# Trend and Alternative Scenarios | December 2019

SOUTHEAST FLORIDA
REGIONAL TRANSPORTATION PLAN
Miami-Dade • Broward • Palm Beach

**2045**

DRAFT TECHNICAL MEMORANDUM
Southeast Florida 2045 Regional Transportation Plan (RTP)
**Trend and Alternative Scenarios**

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|---|---|
| Date: | December 2, 2019 |
| To: | Paul Calvaresi and William Cross (Broward MPO) |
| From: | Jessica Josselyn and Franco Saraceno (Kittelson & Associates) & Kevin Tilbury and Martin Milkovitz (Cambridge Systematics) |

# 1 Scenario Planning Task Purpose

Given the region's expected growth and need to proactively explore transportation funding to meet urban area needs, the 2045 RTP explored several important policy and investment questions about South Florida's future. These questions revolved around two main elements:

- **Financial and legislative:** What changes to policy and legislation will allow greater flexibility in how existing revenue sources are used? What new revenue sources can feasibly generate revenue for regional transportation infrastructure?

- **Growth and development:** Are changes in development patterns (density/intensity) necessary to complement regional transportation investments?

To help answer those questions, a set of four scenario concepts were evaluated to help assist the region in determining what policy changes are needed to fund a multimodal transportation system which meets the ever-growing needs of our urbanized area.

**Scenario 1 - Trend:** Current funding practices, transportation investment and land use decisions.

**Scenario 2 - Flexible Transit:** Creating flexibility in existing revenue sources to enable a "flexing" of funds to new transit investment.

**Scenario 3 - Regional Transit:** New revenue sources to fully build out a regional transit network.
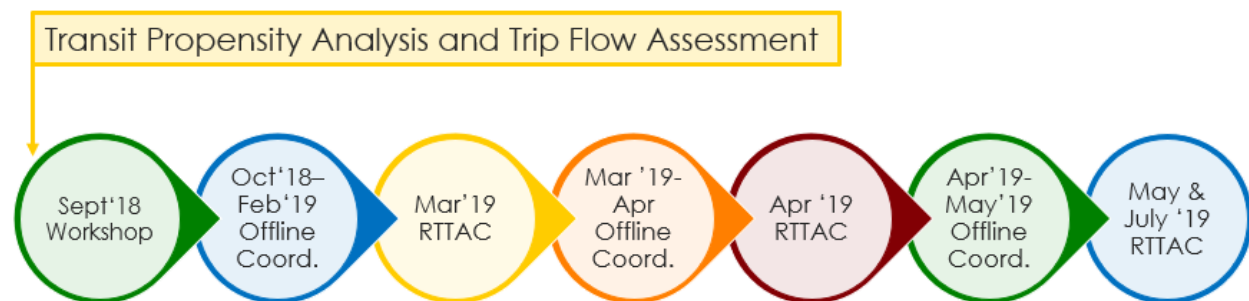
**Scenario 4 - Alternative Growth and Development:** Shifting future growth to compact locations is close proximity to regional transit.

Figure 1 – 2045 RTP Scenario Concepts
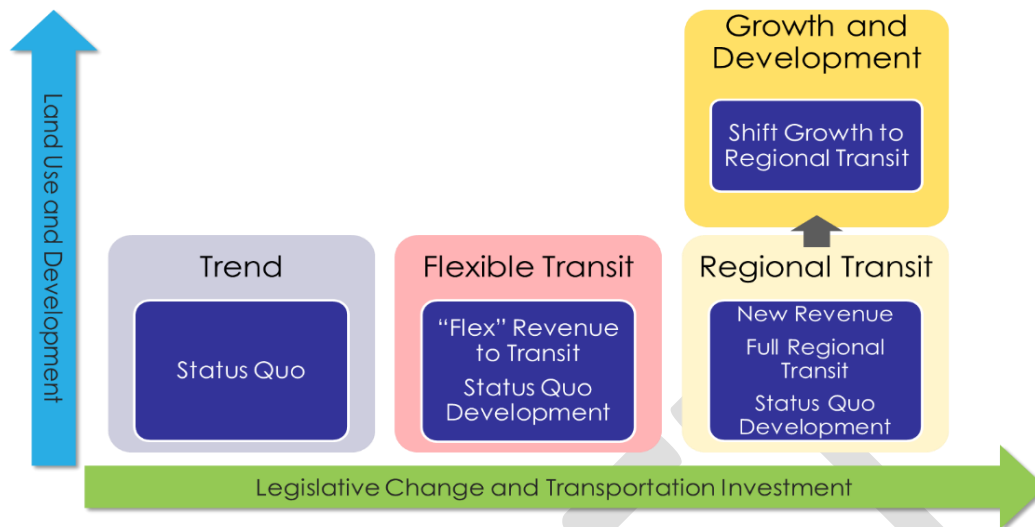


# 2 Coordination Overview



The first version of the scenarios was crafted in September 2018 at an RTTAC meeting/workshop (see Appendix A for workshop presentation). The RTP consultant team coordinated with RTTAC members October 2018 through July 2019 to complete the scenario evaluations.

# 3 Agreed to Intent

Given the purpose of scenario planning, the RTTAC understood and agreed that precision was not the goal and general assumptions were applied at a regional-scale. RTTAC members understood that the regional scenario concepts could be used and adjusted at the county level if there was a desire to do so for supporting each MPO MTP/LRTP efforts. The assumptions used for this task were founded on the 2040 Cost Feasible Plans and in-process 2045 land use data.

# 4 Scenario Planning Methodology

## 4.1 Transit Network & Station Development

In order to model a set of future development scenarios for Southeast Florida, the RTP team prepared different conceptual recommendations for how the transit system might look. The initial phase of the network development process considered existing conditions data and adopted/endorsed transit plans in the region as well as new analysis considering transit propensity[1], future employment allocations, and SERPM model trip flows. Network recommendations were initially identified through a data analysis that resulted in a list of gaps and needs. From there, the team prepared a set of recommendations focused on:

o A regional high-capacity transit (HCT) network. While the network is modal neutral, a high-capacity transit network would consist of BRT (at various investment levels) or rail-based transit that provides greater speed and capacity than a conventual bus service.

o A commuter bus network which provides regional connections to key employment centers.

o A high-frequency transit network (FTN) of bus lines. High-frequency service is composed of conventional bus routes that operate at least every 15-minuters. Such service allows riders to utilize the system without consulting a schedule.

o Major transit transfer facilities (TTF) that would serve as hubs for the region's transit network.

As this was a high-level exercise, several general assumptions about service characteristics, costs, and ridership were assumed. Post the initial phase several rounds of changes occurred that more heavily relied on individual agency input and adjustments. The final adjustments were primarily based on individual agencies separate data and analysis work conducted outside of the RTP. Where possible, the RTP team reconciled the new recommendations received from individual agencies against the initial data and analysis work the RTP team performed to ensure a proper balance of transit was being considered in the scenarios. As a result, the FTN was removed given the amount of HCT being assumed in the scenarios. Appendix B contains more details on the network development process.

The following was assumed when identifying stations related to the HCT high and medium routes.

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[1] The transit propensity model generates four indices that focus on transit-oriented populations, commuter populations, employment destinations, and activity destinations. The analysis combines different metrics typically used to estimate potential transit ridership, such as population density, employment density, and the locations of transit-dependent populations.

- **Average spacing assumed:**
  High investment: 0.5 to 1.5 miles
  Medium investment: 0.5 mile

- **Overlap with:**
  Transfer Facilities
  Existing Tri-Rail Stations
  Existing Metrorail Stations
  HCT low routes

- **Considered**
  2015 Population + Employment density
  Underlying roadway network
  Existing plans and documents that had identified future stations locations

The following sources were used in developing the transit network and stations:

**Network:**
- SMART Plan documentation: Miami-Dade TPO
- Broward County Penny Surtax Website
- LRTP/MTP information: Broward MPO and Palm Beach TPA

**Stations:**
- SMART Plan corridors: Miami-Dade TPO
- Broward corridors: Broward MPO
- Tri-Rail Coastal Link: LPA documentation
- Bay Link: LPA documentation
- All others: Manual assignment + RTTAC meeting maps

# 4.2  Land Use

Each MPO supplied socioeconomic data to the RTP team. For the scenario planning activity, the data submitted in late 2018 was used. Since the receipt of the data in late 2018, changes have been made individually by each MPO. The scenario planning activity will not include these changes to ensure that the trend scenario is comparable to the forecasted scenarios.

| County | Population | | | Employment | | |
|---|---|---|---|---|---|---|
| | 2015 | 2045 Estimates* | Forecasted Growth | 2015 | 2045 Estimates* | Forecasted Growth |
| **Palm Beach** | 1,399,500 | 1,784,500 | 385,000 | 720,800 | 931,100 | 210,300 |
| **Broward** | 1,827,000 | 2,200,400 | 373,400 | 961,600 | 1,241,600 | 280,000 |
| **Miami-Dade** | 2,629,800 | 3,533,000 | 903,200 | 1,353,300 | 1,848,600 | 495,300 |
| **Total** | 5,856,300 | 7,517,900 | 1,661,600 | 3,035,700 | 4,021,300 | 985,600 |

*Late 2018 estimates. MPOs/Counties have more recent data that will be used in the adopted Cost Feasible Plan

## 4.3 Transit Service Characteristic Assumptions

The following tables summarizes the service characteristic assumptions the RTP team assumed for the performance testing portion of the scenario planning analysis.

