Prepared for:

MIAMI-DADE MPO
Metropolitan Planning Organization

Metromover System Expansion Study
Appendix

Work Order #GPC V-16

PM260013.13

Prepared by:

Kimley»Horn

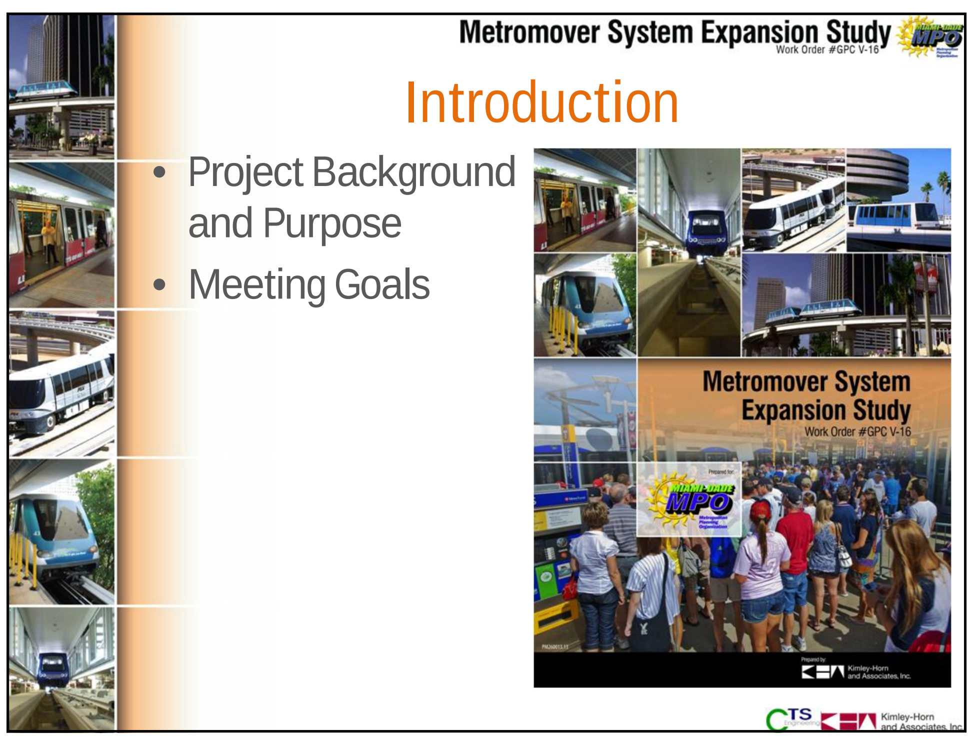
Appendices

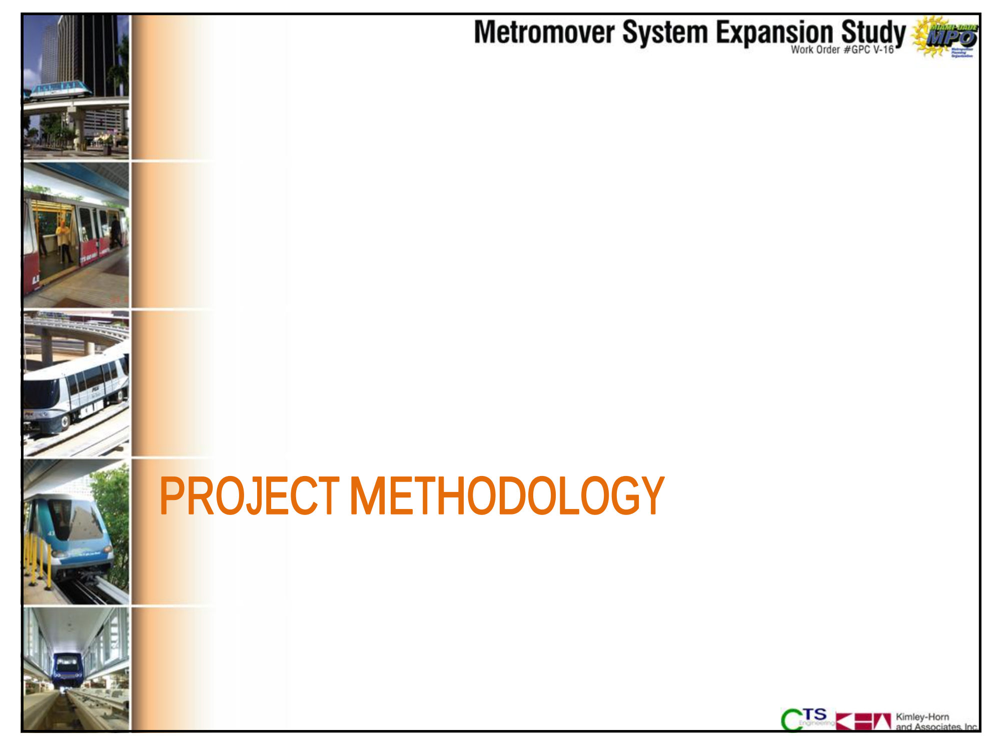
Appendix A: SAC Presentations and Sign-in Sheets

SAC Meeting #1


SAC Meeting #1
Metromover System Expansion Study
Work Order #GPC V-16
MIAMI-DADE MPO
Metropolitan Planning Organization
Kimley-Horn and Associates, Inc.


Metromover System Expansion Study
Work Order #GPC V-16
Agenda
• Introduction
• Project Methodology
• Data Collection Summary/Survey Logistics
• Next Steps/Action Items


Metromover System Expansion Study
Work Order #GPC V-16
Introduction
• Project Background and Purpose
• Meeting Goals
Metromover System Expansion Study
Work Order #GPC V-16


Metromover System Expansion Study
Work Order #GPC V-16
PROJECT METHODOLOGY

Schedule

Task #	Description	N	D	J	F	M	A	M	J	J
1	Study Coordination	K		S		W	S		S	
2	Data Collection									
3	Concept Alternatives Development									
4	Feasibility Assessment									
5	Refined Metromover Expansion Plan									
6	Implementation Strategies									
7	Deliverables									

Notes:
K = Indicates Kick-off Meeting with MPO Project Manager
S = Indicates a Study Advisory Committee (SAC) Meeting
W = Indicates Alternatives Development Workshop

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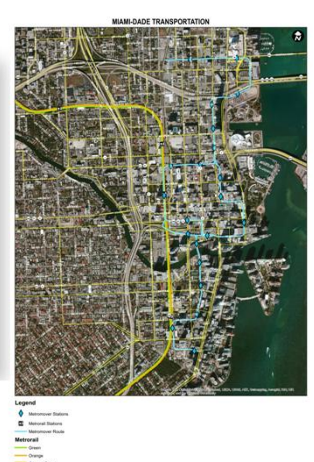
Data Collection – January / February

Metromover System Expansion Study
Work Order #GPC V-16

Alternatives Development Workshop - March 31st



Metromover System Expansion Study
Work Order #GPC V-16

Alternatives Assessment – April

First Level Screening Matrix -- Long List of Alternatives Greater East End Management District - Urban Circulator System Alternatives Analysis Study Alternative	Description	Right-of-Way	Existing Infrastructure	Traffic Impacts	Geometric Constraints	Ease of Construction	Land Use	Pedestrian Realm/Walkability	Economic Development	Socioeconomic Benefits
1	Alignment A, Double-Track Streetcar with West Belt crossing Option 1	Good	Neutral	Good	Poor	Poor	Good	Very Good	Good	Neutral
2	Alignment A, Double-Track Streetcar with West Belt crossing Option 2	Fatal Flaw	Good	Very Good	Good	Good	Neutral	Good	Very Good	Poor
3	Alignment B, Single-Track Streetcar Loop with West Belt crossing Option 1B	Good	Poor	Neutral	Good	Very Good	Neutral	Good	Poor	Good
4	Alignment C, North End Double-Track Streetcar & Loop with Dual West Belt crossing Option 3	Poor	Neutral	Bad	Fatal Flaw	Neutral	Good	Very Good	Good	Good

Refined Metromover Alternative - May

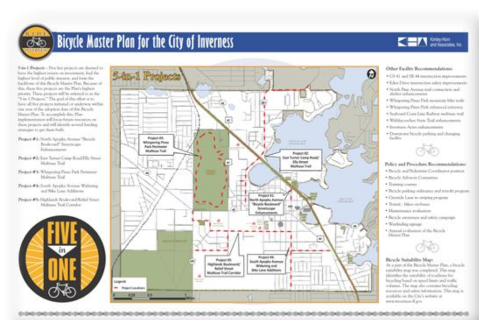
http://www.youtube.com/watch?v=XNkXIYngD8I

Implementation Strategies - June

- High-Level
- Capital and Operating Funding Strategy
- Immediate, Short, Medium, and Long-Term Strategies
- Steps for inclusion in Agency Plans
  - CIP
  - FDOT Work Program
  - LRTP

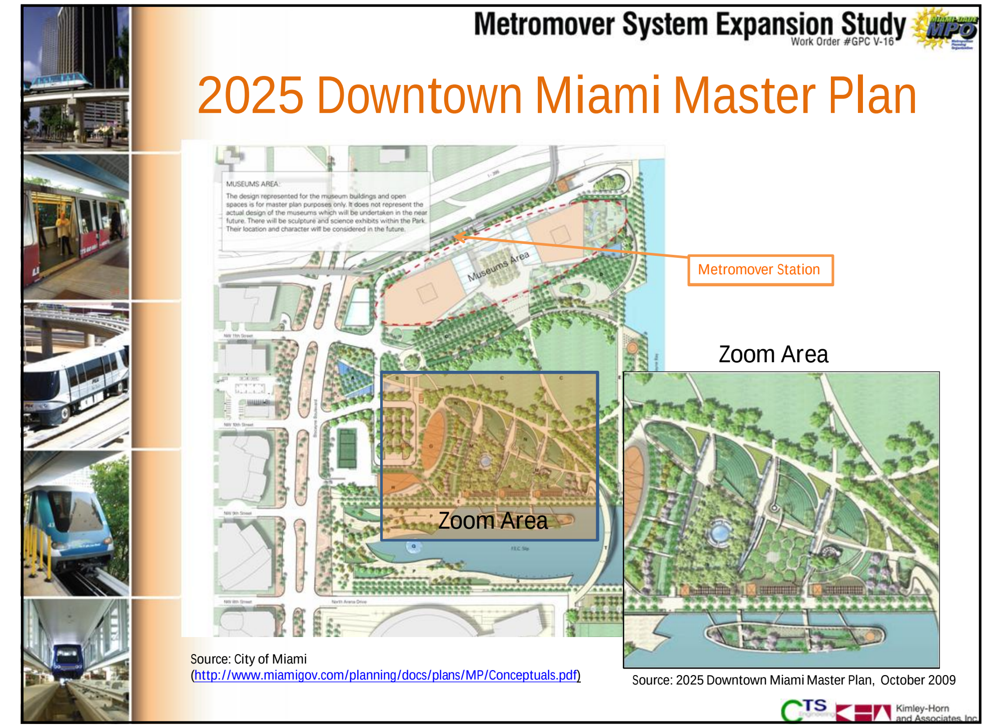
Deliverables

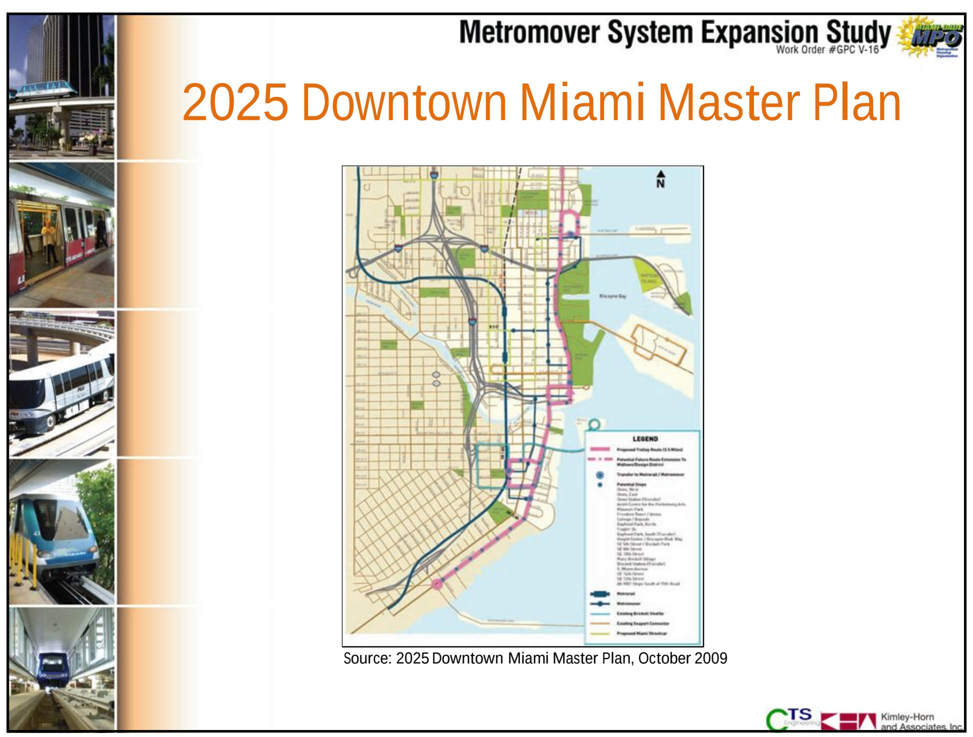
- Interim Memorandums – Throughout Project
- Report - July
- Executive Summary - July

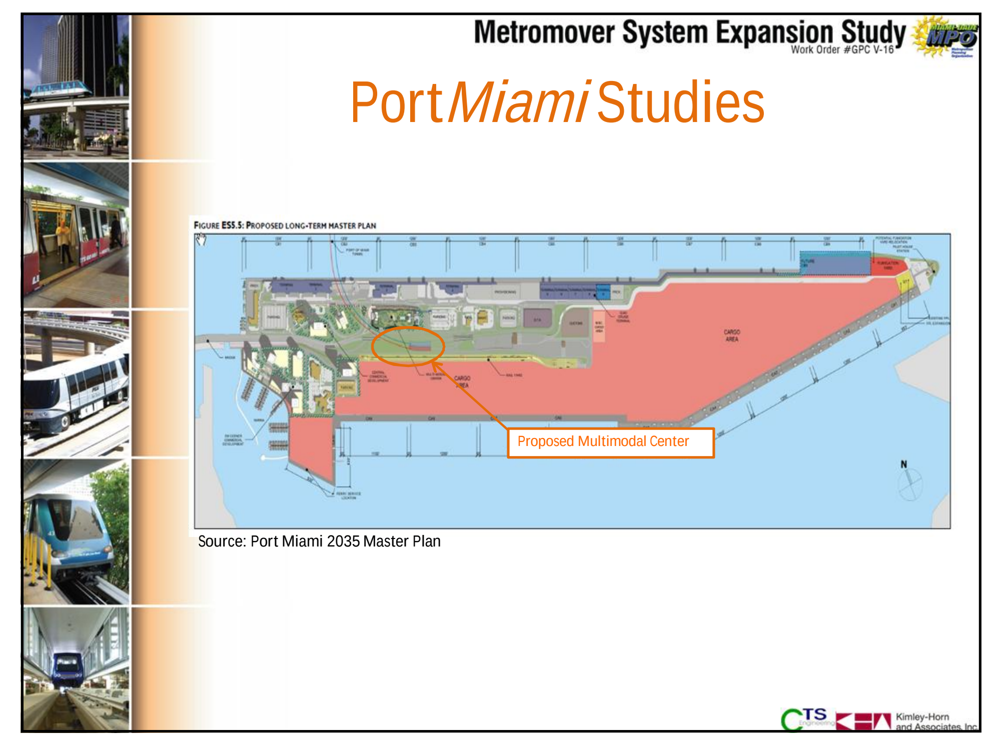


DATA COLLECTION SUMMARY / SURVEY LOGISTICS


Metromover System Expansion Study
Work Order #GPC V-16
Reviewed Studies
DWNTWN MIAMI...
Epicenter of the Americas
Transit Development Plan
Miami-Dade Transit
Miami-Dade 2035 Long Range Transportation Plan
PORTMIAMI
Goals
Objectives
Policies


Metromover System Expansion Study
Work Order #GPC V-16
2025 Downtown Miami Master Plan
Metromover Station
Zoom Area
Zoom Area
Source: City of Miami
(http://www.miamigov.com/planning/docs/plans/MP/Conceptuals.pdf)
Source: 2025 Downtown Miami Master Plan, October 2009


Metromover System Expansion Study
Work Order #GPC V-16
2025 Downtown Miami Master Plan
Source: 2025 Downtown Miami Master Plan, October 2009


Metromover System Expansion Study
Work Order #GPC V-16
Port*Miami* Studies
Proposed Multimodal Center
Source: Port Miami 2035 Master Plan

Port*Miami* Studies

Source: Miami-Dade MPO; June 3, 2013

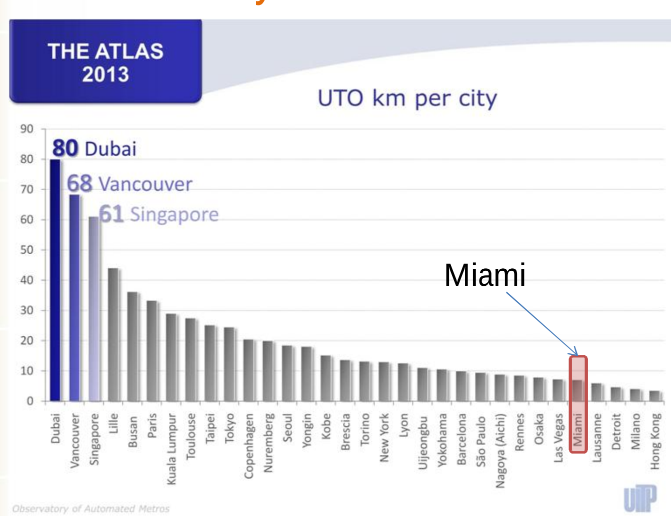
Metromover System Expansion Study
Work Order #GPC V-16

Other Study Findings

- Recommended Port*Miami* and Bayshore Drive Metromover Connections *(MCNP)*
- Brickell Extension *(2035 LRTP)*
- Anticipated Omni/Brickell Loop Closures *(2040 LRTP)*
- Signage/Lighting/Other Refurbishments *(TDP)*
- Trolley Connections – Coral Way/Brickell Trolley *(2035 LRTP)*
- Safety/Security Programs *(2035 LRTP)*
- **Draft Literature Review – February 2014**

Metromover System Expansion Study
Work Order #GPC V-16

Similar Systems Worldwide



Source: International Association of Public Transport. Observatory of Automated Metros, 2013 Data and Activities

Metromover System Expansion Study
Work Order #GPC V-16

Summary of System Review

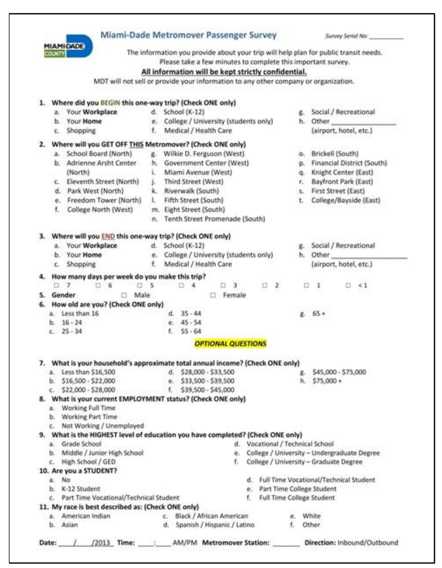
- Matrix of Similar Systems
  - Location
  - Purpose
  - Dates of Operation
  - Technology
  - Length and Expansions
- Expanded Systems
  - Jacksonville
  - Lille, France
  - Paris, France
  - Lausanne, Switzerland

Passenger Survey

- Methodology
  - Sampling Survey
  - IPADs
- Goals
  - Origin-Destination Information Between Zones
  - Trip Purpose
  - Socio-economic Information
- Target Date – February 12th

Survey Locations

Draft Survey



Miami-Dade Metromover Passenger Survey Survey Serial No: ________

The information you provide about your trip will help plan for public transit needs.
Please take a few minutes to complete this important survey.
All information will be kept strictly confidential.
MDT will not sell or provide your information to any other company or organization.

1. **Where did you BEGIN this one-way trip? (Check ONE only)**
   a. Your **Workplace** d. School (K-12) g. Social / Recreational
   b. Your **Home** e. College / University (students only) h. Other ________ (airport, hotel, etc.)
   c. Shopping f. Medical / Health Care
2. **Where will you GET OFF THIS Metromover? (Check ONE only)**
   a. School Board (North) g. Wilkie D. Ferguson (West) o. Brickell (South)
   b. Adrienne Arsht Center (North) h. Government Center (West) p. Financial District (South)
   c. Eleventh Street (North) i. Miami Avenue (West) q. Knight Center (East)
   d. Park West (North) j. Third Street (West) r. Bayfront Park (East)
   e. Freedom Tower (North) k. Riverwalk (South) s. First Street (East)
   f. College North (West) l. Fifth Street (South) t. College/Bayside (East)
   m. Eight Street (South)
   n. Tenth Street Promenade (South)
3. **Where will you END this one-way trip? (Check ONE only)**
   a. Your **Workplace** d. School (K-12) g. Social / Recreational
   b. Your **Home** e. College / University (students only) h. Other ________ (airport, hotel, etc.)
   c. Shopping f. Medical / Health Care
4. **How many days per week do you make this trip?**
   ☐ 7 ☐ 6 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐ <1
5. **Gender** ☐ Male ☐ Female
6. **How old are you? (Check ONE only)**
   a. Less than 16 d. 35 - 44 g. 65 +
   b. 16 - 24 e. 45 - 54
   c. 25 - 34 f. 55 - 64

OPTIONAL QUESTIONS

7. **What is your household's approximate total annual income? (Check ONE only)**
   a. Less than $16,500 d. $28,000 - $33,500 g. $45,000 - $75,000
   b. $16,500 - $22,000 e. $33,500 - $39,500 h. $75,000 +
   c. $22,000 - $28,000 f. $39,500 - $45,000
8. **What is your current EMPLOYMENT status? (Check ONE only)**
   a. Working Full Time
   b. Working Part Time
   c. Not Working / Unemployed
9. **What is the HIGHEST level of education you have completed? (Check ONE only)**
   a. Grade School d. Vocational / Technical School
   b. Middle / Junior High School e. College / University – Undergraduate Degree
   c. High School / GED f. College / University – Graduate Degree
10. **Are you a STUDENT?**
   a. No d. Full Time Vocational/Technical Student
   b. K-12 Student e. Part Time College Student
   c. Part Time Vocational/Technical Student f. Full Time College Student
11. **My race is best described as: (Check ONE only)**
   a. American Indian c. Black / African American e. White
   b. Asian d. Spanish / Hispanic / Latino f. Other

Date: __/__/2013 **Time:** __:__ AM/PM **Metromover Station:** ______ **Direction:** Inbound/Outbound

NEXT STEPS / ACTION ITEMS

Next Steps / Action Items

- Conduct Survey – February 12th
- March SAC Meeting – March 31st at DDA
  - Present Survey Results
  - Develop/Refine Alternatives
  - Present Screening Criteria

Initial Options

- Close Brickell Loop
- Extend South along Brickell
- Beach Connection
- Close Omni Loop
- Marlins Park Connection
- Omni Loop North Extension
- PortMiami Connection

Kimley-Horn and Associates, Inc.

MEETING ATTENDANCE

Date: 1/24/2013 Time: 10:00 A

KHA Project: Metromover Expansion

Subject: SAC #1

Location: Miami KHA Office

Attendees	Company/Department	Phone	Address or E-mail Address
Napoleon Somoza	MDC-RER	305/375-2835	nvs@miamidade.gov
Aiah Yassin	FDOT / ISDO	305-470-5227	aiah.yassin@dot.state.fl.us
Dionne Richardson	FDOT / ISDO	305-470-5292	dionne.richardson@dot.state.fl.us
Sarah Ingle	Miami DDA	3)579 6675	ingle@miamidda.com
Thomas Rodriguez	City of Miami	3) 416 1020	trodriguez@miamigov.com
Suresh Allu	CTS Engs, Inc.	305-599-8698	SALLU@CTSEINC.COM
Rolando Jimenez	PWWM	305 375 5681	rjimen@miamidade.gov
Wilson Fernandez	MD MPO	305 375 1886	wilson@miamidade.gov
Jill Capelli	KHA	954-535-5107	jill.capelli@kimley-horn.com

The meeting adjourned at: 12:00P

1221 Brickell Avenue - Suite 400 ▪ Miami, Florida 33131
voice: 305.673.2025
lexy.kaptaine@kimley-horn.com

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SAC Meeting #2

Agenda

- Survey Summary
- Alternatives Brainstorming
- Draft Evaluation Matrix
- Next Steps/Actions Items

Final Survey

- OD Patterns
- Trip Purpose
- Access/Egress Mode
- Frequency of Use
- Extension Options
- Zip Code
- Gender

Survey Locations

Metromover System Expansion Study
Work Order #GPC V-16

Survey Summary

- Are you willing to take the survey?
  - Approached 1,193 Riders
    - Yes 75% (898)
    - No 25% (295)
- February 2013 Boarding Activity
  - Surveyed Stations = 22,859 boardings
    - 5.5% intercepted
    - 3.9% surveyed
  - All Stations = 32,741 boardings
    - 3.6% intercepted
    - 2.7% survey

Great Response Rate!

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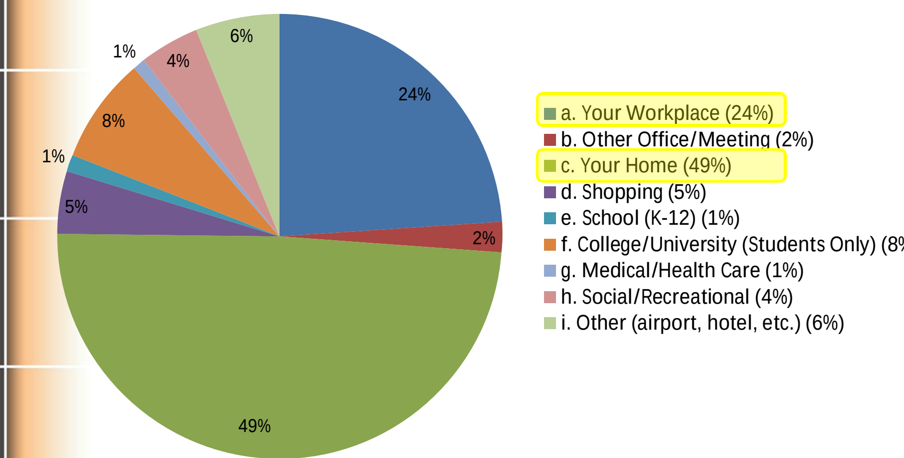
Metromover System Expansion Study
Work Order #GPC V-16

Survey Summary

- Where did you BEGIN this one-way trip?



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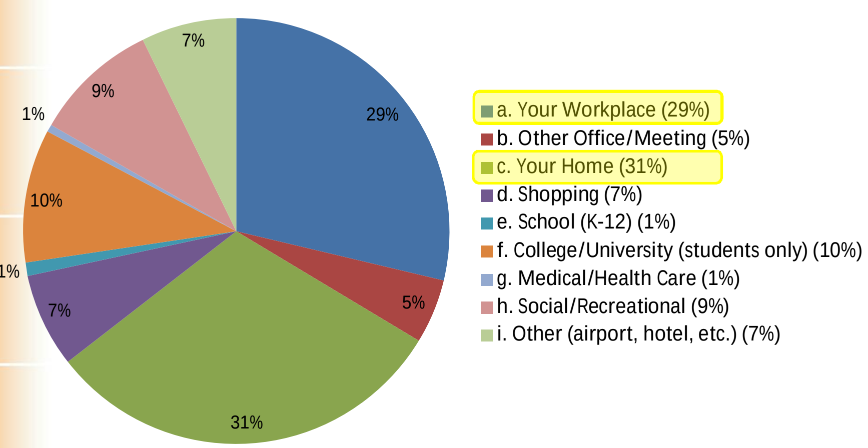
Metromover System Expansion Study
Work Order #GPC V-16

Survey Summary

- Where did you END this one-way trip?



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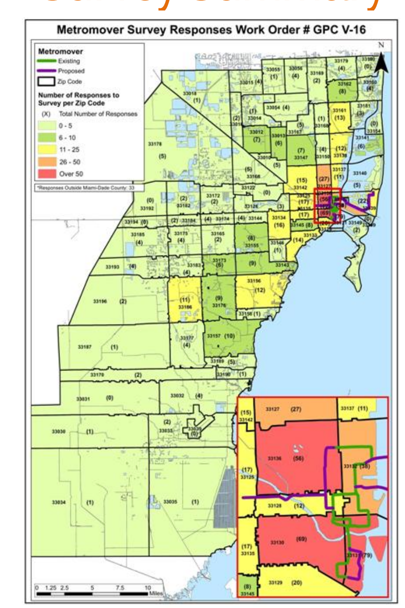
Metromover System Expansion Study
Work Order #GPC V-16

Survey Summary



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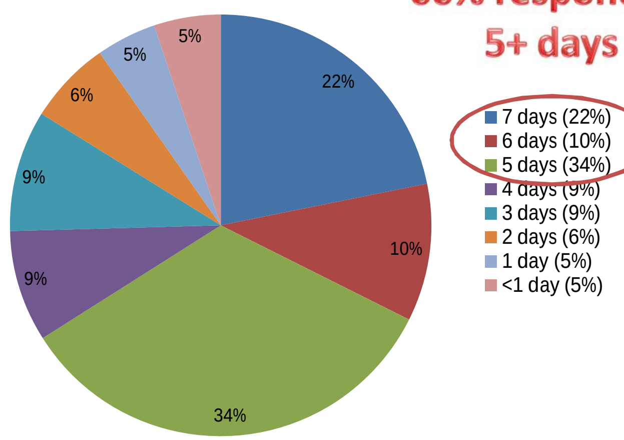
Metromover System Expansion Study

Survey Summary

- How many days per week do you typically use Metromover?

