Sustainability and the Transportation System

A Study for the Miami-Dade MPO

JACOBS

MIAMI-DADE MPO
Metropolitan Planning Organization

Mobility Management

Strategies:
Managed lanes/High Occupancy Toll lanes
Transit & fare policy
Variable parking pricing
Advanced traveler information
Freight operational improvements

Miami-Dade County

Linkages

Strategies:
Transit Oriented Development
Smart Growth
Complete Streets

Multimodal

Strategies:
Arterial Bus Rapid Transit
Transit Signal Priority
Improved rider information
Bus shelters
Park-and-Ride lots
Ridesharing
Telecommuting
Car-sharing
Biking initiatives/programs

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Presenters

Wilson Fernandez
Transportation Systems Manager, Miami-Dade MPO

Leigh Ann Nichols, PE, PTOE
Transportation Engineer, Jacobs

Jill Quigley, AICP
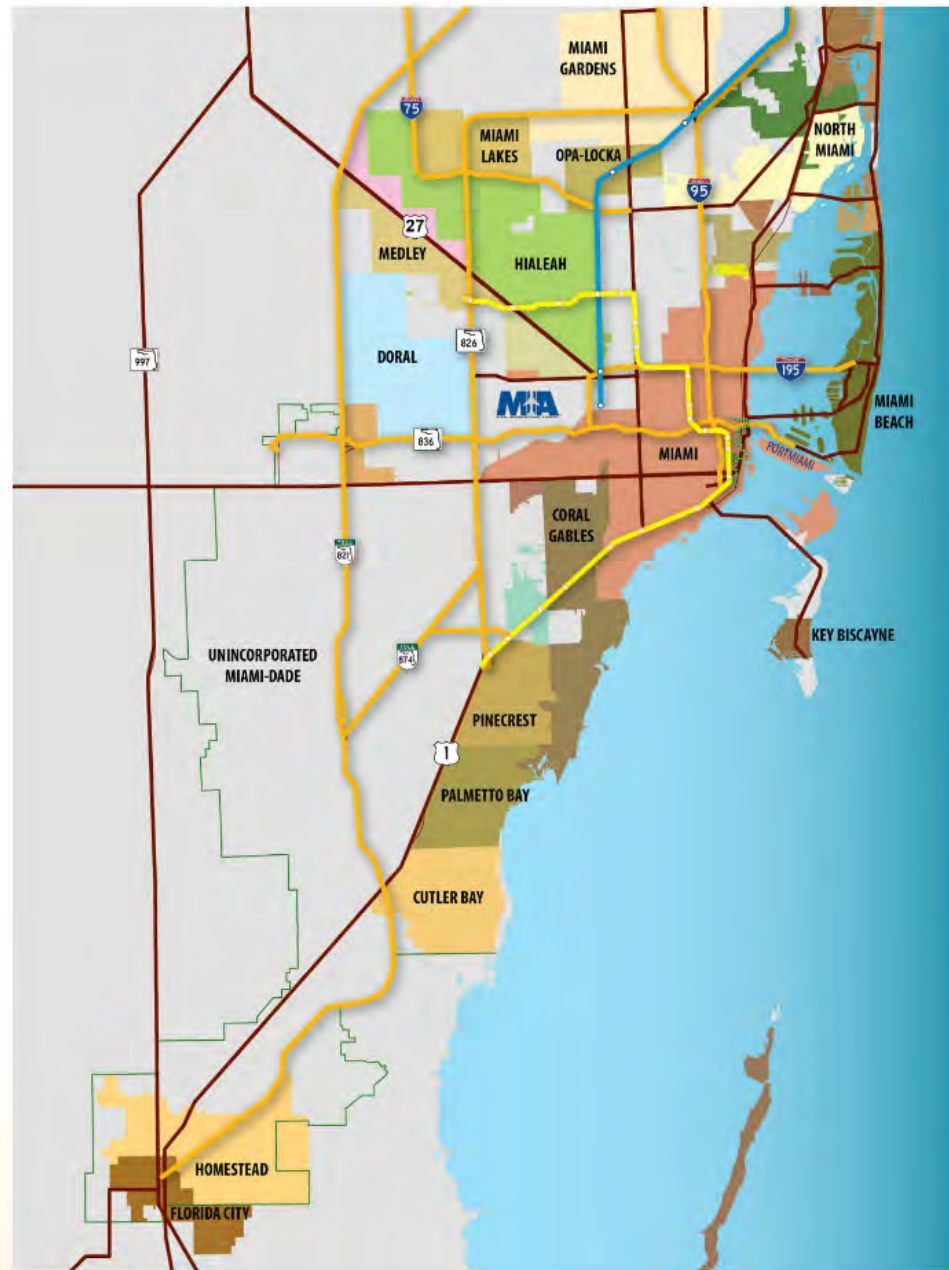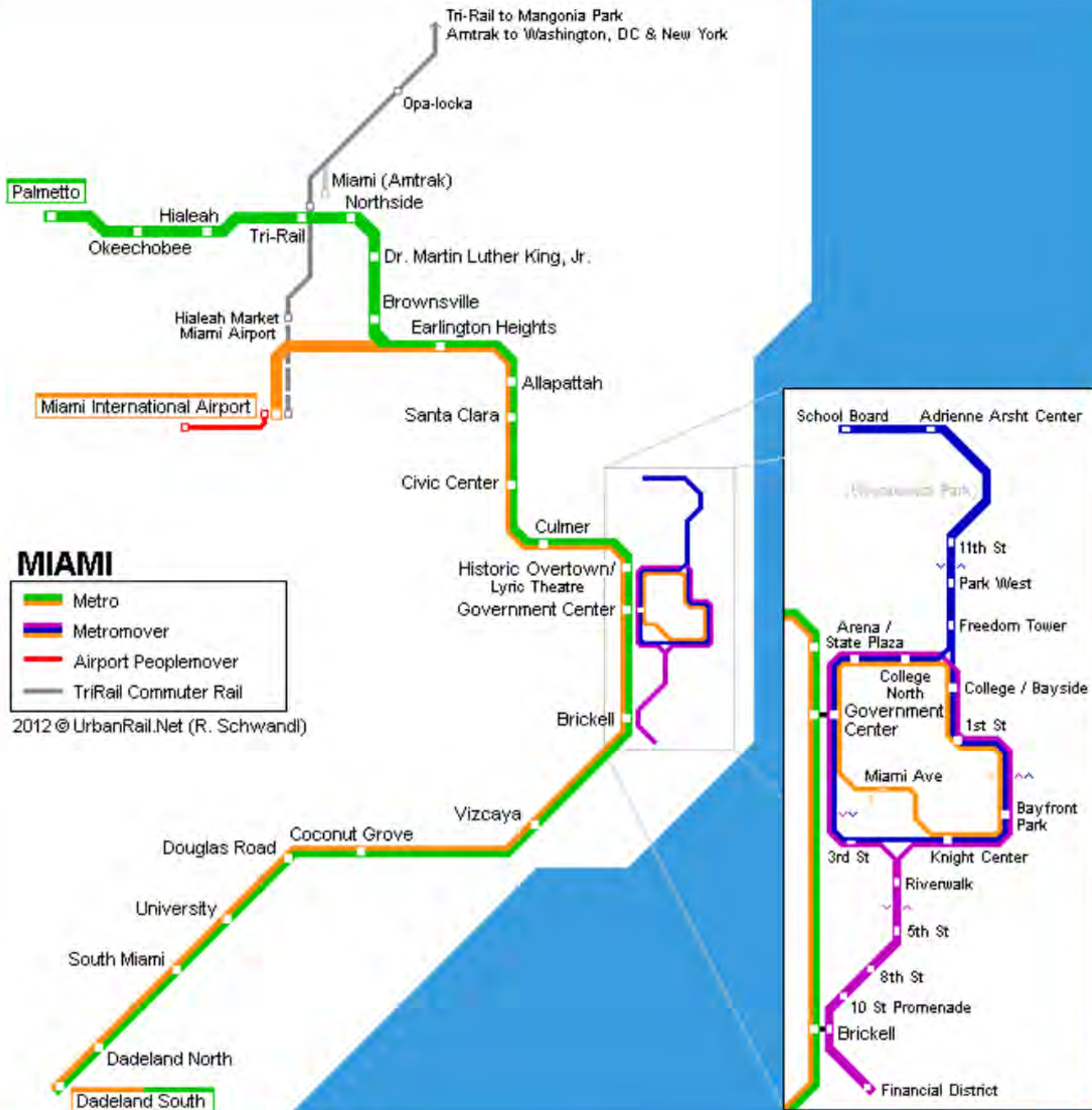Transportation Planner, Jacobs

Miami-Dade County

Tri-Rail to Mangonia Park
Amtrak to Washington, DC & New York

Opa-locka

Palmetto

Miami (Amtrak)
Northside

Hialeah
Okeechobee
Tri-Rail

Dr. Martin Luther King, Jr.

Brownsville
Earlington Heights

Hialeah Market
Miami Airport

Miami International Airport

Allapattah

Santa Clara

Civic Center

Culmer

MIAMI

	Metro
	Metromover
	Airport Peoplemover
	TriRail Commuter Rail

2012 © UrbanRail.Net (R. Schwandl)

Historic Overtown/
Lyric Theatre
Government Center

Brickell

Vizcaya

Coconut Grove
Douglas Road

University

South Miami

Dadeland North

Dadeland South

School Board   Adrienne Arsht Center

(Bicentennial Park)

11th St

Park West

Freedom Tower

Arena /
State Plaza

College / Bayside

College
North
Government
Center

1st St

Miami Ave

Bayfront
Park

3rd St   Knight Center

Riverwalk

5th St

8th St

10 St Promenade
Brickell

Financial District

2010 Census Population
was just under 2.5 million

Over 5,500 lane miles of roadways

Over 8.7 million trips per day

93 bus routes with 829 buses
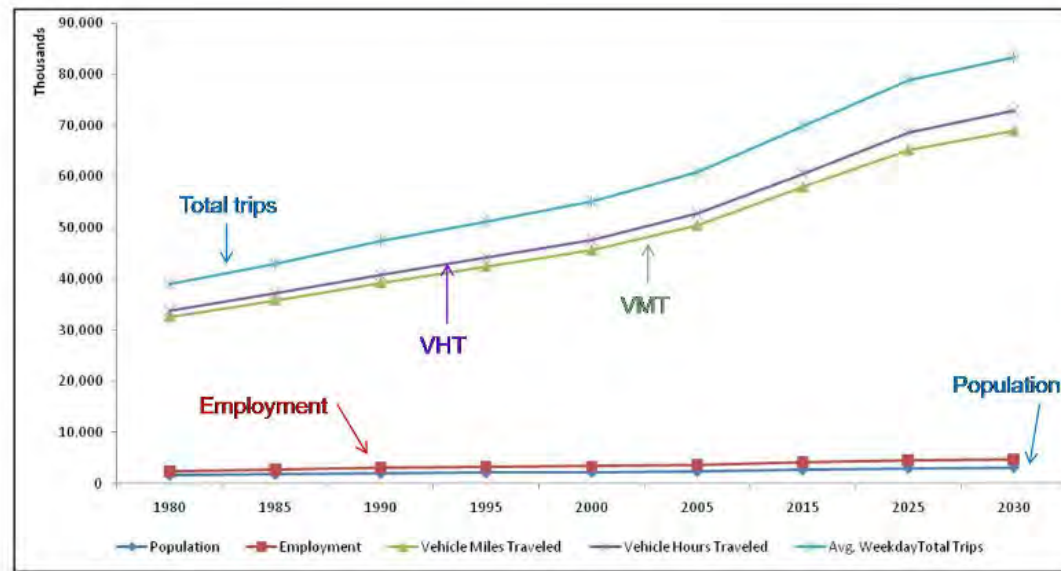Over 78 million trips per year

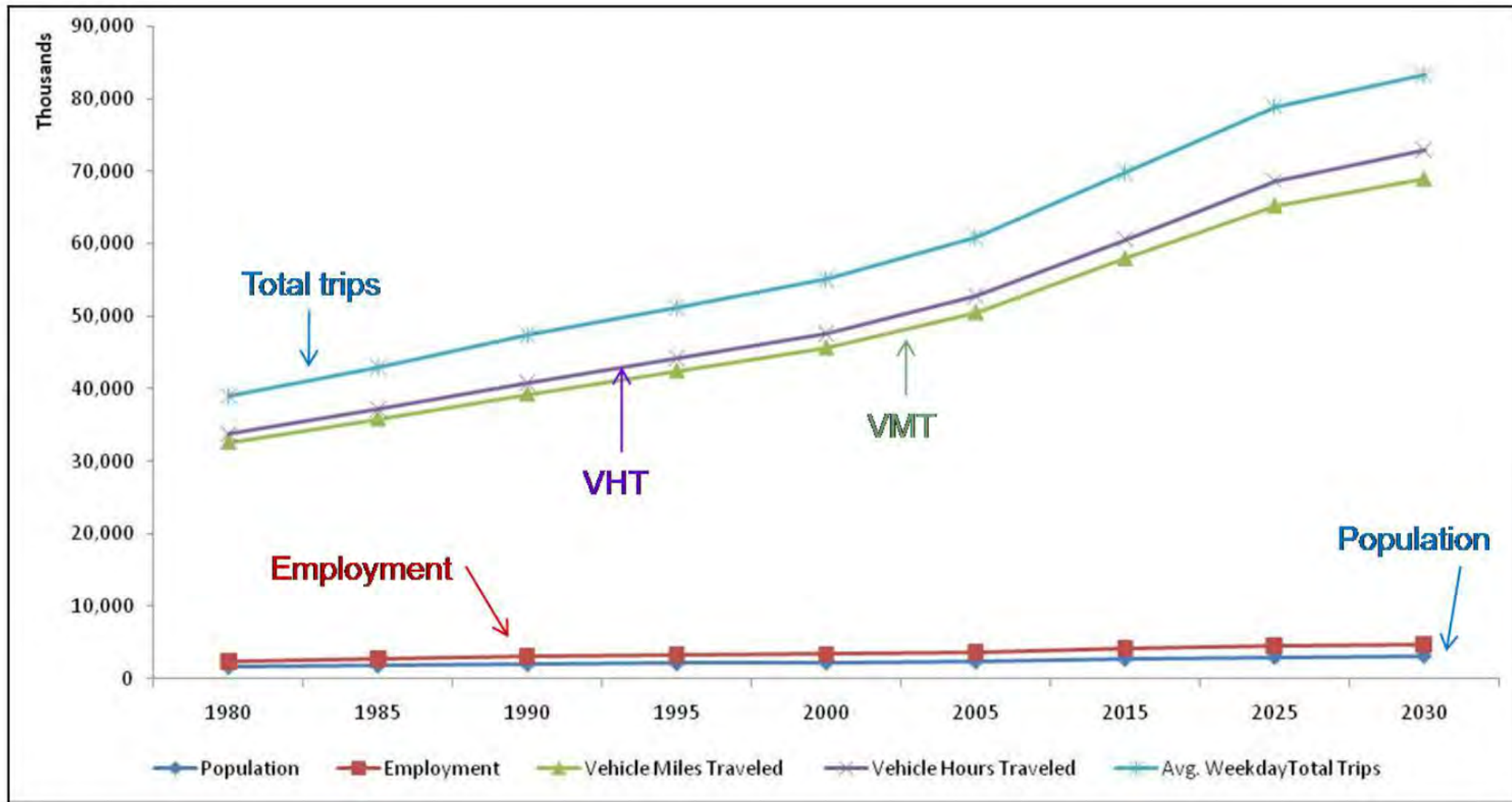25 miles of heavy rail (Metrorail)
Over 18 million trips per year