**Service Characteristics Assumed Where Supplemental Analysis Does Not Exist**

| Level of Transit Investment | Description | SERPM Mode Assignment* | Service Span | Headway | | Top Speed | Average Speed | Average Station Spacing |
|---|---|---|---|---|---|---|---|---|
| | | | | Peak | Off-peak | | | |
| **High** | • Limited stop high frequency service<br>• Operates in 100% dedicated fixed guideway | 22 (LRT) or 23 (BRT) | 18 hours | 7 min | 15 min | 30 mph | 22 mph | 0.5 to 1 mile |
| **Medium** | • Limited stop high frequency service with transit preferential treatments (TSP and queue jumps)<br>• At minimum, operates in marked Bus Only lanes during the peak periods. Percentage of Bus Only lanes may vary. | 31 (Local Bus) | 18 hours | 10 min | 15 min | Prevailing congested roadway conditions, but with 10% travel time reduction applied | | 0.5 to 1 mile |
| **Low** | • Limited stop service with transit preferential treatments (TSP and queue jumps)<br>• Operates 100% in mixed traffic conditions | 31 (Local Bus) | 18 hours | 10 min | 15 min | Prevailing congested roadway conditions, but with 5% travel time reduction applied | | 0.35 to .75 mile |
| **Commuter/ Express Bus** | • Limited stop, closed-door, long haul service<br>• Whenever possible operates on freeways and takes advantage of HOV/HOT and/or Bus-on-shoulder (BOS)<br>• Operates on arterials as necessary to serve termini locations | 15 (Express Buses) | 6 hours (peak only) | 30-60 min | NA | Prevailing congested roadway conditions | | Stops at termini |

*See Section 4.5 for modeling attributes

**Specific Corridor Service Characteristics Based on Supplemental Analysis Provided by RTTAC Mem**

| Transit Routes with Supplemental Information* | Level of Transit Investment Assigned | Description | SERPM Mode Assignment* | Coded as Separate Guideway (Y/N) | Service Span | Headway | | Top Speed | Average Speed | Average Station Spacing |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Peak | Off-peak | | | |
| Tri-Rail Coastal Link / Commuter Rail | N/A | • Limited stop service<br>• Operates in fully dedicated fixed guideway | 11 (Tri-Rail/ Commuter Rail) | Y | 18 hours | 30 min | 60 min | 45 mph | 33 mph | Assumes LPA Stations |
| North Corridor | High | • Limited stop high frequency service<br>• Operates in fully dedicated fixed guideway | 21 (Metrorail) | Y | 18 hours | 10 min | 15 min | 30 mph | 22 mph | Assumes LPA/TPO Provided Stations |
| South Corridor | High | • Limited stop high frequency service<br>• Operates in fully dedicated fixed guideway | 23 (BRT) | Y | 18 hours | 10 min | 15/20 min | 30 mph | 22 mph | Assumes LPA/TPO Provided Stations |
| Northeast Corridor | High | • Limited stop service<br>• Operates in fully dedicated fixed guideway | 11 (Tri-Rail/ Commuter Rail) | Y | 18 hours | 30 min | 60 min | 27 mph | 26 mph | Assumes LPA/TPO Provided Stations |
| Kendall Corridor | High | • Limited stop high frequency service<br>• Operates in fully dedicated fixed guideway | 23 (BRT) | Y | 18 hours | 10 min | 20 min | 17.6 mph | 17.6 mph | Assumes LPA/TPO Provided Stations |
| US 1 - Palm Beach (PTX Blue and Green) | Medium | • Limited stop high frequency service with transit preferential treatments<br>• At minimum, operates in marked Bus Only lanes during the peak periods. Percentage of Bus Only lanes may vary | 31 (Local Bus) | N | 9 hours | 20 min | 20 min | Prevailing congested roadway conditions, but with 10% travel time reduction applied | | Assumes Corridor Study Stations Provided by TPA |

\* See Section 4.5 for modeling attributes.
Two SMART Plan corridors were in-process in terms of selecting LPAs during the scenario planning exercise. The details were assumed. Where variables were missing, the defaults were used related to the level of transit investment.
1. Beach Corridor level of transit investment will be High with 22 (LRT) SERPM mode assignment.
2. E-W Corridor level of transit investment will be High with 21 (Metrorail) SERPM mode assignment.

## 4.4 Assumptions Specific to SERPM 8.0 Modeling Activities

The RTP modeling team used the RTTAC agreed to definitions when modeling the various scenarios. The table below details out the coding assignments used for the purposes of assessing the performance of the scenarios.

**SERPM 8.0 Transit Coding Details by Mode**

| Transit Service | Mode Number | IVT Discount | Bonus* | IVT Source | Dwell Time |
|---|---|---|---|---|---|
| Tri-Rail / Commuter Rail | 11 | 25% | 12 | Determined by link speed, either dedicated ROW with directly coded speed or congested speed | Stop-level dwell time is set by operator number (i.e., county-specific mode number)<br><br>Default 0.5 minutes<br><br>Max value 1.3 minutes (I-95 express buses) |
| Metrorail | 21 | 15% | 5 | | |
| LRT | 22 | 10% | 3 | | |
| BRT | 23 | 5% | 2 | | |
| Express Buses | 15 | 5% | 1 | | |
| Metromover / Streetcar | 24 | 0% | 0 | | |
| Local Bus | 31 | 0% | 0 | | |
| Tri-Rail Shuttle | 12 | 0% | 0 | | |

\* Bonus is applied if the weighted IVT is greater than 5 minutes and is the minimum of the discounted time and the following values

IVT = In-vehicle time

Transfers were assumed to occur where HCT routes intersect. Transfer penalties in SERPM followed the items below:

- A key point is that the model isn't setup to define stops as timed-transfer points with a lower penalty. Also note that the penalty is quite small (1 minute) so there isn't much to be gained by changing it, also that would require some recalibration if existing modes are affected (and we're beyond the schedule/budget availability to do that).

- In the transit path builder, transfer and boarding penalties are uniform across all modes except between Tri-Rail (mode 11) and I-95 Express Buses (mode 15) and between express buses, which have a high penalty to discourage transfers. In mode choice, a fixed 1 minute per transfer penalty is applied to walk and KnR access alternatives. A 10 minute per transfer penalty is applied to PnR access alternatives.

# 4.5 Alternative Growth & Development Allocation

The Alternative Growth & Development Scenario assumed that a majority of the region's net population and employment growth will occur in close proximity to high capacity transit. Briefly stated, the methodology for developing the Alternative Growth Scenario includes the following steps:

1. Station area MAZs are those with greater than 50% of their area within one half mile a proposed high capacity station (high or medium investment) or existing high capacity station (Metrorail and Tri-Rail).

2. Each station area MAZ's growth potential is determined by its character (Urban Core, Urban General or Suburban) and investment level (high or medium) according to the table below.

3. Growth potential is estimated using gross population and employment density and percent mix using criteria established in FDOT TOD Design Guidelines.

4. Seventy five percent of the net 2015-45 population and employment change is allocated proportionally to station area MAZs, up to each MAZ's growth potential.

5. The balance of net population and employment change (25%) is allocated to non-station area MAZs in the same proportion as the Trend Scenario.

6. The process maintains separate population and employment control totals for Miami-Dade, Broward and Palm Beach Counties.