66% responded 5+ days



Metromover System Expansion Study

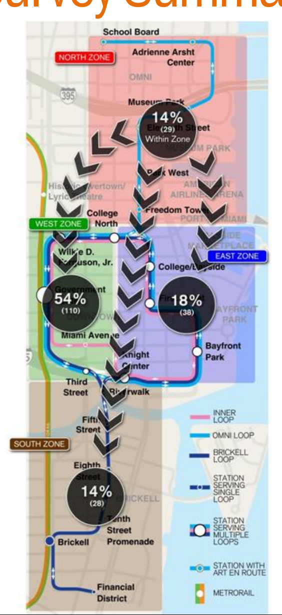
Survey Summary

- Modes To/From Metromover

Mode	Access Percent	Egress Percent
Walk Only	368 (41%)	411 (46%)
Metrorail	226 (25%)	209 (23%)
Bus	187 (21%)	175 (19%)
Car/Taxi	65 (7%)	60 (7%)
Bicycle	10 (1%)	10 (1%)
Other	42 (5%)	33 (4%)

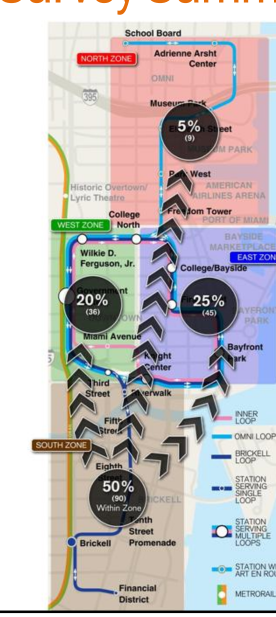
Metromover System Expansion Study

Survey Summary

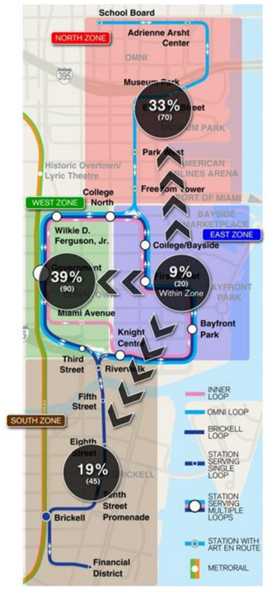


Metromover System Expansion Study

Survey Summary

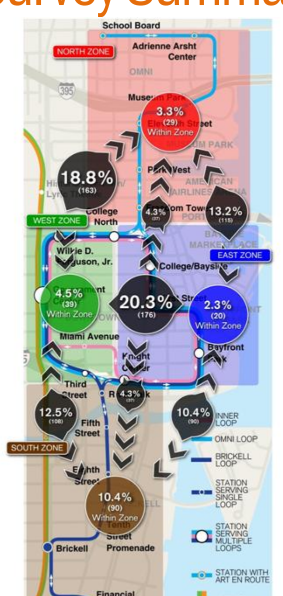


Survey Summary



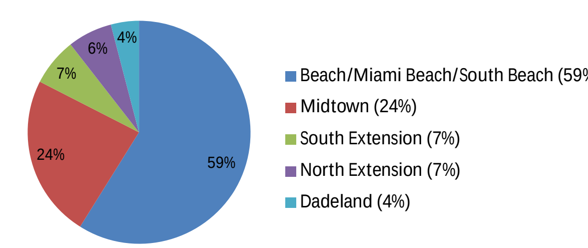
Survey Summary

Survey Summary



Survey Summary

- Would you like to see the Metromover add another stop?
  - Yes 36% (315) / No 64% (564)
- Top responses for Metromover Expansion:



Metromover System Expansion Study
Work Order #GPC V-16

Alternatives Development

Metromover System Expansion Study
Work Order #GPC V-16

Alternatives Development

- Workshop/Charette
  - Small groups
  - Concepts by zone
  - Summarize concepts on 11x17 sheets
  - Supporting GIS data
  - Favorites

Metromover System Expansion Study
Work Order #GPC V-16

Screening Matrix

Screening Matrix - Alternatives

Metromover System Expansion Study

Alternative	Description	Residential Density	Transit Ridership	Proposed Length	Cost Effectiveness	Infrastructure Constraints	Geometric Constraints	Constructability	Walkability
1									
2									
3									
4									
5									

Metromover System Expansion Study
Work Order #GPC V-16

Next Steps / Action Items

- Alternatives Assessment: April/May
- Refined Metromover Alternative: May
- Implementation Strategies: June
- Report: July
- Executive Summary: July

Sign-In Sheet

Name	Phone Number	Email
Jill Capelli	954-535-5107	jill.capelli@kimley-horn.com
IAN RAIRDEN	954-535-5139	IAN.RAIRDEN@KIMLEY-HORN.com
Eric Riel	305 579 6675	riel@miamidda.com
THOMAS RODRIGUES	305 416 1020	Trodrigues@MiamiGov.com
Rolando Jiménez Jr	305 375 5681	rjimene@miamidade.gov
Douglas Robinson	786.469.5248	dkr@miamidade.gov
Sarah Ingle	305 322 2614	ingle@miamidda.com
JAVIER BETANCOURT	3/579-6675	Betancourt@Miamidda.com
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Wilson Fernández	305 375 1886	wilson@miamidade.gov
Aiah Yassin	305-470-5227	aiah.yassin@dot.state.fl.us
Nate Walnum	602-906-1111	nate.walnum@kimley-horn.com
Dionne Richardson	305-470-5292	dionne.richardson@dot.state.fl.us

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SAC Meeting #3


SAC Meeting #3
Metromover System Expansion Study
Work Order #GPC V-16
MIAMI-DADE MPO
Metropolitan Planning Organization
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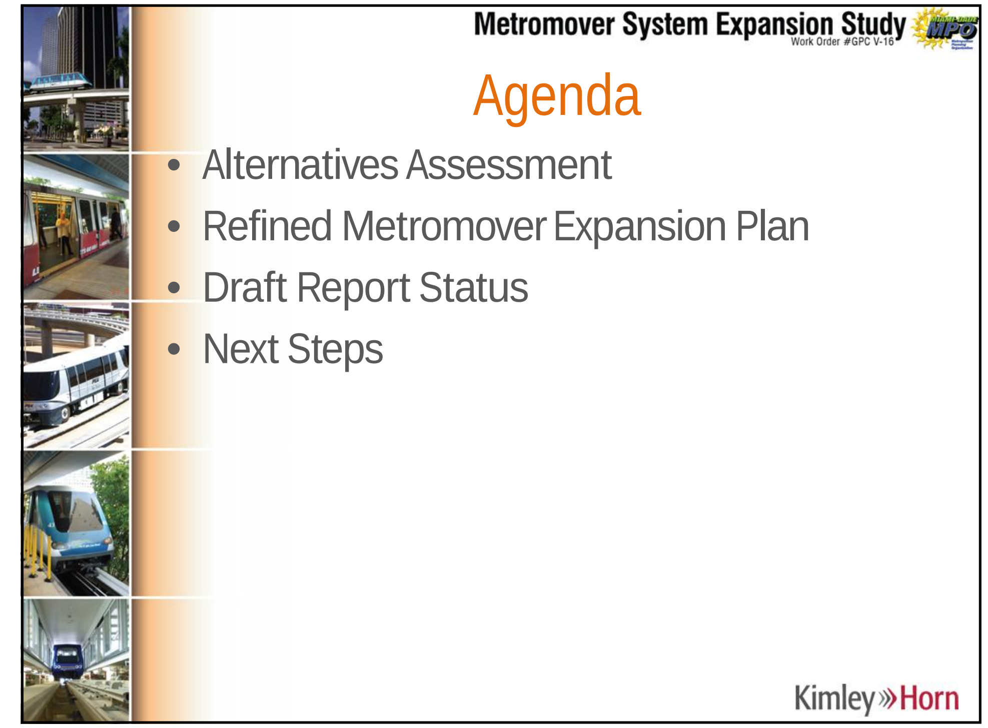
Metromover System Expansion Study
Work Order #GPC V-16
Agenda
• Alternatives Assessment
• Refined Metromover Expansion Plan
• Draft Report Status
• Next Steps
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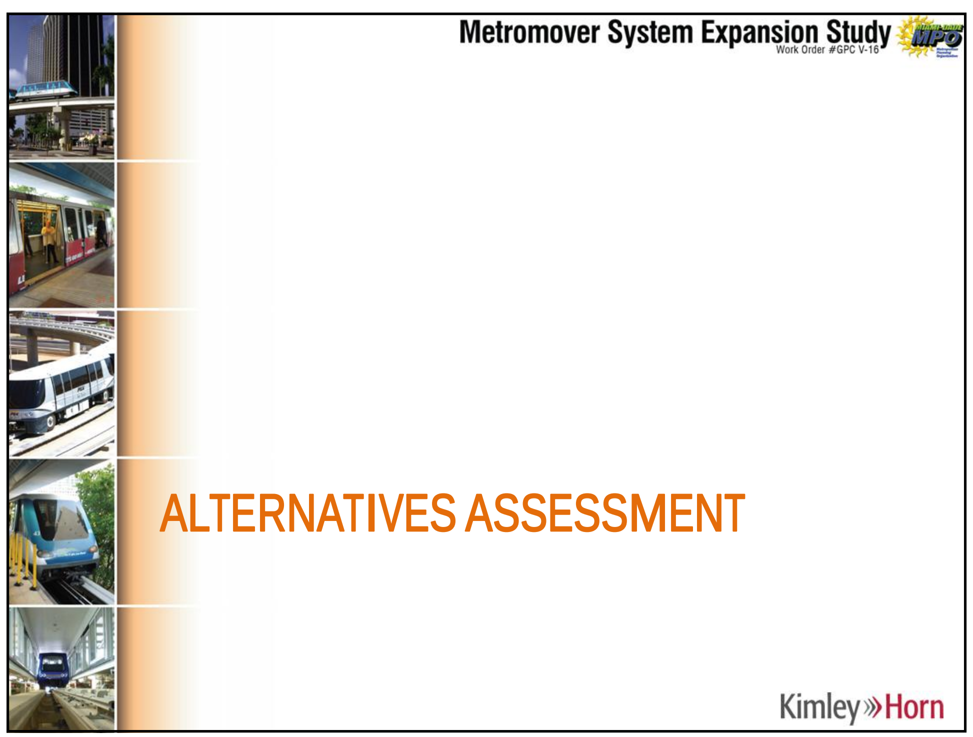
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ALTERNATIVES ASSESSMENT
Kimley»Horn


Metromover System Expansion Study
Work Order #GPC V-16
Workshop
Next Steps / Action Items
Kimley»Horn

Metromover System Expansion Study

Workshop Alternatives

Metromover System Expansion Study

Activities Since Workshop

- Field Review
- Concept Development
  - North
  - South
  - East
  - West
- Metromover Expansion Master Plan
- Screening
- Refinement

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Metromover System Expansion Study

Field Review

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Metromover System Expansion Study

Feasibility Assessment

- Qualitative Assessment
  - Infrastructure Constraints
  - Geometric Constraints
  - Constructability
  - Pedestrian Friendly Environment
- Quantitative Assessment
  - Residential Population
  - Average Corridor Density
  - Bus Ridership
  - Proposed Development
  - Relative Capital Costs

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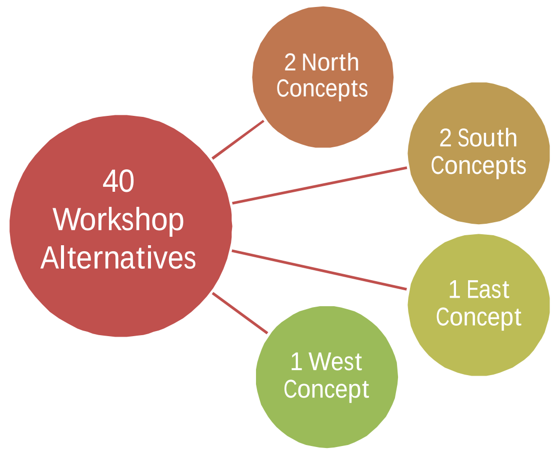
Summary of Concept Alternatives



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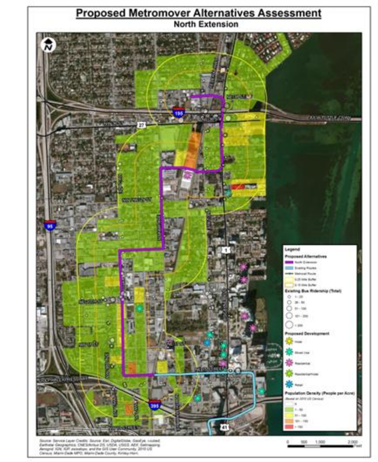
Concept Alternative, North Extension

- Qualitative Assessment
  - Connects Wynwood, Overtown, Design District, etc.
  - Rail crossings at several locations
  - Overhead utilities
  - Narrow street widths
  - Pedestrian environment varies
  - Line-Haul route
- Quantitative Assessment
  - Residential Population: 8,782 people
  - Average Corridor Density: 14.2 people/acre
  - Bus Ridership: 5,877 boardings/alightings
  - Proposed Development: 12 developments
  - Relative Capital Costs: Highest



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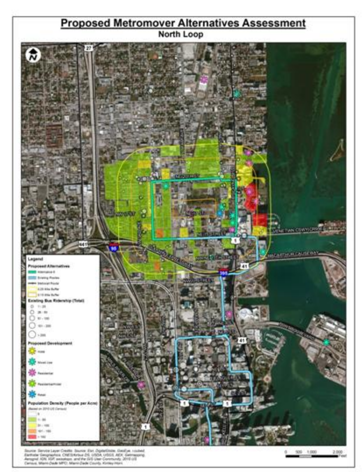
Concept Alternative, North Loop

- Qualitative Assessment
  - Provides access to Biscayne Boulevard and other revitalized industrial areas
  - Potential challenges connecting to existing line
  - Rail crossings
  - Pedestrian environment varies
- Quantitative Assessment
  - Residential Population: 8,096 people
  - Average Corridor Density: 20.36 people/acre
  - Bus Ridership: 7,768 boardings/alightings
  - Proposed Development: 12 developments
  - Relative Capital Costs: Medium



North Loop preferred over North Extension

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Concept Alternative, South Extension

- Qualitative Assessment
  - Least number of infrastructure constraints
  - Connects to the Brickell area with a pedestrian friendly environment
- Quantitative Assessment
  - Residential Population: 13,332 people
  - Average Corridor Density: 39.14 people/acre
  - Bus Ridership: 363 boardings/alightings
  - Proposed Development: 11 developments
  - Relative Capital Costs: Low

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Concept Alternative, South Loop

- Qualitative Assessment
  - Fewer infrastructure constraints
  - High-rise buildings
  - Very pedestrian friendly environment
- Quantitative Assessment
  - Residential Population: 11,572 people
  - Average Corridor Density: 41.54 people/acre
  - Bus Ridership: 2,609 boardings/alightings
  - Proposed Development: 16 developments
  - Relative Capital Costs: Lowest

South Loop preferred over South Extension

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Concept Alternative, East Extension

- Qualitative Assessment
  - Supports Port Miami Development Plans
  - Linear Route
  - Metrorail connection
  - Crosses Government Cut
  - Varied pedestrian environment
- Quantitative Assessment
  - Residential Population: 2,833 people
  - Average Corridor Density: 10.60 people/acre
  - Bus Ridership: 3,147 boardings/alightings
  - Proposed Development: 8 developments
  - Relative Capital Costs: High

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Concept Alternative, West Extension

- Qualitative Assessment
  - Serves high transit population area
  - Miami River & I-95 crossing
  - ROW impacts anticipated
- Quantitative Assessment
  - Residential Population: 10,863 people
  - Average Corridor Density: 27.37 people/acre
  - Bus Ridership: 24,620 boardings/alightings
  - Proposed Development: 6 developments
  - Relative Capital Costs: Medium

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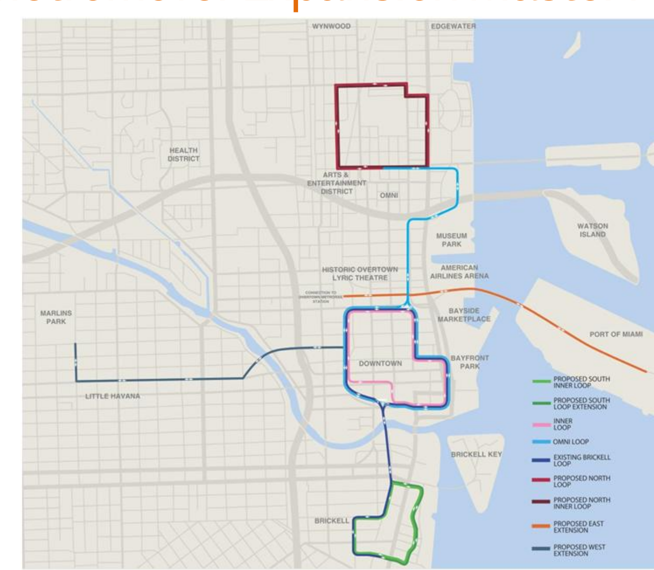
Metromover Expansion Master Plan



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REFINED EXPANSION PLAN

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Screening

Quantitative Metrics

Qualitative Metrics

Concept Description	Proposed Length (miles)	Relative Capital Costs	Population / Mile	Average Corridor Density	Bus Ridership/ Mile	Proposed Develop-ment	Infrastructure Constraints	Geometric Constraints	Construct-ability	Pedestrian Friendly Environment	Total Weighted Points	Ranking
South Loop	0.77	5	5	5	1	5	4	4	4	5	3.3	1
North Loop	1.63	3	2	2	2	4	3	2	3	2	2.0	2
West Extension	1.69	2	2	3	5	2	1	3	1	2	1.6	3
East Extension	1.73	1	1	1	1	3	2	5	1	3	1.3	4
Metric Classification		Constraint	Benefit	Benefit	Benefit	Benefit	Constraint	Constraint	Constraint	Benefit		
Weight		25%	5%	5%	5%	5%	7.5%	7.5%	10%	5%		

South Loop identified as Preferred Short Term Project

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System Impacts

- MDT meeting, May 13, 2014
- New Maintenance Facility
- Train Control System upgrades
- Integration costs
- Reliance on existing technology

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Refined Metromover Concept

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Simulation Analysis

http://www.youtube.com/watch?v=XNkXIYngD8I

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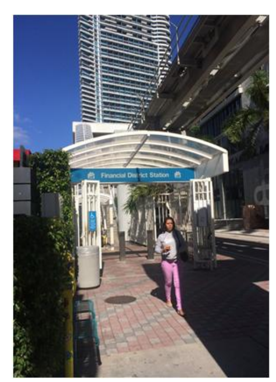
Costs

- Capital Costs $260M
  - Demolition $9.5M
  - Guideway $96.5M
  - Stations $22.5M
  - Vehicles $12.5M
  - Other Costs $66.0M
  - Contingency/Soft Costs $51.8M
- O&M Costs $6M / year



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Funding

- FTA New Starts 50%
- Local 25%
  - Miami-Dade County
  - City of Miami
  - Special Assessment
- FDOT 25%

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Metromover System Expansion Study
Work Order #GPC V-16

Implementation Plan

- Conceptual Planning ✔
- Secure Project Funding
- Project Development / NEPA
- Engineering
- Right-of-Way
- Construction/Capital-Rolling Stock
- Secure O&M Funding

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Metromover System Expansion Study
Work Order #GPC V-16

Implementation Summary

Implementation Task	Budget	Schedule
Project Development/NEPA	$8M	2 years
Engineering and Design	$45M	2 years
Right of Way Acquisition (if required)	Market Price	2-3 years
Construction/Vehicle Purchase/ Contingency	$215M	2-3 years
Total Project (to Operation)	$270M	8 years
Operations and Maintenance	$6M/year	Annual

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Work Order #GPC V-16

NEXT STEPS

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Work Order #GPC V-16

Draft TPC Presentation

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Metromover System Expansion Study
Work Order #GPC V-16

Next Steps / Project Advancement

- Report status
- Funding ideas
- Implementation ideas

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Sign-In Sheet

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Appendix B: TPC Presentation

Metromover System Expansion Study
Work Order #GPC V-16

Introduction

- Study Purpose
- Study Tasks
  - Data Collection
  - Feasibility Assessment
  - Concept Alternatives/Master Plan
  - Refined Metromover Concept
  - Implementation Strategies
- Summary and Next Steps

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Metromover System Expansion Study
Work Order #GPC V-16

DATA COLLECTION

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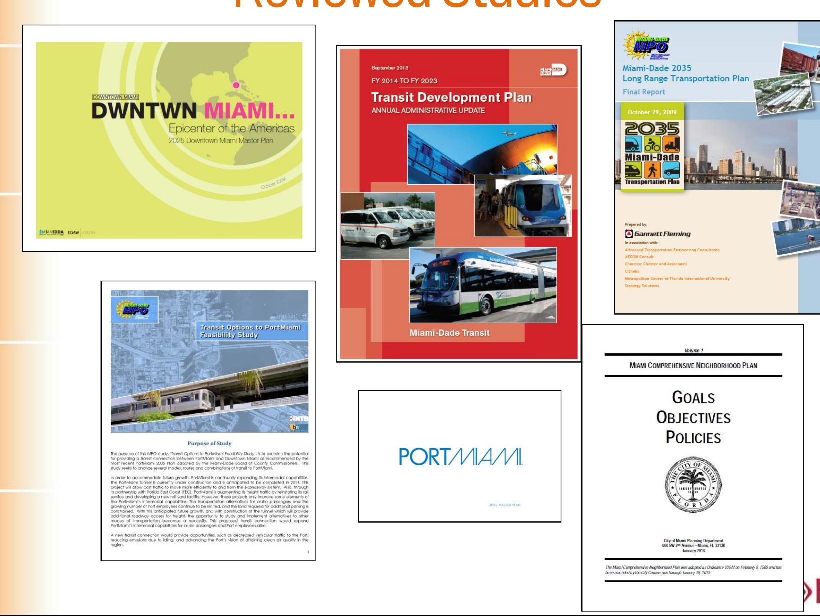
Metromover System Expansion Study
Work Order #GPC V-16

Reviewed Studies



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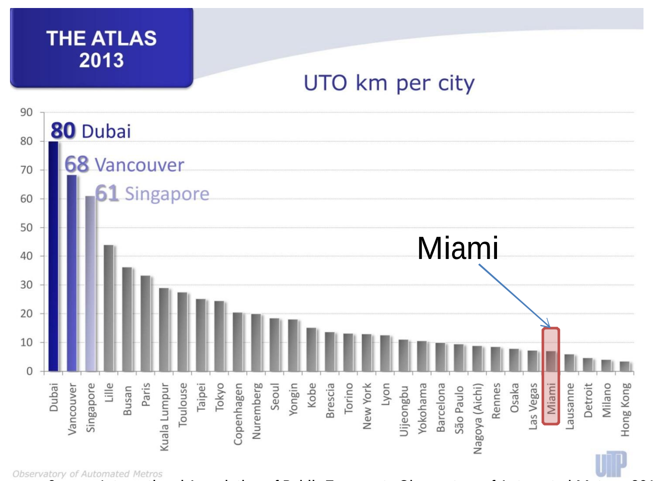
Similar Systems Worldwide



Source: International Association of Public Transport. Observatory of Automated Metros, 2013 Data and Activities

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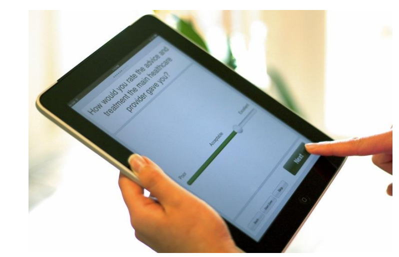
Survey

- Origin/Destination Patterns
- Trip Purpose
- Access/Egress Mode
- Frequency of Use
- Extension Options
- Zip Code
- Gender



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Survey Locations

Great Response Rate!

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Survey Summary

- **Trip Purpose** – Primary responses
  - Home: Start (49%)/End (31%)
  - Work: Start (24%)/End (29%)
- **Zip Code** – Users distributed throughout the County with the highest concentration (35%) of downtown residents
- **Frequency** – High frequency users, 5+ days/week (66%)
- **Modes** – Primarily walk to stations (41-46%), but also high percentage of connections to rail (23-25%) and bus (19-21%)

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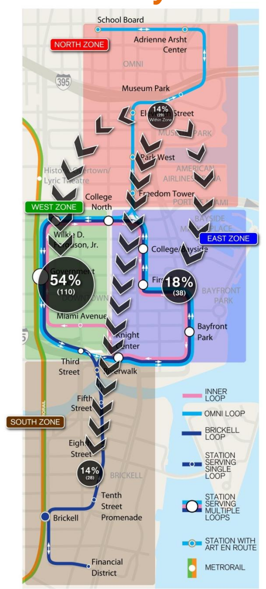
Survey Summary – North Zone



- Highest movement north to west (54%)
- Relatively balanced between remaining zones

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Metromover System Expansion Study
Work Order #GPC V-16

Survey Summary – South Zone

- Largest percentage remains "in zone" (50%)
- Smallest movement south to north (5%)
- Relatively balanced between east and west

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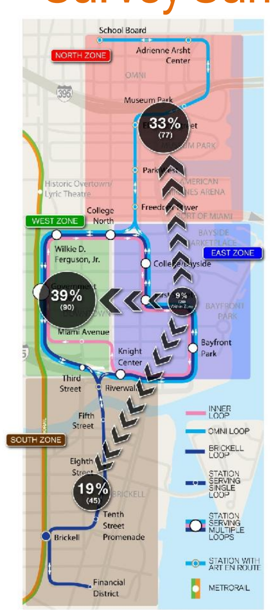
Work Order #GPC V-16

Survey Summary – East Zone



- Largest movement east to west (39%)
- East to north also high (33%)
- Small percentage remains "in zone" (9%)

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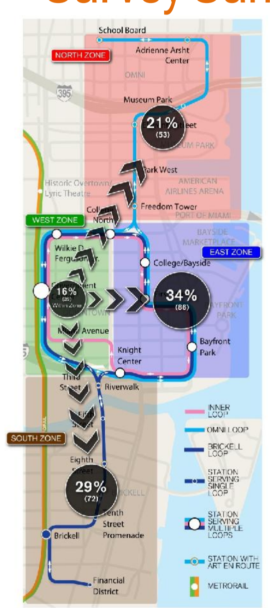
Survey Summary – West Zone



- Largest movement west to east (34%)
- West to south is also high (29%)

Urban Circulator

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CONCEPT ALTERNATIVES

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Workshop

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Workshop Alternatives

Field Review

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Metromover System Expansion Study

Feasibility Assessment

- Qualitative Assessment
  - Infrastructure Constraints
  - Geometric Constraints
  - Constructability
- Quantitative Assessment
  - Residential Population
  - Average Corridor Density
  - Bus Ridership
  - Pedestrian Friendly Environment
  - Proposed Development
  - Relative Capital Costs

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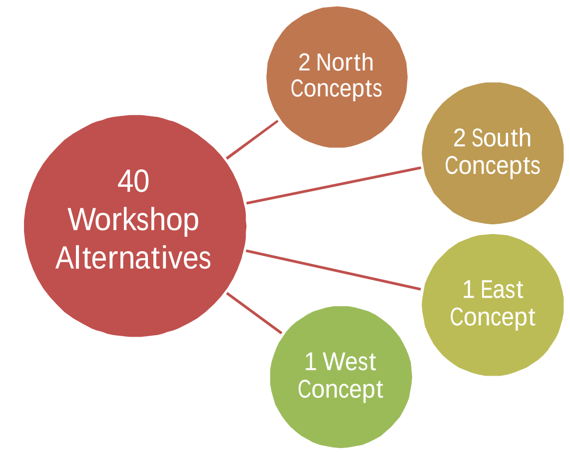
Summary of Concept Alternatives



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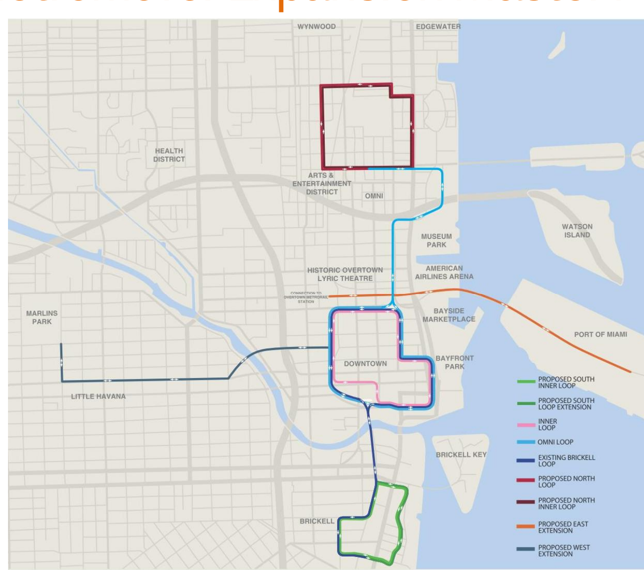
Metromover System Expansion Study

Metromover Expansion Master Plan



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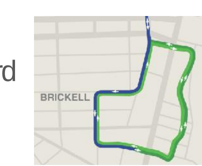
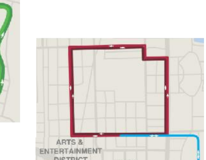
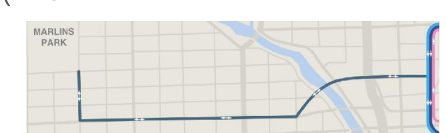
Metromover System Expansion Study

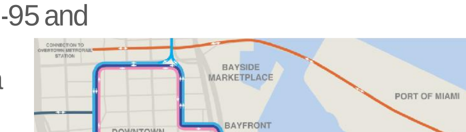
Master Plan Alternatives

- North Biscayne Loop
  - Provides access to Biscayne Boulevard and other revitalized areas
  - 12 proposed developments
- South Brickell Loop
  - Highest average corridor density (41.54 people/acre)
  - 16 proposed developments
  - Lowest capital cost estimates
- West Extension to Marlins Park
  - Infrastructure challenges with I-95 and Miami River
  - Highest transit population area
- East Extension to Port Miami
  - Supports PortMiami development plans
  - Infrastructure challenges with Intracoastal Waterway









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REFINED METROMOVER CONCEPT

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Screening

- South Brickell Loop Ranked #1
- North Biscayne Loop Ranked #2
- West Extension to Port Miami Ranked #3
- East Extension to Marlins Park Ranked #4

South Loop identified as Preferred Short Term Project

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Refined Metromover Concept

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Simulation Analysis

http://www.youtube.com/watch?v=XNkXIYngD8I

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Metromover System Expansion Study

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Metromover System Expansion Study

Costs

Item	Estimated Cost
Guideway Construction	$96.5M
Station Construction	$22.5M
Demolition	$9.5M
Vehicles	$12.5M
Other System Costs	$66.0M
Sub-Total	$207.0M
25% Contingency and Soft Costs	$51.8
Total Capital Costs	$260M
Additional O&M Costs	$6M/year

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Metromover System Expansion Study

SHORT-TERM IMPLEMENTATION STRATEGIES AND NEXT STEPS

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Metromover System Expansion Study

Implementation Plan

- Conceptual Planning ✔
- Secure Project Funding
- Project Development / NEPA
- Engineering
- Right-of-Way
- Construction/Capital-Rolling Stock
- Secure O&M Funding
- Public Participation

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Funding

- FTA New Starts 50% ($135M)
- Local 25%
  - Miami-Dade County ($21.3M)
  - City of Miami ($20.6M)
  - Special Assessment ($20.6M)
- FDOT 25% ($67.5M)

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Implementation Summary

Implementation Task	Budget	Schedule
Project Development/NEPA	$8M	2 years
Engineering and Design	$45M	2 years
Right of Way Acquisition (if required)	Market Price	2-3 years
Construction/Vehicle Purchase/ Contingency	$215M	2-3 years
Total Project (to Operation)	$270M	8 years
Operations and Maintenance	$6M/year	Annual

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THANK YOU

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Appendix C: Beach Corridor Assessment Memorandum

Kimley»Horn

MEMORANDUM

To: Wilson Fernandez, Miami-Dade Metropolitan Planning Organization

From: Jill Capelli

Kimley-Horn and Associates, Inc.