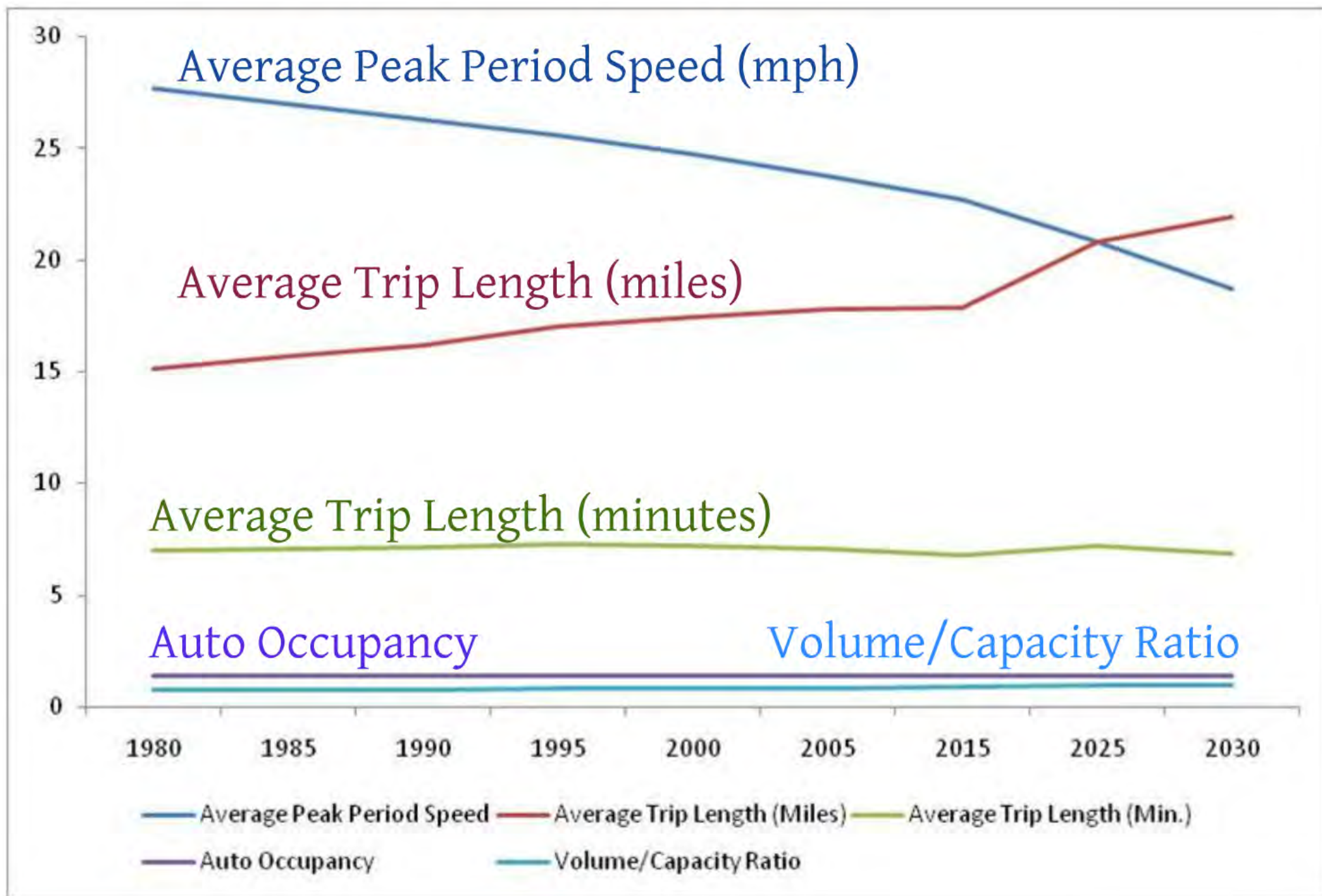8.5 miles of automated guideway
(Metromover)
Over 9 million trips per year

The Case for Sustainability

The Case for Sustainability

Average Peak Period Speed (mph)
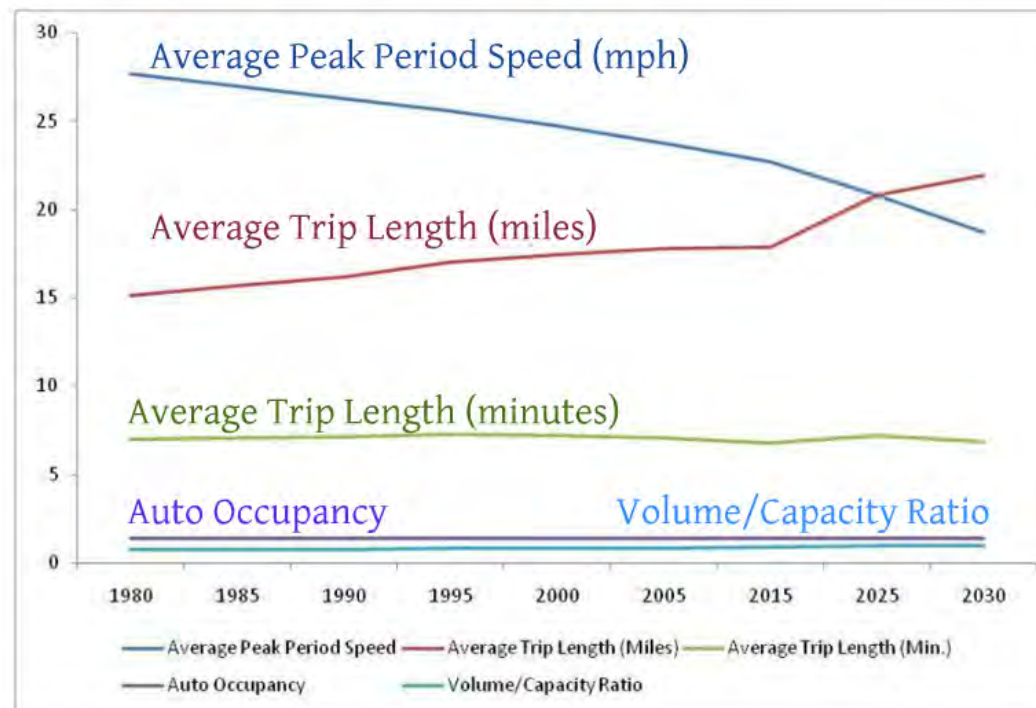
Purpose of this Study

To develop a sustainable transportation system by examining different strategies that affect travel demand.

Objective

To investigate sustainable strategies and their effect on travel behavior.

What does it mean when we say, "Sustainable Transportation System?"

Common thoughts:

- Resilient to sea-level change
- Uses alternative fuels
- Multimodal

How we defined it for this study:

A transportation system that is able to meet today's needs and those of the future using the existing and committed infrastructure identified in the 2035 Long Range Transportation Plan.

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Rules of the Game

1. Little to no capital cost outlay.

2. Each scenario has a unique set of strategies.

3. Strategies must be focused on changing travel demand and must be under the realm of influence of Miami-Dade County.

4. Evaluation of impacts will be based on 2035 LRTP metrics.

Step 1: Literature Review

Portland, OR
- Parking management
- Travel auditors
- Public transportation
- TOD & TPRs (parking)

San Francisco, CA
- SFpark
- BART
- Parking maximums

Bogota, Columbia
- BRT
- Focused development along transportation corridors
- Ciclovia & pedestrian boulevards

London, England
- Congestion pricing
- Travel planning
- Public transportation
- Complete streets
- Improve roadway performance
- Cycle Superhighways

Travel Demand Strategies

Groups

Pricing/Behavior
Efficient Resource Utilization
Transit, Pedestrian & Bicycle

Pricing & Behavior

Variable pricing
Cordon tolling
Parking management
Parking cash-out
Mileage based fees

Variable work hours
Telecommuting
Ridesharing
Park-and-Ride
Real-time information
Ramp metering

Resource Utilization

Smart Growth

Transit Oriented Development

Prioritize repair & performance

Transit, Pedestrian & Bicycle

Encourage Transit Use

- Fare policy
- Transit priority
- Comfort & convenience
- Rider information

Support Non-Motorized Transportation

Complete Streets

Step 2: Screening of Strategies

Tier 1 - Agreement with Local Plans

Tier 2 - Prioritization within Local Context

- Effectiveness
- Ease of implementation
- Appropriateness

Screening Results

21 of 53 strategies remained

#1 for Effectiveness - Smart Growth

#1 for Implementation - Rider Information

#1 for Appropriateness - Smart Growth

Overall
1. Rider Information
2. Park-and-Ride Lots
3. Smart Growth

Step 3: Develop Scenarios

3 Groups of Strategies

Pricing/Behavior Scenario

Efficient Use of Resources Scenario

Transit, Pedestrian & Bicycle Scenario

Mobility Management

Strategies:
Managed lanes/High Occupancy Toll lanes

Transit & fare policy

Variable parking pricing

Advanced traveler information

Freight operational improvements

Miami-Dade County

Linkages

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Multimodal

Strategies
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Transit Signal Priority
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Telecommuting
Car-sharing
Biking initiatives/programs

Step 4: Evaluation

Regional travel demand model

- Vehicle miles traveled (VMT)
- Vehicle hours traveled (VHT)
- Delay or congestion
- Mode split
- Transit ridership
- Trip length

Off-model

- Greenhouse gas emissions
- Energy consumption
- Productivity
- Equity

Travel Demand

What is travel demand?

Travel demand is the result of thousands of individual travelers making decisions on where, when and how to travel.

The projected demand is generally expressed in terms of forecasted traffic volumes and transit ridership.

What is a Travel Demand Forecast?

Process of quantifying future travel demand, as it responds to the effects of various policies, programs, and projects on highway and transit facilities.

Usually done by means of a Travel Demand Model.

What is a Travel Demand Model?

A series of mathematical equations aimed to represent how people make choices when traveling.

Simplification - through mathematical relationships - of human behavior making these choices.

What will our community look like in the future?

What will be the travel patterns in the future?

What will be the effects of this travel?

What will our community look like in the future?
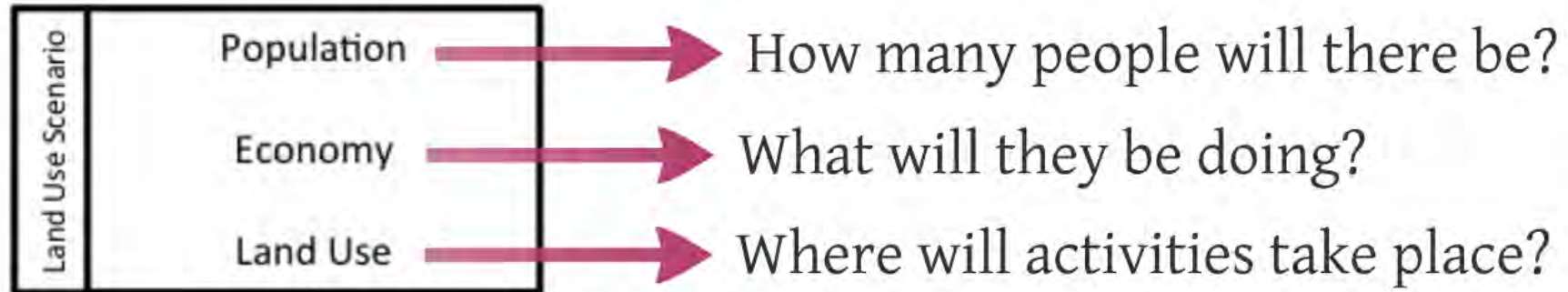
Land Use Scenario

Population → How many people will there be?

Economy → What will they be doing?

Land Use → Where will activities take place?

What will be the travel patterns in the future?

What will be the effects of this travel?

What will the travel patterns be in the future?

Land Use Scenario

Population

Economy

Land Use

Travel Forecast

Trip Generation → How many trips will be made?

Trip Distribution → Where will the trips be going?

Mode Split → What modes will be used?

Trip Assignment → What routes will be used?
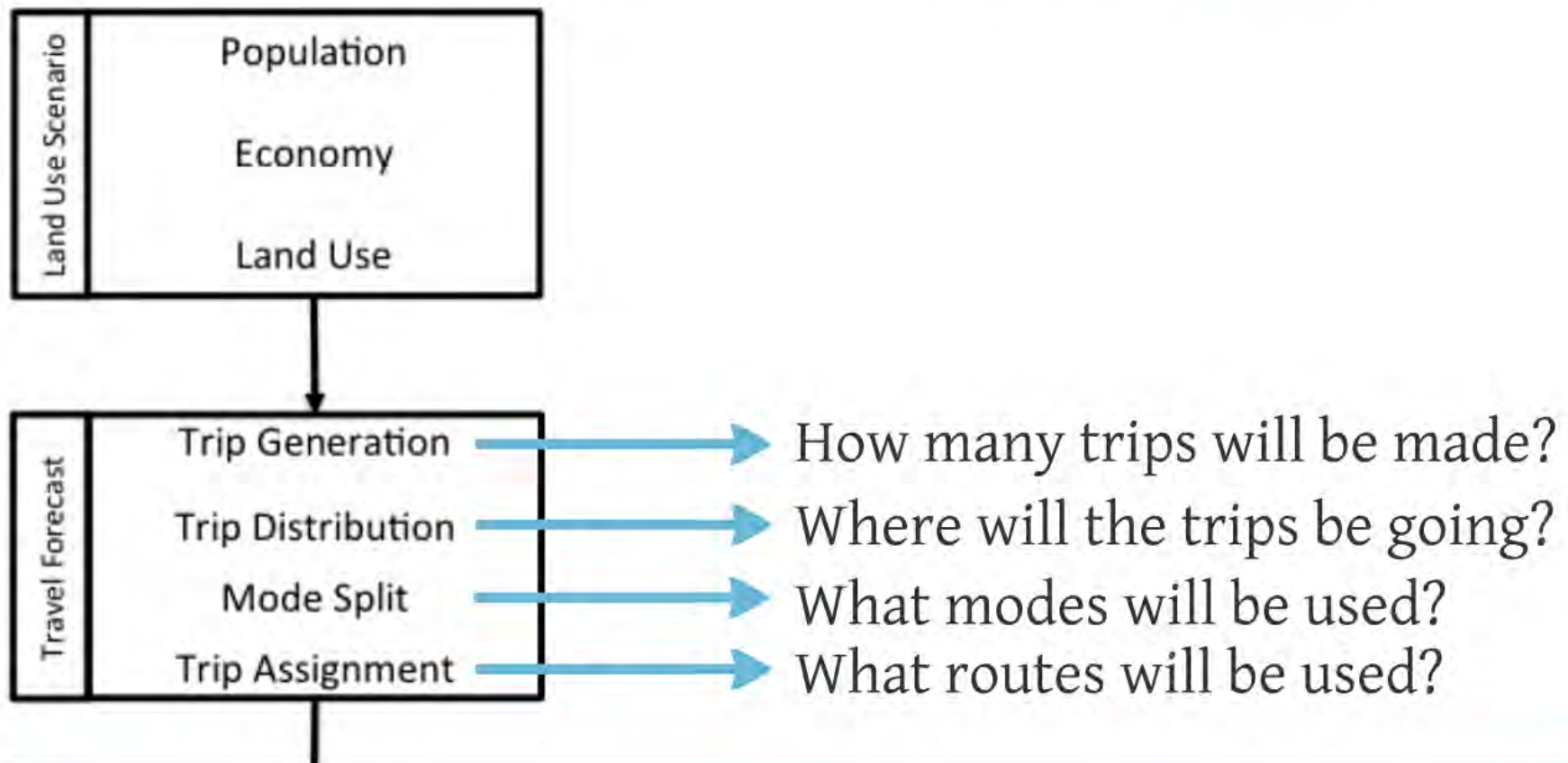
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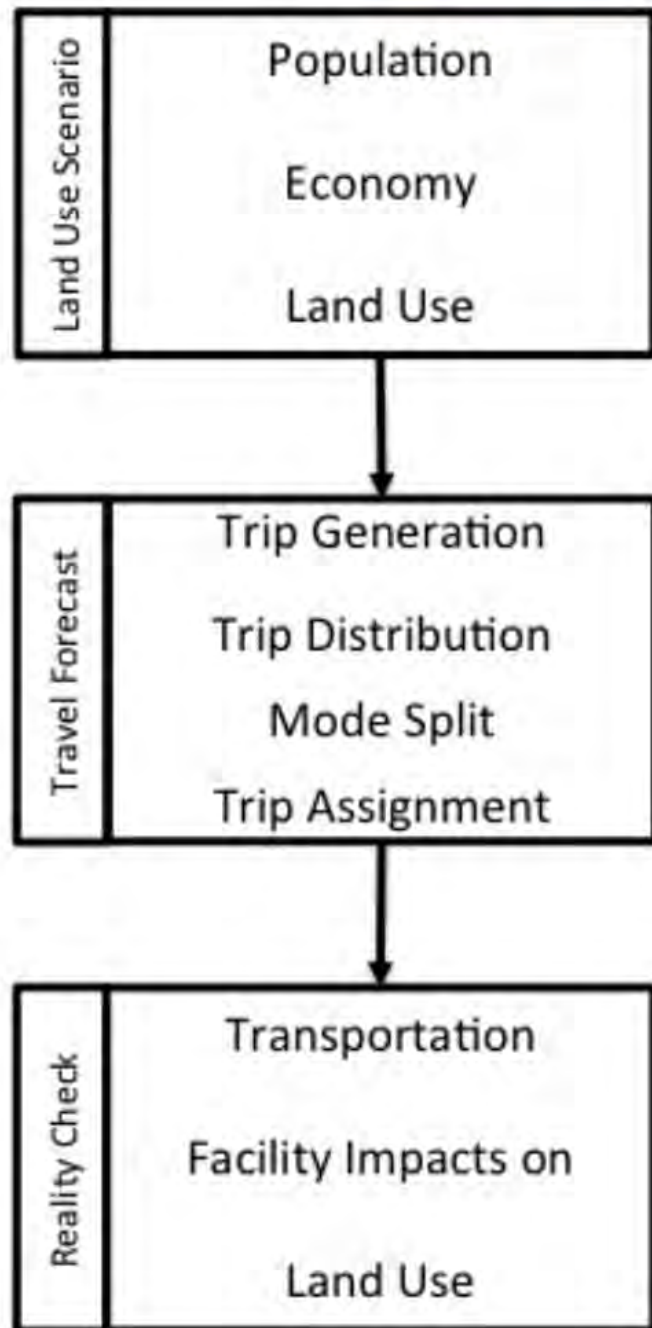
- *Levels of congestion*
- *Travel times and speed of travel*
- *Vehicle miles of travel*
- *Other effects: air pollutant emissions*

