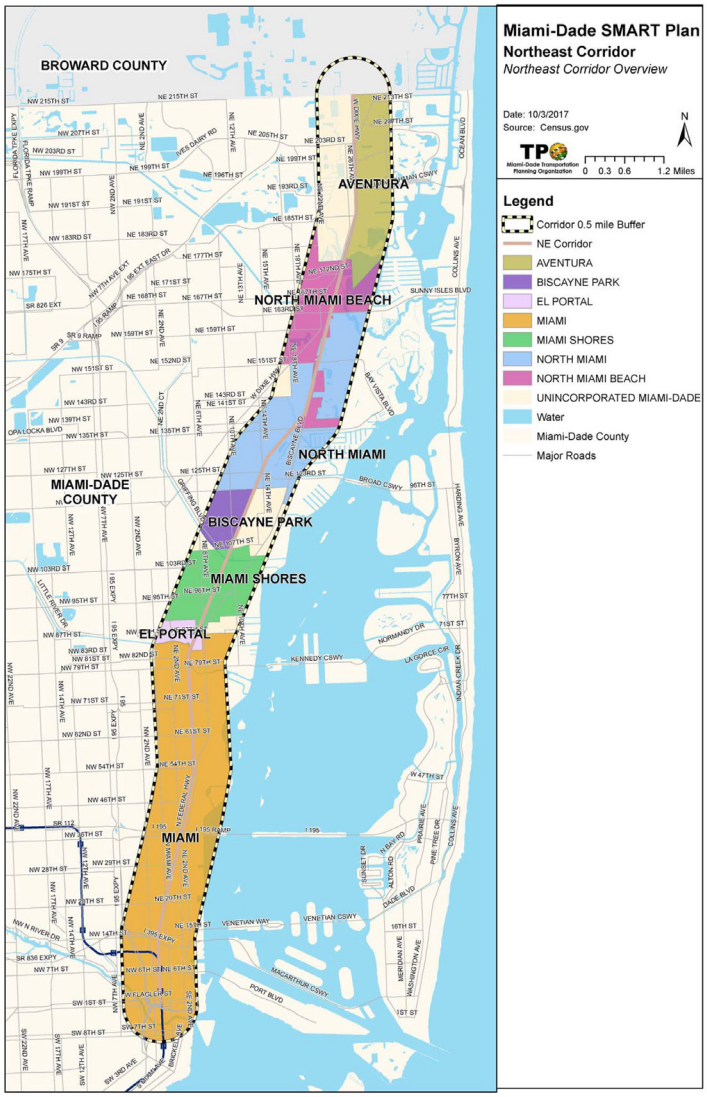
Recommendations

The NE Corridor is the only SMART Plan corridor to possess an active heavy-rail line (FECR). Brightline will provide regional connectivity to four major cities within the state of Florida on the FECR line, and the proposed Tri-Rail Coastal Link will provide inter-local connectivity to numerous proposed stations within South Florida. Northeast Corridor transportation improvements will be key to helping the DDA achieve its goals

Proposed Coastal Link Stations in MDC:

- Government Center - Downtown Miami
- NE 11th Street @ Biscayne Blvd
- NE 36th Street @ Biscayne Blvd
- NE 55th Street @ Biscayne Blvd
- NE 79th Street @ Biscayne Blvd
- NE 125th Street @ Biscayne Blvd
- NE 163rd Street @ Biscayne Blvd
- NE 192nd Street @ Biscayne Blvd

.



NORTHEAST CORRIDOR LAND USE SCENARIO AND VISIONING PLANNING, 2018

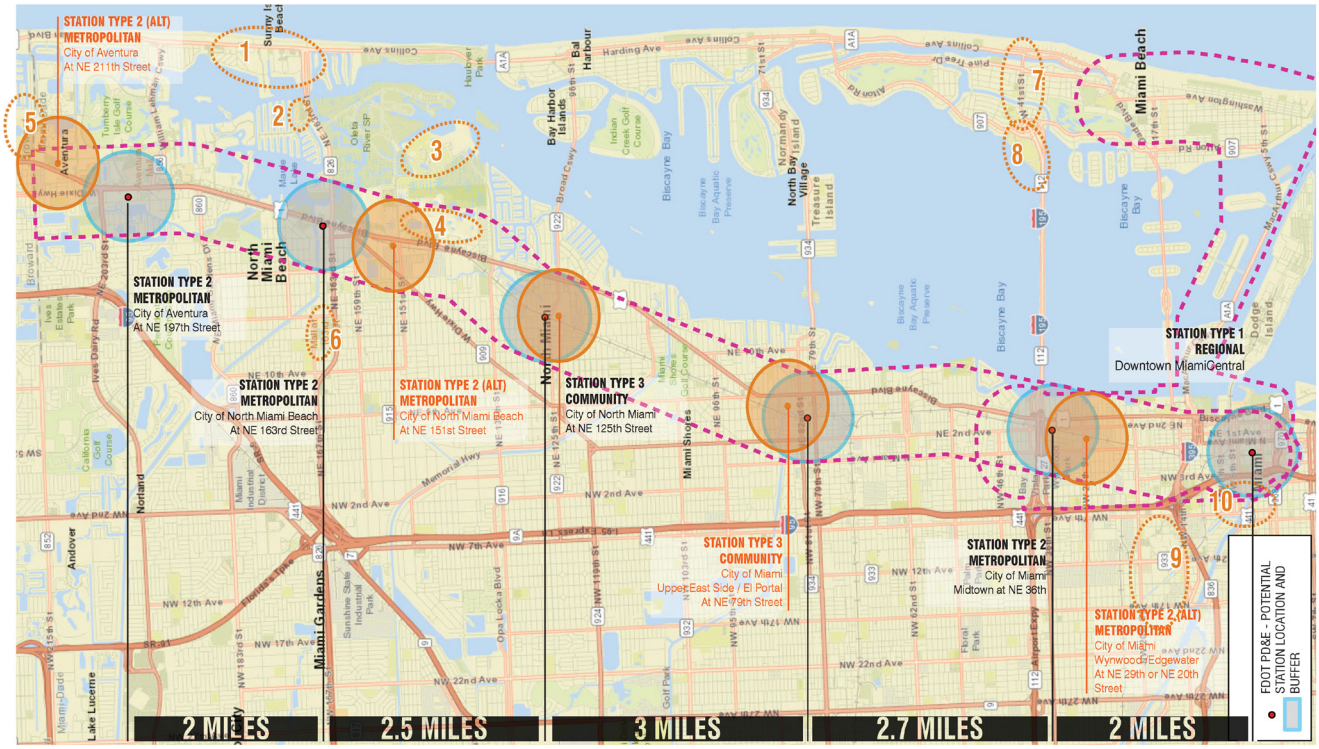
Purpose: To study the direct relationship between transit and land development to promote transit use and increases mobility choices for the residents, businesses and visitors along the corridor.

This corridor vision shall consider the following elements:

- transit improvements
- station area plans
- land use policies
- design criteria
- economic mobility
- accessibility, and
- quality of life

Three station typologies: Regional, Metropolitan, and Community. Each type has different specifications on Land Use Mix, Street and Block Pattern, Parking, Building, Density and Intensity.

NORTHEAST CORRIDOR: STATION LOCATIONS per FDOT PD&E and Tri-Rail Coastal Link and per SCENARIOS 1, 2 and 3 with Alternative Station Locations per Charrette #1



MIAMI RIVER TUNNEL FEASIBILITY STUDY, 2017

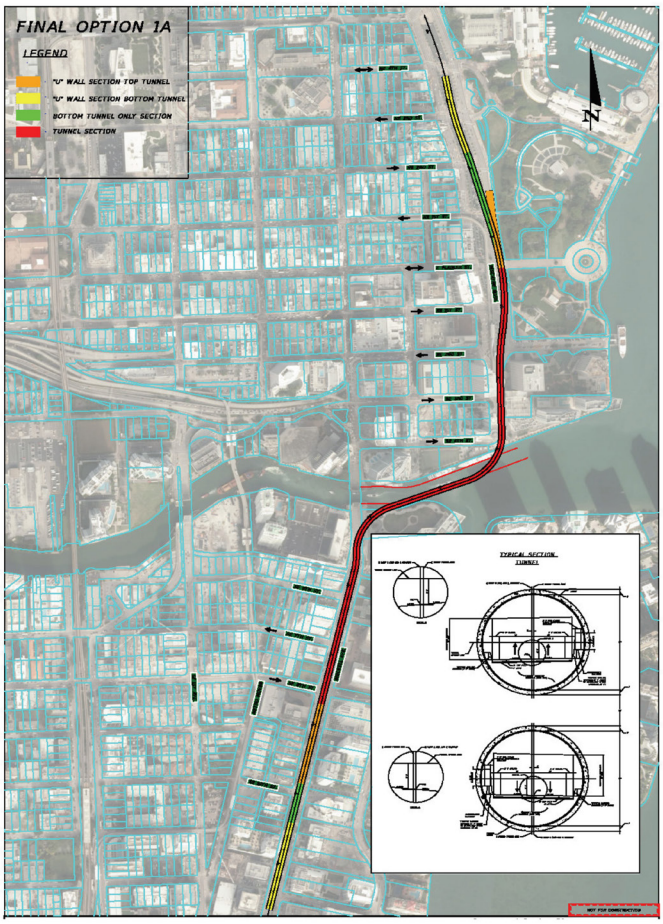
Purpose

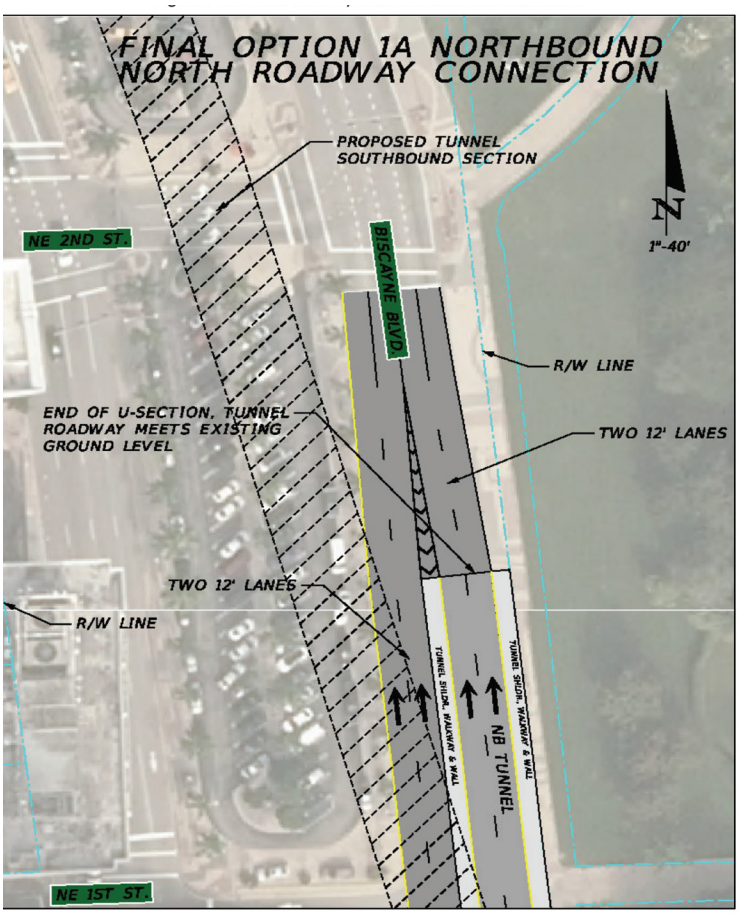
This report analyzes the feasibility of constructing a tunnel facility connecting Brickell Avenue and Biscayne Boulevard under the Miami River in Downtown Miami. The project study area is bounded on the north by NE 6th Street, on the west by the Metrorail line, on the south by SE 13th Street, and on the east by Biscayne Bay.

Recommendations

Four alternatives were proposed and evaluated. Alternative 1A: Reverse Curve Alignment – Bored Tunnel best addresses the purpose of the project with the lowest cost. Construction predicted to last between 40-52 months for this alternative.

Relatively short vehicular trips between lower Downtown and northern Brickell will likely remain bridge users given the locations of the tunnel portals as necessitated by existing foundation conditions at the bridge and along Metromover on Biscayne Boulevard.





MIAMI REGIONAL INTERMODAL PLAN, 2014

Purpose

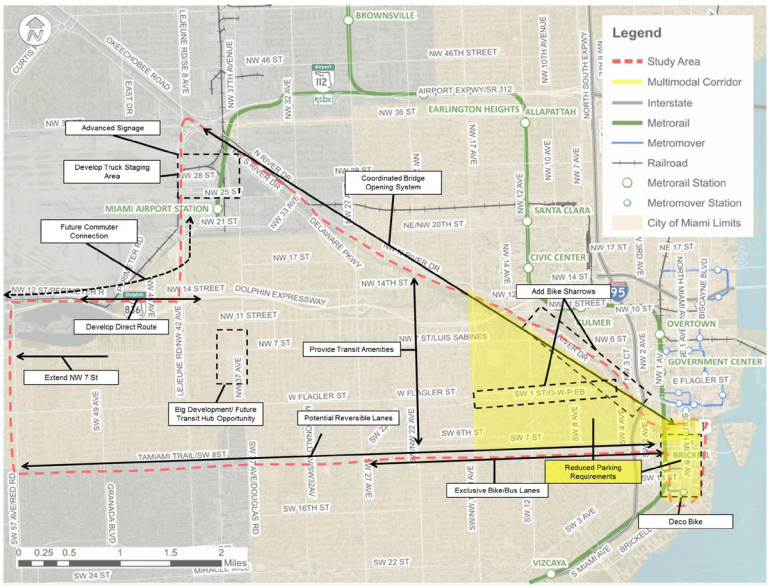
To identify and evaluate the existing transportation connectivity between destinations of regional importance including the Miami Intermodal Center (MIC), Port of Miami River, Miami Marlins Park, the Downtown Miami area, and the Brickell area.

Study Area

Within the Concurrency Exception Area and is bounded by the Miami River to the north, Brickell Avenue (SR 5/US 1) to the east, SW 8 Street to the south, and NW 57 Avenue to the west. The lower river segment extends approximately 1.5 miles from Brickell Key to the 5th Street Bridge, mainly falling within the study area of the present study.

Recommendations

- The Riverwalk on the Lower River segment is not completely connected, which is a point of emphasis for the future.
- There is a need for better street connectivity and signage near the Miami Intermodal Center (MIC).
- Transit hubs including the MIC require high levels of mobility and accessibility for their success so that many modes can connect seamlessly.
- The same constraints and opportunities exist near the Brickell Metrorail Station.
- There are opportunities around the Metrorail Station to emphasize alternative modes of transport to reduce the reliance on automobile travel, such as rental bikes, car sharing programs, and pedicabs.
- Reducing parking requirements east of 17 Avenue in the study area would help to encourage new developments that would increase densities.



Address	Name of Development	Type of Use	Office / Retail SqFt	Residential Units	Status
701 S Miami Ave	Brickell CityCentre	Mixed Use	760,000	893	Under construction (Est. completion - 2016)
1301 Brickell Bay Dr	Brickell House	Mixed Use	0	364	Under construction (Est. completion - 2014)
30 SE 6 St	MyBrickell	Residential	0	192	Under construction (Est. completion - 2014)
900 SW 1 Ave	Nine at Mary Brickell Village	Residential	0	369	Under construction (Est. completion - 2015)
1080 Brickell Ave	The Bond	Residential	0	328	Under construction (Est. completion - 2015)
1010 Brickell Ave	1010 Brickell	Residential	0	352	Pre-construction sales
1451 Brickell Ave	Echo Brickell	Residential	0	190	Pre-construction sales (Est. completion - 2017)
SW 17 Rd & SW 1 Ave	Le Parc	Residential	0	275	Pre-construction sales (Est. completion - 2016)
1300 S Miami Ave	SLS Hotel and Residences	Mixed Use	10,000	450	Pre-construction sales (Est. completion - 2015)
1500 SW 1 Ave	Atton Hotel	Hotel	0	0	Announced
850 S Miami Ave	Brickell Heights	Residential	0	0	Announced
145 SW 13 St	Broadstone Brickell Lofts	Residential	0	0	Announced
1101 Brickell Ave	Panorama Tower	Mixed Use	0	0	Announced
28 SW 9 St	Premiere Towers Brickell Village	Mixed Use	111,065	556	Pending
267 SW 11 St	West Brickell Center	Mixed Use	2,780	192	Pending
1000 SW 1 Ave	Brickell View Terrace Project	Mixed Use	400	119	Pending
1001 S Miami Ave	Brickell Flatiron Building	Mixed Use	301,272	554	Pending
1101 Brickell Ave	1101 Brickell Avenue	Mixed Use	299,007	650	Pending
1110 Brickell Ave	1080 Brickell	Mixed Use	1,250	315	Pending
1300 S Miami Ave	Infinity II	Mixed Use	33,018	589	Pending
SW 1 Ave / Coral Way	Off Brickell	Mixed Use	229,850	0	Pending
1300 Brickell Bay Dr	South Bayshore Tower	Mixed Use	21,388	364	Pending
1400 NW N River Dr	River Landing	Mixed Use	527,560	81	Pending
718 NW 2 St	747	Residential	0	223	Pending

IMPACT OF PORTMIAMI TUNNEL ON DOWNTOWN TRAFFIC CONGESTION, 2014

Purpose

To evaluate multimodal congestion of vehicles, service and deliveries, and freight as well as develop Downtown congestion improvement scenarios using existing and future year 2035 traffic conditions, identifies constrained locations and congestion deficiencies in Downtown Miami, and proposes specific improvements to accommodate existing and future development and forecasted freight growth.

Recommendations

Development of improvement scenarios for the mitigation of downtown congestion include system-wide improvements and loading zone improvements:

Programmed Improvements:

- FDOT I-395 Reconstruction
- FDOT Downtown Distributor On-Ramp Lane Addition

Contemplated Improvements:

- City of Miami Improvements on SE 3rd Avenue

Proposed Improvements:

- I-95 Ramps at NW 8th Street and NW 3rd Court/NW 3rd Avenue: The improvements propose to construct an additional lane for the I-95 northbound on-ramp as well as converting the I-95 southbound off-ramp shared through/left-turn lane to an exclusive left-turn lane.

Loading Zone Improvements:

- Policy
- High-emphasis loading zones
- Time-of-day loading restrictions for both general and location specific purposes

PORT OF MIAMI FREIGHT ACCESS STUDY, 2006

Purpose

To examine the feasibility of developing a rail-only tunnel connection to the Port of Miami. The service would be designed to significantly reduce truck dray moves in downtown Miami.

Recommendations

The preferred evaluated alternative consists of a grade separated rail connection: On-Port Intermodal Container Transfer Facility (ICTF) with New Tunnel and Short-Haul Shuttle Service. The service would consist of a new 18- to 25-acre ICTF on port property and a grade separated connection (tunnel) to the FEC system. Frequent, short shuttle trains would connect the POM with the western Miami-Dade County distribution infrastructure via the FEC facility or a new transfer facility. This alternative was found to be technically possible but highlights serious environmental and constructibility considerations. The conceptual rail corridor has a conservative cost estimation of $1 billion.

Other alternatives proposed include: On-Port ICTF with Existing At-Grade Rail Service & On-Port ICTF with New Tunnel – Traditional Long-Haul Intermodal Service.

Figure ES.5 Conceptual Rail Alignment

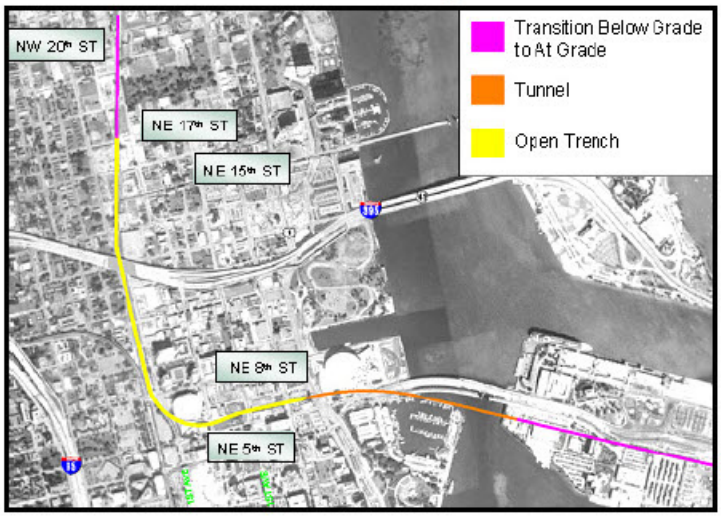
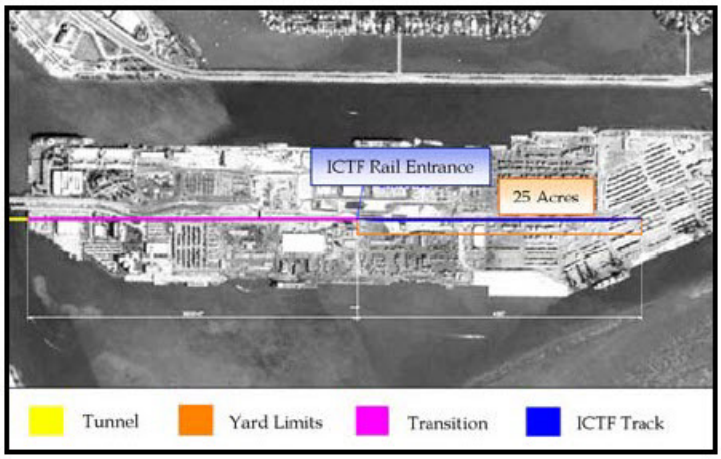


Figure ES.6 On-Port Facilities with Bored Tunnel Access



MIAMI RIVER CORRIDOR MULTIMODAL TRANSPORTATION PLAN, 2006

Purpose

Evaluates means to increase safety and mobility of freight, pedestrians, transit, and vehicular traffic, while trying to reduce congestion.

Recommendations

The Miami River Corridor stretches from NW 36th Street to the mouth of the River. The mouth of the Miami River is in Downtown Miami, where the River flows into Biscayne Bay between SE 3rd Street and SE 5th Street.

Proposes that the Miami River be incorporated as a SIS facility, noting that it meets and exceeds criteria for admission. Ever since this study, the Miami River has indeed been incorporated in the SIS Network.

Table ES-2: Additional Lower River Transportation Improvements Developed in Miami River Corridor Multimodal Transportation Plan

Mouth of River to 5th Street Bridge

Location	Improvement Type	Recommended Improvement
Roadway Improvements		
Along Miami River Corridor	Signage	Install wayfinding signage along corridor and on the local major highways (i.e. I-95) indicating major attractions
Brickell Avenue, South Miami Avenue, SW 2nd Avenue, SW 1st Street, West Flagler Street, NW 5th Street	ITS/Signalization	Implement an automated drawbridge traffic management system, including extended green times following bridge openings and dynamic message signs
I-95 Downtown Distributor Ramps	Reconstruction	Study alternatives to replace existing ramp system (PD&E study removed from work program)
NW 4th Street from NW 8th Avenue to NW 9th Avenue	Traffic Flow Modification	Convert to one-way westbound traffic flow, as part of the 5th Street Bridge intersection modification
South River Drive @ NW 5th Street/ NW 8th Avenue/ NW 4th Street	Traffic Flow Modification	Close driveway within the intersection, leaving the east and west driveways serving the adjacent open
North River Drive and Flagler Street (surface street)	Traffic Flow Modification	Install raised median deflectors for traffic calming
Flagler Street from I-95 to North River Drive	Traffic Flow Modification	Continue implementation of 2-way traffic flow (this project has recently been completed)
SW 3rd Street @ S. Miami Avenue	Traffic Flow Modification	Modify intersection to permit eastbound through movement (improvement is under design - to be constructed as part of Riverfront development)
SW 3rd Avenue from SW 6th Street to SW 7th Street	Traffic Flow Modification	Convert to two-way traffic flow
NW 2nd Street and NW 3rd Street	Traffic Flow Modification	Convert the one-way pair to two-way streets from North River Drive to NW 3rd Avenue, where it is already two-way flow
North River Drive @ NW 2nd Street and southbound, north of NW 2nd Street	Signage	Street sign correction, change South River Drive sign to accurately read North River Drive. Add advance warning signage for low bridge clearance at SW 1st Street Bridge
North River Drive northbound @ NW 6th Avenue	Signage	Add advance signage in northbound direction indicating that left-turns are not permitted at NW 7th Avenue
NW 5th Street & NW 6th Street from NW 7th Avenue to NW 4th Avenue	Traffic Flow Modification	Convert the one-way pair to two-way streets and install streetscape improvements
North River Drive, northbound, south of SW 2nd Street	Signage	Add advance warning signage for low bridge clearance at SW 1st Street Bridge
North River Drive, southbound, south of NW 5th Street/NW 7th Avenue	Signage	Add advance warning signage for low bridge clearance at SW 1st Street Bridge
South River Drive, southbound, south of NW 8th Avenue/NW 4th Street/ 5th Street Bridge intersection	Signage	Add advance warning signage for low bridge clearance at SW 1st Street Bridge
SW 4th Avenue, northbound, north of intersection with SW 6th Street	Signage	Add advance warning signage for low bridge clearance at SW 1st Street Bridge
SW 2nd Street, westbound, west of intersection with SW 2nd Avenue	Signage	Add advance warning signage for low bridge clearance at SW 1st Street Bridge
NW 1st Street from NW 6th Avenue to South River Drive	Traffic Flow Modification	Convert to two-way traffic flow
Transit Improvements		
Metrobus	Service Expansion	Improve service as demand warrants
Water bus	New Service	Implement water bus service to provide mobility between downtown terminal/port and MIC
Metromover	Service Expansion	Extend service hours as development occurs and demand warrants
North River Drive @ West Flagler Street - NB	Bus Stop	Provide pedestrian level lighting and bench at bus stop
North River Drive @ West Flagler Street - SB	Bus Stop	Provide pedestrian level lighting and bench with shelter at bus stop
North River Drive @ NW 2nd Street - NB	Bus Stop	Provide pedestrian level lighting and shelter at bus stop
North River Drive @ NW 2nd Street - SB	Bus Stop	Provide pedestrian level lighting and bench at bus stop
North River Drive @ NW 3rd Street - NB	Bus Stop	Provide pedestrian level lighting and bench at bus stop
North River Drive @ NW 3rd Street - SB	Bus Stop	Provide pedestrian level lighting and shelter at bus stop
Bicycle/Pedestrian Improvements		
Miami River Greenway	Riverwalk/ On-street	Complete the Miami River Greenway
Miami River Corridor	Parking	Remove parking meters from sidewalk and replace with "Pay and Display" machines throughout the Corridor
Bridges in Lower River Section	Bicycle Facilities	Install wheel gutters for bicycles at all feasible pedestrian stairs on Brickell Avenue Bridge, SW 2nd Avenue Bridge, SW 1st Street Bridge, Flagler Street Bridge
Brickell Bridge Pedestrian staircase	Sidewalk	Install sidewalk connecting bridge to existing Riverwalk
North River Drive @ NW 5th Avenue/ NW 7th Street	Bicycle Facilities	Install a bike rack at bus stop
Maintenance on south side of River	Signage & Maintenance	Provide proper M-Path signage / and remove fences that restrict M-Path access
SW 7th Street @ SW 1st Court, M-Path	Crosswalk	Install crosswalk for M-Path and improve paved connectivity of M-Path
SW 1st Avenue between SW 7th Street & SW 8th Street	Sidewalk	Widen sidewalk to match sidewalk between SW 8th Street and Brickell Metrorail Station
Fort Dallas Park	Maintenance	Remove fence near the Park which disconnects the surrounding area to the Riverwalk
SW 4th Avenue and SW 4th Street	Crosswalk	Install pedestrian crosswalks at all approaches of the intersection
Beneath South Miami Avenue Bridge	Riverwalk/ On-street	Create riverwalk section connecting One Riverview Square to riverwalk section to the west of the bridge
South River Drive between NW 8th Avenue and NW 2nd Street	ADA Ramps/Crosswalks	Provide ADA ramps and crosswalks, specifically at the intersections of South River Drive & NW 2nd Street, NW 3rd Street, NW 7th Avenue and NW 8th Avenue
North River Drive from SW 2nd Street to NW 2nd Street	Sidewalk	Sidewalk along north side of road needs to be replaced and overgrown landscape needs to be removed
North River Drive and Flagler Street (surface street)	Maintenance	Remove chain link fence in front of pedestrian stairs at Flagler Street Bridge and move chain link fence to allow access to sidewalk on south side of street
SW 1st Street Bridge	Pedestrian Facilities	Provide ADA ramps, pedestrian level lighting at stairs, and enhance pedestrian pathway leading to bridge
Flagler Street Bridge	ADA Ramps	Provide ADA ramps
North River Drive from NW 1st Street to NW 3rd Street - west side	Sidewalk	Construct sidewalk, maintain streetscape
North River Drive @ NW 2nd Street	ADA Ramps	Reconstruct existing ADA ramps to feed directly into existing paved crosswalk
North River Drive @ NW 3rd Street	Lighting	Provide pedestrian level lighting adjacent to Lummus Park
North River Drive @ NW 5th Street/NW 7th Avenue	ADA Ramps/Crosswalks	Provide ADA ramps on north leg of the intersection and north side of NW 5th Street/Provide crosswalks on north leg of the intersection

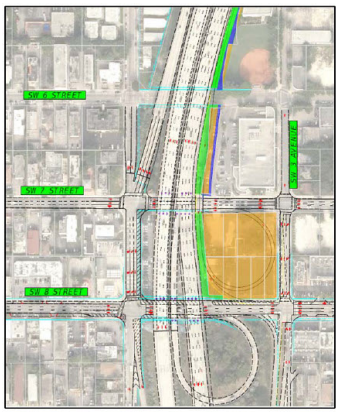
SR 90/SW 8 ST/SW 7 ST FROM SW 27 AVE TO SR 5/US 1/BRICKELL AVE PROJECT DEVELOPMENT AND ENVIRONMENT STUDY

Purpose

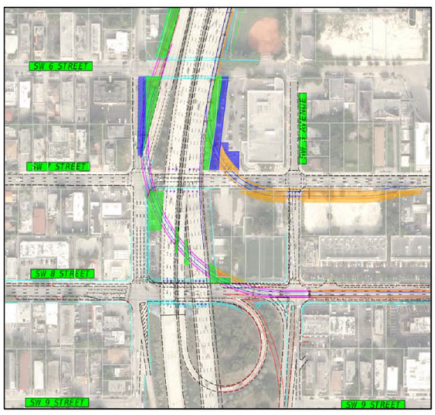
Ongoing study to improve the existing and future physical, operational and safety deficiencies along the one-way pair of SR 90/SW 8th Street and SR 90/SW 7th Street, including at the interchanges of these roadways with Interstate 95 (I-95). Proposed improvements will be developed to enhance traffic operations, promote safety, provide a multimodal and pedestrian friendly corridor, and provide better access to the Brickell area. This study is estimated to be completed by September 2019

Recommendations

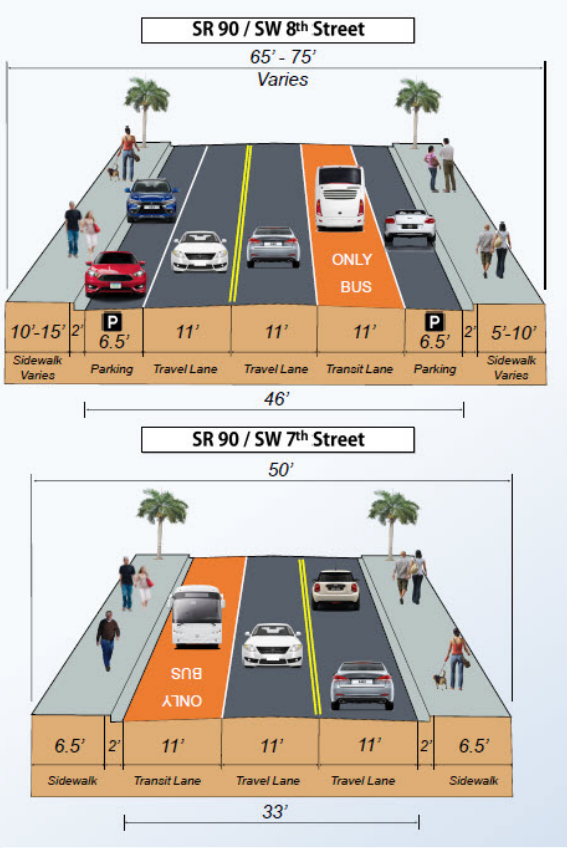
Eight total alternatives are being considered for SW8TH/SW 7TH Streets. Alternatives 1,2, and 2A are two-way two-lanes concepts, alternative 5 is a reverse flow and the remaining alternatives are one-way concepts. Only one alternative includes a transit component, while about half include some level of bicycle facility improvement. The I-95 improvements under consideration for the two-way alternatives include an on-ramp at SW 8th Street for the westbound traffic and an on-ramp at SW 7th Street for the eastbound traffic. The I-95 improvements being considered for the one-way alternatives provide an elevated off-ramp at SW 8th Street for the eastbound traffic and an elevated on-ramp at SW 7th Street for the westbound traffic.

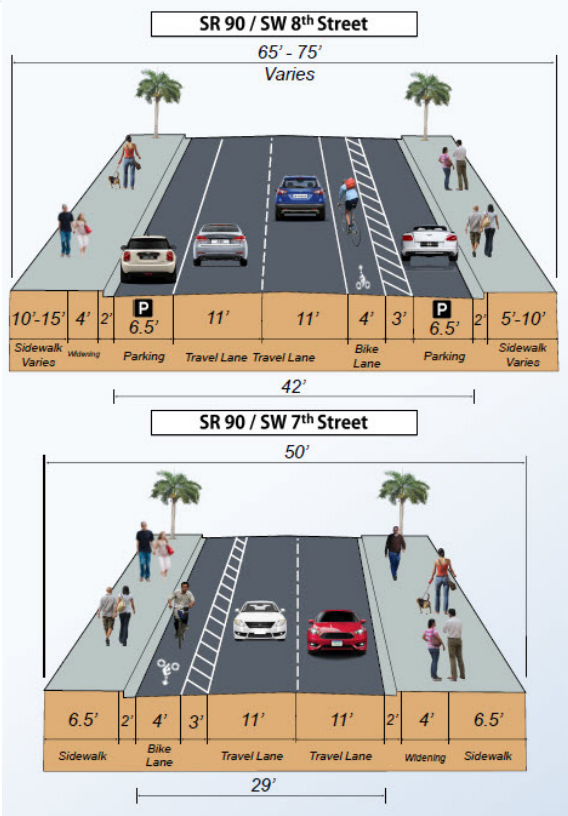


TWO LANES - TWO WAY ALTERNATIVES
+ REVERSED FLOW



ONE WAY ALTERNATIVES
SW 8TH STREET EB & SW 7TH STREET WB





3 STATE OF THE PRACTICE

In transportation literature, the term "First and Last Mile" (FLM) is used to address the connectivity and mobility issues posed by the beginning and ending leg of a transit trip. Even in cities with thoroughly comprehensive premium transit systems, some distance must be traveled from the trip origin to the nearest transit stop or station and to the ultimate destination. Therefore, the traveler is presented with a choice the very minute they leave their front door: to drive or to make their way to transit. Should the traveler choose transit, statistically, this first portion of the trip is most often completed by means of walking.

Understanding what drives a person to choose walking and transit over driving has become a central focus point of much of the transportation research of the past 50 years. More so, knowing the distance people are willing to walk to a transit stop allows planners to evenly distribute stops to reach the maximum number of potential users within this imaginary catchment area. Although this distance varies widely based on a number of factors, FLM is the umbrella term used to describe access within that catchment area of a transit stop or station. Cities with limited transit options actively engaging in policies to increase ridership, typically follow interventions based on three strategies:

- Enhance quality of transit system and service. People are willing to walk further for better service.
- Increase the reach of the transit shed as to increase the total number of people from whom transit is a viable option.
- Increase percentage of transit users within a transit catchment area

To influence travel behavior to any significant degree, interventions must be tailored to the needs and character of the local community and be in line with the current trends.