Date: August 31, 2014

Subject: Metromover Analysis of Beach Corridor Connection

Kimley-Horn and Associates, Inc. (KH) was retained by the Miami-Dade Metropolitan Planning Organizatino (MPO) to perform a review of the finding and results of the Miami Beach Corridor studies including.

- Bay Link Phase 2, Miami-Miami Beach Transportation Corridor Study, 2004
- Beach Corridor Transit Connection Study, 2013

Using these findings, KH was tasked with completing a high-level analysis of using Metromover in lieu of the currently proposed streetcar technology for the Beach Corridor. The following sections summarize the analysis and recommendations.

Route Summary

The Bay Link Phase 2 study identified a Locally Preferred Alternative (LPA). During the ongoing Beach Corridor Transit Connection Study, the LPA was refined. The current Direct Connection (DC) Alignment for refined LPA is shown in **Figure 1**.

For purposes of this analysis, the Metromover alignment was assumed to travel from Miami Beach along the DC Connection route, but terminate at the Museum Park station. The resulting route length is approximately 5.4 miles long. This additional length more than doubles the existing 4.4-mile length of the Metromover system. The new alignment includes eight new stations and a modification to the Museum Park station to accommodate the new extension and transfers to the existing Metromover routes. It was also assumed that this system operates independent of the existing Metromover System. There is a joint station at Museum Park, but passengers will be required to transfer from the Beach Corridor Metromover system to the existing Metromover system.

Figure 1: Direct Connection Route, Alignment and Operating Plan (Source: Beach Corridor Transit Connection Study, PEC Meeting Presentation, April 2, 2014)

Level of Service

The Beach Corridor Transit Connection Study identified an operating plan of five-minute headways for peak periods and ten-minute headways for off-peak periods. To achieve the five-minute headway, 12 trains must pass each station during the peak hour traveling in each direction and six trains must pass each station during the off-peak hours.

The overall route length (both directions) is 10.8 miles. The resulting round trip travel time is approximately 25 minutes assuming the following:

- average travel speed of 40 miles per hour (since newer APM technologies can reach higher cruise speeds of 50 mph, which is twice that of the existing Metromover vehicles),
- 30 second dwell at each stop, and
- 16 stops along the route (two end of line stations with one stop, and seven intermediate stations with a stop for trains traveling in each direction).

To accommodate the five-minute peak hour headway with the 25 minute round trip travel time, five trains are needed in the system. These fleet size requirements are estimates based on the available planning level information. Refinements in the design process could potentially reduce the system requirements substantially.

The Bay Link Phase 2 LPA Report (dated September 2004) projected 20,075 daily boardings (Year 2025) for the Beach Corridor. The peak hour was assumed to comprise approximately 20% of the daily boardings, or 4,015 boardings per hour. Each Metromover vehicle has a capacity of approximately 100 passengers. To accommodate the peak hour boardings and meet the 5-minute headway, four-car trains are required. This results in a capacity of 400 people per train, for a total peak hour capacity of 4,800 people. An alternative to the four-car trains is running additional, two-car trains with an increased service level (i.e. shorter headways). With an increased service level, the ridership may further increase resulting in a future need for longer trains. Again, the design process would evaluate these requirements in more detail and may substantially reduce the system requirements and corresponding costs.

The trains will connect to the Metromover Station at Museum Park. To accommodate this connection additional passenger accumulations may be required, especially if the headways are not consistent between the Beach Corridor and the existing Omni Loop. This will result in the need for an expanded Transfer Station at Museum Park. In addition, if four-car trains are implemented the stations will need modification to accommodate the longer train length. A separate station for the new system with a short connecting walkway between stations is envisioned to accommodate both the old and new technologies. The modified Museum Park station could be modified vertically with the new station directly over the existing Museum Park station.

Capital Costs

Based on the proposed route, budgetary capital costs were developed and are summarized in **Table 1**. The construction costs summarized within this table are based on recent construction costs for APM projects with similar technologies for projects within the US and represent conceptual, high-level costs for planning purposes. A description of each of the cost categories follows the table summary. These costs are conservative and consistent with information available at this planning stage. Refinements in the design process could substantially reduce the system requirements and corresponding capital costs.

Table 1: Order of Magnitude Cost Estimate, Preferred Concept

Item	Quantity	Units	Unit Cost	Total Cost
Demolition				
Guideway and Columns Demolition at Museum Station	500	LF	$ 5,000	$ 2,500,000
Demolition at Column Locations	368	EA	$ 50,000	$ 18,400,000
Future Station Location Demolition	8	EA	$ 250,000	$ 2,000,000
Guideway				
Foundations and Columns	368	EA	$ 150,000	$ 55,200,000
Elevated Guideway – Difficult Construction at Water Crossings	5,900	LF	$ 40,000	$ 236,000,000
Elevated Guideway – Average Construction	22,500	LF	$ 15,000	$ 337,500,000
Reconstructed Guideway at Museum Station	1,000	LF	$ 10,000	$ 10,000,000
Guideway Storm Drainage	368	EA	$ 50,000	$ 18,400,000
Stations				
5,000 sf Station with Escalator, Elevator, Utilities, Communications/Security, Site Improvements	8	EA	$ 7,500,000	$ 60,000,000
Modified/Expanded Museum Park Station	1	EA	$ 10,000,000	$ 10,000,000
Vehicles				
New Four-Car Trains (including spares)	7	EA	$ 5,000,000	$ 35,000,000
Other Costs				
Maintenance Facility	1	EA	$ 25,000,000	$ 25,000,000
Propulsion Power Substation	6	EA	$ 4,000,000	$ 24,000,000
Traffic Control	28,400	LF	$ 500	$ 14,200,000
Miscellaneous: Utility Relocations, Landscape, Power/Communication Conduits and Cable, Security, Lightning Protection, Roadway Improvements	28,400	LF	$ 2,500	$ 71,000,000
System Costs (Automatic Train Control, Running Surface, Guide Beams, Communication, Power, Switch Gear, etc.)	57,300	LF	$ 5,000	$ 286,500,000
Sub-Total				$ 1,200,000,000
25% Contingency and Soft Costs				$ 300,000,000
Total				**$ 1.5B**

DEMOLITION COSTS

The demolition costs consist of three, separate components: future station demolition, existing station demolition, and column demolition. Demolition will be required at each of the new stations. In addition, limited demolition will be required to modify the existing Museum Park station. An estimate of 500 linear feet of guideway demolition was included to account for the reconfiguration.

The final demolition cost is associated with the columns to support the elevated guideway throughout the new sections. The number of columns was estimated based on assumed 80 foot spacing between columns for the new guideway. It was assumed that one column support could support the dual guideway, but there will likely be some additional places where additional columns are required. Each column will require demolition of the footprint area to accommodate the new column.

GUIDEWAY COSTS

New double track guideway is required for the 5.4-mile extension to Miami Beach. In addition, the proposed route includes two water crossings that will increase the guideway costs. A small amount guideway was also included to accommodate the modifications at the existing Museum Park Station. The costs also include the individual column construction for guideway support and storm drainage at each column location to accommodate storm water run-off.

STATION COSTS

As shown in **Figure 1**, eight new stations are proposed with the route. Consistent with the existing Metromover stations, the stations were assumed to be open-air stations sized approximately 5,000 square feet each. The station costs include estimates for elevators and escalators, as well as other general station amenities. An estimate for the modified Museum Park station was also included.

VEHICLE COSTS

A total of seven new Metromover trains were anticipated for the proposed Beach Corridor. It is assumed that five, four-car trains will be in operation, with two spares provided. The estimates for vehicle costs are based upon the recently completed MIA Mover cited in a previous MPO Study[1] but were increased to account for four-car trains versus two-car trains.

---

[1] *Transit Options to Port Miami Feasibility Study*, Miami-Dade MPO, June 2013

OTHER COSTS

A series of other, miscellaneous costs were also tabulated. These other costs include a new maintenance facility and propulsion power substations. The new substations are anticipated based on the additional guideway length being added. A line item cost is also included for traffic control along city streets throughout the construction zone, often called Maintenance of Traffic (MOT). This is a conservative estimate that accounts for the dense urban environment that exists along the corridor. Because of the busy environment, extensive MOT may be required to accommodate construction.

A line item for system costs was also added. These system costs are based on a linear foot of new guideway track being added and include automatic train control costs. The 57,300 quantity is based on dual guideways along 28,400 linear feet plus the 1,000 feet of modified guideway at the Museum Park Station. Finally the miscellaneous line item accounts for additional items such as landscaping, utility relocations, security, communications, etc.

ALLOWANCES

A 25% allowance was added for soft costs (design, permitting, construction engineering and inspection, etc.) and contingency.

COMPARATIVE COSTS

The overall alignment for the proposed Beach Corridor Connector is 5.4 miles. As a point of comparison, the length compares well to the Phoenix Sky Harbor International Airport APM system, the PHX Sky Train, with an ultimate length of 5 miles and a full build out construction cost of $1.6B. The first phase of the PHX Sky Train is now in operation.

The $1.5B capital cost estimates well exceed the capital cost estimates of $532M associated with the DC Connection (Source: Beach Corridor Transit Connection Study, PEC Meeting Presentation, April 2, 2014).

O&M Costs

A 2011 Peer Review Study[2] provided annual O&M costs data for 2004 through 2010. Using this data, an average, annual operational cost of $4.77M per mile and an average, annual maintenance cost of $2.57M per mile was determined. This results in an average, annual O&M cost of $7.34M per mile. The additional O&M costs for the 5.4-mile proposed extension are estimated to be approximately $39.5M per year based on this O&M estimate. This exceeds the O&M estimates of $22M associated with the DC Connection (Source: Beach Corridor Transit Connection Study, PEC Meeting Presentation, April 2, 2014).

General Constructability

An elevated guideway improves the constructability with respect to at-grade traffic compared to streetcar type technology. An elevated guideway crosses over the traffic and intersections with the footprint impact limited to the columns as shown in **Figure 2**. Along the proposed corridor, the location for guideway columns is a challenge, but there are some locations with existing medians that can accommodate the center columns. Due to the dense environment there may also be utility impacts and some larger spans associated with the intersection crossings, such as at Washington and 5th.

The alignment is long, but this could lead to some potential cost savings with economy of scale. Most of the guideway alignment could be built using common size support columns and guideway beams that could be pre-fabricated and installed on site (rather than constructed on site) which has the potential to reduce overall costs. Except for the water crossings, the profile should remain relatively flat so column spacing could also be uniform. Pre-fabricated steel columns and guideways may be more cost competitive than concrete, although special care of steel members would be required due to the marine environment of the area.

Public Perception is a potential disadvantage. Such a long extension of the Metromover may not be supported by the local residents. There may be concerns about the blocked views associated with the aerial alignment or the change in the beach environment associated with the corridor.

---

[2] *An Analysis of Miami-Dade Transit's Operating Cost Efficiency; Volume One, Peer Review,* Center for Urban Transportation Research, November 7, 2011

Figure 2: Alignment Rendering (Source: Kimley-Horn)

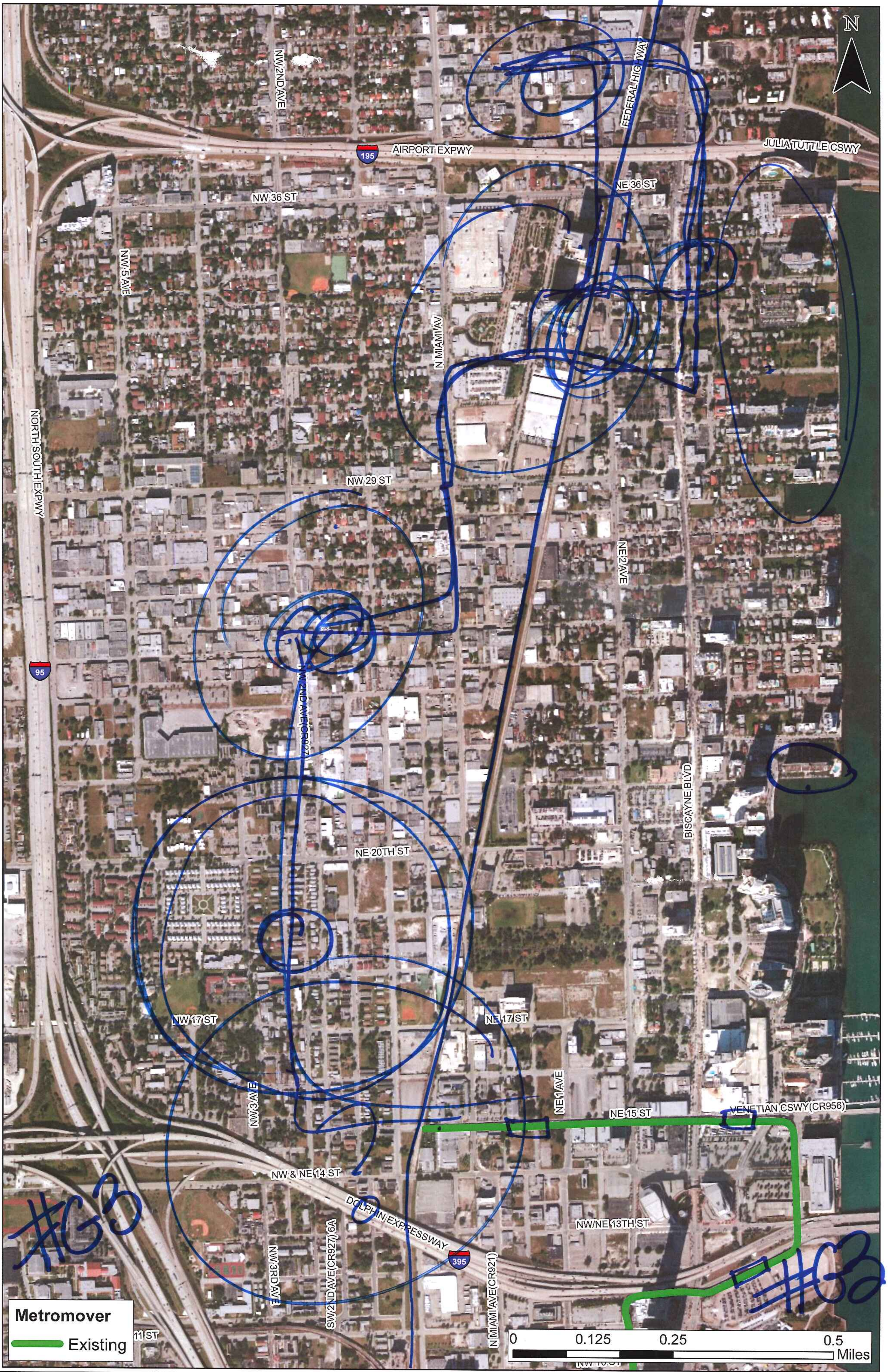
Summary

In summary, although a Metromover extension for the Beach Corridor may have some constructability benefits, the significantly higher capital and O&M costs make the Metromover a less feasible option than the currently proposed streetcar. However, traffic congestion may be a significant factor in efficient streetcar operations and travel times, with grade separated transit providing higher reliability of travel times and higher passenger service levels. If fares are involved, then higher levels of passenger service of a grade separated system may be worth an additional fare to the average person.

Appendix D: Scanned Workshop Concept Alternatives

North Workshop Concept Alternatives

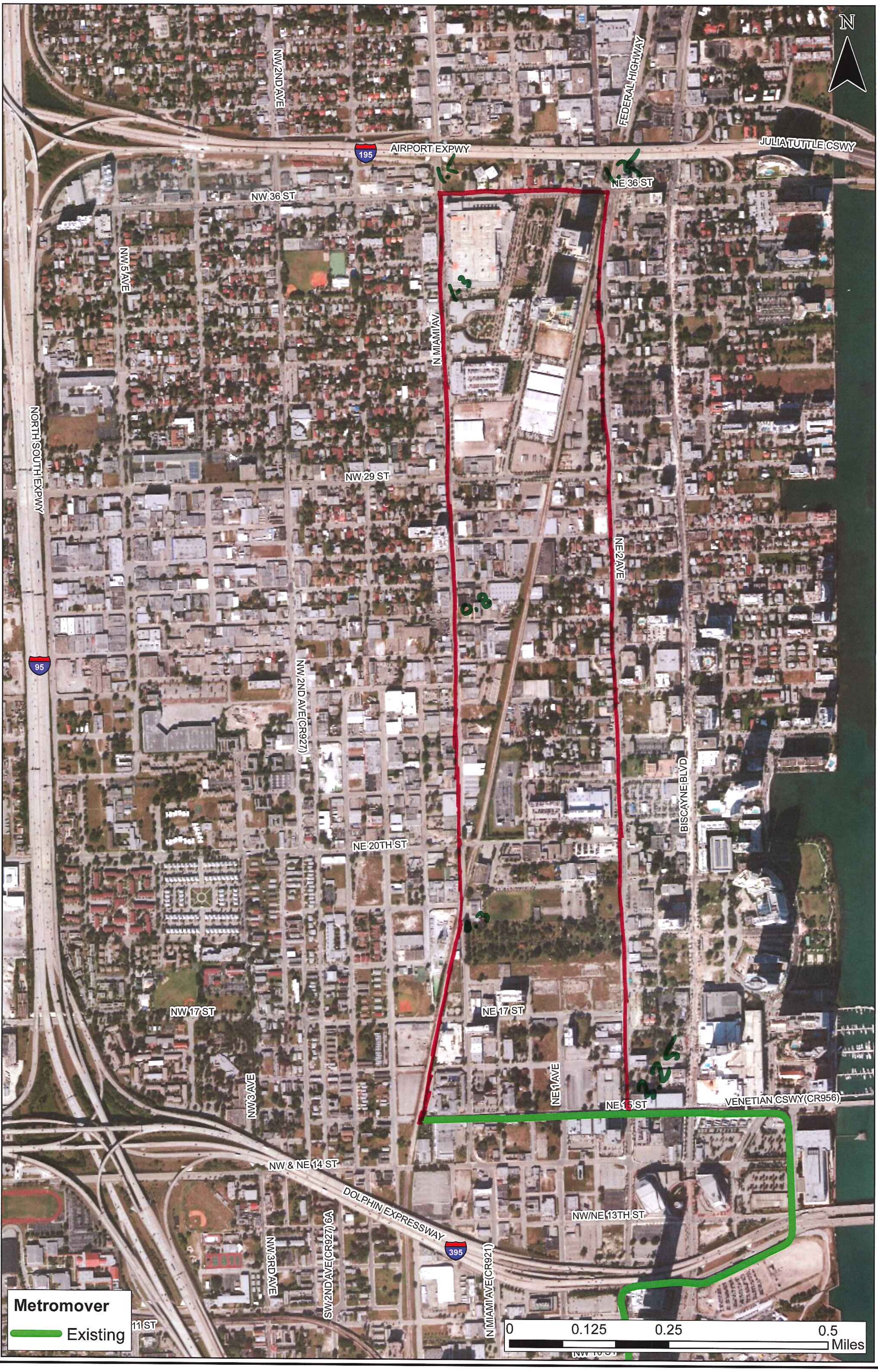
Metromover System Expansion Work Order # GPC V-16



Metromover System Expansion Work Order # GPC V-16

Metromover System Expansion Work Order # GPC V-16 (3)

Metromover System Expansion Work Order # GPC V-16



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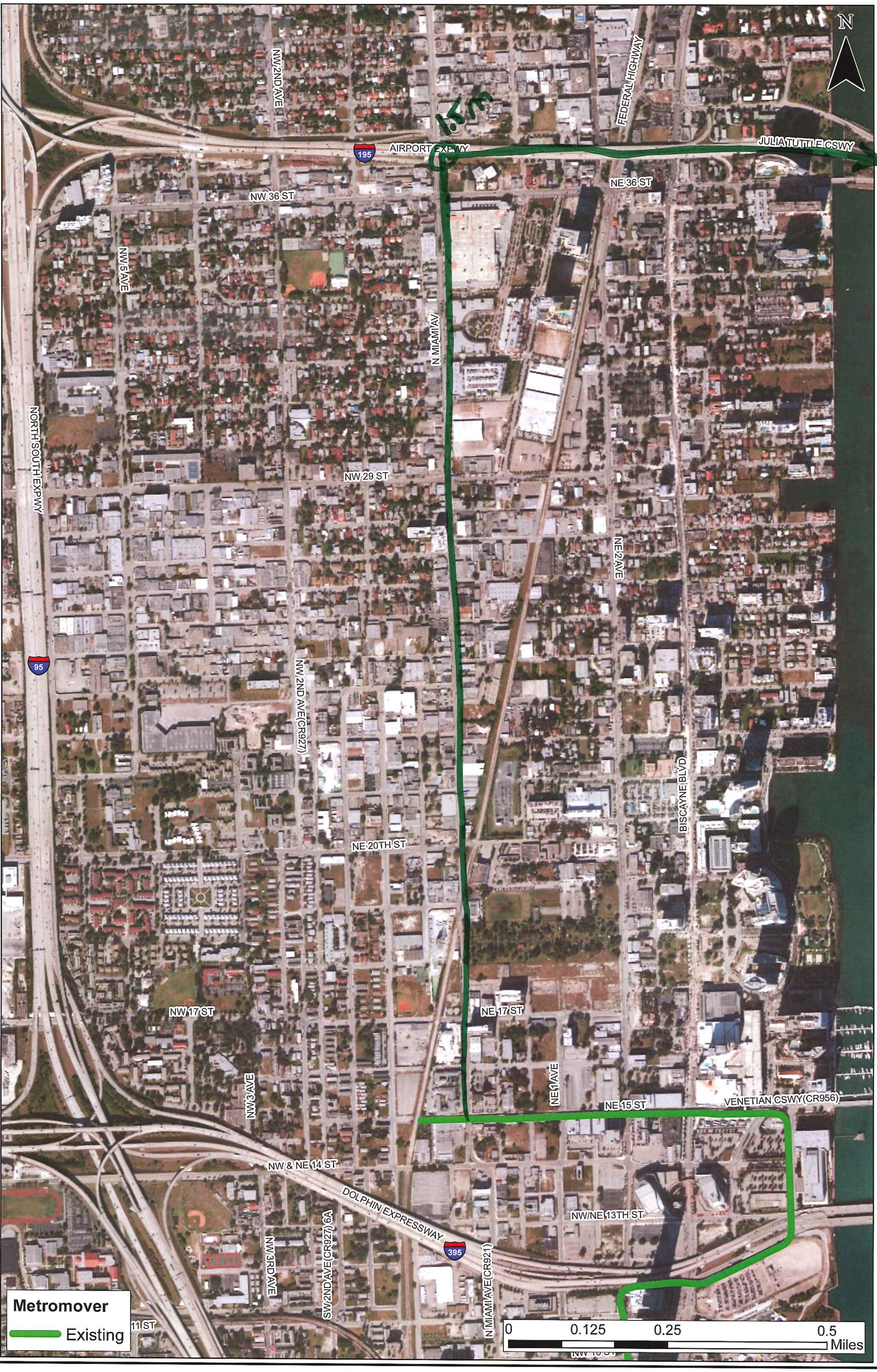

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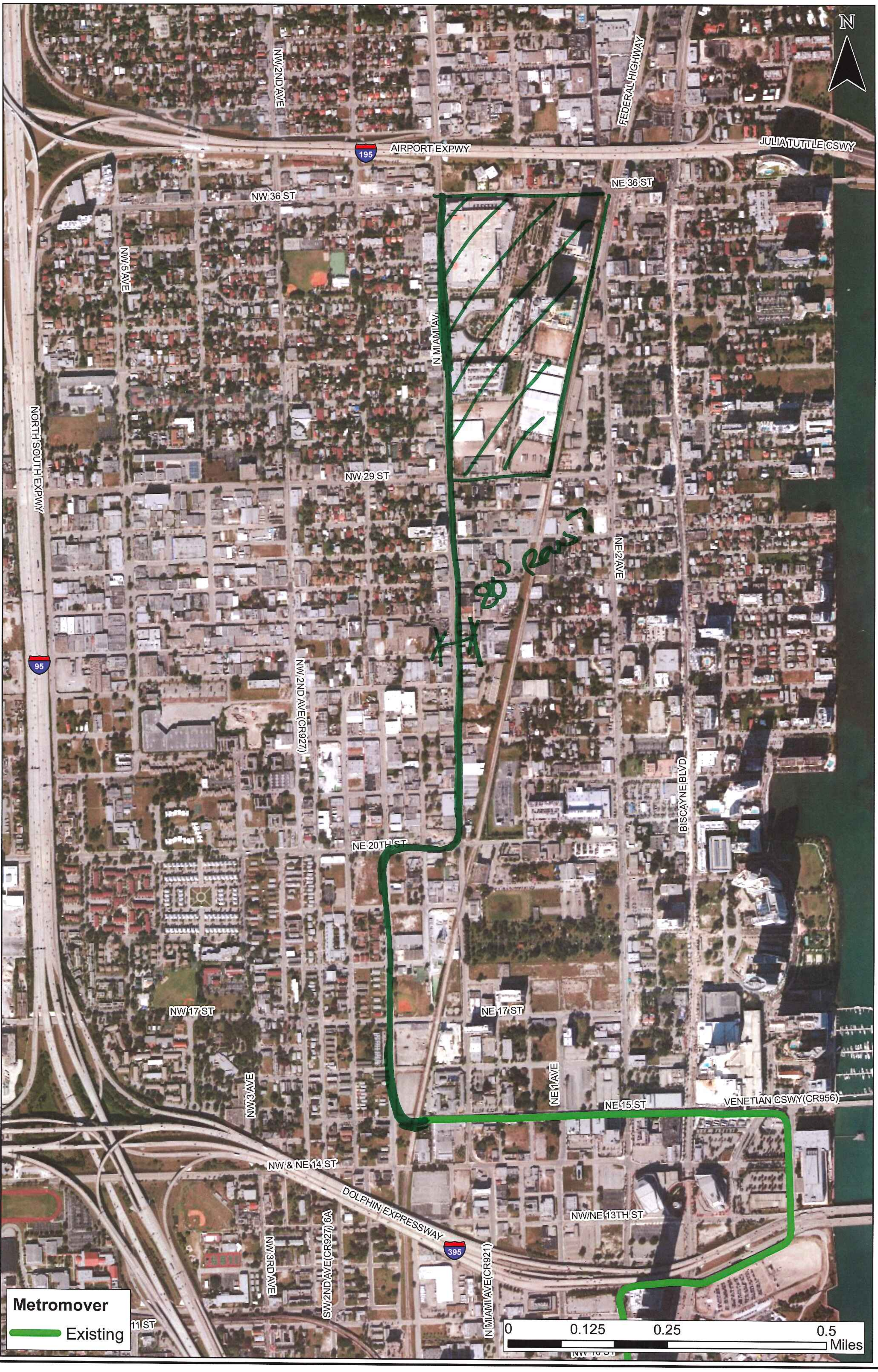