The below graphic and table depict the process and assumptions per character area.
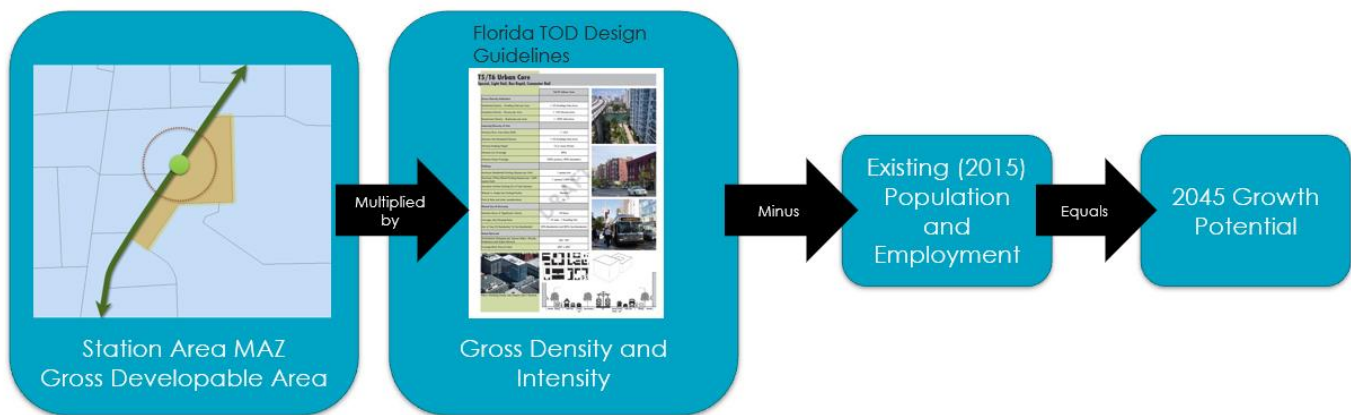


Proposed Density and Intensity Allocations per Transit Investment Level

| Character | Mode | Residential | | | Employment | | |
|---|---|---|---|---|---|---|---|
| | | Net Density (du/ac) | Gross Density (pop/ac) | % | Net FAR | Gross Density (jobs/ac) | % |
| Urban Core | HIGH | 35 | 85 | 20% | 10.0 | 500 | 80% |
| | MEDIUM | 35 | 85 | 20% | 10.0 | 500 | 80% |
| Urban General | HIGH | 30 | 75 | 50% | 3.0 | 125 | 50% |
| | MEDIUM | 15 | 37.5 | 50% | 1.0 | 40 | 50% |
| Suburban | HIGH | 22.5-25 | 57.5-65 | 70-80% | 1.0 | 50-57.5 | 20-30% |
| | MEDIUM | 10 | 25 | 70% | 0.5 | 15 | 20% |

Source: Florida TOD Design Guidelines

# 5 Trend Scenario

The Trend Scenario was the default condition. In other words, it describes a future in which we stay on our current trajectory in terms of funding practices, investment decisions and land use policy. The Trend Scenario was used as a baseline to develop and evaluate alternative scenarios.

## 5.1 Key Assumptions

| Network | Land Use | Revenue |
|---|---|---|
| A merger of the 2040 Cost Feasible Plan and 2045 E+C Network (where projects overlap, the larger investment remained) | 2045 SE data submitted in 2018 to the RTP team | 2045 FDOT forecasts plus 2040 Cost Feasible Plan related revenue forecasts not related to state funds |

**Major Investments by Source in 2040 LRTPs**

**TMA & TA**
o 6 premium transit improvements, including enhanced bus and BRT services ($376m)
o Medley Bridge/Canal Improvement Program ($5m)
o NW South River Dr ($5m)

**Turnpike**
o Widening Boynton Beach Blvd to PGA Blvd ($420m)
o Widening from Broward/Palm Beach Co line to Boynton Beach Blvd ($220m)
o Widening from SW 137th Ave to SW 216th St, includes express lanes ($116m)
o Widening from Golden Glades to HEFT ($82m)
o New interchange at Hypoluxo Rd ($55m)
o Add SB ramp capacity at Golden Glades Interchange ($55m)
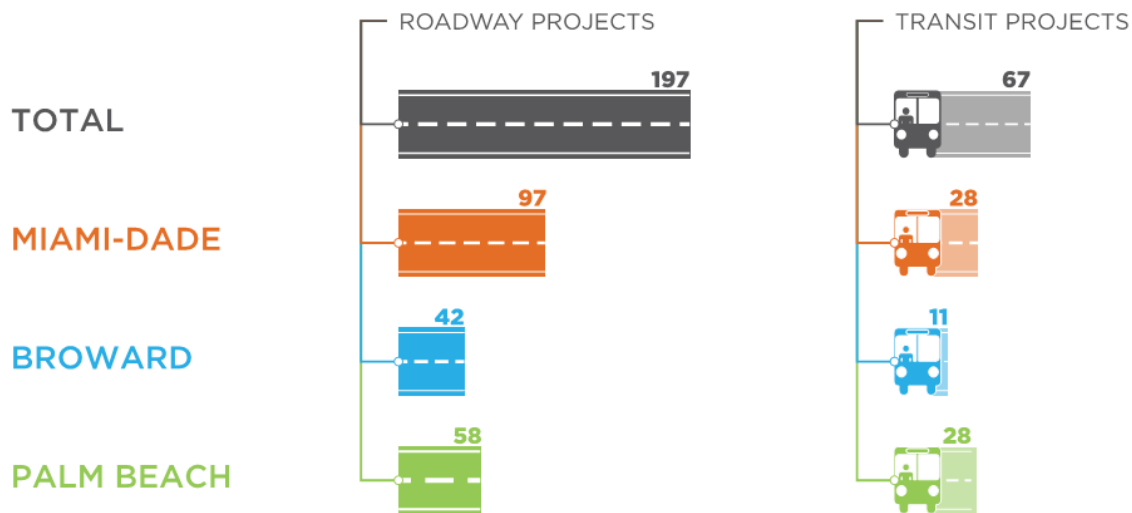o TSM&O on HEFT from SW 88th St to SW 40th St and NW 12th St to NW 74th St ($31m)

**SIS**
o Eight interchange modifications on I-75, I-95, SR 826 ($860m)
o 17 interchange improvements on I-95 ($680m)
o New interchange - I-95 at Spanish River Blvd ($70m)
o Nine express/managed lanes improvements on I-75, SR 826, I-95 ($1,500m)
o Twelve other widening improvements on SR997, SR710, I-595, SR80 ($1,150m)
o Ultimate improvement on I-595 ($840m)

**Other Arterials**
o NW 36th/41st St redesign as superarterial ($250m)
o Two grade separations on SW 8th St ($130m)
o Grade separated intersection reconstruction at Pines Blvd and Flamingo Rd ($100m)
o Intersection reconstruction at US1 and Sunrise Blvd ($80m)
o Tri-Rail Jupiter extension ($55m)
o US1 Busway to SR826 ramps ($60m)

## Major Investments by Mode and County in 2040 RTP Cost Feasible Plan



ROADWAY PROJECTS      TRANSIT PROJECTS

| | ROADWAY | TRANSIT |
|---|---|---|
| TOTAL | 197 | 67 |
| MIAMI-DADE | 97 | 28 |
| BROWARD | 42 | 11 |
| PALM BEACH | 58 | 28 |

**Major highway** projects in the regional cost feasible network included:

PALM BEACH

› I-95 managed lanes from Linton Blvd. to Broward/Palm Beach county line
› Glades Road widening from Butts Road to NW 10th/University
› SR 7 widening from Okeechobee Blvd. to Belvedere Road

BROWARD

› I-95 managed lanes from Stirling Road to Broward/Palm Beach county line
› Sawgrass Expressway widening from I-595 to Turnpike
› Turnpike widening segments between The Turnpike Extension and Palm Beach county line
› I-595 reversible lanes opening

MIAMI-DADE

› SR-836 managed lane from The Turnpike Extension to 27th Avenue
› SR-826 managed lane/improvements from SR-826 to NW 17th Avenue
› SR-924 Gratigny West Extension from SR-826 to The Turnpike Extension
› The Turnpike Extension multiple segments widening
› SR-997 Krome Avenue Truck Bypass
› US-27 from Krome Avenue to NW 79th Avenue, multiple grade separation intersection

**Major transit** projects included in the cost feasible plan network included:

REGIONAL

› Tri-Rail Coastal Link on FEC: West Palm Beach to Jupiter
› Tri-Rail Extension along CSX/SR 710 from Mangonia Park to VA Hospital

PALM BEACH

› Express bus on several alignments, including several routes serving West Palm Beach (WPB) Intermodal Center

BROWARD

› Express bus from Aventura Mall to Ft. Lauderdale downtown
› Express bus from Golden Glades to Sample Road

MIAMI-DADE

› Downtown Intermodal Terminal
› Dolphin Mall Station PNR/Transit Terminal
› Palmetto Intermodal Terminal
› Enhanced bus on several alignments; additional park-and-ride improvements
› North Corridor BRT from MLK Metrorail Station to NW 215 Street
› Double-track Tri-Rail for Miami River Intermodal Center capacity improvement

Figure 2 – 2040 RTP Cost Feasible Plan

# 6 Flexible Transit Scenario

This scenario re-thinks how existing revenue sources are traditionally allocated. As the name implies, the Flexible Transit Scenario "flexes" future funding from highways to transit. The scenario operates within the constraints of existing revenue sources, so future transit investments are limited to projects that can be funded with existing highway expenditures shifted to transit.

## 6.1 Key Assumptions

| Network | Land Use | Revenue |
|---|---|---|
| o Performance* desired over coverage <br><br> o A multi-level High Capacity Transit (HCT) System developed by the RTTAC <br><br> o Existing premium transit remains in place (express bus and rail) <br><br> o Transit Transfer Facilities (TTF) where HCT routes intersect and at HCT termini <br><br> o High and Medium HCT transit stations in locations per RTTAC guidance | o 2045 SE data submitted in 2018 to the RTP team | o 2045 FDOT forecasts plus 2040 Cost Feasible Plan related revenue forecasts not related to state funds <br><br> o Flex 30-50% of "SIS Highways Construction & ROW", "Managed Lanes" and "Other Roads & ROW" programs to transit/multimodal investments |

*Performance = focus on HCT corridors to maximize high quality premium transit. This approach inherently values the quality of transit investments as opposed to quantity.