Photo by Kimley-Horn

Leading Trends in Travel Behavior

A nationwide literature review across a range of case studies, planning documents, and research papers identified leading trends influencing travel behavior based on generational changes and increased popularity and availability of on-demand services. A study in the Journal of Public Transportation (Shaheen & Cohen, 2018) reflected and catalogued these trends into five encompassing categories:

I. CHANGING GENERATIONAL BEHAVIOR TOWARD SUBURBANIZATION AND AUTOMOBILITY

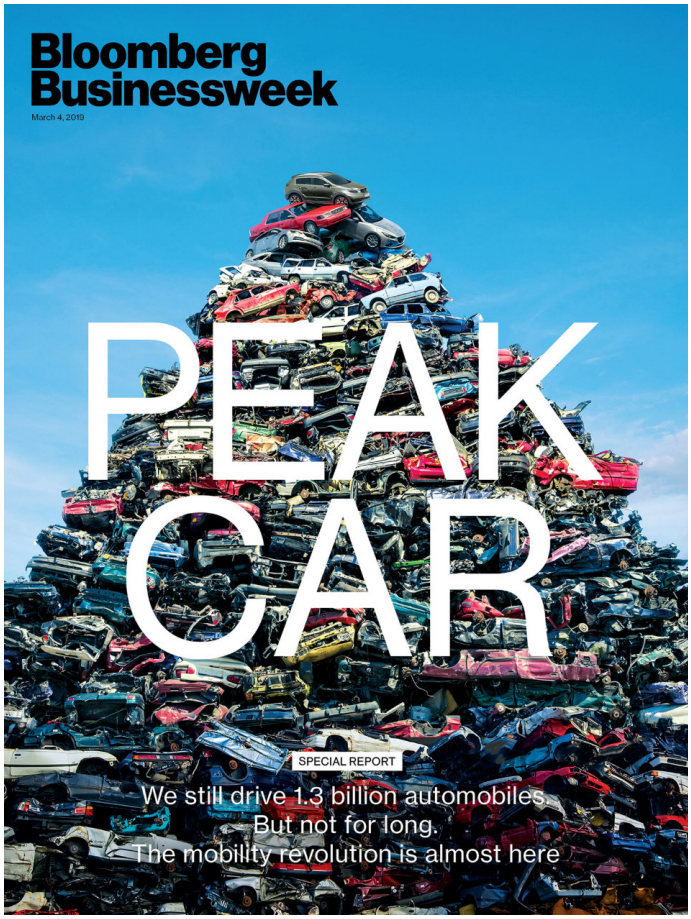
Recent years have demonstrated a strong trend towards urbanization, with more and more people each year moving to the urban core of cities across the globe. Miami is no different, in fact since 2010 the population of Downtown Miami has increased more than 38% to an estimated population of 92,235 in 2018 (Miami Downtown Development Authority, 2018). A vast majority of these residents consist of highly educated, young working professionals living, working, learning, and playing within a 3.8-square mile radius. During the day the population surges to more than 250,000 people between workers, students, and tourists.

In terms of automobility, despite some declines in new passenger car sales in 2018, there is not enough evidence suggesting Peak Car Ownership in the U.S. Moreover, "alone driving" continues to be the leading mode of commuting, even in Greater Downtown Miami, one of the best-served areas in Miami-Dade County in regard to public transit options.

However, one trend that is evident is a change in attitude towards ownership among Millennials and Generation X'ers in comparison to preceding generations. The social structure that derives status from car ownership seems to be changing prompted at least partially by ride-hailing, as an increasing number of people seek alternatives to private car travel.

Although it is uncertain how this trend will evolve as generations age, at present it has allowed for new concepts such as car-free housing to emerge.

> "Millennials are the first generation perhaps since the Great Depression to show less desire for car ownership than previous generations."
>
> – Understanding Travel Behavior Research Scan, FHWA 2016



II. NEW ATTITUDES TOWARD INFORMATION COMMUNICATIONS TECHNOLOGY

The proliferation of the Internet and smart-phone technology has propelled a decisive change in how people go about their everyday lives, including their working and travel patterns. Information communication technology has been integrated in nearly all aspects of life at the individual and community levels. No industry has been left untouched by this trend, with operations experiencing reliability and even dependency on the easy and fast sharing of information to conduct everyday business. Market forces shape cities, and transportation has benefited significantly from Transportation System Management and Operations (TSM&O) strategies. As use of communications technology becomes more widespread, and sharing of information turns faster

with the introduction of 5G, cities and transportation networks are set for a transformation in mobility. Cooperation is essential for efficient planning, and public and private operators are starting to form relationships with community leaders and key stakeholders in order to keep up with market shifts in time to adapt for a yet-unpredictable future.

III. SHIFTING ATTITUDES TOWARD SHARING AND MOBILITY ON DEMAND

Shared Mobility is not a new concept, but it has been gaining traction in recent years, at least partly due to the expansion of communications technology, which allows for faster and easier sharing of information facilitating on-demand services. It is unclear whether these shifting attitudes have been the cause or the result of the rise of ridesharing Transportation Network Companies (TNC's), as well as car and bikesharing programs. Evidently though, whereas getting in a car with strangers constituted a taboo as early as a decade ago, today this is the business model that drives the success of companies such as Uber and Lyft. The effect is spilling over, as TNCs begin to push transit to evolve into more performance-driven models.

IV. INNOVATIVE ALTERNATIVES TO WORK AND NON-WORK TRAVEL

Information communications technology has also changed travel patterns for commuting and non-commuting trips. Telework and telecommuting continue to grow in the US, since it is now easier than ever to conduct business operations without need of being physically present in any given location. On the other hand, travel for purposes other than work has also changed radically, with e-commerce perhaps being the most noticeable example. According to FHWA research, non-work travel makes up the majority of trips, with a 2009 NHTS survey showing approximately 69% share on the weekday and 90% on the weekend (Martin, et al., 2016). Therefore, changes in non-work travel have the power to affect the entire system, perhaps suggesting an opportunity to target multimodal FLM interventions to non-commuters. The effects of this trend have not yet been fully understood, and it would be inaccurate to assume it translates into less daily trips. Whereas online shopping could be removing a number of person trips from the chain, it also drives an increase in small van vehicle miles traveled (VMTs) due to delivery services. An important question to ask is how well do FLM strategies deal with the sector of the demographic most involved with these innovative ways of completed – or not-work and non-work trips.

V. AN INCREASING NUMBER OF ON-DEMAND FLEXIBLE ROUTE TRANSPORTATION OPTIONS

From 2000 to 2014, growth in ridership for demand-responsive transportation in the US doubled from 110.9 million trips to 225.4 million trips, while overall transit ridership only grew by 14% in the same time period (Martin, et al., 2016). These services offer an alternative to conventional transit services with fix routes and schedules. One such service is microtransit, which features smaller vehicles that can easily respond to demand and are usually under private operation and management. In South Florida, Freebee operates as a microtransit provider. Although these mobility options have proven popular in urbanized areas, it is important to avoid a saturated but underused market.

Goals and Objectives

Goals and objectives for Demand Management strategies across the literature focus on sustainability interventions to elevate the efficiency, reliability, safety, and comfort of transportation alternatives, with the ultimate purpose of impacting modal share away from single-occupancy privatized auto travel.

However, presenting transit as a desirable alternative in communities with predominant car culture is challenging, and change is not likely to happen organically. Cities battling congestion, pollution, and social isolation have turned to the Transit-Oriented Development (TOD) model to guide the restructuring of their transportation systems and urban layouts. Reducing car dependency, in particular near city centers, is an ambitious goal that no single policy or intervention can achieve by itself. Those cities that have reported positive, measurable progress toward achieving this goal have done so through a series of systematic intervention packages that address transportation as much as land-use. Each intervention package must be specific to local conditions to ensure valid implementation while meeting the needs of the community.

The diagram below lays the roadmap for a potential intervention package in Greater Downtown Miami.

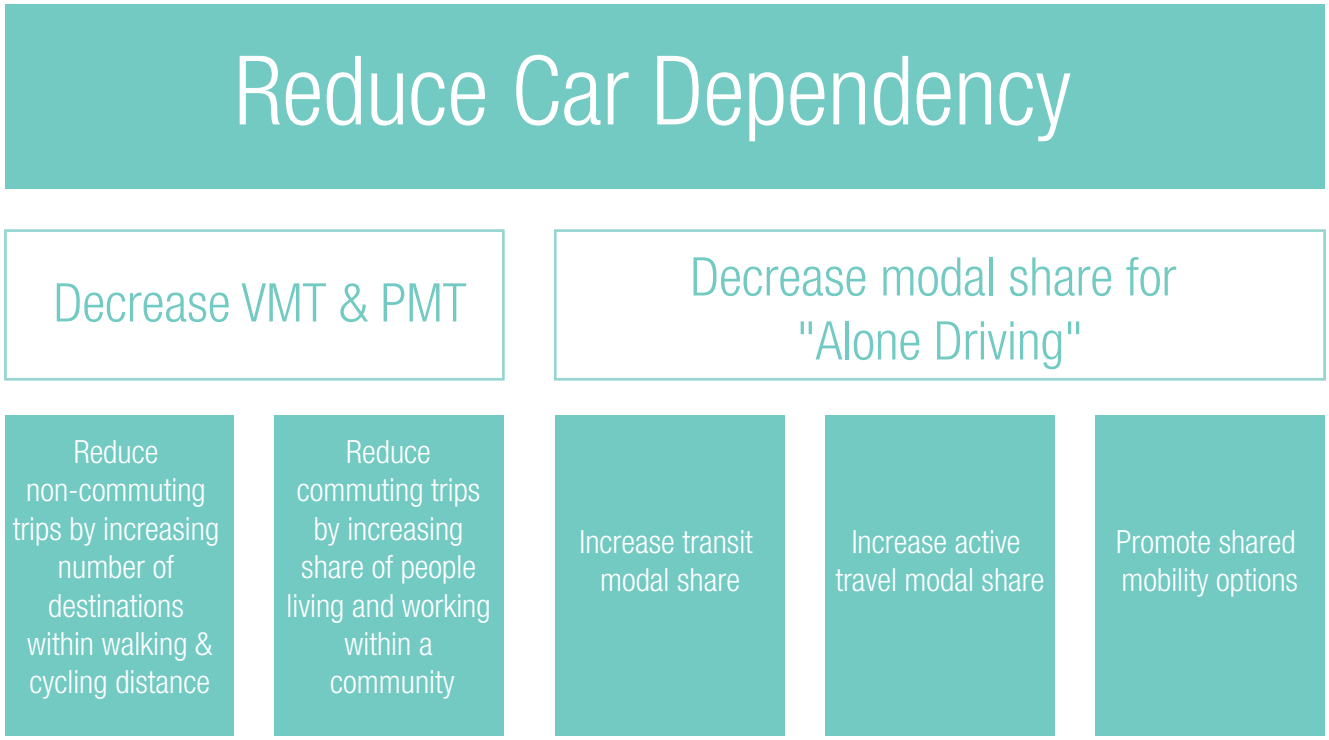


Figure 2. Goals and Intervention Package

Mobility hubs can expand user access sheds by:

- Increasing the average speed of active transportation users through a decrease in wait times at intersections and increased speed and capacity along walking/rolling routes
- Decreasing point to point distances
- Supporting multi-modal transfer activity

However, the influence of these hubs on travel behavior expands well beyond increasing access sheds. Ultimately, mobility hubs must serve a wider range of purposes than solely connecting to transit. Mobility hubs are about the user experience and creating the conditions for walkable and cyclable neighborhoods with attractive public spaces that become a destination on their own. The right set of strategies can ensure that mobility hubs support social interactions and economic growth in communities while improving health and environmental indicators.

Safe, intuitive, accessible, efficient, practical, and interesting mobility hubs are the core of TOD and Smart Growth strategies.

Components of TOD:

- Walkable design with pedestrians as the highest priority
- Train station as prominent feature of city center
- Public square fronting train station
- A regional node containing a mixture of uses in close proximity (office, residential, retail, civic)
- High density, walkable district within 10-minute walk circle surrounding train station
- Collector support transit systems including streetcar, light rail, and buses, etc
- Designed to include the easy use of bicycles and scooters as daily support transport
- Large ride-in bicycle parking areas within stations
- Bikeshare rental system and bikeway network integrated into stations
- Reduced and managed parking inside 10-minute walk circle around town center / train station
- Specialized retail at stations serving commuter

Nationwide Case Studies

MOBILITY HUB GUIDELINES FOR GREATER TORONTO AND HAMILTON AREA

The Mobility Hub Guidelines introduced in 2011 sought to elaborate upon the principles that were used to identify and implement mobility hubs in The Big Move: Transforming Transportation in the Greater Toronto and Hamilton Area (GTHA) – a regional transportation plan for the area.

The Mobility Hub Guidelines identify two types of hubs: *anchor hubs* and *gateway hubs*.

- Anchor hubs have the potential to transform regional urban structure and act as an anchor in the regional transportation system.
- Gateway hubs are key nodes in the regional transportation system where two or more existing or future regional rapid transit lines intersect and there is expected to be significant passenger activity.

A hub must have 4,500 or more forecasted boardings and alightings in 2031 in the morning peak period to be classified as a gateway hub as classified by GTHA.

Continually, the Guidelines identify destinations and major transit station areas as important nodes to take into consideration. Destinations are nodes that draw significant activity, though they do not draw enough activity to be considered a mobility hub.

Major transit station areas are locally significant interchange points that provide access to multiple forms of transportation that do not satisfy the criteria to be considered a mobility hub.

The mobility hub objectives identified by the Guidelines were created to reflect the need for quick and efficient movement or the transportation function, the need for elements that make the hub desirable destination or the placemaking function, and the challenge of creating a successful hub.

A mobility hub typology was established to address the differences between hubs. The Guidelines noted the necessity of the typology categories to help determine a more specialized approach to hubs in each typology category, as they all present unique challenges and opportunities. These typology categories are noted below.

Urban Context

- U1 Central Toronto
- U2 Urban Transit Nodes
- U3 Emerging Urban Growth Centres
- U4 Historic Suburban Town Centres
- U5 Suburban Transit Nodes
- U6 Unique Destinations

Transportation Function

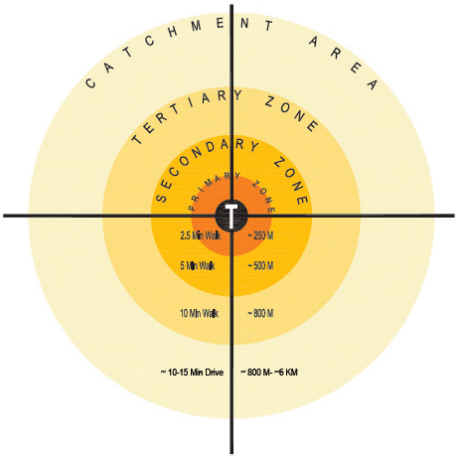
- T1 Entry
- T2 Transfer
- T3 Destination

The Guidelines suggest that when defining the planning area of an individual mobility hub, walking routes, environmental features, infrastructure barriers, existing land use types, regional destinations, and the relationship between the mobility hub and other planning areas and policies should be considered. Additionally, dividing the area surrounding the mobility hub into mobility hub zones can help planners to better understand the challenges and opportunities of an area. The zones defined in the mobility hub guidelines are the following:

- Primary Zone – includes the rapid transit station, corresponding facilities, and the surrounding area within a 2.5-minute walk.
- Secondary Zone – includes the area within a 5-minute walk of the hub that has significant opportunity for TOD.
- Tertiary Zone – includes the area within in a

10-minute walk of the hub that functions as a transition out of the mobility hub

- Catchment Area – includes the area within a 10-to15-minute drive of the hub where most users that access the regional transit system through the hub will come from.



Recommendations

- Consider the provision of facilities for specialized transit services to assist in the coordination of inter-regional travel for persons with disabilities
- Walking distances should be minimized between the accessible/barrier-free entrance, elevators and escalators
- Create "fare-paid" zones within transit stations to minimize delays from fare payment and speed up boarding
- Locate clearly marked taxi and passenger pick-up areas within direct sight
- Operate local feeder transit services during rapid transit operating hours
- Clearly indicate routes that serve rapid transit stations on destination signage
- Where connecting services are infrequent, schedule timing points and layovers at rapid transit stations, so that trip times are timed with train arrivals and departures
- Where fares are not integrated, provide reduced local transit fares when transferring from regional or rapid transit to encourage the use of feeder transit services
- Require developments with significant traffic impacts to contribute funds to transit agencies
- Separate queuing areas with pedestrian islands, connected by clearly marked crosswalks and walkways

Staffed bike stations with secure storage, lockers, rentals, and change facilities.

Highly visible stations promote connections to TOD and other transport services.

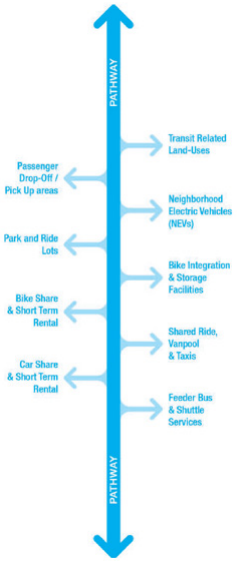
Transfers should minimize walking distance and vertical separations.

LOS ANGELES FIRST LAST MILE STRATEGIC PLAN & PLANNING GUIDELINES

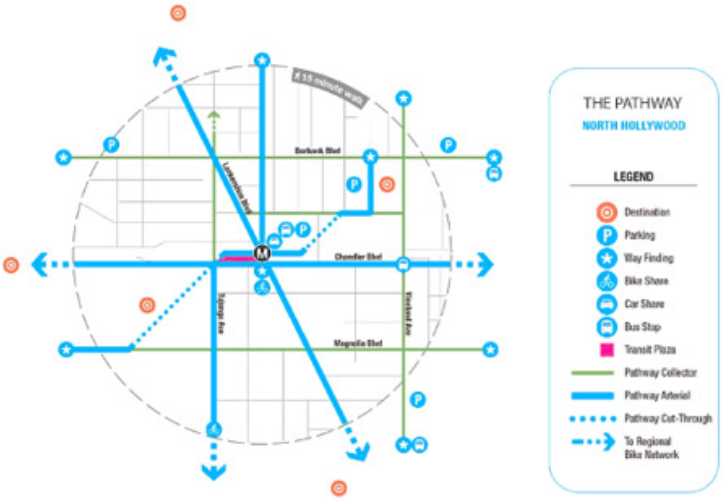
The Los Angeles County Metropolitan Transportation Authority (LA Metro) and the Southern California Association of Governments (SCAG) developed the Los Angeles First Last Mile Strategic Plan & Planning Guidelines to be a key resource for LA Metro in taking on planning and design projects focused on improving first and last mile connections to transit, as well as to design and explain objectives, characteristics, and applications of the Pathway concept.

Metro survey data and field observation revealed that the majority of Los Angeles County residents use active transportation networks to access the overall transportation system and there are several challenges to users of these networks. Active transportation networks are defined in the plan as consisting of sidewalks, bicycle lanes, street crossings, signals, signs, curb returns, lighting, furnishings and landscaped elements. The plan defines an access shed the distance people travel in a set duration of time and explains that an effective first last mile strategy should strive to increase the area covered by the access shed centered on transit station as well as to improve conditions within the sheds.

The Pathway consists of proposed, transit access network improvements designed to decrease the time and length of travel from users' origins and destinations to stations, improve the travel experience of users, and connect users with intermodal facilities or hubs throughout the county. These improvements are intended to surround Metro Rail and BRT stations.



The plan identifies the first step in planning for the Pathway as site area definition¬– setting the location and limits of the network. The plan suggests creating one-half-mile and three-mile radius pedestrian and bicycle circles as thresholds.



The first threshold correlates to the distance a user will walk to reach transit. The second threshold correlated to the distance a user will bike to reach transit. These thresholds can be used to help allocate funding to different improvements in the Pathway, as these are the thresholds set forth by the Federal Transit Administration (FTA).

A pathway arterial must extend from one-half mile of the hub to three miles from the hub that should provide access to the regional bike network.

The second step in planning for the Pathway is to analyze existing conditions. In this step, it is suggested to perform a station analysis, use overlay maps, determine walking routes, and perform a site visit. The third step is to layout the pathway network by locating pathway arterials, locating pathway collectors, identifying site specific opportunities and constraints, evaluating the network, and refining the network.

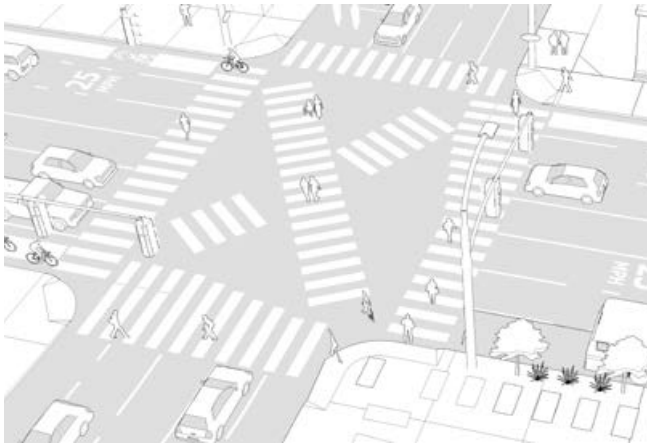
Recommendations

- Paint stripes on existing crosswalk
- Incorporate advance stop bar or yield lines for on-coming vehicular traffic
- Incorporate special paving for crosswalks
- Install in-road warning lights or rectangular rapid-flashing beacons (RRFBs)
- Raise crossings to be flush with the sidewalk
- Couple crosswalks with directional signage
- Place signs on/near corners and decision points
- Ensure that signs are pedestrian-scaled and oriented, if applicable
- Place scramble crossings in dense areas
- Provide real-time information and expected transit arrival times on mobile devices
- Assist new users in finding stations using geospatial software
- Design smart technologies to be used on all platforms
- Provide amenities to make active transportation users comfortable
- Increase number of eyes-on-the-street by providing places for people to sit comfortably
- Install parking areas for bikes, scooters, and other active transportation mobility devices
- Use environmentally sustainable materials
- Provide pedestrian-oriented light fixtures along sidewalks

Beverly Hills saw an overall decrease in pedestrian/vehicle collisions by as much as 63% after a series of scramble crossings were installed

Bicycle parking on the curbside

Separated Bicycle Lanes



Enhanced intersection with diagonal crossings

SMART Mobility Hubs Toolkit of Options

First Mile - Last Mile Options with High Trip Generator Employers (Miami-Dade TPO, 2017) covers a wide range of infrastructure-related improvements support of a multimodal transportation system. As an update to that document, two new sets of complementary measures are incorporated in this study:

- Package of infrastructure improvements relating technology and sustainable transportation, grouped under "Digitally-Integrated Shared Mobility"
- Intra-individual and socio-cultural behavioral and policy interventions that will complement infrastructure improvements within the communities encircling the mobility hubs

Mobility is explored as a service, transposing the customer as the traveler and the mobility hub as the product. Elevating the traveler experience is the underlying strategy that will guide investment and design recommendations for the Greater Downtown SMART Mobility Hubs.

This chapter examines a toolkit of interventions proven to impact travel behavior and mode choice, and in particular those interventions with good track record in the U.S.. The mobility hubs improvement recommendations outlined in Chapter 6 extrapolate from the most relevant interventions analyzed in this chapter and tailor them to local conditions in Greater Downtown Miami.

DIGITALLY-INTEGRATED SHARED MOBILITY

The transportation industry is amid a transformative wave boosted by advances in digital information and communication technology. Downtown mobility hubs are expected to cater to all conventional transportation modes and to the demand for app-based mobility services such as carshare, bikeshare, and e-scooters rentals. Moreover, mobility hubs present the opportunity to layout the footprint for Autonomous Urbanism.

WHAT IS SHARED MOBILITY?

Shared Mobility is an umbrella term used to describe transportation services and resources that are shared among users either concurrently or one after another. Shared Mobility is not a new concept, as by definition it encompasses all traditional modes of public transit and for-hire vehicles such as taxis.

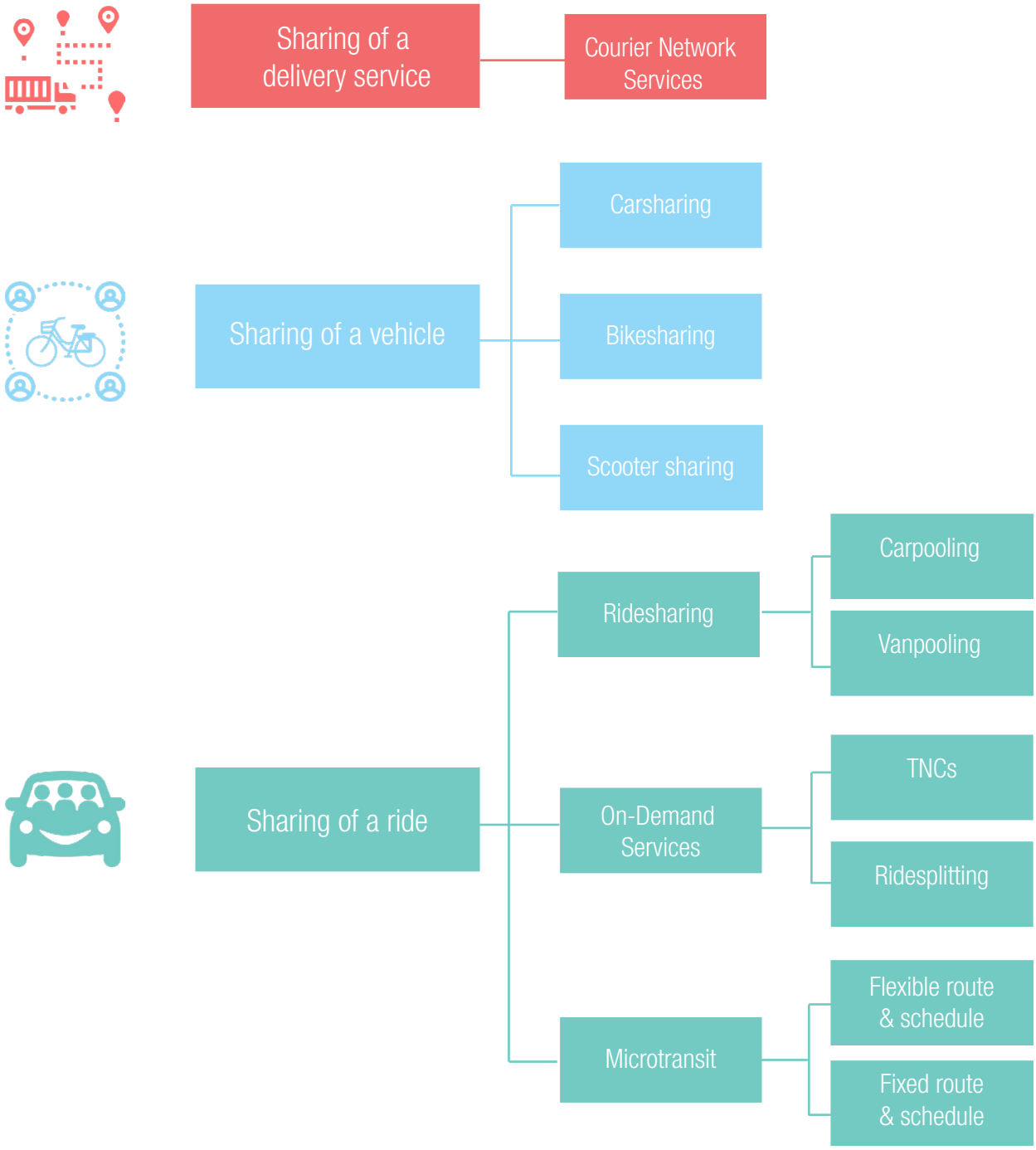
Photo by Kimley-Horn

Studies of Shared Mobility modes have documented environmental, social, and transportation-related impacts including the reduction of vehicle use, vehicle ownership, vehicle miles traveled (VMT), and greenhouse gas (GHG) emissions. (Chan & Shaheen, 2016)

Fostered by technology, recent years have seen a rise in Shared Mobility options, even expanding beyond motor vehicles to include bikesharing and scooter sharing programs. In spite of the challenges that these new micromobility modes have created in the urban environment, they play a decisive role in expanding the catchment area of transit.

The diagram below outlines main areas of Shared Mobility.

Figure 3. Key Areas of Shared Mobility



Sharing of a delivery service

This type of shared mobility includes all delivery services, an industry that has significantly expanded due to the growth of e-commerce. The ultimate impact of this trend has not been quantified as it is still unclear how many delivery trips are generated for each personal trip that is eliminated from the chain.

Research from the United Kingdom does show a steady rise in small vans traffic volumes in recent years. As e-commerce conglomerates like Amazon continue to put forth delivery subscriptions with unlimited expedited shipping, it is likely that those numbers will continue to rise. In addition, there is an increasing number of businesses, retailers, and restaurants offering their products through online platforms, and depending on delivery services for customer interaction. In response, companies like Uber have expanded their practices to cater to those needs with services like Uber Eats.

Although motor vehicles are still the predominant mode used for delivery services, e-scooters and bicycles can be an attractive alternative in dense urban settings for smaller deliveries.

Photo by Kimley-Horn

Sharing of a vehicle

- Carsharing program members have access to a fleet of shared vehicles. It has been estimated that one carsharing vehicle can replace 9-13 personal vehicles. FHWA survey data on carsharing programs found that 25% of people who joined a carsharing program postponed a vehicle purchase, while another 25% sold a vehicle after joining the program. In addition, the research found that more carsharing users increased their overall public transit and active travel use than decreased it. This strategy is most effective in cities and urban areas.

- Bikesharing programs have become an effective and efficient first and last mile connection option, with the potential to impact public transit systems. These programs, which can run largely unattended with 24/7 accessibility offer a huge business advantage. Although the concept of bikesharing was first introduced using docked bicycles, dockless bicycles are increasingly more popular since this model allows for larger area and destination coverage. Increases in bus ridership across US cities has been attributed to bikesharing improving access to and from bus routes. Nonetheless, implementation of bikesharing programs without investing in bicycle infrastructure is counterintuitive and inefficient. The sustained success of bikesharing will depend on how well cities can reshape themselves to provide the necessary infrastructure for these programs to take off.

> 50% of surveyed North American bikesharing members reduced personal auto usage after joining the program.
>
> - Shaheen and Chan, 2015

- Scooter sharing programs have risen with almost unparalleled popularity in the few years since their first introduction, following a similar model as dockless bikesharing. Nonetheless, the sudden success of electric scooters has also sprouted growing concerns both from the public and city officials about the safe and orderly integration of this new mode into the transport network.

Parking is a common concern with e-scooters and dockless bicycles. With no defined parking area, many of these vehicles become obstructions along the pedestrian zone, driveways, and even roadway. The very recent rise of this mode means that in many cities neither infrastructure nor policy has been set in place to integrate e-scooters. Lack of comprehensive data makes it difficult to determine the impacts or best practices of e-scooters. However, micromobility lanes or "rolling lanes" are starting to emerge to fill the infrastructure gap. Other best practices also include designating parking zones in non-obtrusive spaces, capping the speed of devices within a reasonable margin, and a focus on requiring companies to comply with permit obligations.

E-scooter parking zone in California.
Photo by Collin Worth.

Sharing of a ride

- Ridesharing involves two or more people conjunctively sharing a vehicle to complete their journeys. Vanpooling is classified by the Federal Highway Administration (FHWA) as a grouping of 7 to 15 persons commuting together in one van. The most common types of ridesharing are acquaintance-based or organization-based, however it can also happen ad-hoc. Trip planning apps, such as Waze, have introduced carpooling programs to assist people with similar commutes to drive together.

  There are multiple benefits associated with ridesharing. At the individual level, it significantly reduce the cost of driving and eases stress. At the community level, it targets "alone driving" modal share - particularly among travelers for whom transit is not a reliable alternative-, thus resulting in fewer trips and reduced traffic congestion. Carpooling can potentially reduce an individual's transport-related greenhouse gas emissions by half. Nonetheless, there are some inconveniences associated with carpooling, as it does require coordination between members. Incentives are typically necessary to influence this behavior. Parking access, reduced parking costs, and other financial benefits have proven to be effective measures to achieve higher levels of carpooling.

- On-Demand Services include Transportation Network Companies (TNCs) with Uber and Lyft being the most recognized names in the industry. These services are app-based with the ability to respond to areas of high demand. There are relatively low operating costs associated with these companies, since in most cases it is not necessary to incur in vehicle purchases or maintenance costs. Ride-splitting within TNCs such as “UberPOOL” and “Lyft Line”, and services without route deviation like Uber’s “Smart Routes” and Lyft’s “Hot Spots”, essentially become on-demand microtransit options. TNCs are one of the factors impacting transit ridership decline in many cities, nonetheless, both services can and must coexist. Some transit agencies are starting to look for ways to integrate characteristics of TNCs into their services to optimize efficiency and profitability.

- Microtransit refers to smaller-scale transit services such as Paratransit (ADA vehicles), community shuttles, and Neighborhood Electric Vehicles (NEV). These services are commonly provided by many cities on a fixed route and schedule. Within the private sector, integration of on-demand responsive platforms to allow for flexibility in route and schedule have resulted in companies like Freebee. Cities across the U.S. have turned to microtransit to target commuters

traveling from residential areas into downtowns. Public-Private Partnerships (P3s) between private providers and government agencies can be powerful coordination tools to maximize coverage and optimize efforts.

Shared Mobility can improve connectivity to other transportation modes, shift travel behavior, reduce single occupancy vehicle trips, and ultimately improve customer satisfaction.

Micromobility devices themselves (such as shared bicycles and e-scooters) produce no emissions, have relatively low cost to users, and enhance active and car-free lifestyles.

AUTONOMOUS URBANISM

Various levels of automation already exist and are in use, and introduction of more advance levels including full automation (self-driving cars) is only a matter of time. This can present an opportunity to foster social, economic, and environmentally sustainable communities if implemented in conjunction with Shared Mobility. But the opposite effect is also possible. Should single-occupancy autonomous vehicles become the norm, both VMT and PMT are likely to increase significantly, as more people might choose to commute longer distances and complete more trips. Connected vehicles (CVs) and autonomous vehicles (AVs) technology could potentially have an overall positive or negative impact particularly at the urban core. Cities must consider which future they want, and what interventions will get them there. Promoting walkability remains a main goal to steer this new wave in right direction.

In terms of transit, small AVs should not be a replacement for transit, but rather a complement to it. Shared autonomous pods, for example, can provide first and last mile connectivity for transit. Moreover, employing AVs for demand-responsive transport systems can reduce the costs of such as service substantially. It can also transform the way public transit services operate, shifting from rigid routes and schedules toward flexible, demand-responsive services. It is important to tailor the distribution of the initial fleet strategically close to demand generators.

In 2018, Dubai's Roads and Transport Authority launched their first fleet of autonomous pods along dedicated lanes. *Source: Dubai's Roads and Transport Authority*

However, to foster these emerging technologies, investments beyond ground infrastructure are necessary to set the digital communication network in place. Optimizing a roadway for AVs will require the installation of various types of sensors and communications technology such as vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) capabilities to allow vehicles to improve system performance. Real-time data such as roadway conditions, traffic signal timing, pedestrian volumes, or traffic along bicycle networks would greatly enhance the overall network.

AV technology is likely to develop based on Dedicated Short-Range Communications (DSRC) or 5G cellular network technology. In each case, communication technology must be embedded in infrastructure, from intersections to lanes and mobility hubs. Additionally, it will be necessary to increase the bandwidth of existing wi-fi networks, possibly by complementing network towers through small cell deployments.