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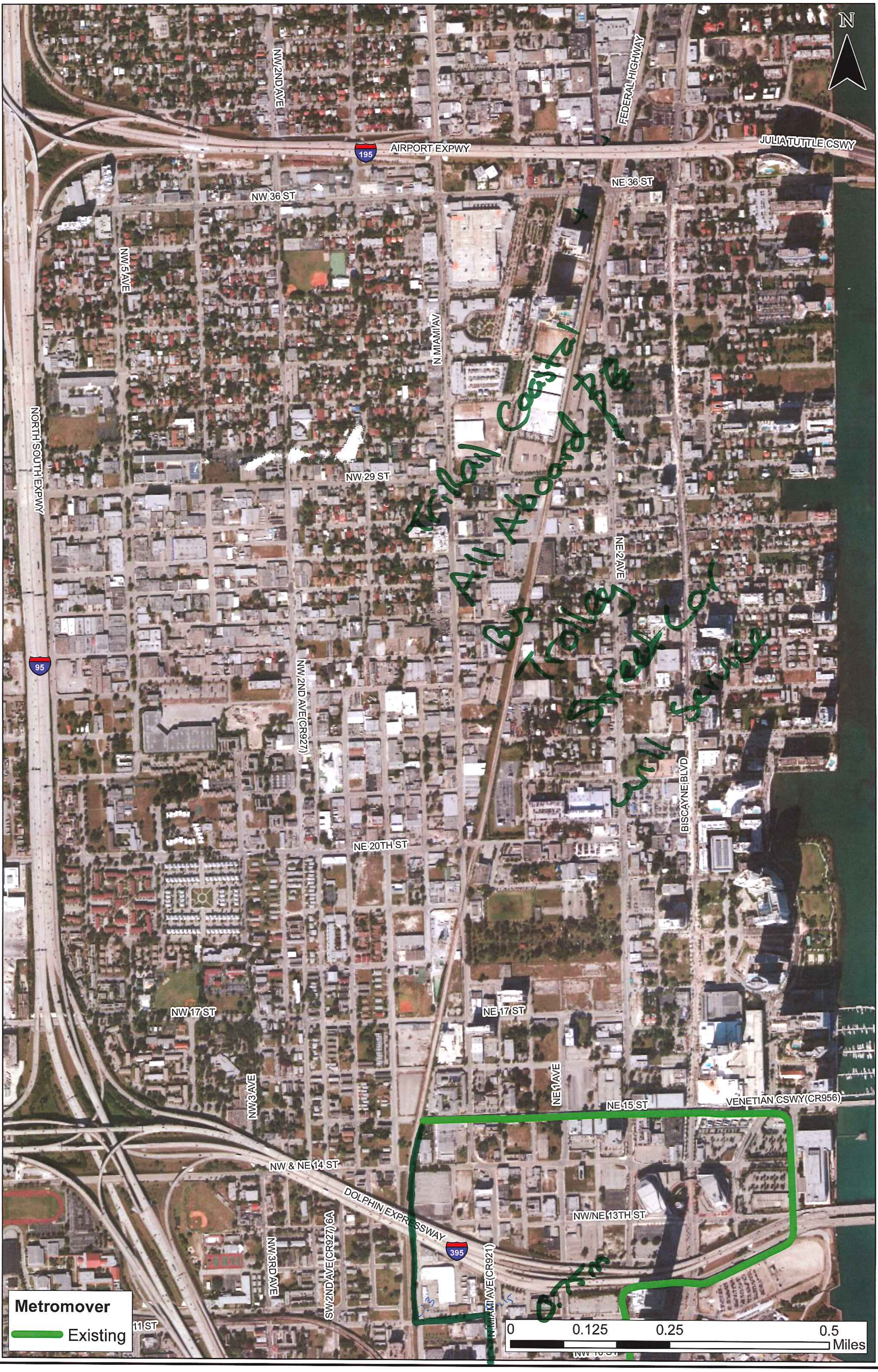

Metromover System Expansion Work Order # GPC V-16

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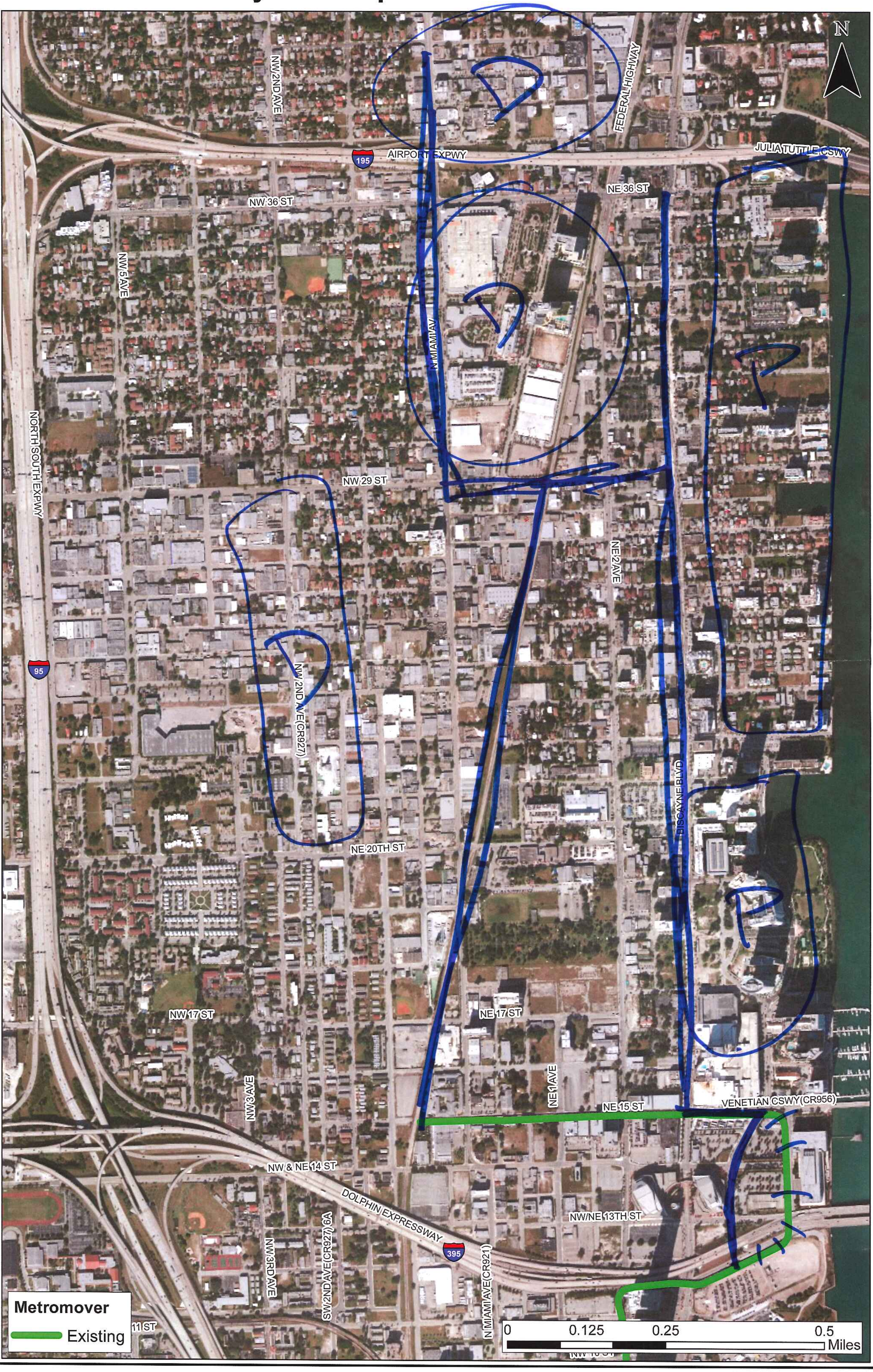
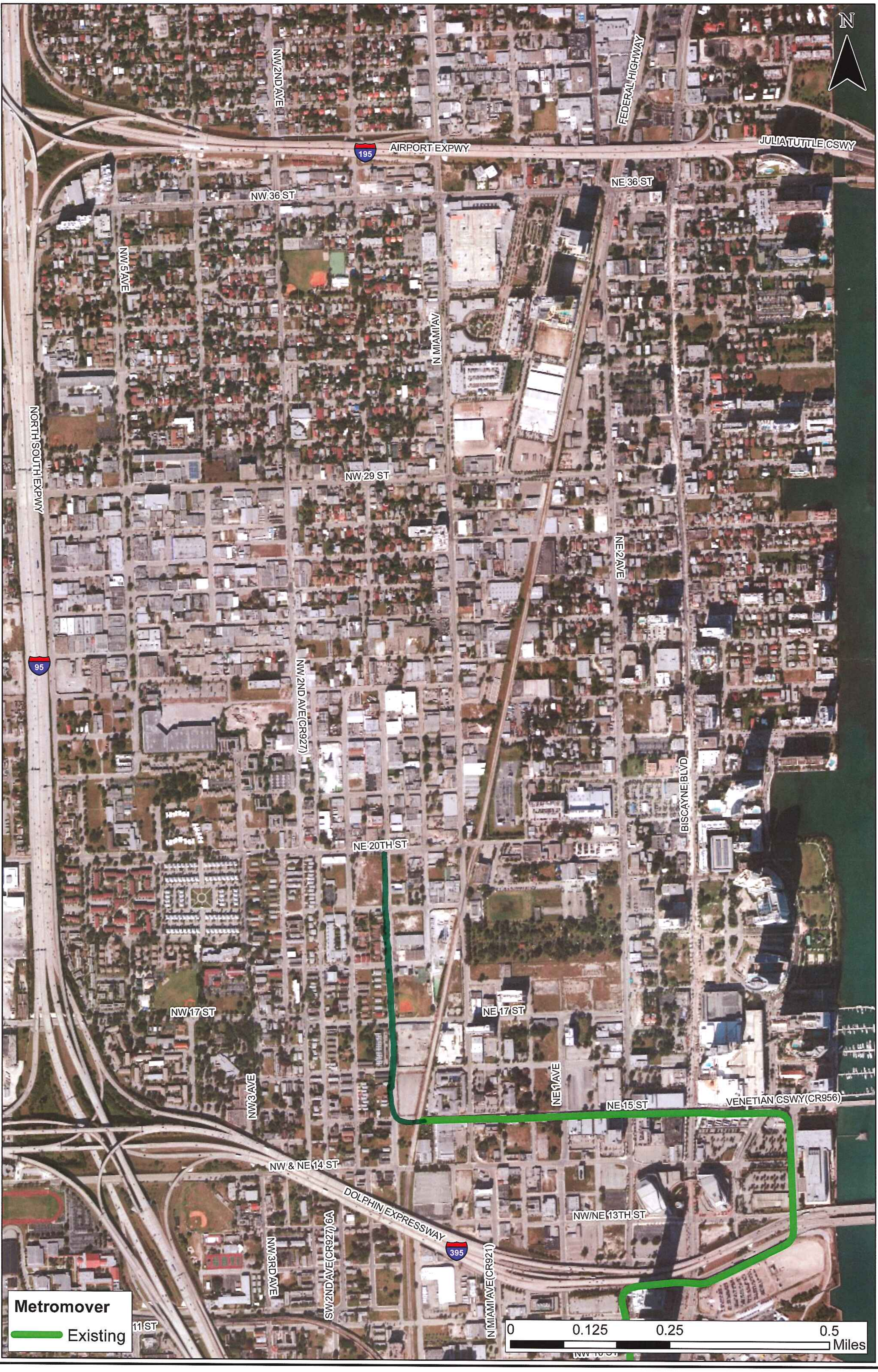


Metromover System Expansion Work Order # GPC V-16



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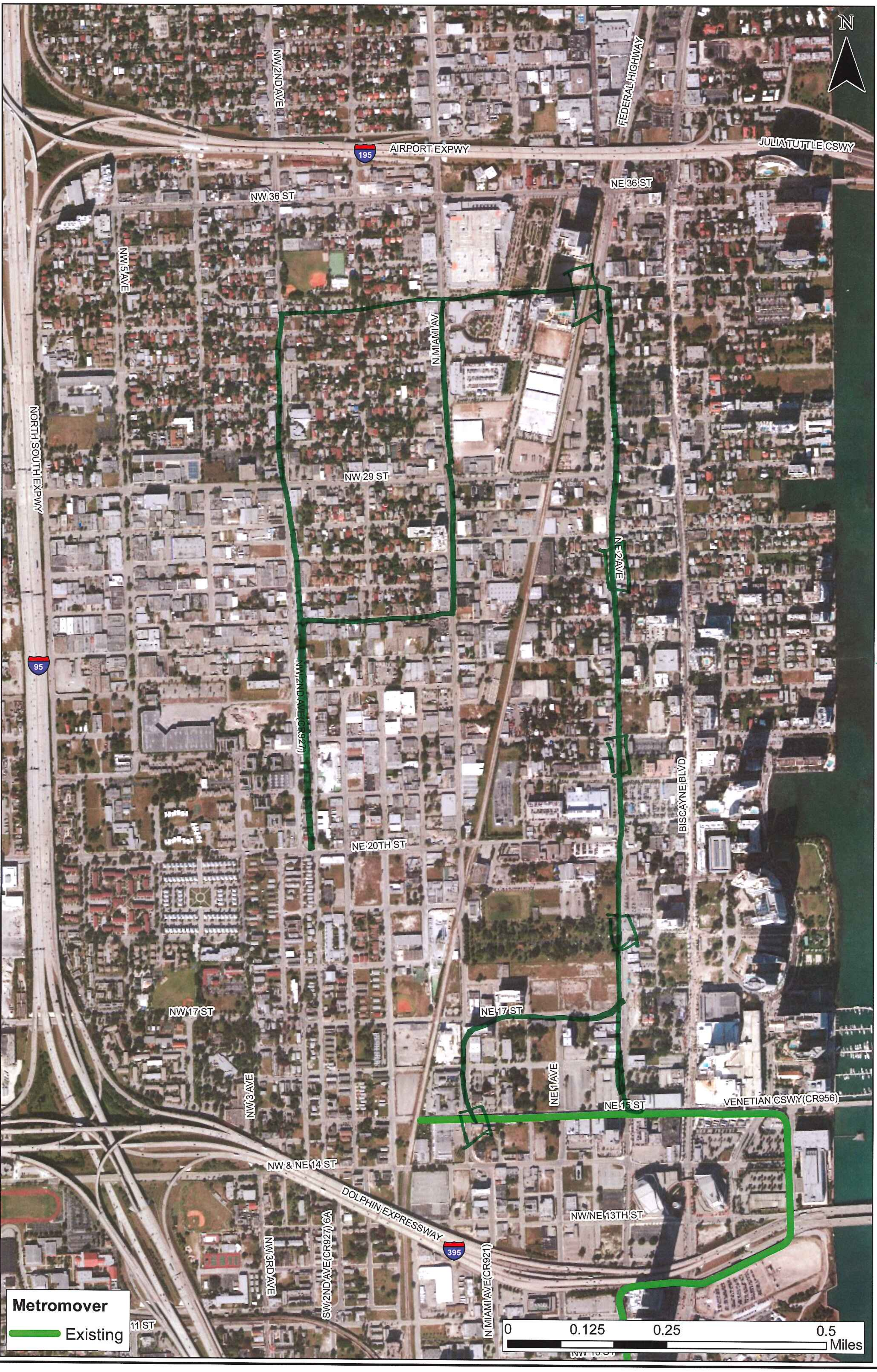

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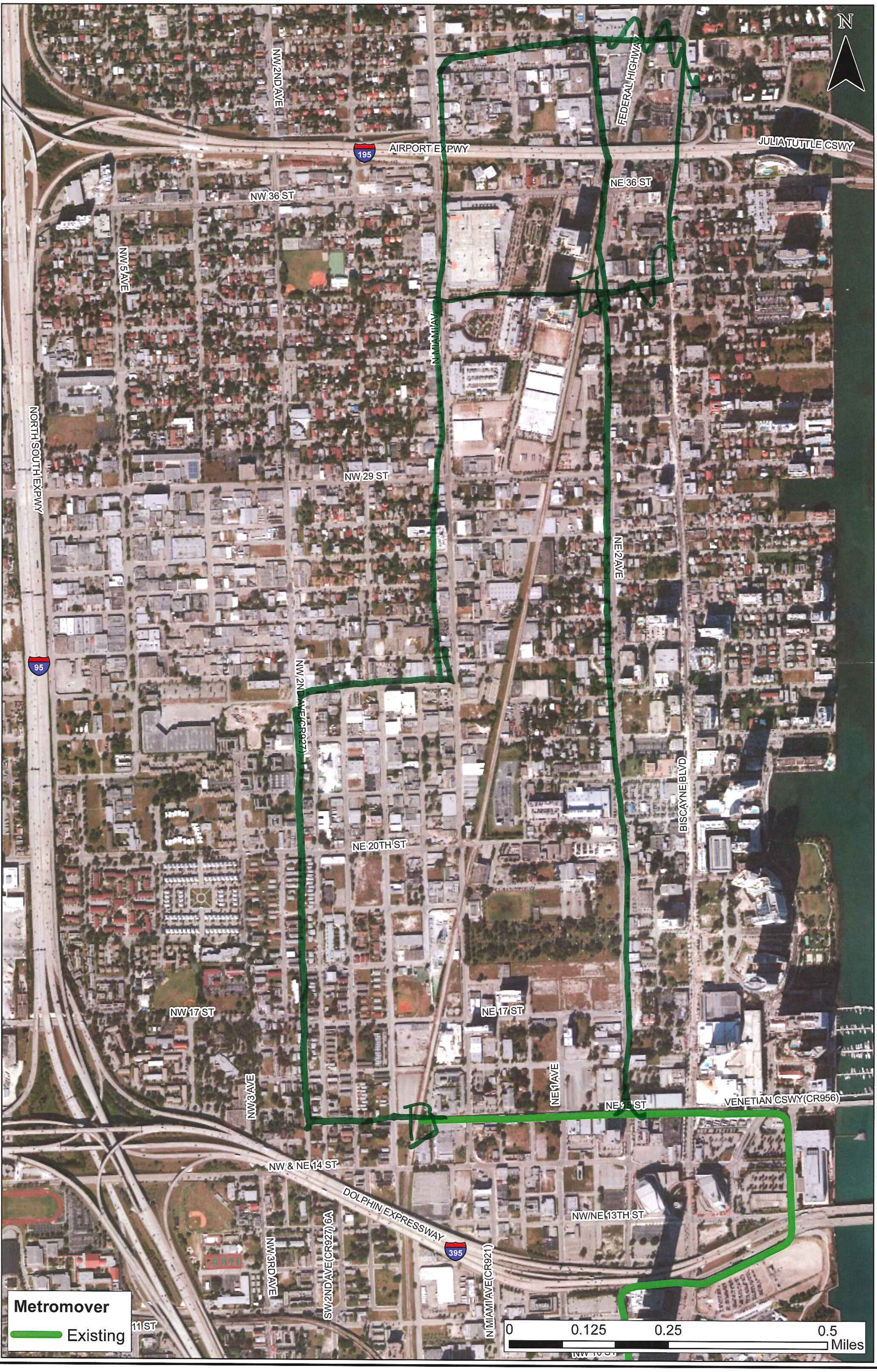
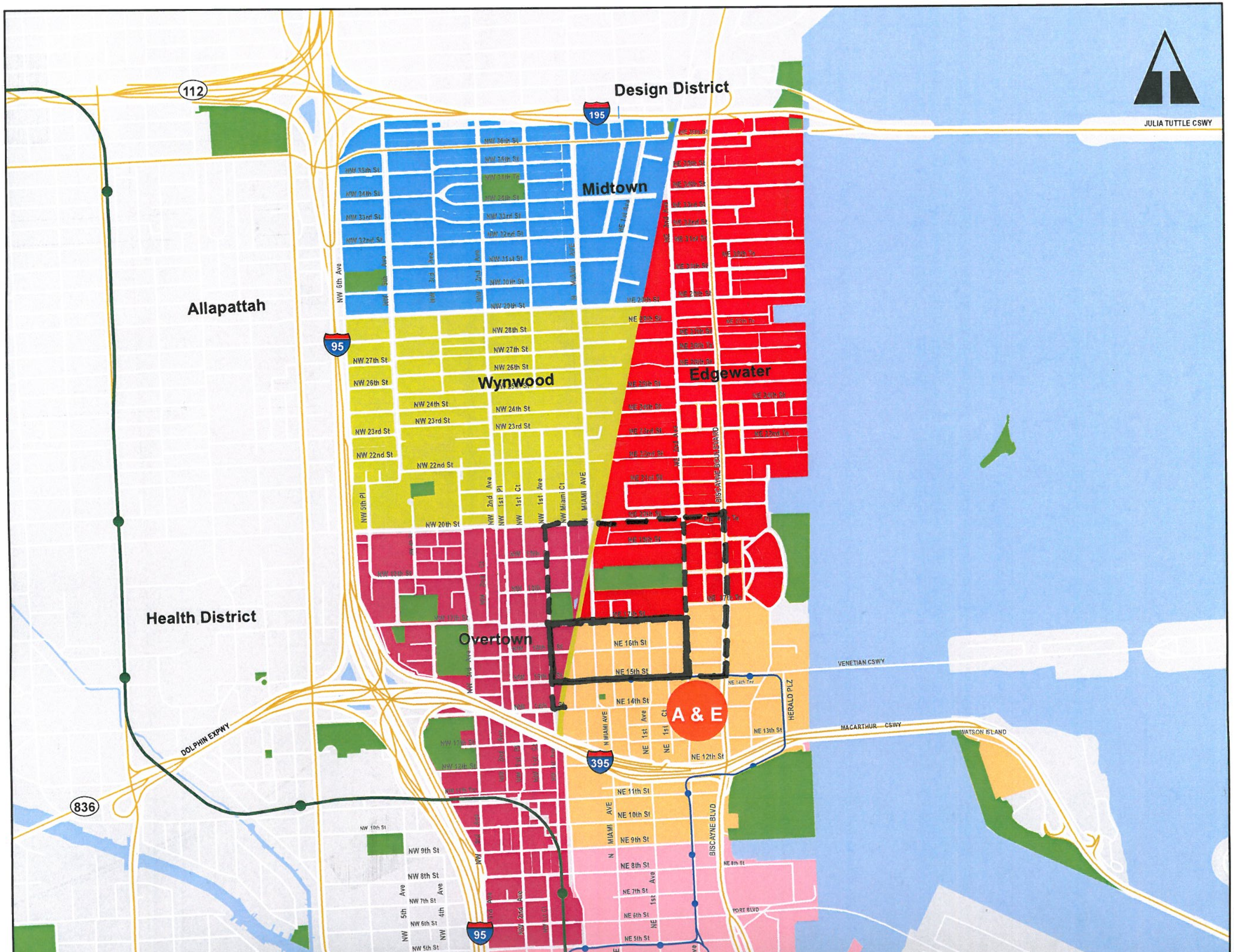



Design District
Midtown
Allapattah
Wynwood
Edgewater
Health District
Overtown
A & E
JULIA TUTTLE CSWY
VENETIAN CSWY
MACARTHUR CSWY
WATSON ISLAND
DOLPHIN EXPWY
112
195
95
395
836
NE 16th St
NE 15th St
NE 14th St
NE 13th St
NE 12th St
NE 11th St
NE 10th St
NE 9th St
NE 8th St
NE 7th St
NE 6th St
NE 5th St
NW 28th St
NW 27th St
NW 26th St
NW 24th St
NW 23rd St
NW 22nd St
NW 20th St
NW 9th St
NW 8th St
NW 7th St
NW 6th St
NW 5th St
N MIAMI AVE
BISCAYNE BLVD
HERALD PLZ
PORT BLVD

South Workshop Concept Alternatives

Metromover System Expansion Work Order # GPC V-16

#4

Metromover System Expansion Work Order # GPC V-16

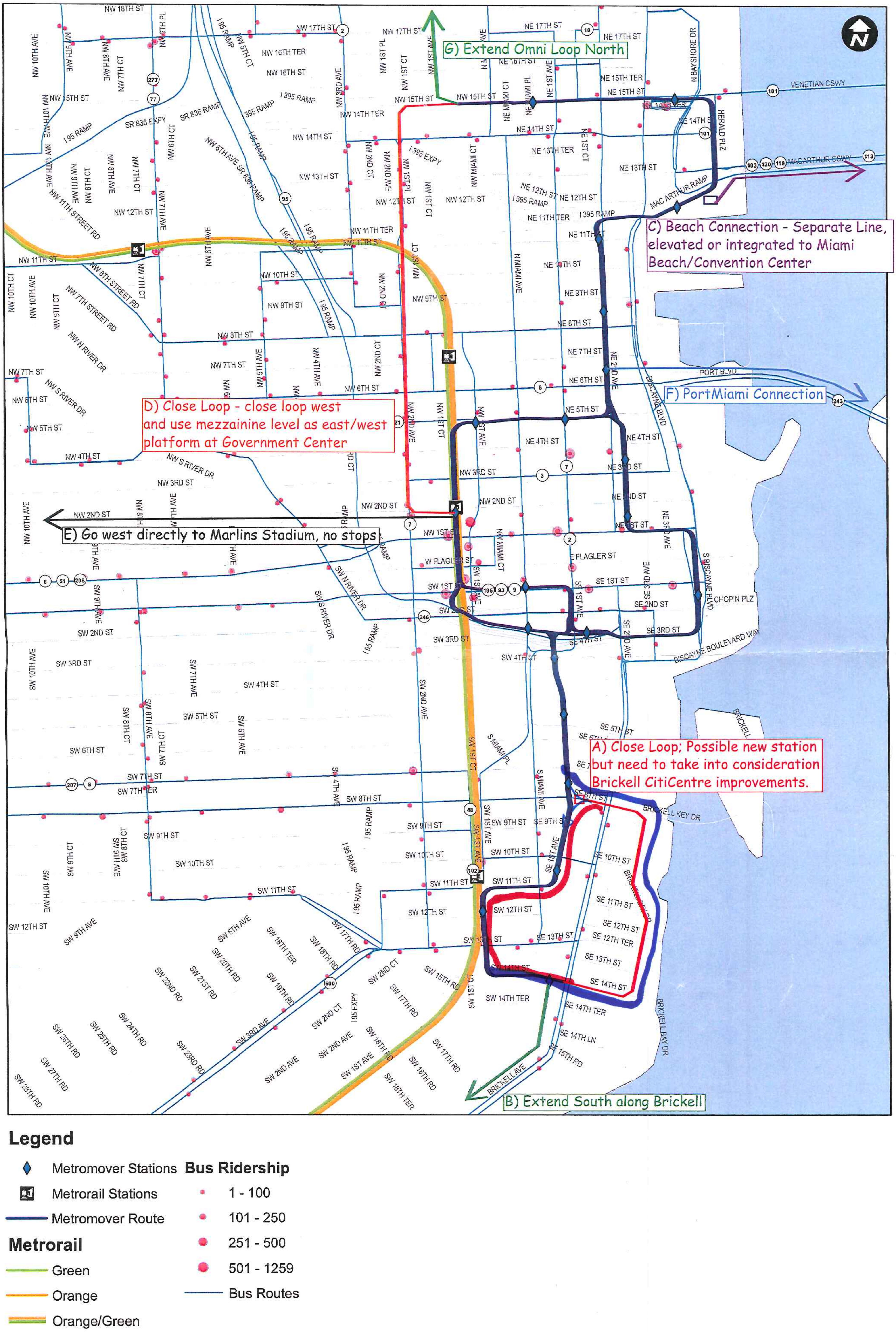
Metromover System Expansion Work Order # GPC V-16

Metromover System Expansion Work Order # GPC V-16

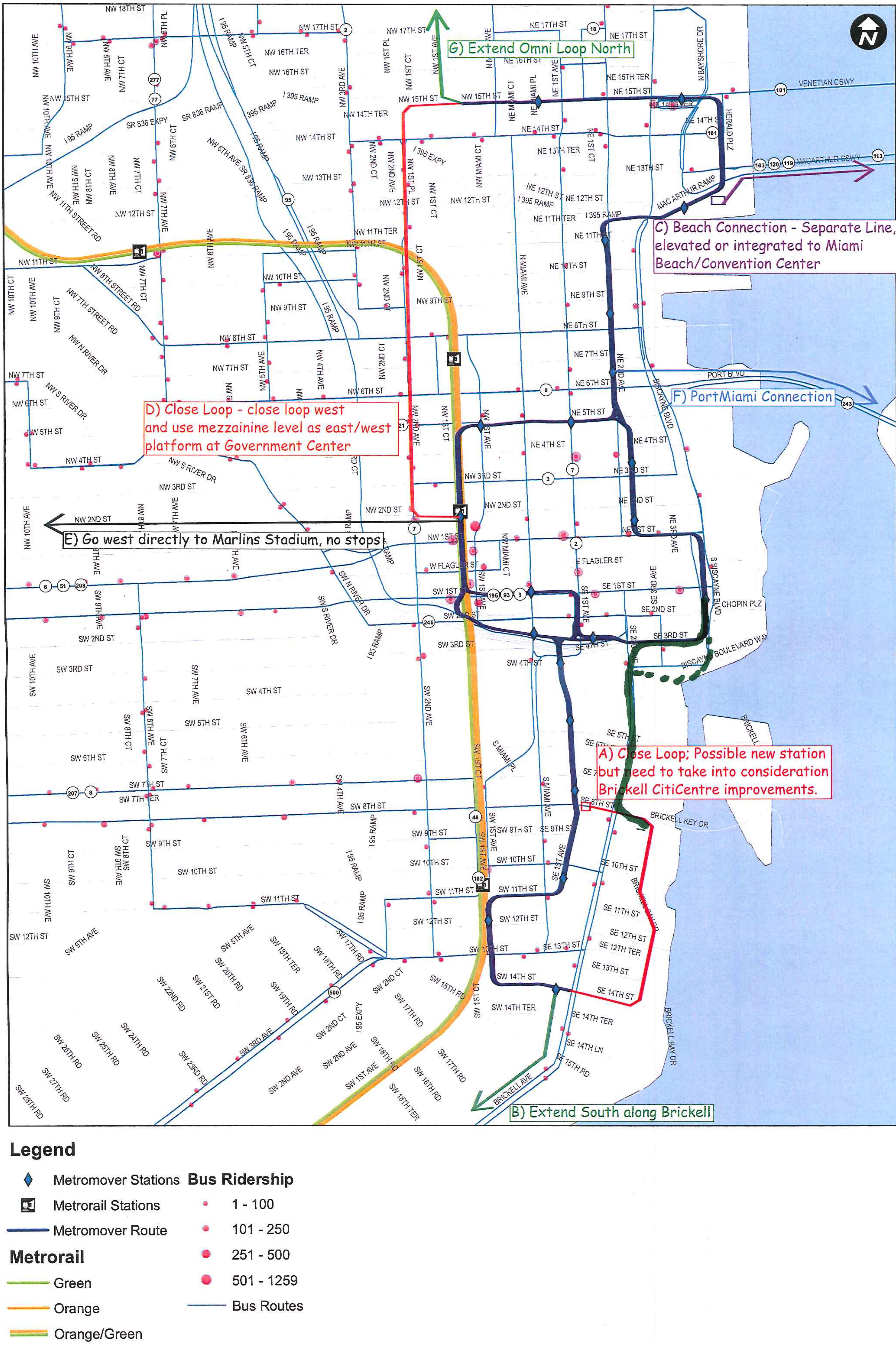
Metromover System Expansion Work Order # GPC V-16