Socio-Economic Data

Activities

Travel DEMAND

Roadway & Transit

Network

Service Type

Travel SUPPLY

Analysis Performed

Demand
- SE Data Allocation (Linkages)

Supply
- Transit Attractiveness (Multimodal)
- Roadway Discouragement (Mobility Management)
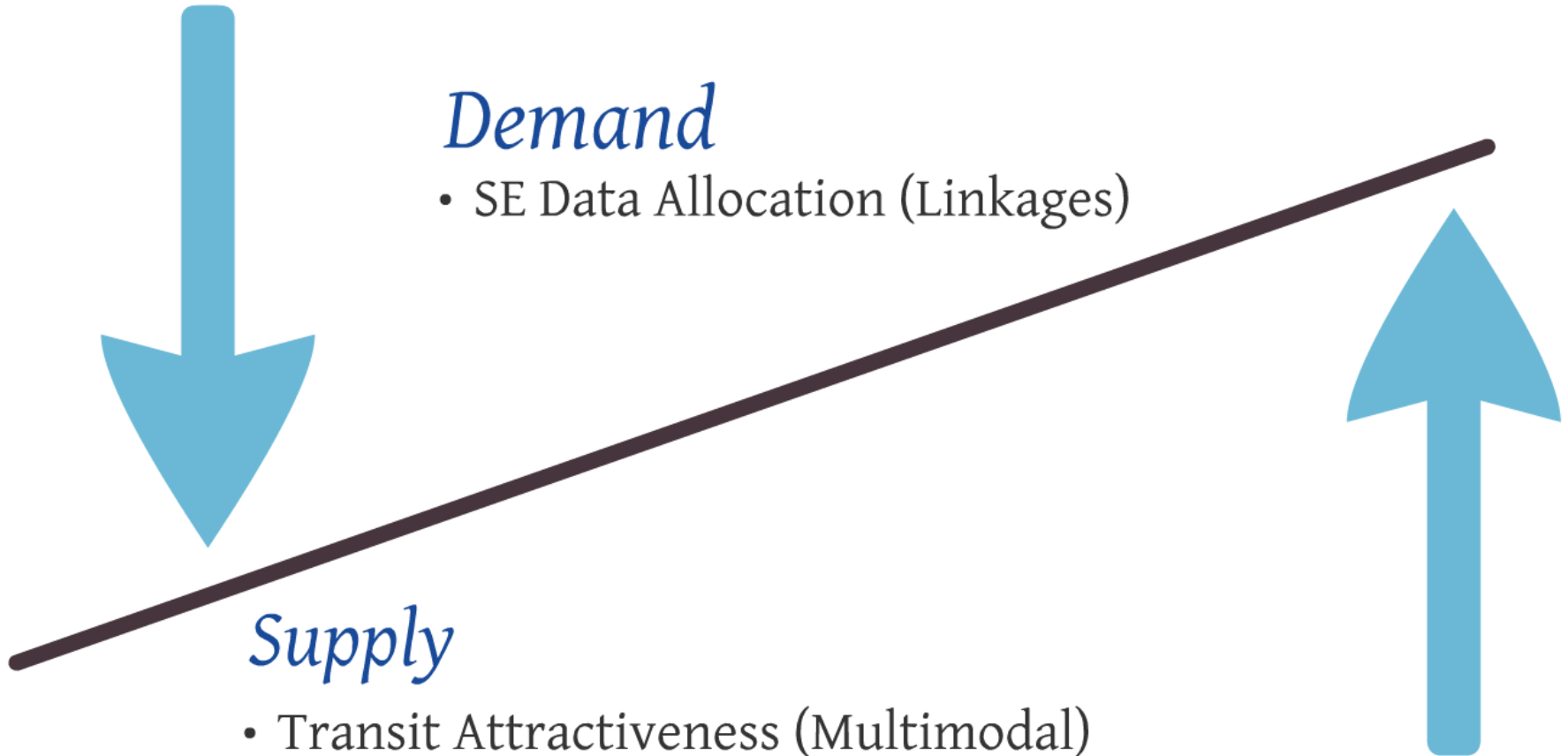
Southeast Regional Planning Model (SERPM)

Covers Miami-Dade, Broward & Palm Beach Counties

- Total of 4,284 Traffic Analysis Zones (TAZs)
- Miami-Dade has 1,486 TAZs
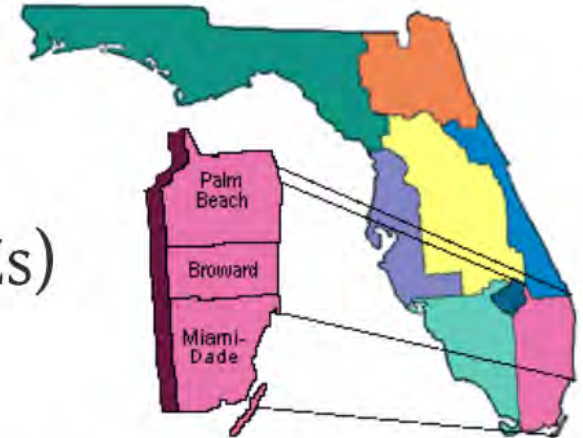
Multimodal including Transit & Managed Lanes

Run Options

- Time-of-Day (AM, MD, PM, OP)
- Highway only
- Districts

Mobility Management

Strategies:

Managed lanes/High Occupancy Toll lanes

Transit & fare policy

Variable parking pricing

Advanced traveler information

Freight operational improvements

Mobility Management

Managed Lanes

- 2 lanes in each direction by taking shoulder and 1 general purpose lane
- Toll rates increased by $2 in peak and $0.75 in off-peak

Transit & Fare Policy

- Express bus routes on all managed lanes - 10 minutes peak/60 minutes off-peak
- Fare is $1.15, which is more than 50% less than 2010 fares

Variable Parking Pricing

- New pay for parking areas created
- Long term costs raised 3 times
- Short term costs doubled

Advanced Traveler Information & Freight Improvements

- Assumed 10% decrease in delay
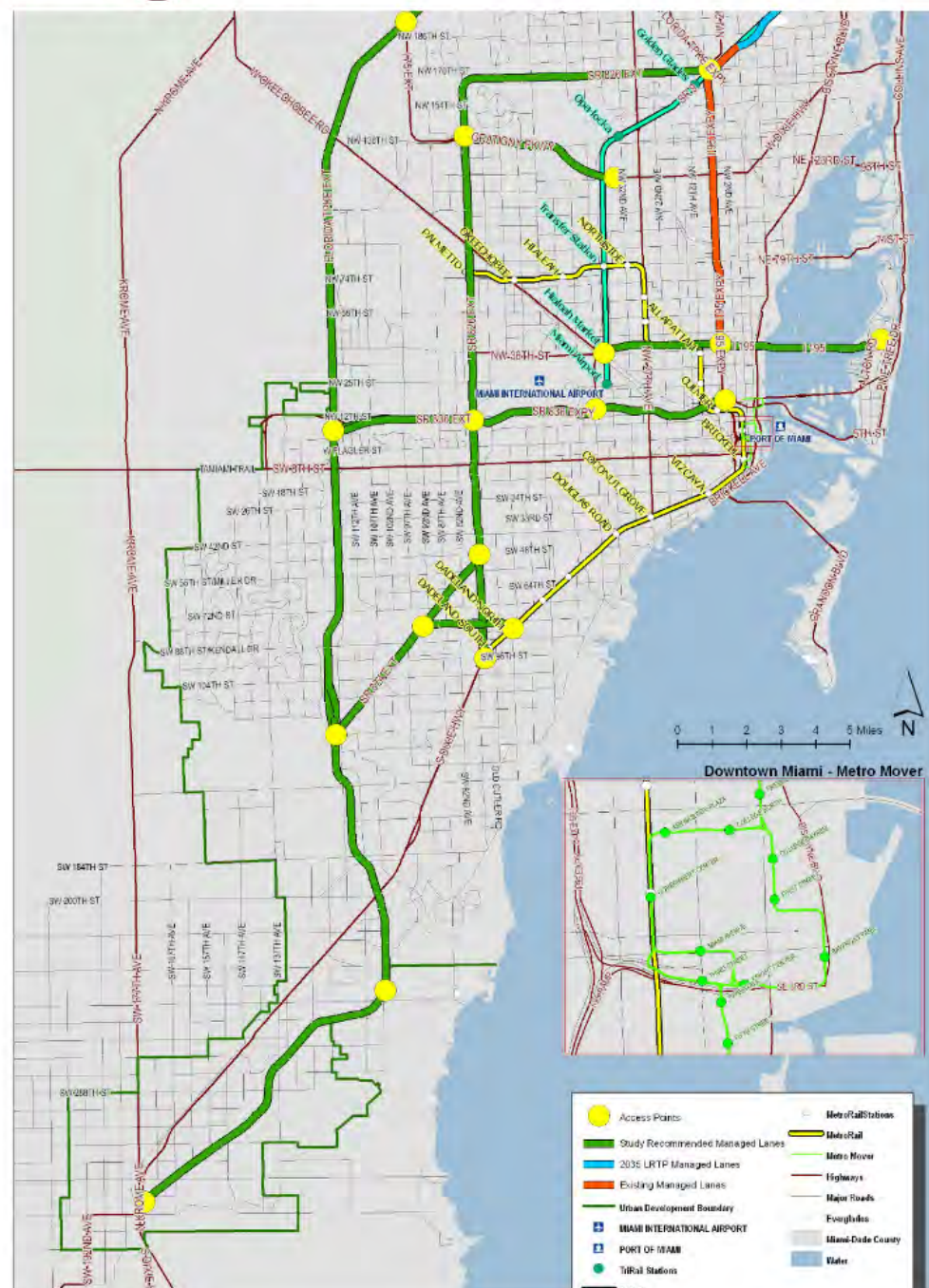
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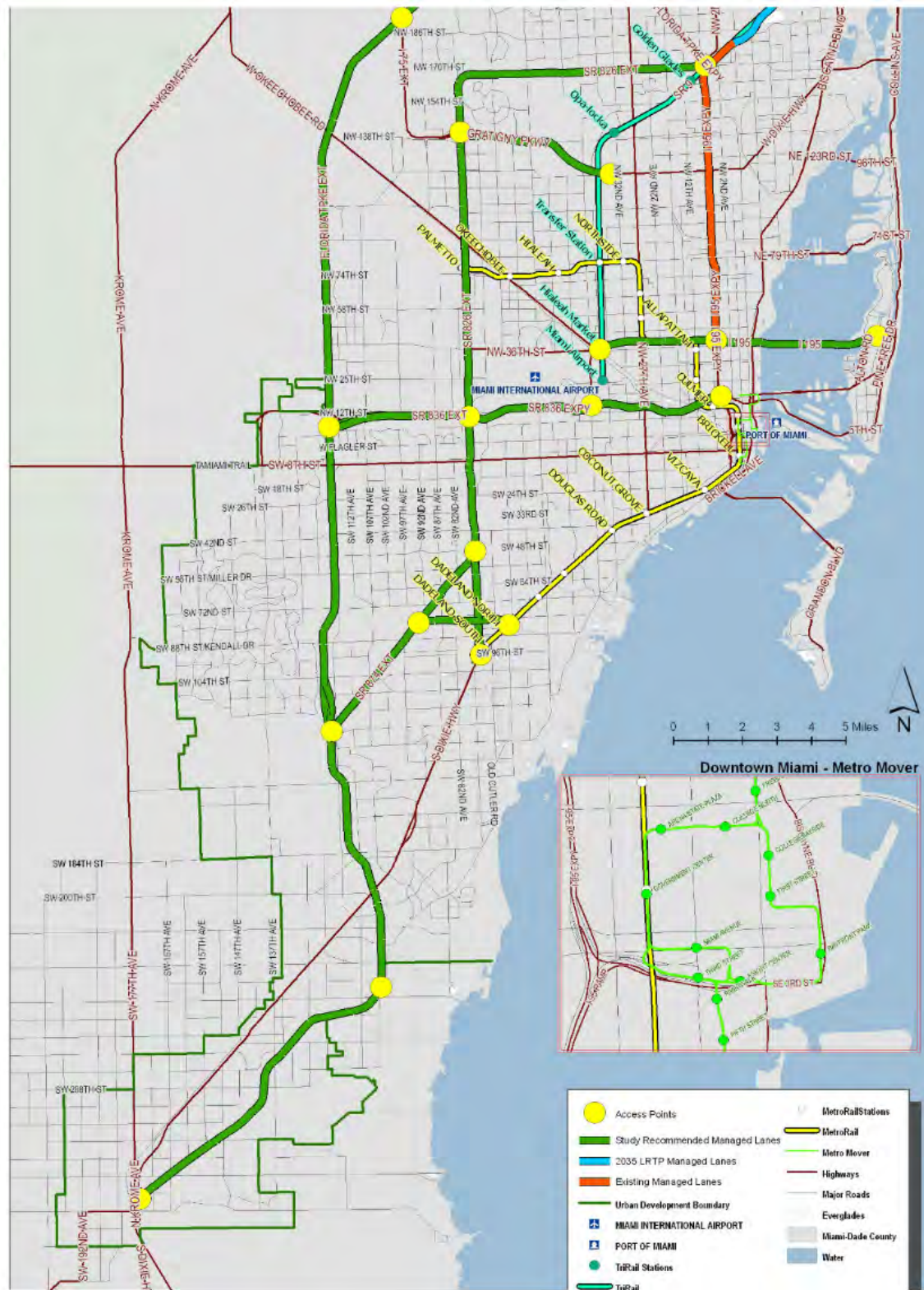
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TRAVEL INFO
CALL 511