Below is a snapshot of potential revenue flex opportunities the RTTAC explored for scenario planning purposes.
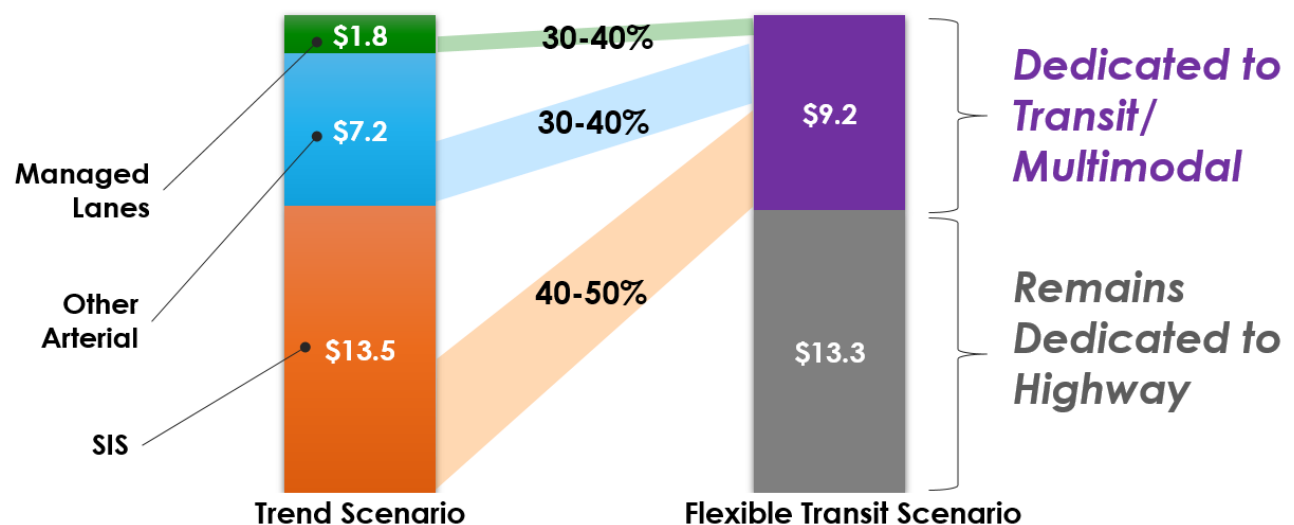


The following figures display the transit alignments and HCT high and medium station location assumptions.

Figure 3 – Flexible Transit Scenario, Palm Beach County
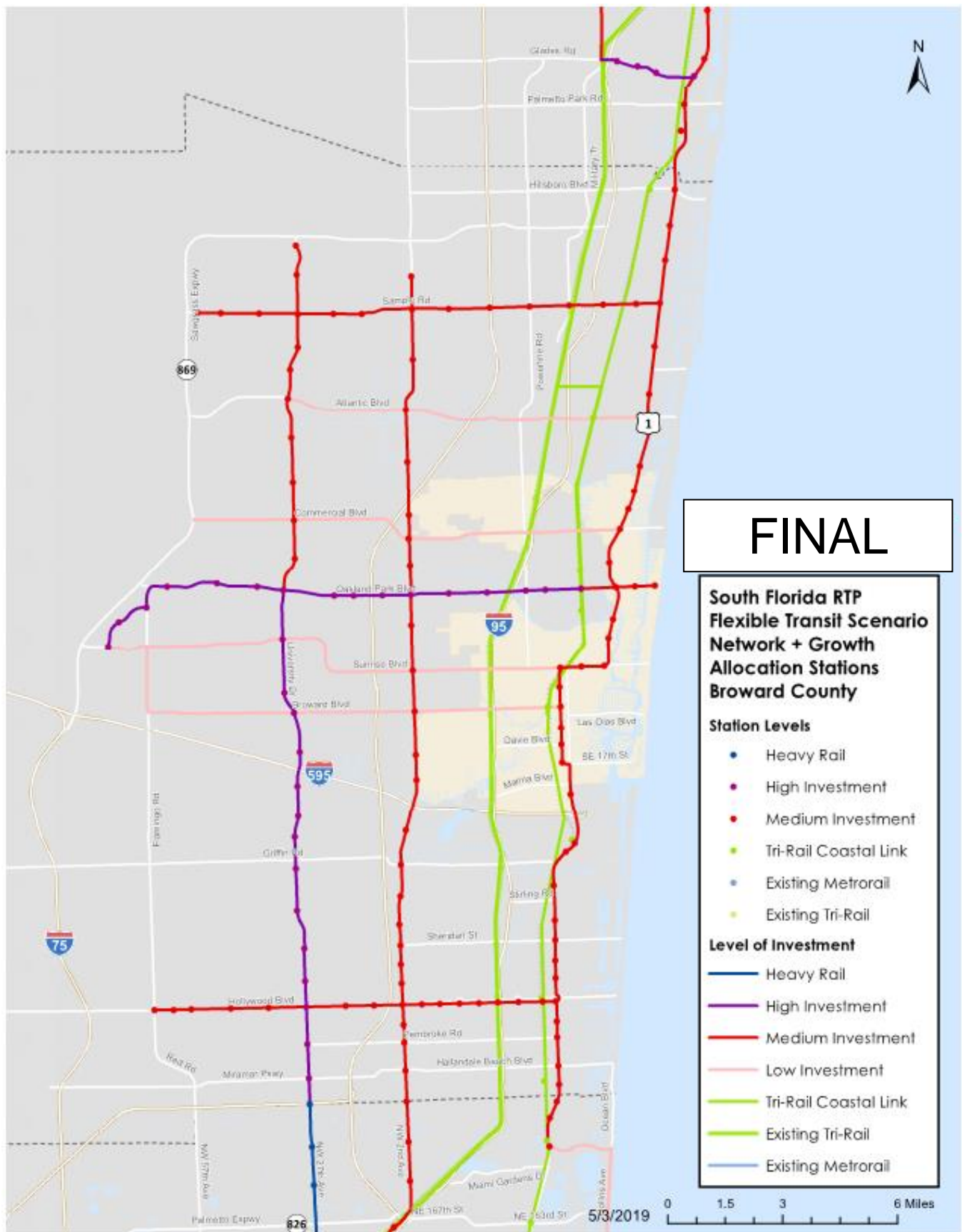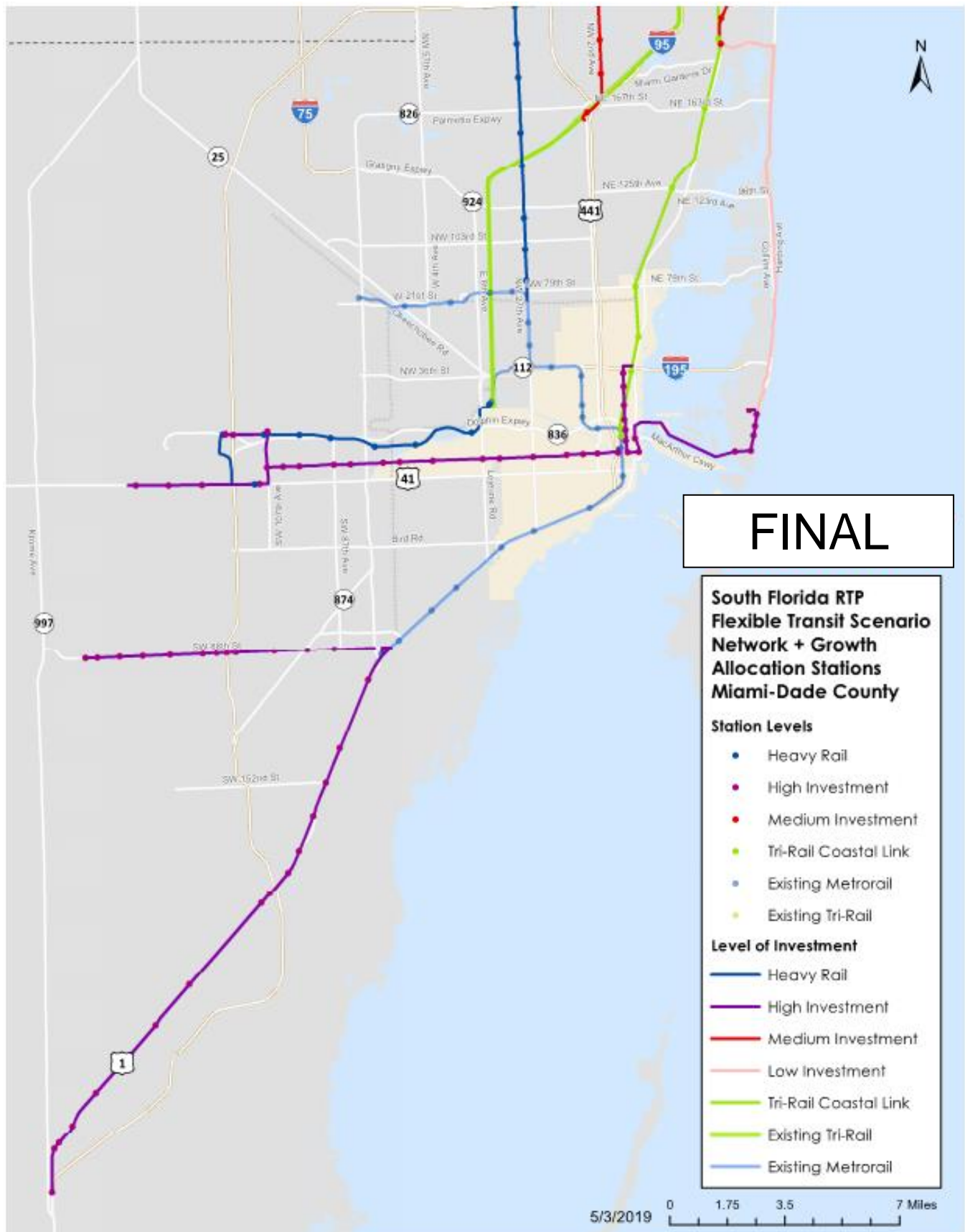