Metromover System Expansion Work Order # GPC V-16

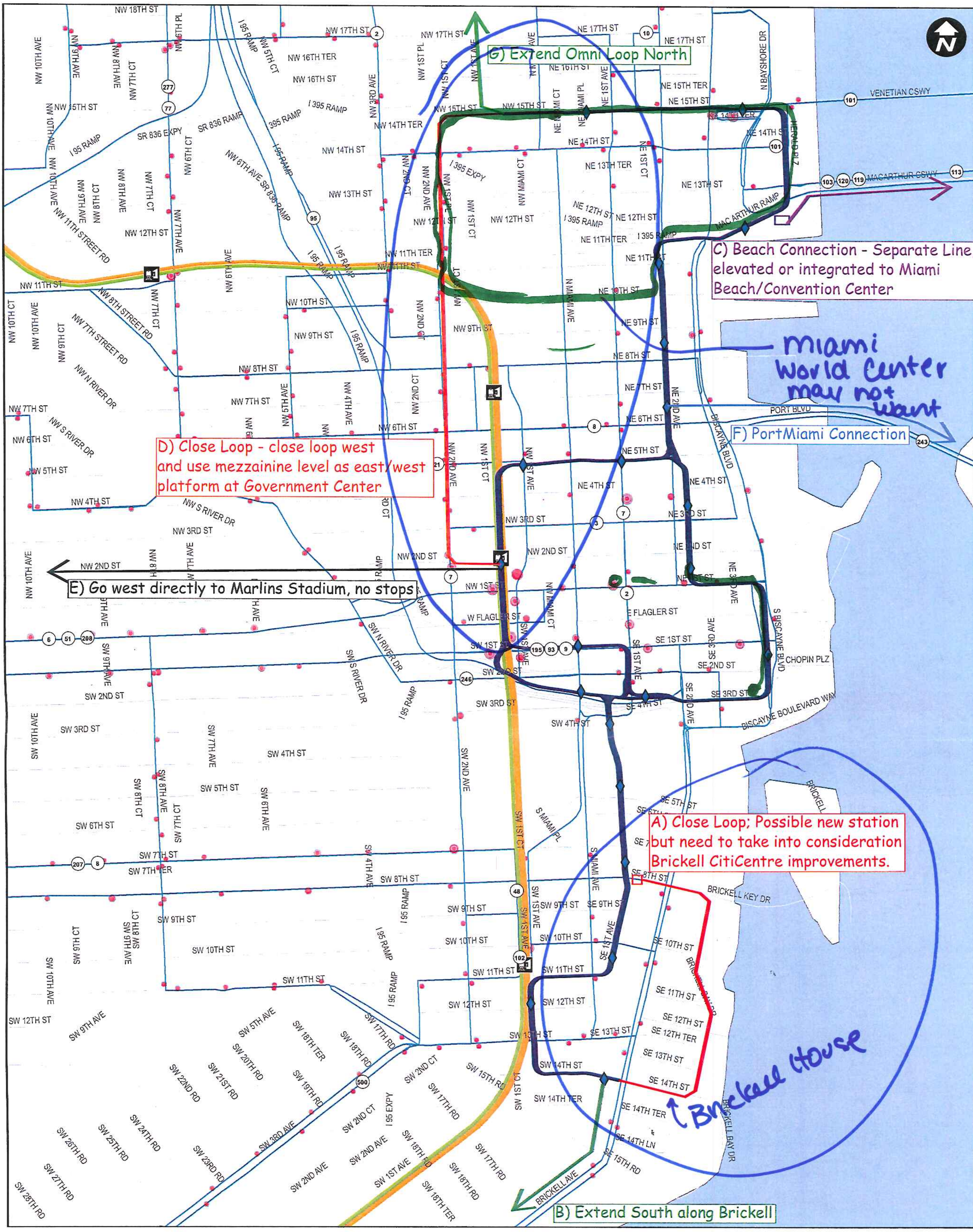
MIAMI-DADE TRANSPORTATION



MIAMI-DADE TRANSPORTATION



MIAMI-DADE TRANSPORTATION



Legend

- Metromover Stations
- Metrorail Stations
- Metromover Route

Metrorail

- Green
- Orange
- Orange/Green

Bus Ridership

- 1 - 100
- 101 - 250
- 251 - 500
- 501 - 1259
- Bus Routes

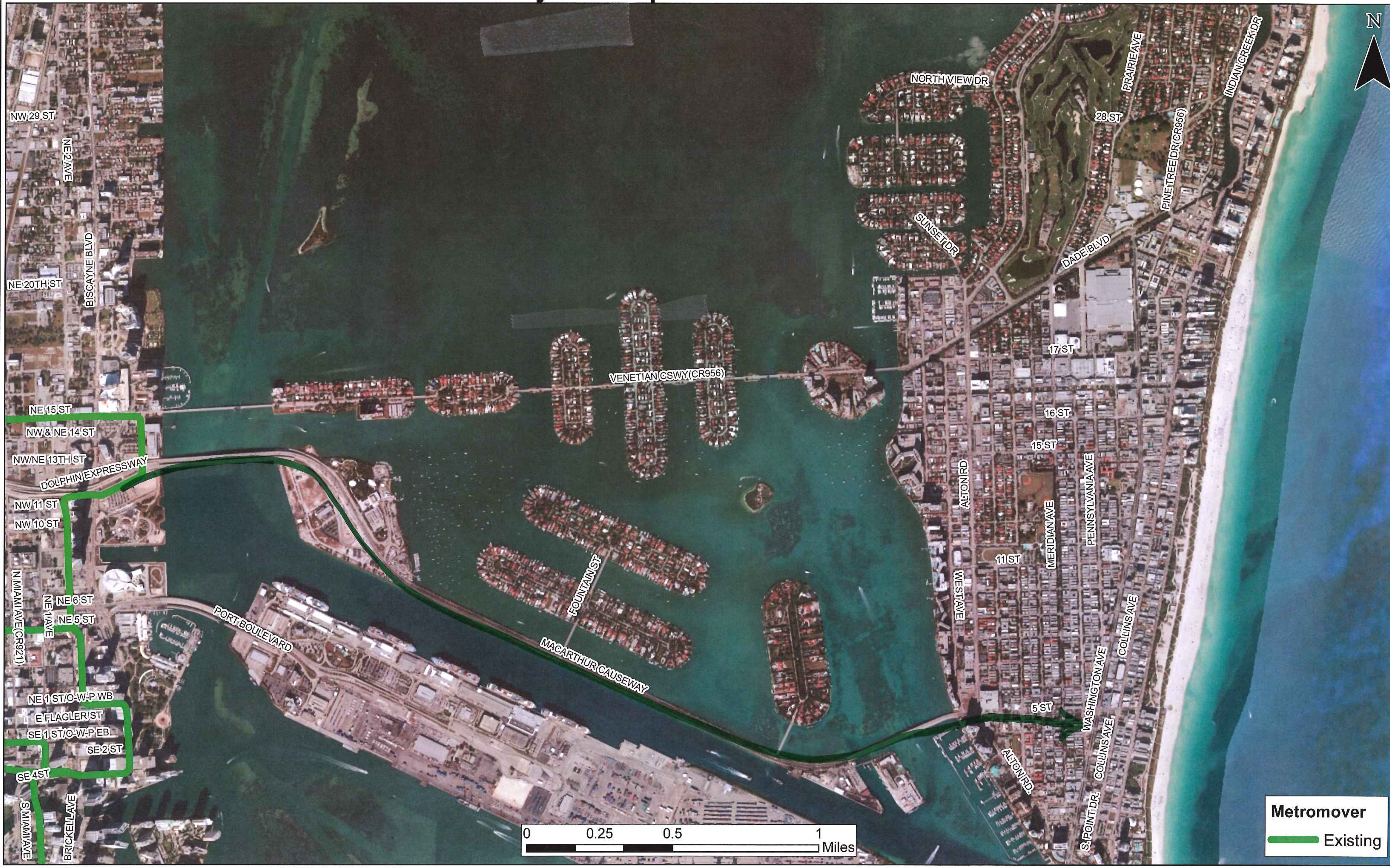
East Workshop Concept Alternatives

Metromover System Expansion Work Order # GPC V-16

Metromover System Expansion Work Order # GPC V-16

Metromover System Expansion Work Order # GPC V-16

Metromover System Expansion Work Order # GPC V-16



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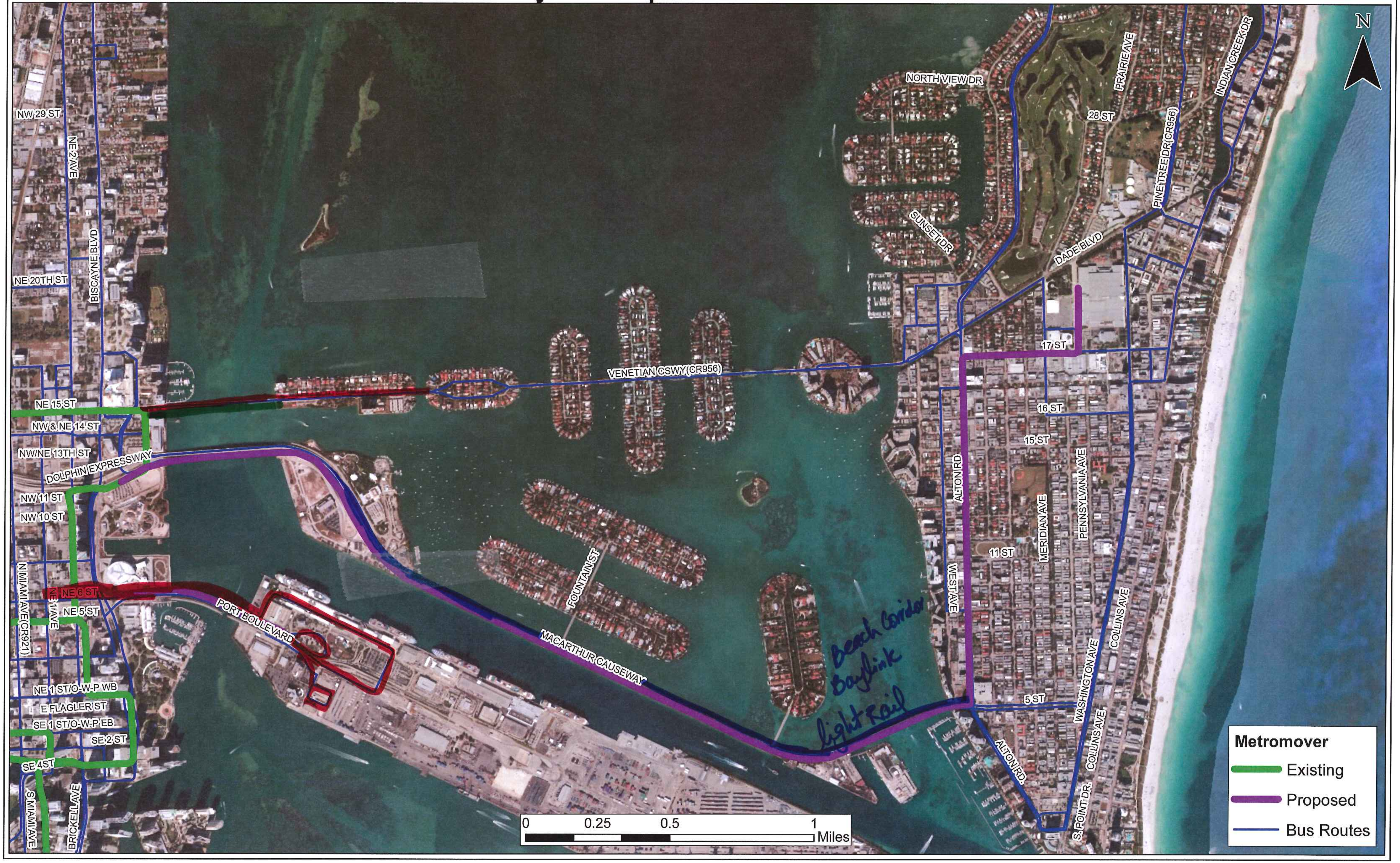

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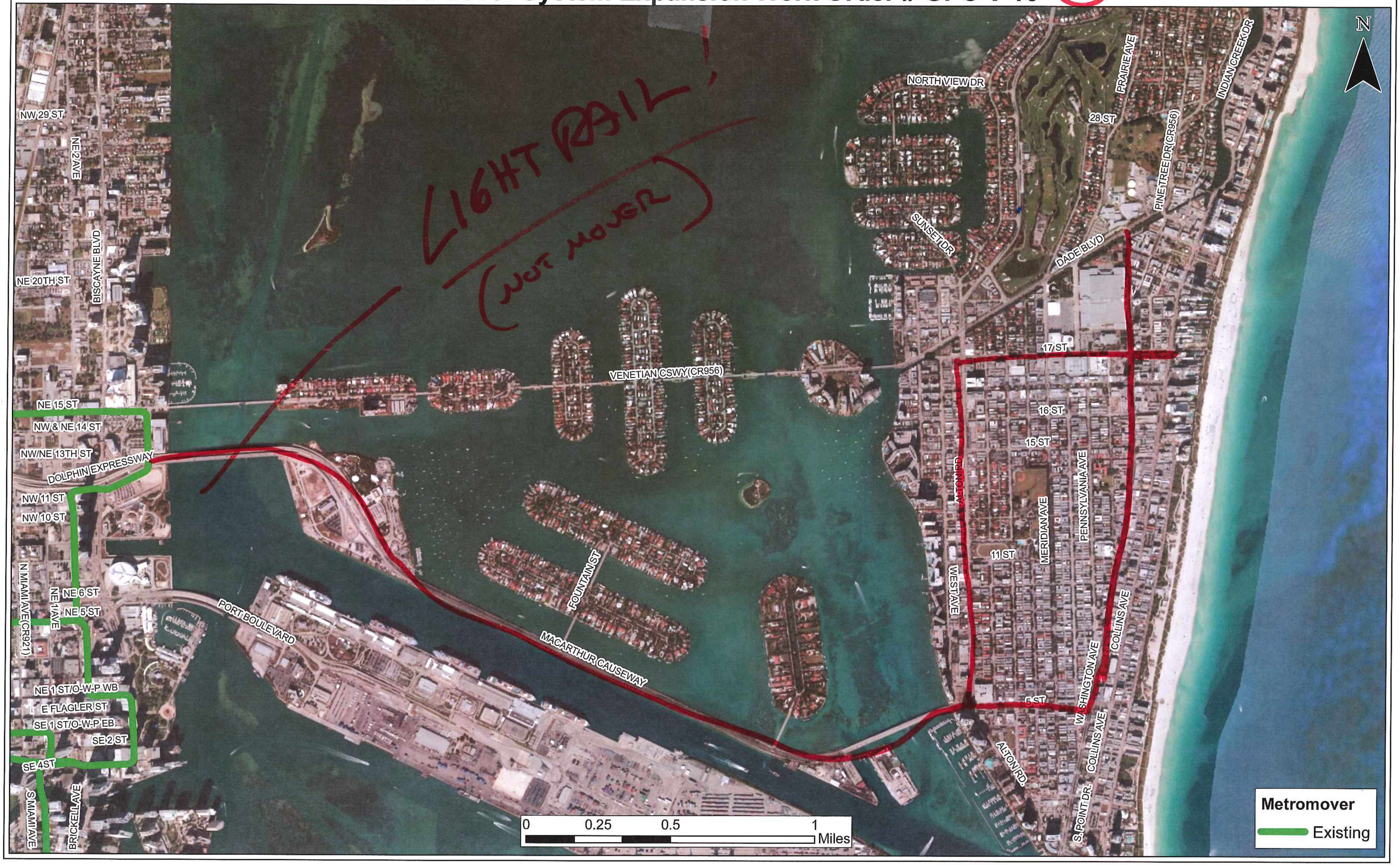