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TRAVEL INFO CALL 511

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Linkages

Strategies

Transit Oriented Development

Smart Growth

Complete Streets

Linkages

Reallocated population and employment growth between 2015 and 2035

Linkages Step 1

Determine county-wide growth between 2015 and 2035

	Population	Employment
2035 Control Totals	3,278,155	1,994,215
- Determined 2015 numbers	2,665,507	1,584,308
Calculated growth increment	612,648	409,907

Linkages Step 2 - Assign Population Growth by Area

Linkages Step 2 - Assign Population Growth by Area
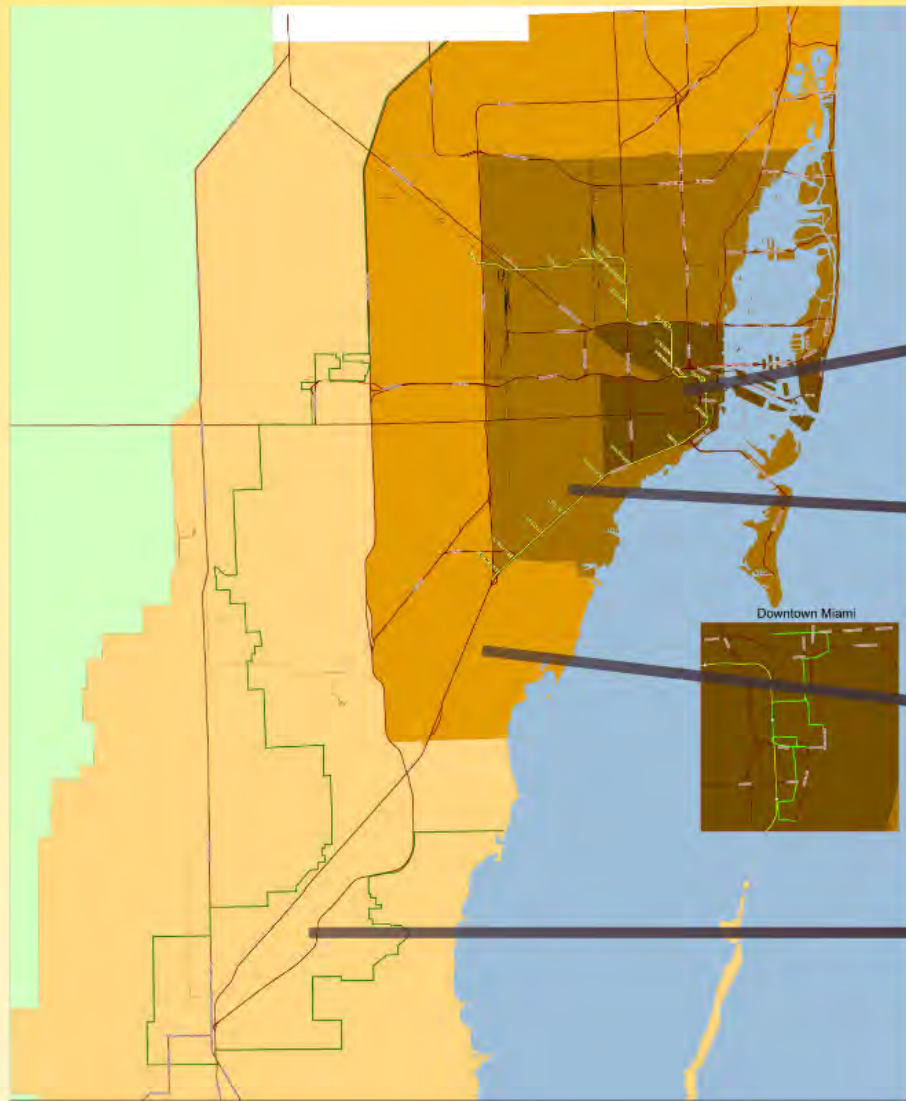
Area	2035 Pop Growth in SERPM	2035 Pop Growth PROPOSED
Urban Core	18%	40%
Urban Fringe	27%	30%
Suburban	35%	20%
Exurban	21%	10%

Downtown Miami

Linkages Step 3 - Allocation to TAD

TAD = Traffic Analysis Districts
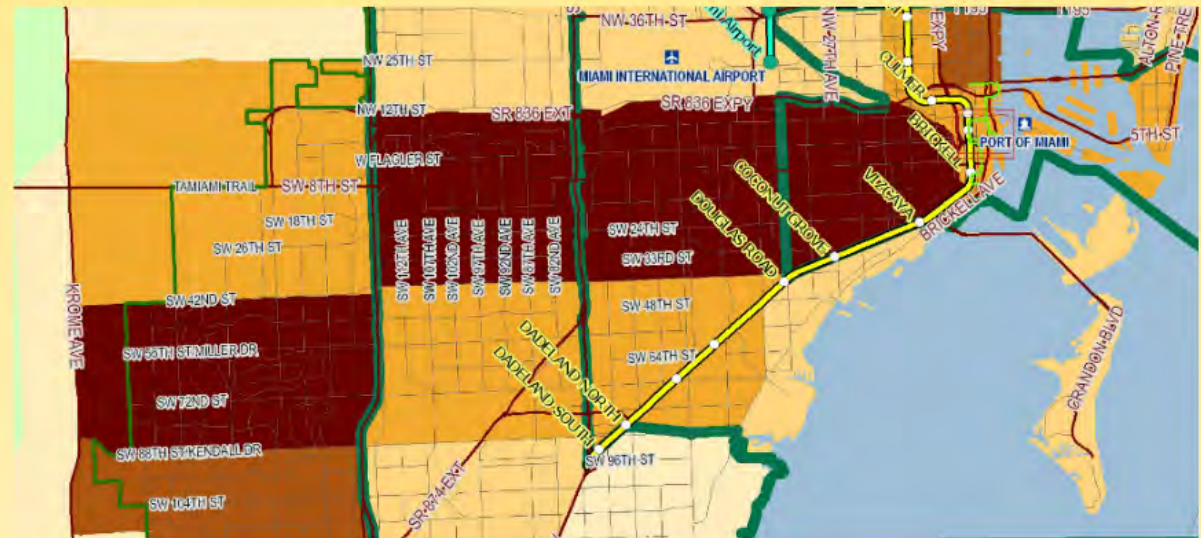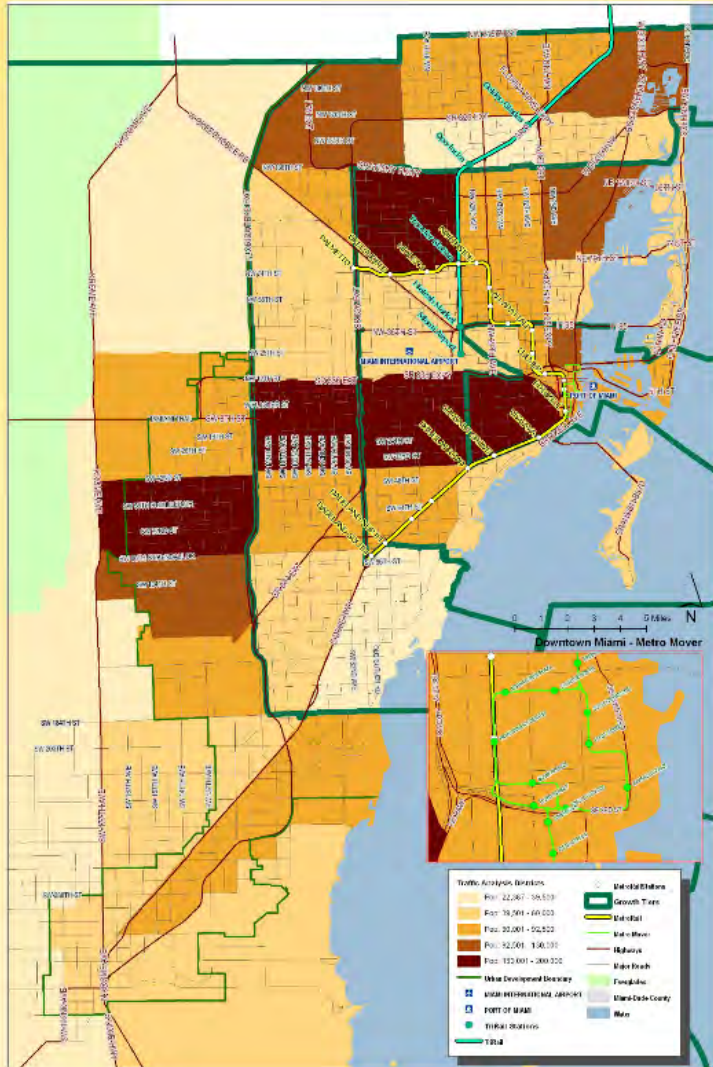
Tried to obtain jobs/housing balance of 0.8 to 1.5 jobs per household.

TAD
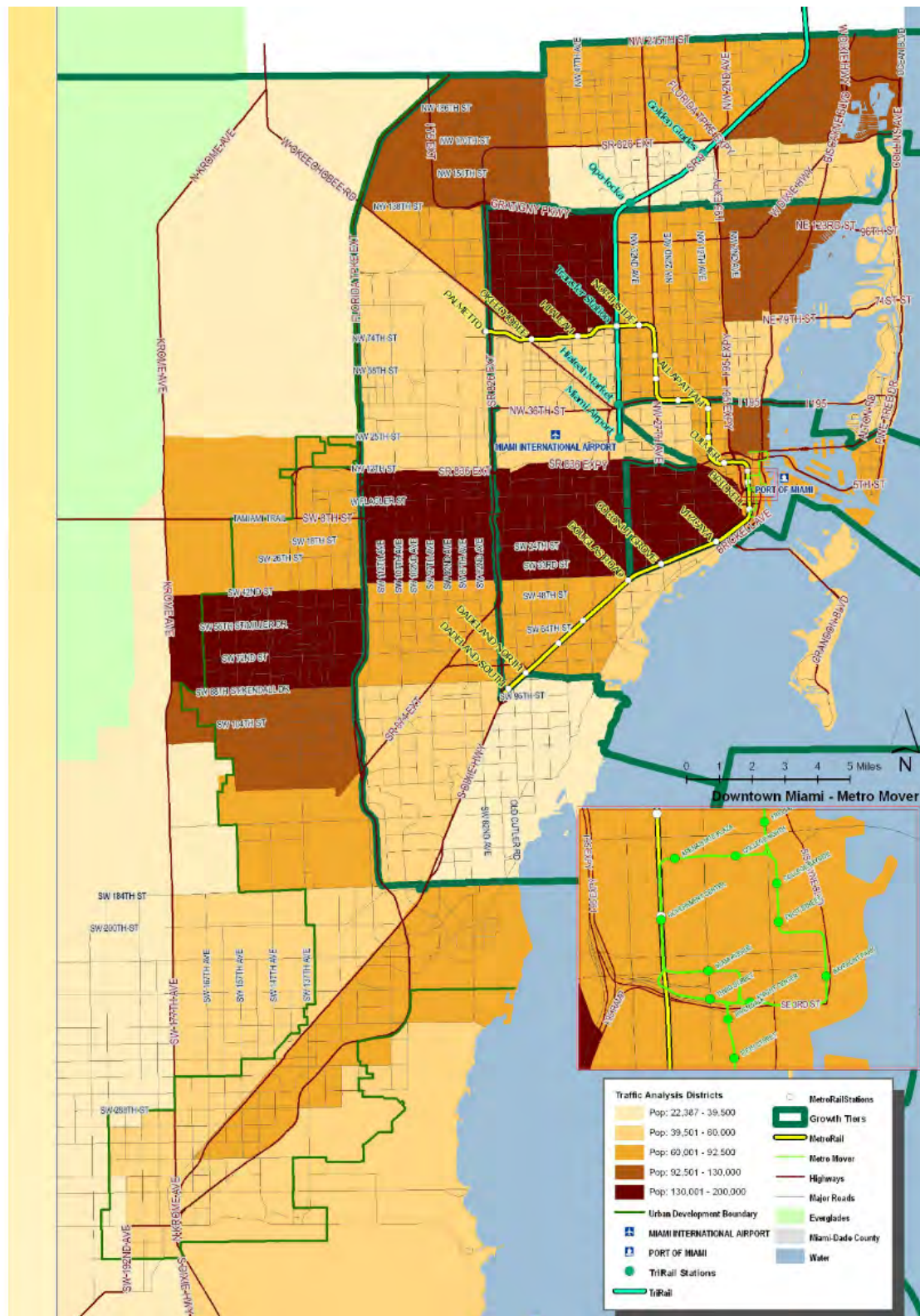
Tried
of 0.8

Downtown Miami - Metro Mover

Traffic Analysis Districts
- Pop: 22,387 - 39,500
- Pop: 39,501 - 60,000
- Pop: 60,001 - 92,500
- Pop: 92,501 - 130,000
- Pop: 130,001 - 200,000
- Urban Development Boundary
- MIAMI INTERNATIONAL AIRPORT
- PORT OF MIAMI
- TriRail Stations
- TriRail

- MetroRailStations
- Growth Tiers
- MetroRail
- Metro Mover
- Highways
- Major Roads
- Everglades
- Miami-Dade County
- Water