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**South Florida RTP
Flexible Transit Scenario
Network + Growth
Allocation Stations
Palm Beach County**

**Station Levels**
- Heavy Rail
- High Investment
- Medium Investment
- Tri-Rail Coastal Link
- Existing Metrorail
- Existing Tri-Rail

**Level of Investment**
- Heavy Rail
- High Investment
- Medium Investment
- Low Investment
- Tri-Rail Coastal Link
- Existing Tri-Rail
- Existing Metrorail

5/3/2019

0    2.5    5    10 Miles

Figure 4 – Flexible Transit Scenario, Broward County

Figure 5 – Flexible Transit Scenario, Miami-Dade County



FINAL

South Florida RTP
Flexible Transit Scenario
Network + Growth
Allocation Stations
Miami-Dade County

**Station Levels**

- Heavy Rail
- High Investment
- Medium Investment
- Tri-Rail Coastal Link
- Existing Metrorail
- Existing Tri-Rail

**Level of Investment**

— Heavy Rail
— High Investment
— Medium Investment
— Low Investment
— Tri-Rail Coastal Link
— Existing Tri-Rail
— Existing Metrorail

0   1.75   3.5   7 Miles

5/3/2019

# 7 Regional Transit Scenario

This scenario goes "all in" with full investment in a regional transit network for South Florida. Unlike the previous two scenarios, the Regional Transit Scenario is not constrained by traditional revenue sources. The Regional Transit Scenario includes new revenue sources necessary to fully construct and operate the regional transit network.

## 7.1 Key Assumptions

| Network | Land Use | Revenue |
|---|---|---|
| o  A multi-level High Capacity Transit (HCT) System developed by the RTTAC<br><br>o  Commuter Bus services with limited stops operating in the peak periods only<br><br>o  Existing premium transit remains in place (express bus and rail)<br><br>o  Transit Transfer Facilities (TTF) where HCT routes intersect and at HCT termini<br><br>o  High and Medium HCT transit stations in locations per RTTAC guidance | o  2045 SE data submitted in 2018 to the RTP team | o  2045 FDOT forecasts plus 2040 Cost Feasible Plan related revenue forecasts not related to state funds<br><br>o  New major source assumed: New sales tax |

Following the revisions based on feedback from the RTTAC Workshop, and further meetings with project stakeholders, the final recommendations include:

- 38 Commuter Bus Routes

- 33 HCT Corridors, including: 18 High Investment corridors; 10 Medium Investment Corridors; and 5 Low Investment Corridors

- 67 Transit Transfer Centers, including: 18 High Investment locations; 31 Medium Investment locations; and 18 Low Investment Locations.

The following figures display the transit alignments and HCT high and medium station location assumptions.
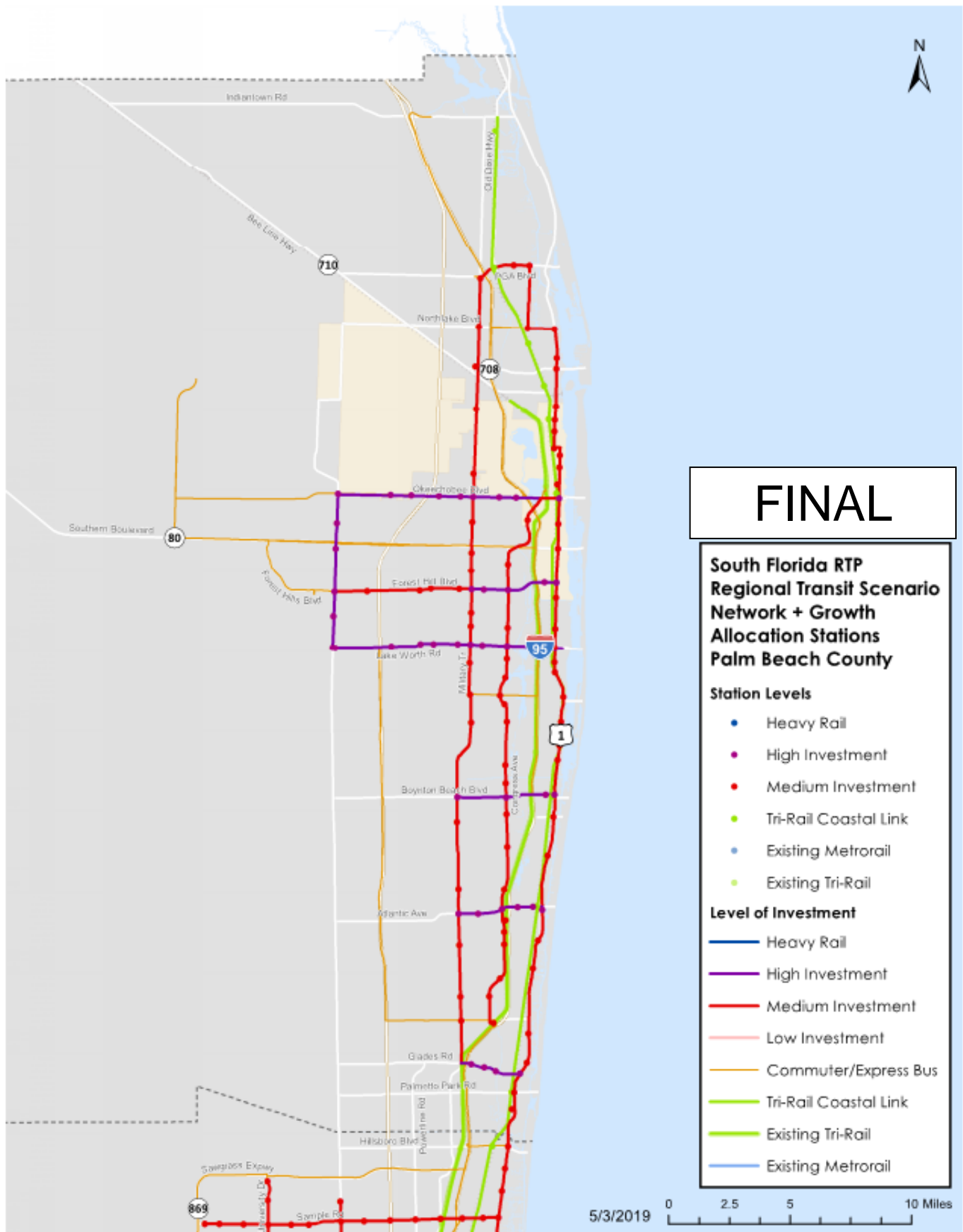
Figure 6 – Regional Transit Scenario, Palm Beach County