Metromover System Expansion Work Order # GPC V-16

Metromover System Expansion Work Order # GPC V-16 3

West Workshop Concept Alternatives

Metromover System Expansion Work Order # GPC V-16

Metromover System Expansion Work Order # GPC V-16

Metromover System Expansion Work Order # GPC V-16

Metromover System Expansion Work Order # GPC V-16

Metromover System Expansion Work Order # GPC V-16

#5

Appendix E: Photo Log

Photo 1: East-West Platform at Government Center

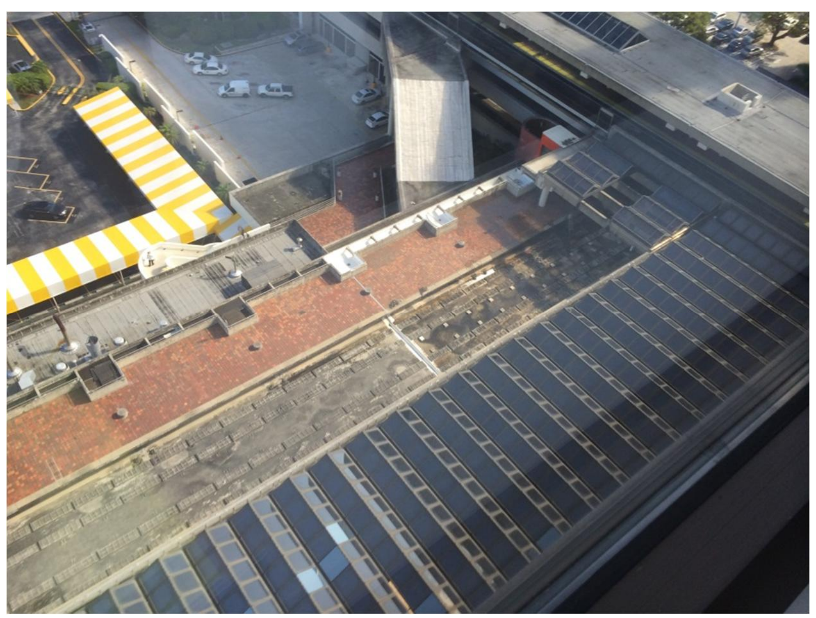


Photo 2: East-West Platform at Government Center

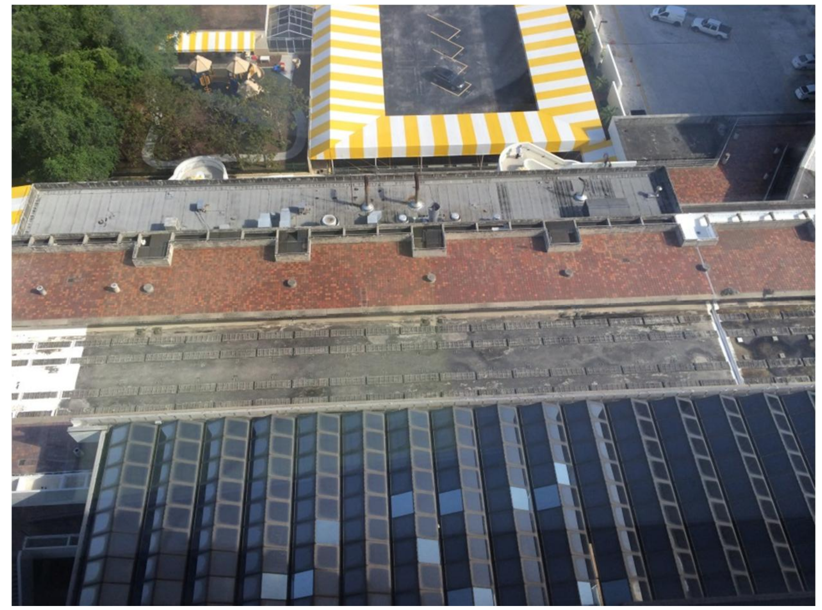


Photo 3: East-West Platform at Government Center

Photo 4: Financial District Metromover Station

Photo 5: Financial District Metromover Station

Photo 6: Financial District Metromover Station

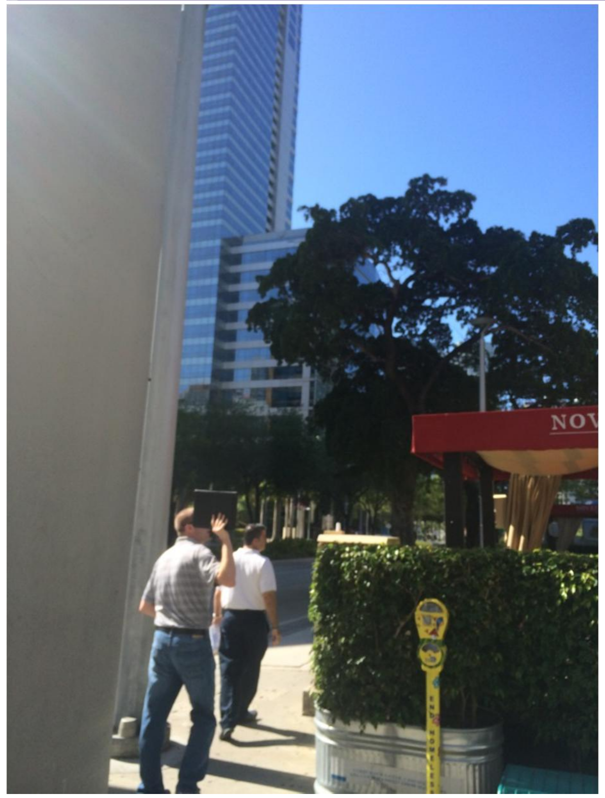


Photo 7: Financial District Metromover Station, Surrounding Area

Photo 8: Financial District Metromover Station, Surrounding Area

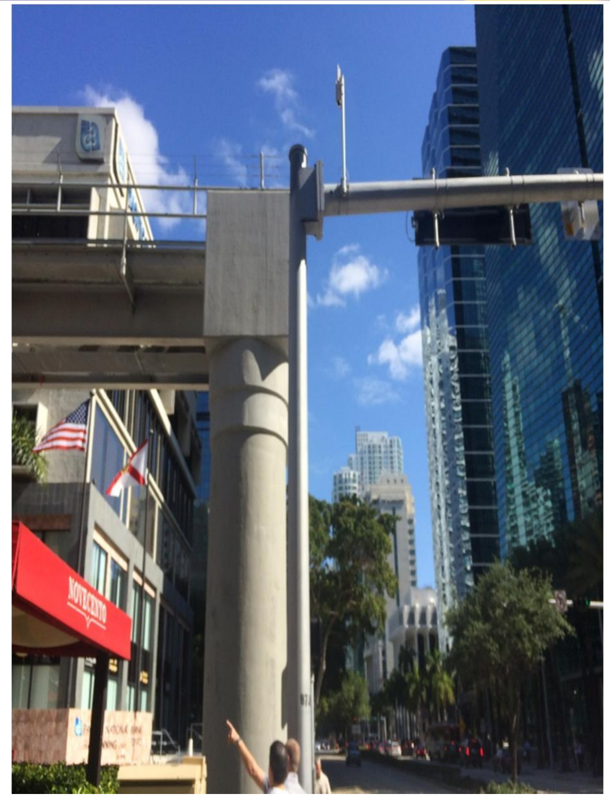


Photo 9: End of Line, Financial District Station

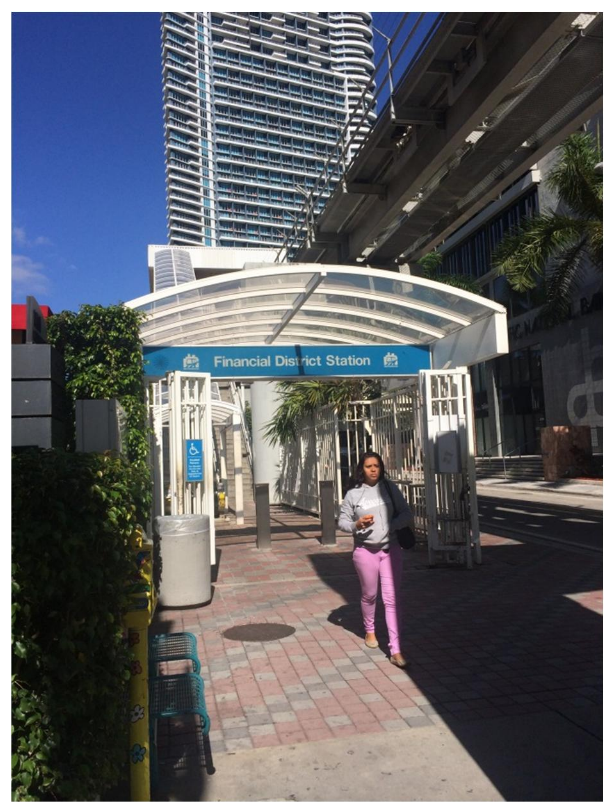


Photo 10: Financial District Station

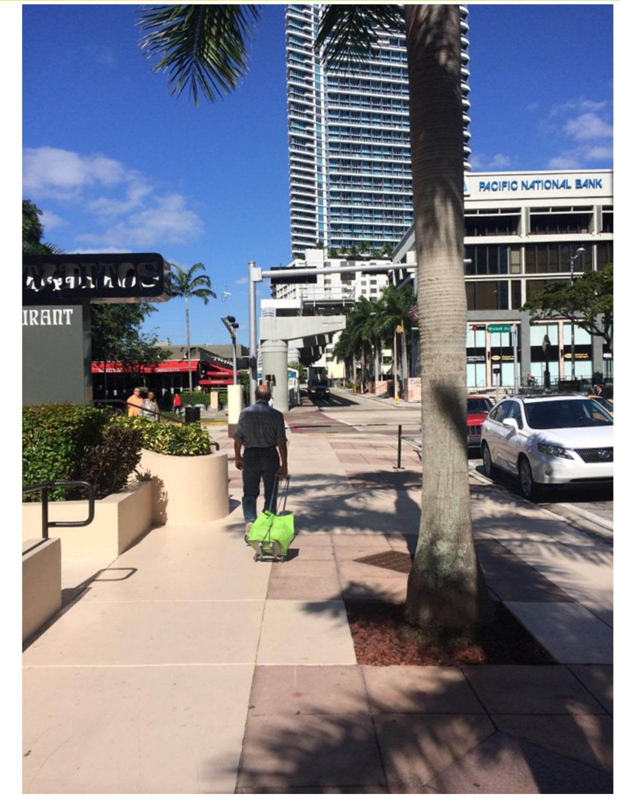


Photo 11: Financial District Station

Photo 12: Financial District Station

Photo 13: Financial District Station

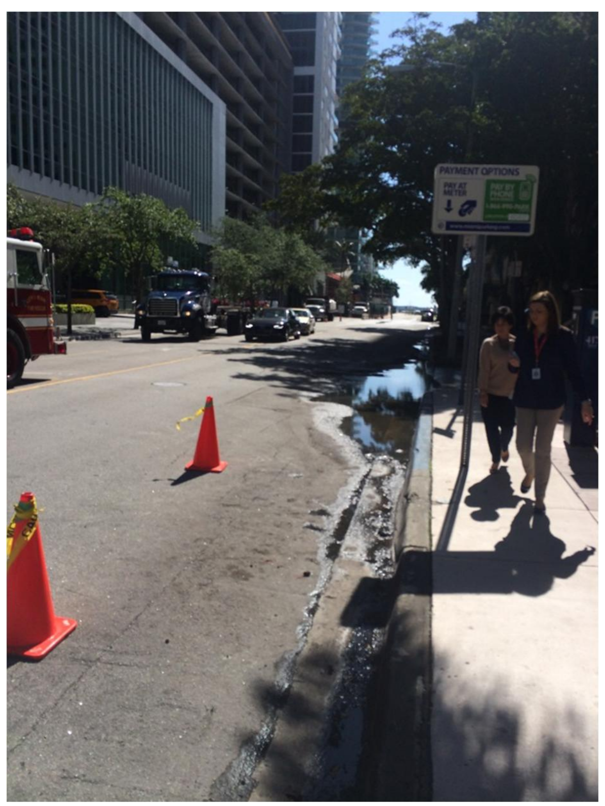


Photo 14: SE 14th Street

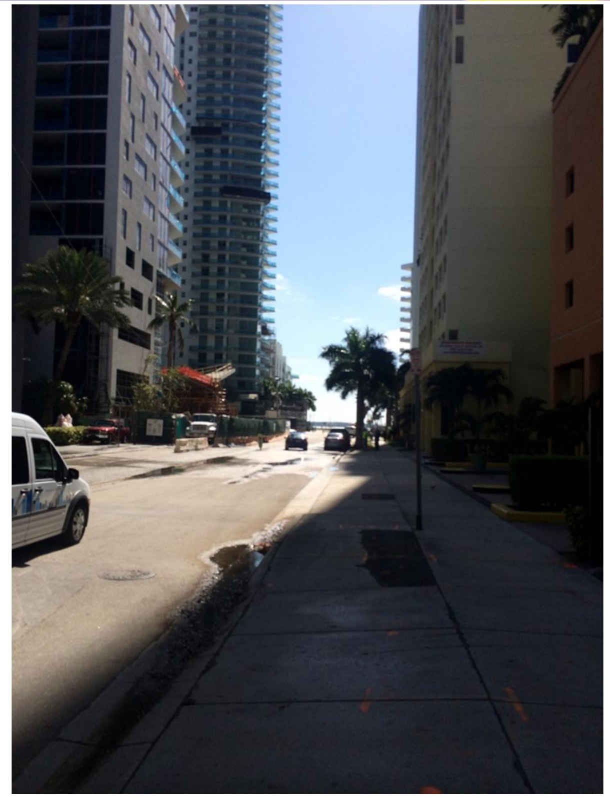


Photo 15: SE 14th Street

Photo 16: SE 14th Street

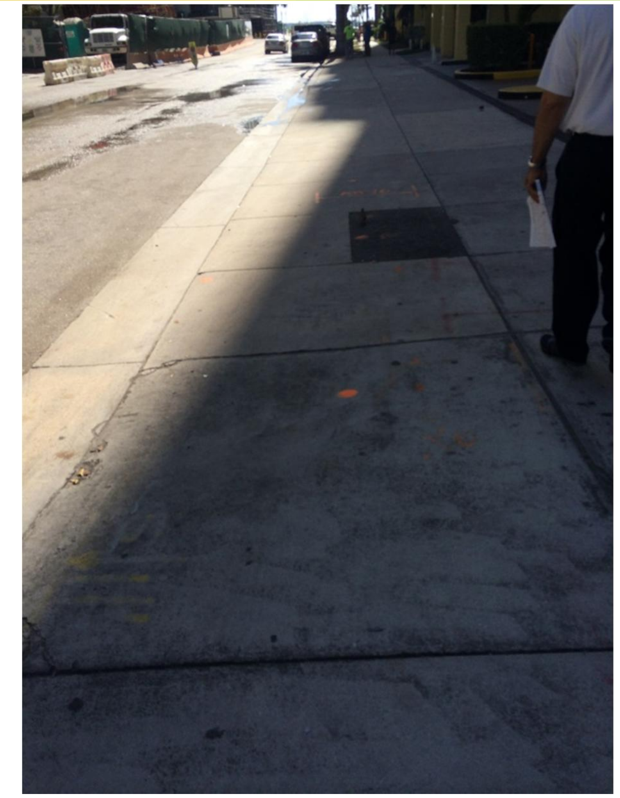


Photo 17: SE 14th Street

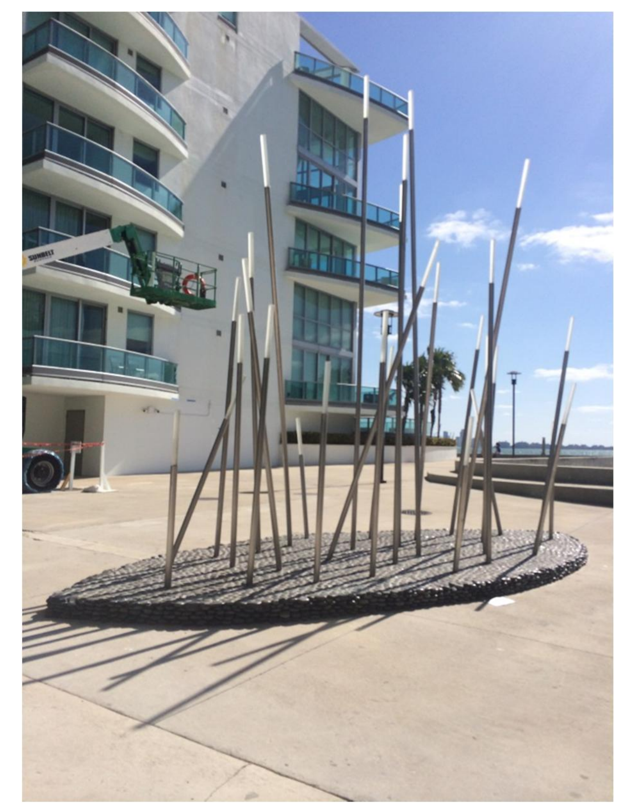


Photo 18: Jade at Brickell Bay

Photo 19: SE 14th Street, East Terminus

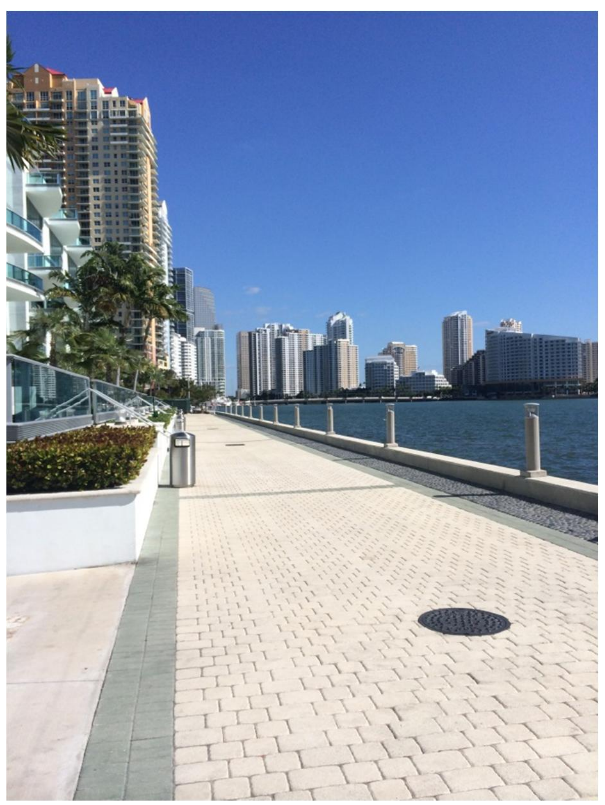


Photo 20: Jade at Brickell Bay Seawall

Photo 21: Jade at Brickell Bay Seawall

Photo 22: Brickell Bay Drive

Photo 23: Jade at Brickell Bay Seawall

Photo 24: Brickell Bay Drive

Photo 25: Dade Heritage Trust, Historic Preservation

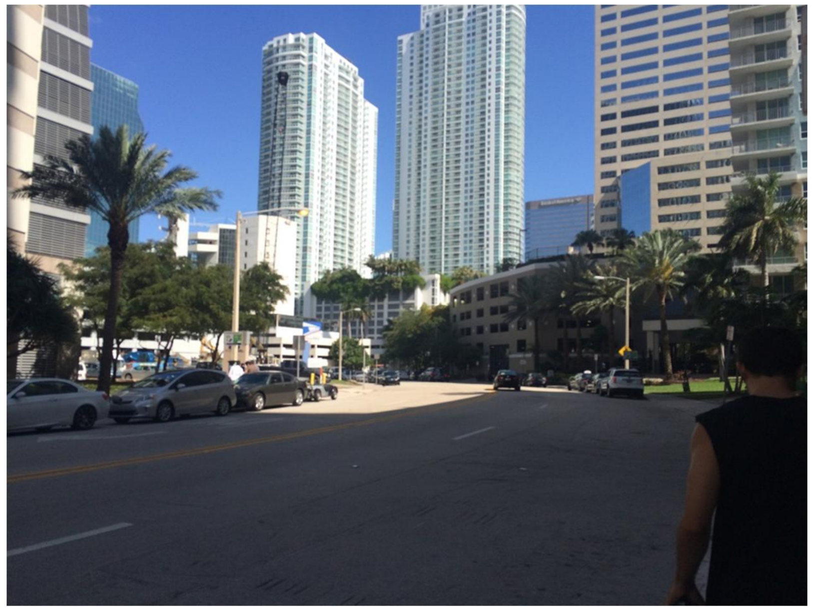


Photo 26: Brickell Bay Drive

Photo 27: Brickell Bay Drive

Photo 28: Brickell Bay Drive

Photo 29: Brickell Bay Drive

Photo 30: Brickell Bay Drive

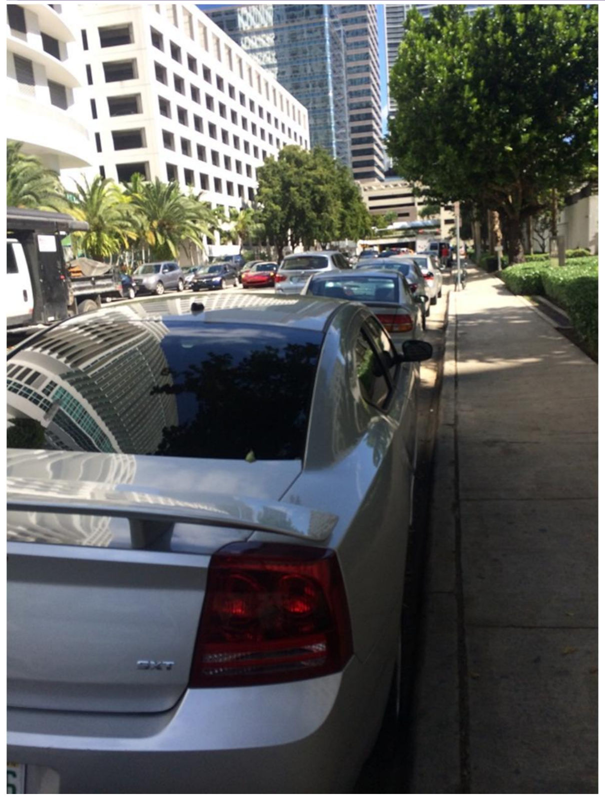


Photo 31: On-Street Parking, Brickell Bay Drive

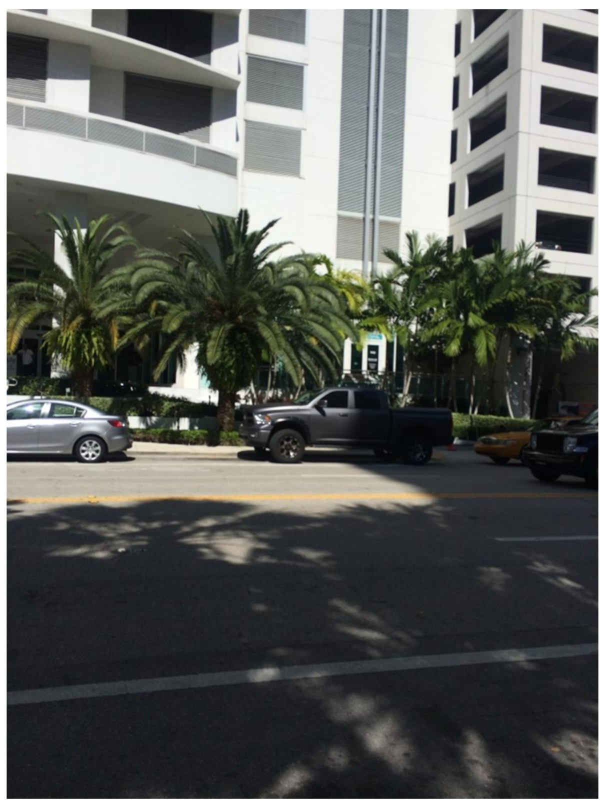


Photo 32: Brickell Bay Drive

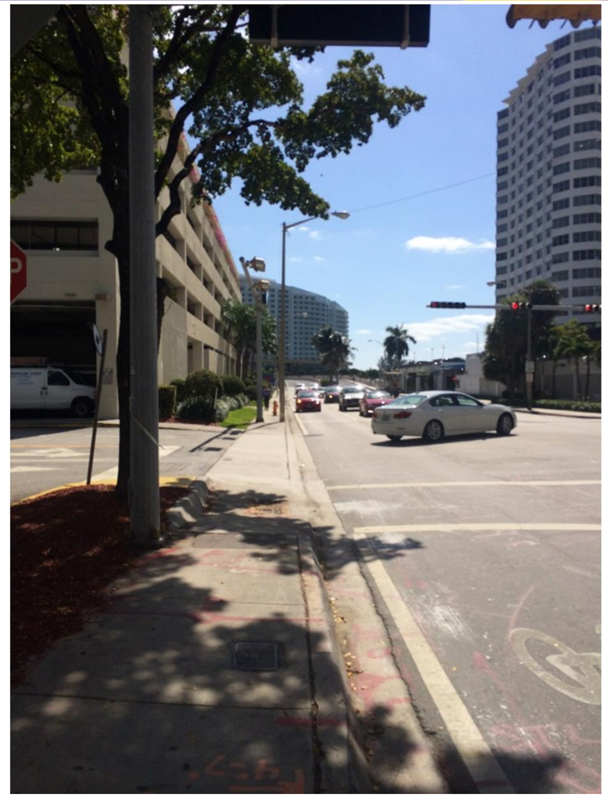


Photo 33: Brickell Key Drive

Photo 34: Brickell Key Drive

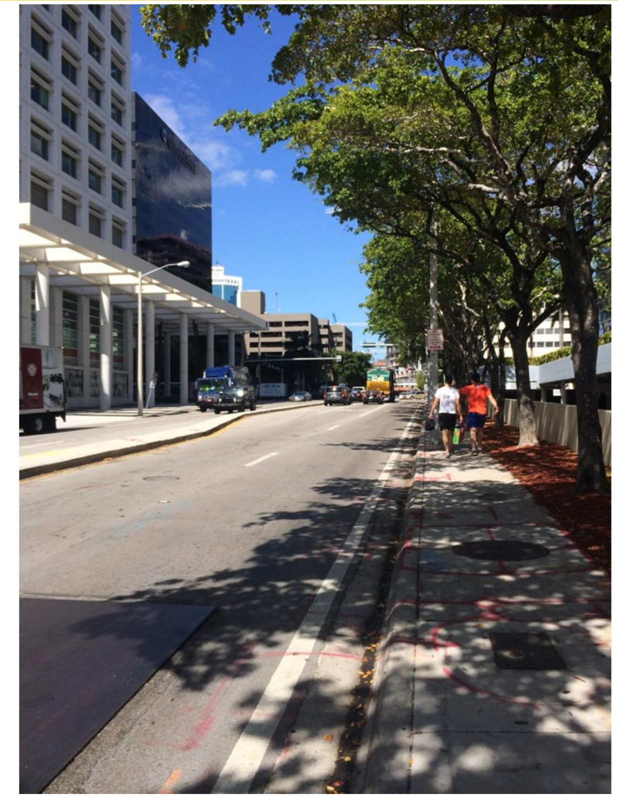


Photo 35: Brickell Key Drive

Photo 36: Brickell Key Drive

Photo 37: Brickell Key Drive

Photo 38: Trolley

Photo 39: Brickell Key Drive

Photo 40: Decorative Crosswalk

Photo 41: Decorative Crosswalk

Photo 42: Brickell Key Drive

Photo 43: Decorative Crosswalk

Photo 44: 8th Street Metromover Station

Photo 45: Brickell Key Drive

Photo 46: Brickell Key Drive

Photo 47: NW Corner of Brickell Avenue and Brickell Key Drive

Photo 48: Guideway South of 8th Street Metromover Station

Photo 49: 8th Street Metromover Station

Photo 50: 8th Street Metromover Station

Photo 51: 8th Street Metromover Station

Photo 52: 8th Street Metromover Station

Photo 53: 8th Street Metromover Station

Photo 54: Metromover

Photo 55: NW 14th Avenue

Photo 56: NW 14th Avenue

Photo 57: End of Line, School Board Metromover Station

Photo 58: End of Line, School Board Metromover Station

Photo 59: End of Line, School Board Metromover Station

Photo 60: NW 2nd Avenue

Photo 61: Overhead Utilities

Photo 62: Wynwood

Photo 63: Rail Crossing

Photo 64: Narrow Street

Photo 65: Design District

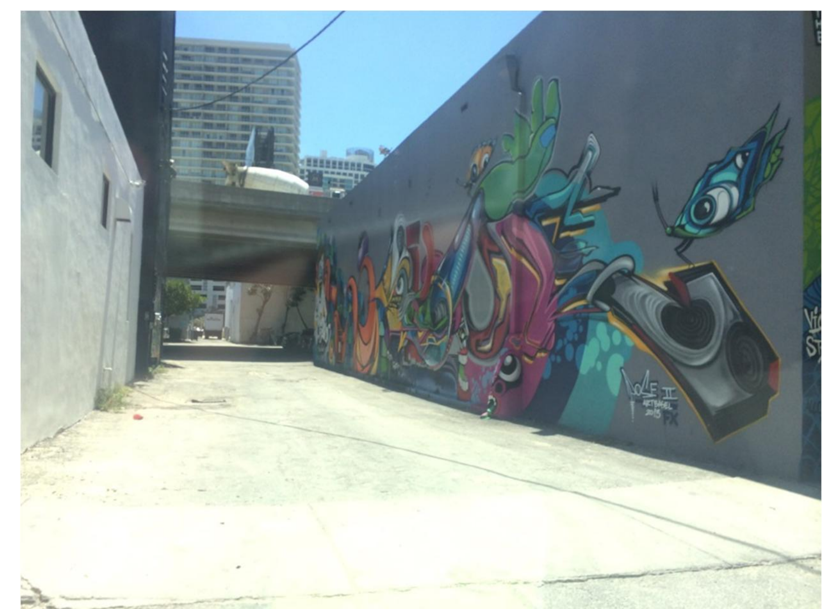
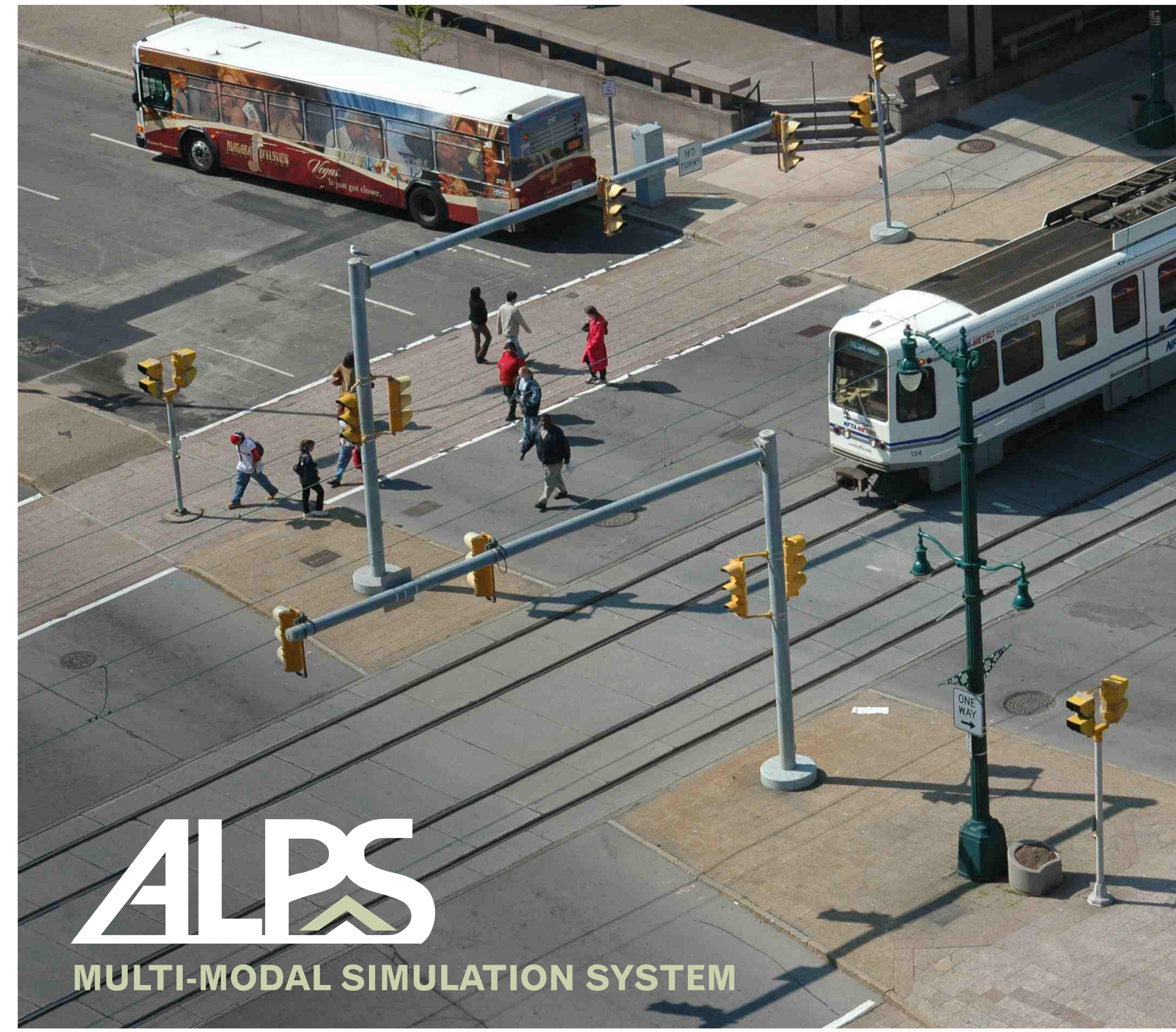
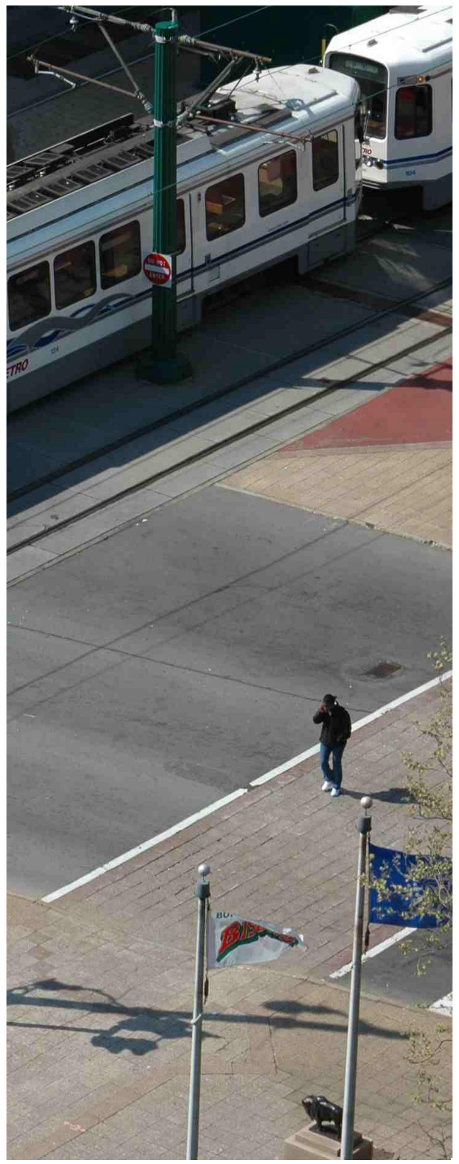


Photo 66: Wynwood

Appendix F: ALPS Information

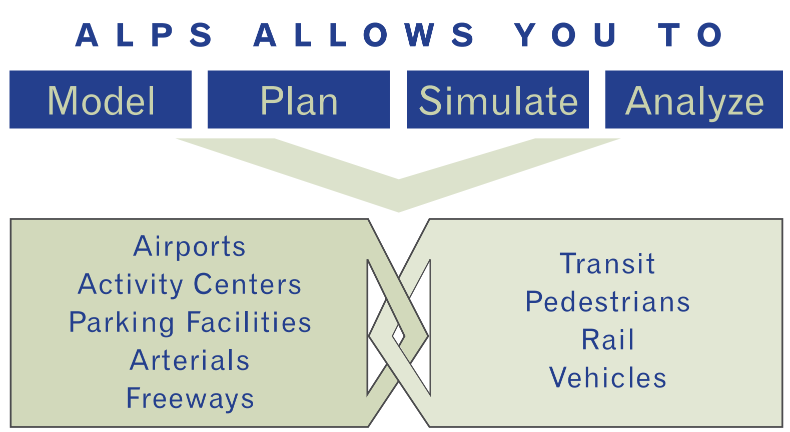

ADVANCED LAND TRANSPORTATION PERFORMANCE SIMULATION
ALPS
Simulating *Peak* Performance
Kimley-Horn and Associates, Inc.


ALPS
MULTI-MODAL SIMULATION SYSTEM



Advanced Land Transportation Performance Simulation (ALPS)

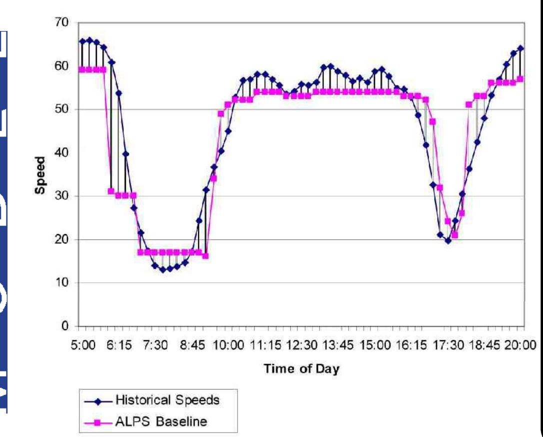
Kimley-Horn formulates the right technical solutions to fit your situation, based on a thorough understanding of your needs and goals. The multi-faceted capabilities of the ALPS software can meet your needs for modeling and simulation of complex multi-modal environments.

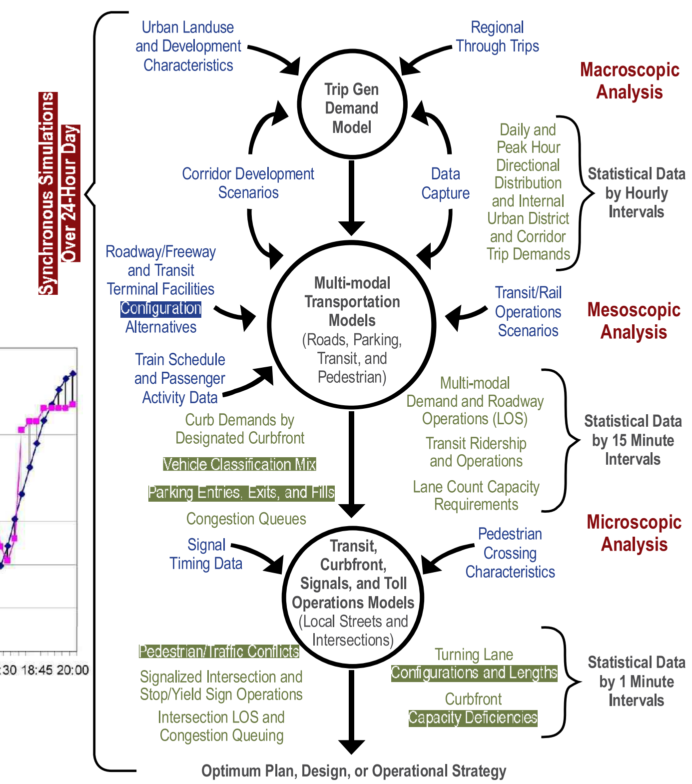


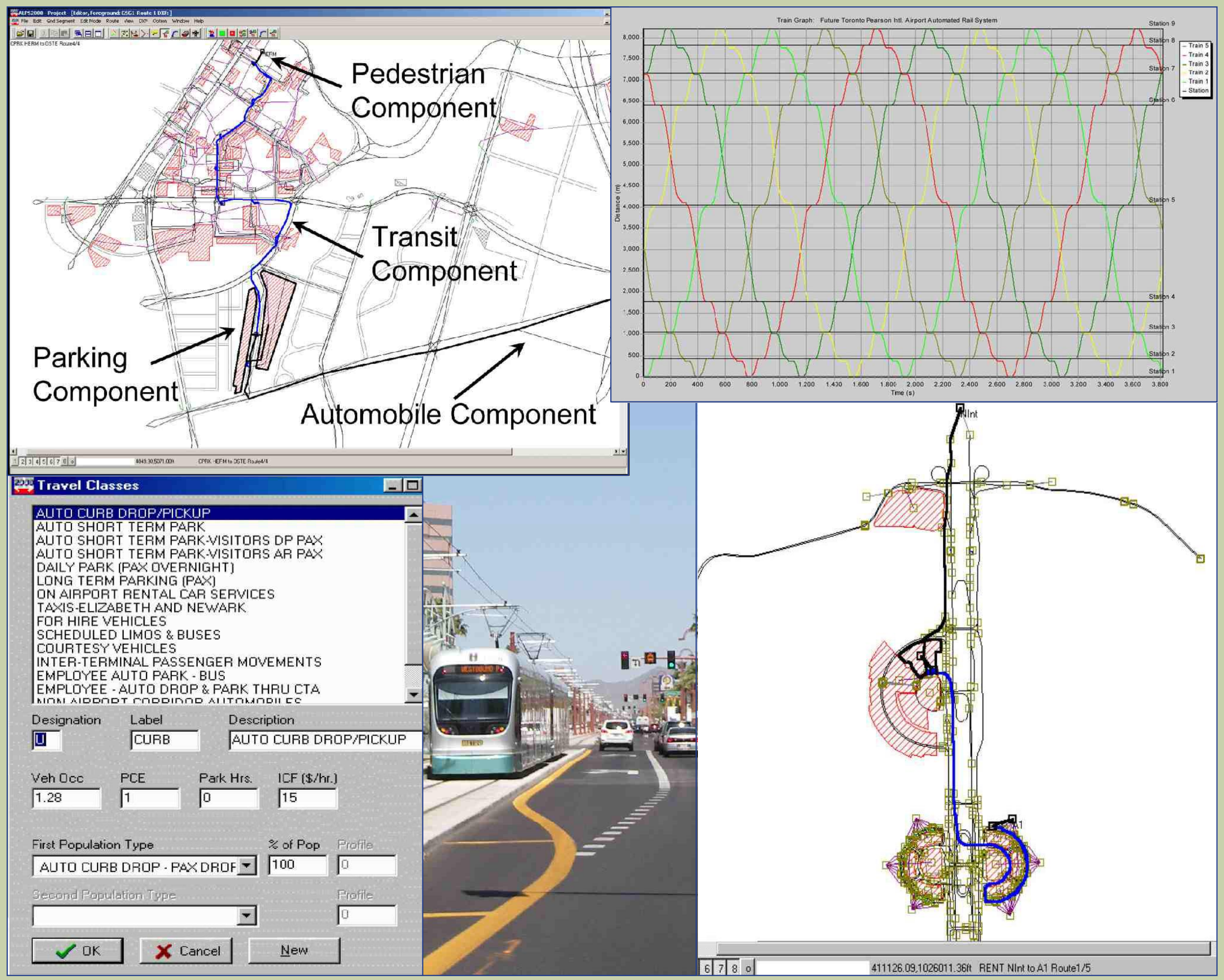
MODEL

Person-Trip Modeling Across Multiple Modes at Varying Levels of Detail

- Multi-modal assignment
- Multi-modal trip distribution
- Path-finding across modal options
- Dynamic routing and traffic assignment
- Faster than real-time simulation
- Macro-meso link interfaces
- Meso-micro link interfaces
- Variable time steps