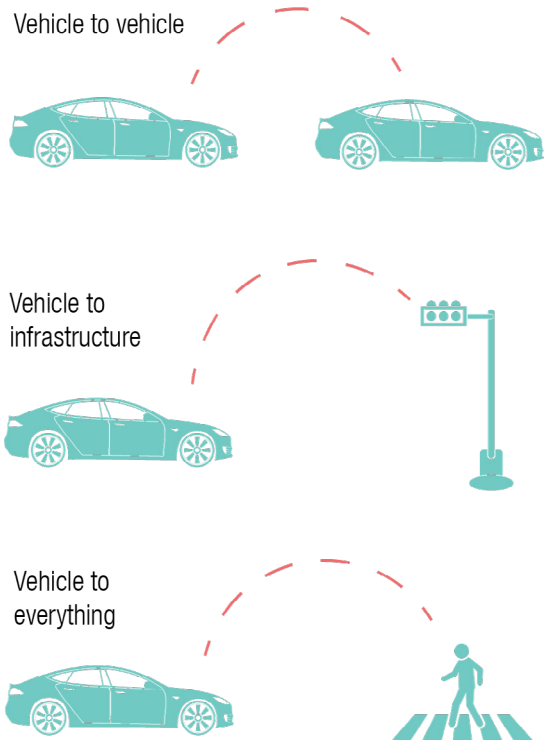


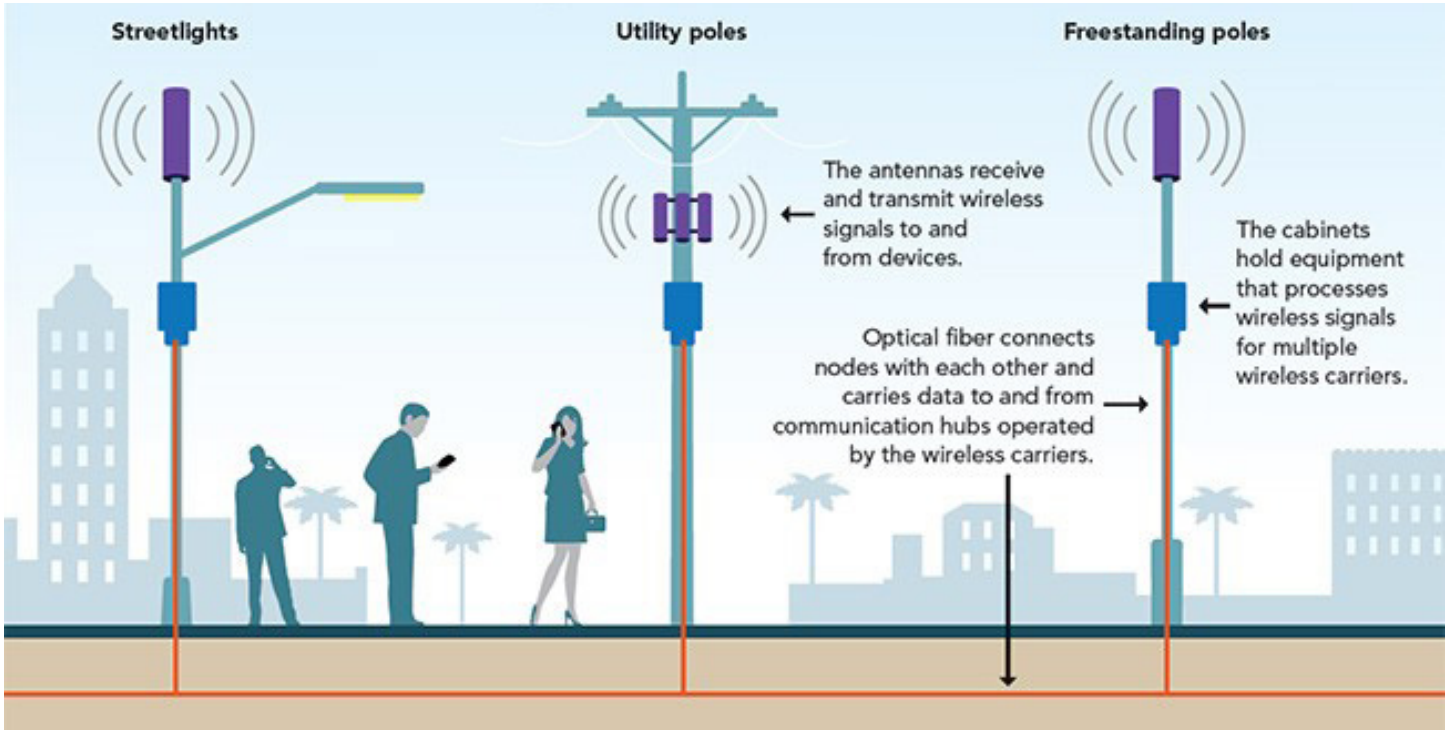
Figure 4. Connectivity Sensors and Communication Technology

Fiber optic coverage at hubs and throughout areas of initial deployment will be essential, in order to deploy and monitor any kind of intelligent transportation system.

At ground level, automation represents an opportunity to redistribute the right-of-way and public space, starting within the catchment area of mobility hubs and expanding out as resources become available. Careful consideration to pedestrian and bicyclists should be given during the planning and design phases to ensure automation enables rather than impede these activities.

NACTO's Principles for Autonomous Urbanism:

- Provide Mobility for the Whole City
- Rebalance the Right-of-Way
- Manage Streets in Real Time
- Move More with Fewer Vehicles
- Public Benefit Guides Private Action



A small cell node is a connectivity point that adds coverage and capacity to urban areas, enabling 5G connectivity.
Source: Florida Trend, April 2019.

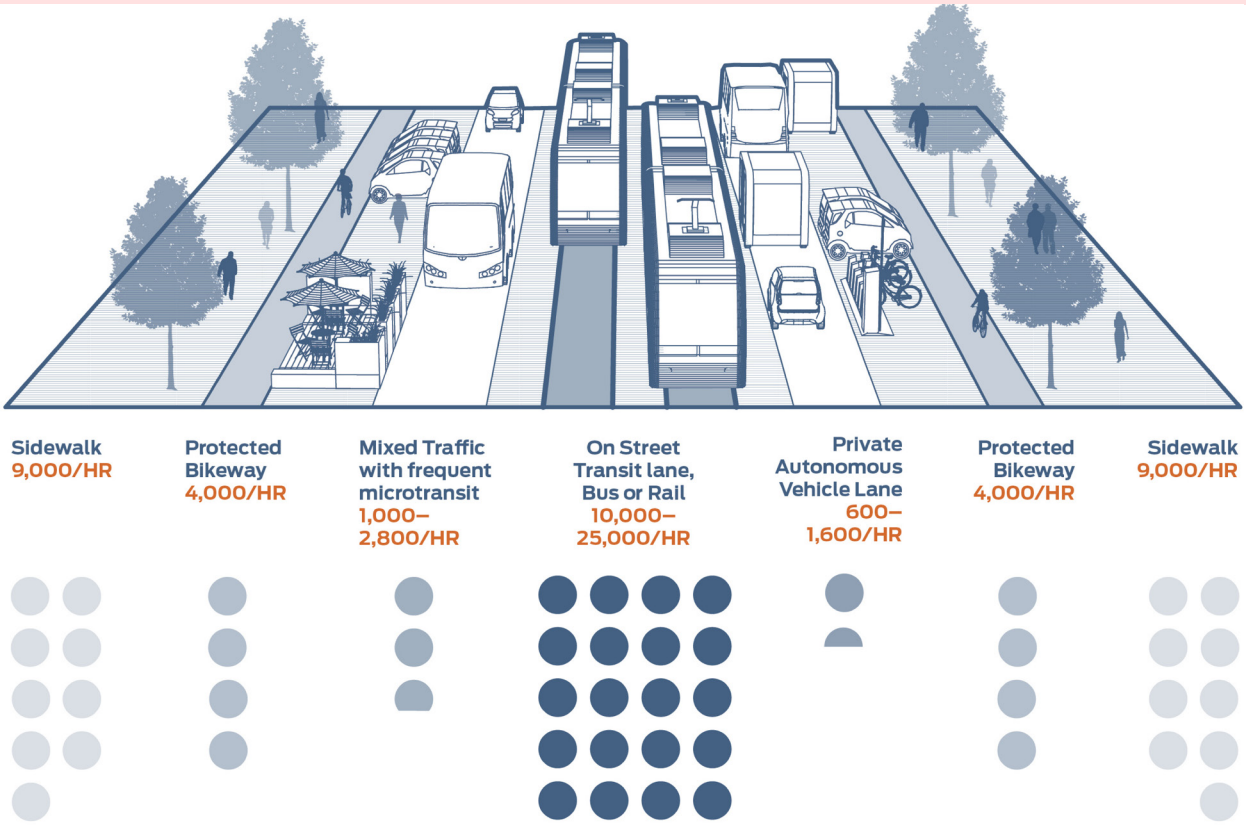


Figure 5. Redistributed Right-of-Way and Corridor Capacity by Mode

Source: NACTO

PROMOTING INTEGRATED SHARED MOBILITY

- *Provide infrastructure and incentives for electric vehicles* - AV technology is most likely to emerge within the electric vehicle industry, since an electric motor allows for greater automated control. As an added benefit, emissions savings are forecasted to be substantial with ecodriving functions, and even more so if the future is shared, automated, electric vehicles. State-sponsored tax incentives for buyers, in addition to federal tax credits, have resulted in high share of electric vehicle ownership in states like California. Policies aimed at automakers have had similar effects.
- *Manage parking dynamically at mobility hubs and urban core areas* - Parking is one of the most intensive land-uses in city centers, where real estate is a priced commodity. Some strategies include:
  - Parking inventory technologies to capture, display and even pay for available parking, eliminating some of the congestion created by circling cars searching for parking spots and allowing for greater understanding of real demand and supply of parking throughout the day.
  - Radio frequency identification (RFID) based technology and biometric devices can efficiently control the entrance and exit gates of parking facilities.
  - Innovative demand-responsive valet parking services.
  - Provide low-speed, electric vehicles priority parking stalls in micro park-and-ride facilities, closer to city center entry/exit points.
  - Employer-based incentives to cede parking rights, where employers allow for workers to trade their parking spaces for the cash equivalent.
  - Parking funds and Parking Benefits Districts for community garages (in-lieu fees) to be placed at key locations (entry-points) of city centers, paired with parking-free communities/buildings.

- Reduce and ultimately eliminate parking minimum requirements. In an automated, shared future, parking spaces become an inefficient use of land resources. Reducing or relocating parking in the short term can prepare communities for a long-term where rather than parking minimum requirements cities can implement parking maximum requirements on new developments.

- *Design and implement a technology-driven, consistent wayfinding system around mobility hubs with supportive features throughout the city* - In the age of big-data, providing real-time information to the public helps users make more informed decisions and increase user satisfaction. Although dissemination of travel information is largely available to drivers along high-volume highways, this is a system that can be extrapolated to transit users and active travelers.

- *Promote data-sharing between stakeholders of the public and private sectors, as well as the general public* - Partnerships with ridesharing companies, telecommunication companies, and trip planning apps can lead to innovations on data collection resulting on a solid data foundation.

- *Implement a centralized, mobile, single-payment fare system platform* - Multiuse mobility cards to access multiple services and modes of transportation, including microtransit, shared programs, and transit. In the case of transit, proof-of-payment systems, where users pay for their tickets before entering the vehicle ("Pay Before You Board"), can significantly reduce delays and costs for operators.

- *Allow for flexibility in Curbside Management* - This space can serve different functions throughout day and nighttime hours. Design of curbside must adapt to changing urban needs, including providing space for microtransit and TNC's pick-up/drop-off zones, carshare parking, mobile vendors, parklets, and servicing and loading areas that do not interfere with the pedestrian network.

- *Consider Congestion Pricing* - This tool is increasingly used to manage VMT and pollution levels in city centers. Cordon charges, where vehicles pay a fee to drive into or within congested areas, have been successfully implemented in Europe and Asia. In the US, both New York and California have started implementing this strategy. Congestion pricing works best in areas that are well-served by high-quality transit services.

Photo by Kimley-Horn

INTRA-INDIVIDUAL, SOCIO-CULTURAL, AND POLICY INTERVENTIONS

Physical infrastructure and behavior change supportive measures are complementary to each other. Even if all infrastructure is set in place to facilitate transit use and active travel, significant barriers remain in place keeping people from embracing these modes. No substantial modal shift is likely to occur until these barriers have been properly tackled.

Prioritizing interventions aimed at normalizing walking and bicycling is fundamental. The goal is not to move a few people from one hundred percent car use to zero, but rather to motivate large groups of people to shift some of their trips to transit, walking, and bicycling. In between people who never partake in these activities and people who do it frequently, there is a group of people who do it occasionally and would be willing to increase frequency under the right conditions. Mobility hubs are more than transit stops, they are the core of TOD.

> Multi-faceted active travel interventions appear to have the strongest benefit-to-cost ratios.

INTERVENTIONS AIMED AT INDIVIDUALS

- *Mass awareness campaigns* have been found to have a positive impact on people's perception of transit and active travel. Negative cultural perceptions toward these modes can be a barrier to adoption, especially when the car is seemed as a symbol of status within the community. Media campaigns can dismantle these perceptions, in particular when designed in cooperation across different industries. Improved fitness can be a strong motivator to take up walking and bicycling, thus healthy bicyclist campaigns can be launched in partnership with the health care sector. Similarly, environmental considerations are another often-cited motivator, therefore highlighting sustainable features of the system can be an effective. Understanding the intended audience will lead to a more effective campaign. The hubs themselves must also be highly visible and recognizable. Ultimately, rather than marketing multimodal journeys, mobility hubs must promote multimodal living.

Photo by Kimley-Horn

- *Personalized Travel Planning* apps can eliminate uncertainty from the journey's decision making process, and have been reported to be able to increase walking trips by up to 5 percentage points in certain cities (Transport for London, 2016). Travel time estimation reported in real-time further enhance an individual's ability to make informed decisions. Although the level of influence does vary given local factors, the evidence suggests this to be one of the most effective interventions even when implemented by itself. Data-sharing between stakeholders is essential for this purpose.
- *Training and support* - Lack of skill or confidence can be a strong deterrent to integrating these activities into everyday routines even among active bicyclists. Bicycling classes and trainings can be offered through local agencies' programs, in particular for kids of younger ages. Support for less confident bicyclists can also be rendered through the provided bicycle facilities. Separated bicycle lanes, colored bicycle lanes, and bicycle phases in traffic signals are all effective at increasing perceived and actual safety.

> NYC saw a 75% decrease in average risk of a serious injury to bicyclists from 2001 to 2013 following implementation of separated bicycle facilities.
>
> - NYCDOT, 2014

- *The Network Effect* - across the literature, several cities report an exponential growth in percentage of people walking, bicycling, and using transit following an initial adoption curve. This trend is referred to as the Network Effect. As the network of continuous pedestrian and bicyclist paths grows, the demand grows too. Eventually, the behavior is normalized and socially accepted, and with more "eyes on the street" even initially reluctant users reconsider their behavior.

- *Provide end-of-trip support facilities at mobility hubs and major destinations* - convenience is key to motivate people to use transit and active travel. Bicycle repair shops, parking, and safe storage are among the support facilities that are often needed to complete bicycle trip for purposes other than exercising. In addition, mobility hubs should have all necessary amenities to protect people against the elements - including heat and rain. To facilitate delivery services and coordination and reduce vehicle travel, mobility hubs may be equipped with drop-off "locker boxes" where residents can ship their online orders. Major hubs should also incorporate restroom facilities and wherever possible showers, nursing, and changing rooms.

INTERVENTIONS AIMED AT PEOPLE IN GROUPS

- *Home and community based interventions* can take many forms such as healthy living maps or reward cards that collect points for using the transit system. Additionally, the provision of small urban parks, gardens, and neighborhood convenience stores expands the number of destinations available within walking distance of people's homes. Mobility hubs that offer these amenities become centers of gravity for the surrounding communities.

- *Workplace based interventions* are practical ways of targeting travel for commuting purposes. Major employers can launch multiple initiatives to positively influence travel behavior among their employees, including bicycling challenges, financial incentives including subsidies for transit, workplace travel plans, and Walk/Cycle to Work days. In San Francisco, Cycle to Work Day in 2008 found bicycle counts to be 100% higher on Cycle to Work Day compared to a control. Showers in the workplace, and other end-of-trip facilities such as bicycle parking change rooms, and lockers should also be promoted. Workplace based carpool programs tend to be one of the

Photo by Kimley-Horn

Case Study: She Moves, Women's Issues in Transportation

Understanding that there are major differences between men and women with regard to travel comfort, security and safety, the European Union conducted a study in 2014 to understand the major obstacles and constraints encountered by women travelers. Some of their key findings include:

- Women's travel patterns are more likely to involve traveling with children, carrying heavy bags, and traveling short distances that require frequent transfers.
- Real-time information displays and Internet services, are effective in reducing waiting time in unsafe environments and thus increase the level of perceived security by female passengers.
- Most incidents involving women on public transport reported in the U.S. are not Type 1 crimes such as rape and aggravated assault, but are more likely to be intimidation, groping, or verbal assaults.
- There are well documented gender differences in attitudes toward active travel. A Portland study reported a decline in physical activity by children, particularly by adolescent girls, who were found to be more likely than boys to report embarrassment about riding a bike and about avoiding falls and injury.
- As agents of the change, women are playing a pivotal role in the transition to sustainable mobility, but understanding transport patterns and mobility is fundamental to the development of evidence-based, gender-sensitive policies.

most efficient ways of ridesharing. Incentives that employers may offer include online platforms to assist finding matches, reserved parking spots near the entrance of building, emergency ride home fund in case somebody must leave early, and nominal cash incentives for every passengers that carpools. Employers who offer free parking may also offer the cash in equivalent for employees who are willing to give up their parking spots and shift modes, or carpool.

- *Effective targeting can also be based on similar attitudes toward the activity*. For instance, the evidence strongly suggests that it is mainly women that respond to behavioral interventions (Transport for London, 2016). Many women also share similar concerns and needs when it comes to mobility. Socio-cultural and policy interventions should be formulated to tackle those concerns, in particular security. Involving women in the planning, design, and operation of transit services and facilities enables them to find solutions for these concerns.
- *Special events* are effective ways of reaching large groups with common interests and present opportunities for individuals to explore these activities in groups, where they might feel more comfortable. Bike tours, "Critical Mass", farmers markets, street fairs, and art exhibits are examples of such events. Introducing mobility hubs to the community through these type of events may have a powerful effect breaking the ice and familiarizing residents and visitors with the amenities the hub has to offer. Creating temporary pedestrian promenade zones around the hubs will further enhance the experience.

Photo by Kimley-Horn

POLICY TOOLS

Policy tools can be used as Travel Demand Management strategies, including:

- Defining modal share targets to inform the development of land use and transportation planning at hubs.
- Implementing supportive land use planning as well as restrictions on car use. This can be achieved by identifying non-mobility services that could be co-located within the mobility hub model.
- Assessing existing travel patterns at each hub. Determining a mix of uses based upon the nature and character of each mobility hub.
- Building or retrofitting a network of Complete Streets with high levels of pedestrian priority.
- Promoting a shift in travel behavior to the maximum extent possible in all decision-making opportunities of project development including planning, design, financing, and operation.
- Establishing a desired modal hierarchy system to guide decision-making.
- Integrating development-specific travel plans into the planning approval process for new developments of a minimum size.
- Providing minimum bicycle parking requirements in zoning bylaws.
- Leveraging expected increase in property taxes to fund interventions.
- Relieving developers from parking requirements if they provide bicycle parking and lockers, transit amenities, subsidized transit operations, and carsharing programs.
- Developing equity plans for low-income groups.
- Subsidizing public transportation for the elderly.
- Monitoring impact of interventions with control areas and establishing feedback loops.
- Creating partnerships with personalized travel apps to optimize data collection.
- Using mobility hubs as a Community Redevelopment tool.
- Educating vendors of positive impacts on retail spending at the local level, which can build support for lane eliminations and similar programs.

> In New York, implementation of bicycle infrastructure was followed by a 177% increase in bicycle volumes, and locally-based businesses saw a 49% rise in retail sales.
>
> - Transport for London, 2016

- Developing special purpose, transit-related urban development zoning districts to facilitate development of mobility hubs over time.
- Updating design standards to include achievement of environmental sustainability objectives, such as LEED certification, for any new transit-related buildings or hubs.

Photo by Kimley-Horn

4 EXISTING CONDITIONS

Socioeconomic Characteristics

Policies to stimulate equity in mobility must be based on socioeconomic research. Moreover, understanding the socioeconomic profile of the study area allows for the development of recommendations that are tailored to the specific needs of the community.

POPULATION

From 2010 to 2018, the study area (Greater Downtown Miami) was estimated to experience a 38.1% population growth rate. From 2018 to 2021, the study area is projected to have population growth rate of 18.8%. The 2018 estimate as well as the 2021 projection was obtained from Greater Downtown Miami Demographics, a 2018 report from the Miami Downtown Development Authority. With a land area of 4.17 square miles, and no foreseen slow down in population growth, it is essential to find transport and urban solutions that allow for sustainable continued growth.

Table 1. Population Density in Greater Downtown

Source	Total Population	Population Density (people/mi²)
U. S. Census, 2010	66,769	16,012
Miami DDA Estimate, 2018	92,235	22,119
Miami DDA Projection, 2021	109,617	26,287

AGE

Based on the Greater Downtown Miami Demographics report, the most prominent age group in the study area is ages 25 to 34, which accounts for 24,357 people and 26.4% of the population. The population is comprised mostly of the middle age groups.

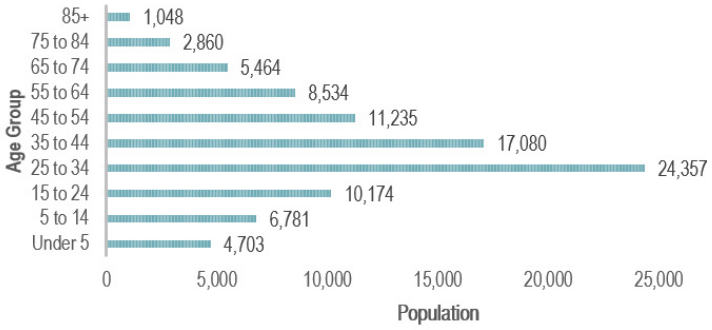


Figure 6. Population by Age - 2018

Photo by Kimley-Horn

GENDER

The population in Greater Downtown Miami is 50.6% male and 49.4% female. The gender division of household roles and responsibilities affects individual mobility. The different travel patterns between men and women must be considered when developing policy and infrastructure aimed at closing the gap in use of public transit between the genders. Despite nearly exact gender parity between residents of Greater Downtown Miami, differences in rates of use of different modes persist.

Research has shown that women are more likely to travel shorter distances and to stop more frequently than men during their journeys. In addition, women are often responsible for the mobility of other family members, making their travel planning a complex spatial-time organization task with specific transport requirements (European Union, 2014). Accommodating active travel and transit use into the already busy schedules of women may prove challenging, but it is essential for the success of a sustainable transit system. Effective first and last mile planning must thus address women's specific mobility needs.

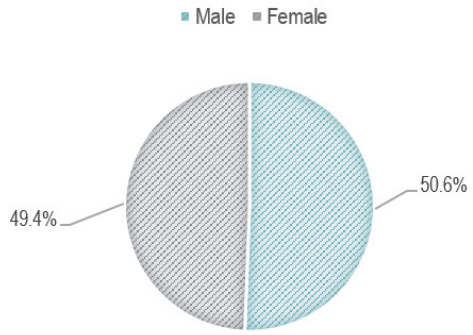


Figure 7. Population By Gender

EDUCATION

Based on the Greater Downtown Miami Demographics report, the primary level of education in the study area is Bachelor's Degree and Graduate/Professional Degree, accounting for 29% and 25% of the population, respectively.

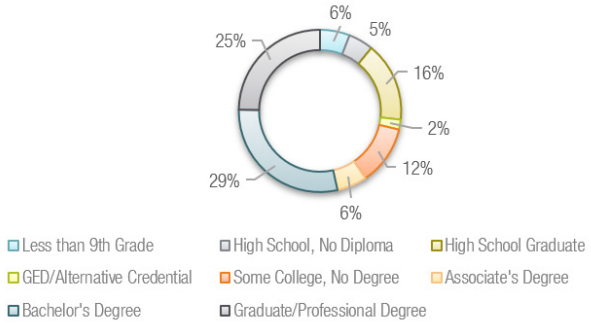


Figure 8. Population By Education

ETHNICITY/RACE

This section summarizes the race and ethnicity breakdown of the City of Miami's population, obtained from the U.S. Census Bureau, 2013-2017 American Community Survey 5-Year Estimates. Key findings include that the City of Miami is almost 75% Hispanic or Latino and 75% white.

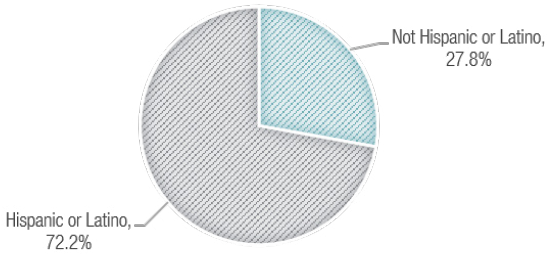


Figure 9. Population by Ethnicity

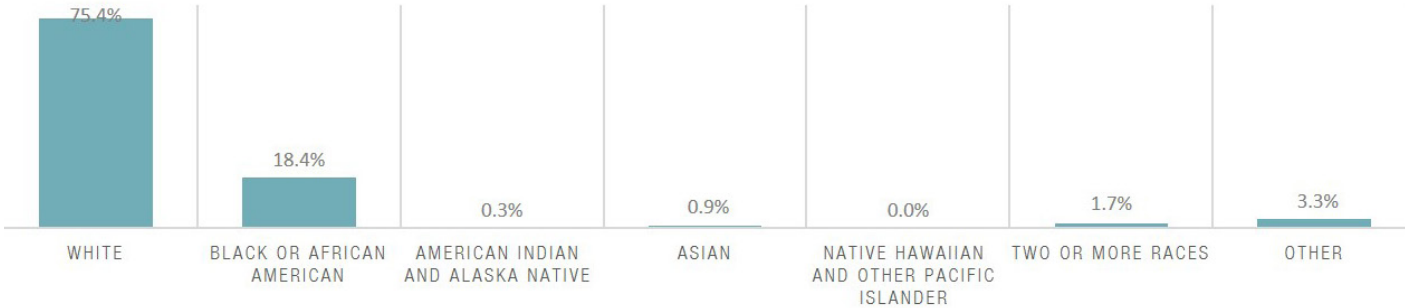


Figure 10. Population by Race

Notable firms and employment centers in Greater Downtown Miami

- JP Morgan Chase
- Wells Fargo
- Bank of America
- Citigroup
- Akerman LLP
- Ernst & Young
- Brown Mackie College
- Florida International University, Brickell Campus
- Miami-Dade College, Wolfson Campus
- New World School of the Arts
- Miami Culinary Institute
- Miami-Dade County Government Center
- City of Miami Administration Building
- Dade County Courthouse
- U.S. Department of State American Passport Office
- Claude Pepper Federal Building, U.S. Courthouse
- Rohde State Office Building

EMPLOYMENT

Based on the Greater Downtown Miami Demographics report, the employment in 2015 in the study area is overwhelmingly comprised of Educational Services and Public Administration. Together, these categories account for 52.9% of the population. The second tier of significant employment categories includes: Finance and Insurance, Pro, Scientific, and Tech Services, Health Care and Social Assistance, and Accommodation and Food Services. The categories in the second tier each account for between 6% and 10%.

Downtown Miami accounts for 16% or all employment in Miami-Dade County. The area contains over 60 major financial institutions as well as several large law firms, Fortune 500 firms, public administrations offices, and educational institutions.

Table 2. Employment by Sector

Category of Employment	Percentage of Population - 2015
Construction	0.8%
Manufacturing	0.5%
Wholesale Trade	1.5%
Retail Trade	3.4%
Transportation and Warehousing	0.8%
Information	1.2%
Finance and Insurance	6.3%
Real Estate, Rental, and Leasing	1.2%
Pro, Scientific, and Tech Services	9.1%
Management of Companies and Enterprises	0.7%
Admin, Support, Waste Management and Remediation Services	3.7%
Educational Services	32.5%
Healthcare and Social Assistance	7.1%
Arts, Entertainment, and Recreation	1.2%
Accommodation and Food Services	7.7%
Other Services	1.9%
Public Administration	20.4%

Source: Greater Downtown Miami Demographics

HOUSEHOLD INCOME

The Greater Downtown Miami Demographics report presents the median household income in 2018 for the Greater Downtown Miami area as $76,610. Additionally, there is a significant discrepancy between the median household income of Greater Downtown Miami in comparison with the City of Miami and Miami-Dade County overall. The median household income of Greater Downtown Miami is around 1.5 times that of Miami-Dade County and more than 2 times that of the City of Miami.

It is important to note that the Greater Downtown area overall has a lower median household income than the more affluent neighborhoods within the Greater Downtown Area –the Arts & Entertainment District and Brickell. These neighborhoods have a median household income of $95,048 and $89,265, respectively. As shown in Figure 11 there is a striking difference in median household income between neighborhoods east and west of the FEC rail line.

Table 3. Median Household Income - 2018

Greater Downtown Miami	$76,610
City of Miami	$32,937
Miami-Dade County	$48,499

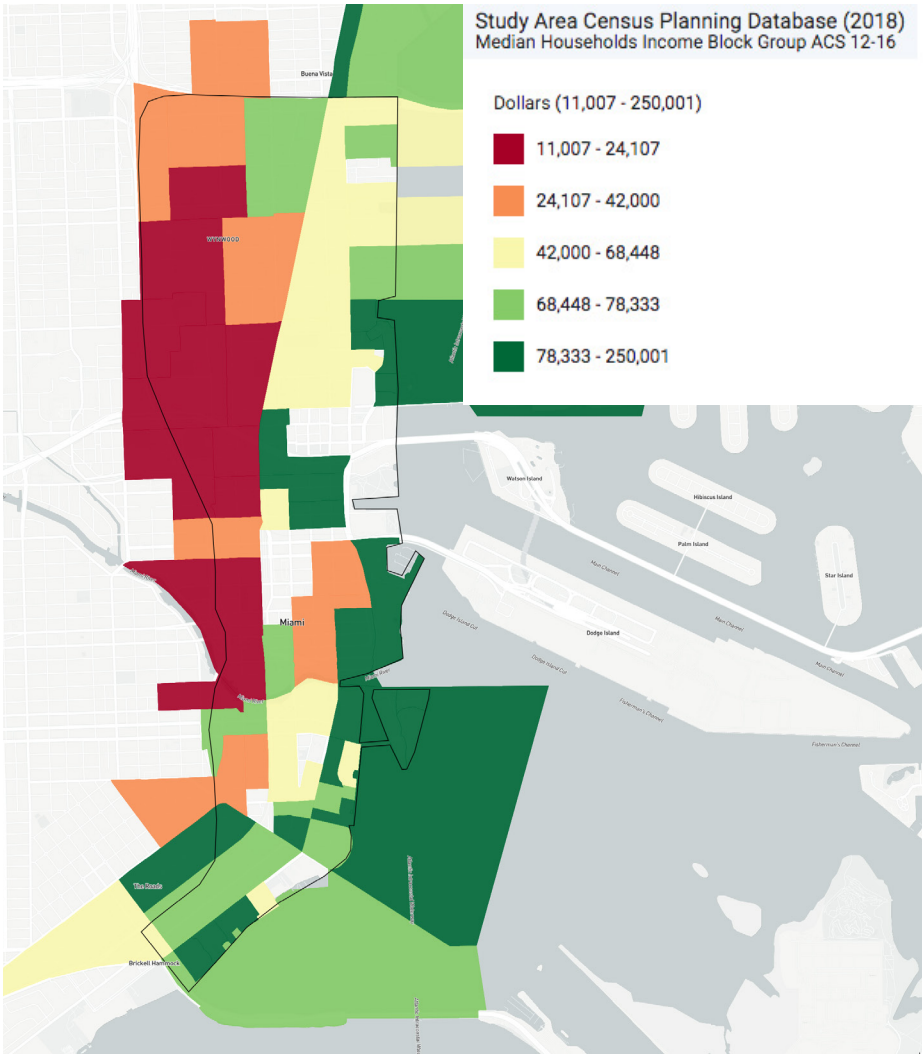


Figure 11. Household Income by Census Block

FUTURE POPULATION AND EMPLOYMENT

Population and employment data for 2010 and expected growth by 2040 was obtained through the Southeast Florida Regional Planning Model (SERPM).

Population and employment growth is expected nearly uniformly throughout the study area. Northern neighborhoods like Edgewater and Wynwood are forecasted to see an increase in population and employment density in future years.

Although higher density is desirable as a means of increasing transit ridership, it is important to provide the necessary facilities and levels of service to ensure that this growth does not translate into a spike in traffic levels.

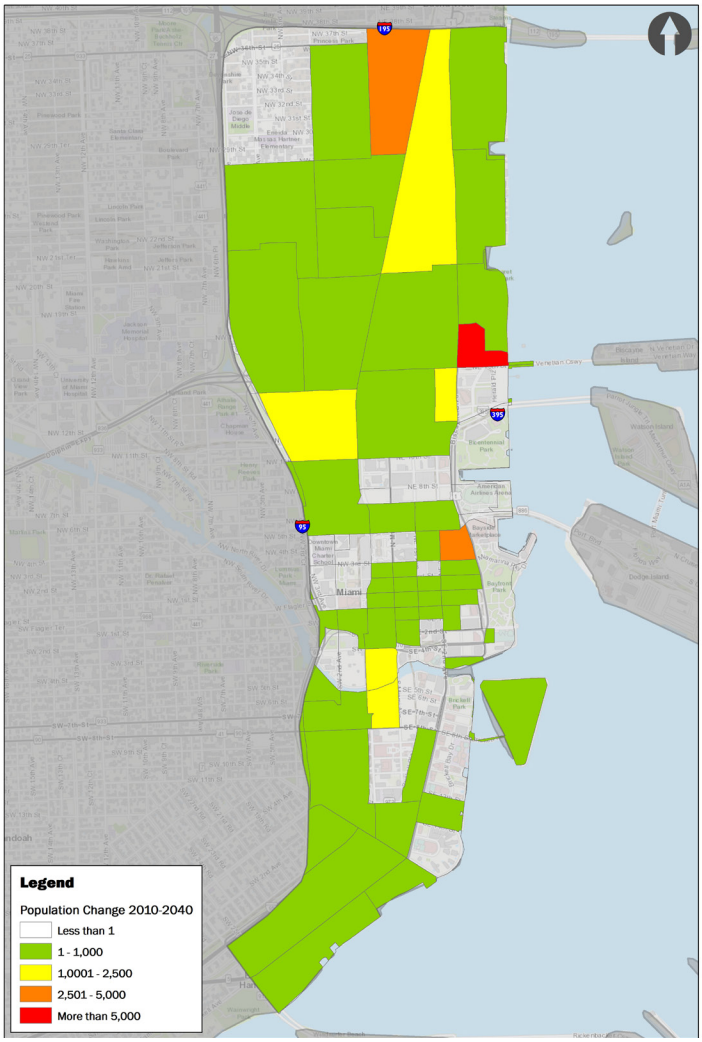


Figure 12. Population Change 2010-2040

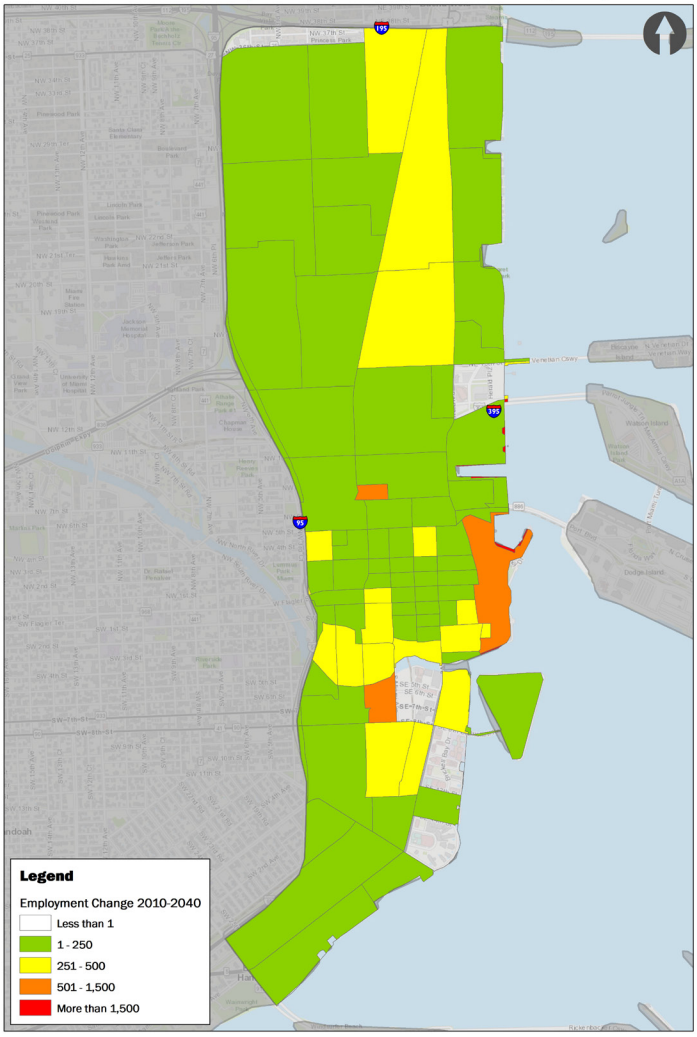


Figure 13. Employment Change 2010-2040

Transportation and Transit

Understanding transportation options and trends is necessary to determine where there is a need for enhanced facilities or services.

TRANSIT SERVICES

Several transit options are available in the Greater Downtown Area including Metrorail, Metrobus, Metromover, Virgin Trains USA (formerly Brightline), Tri-Rail, Trolleys, and Freebee.

MIAMI-DADE METRO

- The Metrorail system provides rail service to Miami International Airport (MIA), Kendall, South Miami, Coral Gables, and Downtown Miami with 23 stations. Brickell Station, Government Center Station, and Overtown Station fall within this project's study area.