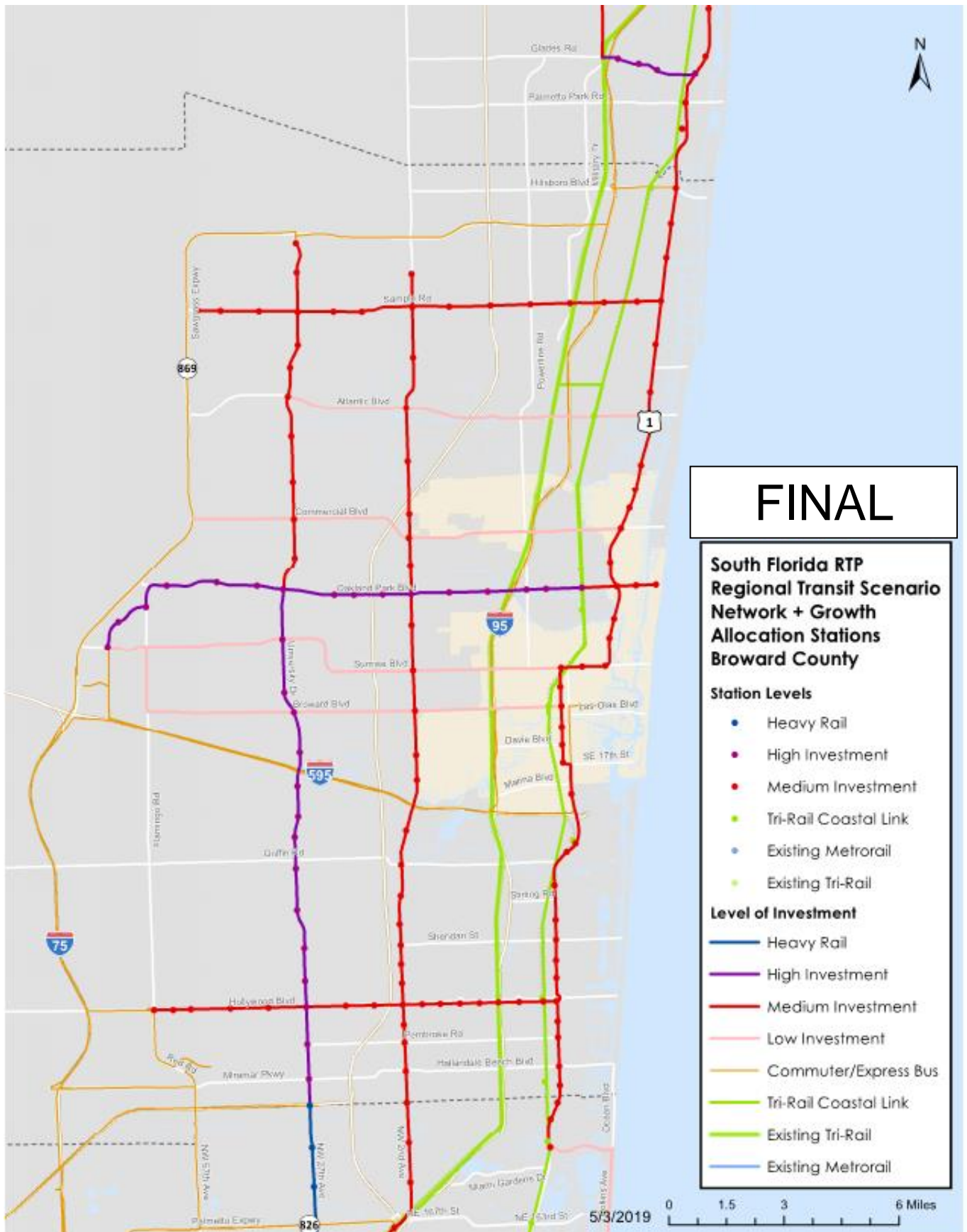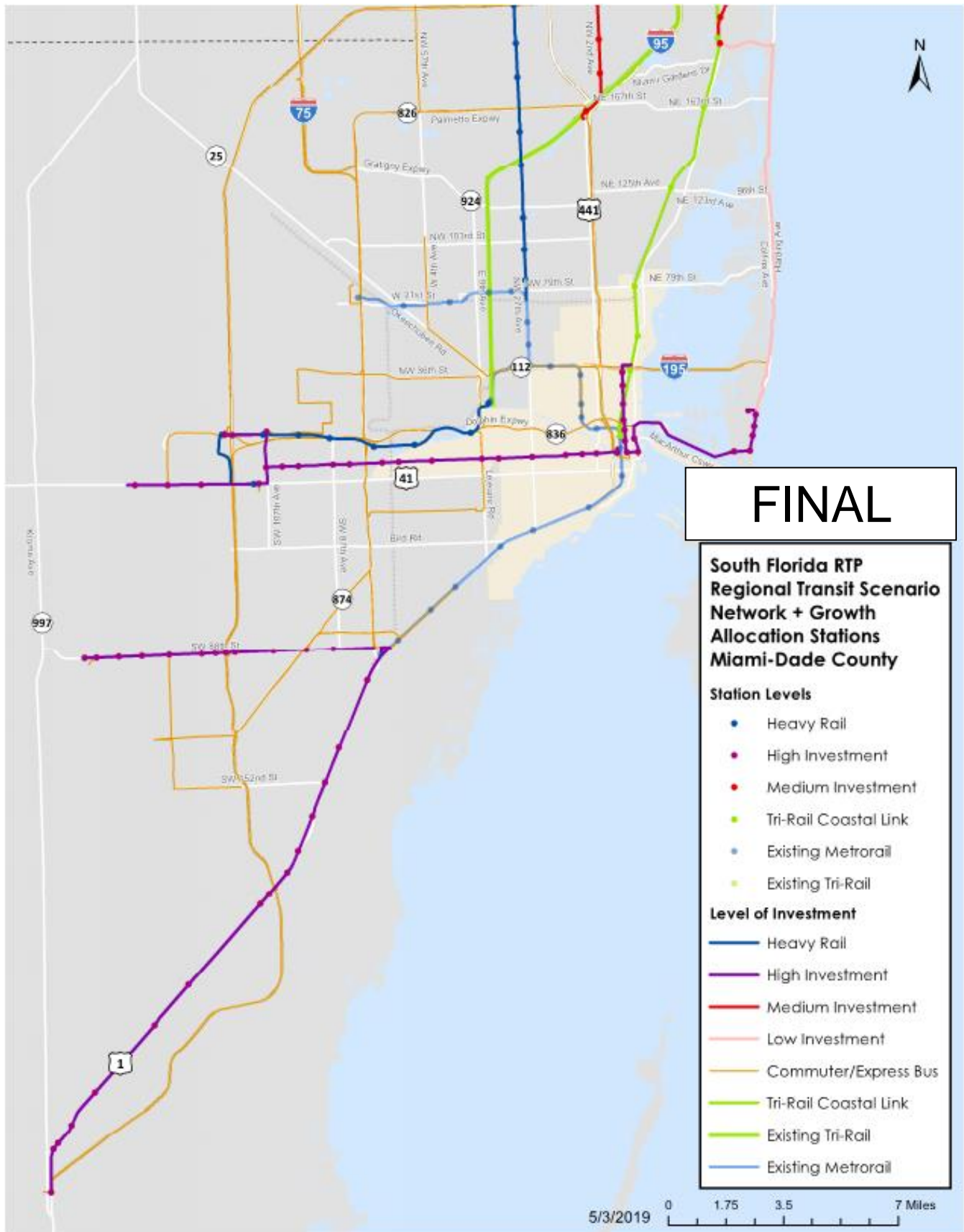

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**South Florida RTP Regional Transit Scenario Network + Growth Allocation Stations Palm Beach County**

**Station Levels**
- Heavy Rail
- High Investment
- Medium Investment
- Tri-Rail Coastal Link
- Existing Metrorail
- Existing Tri-Rail

**Level of Investment**
- Heavy Rail
- High Investment
- Medium Investment
- Low Investment
- Commuter/Express Bus
- Tri-Rail Coastal Link
- Existing Tri-Rail
- Existing Metrorail

5/3/2019

0   2.5   5   10 Miles

Figure 7 – Regional Transit Scenario, Broward County



**FINAL**

**South Florida RTP
Regional Transit Scenario
Network + Growth
Allocation Stations
Broward County**

**Station Levels**

- Heavy Rail
- High Investment
- Medium Investment
- Tri-Rail Coastal Link
- Existing Metrorail
- Existing Tri-Rail

**Level of Investment**

- Heavy Rail
- High Investment
- Medium Investment
- Low Investment
- Commuter/Express Bus
- Tri-Rail Coastal Link
- Existing Tri-Rail
- Existing Metrorail

0   1.5   3   6 Miles

5/3/2019

Figure 8 – Regional Transit Scenario, Miami-Dade County

FINAL

**South Florida RTP Regional Transit Scenario Network + Growth Allocation Stations Miami-Dade County**

**Station Levels**
- • Heavy Rail
- • High Investment
- • Medium Investment
- • Tri-Rail Coastal Link
- • Existing Metrorail
- • Existing Tri-Rail

**Level of Investment**
- —— Heavy Rail
- —— High Investment
- —— Medium Investment
- —— Low Investment
- —— Commuter/Express Bus
- —— Tri-Rail Coastal Link
- —— Existing Tri-Rail
- —— Existing Metrorail

5/3/2019

0    1.75    3.5    7 Miles

# Commuter/Express Route Details

The RTP team transit experts have found that more commuter service across a region is typically one of the low-hanging fruits. When combined with HOV/HOT lanes, they can be very effective at moving masses of people with a relatively low-subsidy (and in some cases commuter services run a profit and support other transit service e.g., Loudoun County in Northern Virginia). As shown in Figures 6 through 8, static maps can pose challenges when trying to portray a network of commuter/express routes because of the difficulty in be able to decipher individual routes given the quantity/overlap of them in the region. To overcome this challenge, the table below summarizes each route tested in the Regional Transit Scenario.