0 1 2 3 4 5 Miles   N

TAD = Traffic Analysis Districts
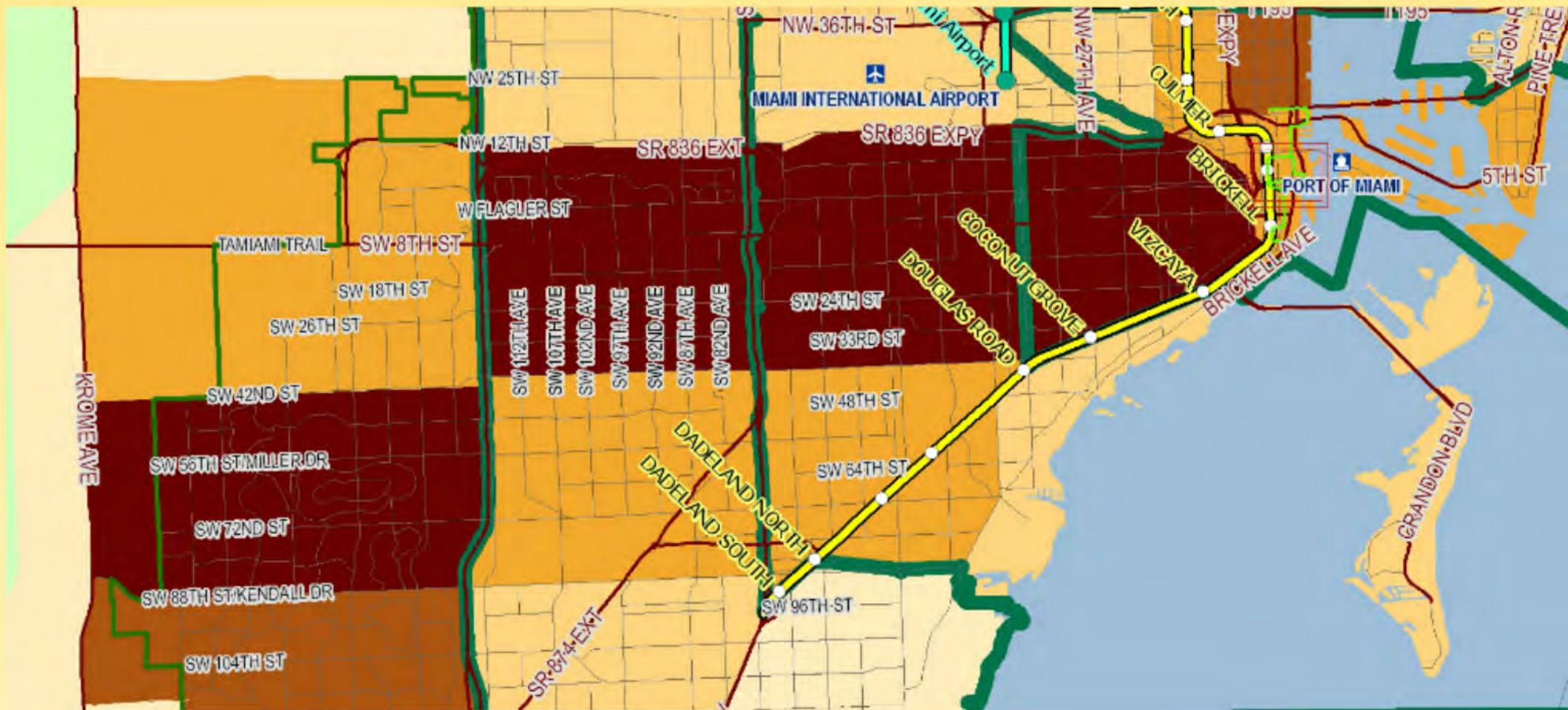
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Step 4 - Allocation to TAZ

Linkages Step 4 - Allocation to TAZ

Example Traffic Analysis Zones

TAD #22 Allapattah		Total Population Growth	17,411
		75%	13,059
TAZ #	**Feature**	**75% Growth**	**25% Growth**
441 & 442	Metrorail	1,041	
452 & 453	None		338
457 – 462	NW 27th Ave Activity Corridor	12,018	
463 – 466	None		4,014
	TOTALS	13,059	4,352

Allocated to TAZ based on presence of certain features.

If the following were present, 75% of the growth went to those TAZs:

- fixed guideway transit
- community centers
- activity corridors.

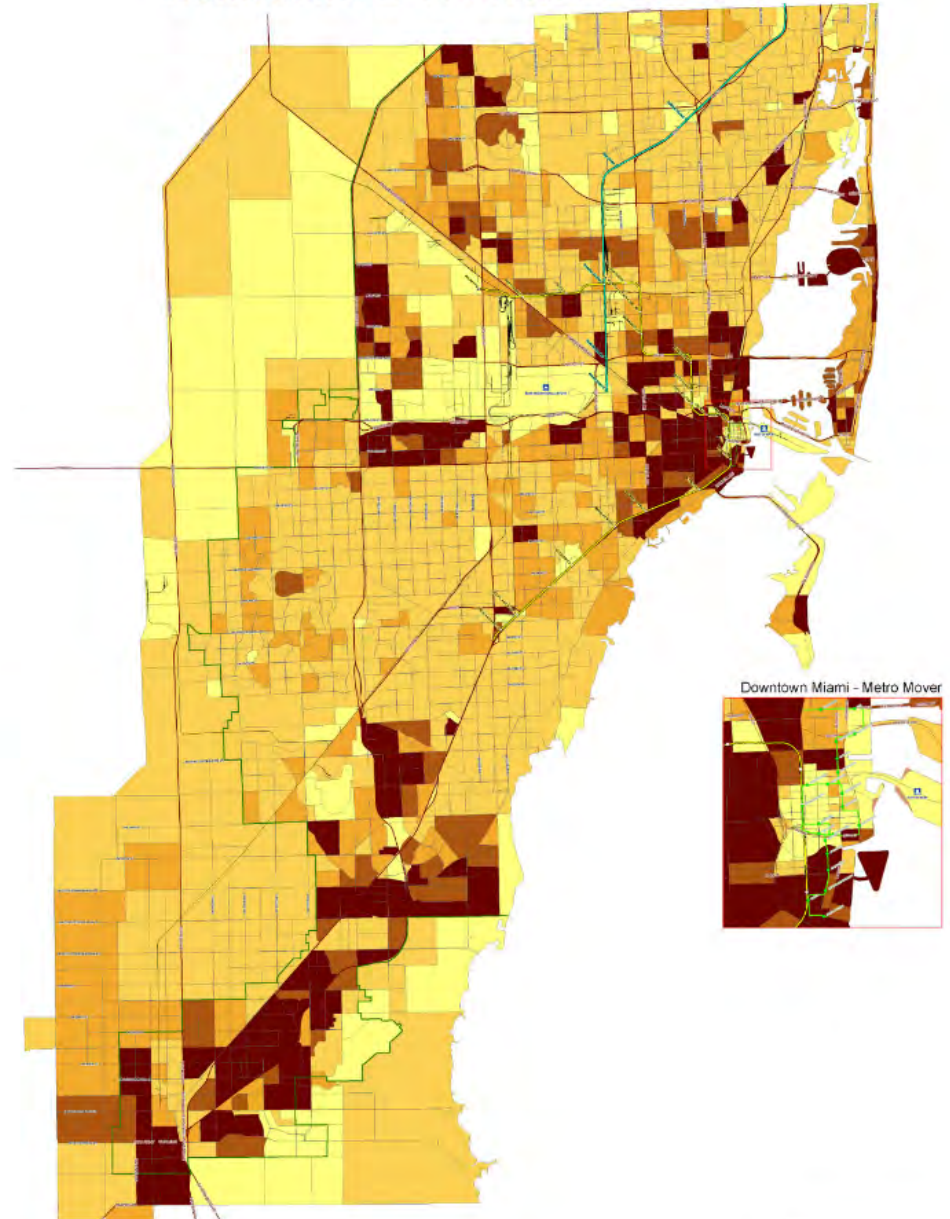All other TAZs received 25% of growth

Example Traffic Analysis Zones
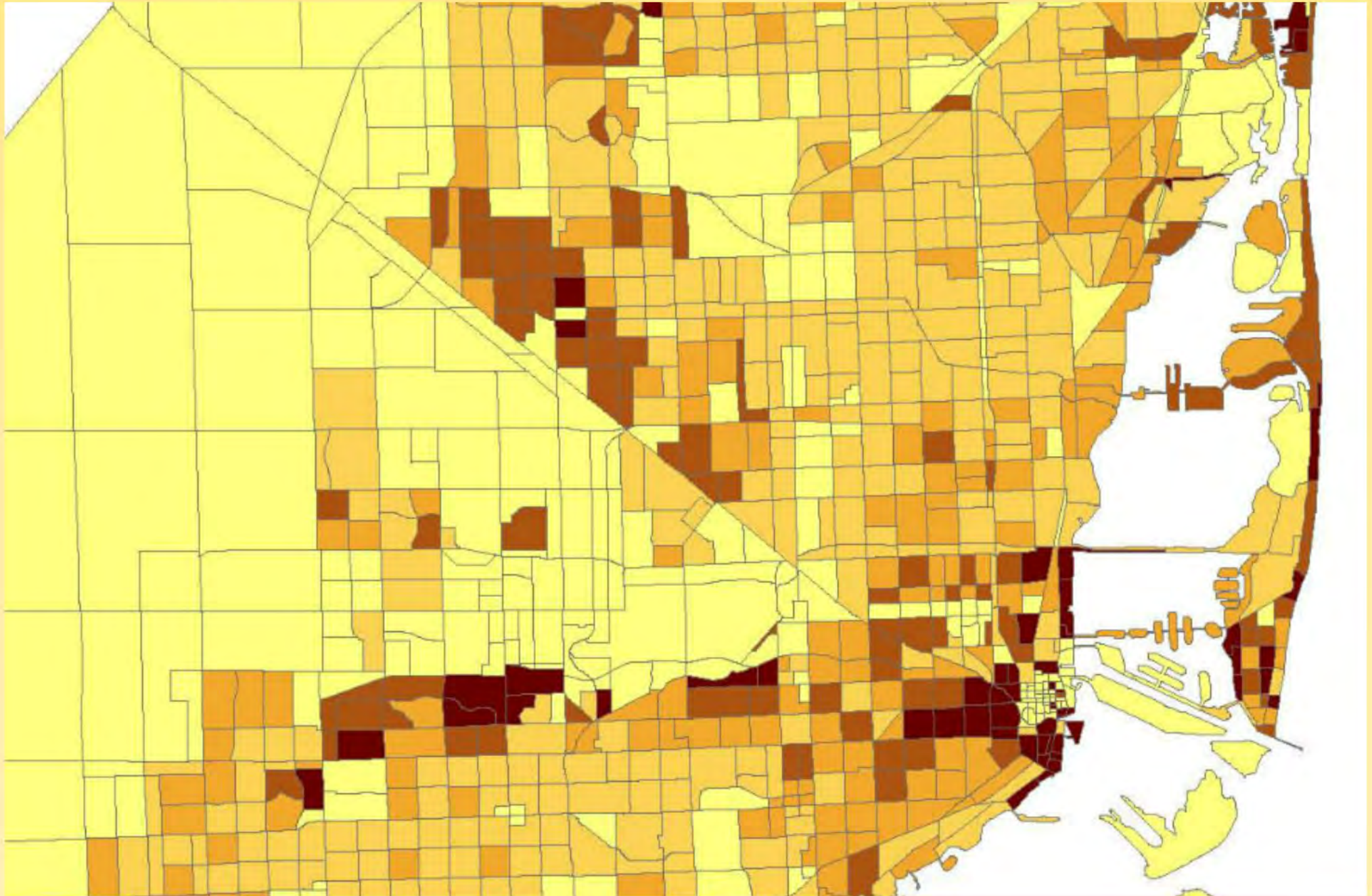
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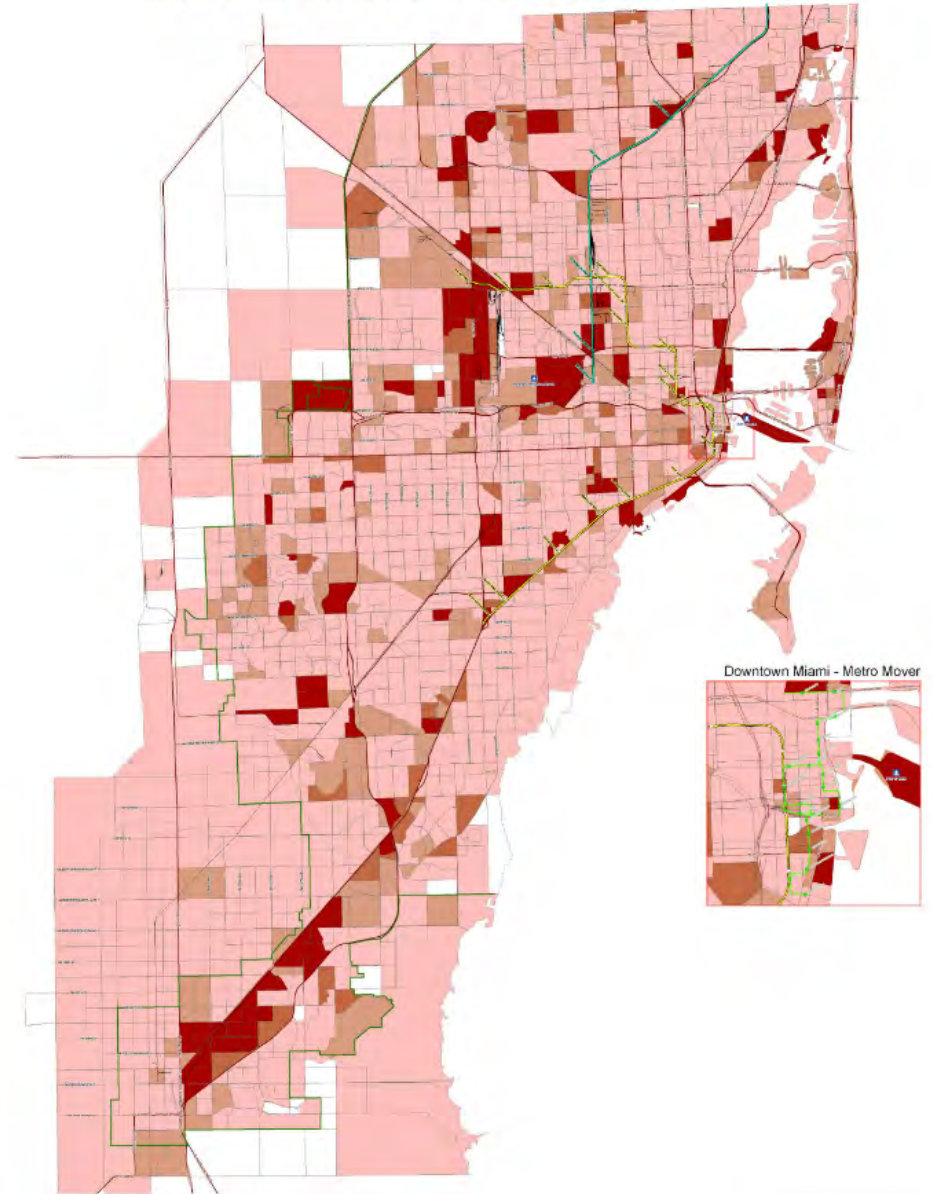# Linkages Reallocation Results