  The service offers transfers to Broward County and Palm Beach County through connections to Tri-Rail and Virgin Trains USA. Metrorail services run from 5:00 a.m. to midnight every day of the week.

- Metrobus provides services from Broward County, Miami Beach, Key Biscayne, West Miami-Dade, Homestead, Florida City, and the Middle Keys through over 90 bus routes. There are nearly 300 Metrobus stops within the study area.

  Buses offer the use of bicycle racks which are mounted on the front of the bus.

- Metromover is a free rail service that operates from 5:00 a.m. to midnight every day of the week. Metromover services the Downtown and Brickell area of Miami. All 21 Metromover stations are within the study area.

  Key destinations reachable by Metromover include Miami-Dade College, Miami-Dade County School Board, Bayside Marketplace, and American Airlines Arena.

Metrorail, Metrobus, and Metromover offer accommodations for people with disabilities, including parking, elevators, raised lettering and Braille signage, wheelchair turnstiles, curb cuts, platform tactile tiles, a public-address system, elevator status announcements, and telecommunication devices.

Several fare options are available that incorporate discounts for college students, low-income riders, county employees, disabled people, senior citizens, veterans, and more.

Transit passes can be purchased in 1-day, 7-day, and 1-month period, allowing for users to ride Metrorail or Metrobus. Payment can be made for these passes online or on smartphones through the EASY Pay application. The Miami-Dade Transit Tracker smartphone application allows for real-time tracking for Metrobus and Metrorail.

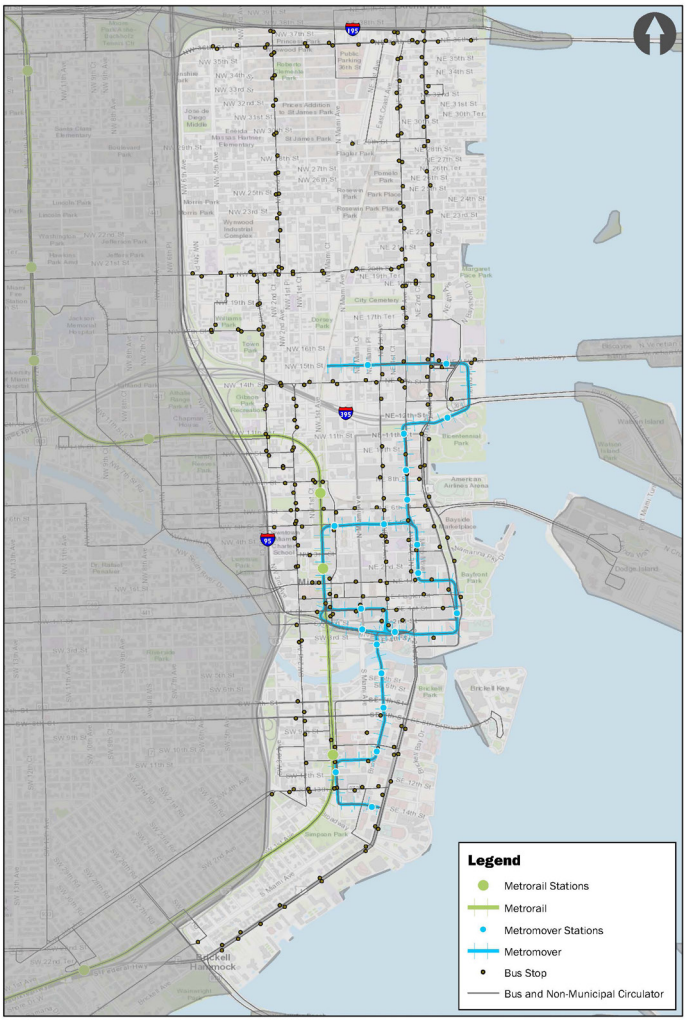


Figure 14. Downtown Miami Transit System

Photo by Kimley-Horn

VIRGIN TRAINS USA

Virgin Trains USA is the only privately owned and operated passenger rail service in the U.S. It offers an express regional service operating three stations located in the downtown areas of Miami, Fort Lauderdale, and West Palm Beach. Currently, construction is underway to expand Virgin Trains services and add a station in Orlando.

The station in Miami-Dade, known as MiamiCentral, covers over 3 million square feet of mix-use development just two blocks north of Government Center Metrorail station. Services to this station commenced in 2018.

In addition to standard fare options, Virgin Trains USA offers a monthly commuter pass and a corporate monthly pass.

TRI-RAIL

Tri-Rail offers service to Palm Beach County, Broward County, and Miami-Dade County with 18 stations. Although no Tri-Rail station currently operates within the study area, options of transfer to Metrorail allow users access to Downtown Miami.

Fare options are available ranging from one-way, round-trip, 12-trip, and monthly passes that can be used on the Tri-Rail system. Additionally, there is a regional monthly pass available that allows for unlimited travel in both the Tri-Rail system and the Miami-Dade Transit system.

Tri-Rail stations and trains are accessible to people with disabilities. Online, the Tri-Rail Tracker is available to allow for trains to be tracked by users in real-time.

TROLLEY

The Trolley is a free service that runs every 15-30 minutes on 12 routes. The Biscayne, Brickell, Coconut Grove, Coral Way, Little Haiti, and Little Havana routes run every day of the week. The Allapattah, Flagami, Health District, Stadium, and Wynwood routes run from Monday through Saturday. The Overtown route runs from Monday through Friday.

FREEBEE

Freebee provides free electric transportation services to Brickell, Downtown, Wynwood, Edgewater, Midtown, Design District, Coconut Grove, Coral Gables, Key Biscayne, Islamorada, Miami Beach, Miami Lakes, and Pinecrest.

TRANSIT RIDERSHIP

An analysis of average weekday ridership data for the month of March 2018 shows Brickell Station, Government Station, and Biscayne Station as the areas with highest Metrorail and Metromover ridership (Figure 15). A similar pattern emerges in Metrobus ridership, with the highest concentrations of boardings happening at Brickell Station and Government Center (Figure 16). Omni Station and NE 36th Street are also areas of high Metrobus ridership. It must be noted, however, that Metro transit ridership has been in decline over the past four years (Table 4).

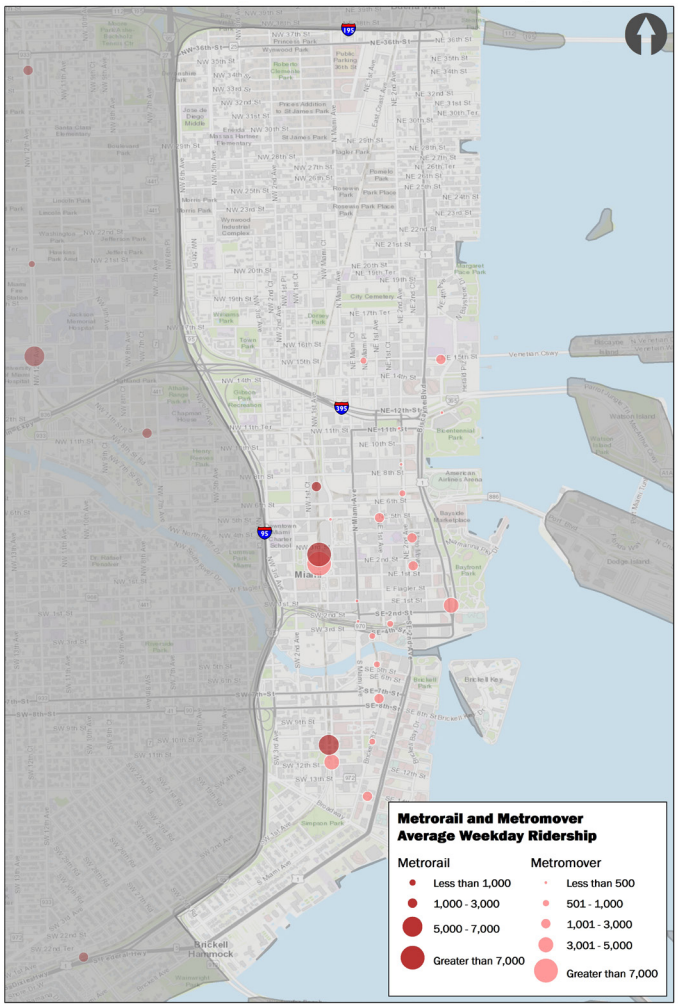


Figure 15. Metrorail and Metromover Average Weekday Ridership

Data Source: MDC Ridership Technical Report

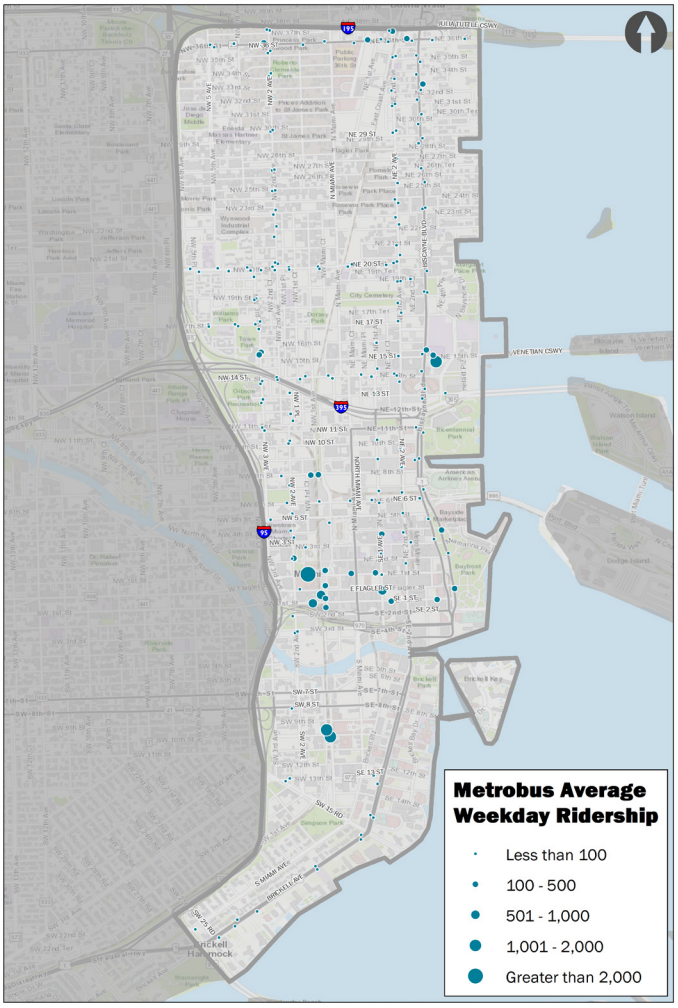


Figure 16. Metrobus Average Weekday Ridership

Data Source: MDC APC Sampling Mar18-Jun18

Table 4. Miami Metro Total Weekday Boardings for March (2014-2018)

Mode	2014	2015	2016	2017	2018	% Change
Metrobus	5,265,534	5,478,734	4,833,560	4,513,157	3,719,191	-29%
Metrorail	1,606,072	1,707,781	1,747,930	1,686,955	1,460,487	-9%
Metromover	740,543	769,463	836,323	783,199	684,041	-8%
Total	7,731,909	8,081,029	7,545,143	7,120,323	5,994,084	-22%

Source: Factors Affecting Transit Ridership, TPO 2018

STATION MODE OF ACCESS

Mode of access to Metrorail is predominantly walking for Home-Based-Other (HBO) and Non-Home-Based (NHB) trips. For Home-Based-Work (HBW) trips the main mode of access is through Park-n-Ride facilities, partly accounting for all commuters who choose to take Metrorail to work but may not have a station within sufficient walking distance from their homes.

Walking is the main mode of egress for all trip purposes.

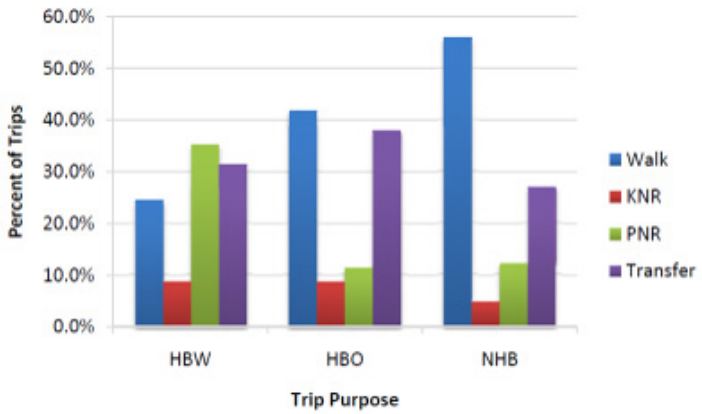


Figure 17. Distribution of Daily Trip Purpose Relative to Access Mode

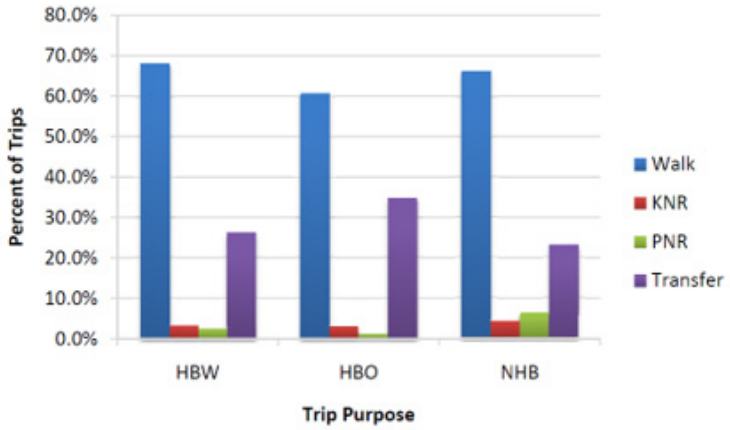


Figure 18. Distribution of Daily Trip Purpose Relative to Egress Mode

Source: Compare Transit Survey Results to Actual Count Data, 2010

It should be noted that Downtown Miami has been classified as a Pedestrian Priority Zone.

PARKING AVAILABILITY

No all-encompassing database exists detailing accurate, up-to-date count of all available public and parking supply in the study area. Parking provided by the Miami Parking Authority in the area is shown in the figure below.

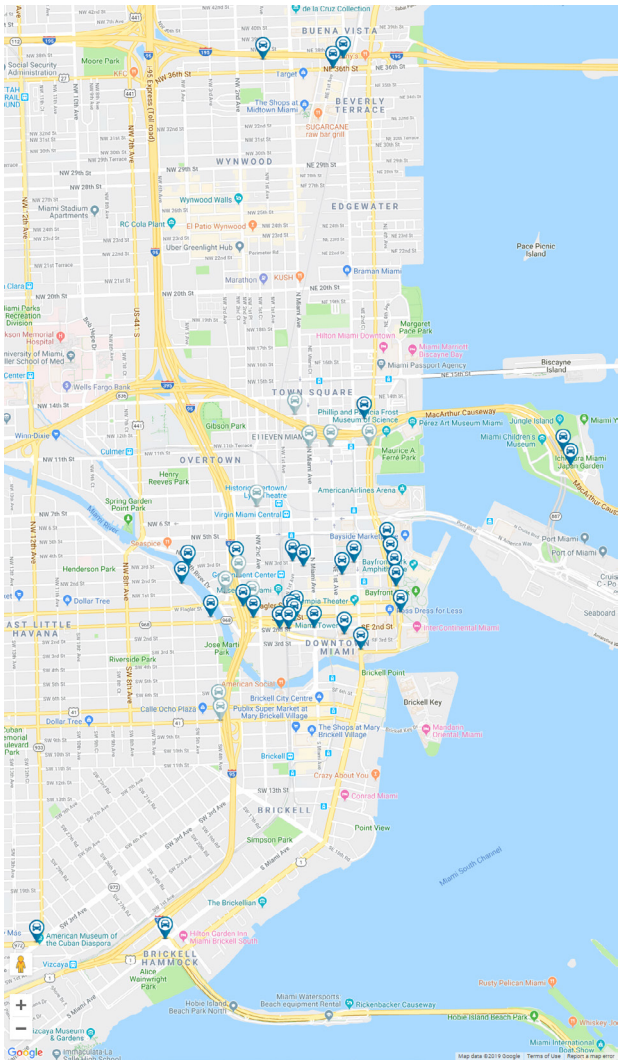


Figure 19. Miami Parking Authority Public Parking Availability

Source: Miami Parking Authority

Parking permits in the public garages located in the core include:

Table 5. Public Parking Permits in CBD

Courthouse Center Garage 1	627
Cultural Center Garage 2	367
College Station Garage 3	397
Knight Center Garage 4	1,098

Downtown Pedestrian Priority Zone

1. Create a Clear Pedestrian Path

Provide a minimum six-foot unobstructed pedestrian path at all sidewalks

OTHER CITIES
Boston, NYC : 8 ft. clear zone or 1/2 the sidewalk width, whichever is greater
Seattle, LA County, Washington DC : 6 ft. clear zone, 10 ft. clear zone with Sidewalk Café.
Philadelphia, Chicago : 6, 8 or 10 ft. clear based on street classification

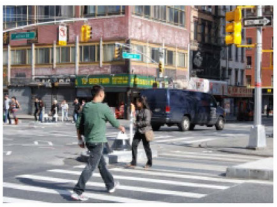
2. Align Curb Ramps with Sidewalks

Provide perpendicular curb ramps at all intersections

OTHER CITIES:
California and Virginia: Perpendicular ramps are preferred for new sidewalk construction, and where feasible, for upgrades to existing sidewalks

3. Require Crosswalks at all Intersections

Provide marked crosswalks at all intersections at all four corners and mid-block crosswalks at blocks greater than 400 feet



OTHER CITIES:
Boston, San Diego, Seattle: 10 ft. min., ladder-style design.
NYC, Chicago, Portland, DC: 10 ft local, 15 ft. collector, 20 ft. major streets

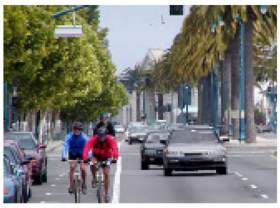
4. Provide Automatic Countdown Timers with More Crossing Time

Provide pre-timed fixed signals at all traffic controlled intersections with a minimum of one second of crossing time for every 2.8 feet of street width

OTHER CITIES:
San Francisco: 2.8 ft./sec.
Code: 3.5 ft./sec.

5. Reduce Drive Lane Widths

Provide driving lane widths of no more than 10 feet, turning lanes of no more than 12 feet, and sharrow lanes of no more than 12 feet.



OTHER CITIES:
Portland: 10 ft. drive lanes, 11 ft. turn lanes.
LA County Model Street Manual : 10 ft. drive lanes, 11 ft. heavy service or bus lanes and sharrows are 12 ft.
2012 NACTO Urban Design Guidelines : 10 and 11 ft. lanes

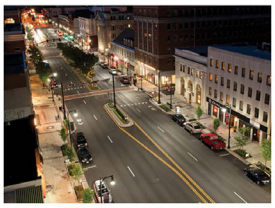
6. Extend the Sidewalk at all Intersections

Provide sidewalk bulb-outs extending at least 20 feet from crosswalks in either direction at all street intersections and curb radii not exceeding 15 feet

OTHER CITIES:
Philadelphia, LA County: 15 ft. curb radius per residential street classification.
Seattle: No obstructions within 20 ft. of the legal crosswalk

7. Enhance Mid-Block Lighting

Provide broad spectrum (white) mid-block street lighting that ensures a consistent and uniform distribution of illumination on all sidewalks



OTHER CITIES:
San Francisco, San Diego, Portland, Seattle and San Jose: LED Mid-Block Lighting

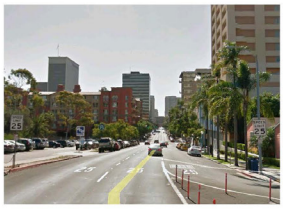
8. Provide Shade at Sidewalks

Provide continuous shade tree canopy on all sidewalks with widths 10 feet or greater; where sidewalks are less than 10 feet wide, require adjacent buildings to have canopies, overhangs and/or other architectural devices that provide shade onto the sidewalk area

OTHER CITIES:
Boston, San Francisco, San Diego, Portland, Seattle, San Jose and Madison: Urban Forestry Plans

9. Designate 25 MPH Speed Limit

To be designed to and posted at a maximum speed limit of 25 miles per hour



OTHER CITIES:
Portland: 20 MPH (Residential) and 25 (Commercial).
Boston, San Diego, San Jose, Sacramento.
Salt Lake City: 25 MPH
Madison, Seattle, San Francisco: 25 MPH (majority of streets), 30-35 MPH (Arterials).

10. Prohibit Right Turns On Red

Prohibit "right turn on red" at all intersections.

OTHER CITIES:
New York City: NTOR Policy with some exceptions.
Chicago Pedestrian Plan: proposes NTOR in downtown

Source: Downtown Development Authority

58

VEHICLE OWNERSHIP

Data was obtained from the U.S. Census Bureau, 2013-2017 American Community Survey 5-Year Estimates relating to the breakdown of households by vehicle ownership. Almost half of all households in the City of Miami have 1 vehicle available. Around 25% of households have 2 vehicles available and around 20% of households have no vehicles available.

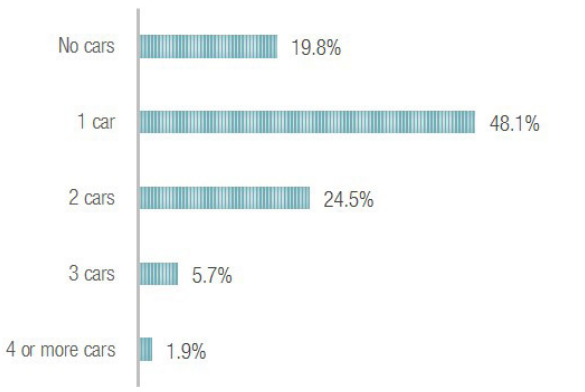


Figure 20. Households by Number of Vehicles Available

MODAL SHARE

Data was obtained from the U.S. Census Bureau, 2013-2017 American Community Survey 5-Year Estimates pertaining to Means of Transportation to Work. Data was collected for Miami-Dade County by Census Tract, and was then narrowed down to reflected only Census Tracts contained within Greater Downtown Miami.

As expected, a significant portion of workers, 65%, travel to work by driving alone. About 6% of workers travel to work by carpooling and about 8% travel to work by bus, trolley bus, streetcar, or trolley car. 7.5% of workers walk to work, and a combined 3.7% of workers travel to work through bicycle, railroad, or Metrorail.

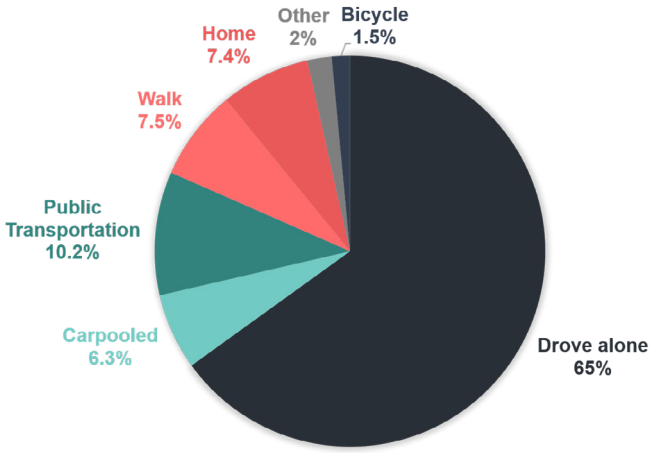


Figure 21. Greater Downtown Miami Commuting Modal Share

Further breakdown of modal share by gender reveals additional opportunities to expand the number of people utilizing transit and active travel. While the percentages of males and females driving alone are similar, more women use public transit modes than men. However at 8.2%, men were found to walk more than females (6.6%). More than double the amount of males bicycle to work (2%) as compared to females (0.8%).

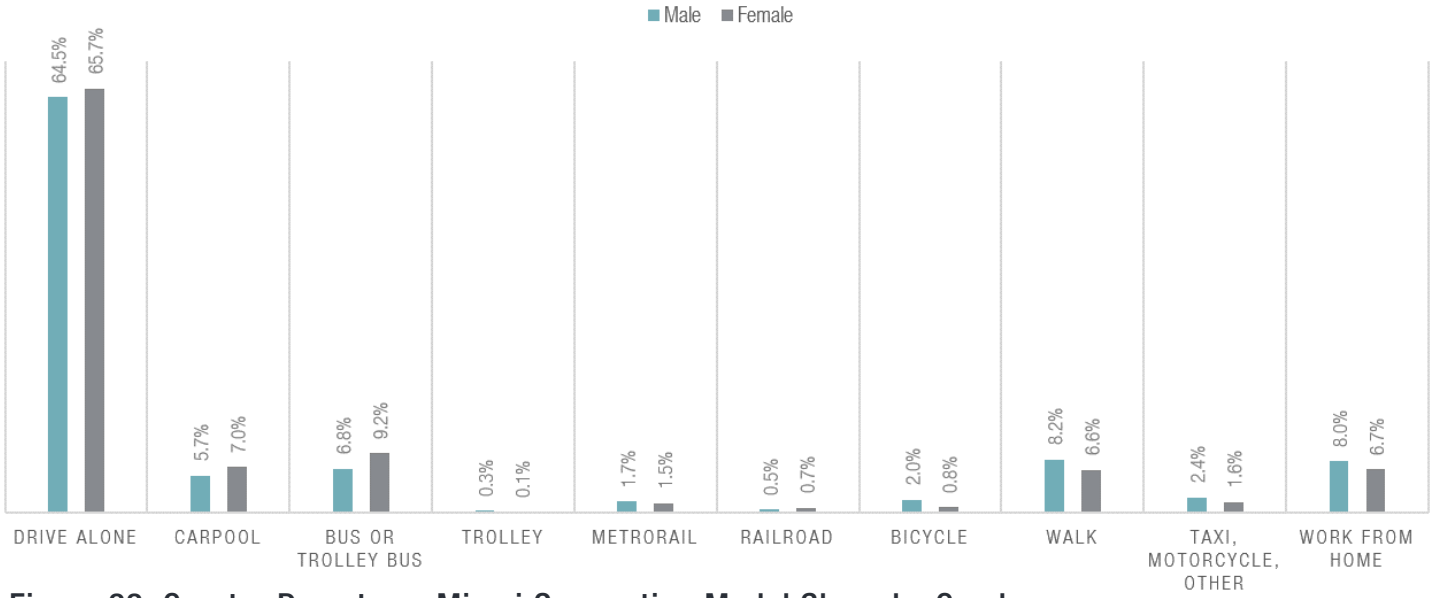


Figure 22. Greater Downtown Miami Commuting Modal Share by Gender

SMART Plan

SMART PLAN 2019

The SMART Plan seeks to create more transit choices along the six SMART rapid transit corridors identified below. A significant goal of the SMART Plan is to create a network of Bus Express Rapid Transit (BERT) to connect the rapid transit corridors to support the expansion of a regional express lane network.

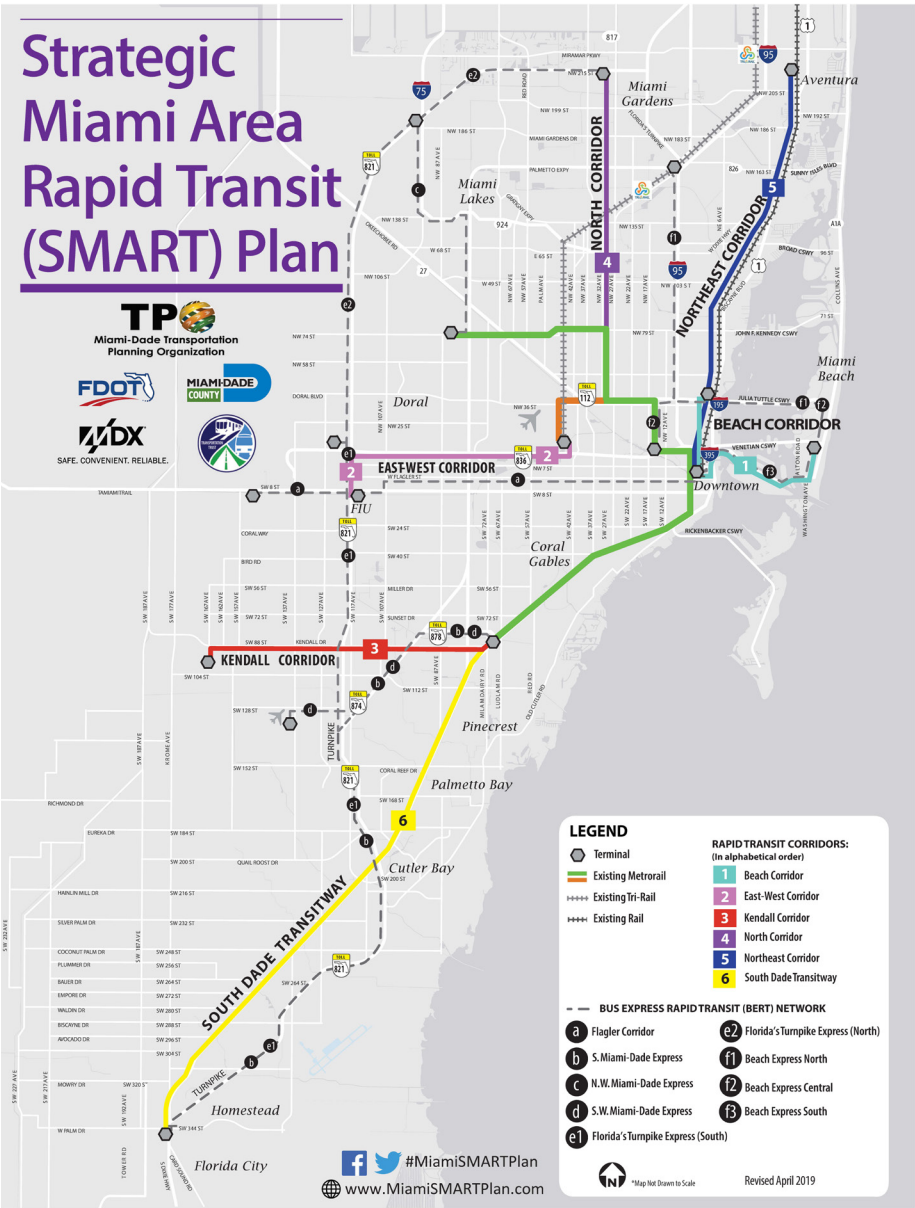


Figure 23. SMART Plan Corridors 2019

Source: Miami-Dade TPO, 2019

Northeast Corridor

This corridor has high demand for transit and regional significance due to the fact that is connects to a regional corridor reaching north to Palm Beach County.

Beach Corridor

This corridor has the highest tourist demand and major employment centers.

North Corridor

This corridor is vital to regional mobility and connectivity, providing to jobs, education, and the Hard Rock Stadium.

East-West Corridor

This corridor has the heaviest commuter travel for local, state, and international businesses.

South Corridor

This corridor is experiencing the fastest population growth rate in all of Miami-Dade County.

Kendall Corridor

This corridor is an extremely congested arterial roadway with high demand.

SMART PLAN UPDATE

TRI-RAIL COASTAL LINK

Currently, Tri-Rail runs from Mangonia Park in Palm Beach County to the Miami International Airport. Tri-Rail will be adding to its service with the Tri-Rail Downtown Miami Link (TRDML), an eastern extension of around 9 miles from the Tri-Rail/Metrorail Transfer Station to MiamiCentral Station in Downtown Miami (Figure 25).

With the addition of Tri-Rail through a Public Private Partnership, MiamiCentral Station will become the main regional multimodal hub for Downtown Miami, providing a station where Tri-Rail, Virgin Trains, Metrorail, Metromover, and the Miami-Dade County Metrobus will all connect.

The TRDML will have immense regional significance, as it will link the South Florida Rail Corridor (SFRC) and the Florida East Coast (FEC) railway corridor.

In addition to MiamiCentral Station, there are plans for SFRTA's Tri-Rail Coastal Link passenger rail service to provide approximately 6 stations to its service along the Florida East Coast (FEC) Railway (Figure 24). Proposed station locations for the Northeast Corridor within the study area include:

- Midtown/Design District, Miami – NE 36th Street
- Wynwood/Edgewater, Miami – NE 29th Street or NE 20th Street

Figure 24. Tri-Rail Coastal Link Proposed Stations

Figure 25. MiamiCentral/Tri-Rail Platform

Source: http://tri-raildowntownmiamilink.com/

5 ACCESSIBILITY AND CONNECTIVITY ANALYSIS

Accessibility and Connectivity

An accessibility and connectivity analysis was conducted to understand baseline conditions within the study area.

WALK ACCESS TO TRANSIT

A parcel-level geospatial analysis of walking accessibility to transit is shown in Figure 26. This analysis takes into consideration all known network paths including sidewalks, park walk paths, and streets, as well as intersections, transit stops, and transit routes.

The wide range of transit options within the study area is reflected in this map, as the furthest a person would have to walk to reach a transit stop is under 10 minutes.

Many areas in Downtown, Brickell, north of the MacArthur Causeway, and south of I-195 are within a 2 minute walk from transit. This is consistent with ridership patterns shown in Chapter 4.

However, it must be noted that an accessibility map does not account for the quality of the existing access routes or for the level of the transit service available. Therefore, while accessibility is a good measure, other elements must be taken into account to understand potential opportunities to increase ridership demand in the area.

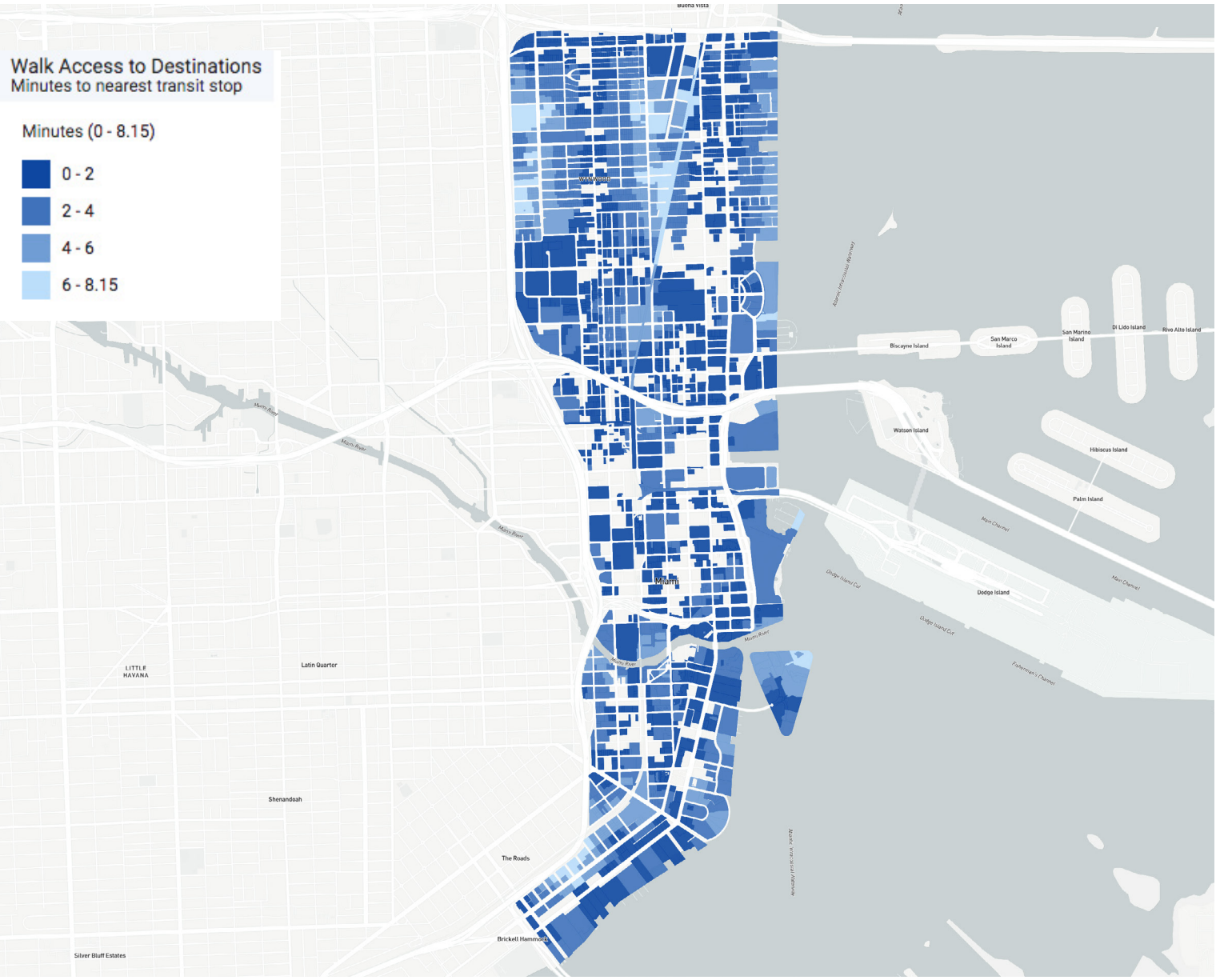


Figure 26. Walk Access to Transit Stops

TRANSIT ACCESS TO POPULATION AND EMPLOYMENT

Population and job density have emerged as strong indicators of walkability and improved transit ridership in numerous studies worldwide. Providing high quality transit services within areas of high population density has the capacity of targeting non-commuting trips and internal commuting trips. Job density, on the other hand, addresses the daytime population increase seen in many Central Business Districts (CBDs), including Downtown Miami.