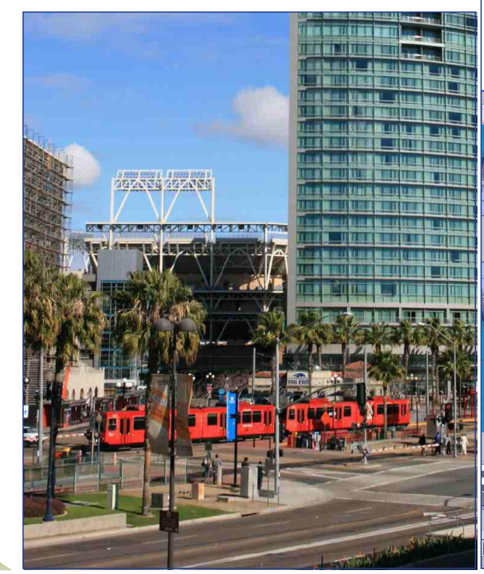


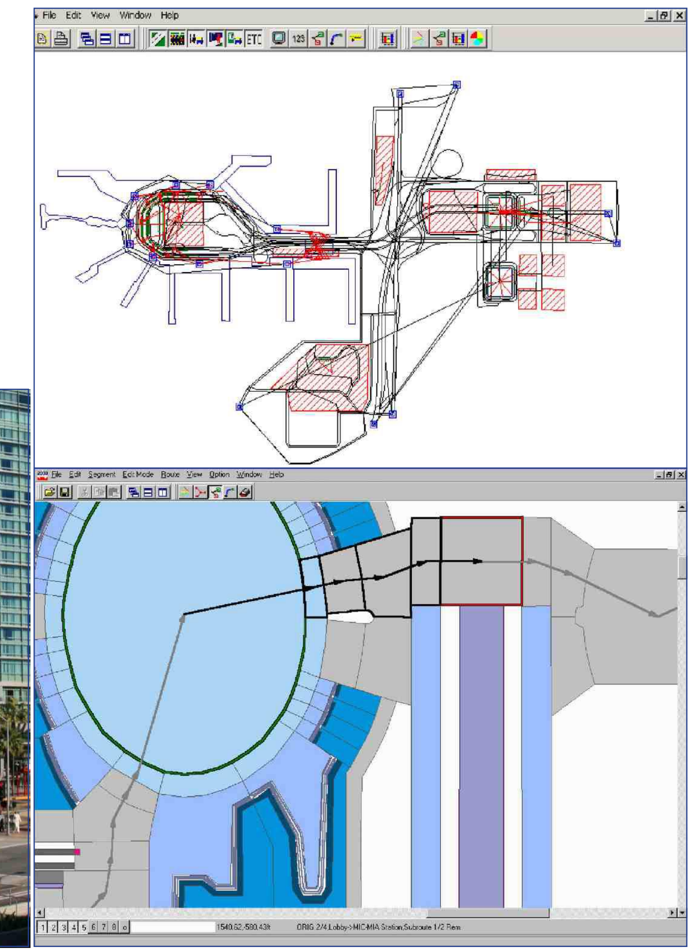


BUILD MULTI-MODAL TRANSPORTATION NETWORKS WITH EASE

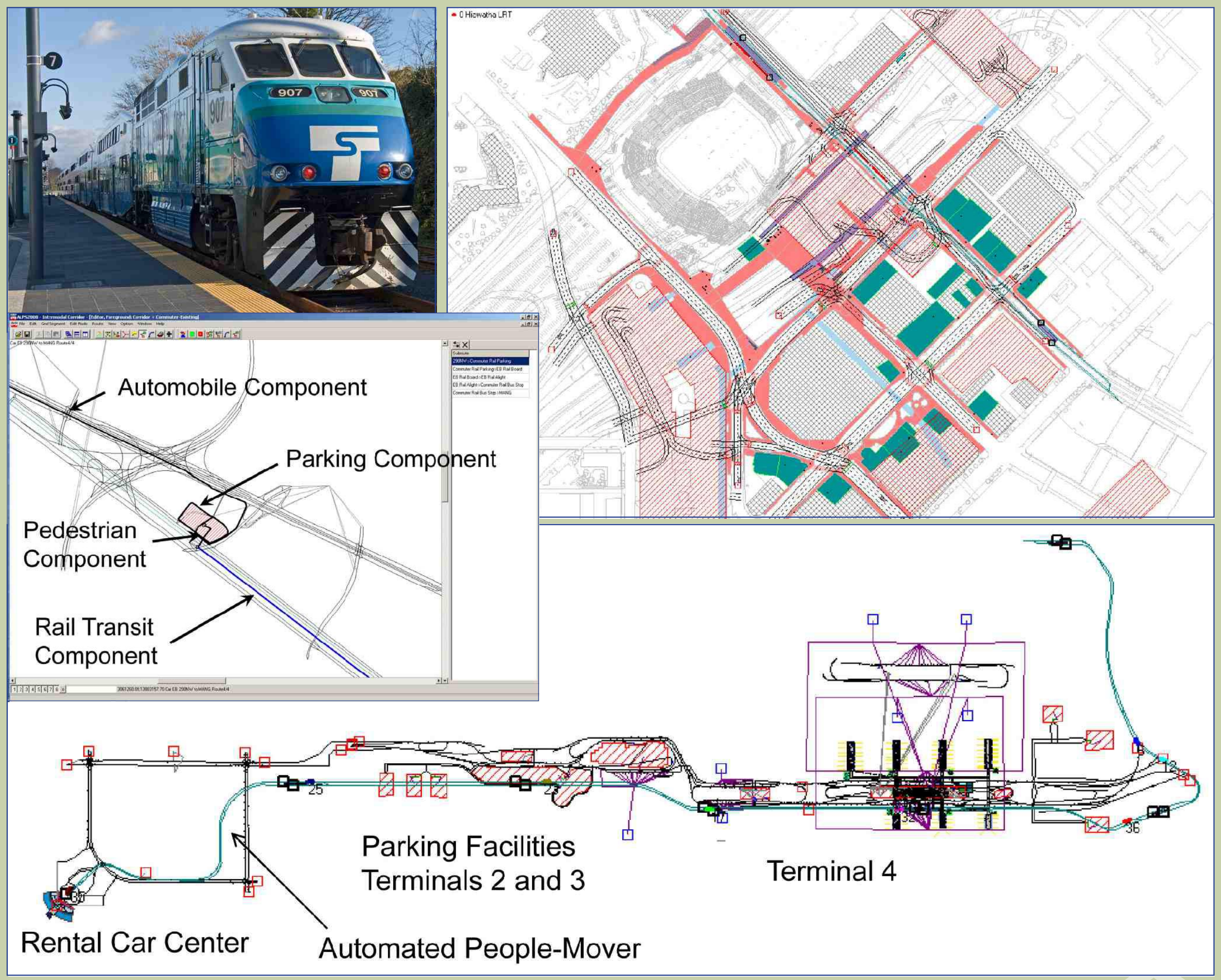
Simulate Future Conditions for Detailed Alternatives Analysis

- Regional planning
- Urban district planning
- Facility planning
- Concept of operations
- Capital forecasting
- Evacuation planning
- Feasibility studies
- Construction phasing





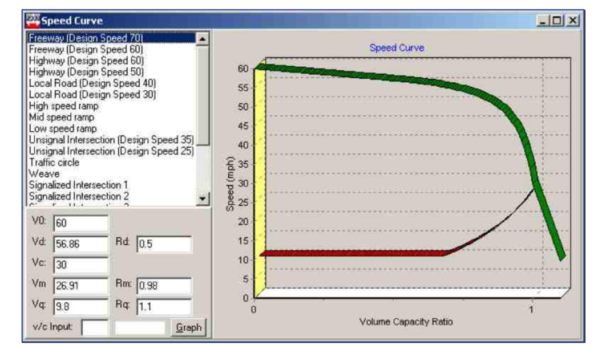
PLAN

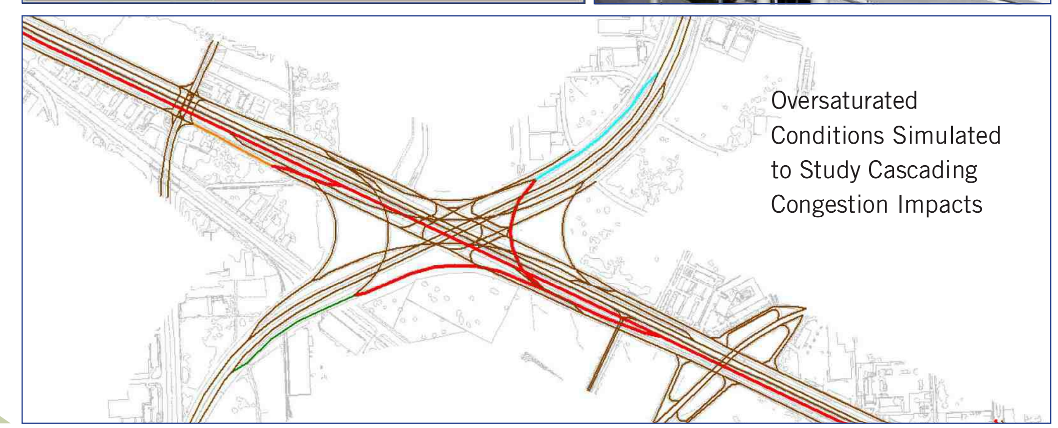


ALPS Meso and Micro Simulation Capabilities Speed the Analysis Process

- Thousands of times faster than microscopic-only simulation
- Run 10x more case studies
- Integrated genetic algorithm calibration tool
- Automated case study manager

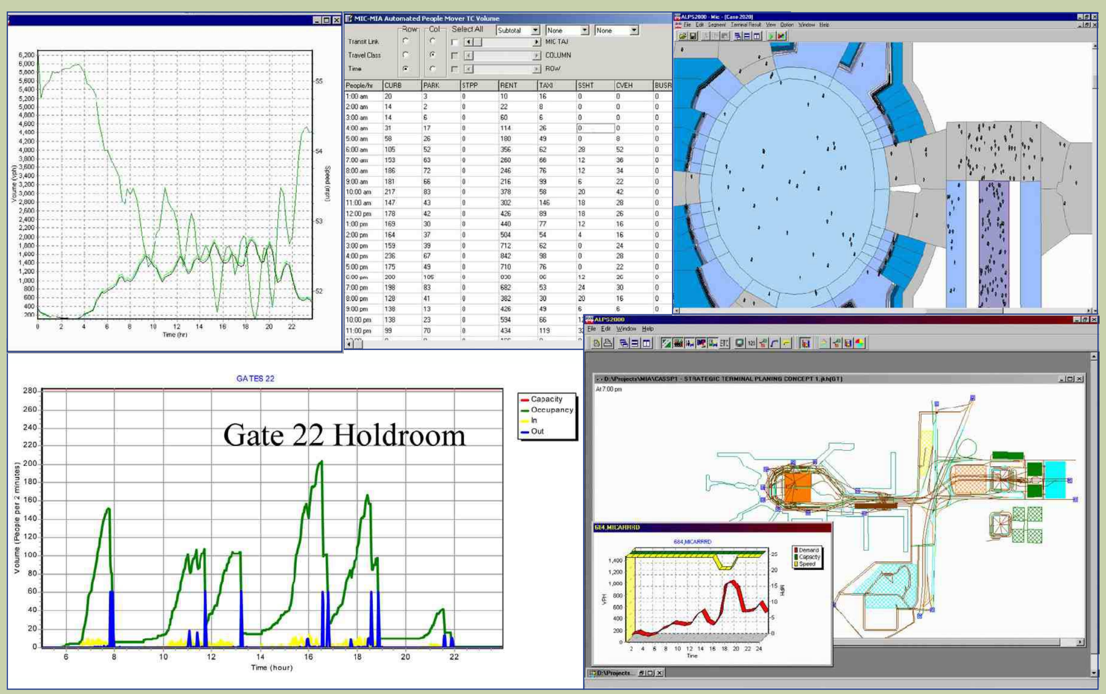
SIMULATE





Integrated Performance Analysis Tools for Rapid Case Study Comparisons

- Time-dependent route assignment for a 24-hour day
- "Pivot table" report capability
- Dynamic 2-D and 3-D animations
- Integrated graphs, charts, and summary statistics
- Delays, throughput, transit metrics, and traveler trip times

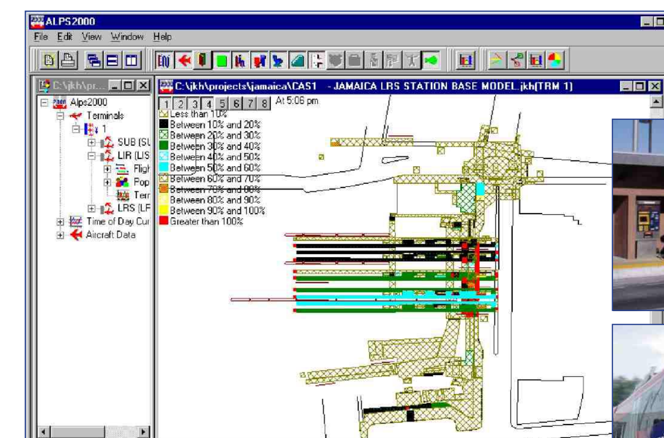


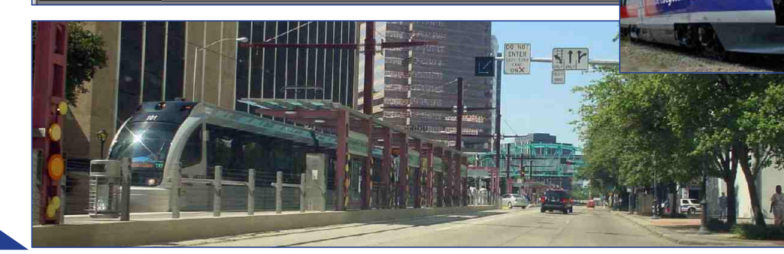
ANALYZE

TRANSIT

Analyze Transit Systems from A to Z

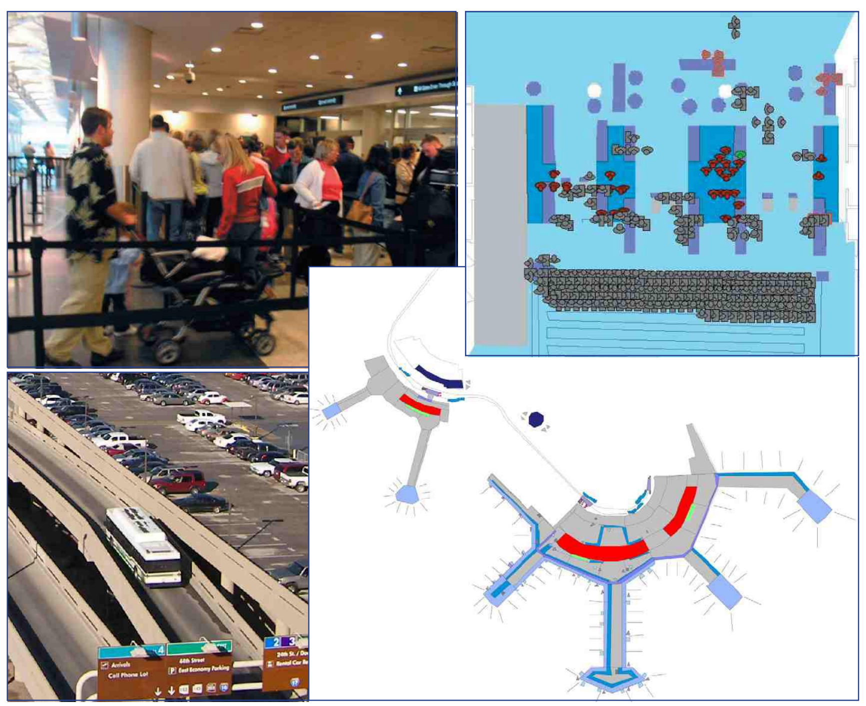
- Vehicle performance modeling
- Headway-based operations
- Schedule-based operations
- Dynamic demand-dispatch of vehicles (buses or PRT)
- At-grade BRT and LRT systems
- Fixed and moving block signaling
- Signal priority
- Intermodal linkage
- Propulsion modeling



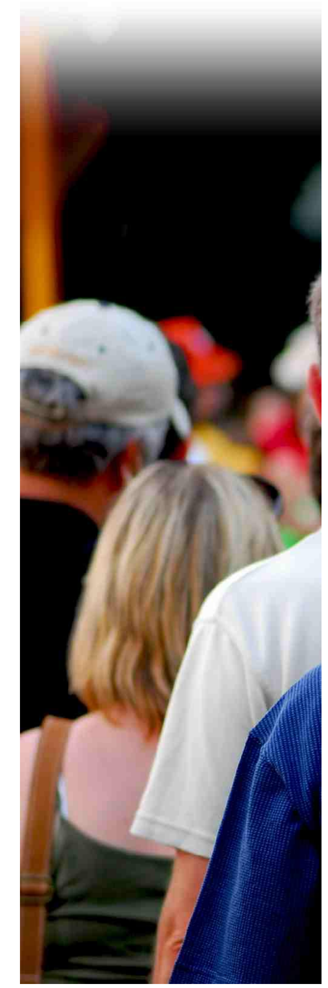


Comprehensive Airport Landside Simulations Driven by Flight Schedules

- Terminal operations
- Security lines
- Baggage and ticketing systems
- Curbside pick-up/drop-off
- Parking shuttles and rental cars
- Inter-terminal transit
- Methods also applicable to rail, ferry, and cruise terminals



AIRPORTS



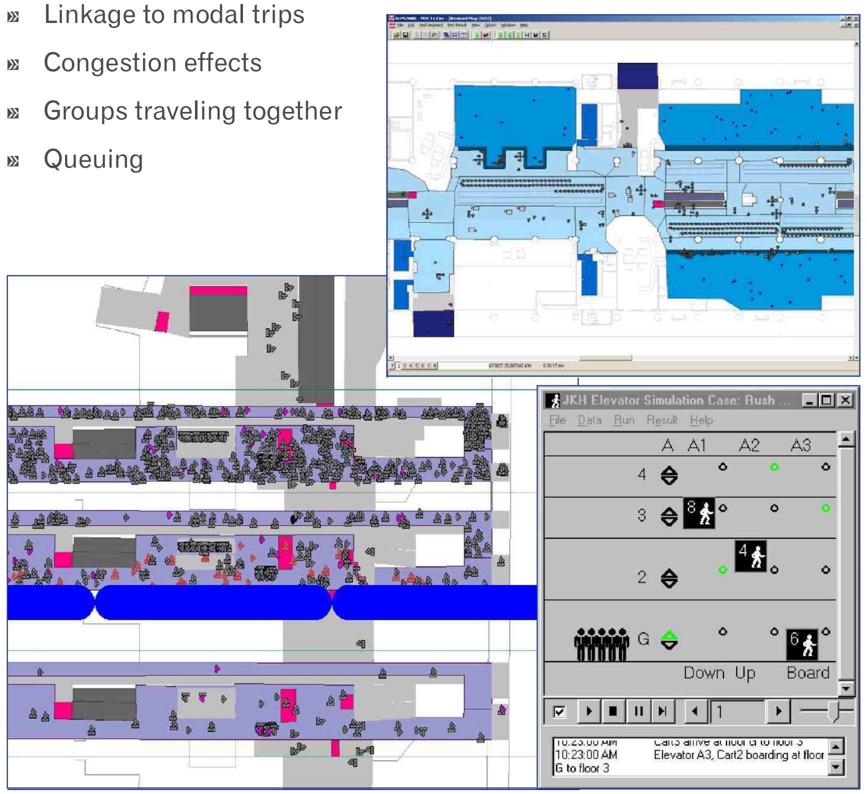
ACTIVITY CENTERS

Evaluate Alternative Strategies for Transportation Facilities at Major Activity Centers

- Stadiums
- Transit terminals
- Entertainment venues
- Convention centers
- Casinos
- Evacuation analysis
- Parking strategies
- Transit access
- Pedestrian usability

Person Trips are Tracked from Origin to Destination

- Dynamic pedestrian routing at intersections
- Conflicts with vehicles
- Linkage to modal trips
- Congestion effects
- Groups traveling together
- Queuing
- Vertical circulation
- Baggage and carts

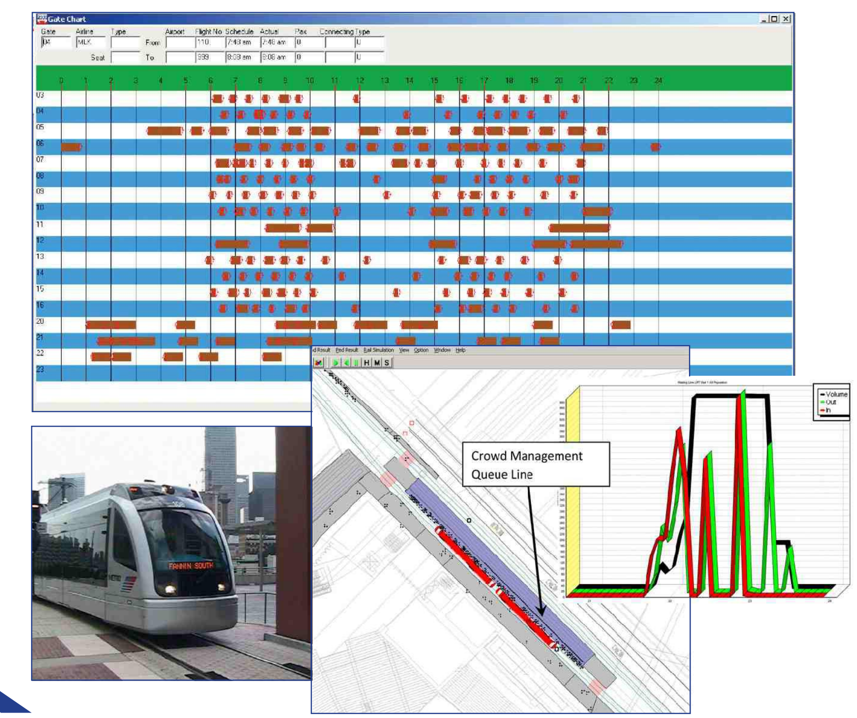


PEDESTRIANS

Analyze Fixed Guideway Systems of Any Design and Complexity

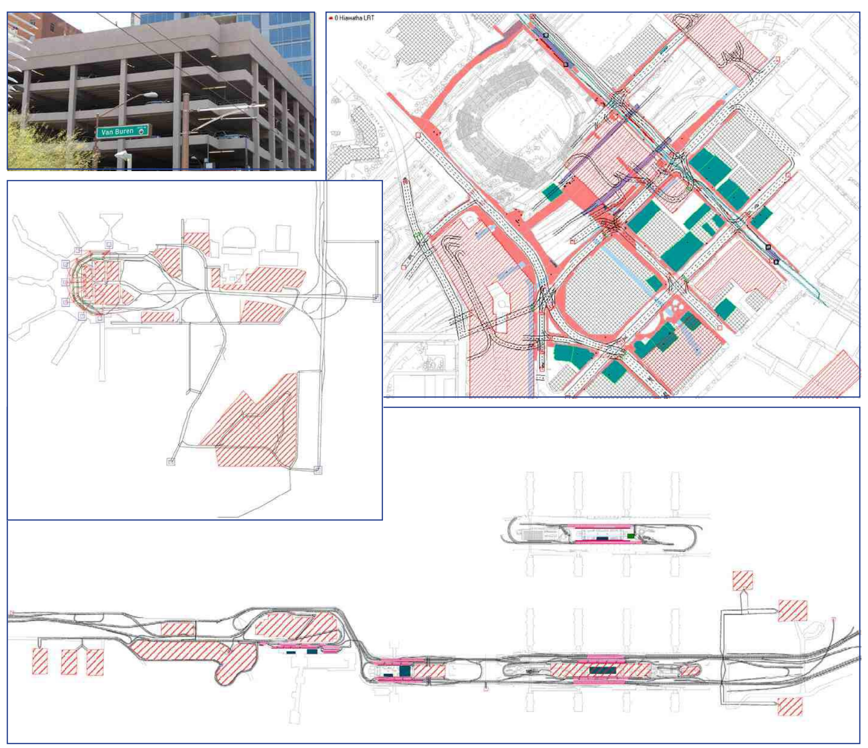
- Light and heavy rail transit
- Passenger and freight railroad
- Fixed and moving block control
- Automated guideway — APM/PRT
- Failure impacts/recovery
- Headway-based operations
- Schedule-based operations
- Platform passenger densities

RAIL

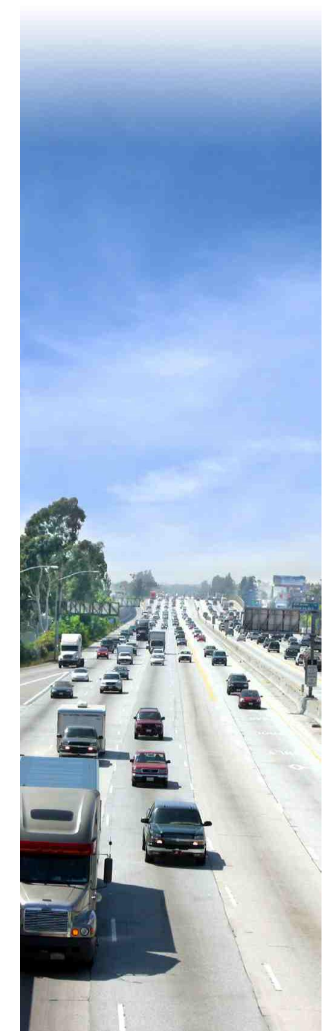


Evaluate Parking Facilities and the Search for Parking

- Dynamic search for closest lot
- Drivers can dynamically change lot choice when full
- Parking circulation on ramps
- Integrated with multi-modal person trip modeling



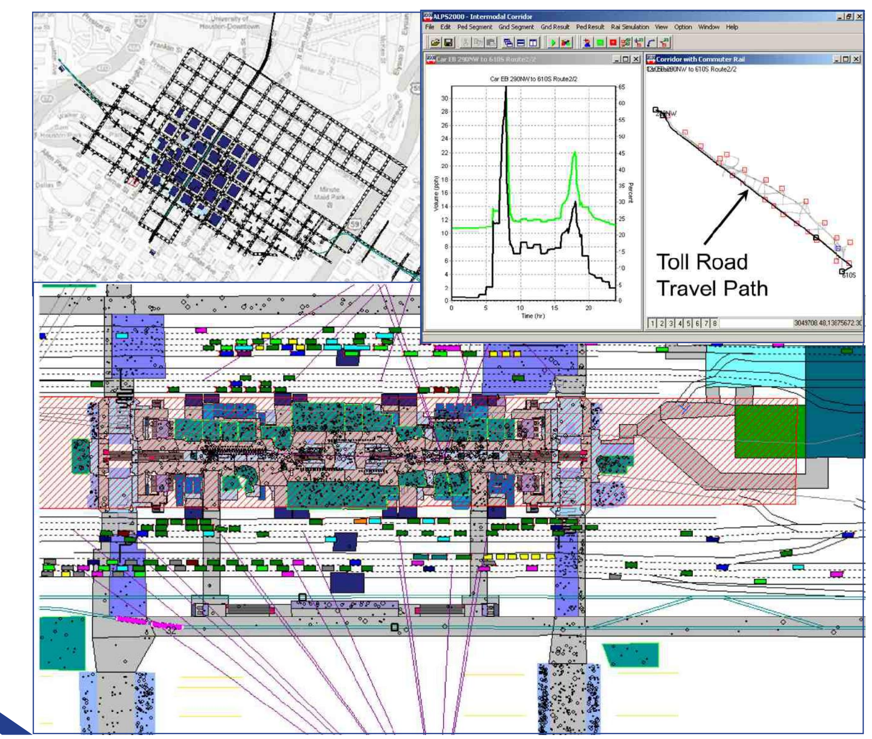
FACILITIES



ARTERIALS/FREEWAYS

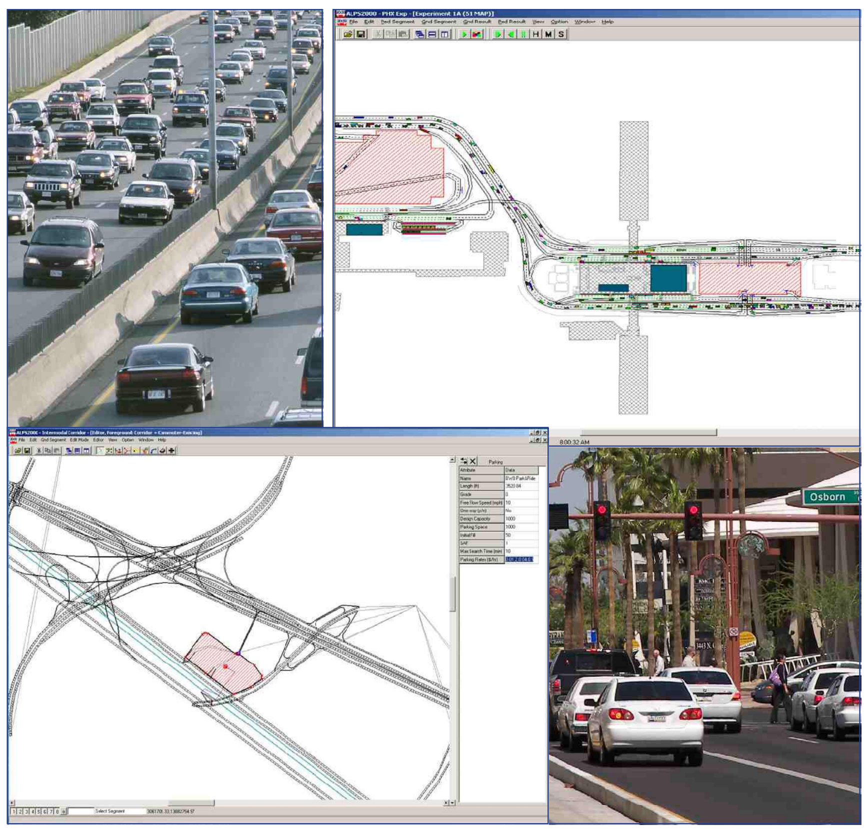
Mesoscopic and Microscopic Modeling of Vehicle Traffic and Mixed-Mode Operations