Adopted Growth 2005-2035

Downtown Miami - Metro Mover

Reallocated Growth 2005-2035

Downtown Miami - Metro Mover
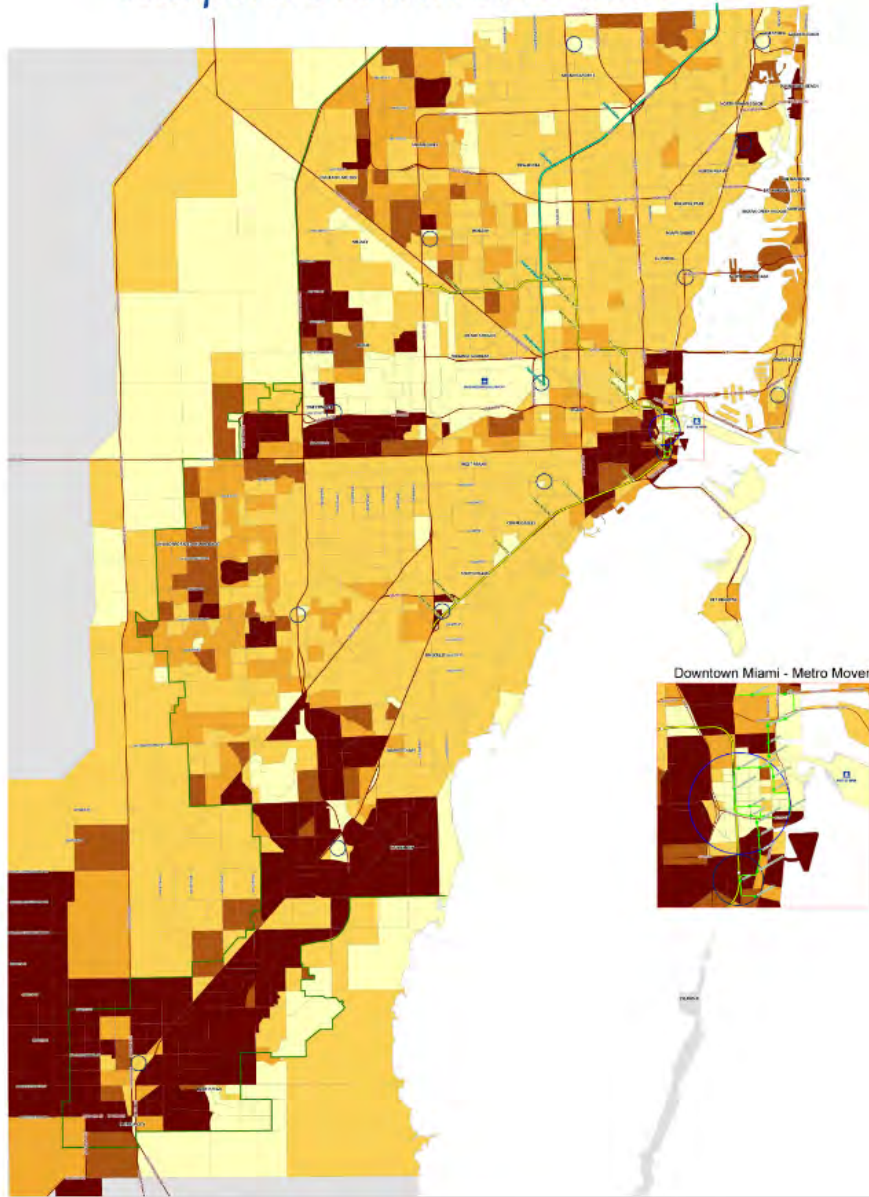
Linkage Results - Employment

Adopted Growth 2005-2035
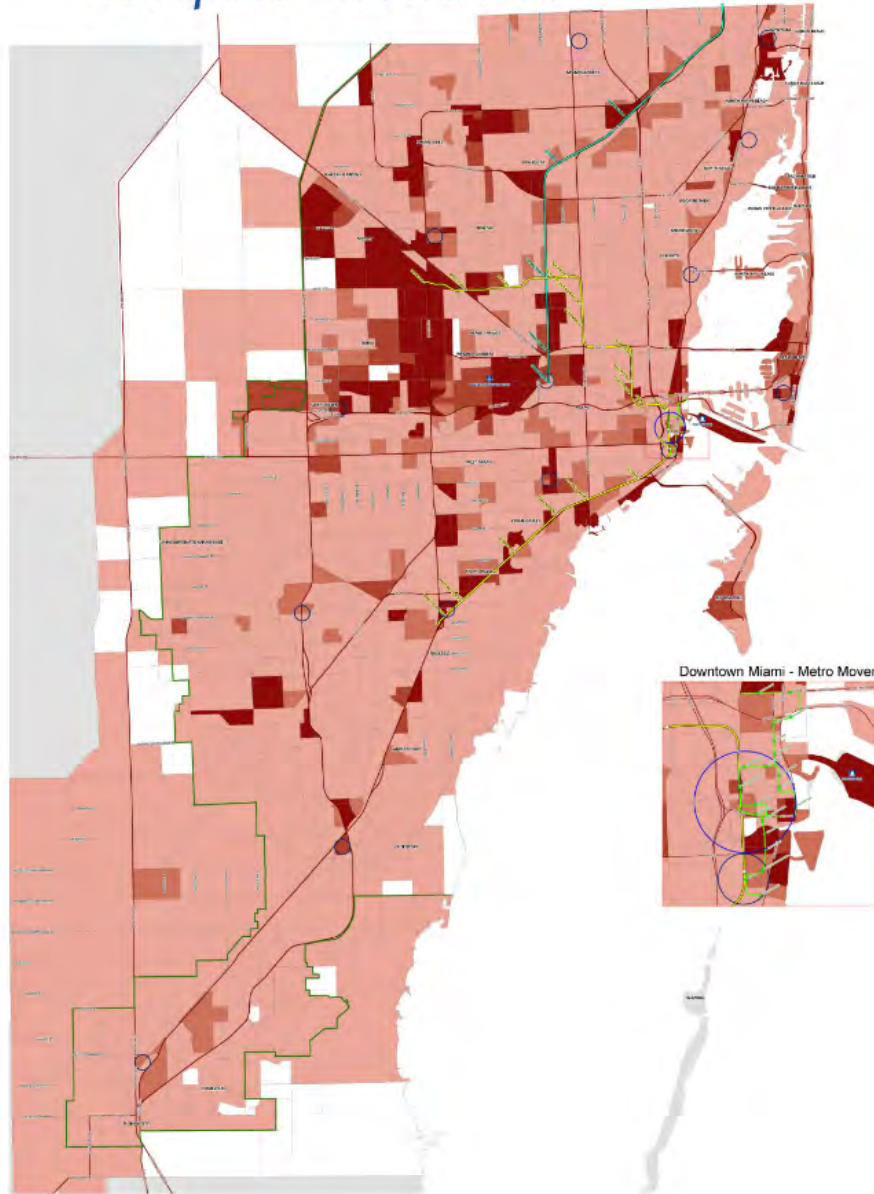
Reallocated Growth 2005-2035

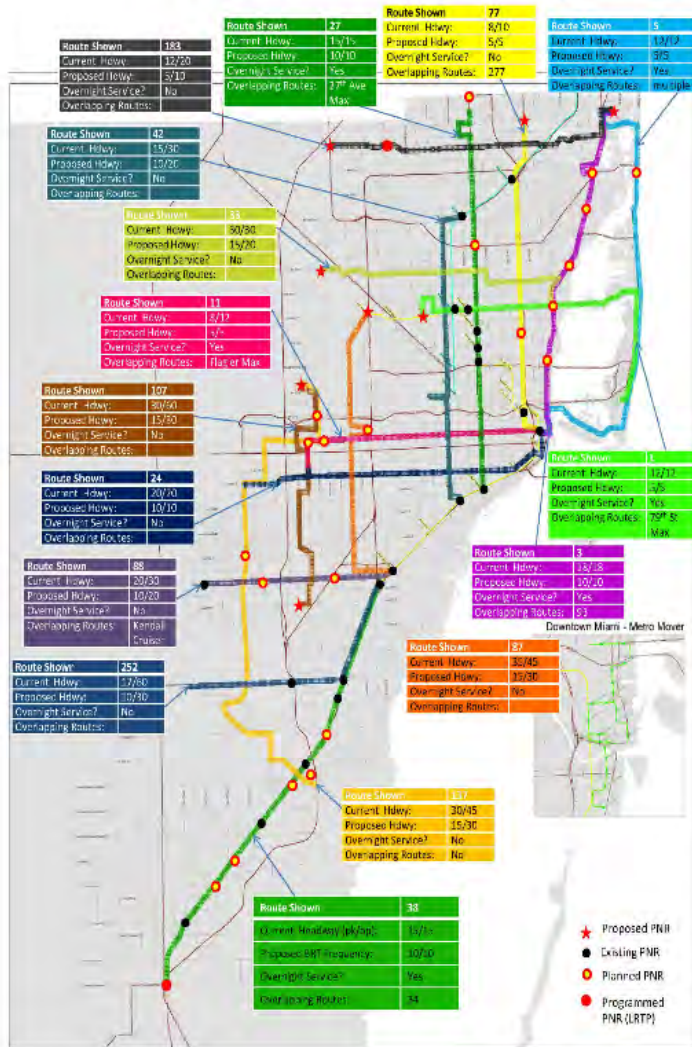Downtown Miami - Metro Mover

Downtown Miami - Metro Mover

Multimodal

Strategies

Arterial Bus Rapid Transit
Transit Signal Priority
Improved rider information
Bus shelters
Park-and-Ride lots
Ridesharing
Telecommuting
Car-sharing
Biking initiatives/programs

Arterial Bus Rapid Transit & Park-and-Ride Lots

Arterial Bus Rapid Transit

- Local bus replaced with faster service - 5 to 20 peak/5 to 30 off-peak
- Bus speeds assumed 25% faster
- Stop spacing expanded to 1/2 mile
- Transit signal priority improved bus speeds by 10%
- Transit fare reduced 50%

Park-and-Ride Lots

- 8 new facilities proposed

Improved Rider Information & Shelters

- Removed penalty and weighting on transit wait times.

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Off-Model Strategies

Vanpool/Carpool with Parking Cash Out

Reduced Home Based Work trips and Vehicle Miles Traveled

Telecommuting

Reduced Home Based Work Trips

Car-sharing

Reduced Non-Home Based Work Trips by 15 trips for every car in car-sharing fleet.
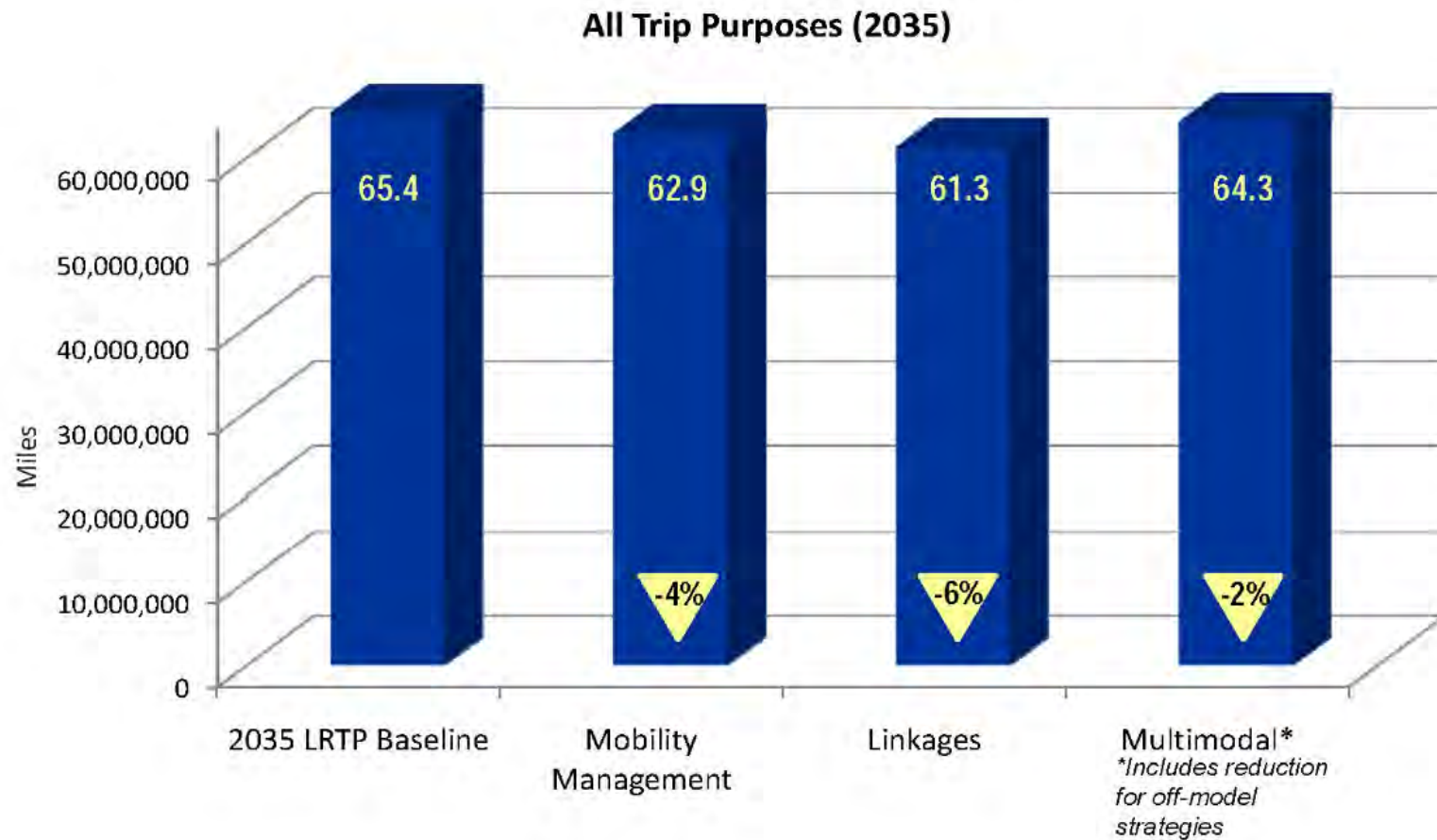
Biking Initiatives/Programs

Overall reduction in Vehicle Miles Traveled

Which scenario do you think had the best results?

Evaluation Results

Vehicle Miles Traveled

All Trip Purposes (2035)