A similar map was produced to visualize transit access to population. Figure 27 displays the concentration of the existing population within a 15 minutes of a transit stop or station. Downtown, Brickell, and areas east of the FEC railroad have the highest concentration of residents within 15 minute access of transit. This is due in part to the wider range of transit options in those areas. Areas west of the FEC railroad and in the southern end of Brickell are characterized by a predominance of single-family homes, thus having much lower densities.

A similar picture is presented in Figure 28 Transit Access to Employment. As with population, this map depicts the number of jobs available within a 15 minute walk of a transit station or stop. The concentration of jobs available through transit is again heighten closer to Downtown, gradually getting reduced in a concentric pattern.

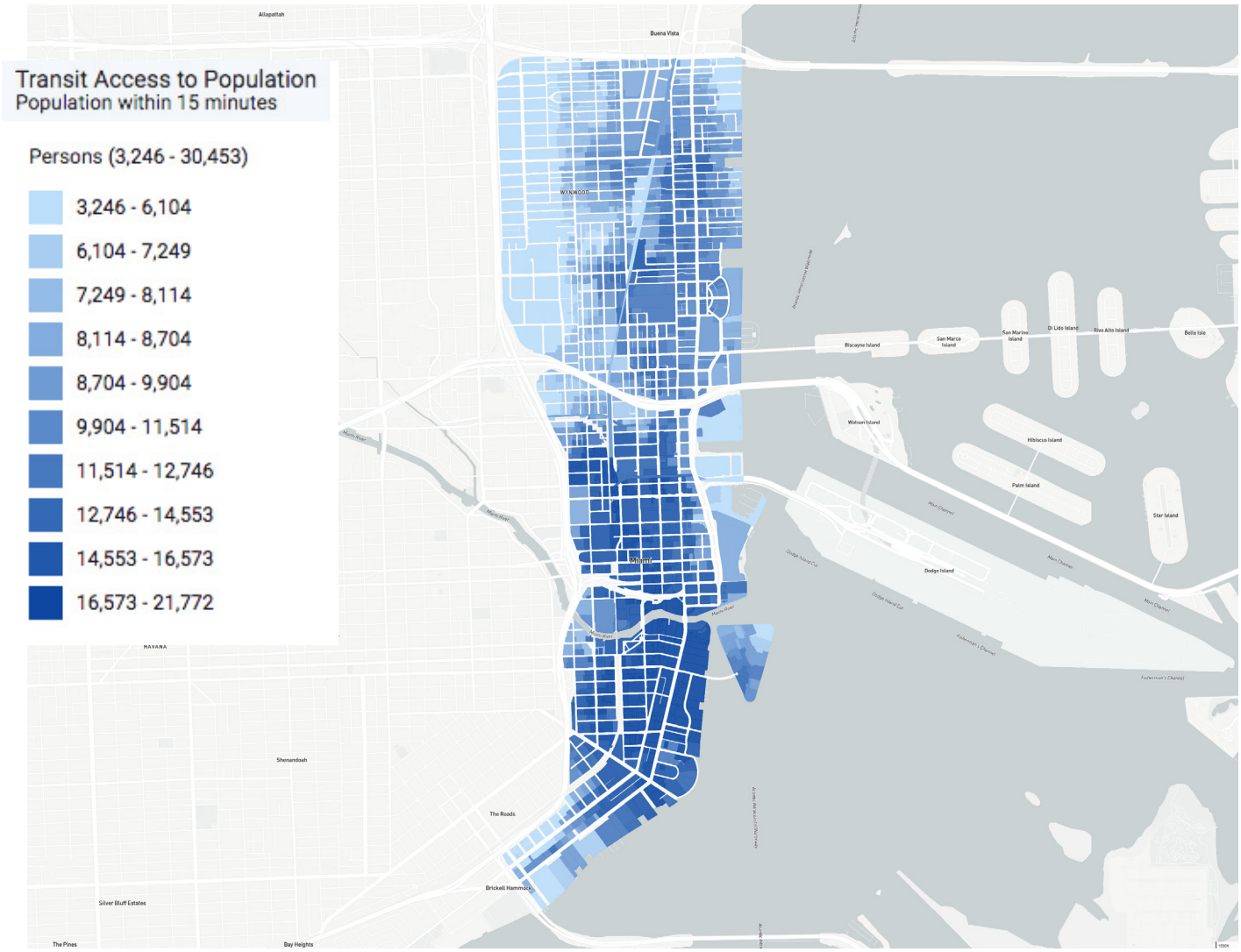


Figure 27. Transit Access to Population

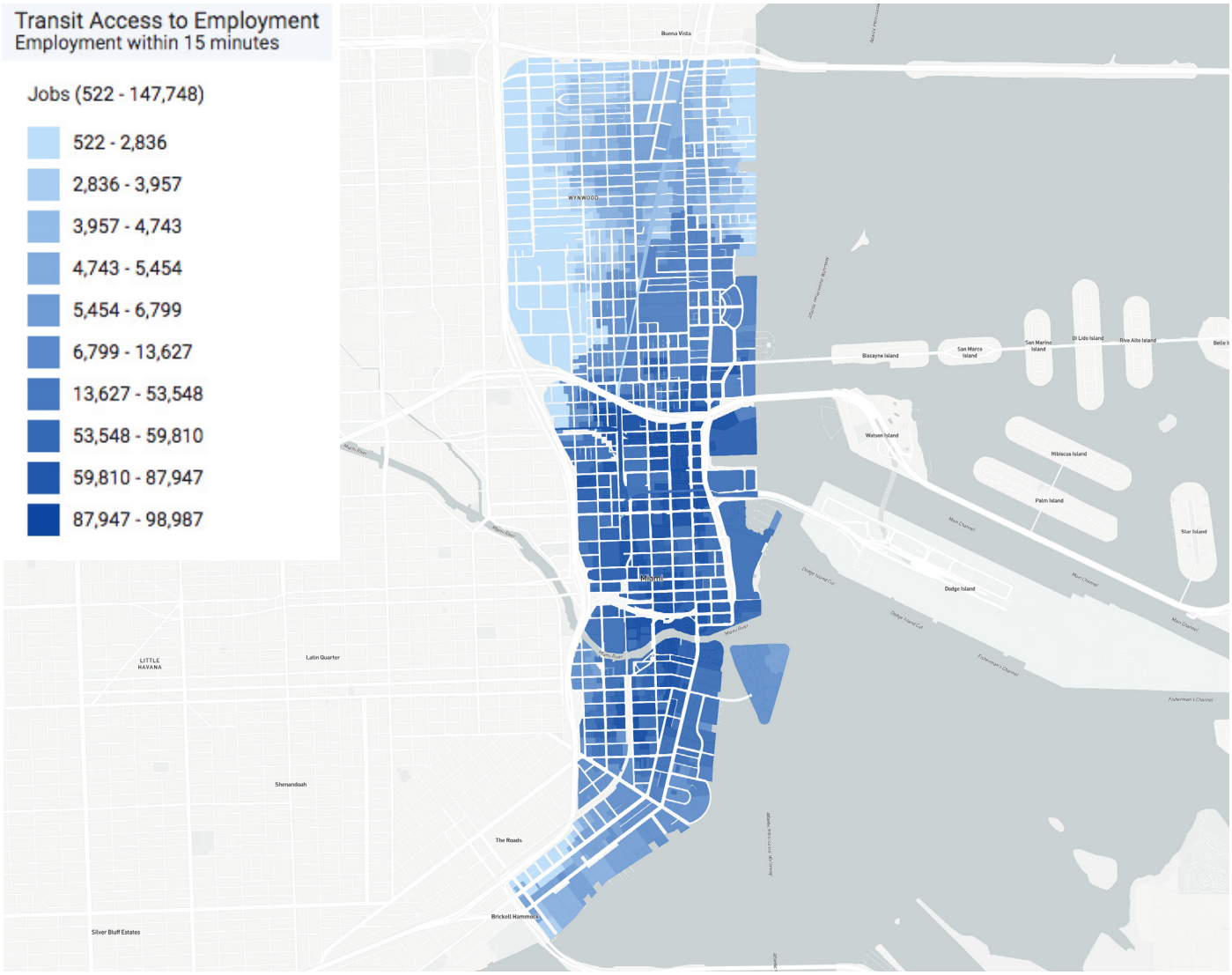


Figure 28. Transit Access to Employment

Photo by Kimley-Horn

VEHICLE TRIPS

Driving alone remains the main form of commuting transportation in Greater Downtown. However, not all areas have equal distribution of daily car use. Figure 27. shows estimation of daily residential vehicle trips per household following a Mixed-Use Trip Generation Model (MXD).

This map is in direct contrast with transit access to population and jobs. In this case, the areas with the lowest concentrations of people and jobs within catchment area of transit also exhibit the highest number of daily vehicle trips per household.

Land use policies to increase both population and job densities could have the highest felt impact in these areas.

Source: AdobeStock

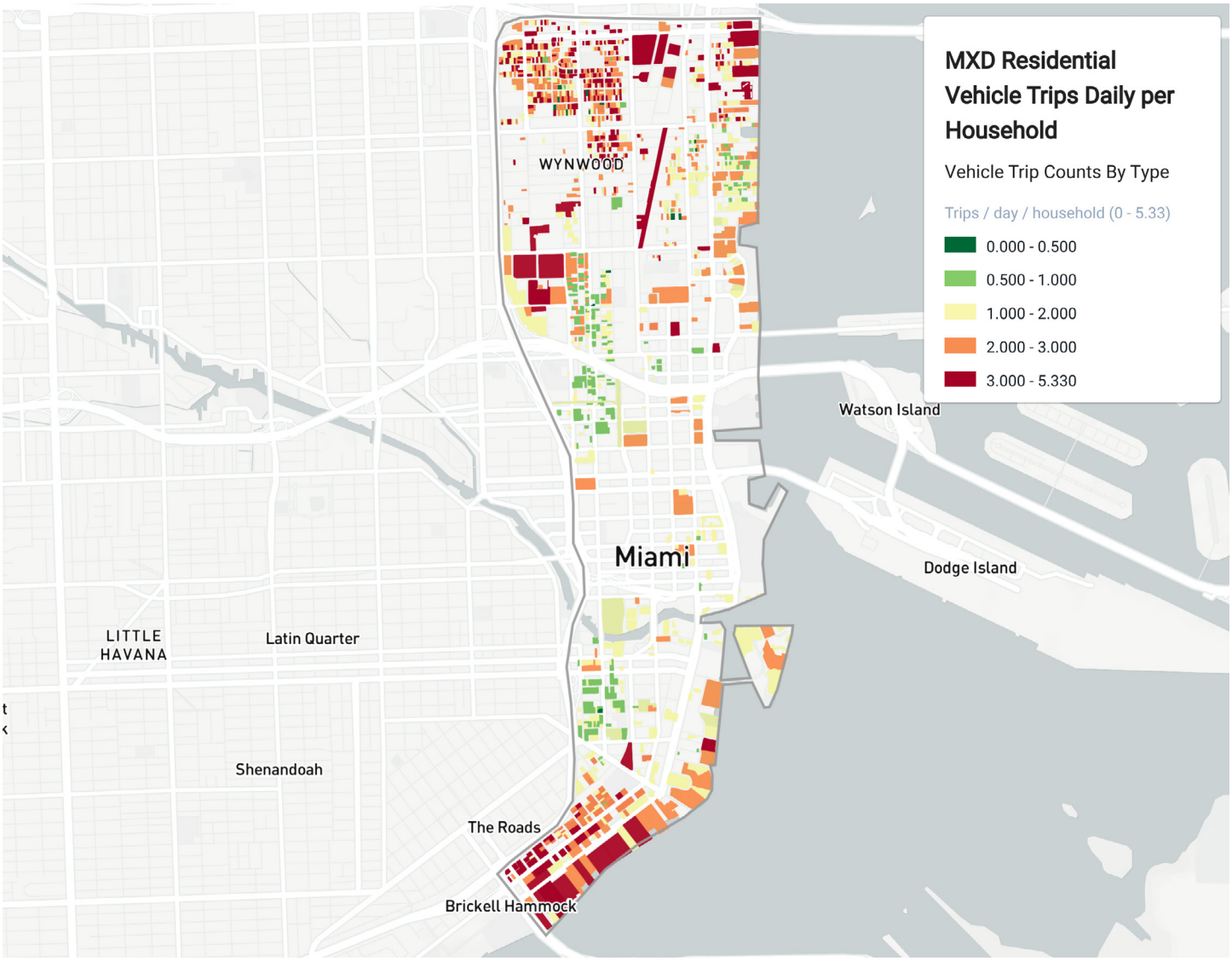


Figure 29. Residential Vehicle Trips per Household

POPULAR DESTINATIONS

Rather than having popular destinations, it is recognized that Greater Downtown Miami is a world-renowned destination of its own. The wide array of notable places within these neighborhoods makes the study area attractive not only to residents and workers, but also to domestic and international visitors.

More than 5 million cruise passengers sailed through Port Miami in 2016, obligatorily passing through the CBD. The same year, over 3 million visitors stayed overnight in one of the approximately 8,000 hotel rooms in the area (Greater Downtown Miami Tourism Report, 2018).

In addition, Greater Downtown Miami contains over 6.5 million square feet of retail space, multiple nightclubs, bars, restaurants, art galleries, museums, and theaters. Some of the most popular destinations include:

- *Adrienne Arsht Center*
- *Perez Art Museum*
- *Frost Science Museum*
- *Museum Park*
- *American Airlines Arena*
- *Bayside Marketplace*
- *Bayfront Park*
- *Brickell City Centre*
- *Knight Concert Hall*
- *Mary Brickell Village*
- *Miami Riverwalk*
- *Olympia Theatre*

In recent years, there has also been a steep increase in tourism and local businesses within the Arts & Entertainment District, Wynwood, and Edgewater neighborhoods. The iconic murals seen throughout these neighborhoods attract millions of admirers every year, gaining status as a cultural mecca and revitalizing the local economy and real estate. Rapid gentrification has been a concern, and transport and urban policies should aim to conserve the character of these communities and facilitate movement for all residents.

Lastly, Greater Downtown is home to numerous events and festivals taking place at different times throughout the year. This provides both an opportunity and a challenge for effective transportation planning in this dynamic area.

Source: AdobeStock

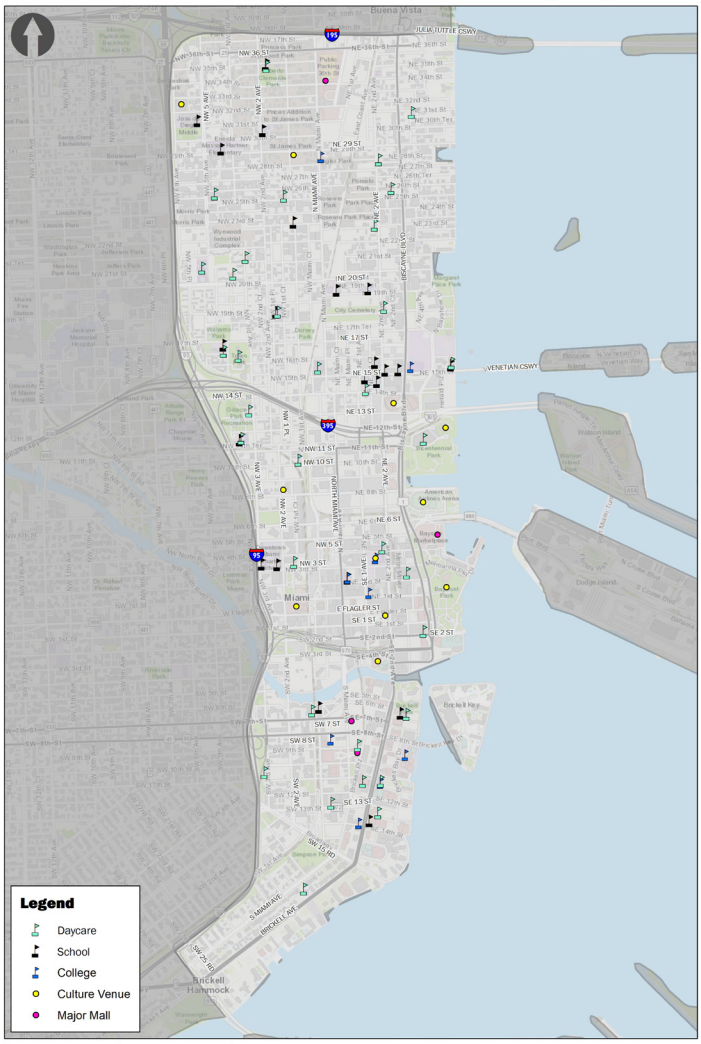


Figure 30. Popular Destinations

CRASH ANALYSIS

Crash data was obtained from Signal Four Analytics for Greater Downtown Miami from 2014 to 2018. A total of 21,766 crashes were reported between 2014-2018 within the study area. The data was used to create heat maps that reflect crash density and indicate the areas in need of attention and increased safety measures.

Crashes tend to be concentrated in the northern areas of Brickell and Midtown/Edgewater neighborhoods, as well as in the eastern area of the Downtown neighborhood, the eastern area of the Overtown/ Wynwood neighborhoods, and the southern area of the Arts and Entertainment District.

There is an especially high crash density around major corridors as well as key local and tourist destinations such as Brickell City Centre, Bayfront Park/Bayside Marketplace, James L. Knight Center, Biscayne Boulevard, and I-395 near Downtown. The areas of high crash density generally have higher Average Annual Daily Traffic (AADT).

More specifically, high crash density corridors were found to be the following:

- SW/SE 25 Road
- SW 13 Street
- SW 8 Street
- SW 7 Street
- S Miami Avenue
- Brickell Avenue
- SW 3 Avenue

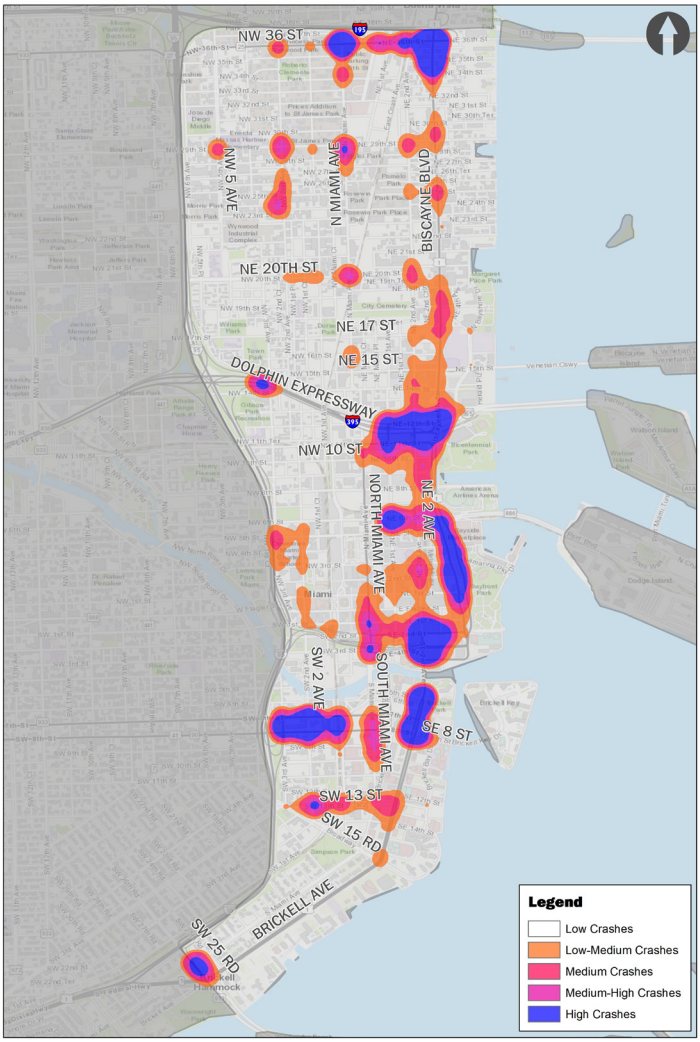


Figure 31. Overall Crashes 2014-2018

Within Downtown -

- SE 2 Avenue
- SE 3 Street
- SE 2 Street
- S Miami Avenue
- Biscayne Boulevard
- NE 6 Street
- NW 5 Street

Within Arts and Entertainment District -

- Biscayne Boulevard
- NE 11 Street
- NE 12 Street
- I-395

Within Overtown/Wynwood -

- I-395
- NW 18 Street
- N Miami Avenue
- NW 2 Avenue
- NW 29 Street

Within Midtown/Edgewater -

- NW 2 Avenue
- NW 29 Street
- Biscayne Boulevard
- NE/NW 36 Street

Photo by Kimley-Horn

BICYCLE AND PEDESTRIAN CRASH TRENDS

Out of the 256 reported crashes involving pedestrians or bicyclists between 2014-2018, 119 occurred in 2018.

The bicycle and pedestrian crash densities follow similar trends to the overall crash density trends.

Crashes tend to be concentrated in the northern areas of the Brickell and Midtown/Edgewater neighborhoods, all of the Downtown neighborhood, the eastern area of the Overtown/Wynwood neighborhoods, and the southern area of the Arts and Entertainment District.

The areas of high bicycle and pedestrian crash density generally have higher Average Annual Daily Traffic (AADT). Areas with high bicycle and pedestrian crash density are more spread out than areas of high overall crash density.

There is an especially high crash density around major corridors as well as key local and tourist destinations such as the Underline Area in Brickell, Government Center, Biscayne Boulevard, and the Omni Center/Adrienne Arsht Center for the Performing Arts. High bicycle and pedestrian crash density corridors were found to be the following:

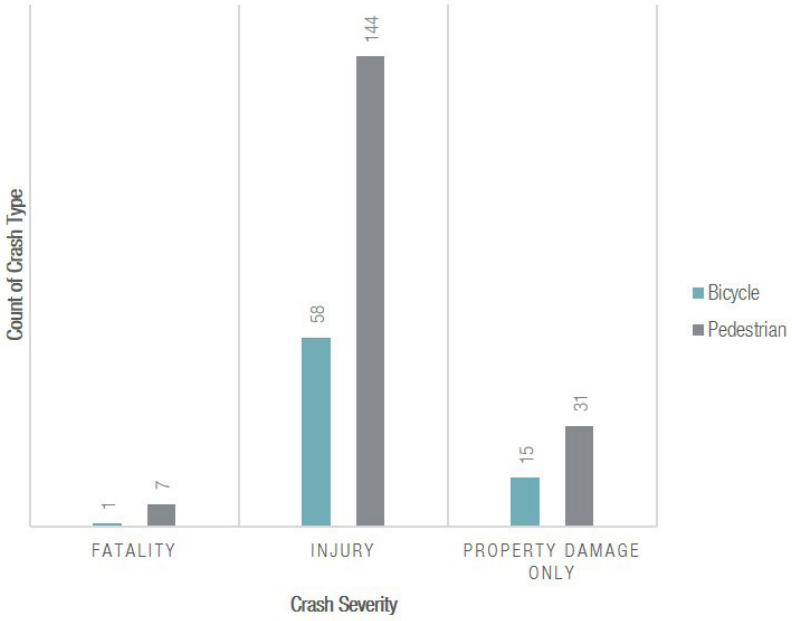


Figure 32. Pedestrian and Bicycle Crashes 2014-2018

- SW/SE 25 Road
- SW 13 Street
- SW 8 Street
- SW 7 Street
- S Miami Avenue
- SW 10 Street
- Brickell Avenue
- SW 3 Avenue
- SE 2 Avenue
- SE 3 Street
- S Miami Avenue
- SE 1 Street
- SW 1 Avenue
- NW 2 Street
- NW 5 Street
- Biscayne Boulevard
- NE 6 Street
- NE 3 Avenue
- NE 4 Street
- E Flagler Street
- SW 2 Avenue
- SW 2 Street
- NW 25 Street
- NW 29 Street
- NE/NW 36 Street

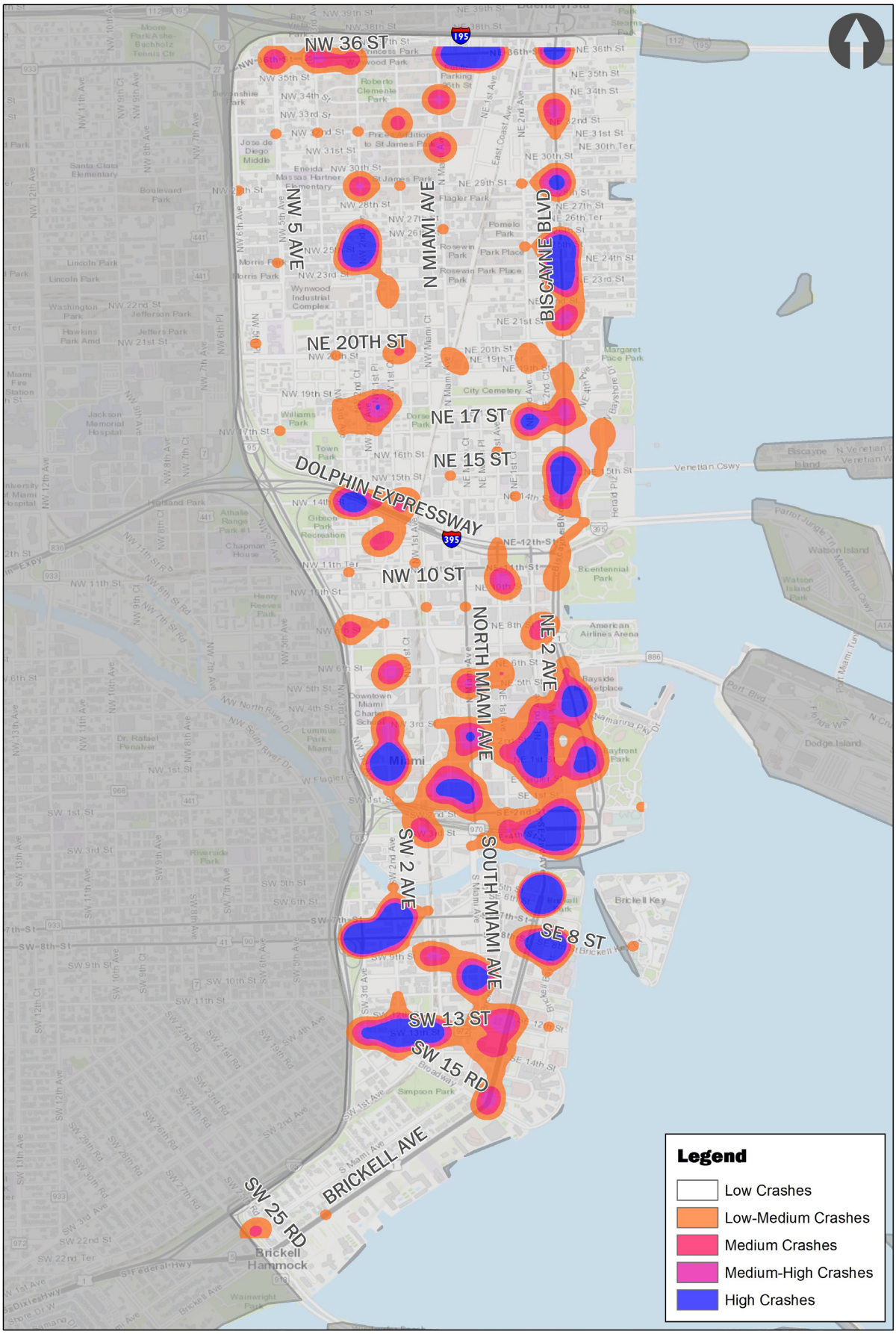


Figure 33. Pedestrian and Bicycle Crashes 2014-2018

WALK ACCESS TO PARKS

Having a park nearby emerged as an indicator of success for many of the transit hubs case studies reviewed in the literature. The proximity of a park, plaza, or high quality open public space has an effect on the use of mobility hubs and customer satisfaction of said hubs. In addition, parks are equitable destinations on their own, providing access to every resident and visitor regardless of their age, abilities, or socioeconomic status.

The walking access analysis revealed good park coverage within the study area, with most areas having some kind of park facility within less than a 10 minute walk.

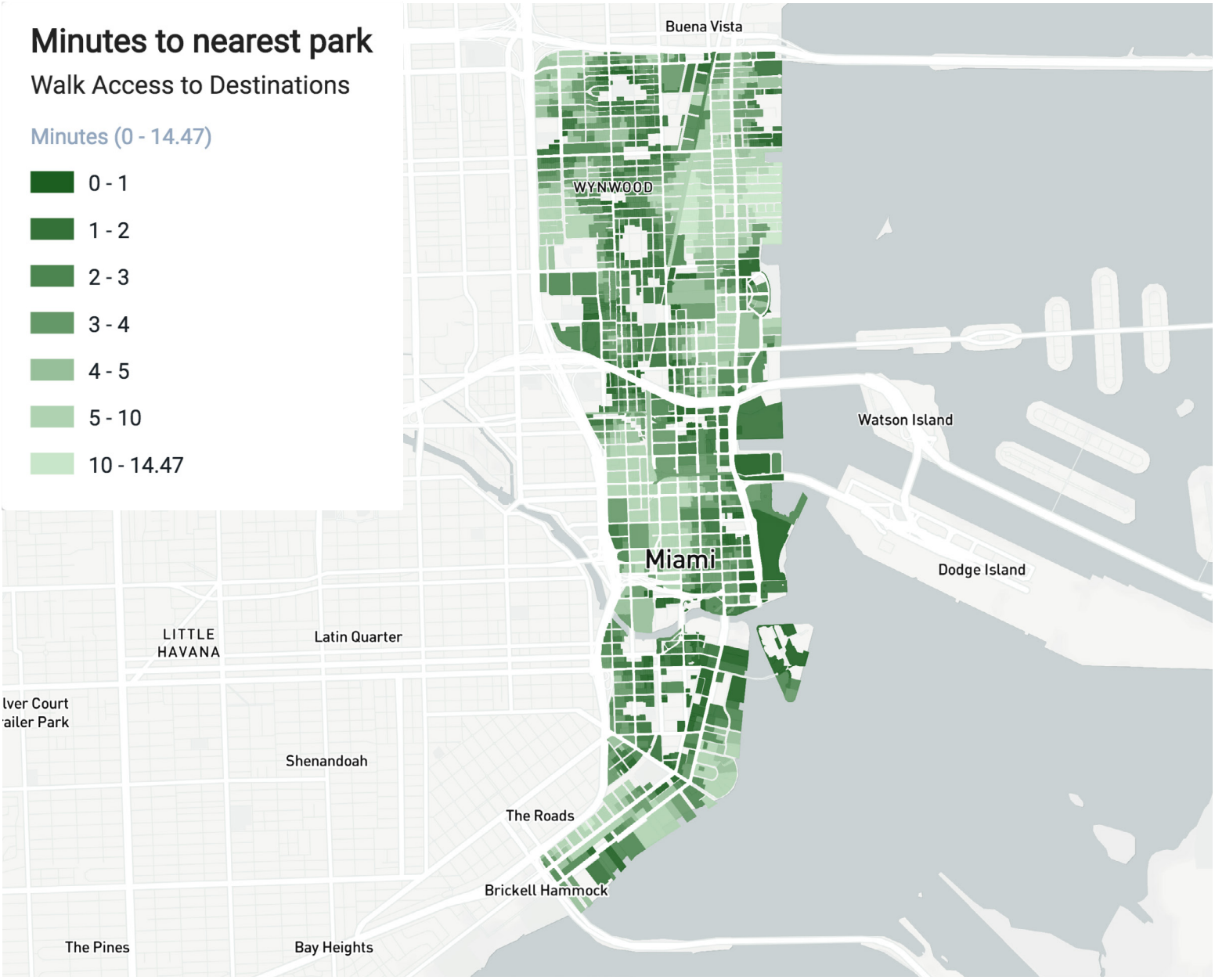


Figure 34. Walk Access to Nearest Park

Photo by Kimley-Horn

6 IMPLEMENTATION PLAN

SMART Hubs and Connecting Routes

A network of 14 SMART Hubs and the optimal routes connecting them to destinations and to each other was developed (Figure 35).

The purpose of developing an Implementation Plan is to provide guidelines to ensure the successful implementation of toolkit strategies at two focus hubs, as selected by the Study Advisory Committee: The Underline Hub and the MiamiCentral Hub. In addition, this Implementation Plan may be used as a guideline document for the implementation of other hubs in the SMART Hubs Network.

The SMART Hubs Network, presented in the following pages, includes the following locations:

1. The Underline Hub
2. Brickell Station Hub
3. Brickell City Center Hub
4. Brickell Key Hub
5. Brickell Point Hub
6. Bayfront Park Hub
7. Government Center Hub
8. MiamiCentral Hub
9. Omni Station Hub
10. Isle Marina Hub
11. 20th Street Hub
12. 29th Street Hub
13. Edgewater Hub
14. 36th Street Hub

Source: AdobeStock

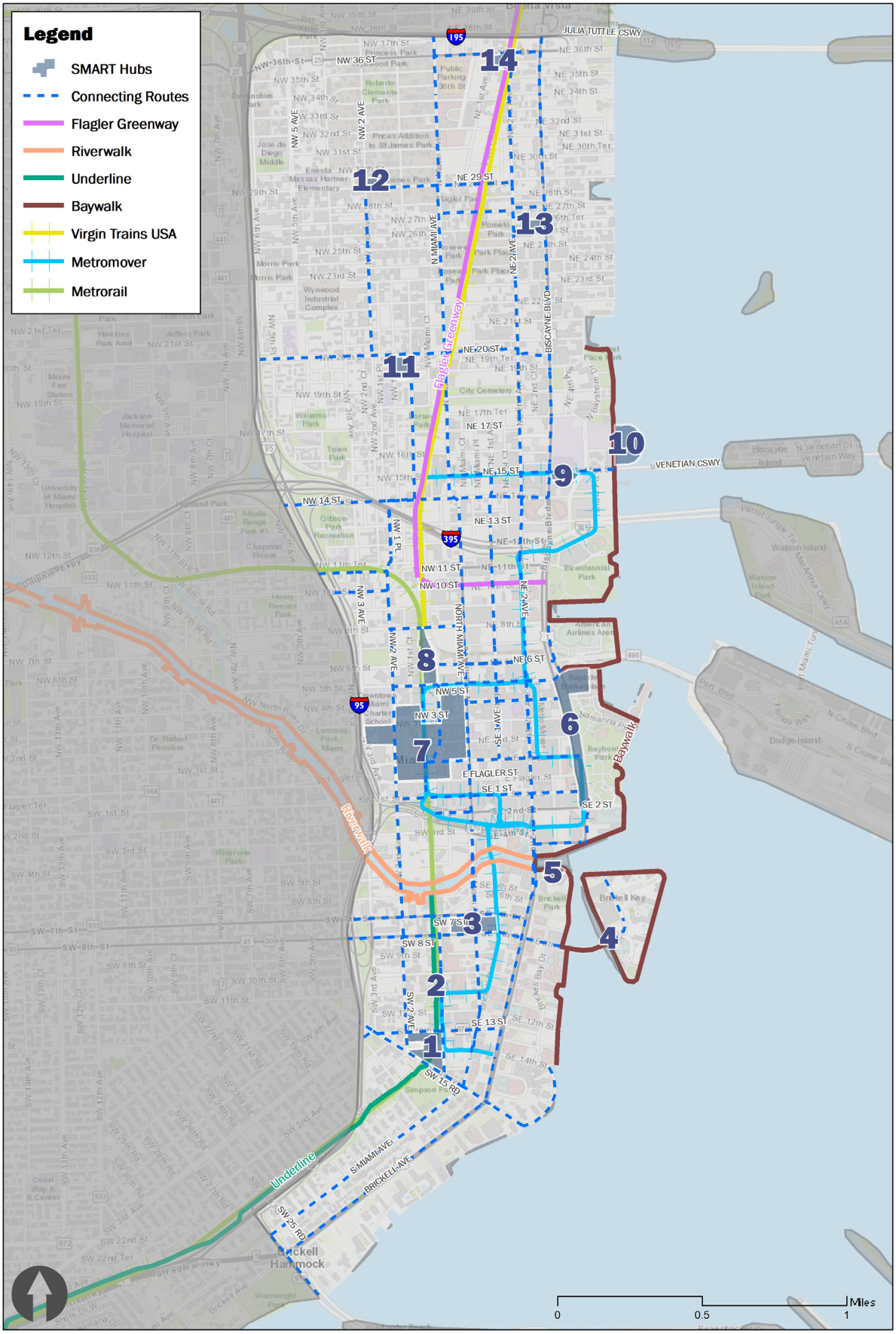


Figure 35. SMART Hubs Network

Each hub has different characteristics and serves different purposes based on its role within the regional transportation system, the urban layout, and the socioeconomic profile of the surrounding community.