**Commuter/Express Routes in the Regional Transit Scenario**

| County | Primary Facility | Start | On | End | Notes |
|---|---|---|---|---|---|
| Palm Beach | I-95 | Boynton Beach (Military and BB Blvd) | I-95 | West Palm Beach (Brightline station) | |
| | Okeechobee Blvd | Loxahatchee | Okeechobee Blvd | West Palm Beach (Brightline station) | Reconciled with PB LRTP 2040T09 |
| | I-95 | Jupiter | I-95 | West Palm Beach (Brightline station) | Reconciled with PB LRTP 2040T01 |
| | Sawgrass Expressway | Coral Square Mall | Sawgrass Expressway/I-95 | Boca Raton (Innovation Campus) | |
| | Turnpike | Wellington | Turnpike/Yamato Rd | Boca Raton (Innovation Campus) | Reconciled with PB LRTP 2040T05 |
| | US 98 | Loxahatchee | US 98/Military/Forest Hill Blvd | Green Acres / Palm Springs | |
| | Forest Hill Blvd | Wellington (Crestwood Square) | Forest Hill Blvd/I-95 | West Palm Beach (Brightline station) | |
| | US 98/I-95 | Wellington (Crestwood Square) | US 98/I-95 | Lake Park/North Palm Beach | |
| | I-95 | Boynton Beach (Military and BB Blvd) | Military/Lantana/I-95 | Lake Park/North Palm Beach | |
| Broward | I-95 | Pompano PnR | I-95 | Downtown Ft Lauderdale (Broward Central Terminal) | |
| | I-595 | Sawgrass Mills Mall | I-595/I-95 | Downtown Ft Lauderdale (Broward Central Terminal) | |
| | Sawgrass Expressway | Magnolia Shoppes plaza | Sawgrass Expressway | Plantation | |
| | I-595 | Sawgrass Corporate Park | I-595 | Downtown Ft Lauderdale (Broward Central Terminal) | |
| | I-75 | Miramar | I-75 | Plantation | |
| | I-95 | Deerfield Beach | I-95 | Coral Heights | |
| Miami -Dade | HEFT* | Dadeland North Metrorail Station | HEFT/SR 874 | Florida City | SMART Plan |
| | I-75* | I-75/HEFT PnR | I-75/SR 924/SR 826 | Palmetto MR station | SMART Plan |
| | SR 874* | Kendall Tamiami Airport | SW 120th St/SR 874/SR 878 | Coral Gables | BERT d extended to Coral Gables, intermediate stop at Dadeland |
| | HEFT-South* | Doral | HEFT/SR 836 | Florida City | Intermediate stop at Dolphin station |
| | HEFT-South* | Doral | HEFT/SR 836 | Cutler Bay | Intermediate stop at Dolphin station |
| | HEFT-South* | Doral | HEFT/SR 836/SW 137th Ave/Kendall Dr/Coral Reef Dr | Coral Reef PnR | Intermediate stops at Dolphin, Kendall/HEFT, Tam-Kendall Airport, SW 137th/Coral Reef |
| | HEFT-North* | Unity Station/NW 27th Ave | HEFT | Dolphin Station Transit Terminal | SMART Plan |
| | I-95* | Golden Glades Interchange Terminal | I-95/I-195 | Miami Beach Convention Center | SMART Plan |
| | I-195* | Miami Beach Convention Center | Collins/I-195 | Civic Center | SMART Plan |
| | I-395* | Miami Beach Convention Center | Collins/I-395 | Downtown Miami (Miami Central Station) | SMART Plan |
| | SR 826 | Unity Station/NW 27th Ave | SR 826/NW 27th Ave | Doral / Medley | Intermediate stop at Palmetto MR station |
| | SR 826 | cb Smith PnR - Pembroke Pines | Flamingo/SR 826 | Doral / Medley | Intermediate stops at Miramar, Palmetto MR station |

| County | Primary Facility | Start | On | End | Notes |
|--------|-----------------|-------|-----|-----|-------|
| Miami -Dade | SR 112/I-95 | Hialeah | SR 823/Okeechobee/SR 112/I-95 | Downtown Miami (Miami Central Station) | |
| | I-595 | Miramar | Turnpike/I-595/I-95 | Downtown Ft Lauderdale (Broward Central Terminal) | |
| | SR 836 | W Kendall Transit Terminal | HEFT/SR 836 | Downtown Miami (Miami Central Station) | |
| | SR 826/SR 836 | W Kendall Transit Terminal | Kendall/SR 826/SR 836 | Miami Springs / Miami International Airport | Intermediate stop at Dadeland North |
| | I-75/SR 826 | Pembroke Lakes Mall | I-75/SR 826 | Miami Springs / Miami International Airport | Intermediate stops at I-75 PnR at HEFT, Palmetto MR station |
| | SR 836 | Tamiami Station | SR 836/SW 42nd Ave | Coral Gables | |
| | SR 826 | I-75/HEFT PnR | I-75/SR 924/SR 826 | Coral Gables | Intermediate stop at Palmetto MR station |
| | SR 874 | W Kendall Transit Terminal | Kendall Dr/SR 874/SW 24th St | Coral Gables | |
| | SR 836 | FIU/Panther Station | SR 836/I-395 | Miami Beach | |
| | SR 826 | Golden Glades Interchange | SR 826 | Dadeland | Intermediate stop at Palmetto MR station |

# 8 Alternative Growth & Development Scenario

In many cases, simply making new investments in transportation infrastructure, specifically regional transit and multimodal corridors, may not be enough to have a significant impact on South Florida's future. The Alternative Growth & Development Scenario builds on the Regional Transit Scenario by introducing changes to growth and development to complement regional transportation investments. More specifically, the Alternative Growth & Development Scenario shifts a large share of the region's population and employment growth to compact locations surrounding high capacity transit corridors.

## 8.1 Key Assumptions

| Network | Land Use | Revenue |
|---|---|---|
| o A multi-level High Capacity Transit (HCT) System developed by the RTTAC | o 2045 SE data submitted in 2018 to the RTP team | o 2045 FDOT forecasts plus 2040 Cost Feasible Plan related revenue forecasts not related to state funds |
| o Commuter Bus services with limited stops operating in the peak periods only | o 75% of new population growth within ½ mile of HCT | o New major source assumed: New sales tax |
| o Existing premium transit remains in place (express bus and rail) | o 75% of new employment growth within ½ mile of HCT | |
| o Transit Transfer Facilities (TTF) where HCT routes intersect and at HCT termini | | |
| o High and Medium HCT transit stations in locations per RTTAC guidance | | |

| County | Forecasted Population Growth | Forecasted Employment Growth |
|---|---|---|
| Palm Beach County | 385,000 | 210,300 |
| Broward County | 373,400 | 280,000 |
| Miami-Dade County | 903,200 | 495,300 |
| Total | 1,661,600 | 985,600 |

The transit network and station locations applied in the Alternative Growth & Development Scenario are identical to Figures 6, 7, and 8. Below, Figure 9 gives an example of how the growth was allocated per character area. The RTP team modeled the growth allocation scenario following RTTAC's agreement of assumptions.

Figure 9 – Sample Map of Growth Allocation Applied throughout the Region



# 9 Scenario Costs

Capital and operating costs associated with the recommended Flexible and Regional Transit scenarios were estimated as part of the scenario planning effort. These high-level cost estimates were based on costs provided to the team from participating agencies or from comparable systems nationwide. In the case of the HCT network, two separate costs were prepared for High Investment HCT: a generic value which applied to most corridors, and an estimate for LRT based on a 2013 cost estimate for BayLink. Appendix B contains more details on the network development process.

**Scenario Planning Cost Assumptions**

| Type | Capital Cost per Unit | Unit | Operating Cost per Unit | Unit | Assumption Notes |
|---|---|---|---|---|---|
| **Commuter Transit** | $600,000 | per vehicle | $215 | revenue hour | 2016 Miami Dade Transit average cost per hour (NTD). Assume 30 mph operating speeds. Trips differ by route and are derived from internal analysis. |
| **High Capacity Transit** | | | | | |
| Low Investment | $1,750,000 | per mile | $500,000 | per mile | Per mile cost for SWIFT BRT in Washington State. Example of shoulder running BRT with enhanced stops but limited ROW treatment. |
| Medium Investment | $5,500,000 | per mile | $500,000 | per mile | Combination of low-end BRT capital cost estimate across 4 corridors in 2015 Miami-Dade BRT Implementation Plan. Figures inflated to 2018 $s. O&M costs based on same source and rounded to nearest $100k. |
| High 1 (Generic BRT w/ extensive dedicated ROW) | $14,500,000 | per mile | $500,000 | per mile | Combination of high-end BRT capital cost estimate across 4 corridors in 2015 Miami-Dade BRT Implementation Plan. Figures inflated to 2018 $s. O&M costs based on same source and rounded to nearest $100k. |
| High 2 (BayLink LRT costs) | $73,800,000 | per mile | $3,500,000 | per mile | Capital cost based on average cost per mile for all SMART corridors, excluding Northeast which is commuter rail. O&M estimate from 2015 Beach Corridor Study (DC Low Cost Alt) with a 5-minute peak headway and 10-minute off peak headway. |
| **Transit Center** | | | | | |
| Small Generic | $1,500,000 | - | - | - | Ballpark of smaller projects in LRTP including Miami Beach Transfer Center, SW 88 St Transit Center. |
| Medium Generic | $12,500,000 | - | - | - | West Kendall Transit Center |
| High Generic | $35,000,000 | - | - | - | Lynx Central Station, Orlando, FL - $35 million (2018 $). $7.5 million subtracted, estimate for cost of 68,000 sf extra office space on site. Inflated to 2018 dollars using RS Means construction cost adjustment figures: https://www.rsmeansonline.com/references/unit/refpdf/hci.pdf |
| Enhance Existing | $1,500,000 | - | - | - | Cost of implementing improvements at existing transit centers to accommodate new routes. Estimate only for new bus bays. Based on "small" cost estimate. |