- Actuated-coordinated traffic signals
- Ramp meters
- Interchanges
- Car following, lane changing, and gap acceptance algorithms
- Transit priority
- Stop-controlled intersections

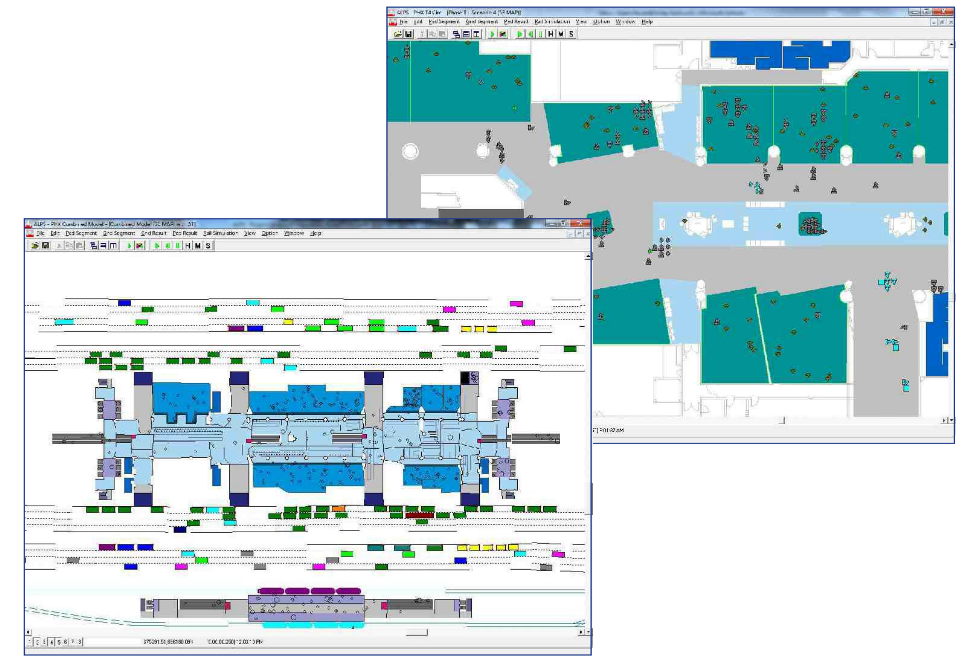


Vehicles of Every Type and Class

- Cars, light trucks, and vans
- Large trucks and double trailers
- Performance characteristics by class
- Interactions with pedestrians

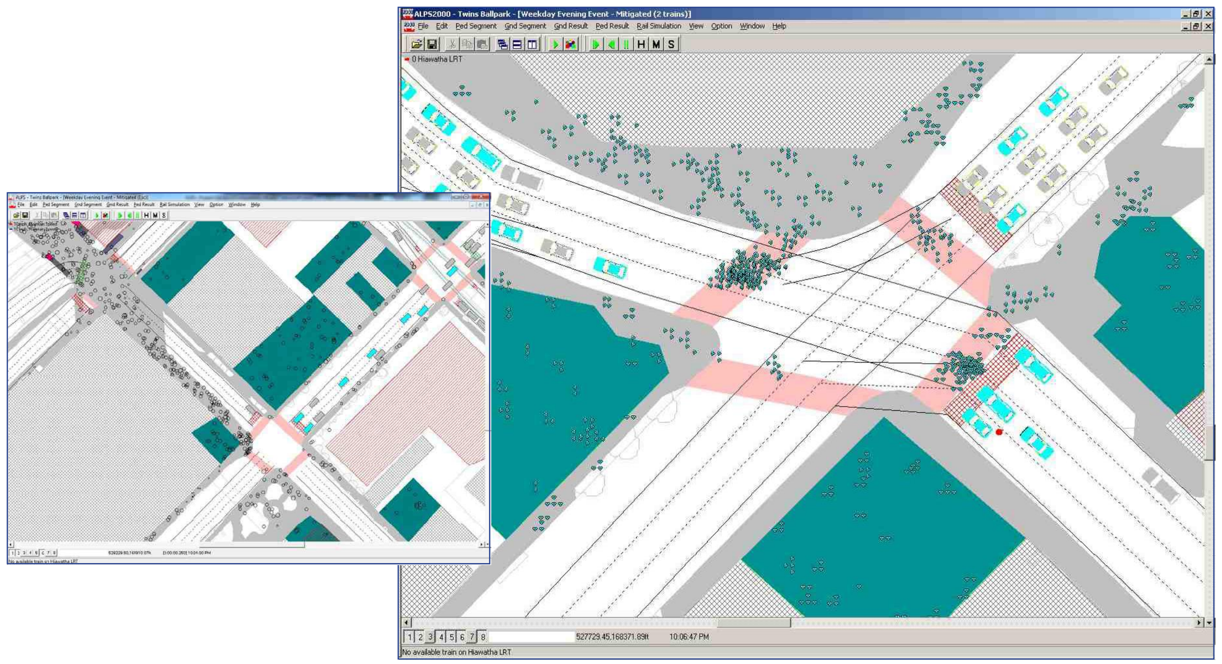


VEHICLES



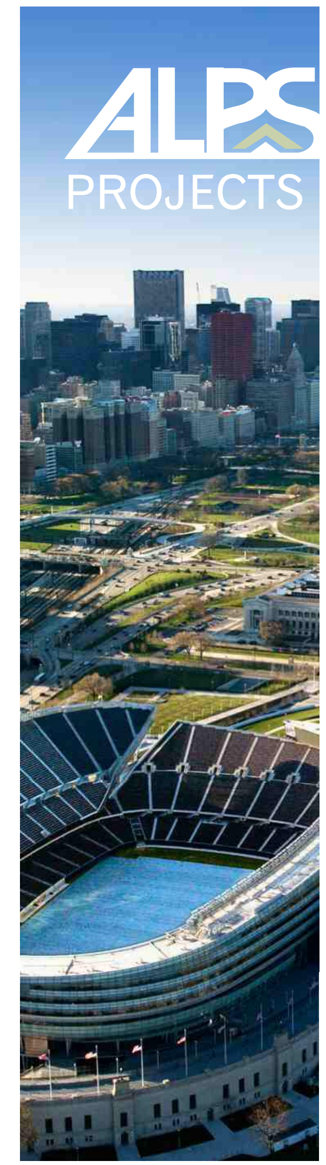
Phoenix Sky Harbor International Airport

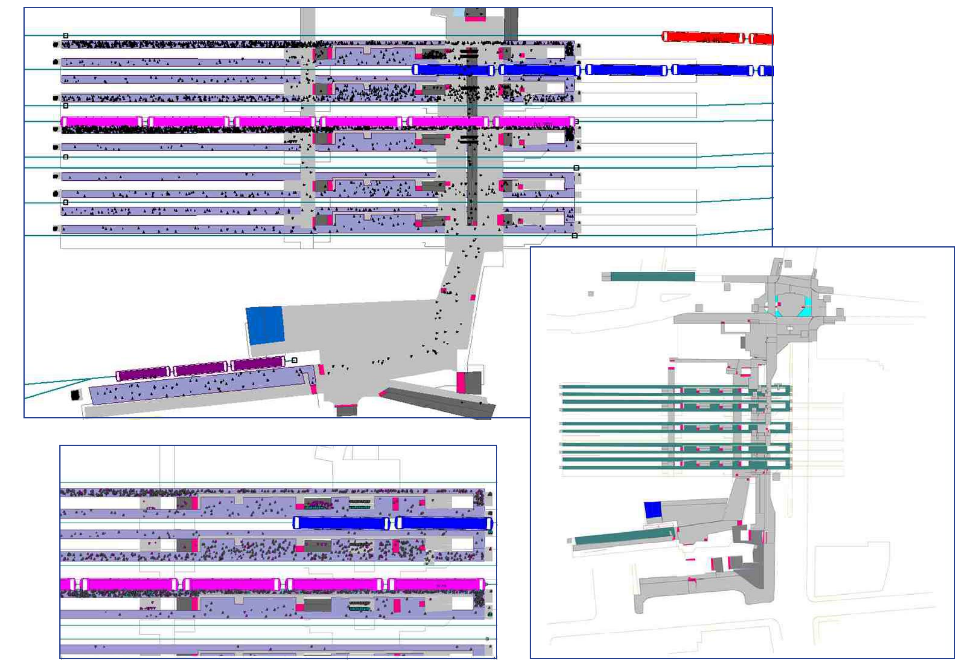
- Evaluated multiple roadway/ configuration alternatives
- Identified solutions for traffic choke points on-airport which were subsequently fixed
- Evaluated vertical circulation problem areas in existing facilities related to introduction of new APM system platform
- Analyzed potential traffic congestion reduction (on- and off-airport) due to installation of APM system



Minneapolis Target Field Pedestrian and Transit Simulation Modeling

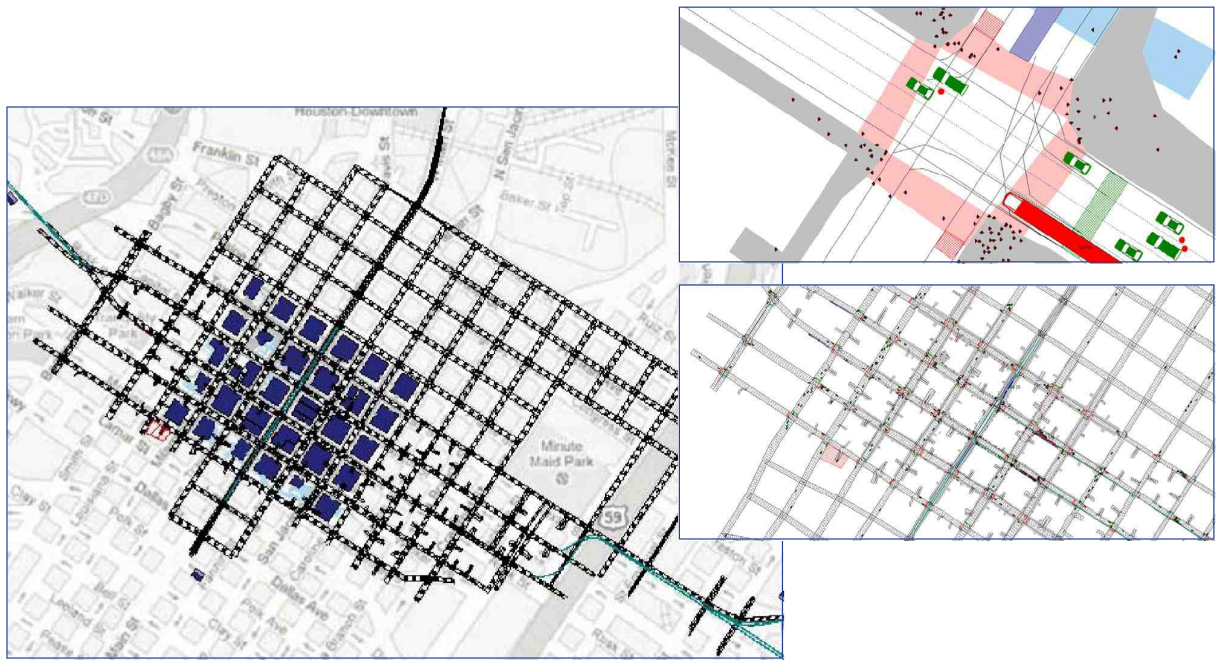
- Evaluated game-day conditions for the ballpark patrons' pedestrian and transit experience
- Simulated all roadways, parking facilities, pedestrian environments, and transit operations
- Modeled the effect of urban context with mixed-used development and new intermodal transit station
- Analytically and visually assessed alternative facilities, configurations, and operating plans





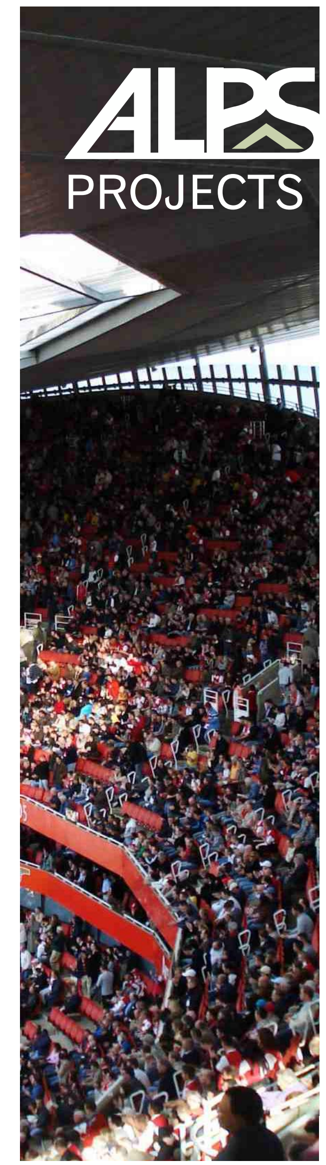
New York Jamaica Station at Kennedy International Airport

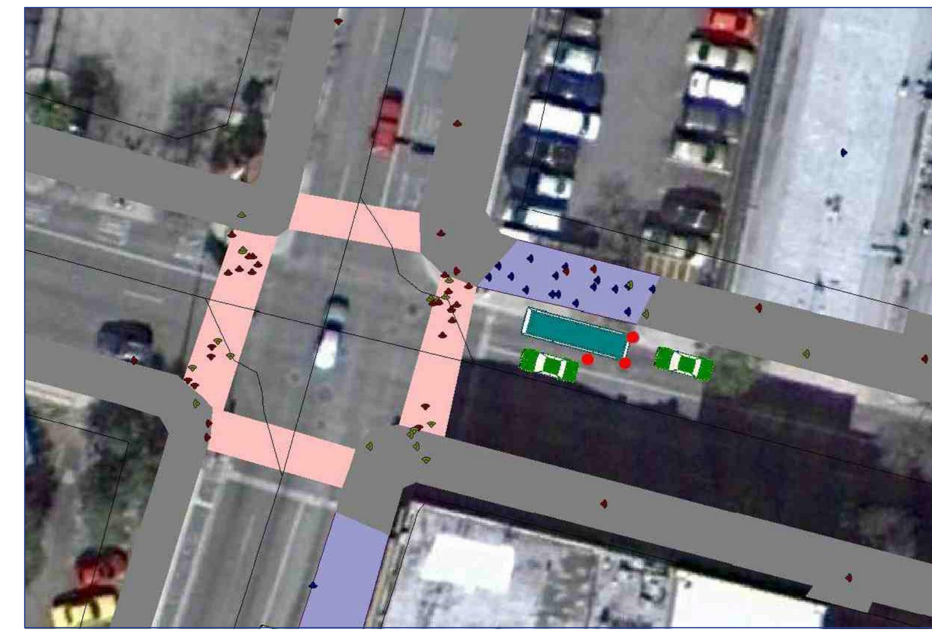
- Analyzed pedestrian activity at major intermodal rail station
- Train schedules and traffic patterns drove pedestrian operations at station
- Evaluated vertical circulation, corridor and boarding platform capacity
- Assessed AirTrain service headways and station passenger densities



Houston Downtown Light Rail System

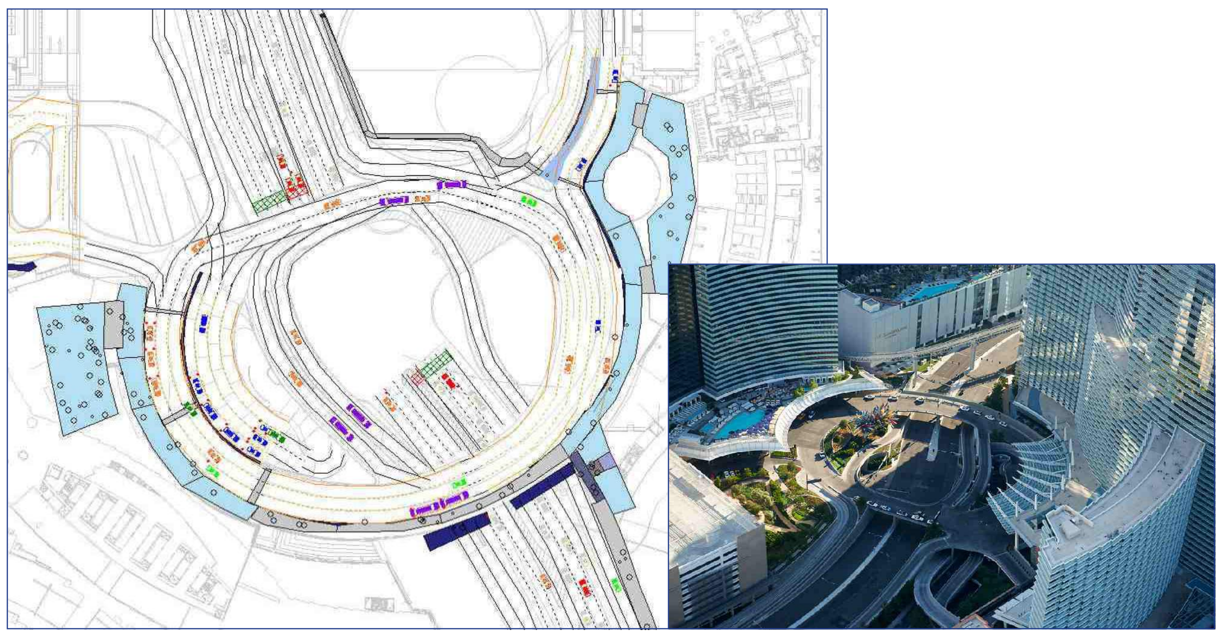
- Analyzed trip generation and travel path assignment for pedestrians and street traffic
- ALPS synthesized turning movement patterns for additional traffic analyses with other tools
- Analyzed 24/7 pedestrian activity for LRT station platforms, crosswalks, and queuing areas
- Modeled pedestrian interactions with traffic, LRT, signals, and underground pedestrian tunnels





San Antonio Downtown Bus and Pedestrian Operations

- Analyzed 165,000 pedestrian trips through the multi-modal system over the day
- Simulated 40 converging bus routes through downtown street grid
- Evaluated boarding, alighting, and transfer activity at shared bus stops
- Compared pedestrian densities for alternative scenarios of bus route configurations



Las Vegas CityCenter — Harmon Place Porte-Cochere

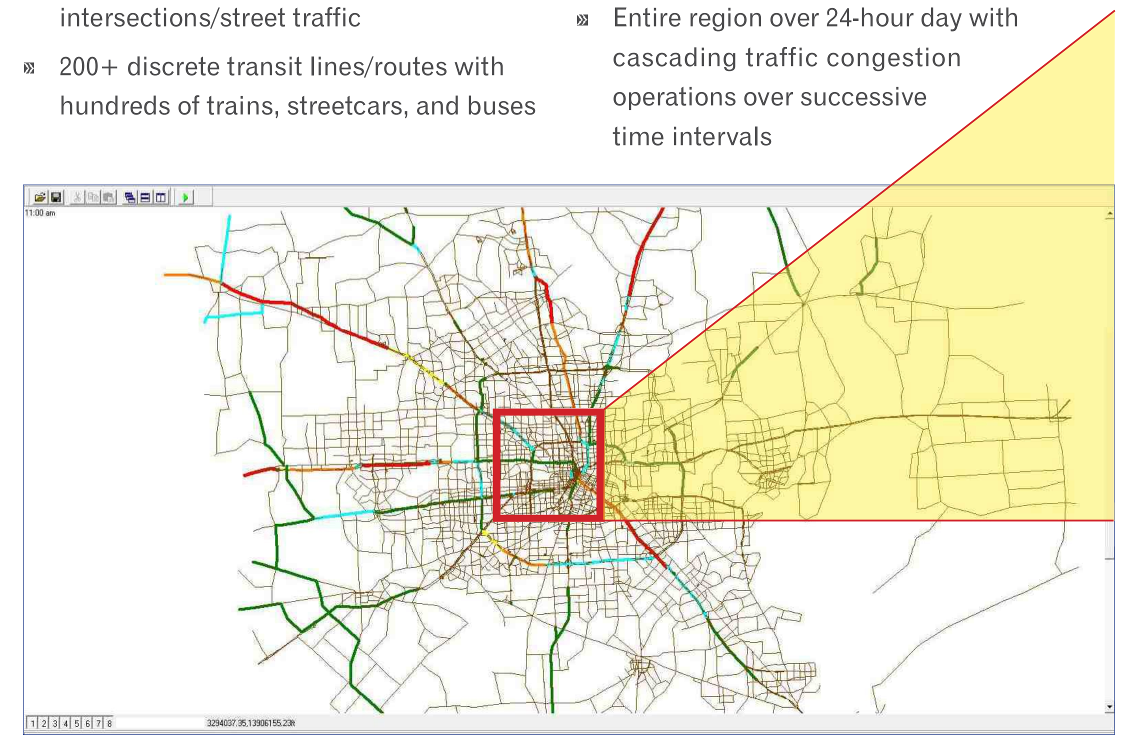
- Analyzed complex front door operations in a combined traffic circle/curbfront for two hotels
- Modeled valet pick-up and drop-off with platooning (valet holding) operations
- Evaluated private automobile and taxi/limo curbfront operations
- Detailed simulation of taxi and valet vehicle queuing

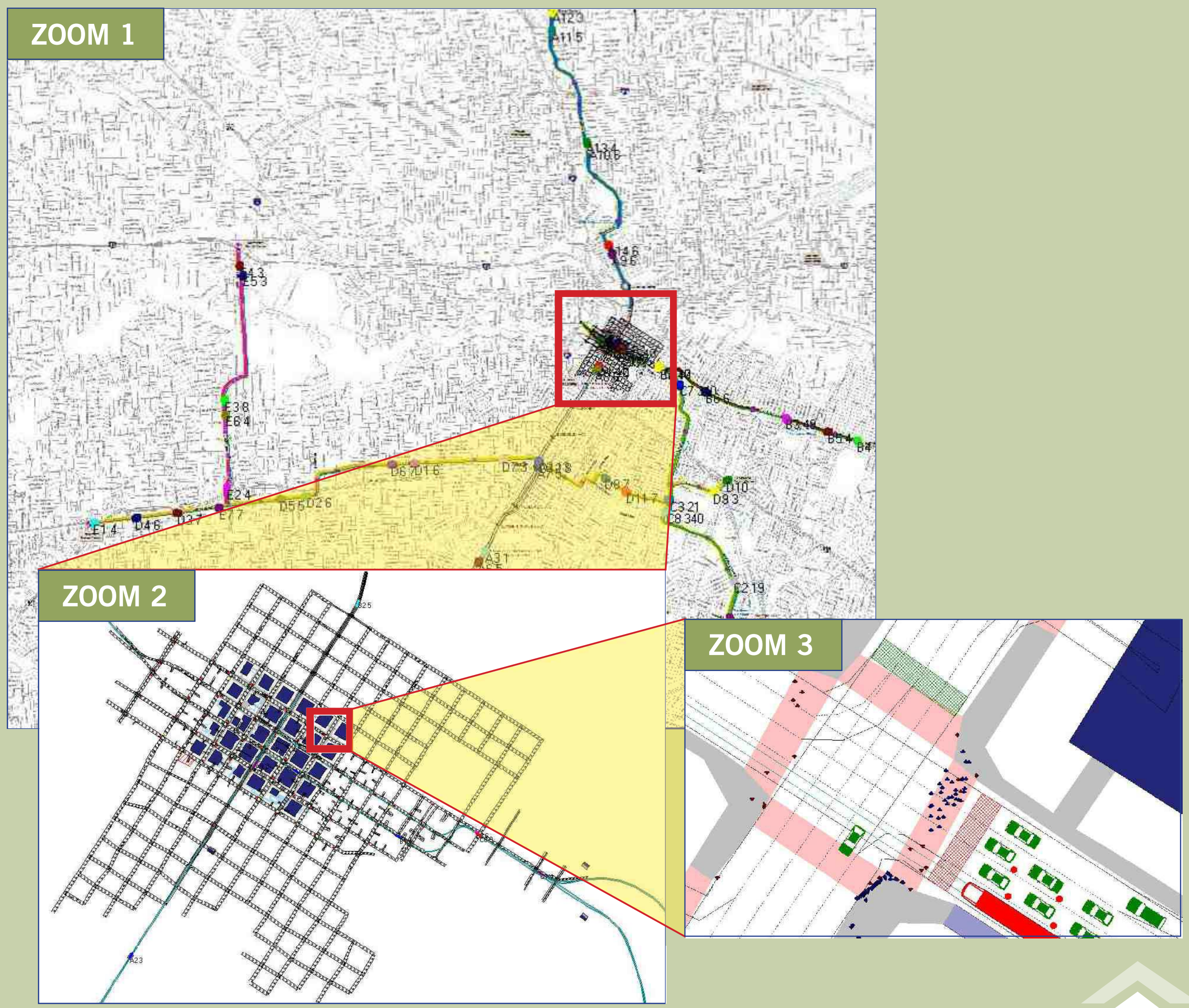
LARGE-SCALE MODELING

Large-Scale Multi-Modal Transportation Systems

ALPS hybrid models incorporating integrated macroscopic, mesoscopic, and microscopic modeling processes can be applied to cover large-scale multi-modal systems.

- 200,000+ pedestrians
- 200+ square city blocks of signalized intersections/street traffic
- 200+ discrete transit lines/routes with hundreds of trains, streetcars, and buses
- 100+ miles of freeways, highways, and arterials in one animated analysis
- Entire region over 24-hour day with cascading traffic congestion operations over successive time intervals





INTEGRATED SERVICES

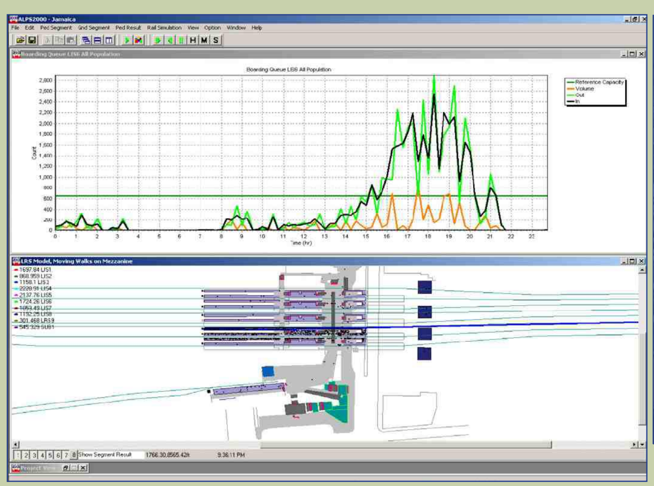
ALPS Your Team of Experts

Kimley-Horn is a national leader in transportation planning, modeling, and simulation. Let our experts successfully manage your modeling application with ALPS from start to finish, or anywhere in between.

- Project management
- Modeling support
- Turn-key modeling and analysis
- Training and support

ALPS Continues to Evolve Every Year with Client Needs!

- D4™ traffic signal control
- Integrated dynamic traffic assignment
- Toll plaza modeling
- Synchro integration
- Roundabouts



NEW FEATURES

Kimley-Horn Office Locations

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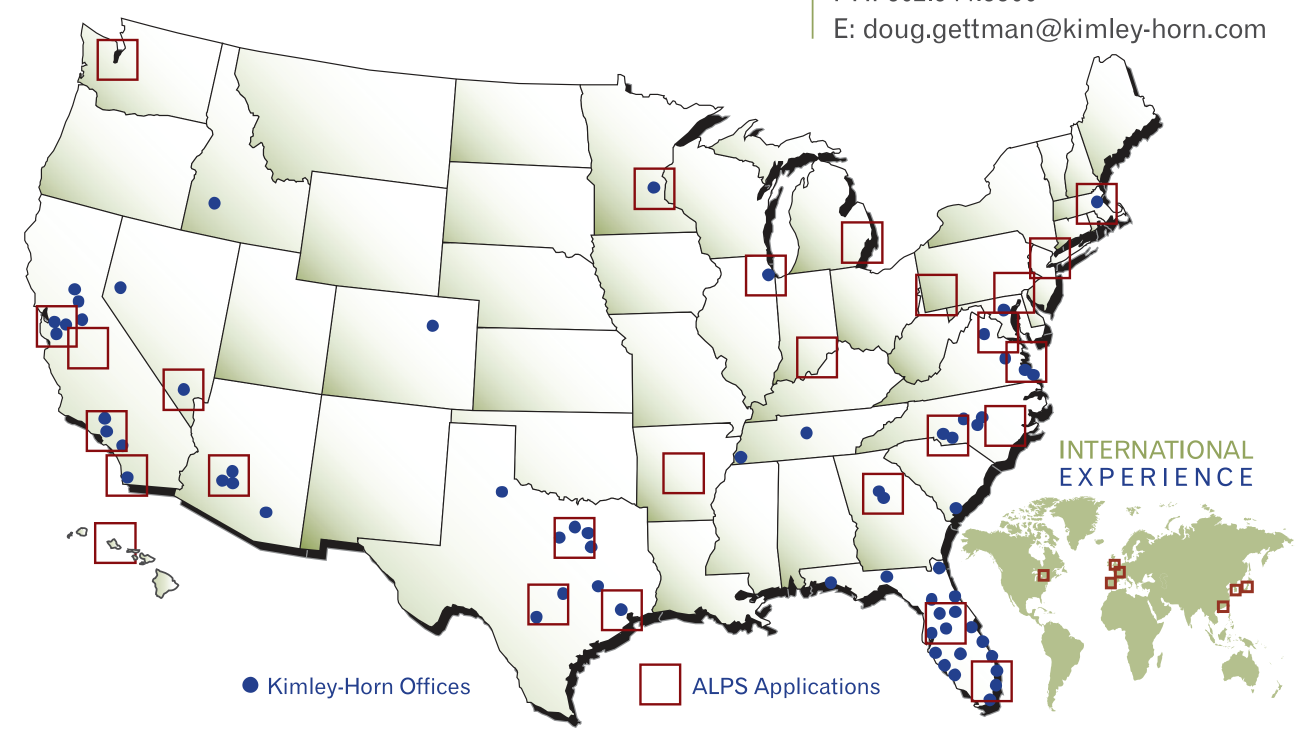

ALPS Simulating *Peak* Performance

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