Although the overarching goal is to reduce car use and dependency, objectives will vary depending on the recognized function of each hub.

Some of the proposed SMART Hubs, such as Government Center, MiamiCentral, Brickell, and Omni Stations, are established transit hubs with high ridership, mixed-use facilities, and high levels of bicycle and pedestrian activity. These hubs are gateway points essential for the transport of people and goods across the Miami-Fort Lauderdale-Palm Beach metropolitan area.

The improvements recommended at those hubs are geared around facilitating the use of those facilities and adding connections from other modes. Objectives for these hubs include maximizing average ridership within the catchment area of transit services, providing high quality facilities that allow people to comfortably complete local and connecting trips by means of walking and cycling, and promoting use of shared mobility programs for vehicular trips.

The hub at Bayfront Park, on the other hand, serves a different function as a destination hub. This hub extends from the Bayfront Park Metromover Station, along Biscayne Boulevard, to the entrance to the Port of Miami/American Airlines Arena. The large number of popular destinations available in this area makes this hub attractive to residents as well as local and foreign visitors.

However, under current conditions, the Crash Analysis revealed this segment as a hot spot for overall crashes as well as crashes involving pedestrian and bicyclists. The section of Biscayne Boulevard transversing this area is x-lanes wide in each direction, with extremely high Annual Average Daily Traffic numbers, essentially breaking the non-vehicular connection between waterfront destinations to the east and the rest of the CBD to the west.

Through incremental steps, this space is envisioned as a future pedestrianized zone with minimal vehicular activity occurring on shared spaces instead of dedicated lanes. Completion of Biscayne Green, Baywalk, Flagler Greenway, and Riverwalk will be essential to this future. Curbside Management is the main strategy recommended to better utilize the available space in a flexible and dynamic manner throughout the day and night. A main objective for this hub is to reduce the number of crashes involving pedestrians and bicyclists.

Other hubs such as The Underline, Brickell Key, and Brickell Point are meant to be supporting facilities within the active travel network. By providing safe, comfortable, convenient, beautiful spaces, these hubs are to become nodes in their communities. Proximity to parks is a strong starting point for these facilities, which are envisioned to become places both for resiting and gathering through the provision of urban plazas within a natural setting. Promoting walking, cycling, and other forms of active travel and micromobility is the main objective at these hubs. Since these hubs are within the catchment area of high quality transit, increasing active travel modal share may also increase the amount of people willing to shift to public transit in these areas.

Key characteristics of the hubs including socioeconomic and transit profile within a half mile radius are presented in the following pages.

1 The Underline Hub

TYPE: ACTIVE TRAVEL/MICROTRANSIT

SOCIOECONOMIC PROFILE

POPULATION: 28,491

EMPLOYMENT: 24,683

TRANSIT PROFILE

METRORAIL STATIONS: Brickell

METROMOVER STATIONS: 8th Street, 10th Street/Promenade, Brickell, Financial District

METROBUS STOPS: 39

TOTAL RIDERSHIP: 16,185

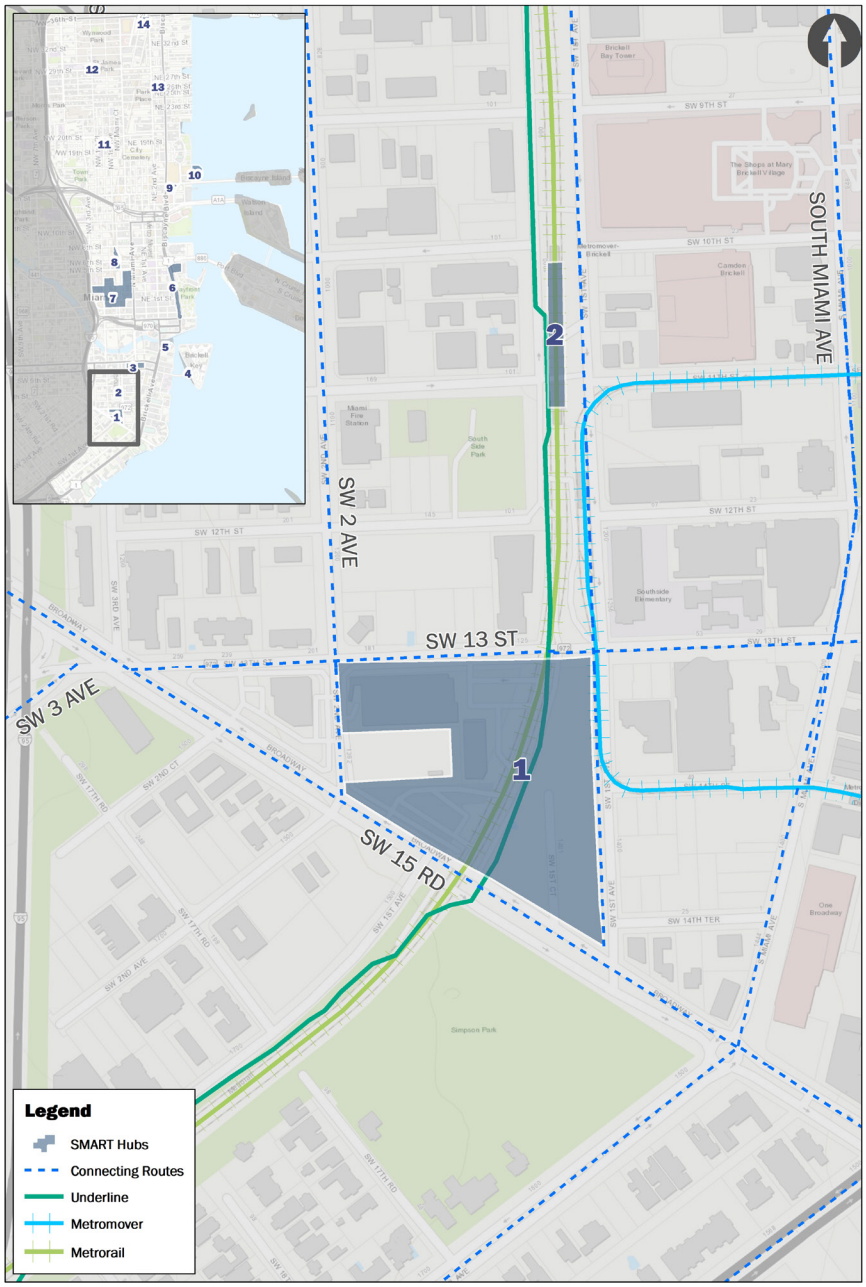


Figure 36. The Underline Hub

TOOLKIT STRATEGIES

- Mixed-Use Hub-Oriented Development
- Pedestrian Path Network
- Bicycle Lanes/Parking
- Board & Skate Access
- Bikesharing/E-scooter Stations
- Carsharing Stations
- Microtransit
- AV Infrastructure
- Curbside Management
- Wayfinding System
- Enhanced Crossings
- Traffic Control Elements
- Plaza/Open Space/Parklets

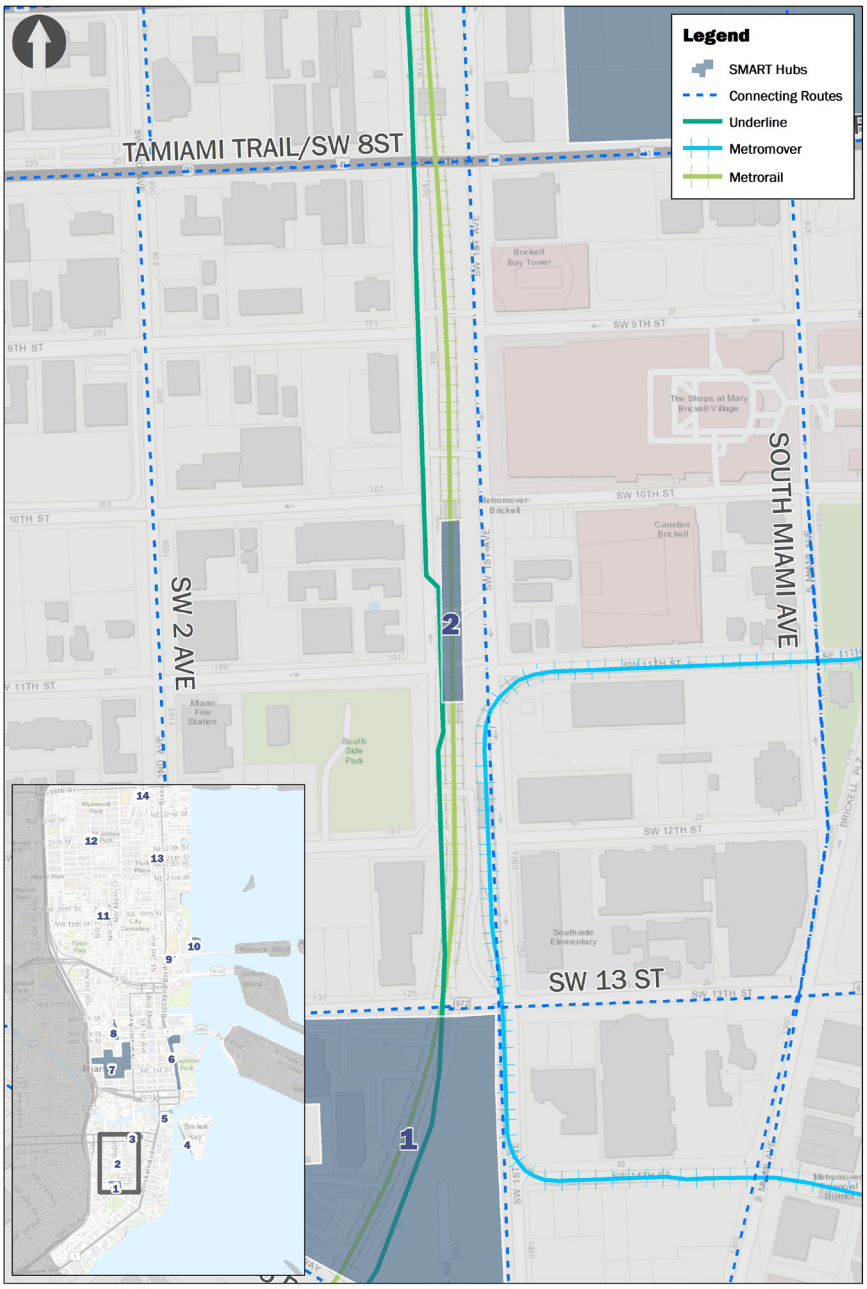


Figure 37. Brickell Station Hub

2 Brickell Station Hub

TYPE: TRANSIT ACCESS

SOCIOECONOMIC PROFILE

POPULATION: 30,723

EMPLOYMENT: 31,780

TRANSIT PROFILE

METRORAIL STATIONS: Brickell

METROMOVER STATIONS: Riverwalk, 5th Street, 8th Street, 10th Street/ Promenade, Brickell, Financial District

METROBUS STOPS: 37

TOTAL RIDERSHIP: 17,599

TOOLKIT STRATEGIES

- Pedestrian Amenities
- Wayfinding
- Transit Station Bicycle Sharing/Storage
- Transit Access Pedestrian/Bicycle Survey
- Board & Skate Access
- Microtransit pick-up/drop-off zone
- Micromobility (bikeshare, e-scooter parking)

3 Brickell City Center

TYPE: DESTINATION HUB

SOCIOECONOMIC PROFILE

POPULATION: 34,924

EMPLOYMENT: 58,036

TRANSIT PROFILE

METRORAIL STATIONS: Brickell

METROMOVER STATIONS: Knight Center, Miami Avenue, 3rd Street, Riverwalk, 5th Street, 8th Street, 10th Street/Promenade, Brickell, Financial District

METROBUS STOPS: 52

TOTAL RIDERSHIP: 22,697

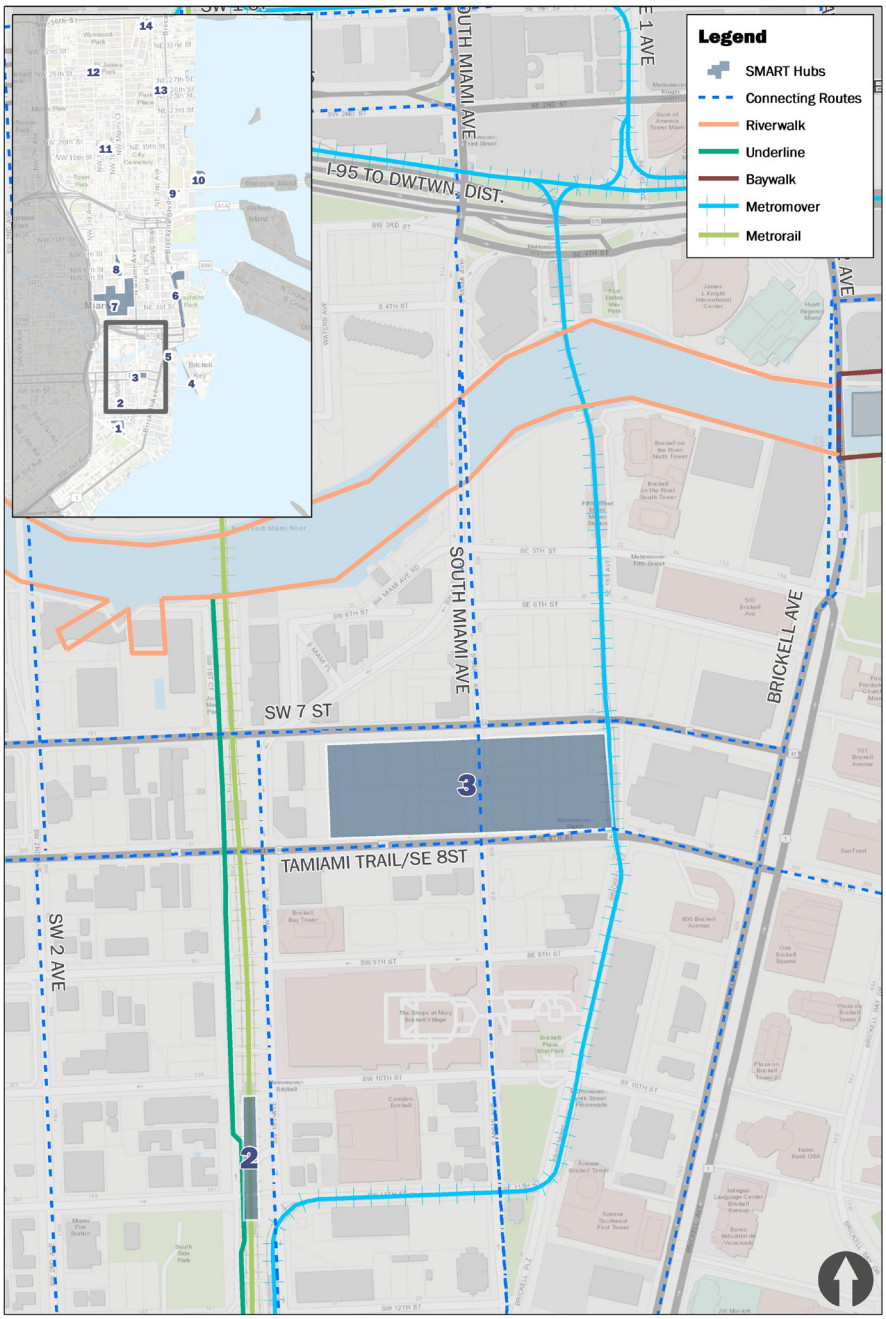


Figure 38. Brickell Station Hub

TOOLKIT STRATEGIES

- Bicycle & Rolling Lanes
- Board & Skate Access
- Signal Operations
- Bicycle Storage/Sharing
- AV Infrastructure
- Carsharing Parking Policies

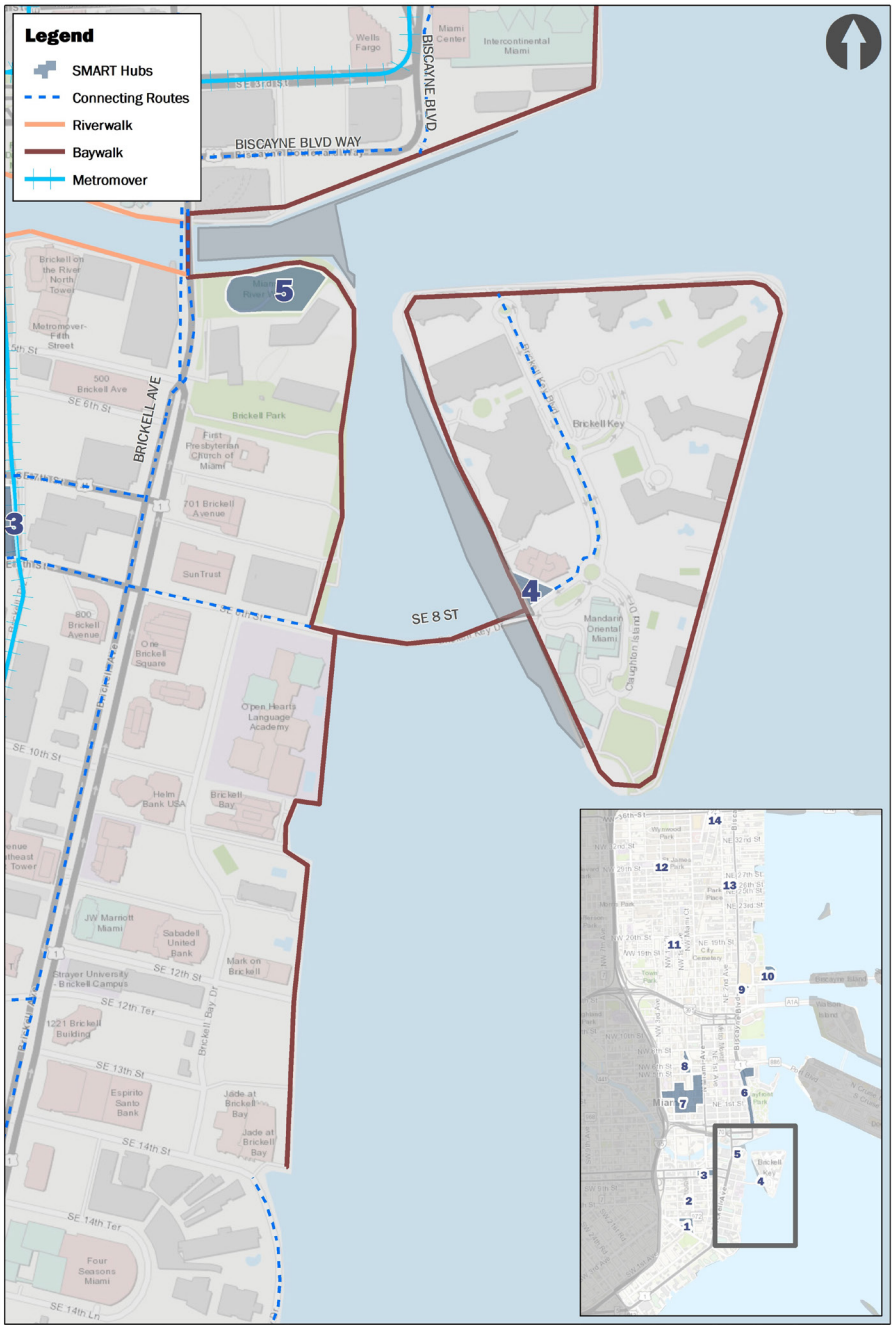


Figure 39. Brickell Key Hub

4 Brickell Key Hub

TYPE: ACTIVE TRAVEL/MICROTRANSIT

SOCIOECONOMIC PROFILE

POPULATION: 21,380

EMPLOYMENT: 29,432

TRANSIT PROFILE

METRORAIL STATIONS: None

METROMOVER STATIONS: Bayfront Park, 5th Street, 8th Street, 10th Street/Promenade

METROBUS STOPS: 11

TOTAL RIDERSHIP: 6,128

TOOLKIT STRATEGIES

- Pedestrian Path Network
- Pedestrian Amenities
- Board & Skate Access
- Bike, Board & Skate Continuous Path
- Wayfinding
- Microtransit pick-up/drop-off zone
- Micromobility (Bikesharing Station, e-scooter parking)

5 Brickell Point Hub

TYPE: ACTIVE TRAVEL/MICROTRANSIT

SOCIOECONOMIC PROFILE

POPULATION: 28,340

EMPLOYMENT: 48,113

TRANSIT PROFILE

METRORAIL STATIONS: None

METROMOVER STATIONS: 1st Street, Bayfront Park, Knight Center, Miami Avenue, 3rd Street, Riverwalk, 5th Street, 8th Street, 10th Street/ Promenade

METROBUS STOPS: 38

TOTAL RIDERSHIP: 16,163

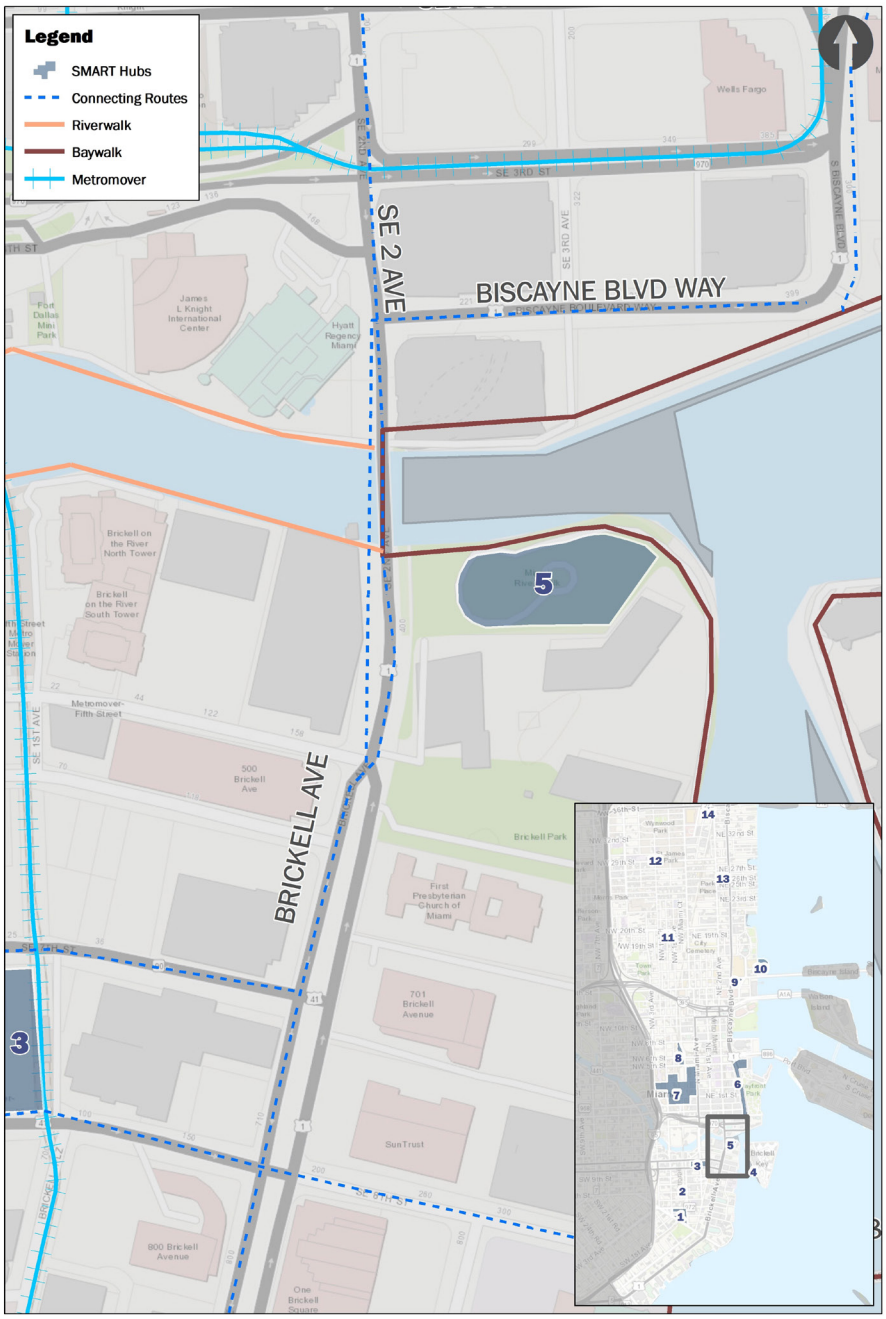


Figure 40. Brickell Point Hub

TOOLKIT STRATEGIES

- Pedestrian Path Network
- Pedestrian Amenities
- Micromobility (Bikesharing Station, e-scooter parking)
- Bike, Board & Skate Continuous Path
- Microtransit pick-up/drop-off zone
- Wayfinding
- Explore options for vertical circulation to Brickell Avenue Bridge

6 Bayfront Park Hub

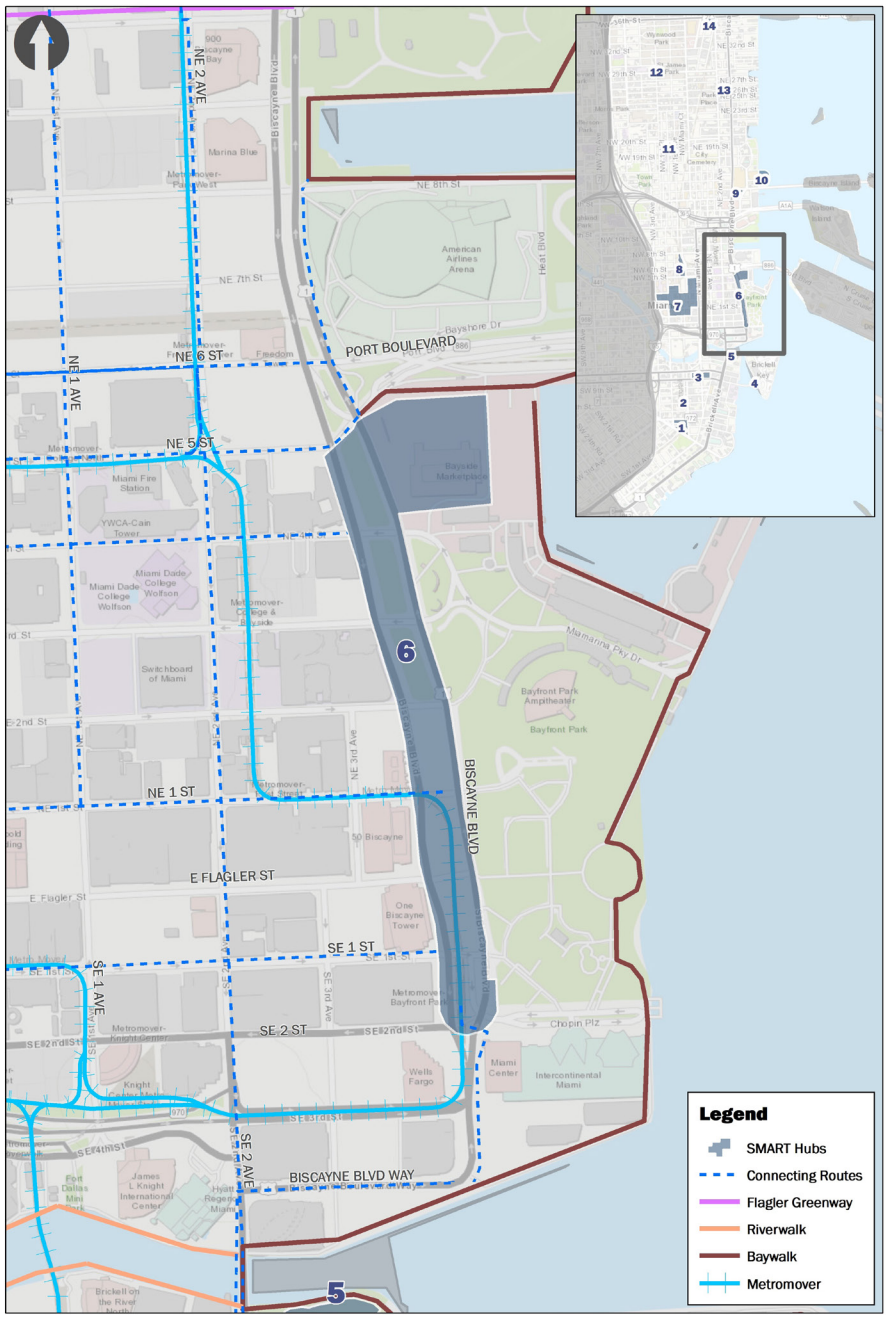


Figure 41. Bayfront Park Hub

TYPE: CURBSIDE MANAGEMENT

SOCIOECONOMIC PROFILE

POPULATION: 27,062

EMPLOYMENT: 83,826

TRANSIT PROFILE

METRORAIL STATIONS: Government Center and Historic Overtown/Lyric Theatre

METROMOVER STATIONS: College/Bayside,1st Street, Bayfront Park, Knight Center, Miami Avenue, 3rd Street, Government Center, Wilkie D. Ferguson, Jr., College North, Museum Park, 11th Street, Park West, Freedom Tower, Riverwalk, 5th Street, 8th Street

METROBUS STOPS: 60

TOTAL RIDERSHIP: 40,089

TOOLKIT STRATEGIES

- Pedestrian Amenities
- Vehicular Travel Lane Width
- Micromobility (Bikesharing Station, e-scooter parking)
- Kiss-n-ride
- TNC Pick-Up & Drop-Off Area
- Transit Signal Priority
- Pedestrian Path Network
- Board & Skate Access
- Shared Space Zone

7 Government Center Hub

TYPE: TRANSIT ACCESS/DESTINATION

SOCIOECONOMIC PROFILE

POPULATION: 22,873

EMPLOYMENT: 84,572

TRANSIT PROFILE

METRORAIL STATIONS: Government Center and Historic Overtown/Lyric Theatre

METROMOVER STATIONS: College/ Bayside,1st Street, Bayfront Park, Knight Center, Miami Avenue, 3rd Street, Government Center, Wilkie D. Ferguson, Jr., College North, 11th Street, Park West, Freedom Tower, Riverwalk, 5th Street

METROBUS STOPS: 94

TOTAL RIDERSHIP: 44,333

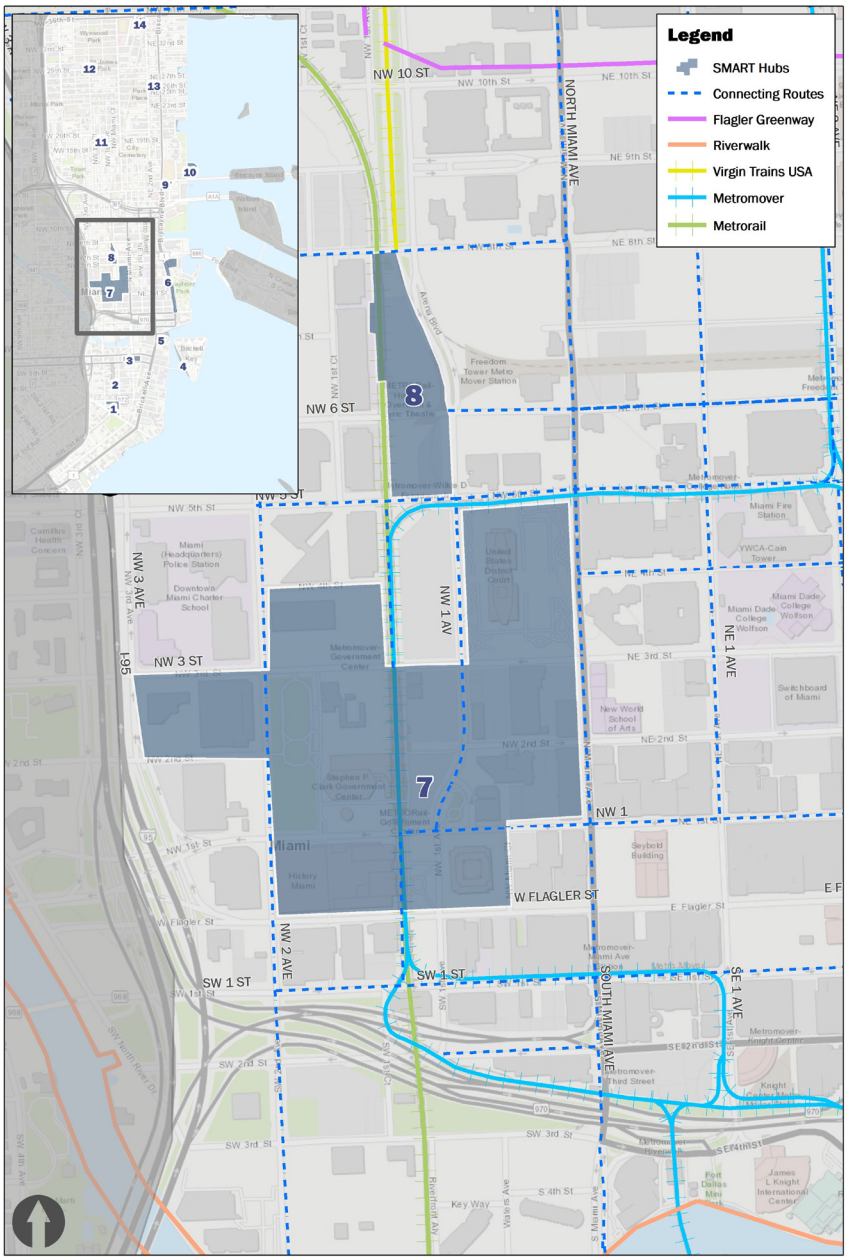


Figure 42. Government Center Hub

TOOLKIT STRATEGIES

- Transit Access Pedestrian/Bicycle Survey
- Complete Streets
- Enhanced Pedestrian Path Network
- Rolling Lanes
- Separated Bicycle Lanes
- Bicycle Sharing/Storage
- Wayfinding
- Direct Access to MiamiCentral
- TNC Pick-Up & Drop-Off Area
- Carsharing Parking Policies and Fees
- AV Infrastructure