Evaluation Results

Vehicle Hours Traveled

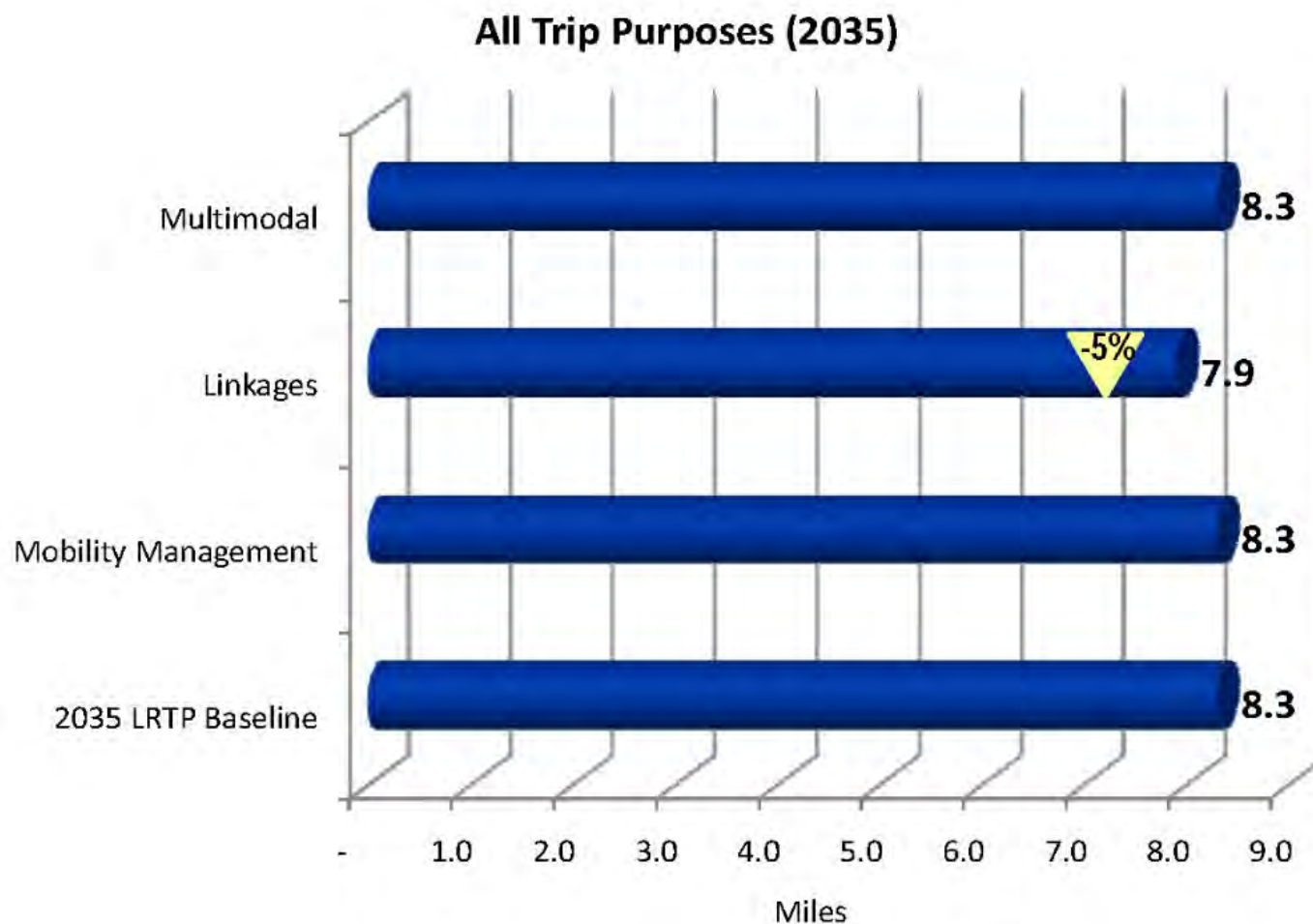**All Trip Purposes (2035)**
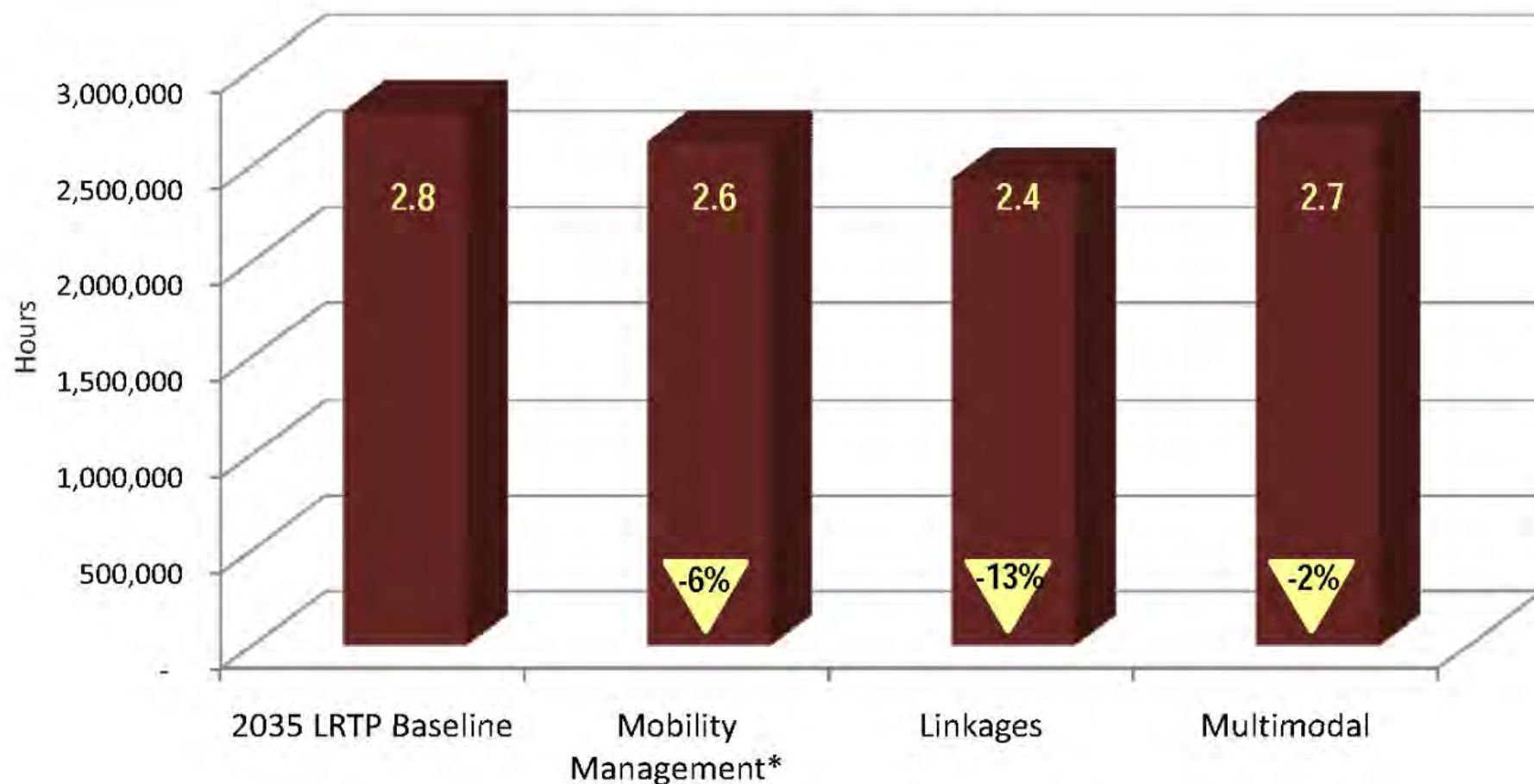
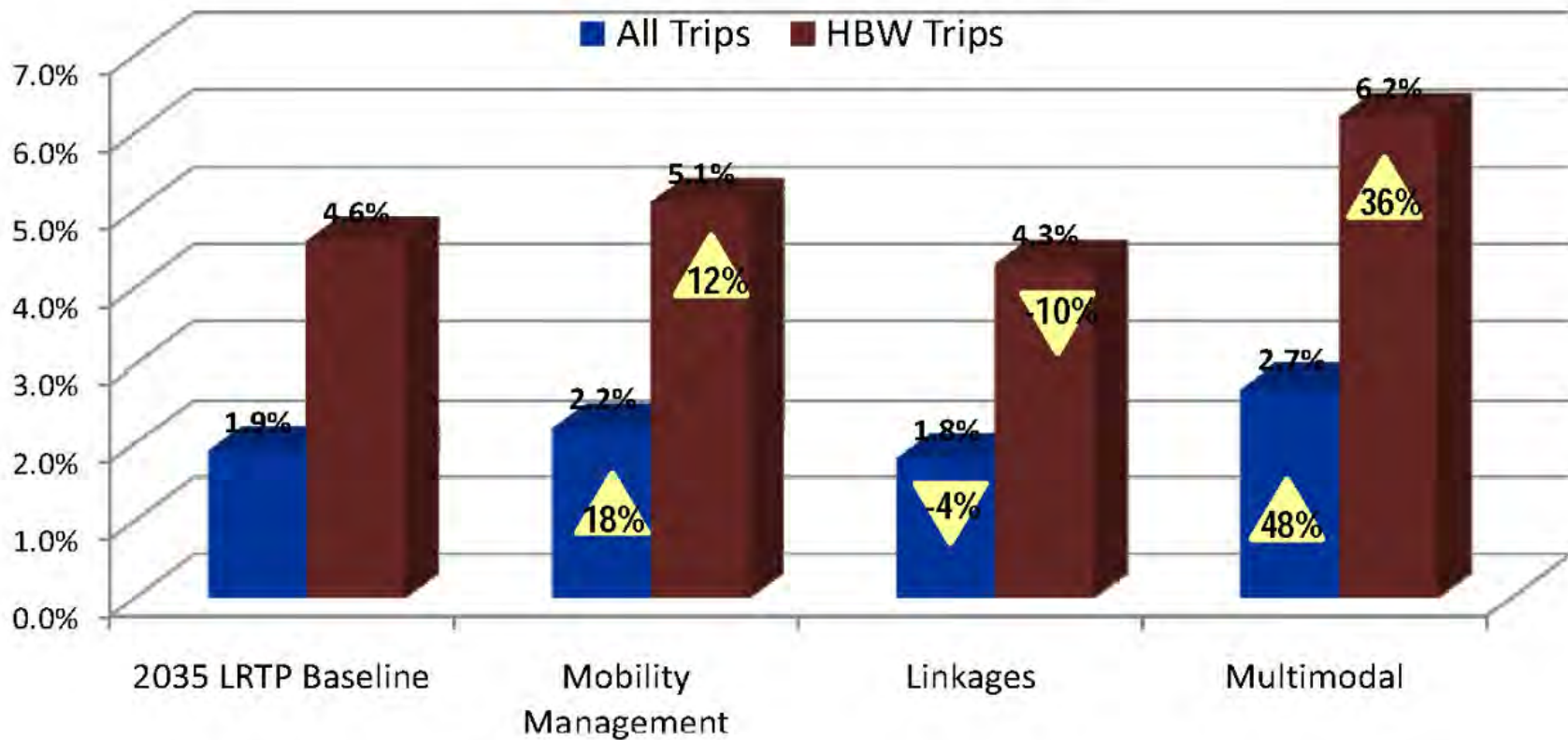*Includes reduction for off-model strategies.

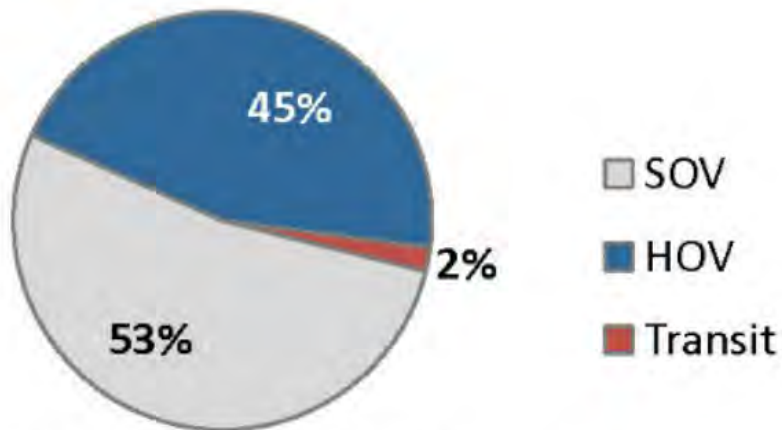# Evaluation Results

Average Auto Trip Length

All Trip Purposes (2035)

Horizontal bar chart showing Average Auto Trip Length in Miles:
- Multimodal: 8.3
- Linkages: 7.9 (-5%)
- Mobility Management: 8.3
- 2035 LRTP Baseline: 8.3

X-axis: Miles (-, 1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0)

Evaluation Results

Mode Split

Daily Transit Mode Split (2035)

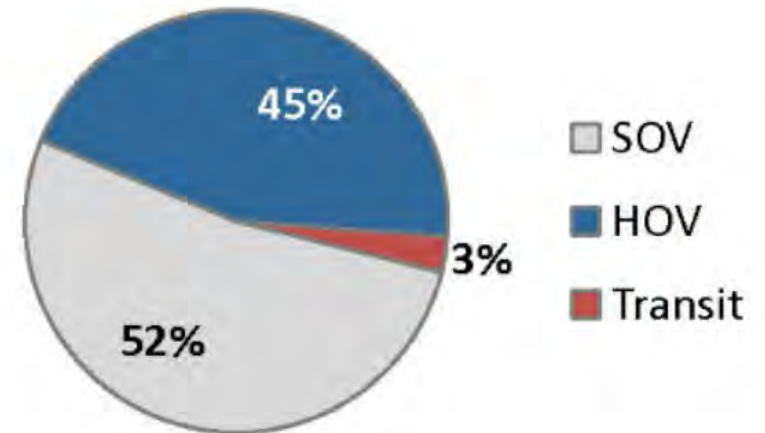# Evaluation Results

Overall 2035 Mode Split

2035 LRTP Baseline

- 45% HOV
- 53% SOV
- 2% Transit
- SOV
- HOV
- Transit

Mobility Management

- 48% HOV
- 50% SOV
- 2% Transit
- SOV
- HOV
- Transit

Linkages

- 45% HOV
- 53% SOV
- 2% Transit
- SOV
- HOV
- Transit

Multimodal

- 45% HOV
- 52% SOV
- 3% Transit
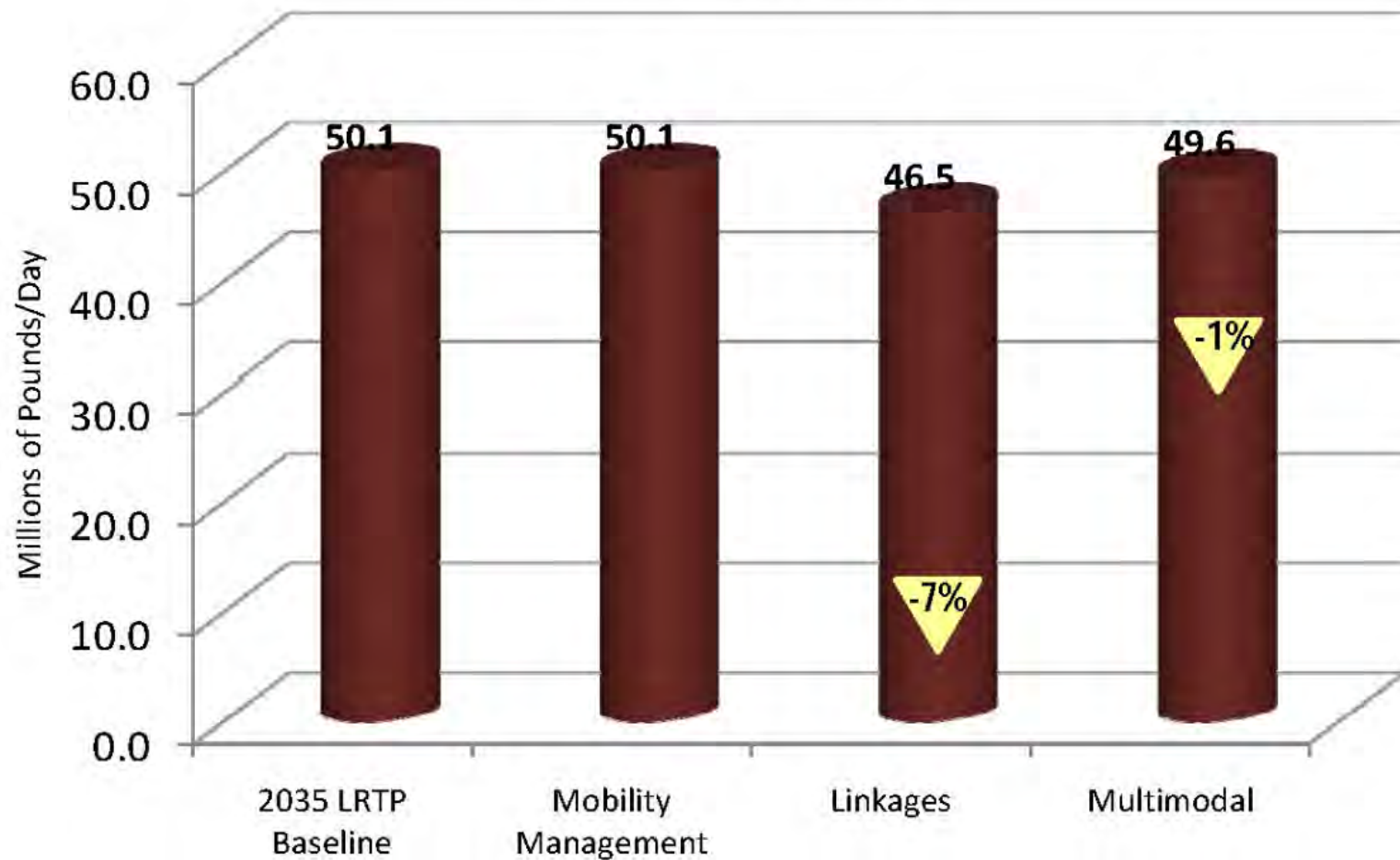- SOV
- HOV
- Transit
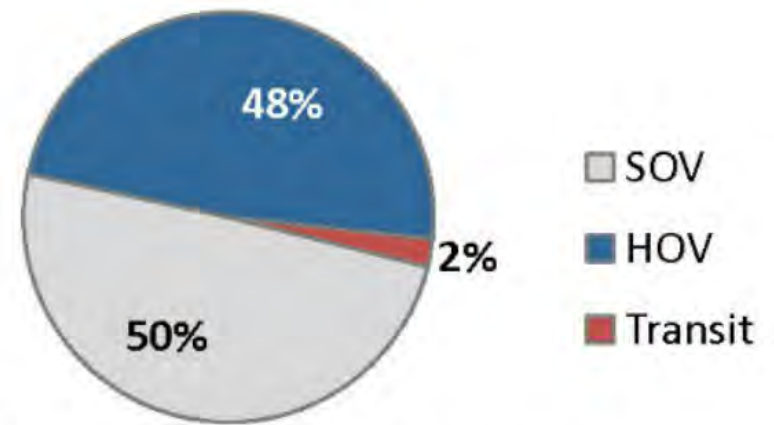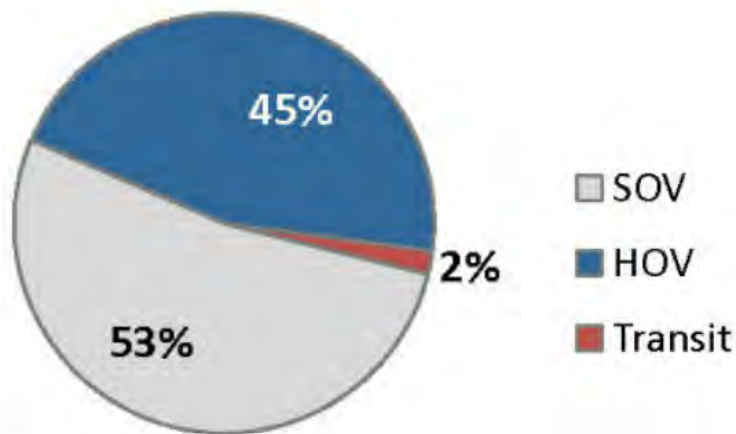
Evaluation Results