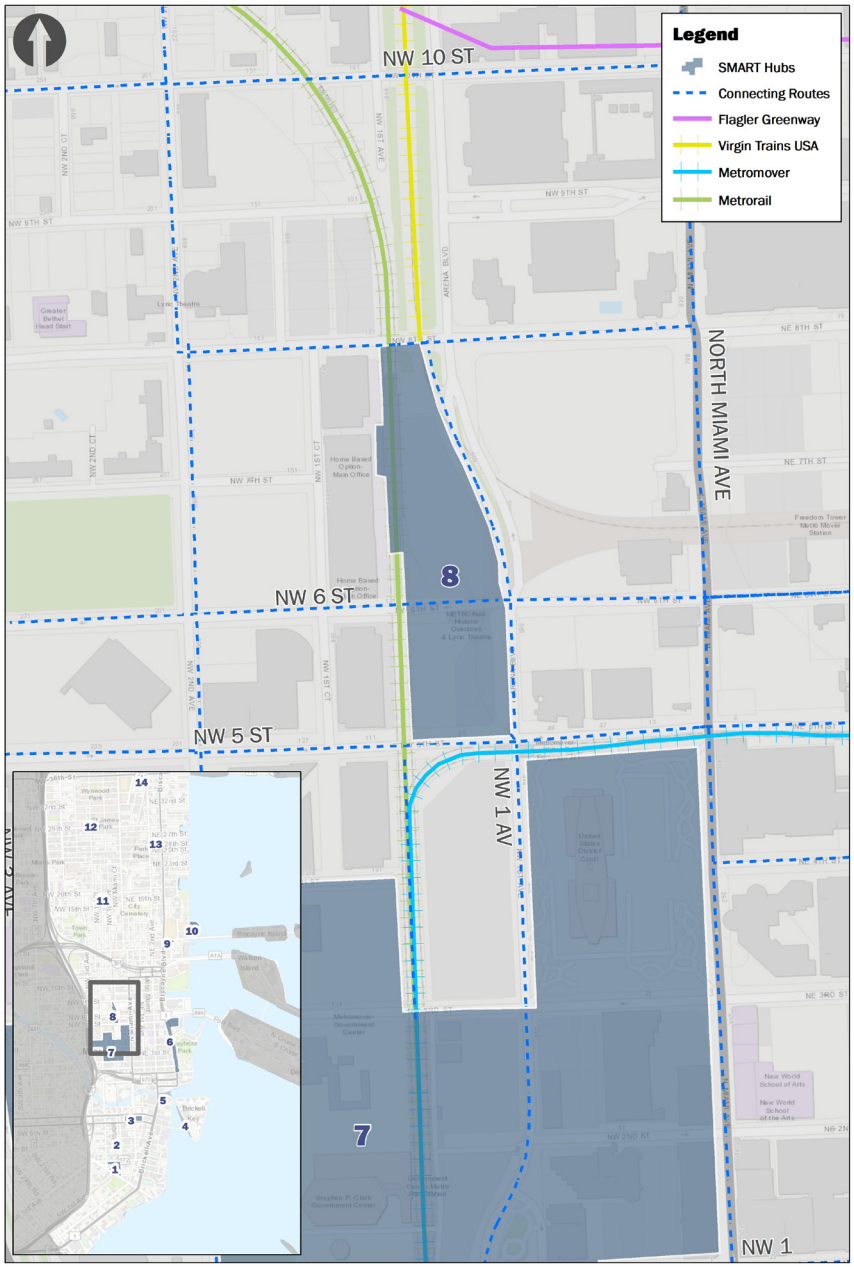


Figure 43. MiamiCentral Hub

8 Miami Central Hub

TYPE: REGIONAL MOBILITY HUB

SOCIOECONOMIC PROFILE

POPULATION: 18,478

EMPLOYMENT: 63,808

TRANSIT PROFILE

METRORAIL STATIONS: Government Center and Historic Overtown

METROMOVER STATIONS: College/Bayside, 1st Street, Miami Avenue, 3rd Street, Government Center, Wilkie D. Ferguson, Jr., College North, 11th Street, Park West, Freedom Tower

NO. METROBUS STOPS: 100

TOTAL RIDERSHIP: 38,511

TOOLKIT STRATEGIES:

- Continuous Pedestrian Path Network
- Bike, Board & Skate Continuous Path
- Separated Bicycle Lanes
- Enhanced Crossings
- Raised Intersections
- Transit Station Bikesharing/Bike Shop
- Curbside Management
- Wayfinding
- Microtransit Pick-Up/Drop-Off Area
- AV Infrastructure
- Transit Station Parking Management
- Car sharing Parking Policies and Fees
- Plaza/Open Space

9 Omni Station Hub

TYPE: TRANSIT ACCESS

SOCIOECONOMIC PROFILE

POPULATION: 14,829

EMPLOYMENT: 56,587

TRANSIT PROFILE

METRORAIL STATIONS: None

METROMOVER STATIONS: School Board, Adrienne Arsht Center, Museum Park, 11th Street, Park West

METROBUS STOPS: 46

TOTAL RIDERSHIP: 6,897

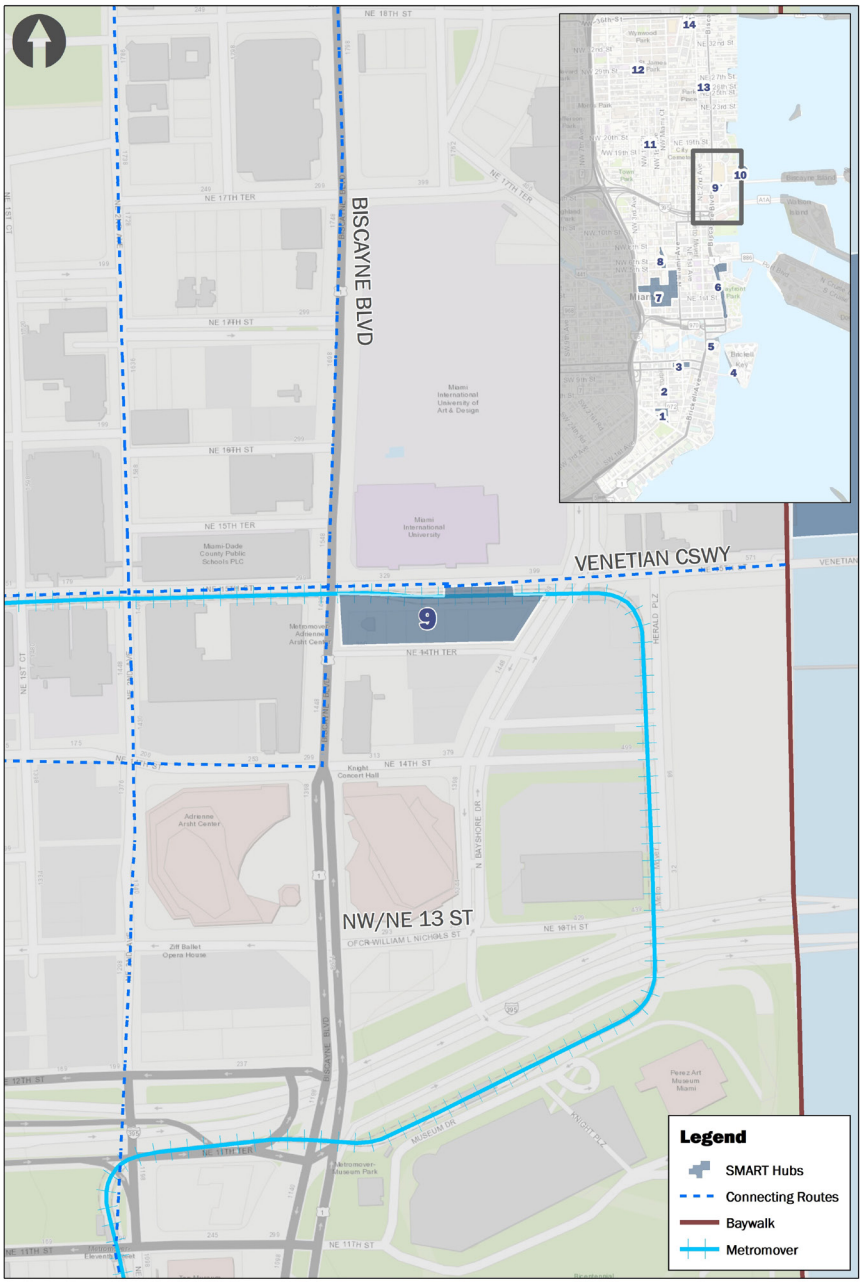


Figure 44. Omni Station Hub

TOOLKIT STRATEGIES

- Pedestrian Path Network
- Pedestrian Amenities
- Board & Skate Access
- Micromobility (Bikesharing Station, e-scooter parking)
- Bicycle Storage
- Wayfinding
- TNC Pick-Up & Drop-Off Area
- Kiss-n-ride
- Microtransit Pick-Up/Drop-Off Area

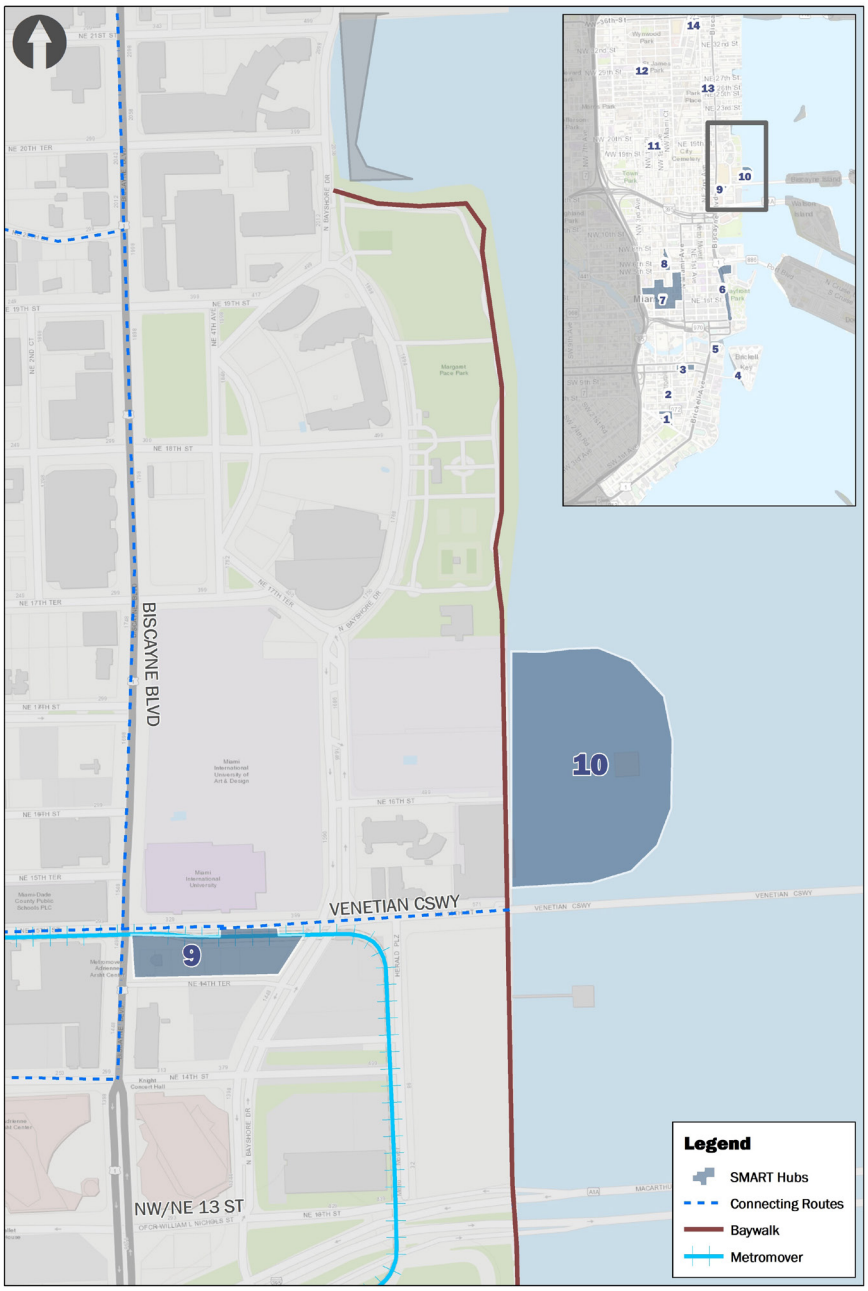


Figure 45. Sea Isle Marina Hub

10 Sea Isle Marina Hub

TYPE: WATER TRANSIT

SOCIOECONOMIC PROFILE

POPULATION: 13,975

EMPLOYMENT: 54,576

TRANSIT PROFILE

METRORAIL STATIONS: None

METROMOVER STATIONS: School Board, Adrienne Arsht Center, Museum Park, 11th Street

METROBUS STOPS: 41

TOTAL RIDERSHIP: 6,427

TOOLKIT STRATEGIES

- Pedestrian Path Network
- Pedestrian Amenities
- Micromobility (Bikesharing Station, e-scooter parking)
- Bicycle Parking
- Microtransit
- TNC Pick-Up & Drop-Off Area

11 NW 20th Street

TYPE: MICRO-TRANSIT/TNC

SOCIOECONOMIC PROFILE

POPULATION: 10,848

EMPLOYMENT: 52,174

TRANSIT PROFILE

METRORAIL STATIONS: None

METROMOVER STATIONS: School Board

METROBUS STOPS: 74

TOTAL RIDERSHIP: 2,115

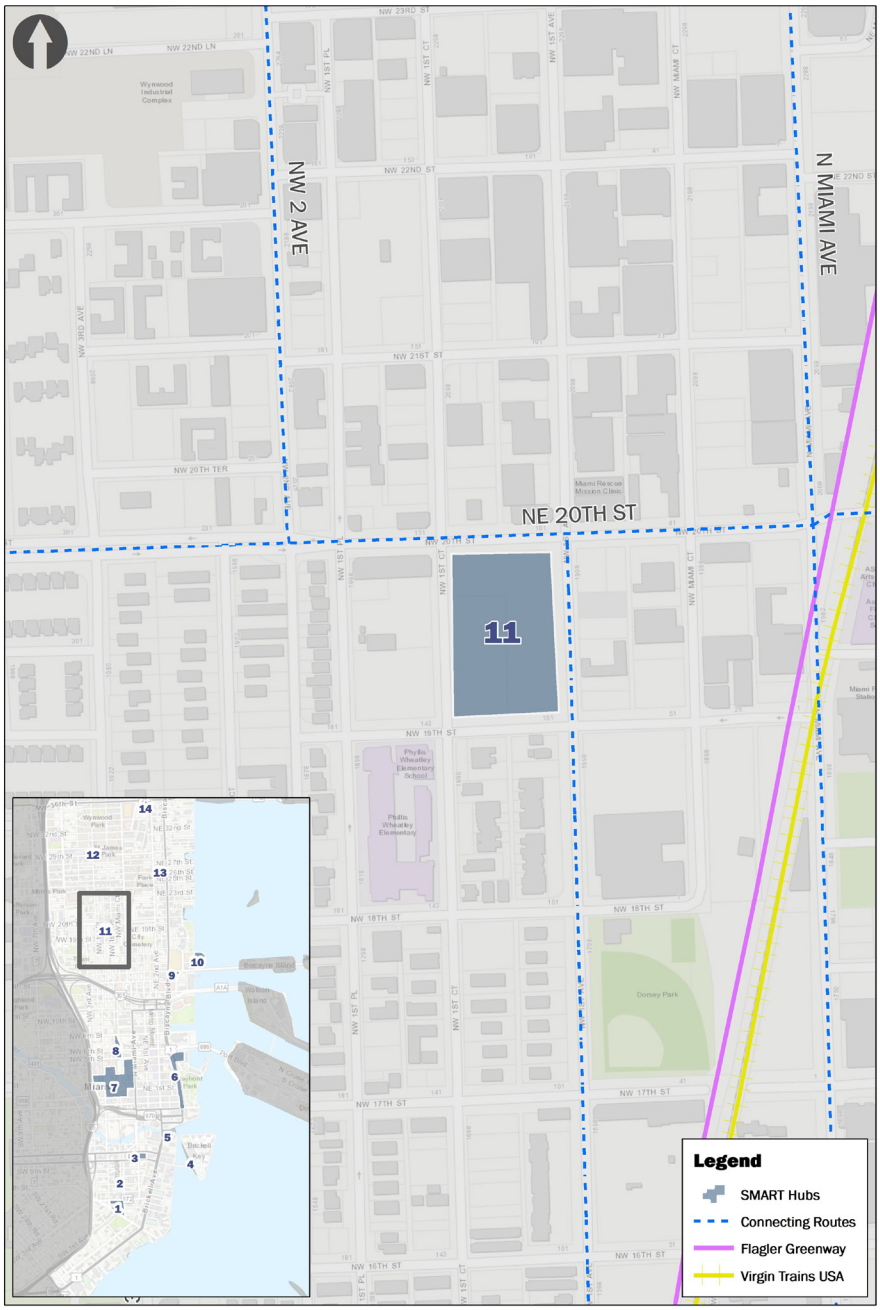


Figure 46. NW 20th Street Hub

TOOLKIT STRATEGIES

- Land Use Planning
- Microtransit
- TNC pick-up/drop-off zones
- Pedestrian Path Network
- Pedestrian Amenities
- Board & Skate Access
- Bicycle Lanes
- Micromobility (Bikesharing Station, e-scooter /bicycle parking)
- Wayfinding

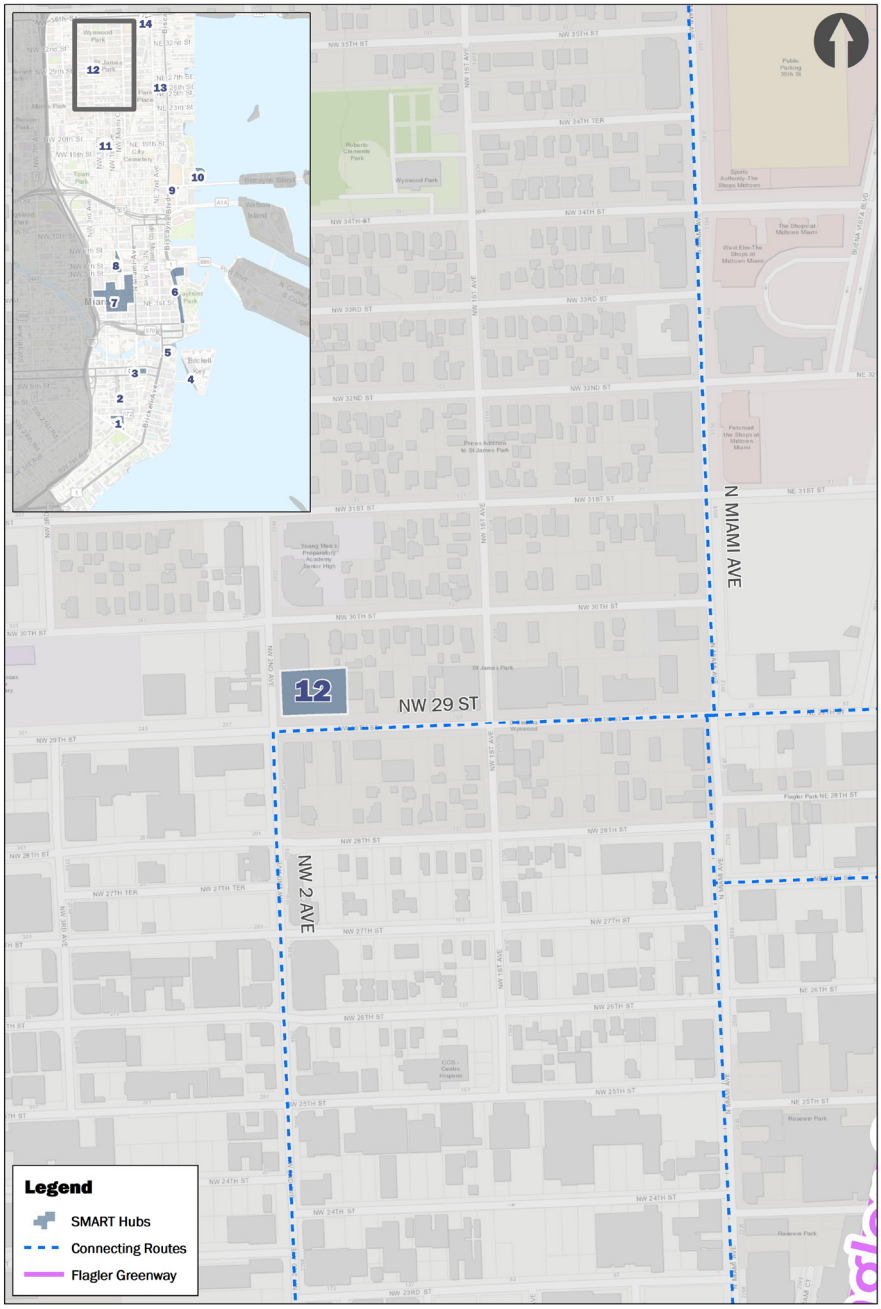


Figure 47. NW 29th Street Hub

12 NW 29th Street

TYPE: MICRO-TRANSIT/TNC

SOCIOECONOMIC PROFILE

POPULATION: 11,372

EMPLOYMENT: 5,849

TRANSIT PROFILE

METRORAIL STATIONS: None

METROMOVER STATIONS: None

METROBUS STOPS: 36

TOTAL RIDERSHIP: 824

TOOLKIT STRATEGIES

- Land Use Planning to increase employment
- Microtransit
- TNC pick-up/drop-off zones
- Pedestrian Path Network
- Pedestrian Amenities
- Board & Skate Access
- Bicycle Lanes
- Micromobility (Bikesharing Station, e-scooter / bicycle parking)

13 Edgewater Hub

TYPE: MICRO-TRANSIT/TNC

SOCIOECONOMIC PROFILE

POPULATION: 18,284

EMPLOYMENT: 7,348

TRANSIT PROFILE

METRORAIL STATIONS: None

METROMOVER STATIONS: None

METROBUS STOPS: 42

TOTAL RIDERSHIP: 834

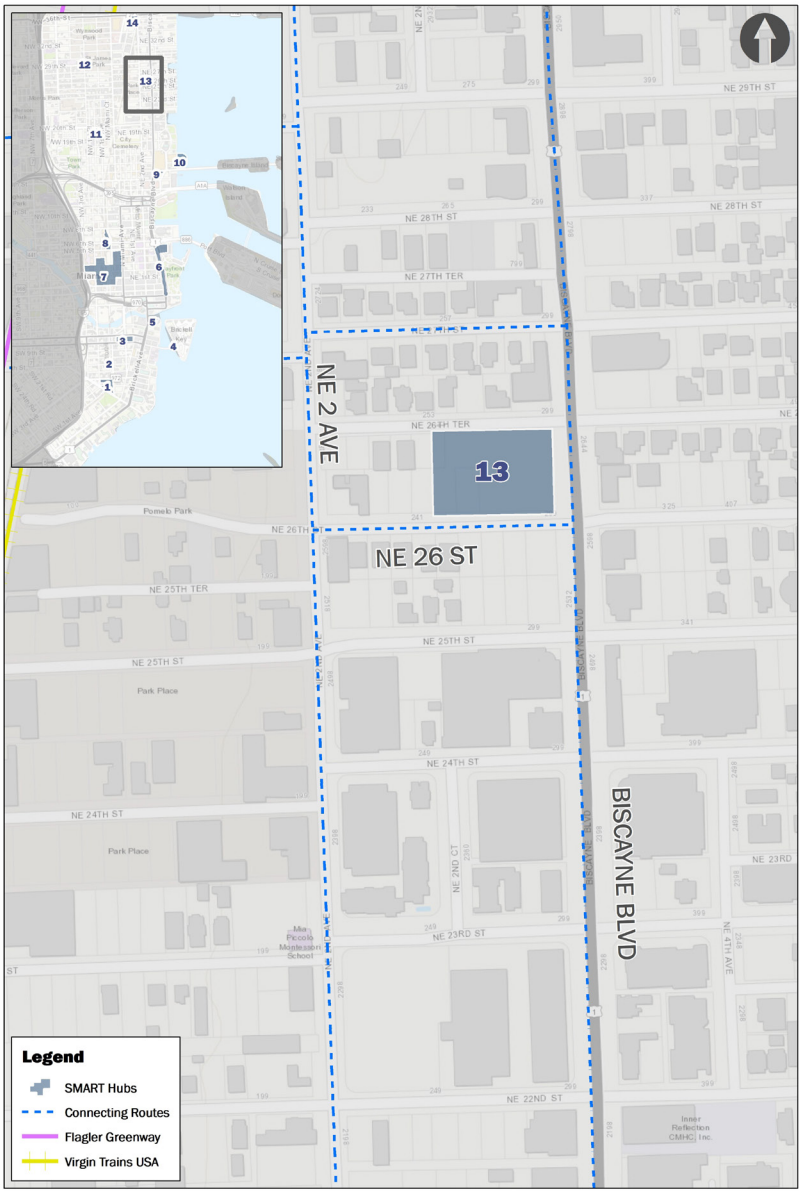


Figure 48. Edgewater Hub

TOOLKIT STRATEGIES

- Land-Use Planning
- Mixed-Use Development (mobile retail services)
- Microtransit
- TNC pick-up/drop-off zones
- Pedestrian Path Network
- Pedestrian Amenities
- Bike, Board & Skate Access
- Wayfinding
- Carsharing Stations
- Urban Plaza/Open Space

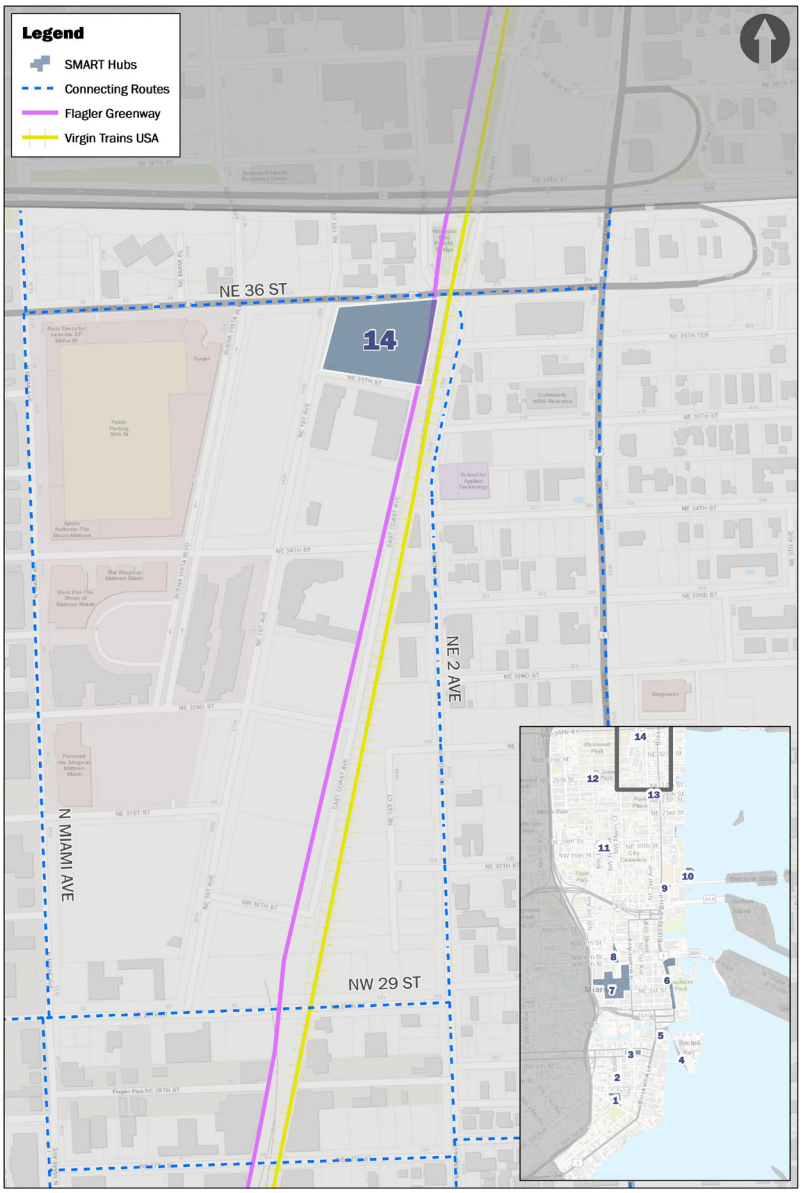


Figure 49. NW 36th Street Hub

14 NW 36th Street

TYPE: TRANSIT

SOCIOECONOMIC PROFILE

POPULATION: 14,713

EMPLOYMENT: 4,950

TRANSIT PROFILE

METRORAIL STATIONS: None

METROMOVER STATIONS: None

METROBUS STOPS: 46

TOTAL RIDERSHIP: 1,765

TOOLKIT STRATEGIES

- Pedestrian Amenities
- Pedestrian Path Network
- Enhanced crosswalks
- Raised Intersections
- Bike, Board & Skate Access
- Bicycle Lanes
- Microtransit/TNC Pick-Up/Drop-Off Area
- Dynamic parking management
- Mixed-Use Hub-Oriented Development
- Package Delivery Boxes
- Curbside Management

Focus Site 1
The Underline Hub

SITE SELECTION

It was recognized in this study that despite a number of facilities attracting pedestrian and bicycle activity to the south of Brickell, there was a need for a node in this area. The Rickenbacker Causeway, at the south end of the study area, attracts large numbers of recreational bicyclists on a daily basis; while the ongoing construction of The Underline is set to provide an intercity spinal cord to the bicycle network.

The surrounding area is mainly sub-urban, residential, and with some of the highest rates of daily vehicle trips per person seen in the study area. Lack of vacant land for any kind of new development makes real estate a prized scarcity, and site selection for a mobility hub challenging.

The chosen site (Figure 50) is north-south bounded by SW 13th Street and SW 15th Street. The east-west boundaries extend from SW 1st Avenue to SW 2nd Avenue.

The site is adjacent to Simpson Park. In addition, the elevated Metrorail transverses this lot, as does The Underline. The later constituted a decisive factor in the selection of this site. Rickenbacker Causeway, a popular bicycle route, is also located on the southern end of the study area. The Underline will serve as a connection between South Miami, Rickenbacker Causeway, and the core of the CBD.

Figure 50. The Underline Hub - Hub Core Area

EXISTING CONDITIONS AND LAND USE

Three main lots occupy this area at present, owned by Publix Super Markets Inc (Figure 51 left), Florida Power & Light Co (FPL), and a privately-owned vacant lot east of Metrorail (Figure 51 right). No change in development is proposed at the FPL lot, as it constitutes a public utility site. Land Use details for the two other lots are provided below:

The site is well served by public transit. Hub 2, Brickell Station, one of the busiest Metrorail stations, is 500 feet from this site. In addition there are four Metromover stations and 39 bus stops within a half a mile radius of the proposed Underline Hub. Population and employment surpass 50,000 people in this same area.

Table 6. The Underline Hub - Existing Land Use

Lot	Owner	Primary Land Use	Existing Land Use	Lot Size (Sq Ft)
1	Publix Super Markets Inc.	6110 Commercial / Residential		71,802 + 12,859 parking lot
2	Brickell Connect LLC, Creations Network Inc.	2865 Parking Lot / Mobile Home Park	804 Vacant, Non-Protected, Privately-Owned	131,366

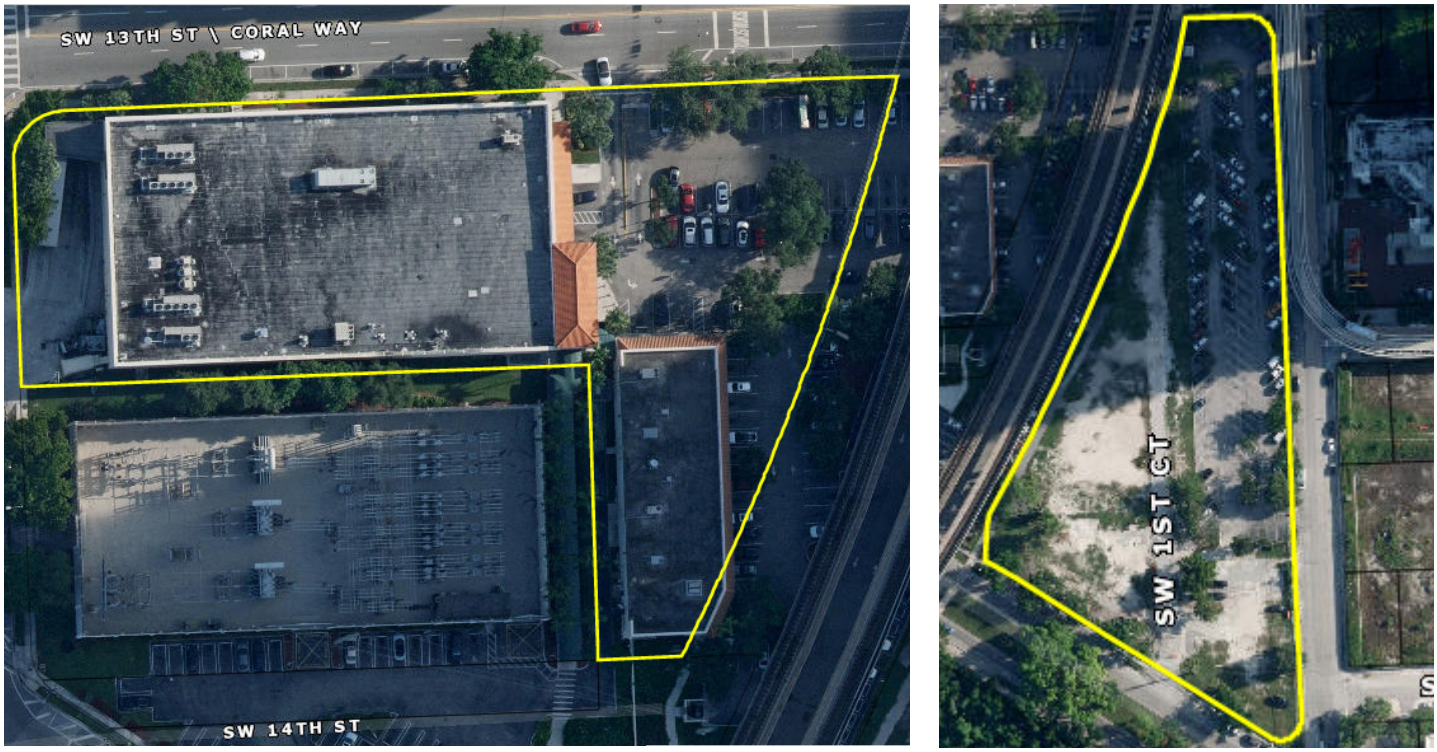


Figure 51. The Underline Hub - Existing Land Use

Between 2014 and 2018 there were a total of 50 crashes involving pedestrians and bicyclists in this area (Figure 52). Crashes at the hub core area are localized mainly at the intersection and midblock crossings, signaling a need for improved facilities and traffic control elements. These improvements should be addressed in a timely manner, since construction of The Underline is likely to provoke an increase in pedestrian and bicycle activity along these corridors.

LAND DEVELOPMENT OPTION

The Publix Plaza property has a total market assessed value of $20 million on 2.31 acres. This is in the Urban Core Transect Zone T6-12 with permissible mix-use to include both commercial and residential uses. Zone T6-12 has a maximum density of 150 dwelling units per acre but it is within the Little Havana Target Area of the Miami Comprehensive Neighborhood Plan which allows a maximum of 200 dwelling units per acre for a total of 462 units

The adjacent vacant property at 1420 SW 1 Ct has a market assessed valued of $62 million on 3.016 acres and is in the Urban Core Transect Zone T6-48. Zone T6-48 has a maximum allowable density of 150 dwelling units per acre for a total of 452 units.

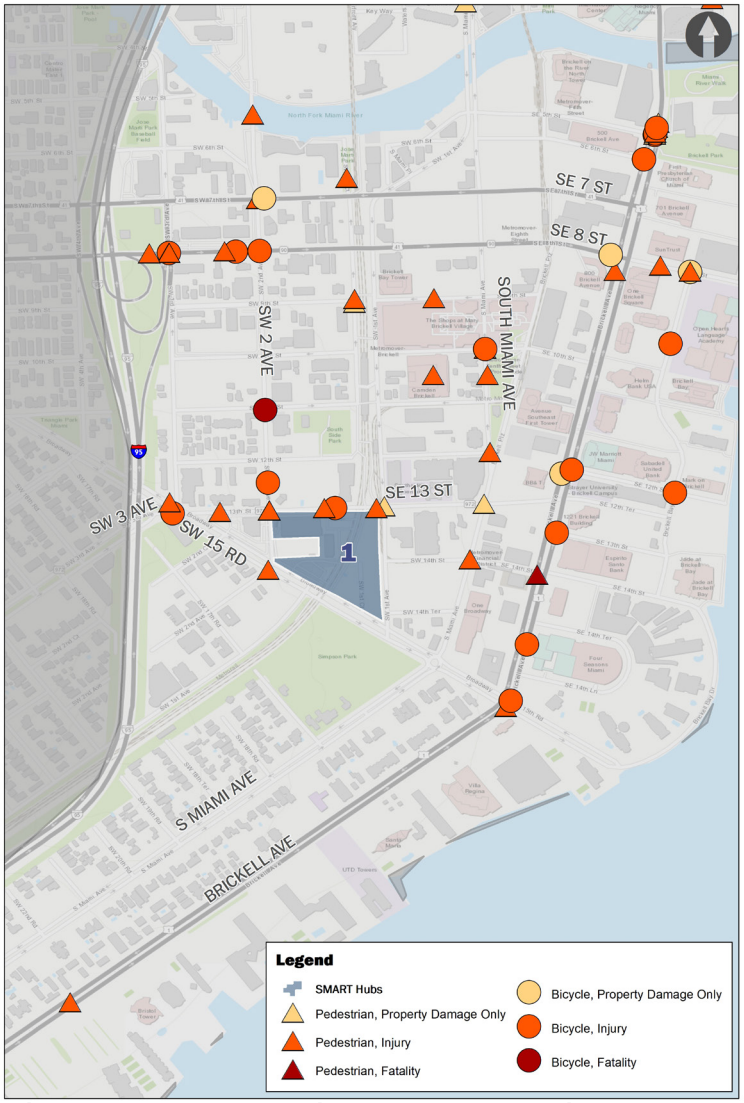


Figure 52. The Underline Hub - Pedestrian and Bicyclist Crashes 2014-2018

Table 7. The Underline Hub - Land Development Options

Property	Market Assessed Value	Area (acres)	Zoning	Maximum Density (dwelling units/ acre)	Target Area Density (dwelling units/ acre)	Total Units
Publix Plaza	$20 million	2.31	Urban Core Transect Zone T6-12	150	200	462
1420 SW 1st Court	$62 million	3.016	Urban Core Transect Zone T6-48	150	N/A	452

Figure 53. The Underline Hub - Existing Conditions

THE VISION

The vision is to transform this site into a mixed-use hub-oriented development that serves as a community focal point, supporting all modes of transportation, with an emphasis on active travel.

Despite being in close proximity to the core of the CBD, the Connectivity Analysis revealed that some of the surrounding communities of this site remain residential single-family homes with higher VMT rates than other surrounding areas.

A need was identified to create a hub surrounding these communities that would serve as a supporting facility for people choosing walking, bicycling, and other forms of micromobility for completing both commuting as well as recreational trips.

In addition, this site would serve to strengthen first and last mile connections to public transit, including Metrorail.

Given that a mix of uses within a walkable distance of one another can reduce car use and dependency, the proposal includes a multi-story residential community with commercial development on the ground floor.

The Underline would transverse the new development, adding a premium civic space to the development and effectively creating the connectivity required of an active travel hub.

Design flexibility along the curbside is another essential element of the vision. Rather than limiting this space to one or no use at all, temporary materials will be used to define uses that accommodate different community needs throughout the day and night. This space can thus become a loading area during the day, and a parklet at night or during special events. Elements of shared mobility may also be placed along the curbside, including carshare parking or TNC pick-up/drop-off zone. Figures 54 and 55 show a rendering of the proposed hub development.

Figure 54. The Underline Hub

The Underline
Publix
FedEx
Express
fedex.com

Figure 55. The Underline Hub At Night

RECOMMENDATIONS

Recommended design elements at this site include:

- *Wayfinding* - launching a unique and comprehensive wayfinding system is recommended for the entire study area, including The Underline Hub. This location should feature signs as well as kiosks displaying real-time travel and destination information.
- *Bicycle/Rolling Lanes* - active travel will be at the center of this development, therefore all supportive facilities to enable users must be provided. Bicycle lanes throughout the hub core area will further serve as secondary feeders to The Underline.
- *Micromobility* - including micromobility options within the design of the space capitalizes on existing popular trends to further advance non-motorized mobility in the area. Bike and e-scooter sharing stations should be available to allow residents mobility options beyond the car.
- *Bicycle/E-scooter Parking* - end-of-trip facilities are necessary to promote active travel and micromobility as viable mobility options. Providing safe and secure bicycle parking invites residents and visitors to choose this mode for completing nearby trips. In addition, a designated zone for e-scooter parking is proposed. Although most rental e-scooters in the area operate dockless, obstruction of the sidewalk and inconvenient placement of e-scooter after use is a common concern in the community. Providing a designated area for parking may alleviate this issue, especially if established in partnership with rental companies.
- *Carsharing* - carsharing is currently provided at this site, and it is proposed to be maintained and further expanded.

- *Curbside Management* - Curbside management is proposed along SE 13th Street and on SW 1st Avenue, with the alternative of being expanded if needed and possible.
- *Enhanced Crosswalks* - crossing safety is a major concern within the hub core area. Enhanced crosswalks should be placed at all intersections. Additionally, mid-block crossing leading up to The Underline should be enhanced to lower the risk of pedestrian and bicyclists injuries and fatalities.
- *Traffic Control Elements* - Traffic control elements such as pedestrian signalization is recommended at significant crossing points.
- *Pedestrian-Friendly Designs* - it is important to incorporate design elements that make the hub accessible and safe to pedestrians at all times of day and night. At a minimum, it is essential to close the missing sidewalk gaps within the hub core area to form a continuous pedestrian path network.
- *Open Plaza* - Civic spaces are at the core of mobility hubs. An active travel hub would not be complete without providing a place for people to gather, rest and enjoy the amenities of the public realm. Adequate siting, shade trees, local art, and pedestrian-scale lighting are some of the necessary features to be incorporated at the hub plaza.
- *Mixed-Use Hub Oriented Development (HOD)* - The Underline Hub must bring together all elements of a TOD to enable urban living where people can live, work, learn, and play while having a variety of mobility options at their disposal.

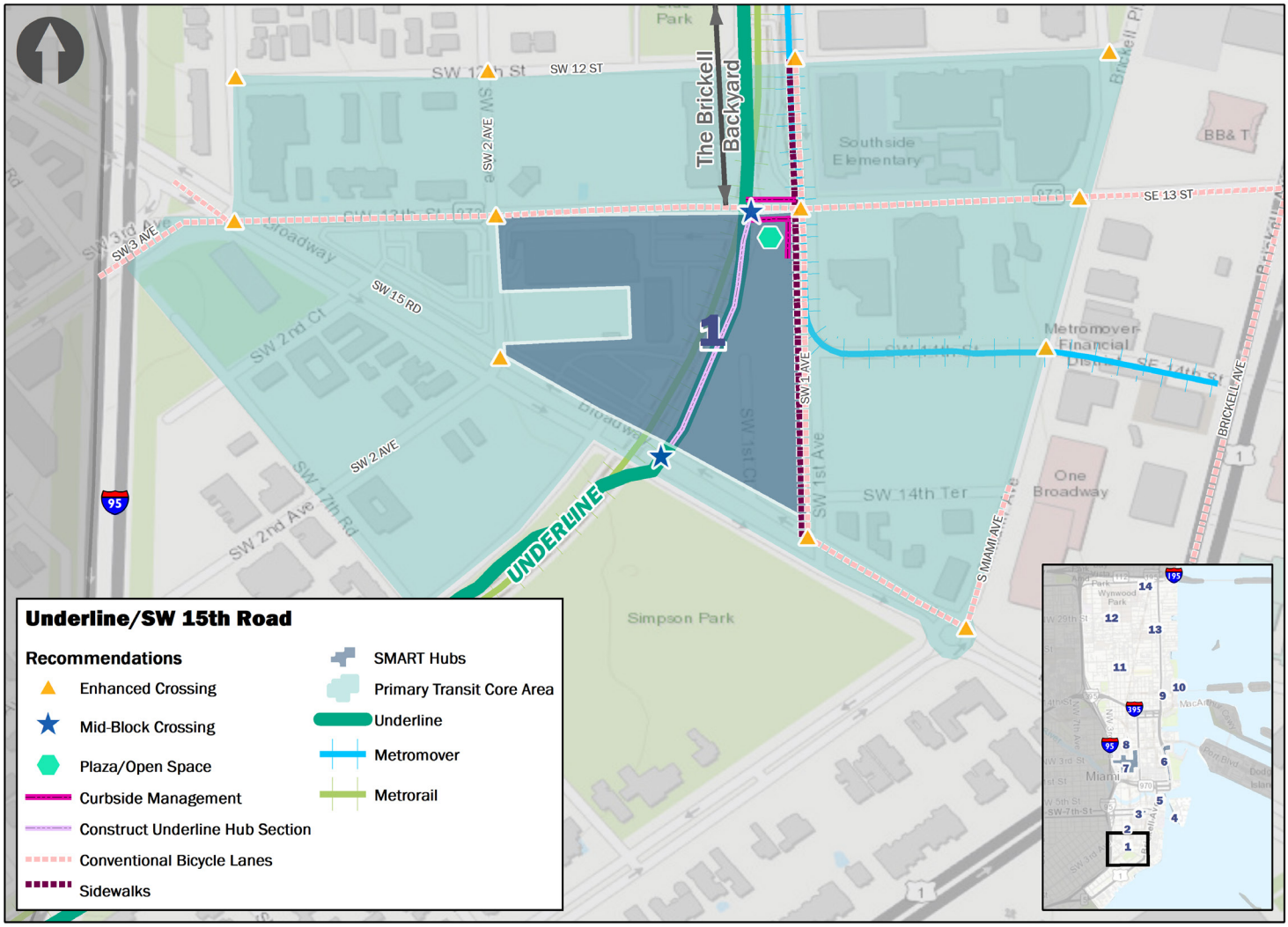


Figure 56. The Underline Hub - Recommended Improvements

CONCEPTUAL COSTS

Conceptual costs associated for the two (2) locations for implementing First/Last Miles strategies were prepared; Underline/SW 13th Street Hub and Miami Central/Northeast Corridor Downtown Hub. Developing a range of cost helps paint a better picture of what level of funding is necessary to implement the toolkit strategies. Statistically, the first portion of a trip is most often completed by foot, so it is crucial to provide a connected active transportation network

Table 8. The Underline Hub - Conceptual Costs

Tool Kit Strategies	Element Type	Description of Element Used to Estimate Associated Cost	Quantity	Cost Type	Cost Estimate	Total Cost
Wayfinding	Confirmation Signs, Turn Signs, and Decision Signs		Varies	Cost per Sign	$400	Varies
	Wayfinding Kiosks	Identification Banner, Wayfinding Messages, Map, and Key Area	2	Cost per Wayfinding Kiosk	$5,000	$10,000
Curbside Management	Parklets and Streetscape, Parked Vehicles and Electric Vehicle (EV) charging, Drivers (both TNC and non-TNC), Couriers and Delivery Vehicles, Micro-transit pick-up/drop-off zone	Signage and/or Mobility Management Platform	2	Cost per Location	$10,000	$20,000
Pedestrian Path Network	Sidewalk		0.22 miles	Cost per Mile	$200,000	$44,000
Bicycle Lanes – Board & Skate Access/Rolling Lanes	Conventional Bicycle Lanes		1.2 miles	Cost per Mile	$40,000	$48,000
Bikeshare Stations	Station with bikes and docks	The first-year cost includes equipment, installation, and operating costs for a station with 8 bikes and 15 docks. After the first year, the only cost associated with the station is the operating cost.		Cost per Station	1st Year: $48,000 After 1st Year: $18,000	Varies
Autonomous Vehicle Infrastructure	Fiber Optic Coverage		Varies	Cost per Mile	$250,000	Varies
Plaza/Open Spaces	Paved public space for individuals to gather for civic, religious, or commercial reasons. May include seating, waste receptacle, lighting, public art, fountains, trees, etc. Providing a built environment to enrich the visitor experience		Varies	Cost per Plaza/ Open Space	$100,000 to $2,000,000	Varies
Enhanced Crossing	Median refuge islands, raised crosswalks, high-visibility crosswalks, flashing beacons, intersection pedestrian signal, midblock pedestrian signal, traffic signal		14	Cost per Intersection	$50,000	$700,000

Focus Site 2
MiamiCentral Hub

SITE SELECTION

Virgin MiamiCentral Station is the most significant regional mobility hub in Miami-Dade County, serving the entire tri-county metropolitan area. Metromover, City of Miami Trolleys, Metrobus, Metrorail, and Virgin Trains all merge together at this hub. MiamiCentral is also the proposed location for a future Tri-Rail Downtown Miami Link (TRDML) platform.

The current development (Figure 57) is north-south bounded by NE 8th Street and NW 5th Street. The east-west boundaries extend from the Metrorail line to NW 1st Avenue in the heart of Downtown Miami.

EXISTING CONDITIONS

Virgin MiamiCentral is a mixed-use TOD featuring retail, dining, office, and residential space. Additionally, the hub directly connects to Government Center, a major employment and business center.

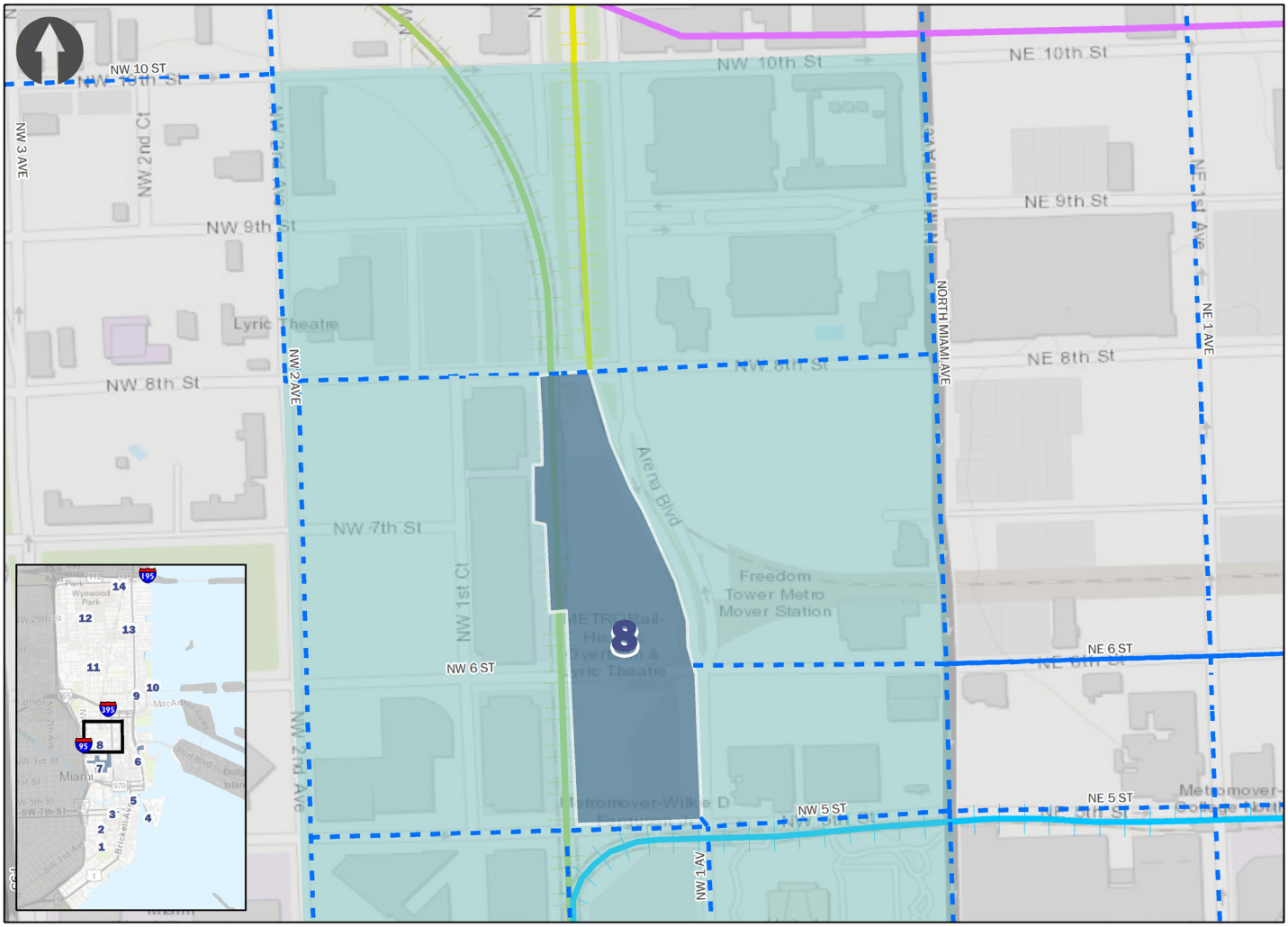


Figure 57. MiamiCentral Hub - Hub Core Area

Figure 58. MiamiCentral Hub - Existing Conditions

Two vacant lots owned by the City of Miami sit adjacent to the property on NW 1st Avenue as seen in the figures below. Table 9 summarizes lot information.

Table 9. MiamiCentral Hub - Existing Land Use

Lot	Owner	Primary Land Use	Lot Size
1	City of Miami	8080 Vacant Governmental	10,586 Sq Ft
2	City of Miami	8080 Vacant Governmental	22,782 Sq Ft

Figure 59. MiamiCentral Hub - Existing Land Use

Between 2014 and 2018 there were a total of 75 crashes involving pedestrians and bicyclists within half a mile of the hub (Figure 60).

Crashes at the hub core area are not centralized around the hub core area, however it is important to note that these statistics were mostly gathered before the opening of MiamiCentral in 2018. It is expected that pedestrian and bicycle activity will increase in the area as the development expands, new residents move to the station towers, and ridership increases over time.

Intersection and midblock crossings appear signaling a need for improved facilities and traffic control elements.

THE VISION

Virgin MiamiCentral is a key hub to regional mobility in South Florida. The station development follows many principles of Smart Growth and TOD. Nonetheless, mobility improvements are needed within the hub core area to foster sustainable growth, promote active travel as viable first and last mile option, and lower the risk of injuries and fatalities. Ensuring a walkable built environment that attracts pedestrians and bicyclists is essential to this vision.

RECOMMENDATIONS

- *Wayfinding* - Launching a unique and comprehensive wayfinding system is recommended for the entire study area, and it is of crucial importance at this hub. Orienting travelers and informing them of all the available mobility and transit options can encourage multimodal journeys that do not rely on private vehicles. Providing destination information is equally important. Specific recommendations include providing appropriate signage in highly visible areas, as well as wayfinding kiosks that display real-time travel information such as estimated arrival time of transit services and approximate walking time to prominent destinations.

- *Bicycle Lanes* - Bicyclists are one of the most disadvantaged users at this site, with limited or no facilities providing direct connection to the station. Providing physical infrastructure for bicyclists is a necessary step to increase demand and subsequently modal share. Designated bicycle lanes are recommended throughout the hub core area. Separated bicycle lanes are recommended along NW 5th Street and NW 6th Street (East-West one-way pair) and North Miami Avenue and NE 1st Avenue (North-South one-way pair).

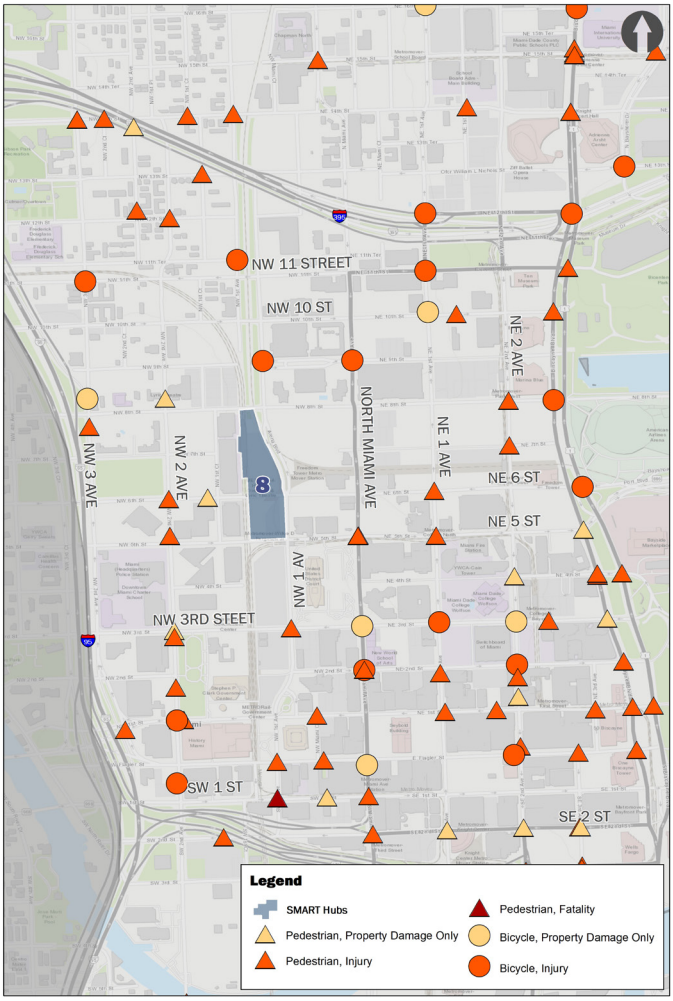


Figure 60. MiamiCentral Hub - Pedestrian and Bicyclist Crashes 2014-2018

- *Secure Bicycle Parking* - Proper end-of-trip supporting facilities for bicyclists are also recommended. A "bike center" is a basic station amenity that enables multimodal journeys by allowing travelers to securely store their bicycles while completing other legs of their trip. Additional repair services and products may also be offered.

- *Bicycle Counter* - A visible bicycle counter tracking how many bicyclists travel through the designated lanes can have positive effects by encouraging cycling, alerting drivers of the

Figure 61. MiamiCentral Hub

Wi-Fi HotSpot
Smart Cities MIAMI
SMART-HUB
UBER

presence of bicyclists, and obtaining reliable data to assess present conditions and the effect of interventions.

- *Micromobility* - Bikesharing and e-scooter rental is widely available and used throughout the area. Providing proper facilities ensures that the demand for micromobility is met pro-actively, reducing conflicts between modes and potential injuries. E-scooter parking, designated areas/lanes, and thorough dissemination of micromobility travel options are tools that may be used to manage the demand.
- *Enhanced Crossings* - Conflicts can be major points of conflict between the modes, often leading to crashes as made evident in the crash analysis. Raised and textured intersections are recommended as a traffic calming measure for improved walkability and safety. Enhanced crossings are recommended at all intersections within the hub core area. A mid-block crossings is also recommended along NW 1st Avenue.
- *Curbside Management* - Curbside management is proposed along NW 6th Street and NW 1st Avenue.
- *Ride and carsharing* - Shared mobility should be promoted at the hub as a desirable mode of access and egress to relief parking demand. The curbside may be used to provide Pick-Up and Drop-Off Areas and carsharing temporary parking.
- *Autonomous Vehicle Infrastructure* - Fiber optic cable coverage should be prioritized throughout the hub to enable intelligent transportation system solutions.
- *Open Plaza* - A pedestrian promenade leading up to the station is a common feature throughout the literature. An open plaza is the defining element that weaves together all other elements of a pedestrian-friendly design. A plaza is recommended at the vacant governmental lots across MiamiCentral on NW 1st Avenue.

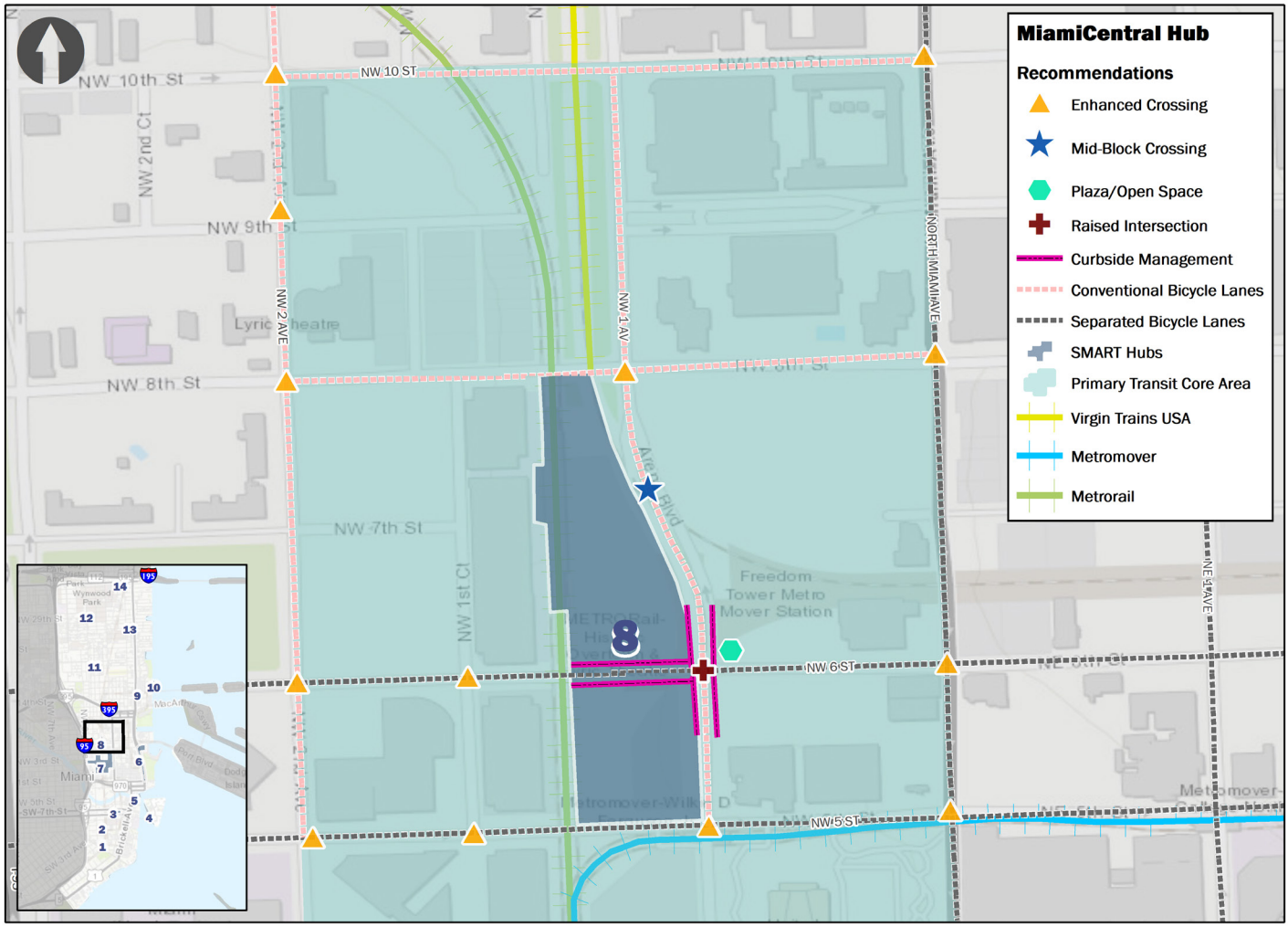


Figure 62. MiamiCentral Hub - Recommended Improvements

CONCEPTUAL COSTS

Conceptual costs associated for Miami Central/Northeast Corridor Downtown Hub for implementing first last miles strategies were prepared.

Table 1. MiamiCentral Hub - Conceptual Costs

Tool Kit Strategies	Element Type	Description of Element Used to Estimate Associated Cost	Quantity	Cost Type	Cost Estimate	Total Cost
Wayfinding	Confirmation Signs, Turn Signs, and Decision Signs		Varies	Cost per Sign	$400	Varies
	Wayfinding Kiosks	Identification Banner, Wayfinding Messages, Map, and Key Area	2	Cost per Wayfinding Kiosk	$5,000	$10,000
Curbside Management	Parklets and Streetscape, Parked Vehicles and Electric Vehicle (EV) charging, Drivers (both TNC and non-TNC), Couriers and Delivery Vehicles, Micro-transit pick-up/drop-off zone	Signage and/or Mobility Management Platform	4	Cost per Location	$10,000	$40,000
Bicycle Lanes – Board & Skate Access/Rolling Lanes	Conventional Bicycle Lanes		1.24 miles	Cost per Mile	$40,000	$49,600
	Separated Bicycle Lanes		1.84 miles	Cost per Mile	$360,000	$662,400
Transit Station Secure Bicycle Parking	Retrofit a retail slot to an indoor secure bicycle parking station with light maintenance available		1	Cost per Station	$250,000	$250,000
Autonomous Vehicle Infrastructure	Fiber Optic Coverage		Varies	Cost per Mile	$250,000	Varies
Plaza/Open Spaces	Paved public space for individuals to gather for civic, religious, or commercial reasons. May include seating, waste receptacle, lighting, public art, fountains, trees, etc. Providing a built environment to enrich the visitor experience		Varies	Cost per Plaza/ Open Space	$100,000 to $2,000,000	Varies
Enhanced Crossing	Median refuge islands, raised crosswalks, high-visibility crosswalks, flashing beacons, intersection pedestrian signal, midblock pedestrian signal, traffic signal		15	Cost per Intersection	$50,000	$750,000
Bicycle Detection	Installation of loop detection, signal modification, and pavement marking		Varies	Cost per Loop Detector	$7,730	Varies
					Total	$1,762,000

Policies, Goals and Objectives

The goals and objectives for the implementation of strategies in the core areas of the Underline/SW 13th Street Hub and the Miami Central/Northeast Corridor Downtown Hub are broken down to reflect the short-term and the long-term. Each long-term goal relates to and builds upon a short-term goal.

The short-term goals are based on a 5-year horizon, while long-term goals are expected to be achieved within a 15-year period. Providing a time frame for the completion of the stated goals allows for more successful monitoring of progress and effectiveness of implemented strategies.

A geographic delimitation was also assigned to both short-term goals and objectives are aimed at the area within ½ mile of the hubs and long-term goals and objectives aimed at the area within 1 mile of the hubs.

GOAL 1: STRONG DATA FOUNDATION

Before the implementation or construction of any strategies, it is imperative that a solid data foundation is developed. Without a baseline of data that is maintained in the long-term, it would be impossible to measure the success of the implementation of various strategies. In order to develop this library of data, data needs to be collected through surveys, observations, and partnerships. It must also be maintained including means of transportation for non-commuting purposes, means of transportation to access the transit stations, and an inventory of parking.

Partnership with shared mobility companies as well as routing and mapping applications is desirable to begin the process of sharing vital data for mutual benefit. Once this library of data is developed, it can be used to evaluate the success of strategies that have been implemented and to disseminate relevant travel information to the public.

- Short-Term Goal: Develop a solid data foundation.
- Long-Term Goal: Maintain and disseminate data.

GOAL 2: PROMOTE NON-MOTORIZED MODES AND TRANSIT

The various strategies that will be implemented are aimed at increasing walking, bicycling, and transit trips, ultimately leading to increased modal share.

- Short-Term Goal: Increase bicycle and pedestrian trips by 50%, increase transit trips by 50%, increase shared mobility trips by 50%.
- Long-Term Goal: Increase bicycle and pedestrian modal share to 5% and 15% respectively, increase public transportation modal share to 20%.

GOAL 3: DECREASE VEHICLE DEPENDENCY

The various strategies that will be implemented are also aimed at decreasing vehicle trips, VMT, and ultimately, vehicular modal share.

- Short-Term Goal: Decrease vehicle trips and VMT by 20%.
- Long-Term Goal: Decrease alone driving modal share to less than 50%.

GOAL 4: DEPLOY TSM&O SOLUTIONS

TSM&O improvements need to be made in order to begin the process of providing a network for autonomous vehicles infrastructure. To begin this process, priority corridors that need these improvements need to be identified.

- Short-Term Goal: Identify TSM&O corridor improvements. Upgrade signal fiber optic connectivity & deploy roadside units.
- Long-Term Goal: Implement Active Arterial Management strategies including TSP, V2V, and pedestrian and bicycle safety strategies.

GOAL 5: REDISTRIBUTE THE RIGHT-OF-WAY

Right-of-way needs to be planned and redistributed in order to account for the variety of modes that are anticipated to need additional right-of-way in the future. Goals and objectives addressed:

- Short-Term Goal: Redistribute right-of-way and deploy Complete Streets improvements within ½ mile of the selected hub.
- Long-Term Goal: Provide a network of Complete Streets within a mile of the selected hub.

GOAL 6: SAFETY

Safety and accessibility is an extremely important goal to strive for in a transportation network.

- Short-Term Goal: Develop a Safety Action Plan to reduce pedestrian and bicycle severe injuries and fatalities by 30% within designated priority locations.
- Long-Term Goal: Achieve Vision Zero throughout SMART Hubs.

Prioritization Criteria

Prioritization should be given to:

- Projects that are located within areas of biggest need.
- Projects that are located within areas of highest opportunity/impact.
- Projects that leverage other ongoing and future construction, studies or funding sources.
- Projects that demonstrate an ability to impact modal share by promoting transit use and active travel.

Next Steps - Type of data to be collected

There are multiple avenues for the gradual implementation of SMART Hubs improvements, including:

- Developing a financial program that increases funds over time to facilitate mobility hub capital improvements.
- Leveraging transit-related improvements such as completing signalization improvements proposed at the 13th Street midblock crossing at The Underline Hub.
- Strategic land acquisitions at hubs and surrounding plots.
- Conducting studies such as Lane Elimination Analysis to redistribute the right-of-way wherever possible within the hub core area to facilitate integration of transportation modes.
- Hub-related standalone improvements such as converting surface parking to structured parking
- Gathering baseline data including Traveler Satisfaction Surveys at existing hubs and documenting mobility activity at undeveloped locations.
- Creating a Vision Zero Task Force to implement and prioritize areawide strategies such as re-examining speed limits, signal timings, leading pedestrian intervals, and left-turn safety measures and other traffic calming projects.
- Creating a Community Outreach Program featuring community meetings, online portals, and public advertising and educational campaigns in order to obtain public input and forge a strong and effective advocacy community.

Potential Funding Sources

BETTER UTILIZING INVESTMENTS TO LEVERAGE DEVELOPMENT (BUILD) TRANSPORTATION GRANTS PROGRAM (FORMERLY TIGER)

Purpose - The BUILD program is a competitive, discretionary funding opportunity that funds investments in transportation infrastructure, including transit. Between 2009 and 2017, the TIGER grant program provided $5.1 billion to 421 projects in all 50 states. The Consolidated Appropriations Act of 2019 made available $900 million

Eligibility - BUILD funding can support roads, bridges, transit, rail, ports or intermodal transportation.

URBANIZED AREA FORMULA GRANTS

Purpose - Makes federal resources available to urbanized areas and to governors for transit capital and operating assistance in urbanized areas and for transportation-related planning.

Eligibility - Funding is made available to designated recipients that are public bodies with the legal authority to receive and dispense federal funds.

Governors, responsible local officials and publicly owned operators of transit services shall designate a recipient to apply for, receive, and dispense funds for urbanized areas pursuant to 49USCA5307(a)(2).

INTEGRATED MOBILITY INNOVATION

Purpose - FTA's Integrated Mobility Innovation (IMI) Program funds projects that demonstrate innovative and effective practices, partnerships and technologies to enhance public transportation effectiveness, increase efficiency, expand quality, promote safety and improve the traveler experience. FTA's IMI 2019 funding opportunity provides $15 million for demonstration projects focused on three areas of interest: Mobility on Demand, Strategic Transit Automation Research and Mobility Payment Integration.

Eligibility - Eligible applicants are providers of public transportation, including public transportation agencies, state/local government DOTs, and federally recognized Indian tribes. Eligible applicants must identify one or more strategic project partner(s) with a substantial interest and involvement in the project. Eligible project partners under this program may include Private for-profit and not-for-profit organizations, private operators of transportation services, bus manufacturers, state or local government entities, including multi-jurisdictional partnerships, and organizations such as a Metropolitan Planning Organization, or other organizations including consultants, research consortia or notfor-profit industry organizations, and institutions of higher education.

MOBILITY ON DEMAND (MOD) SANDBOX PROGRAM

Purpose - FTA's MOD Sandbox Demonstration Program provides a venue through which integrated MOD concepts and solutions – supported through local partnerships – are demonstrated in real-world settings. FTA seeks to fund project teams to innovate, explore partnerships, develop new business models, integrate transit and MOD solutions, and investigate new, enabling technical capabilities such as integrated payment systems, decision support, and incentives for traveler choices.

Eligibility - Eligible activities include all activities leading to the demonstration of the innovative MOD and transit integration concept, such as planning and developing business models, obtaining equipment and service, acquiring/developing software and hardware interfaces to implement the project, and operating the demonstration.

Eligible recipients are providers of public transportation, including public transit agencies, state/local government DOTs, and federally recognized Indian tribes. Each recipient must identify one or more strategic project partner(s) with a substantial interest and involvement in the project.

PILOT PROGRAM FOR TRANSIT ORIENTED DEVELOPMENT PLANNING

Purpose - Competitive Pilot Program for TOD Planning providing funding to local communities to integrate land use and transportation planning with a new fixed guideway or core capacity transit capital investment. Comprehensive planning funded through the program must examine ways to improve economic development and ridership, foster multimodal connectivity and accessibility, improve transit access for pedestrian and bicycle traffic, engage the private sector, identify infrastructure needs, and enable mixed-use development near transit stations.

Eligibility - Any comprehensive planning work proposed for funding under this program must be associated with an eligible transit capital project, namely a new fixed guideway project or a core capacity improvement project

PUBLIC TRANSPORTATION INNOVATION

Purpose - Discretionary funding opportunity to develop innovative products and services that will assist transit agencies in better meeting the needs of their customers.

Eligibility - Universities, public transportation systems, state DOTs, non-profit and for-profit entities, amongst others

PUBLIC TRANSIT SERVICE DEVELOPMENT GRANT PROGRAM

Purpose - Provides initial funding for special project involving new or innovative ways to increase service to the riding public, such as new technologies, services, routes or vehicle frequencies. Projects submitted for funding must be justified in the recipient's Transit Development Plan (TDP) or transportation disadvantaged service plan (TDSP), if applicable.

DOWNTOWN MIAMI

SMART CORRIDOR HUB

TRANSPORTATION MOBILITY & CONNECTIVITY STUDY