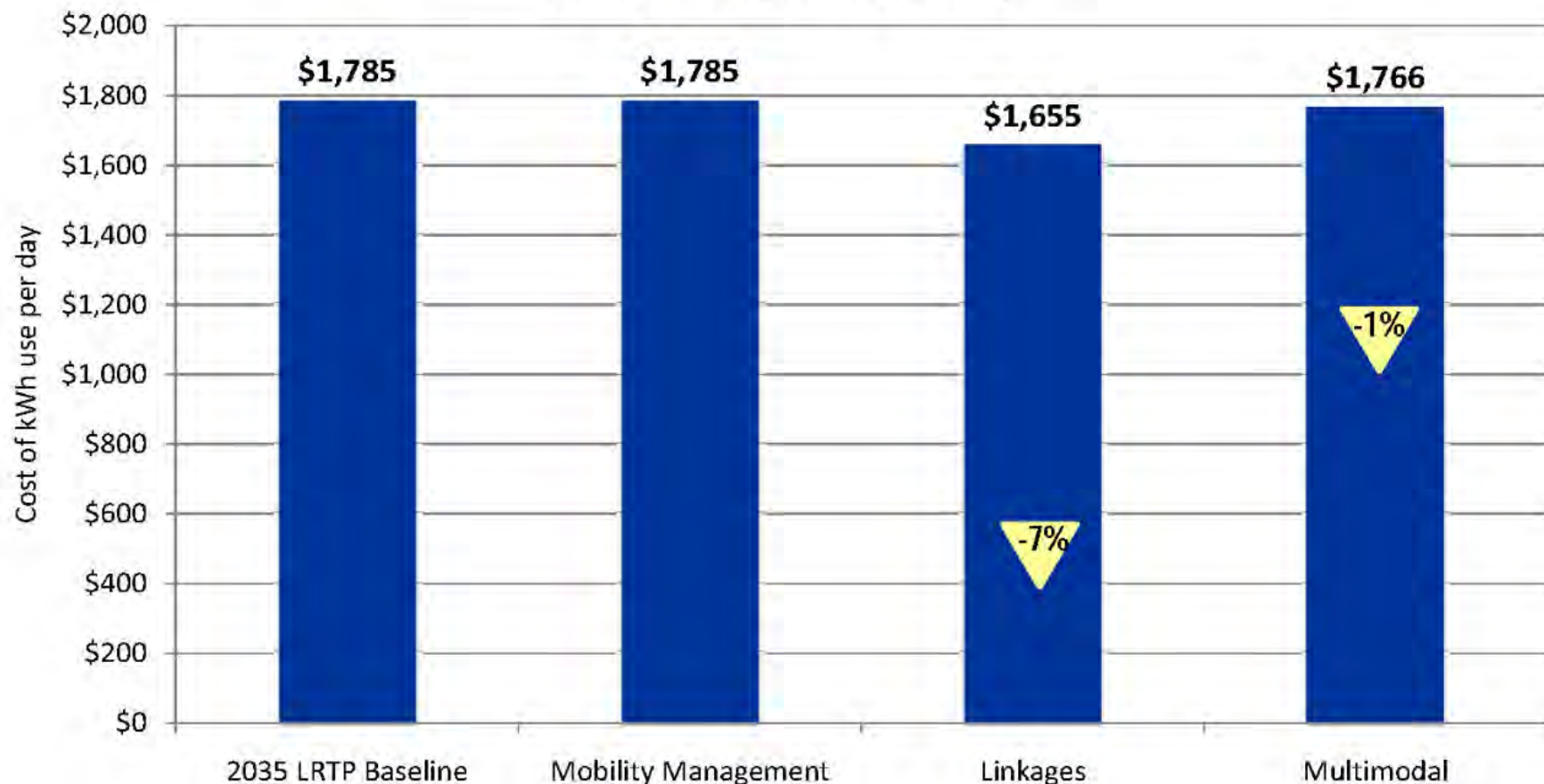*Carbon Dioxide Emissions*

Pounds/day (2035)

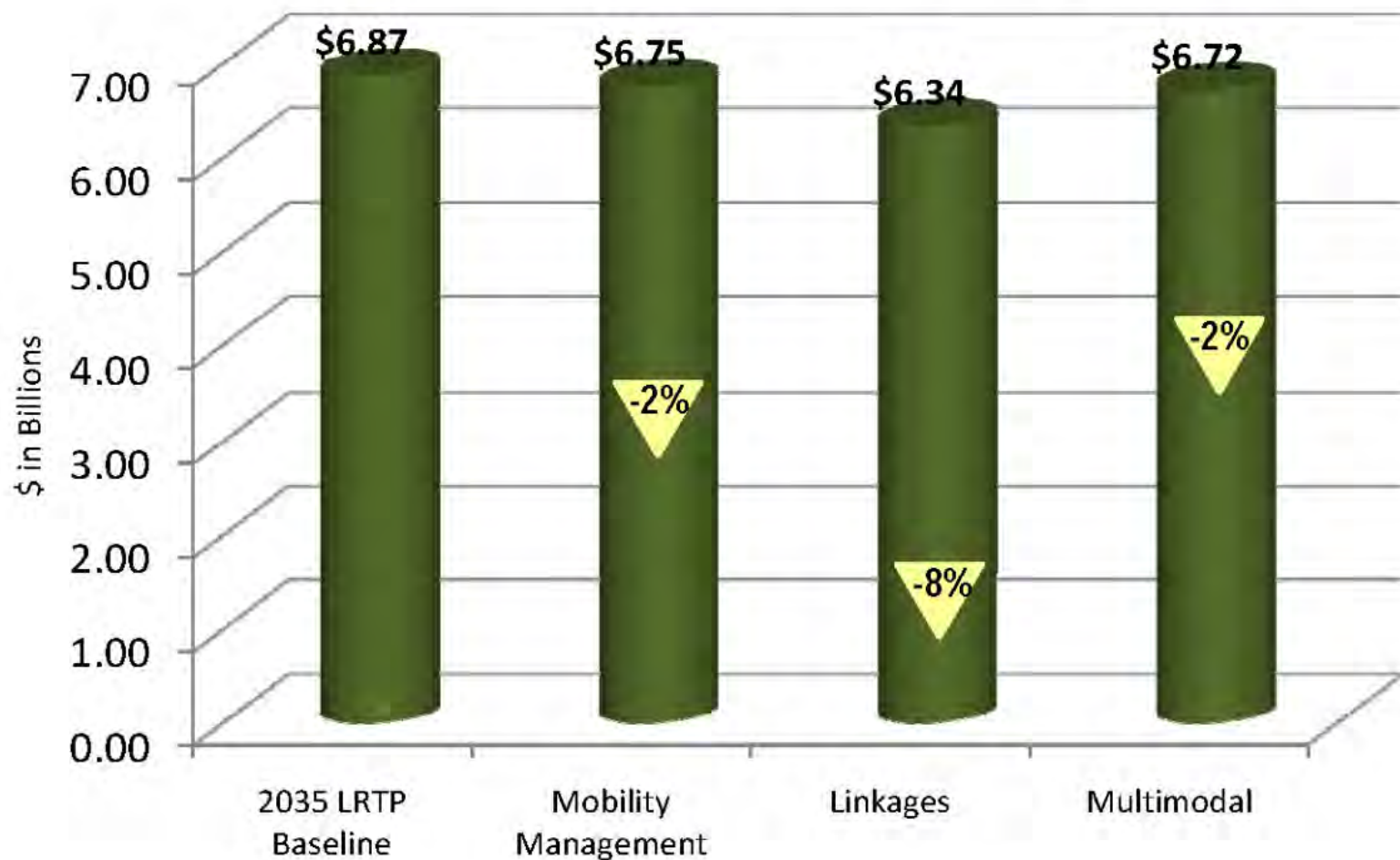# Evaluation Results

Energy Consumption

Daily Energy Cost (2035)

Evaluation Results
Lost Productivity

Annual Cost of Congestion (2035)

2010 Cost of Congestion was $3.2 million

Evaluation Results

Cost/Revenue Estimates

Type of Cost/Revenue	Mobility Management	Multimodal
Capital Costs	$1.5 - $2.8 billion Managed lanes, 7 new buses; parking meters	$61 - $90 million 16 new buses; TSP, real-time information; park-n-ride
Annual Operating Costs	$92 - $221 million	$14-$21 million
Annual Revenue	$228 - $404 million Tolls; farebox recovery; parking fees	$2.5 - $4 million Farebox recovery

Costs were not developed for the Linkages scenario because direct costs for Miami-Dade County could not be determined.

Mobility Management Findings

- Noticeable impact on performance measures
- Potential to be self-sustaining
- Nexus between user fee and benefits
- Consistent with current state/local initiatives and policies
- Results vary widely by corridor
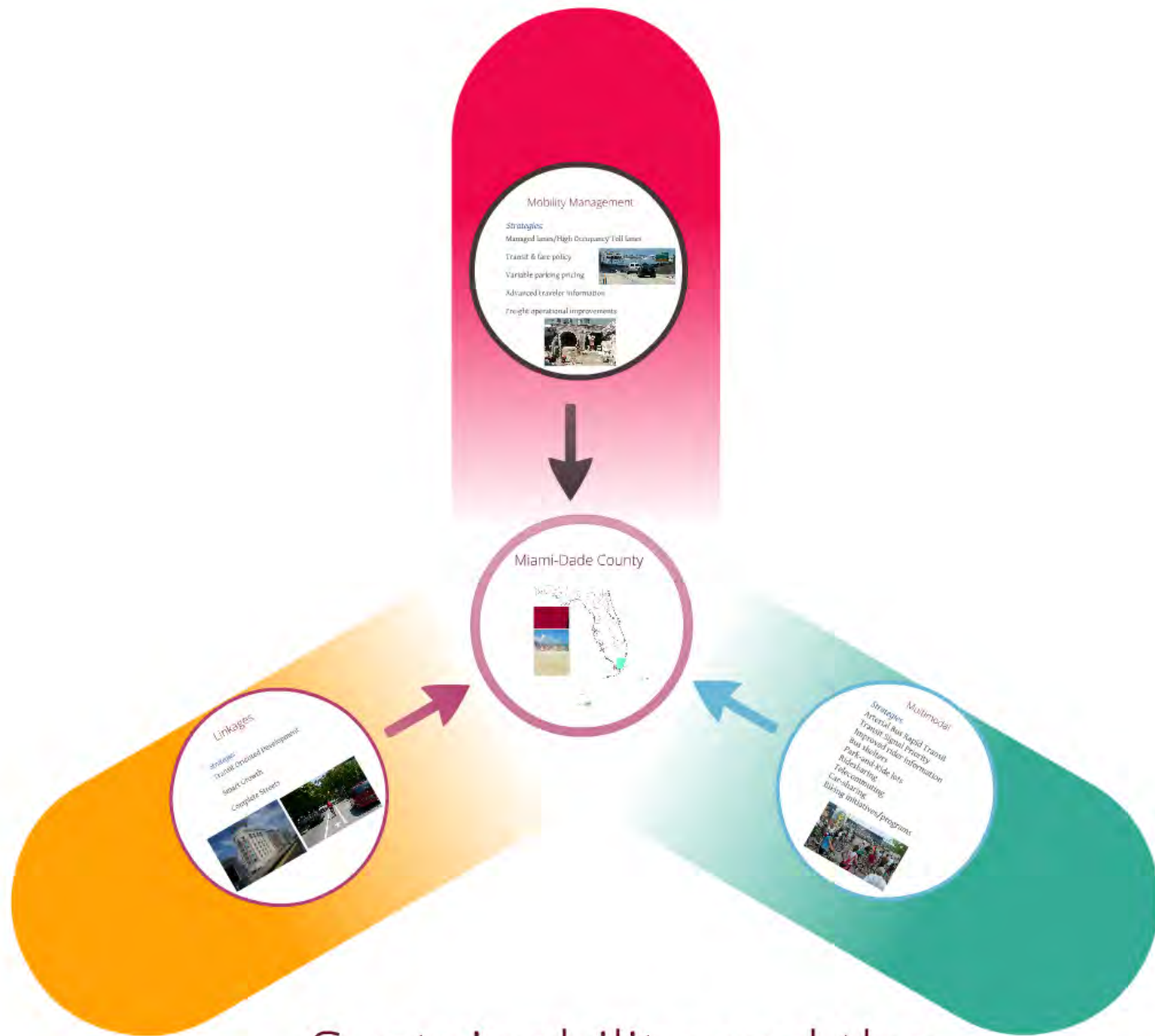
Multimodal Findings

- Significant increase in transit usage
- Limited capital investment
- Minimal impact at system-wide level
- Increased subsidy - farebox revenues do not cover operating costs
- Geared towards mobility instead of accessibility

Linkages Findings

- Most meaningful impact on system
- No big ticket capital item but political capital required
- Long-term approach not suitable for short-term
- Transit oriented development scenario that reduced transit use

Next Steps

- *Combination of scenarios:*
  - *may provide greater benefits.*
  - *may allow for short - , mid- and long-term implementation*

- *Results are being used for other studies and initiatives, including:*

  - Seven50 Southeast Florida Prosperity Plan
  - Comprehensive Development Master Plan Update
  - 2040 Long Range Transportation Plan
  - Miami-Dade Transit Grid Analysis
  - Regional Managed Lanes Study
  - Parking Rate Study

Sustainability and the Transportation System

A Study for the Miami-Dade MPO

Mobility Management

Strategies:

Managed lanes/High Occupancy Toll lanes

Transit & fare policy

Variable parking pricing

Advanced traveler information

Freight operational improvements

Miami-Dade County

Linkages

d Development

Strategies

Multimodal

Arterial Bus Rapid Tra

Transit Signal Pri

Improved rid

Bus shel

Park