**Flexible Transit Scenario Costs**

| | County | Capital Cost | Annual Operating Cost | Total Operating Cost (x12.5 Years) | Total Cost (Capital Cost + Total Operating Cost) |
|---|---|---|---|---|---|
| HCT | Broward | $2,563,500,000 | $161,800,000 | $2,022,500,000 | $4,586,400,000 |
| | Miami-Dade | $5,089,500,000 | $174,400,000 | $2,180,000,000 | $7,269,300,000 |
| | Palm Beach | $2,781,900,000 | $154,300,000 | $1,928,800,000 | $4,711,200,000 |
| | Coastal Link | $800,000,000 | $40,000,000 | $500,000,000 | $1,300,000,000 |
| | **Total** | **$11,234,900,000** | **$530,500,000** | **$6,631,300,000** | **$17,866,900,000** |
| Transit Transfer Facilities | Broward | $286,500,000 | - | - | $286,500,000 |
| | Miami-Dade | $290,000,000 | - | - | $290,000,000 |
| | Palm Beach | $468,000,000 | - | - | $468,000,000 |
| | **Total** | **$1,044,500,000** | **-** | **-** | **$1,044,500,000** |
| Total Scenario Costs | Broward | $2,850,000,000 | $161,800,000 | $2,022,500,000 | $4,872,900,000 |
| | Miami-Dade | $5,379,500,000 | $174,400,000 | $2,180,000,000 | $7,559,300,000 |
| | Palm Beach | $3,249,900,000 | $154,300,000 | $1,928,800,000 | $5,179,200,000 |
| | Coastal Link | $800,000,000 | $40,000,000 | $500,000,000 | $1,300,000,000 |
| | **Total** | **$12,279,400,000** | **$530,500,000** | **$6,631,300,000** | **$18,911,400,000** |

**Regional Transit Scenario Costs**

| | County | Capital Cost | Annual Operating Cost | Total Operating Cost (x12.5 Years) | Total Cost (Capital Cost + Total Operating Cost) |
|---|---|---|---|---|---|
| HCT | Broward | $2,563,500,000 | $161,800,000 | $2,022,500,000 | $4,586,400,000 |
| | Miami-Dade | $5,089,500,000 | $174,400,000 | $2,180,000,000 | $7,269,300,000 |
| | Palm Beach | $2,781,900,000 | $154,300,000 | $1,928,800,000 | $4,711,200,000 |
| | Coastal Link | $800,000,000 | $40,000,000 | $500,000,000 | $1,300,000,000 |
| | **Total** | **$11,234,900,000** | **$530,500,000** | **$6,631,300,000** | **$17,866,900,000** |
| Transit Transfer Facilities | Broward | $286,500,000 | - | - | $286,500,000 |
| | Miami-Dade | $290,000,000 | - | - | $290,000,000 |
| | Palm Beach | $468,000,000 | - | - | $468,000,000 |
| | **Total** | **$1,044,500,000** | **-** | **-** | **$1,044,500,000** |
| Commuter Routes | Broward | $9,900,000 | $5,300,000 | $66,300,000 | $76,500,000 |
| | Miami-Dade | $35,300,000 | $19,000,000 | $237,500,000 | $272,200,000 |
| | Palm Beach | $16,600,000 | $8,900,000 | $111,300,000 | $128,200,000 |
| | **Total** | **$61,800,000** | **$33,200,000** | **$415,100,000** | **$476,900,000** |
| Total Scenario Costs | Broward | $2,859,900,000 | $167,100,000 | $2,088,800,000 | $4,949,400,000 |
| | Miami-Dade | $5,414,800,000 | $193,400,000 | $2,417,500,000 | $7,831,500,000 |
| | Palm Beach | $3,266,500,000 | $163,200,000 | $2,040,100,000 | $5,307,400,000 |
| | Coastal Link | $800,000,000 | $40,000,000 | $500,000,000 | $1,300,000,000 |
| | **Total** | **$12,341,200,000** | **$563,700,000** | **$7,046,400,000** | **$19,388,300,000** |

# 10 Final Network Recommendations

The final network recommendations across the Flexible and Regional Transit scenarios included 33 HCT corridors in the region, totaling approximately $11.2 billion in capital costs. The HCT network assumes a range of investment types, from enhancing existing bus routes with transit priority features, to building out new fixed-guideway transit lines. The system would cost approximately $531 million per year to operate. The table below summarizes the number of HCT corridors, and sum of costs by each corridor's primary jurisdiction. Costs for routes in Miami-Dade that are part of the SMART network are estimated using figures from the Miami-Dade TPO. **Error! Reference source not found.** maps out the proposed network.

**Summary of HCT Network Capital and Operating Costs by Jurisdictions**

| County | Number of Corridors | Route Miles | Capital Costs | Annual Operating Costs |
|---|---|---|---|---|
| Broward | 12 | 161 | $2,563,500,000 | $161,800,000 |
| Miami-Dade | 8 | 92 | $5,089,500,000 | $174,400,000 |
| Palm Beach | 10 | 140 | $2,781,900,000 | $154,300,000 |
| Tri-Rail Coastal Link (multi-county) | 3 | 175 | $800,000,000 | $40,000,000 |
| **Total** | **33** | **568** | **$11,234,900,000** | **$530,500,000** |

*With the exception of Tri-Rail Coastal Link, for corridors that cross jurisdictions, figures allocated to county with the most corridor miles.

The final recommendations call for 67 transit transfer facilities. The TTFs have been categorized by low, medium, or high investment facilities. Medium and high investment facilities would be located off-street, with high-investment facilities including significant infrastructure investments like indoor waiting areas. Low-investment transfer facilities would be an enhanced on-street facility. The facility locations are based on where existing and proposed major transit routes intersect one another. Eighteen facilities are marked for high-investment, 31 are medium-investment facilities, and 18 are low-investment facilities.

**Summary of Transit Transfer Facility Costs by Level of Investment**

| Level of Investment | Count | Capital Costs |
|---|---|---|
| High | 18 | $630,000,000 |
| Medium | 31 | $387,500,000 |
| Low | 18 | $27,000,000 |
| **Total** | **67** | **$1,044,500,000** |

The final recommendations identify 38 commuter bus routes to serve the Southeast Florida region. These routes would run during peak periods only and provide express service to major employment centers in the region.

**Summary of Commuter Bus Recommendations**

| Measure | Statistics |
|---|---|
| Count | 38 |
| Peak Vehicles | 103 |
| Annual Revenue Hours | 154,500 |
| **Capital Costs** | **$61,800,000** |
| **Annual Operating Costs** | **$32,200,000** |

# 11 Performance Measures

The RTP team used various modeling tools to produce performance measures. The intent of the measures was to help the region understand the large-scale differences across the scenarios when compared to the Trend Scenario. The following table summarizes the different performance measures and supporting tool. These measures were derived from the adopted 2045 RTP Goals and Objectives.

**Scenario Planning Performance Measures**

| Measure | SERPM | Off-Model | Methodology |
|---|:---:|:---:|---|
| Job Accessibility by Transit | ✓ | | Average Employment Transit Accessibility Time (AETAT) |
| Walk Access to Transit | | ✓ | ½ mile buffer around rail/BRT stations<br>¼ mile buffer around high frequency transit routes |
| Cost Effectiveness | ✓ | ✓ | Annualized cost per passenger mile |
| Walk and Bike Access to Activities | | ✓ | ¼ mile and 3-mile buffer around MAZs that meet employment thresholds<br>Jobs per acre and/or total employment |
| VMT Reduction | ✓ | | Model output |
| Person VMT by mode (SOV, HOV, transit) | ✓ | | Model output |
| Hours of delay | ✓ | | Congested vehicle and truck VHT |
| Average Drive Time to Work | ✓ | | Weighted average HBW travel time |
| Mode Share | ✓ | | Model output |
| Total Walk/Bike Trips | ✓ | | Model output |
| Resiliency and Vulnerability | | ✓ | Population and employment in vulnerable areas (mean sea level rise) |
| Equity | | ✓ | All of the above: Equity Area vs. region as a whole |
| Total GHG Emissions | ✓ | | SERPM output |

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Transportation Council

# 12 Scenario Performance Findings

Below is a graphic summarizing the results across the four scenarios.

| Measure | Trend (2045 XCF) | Flexible Transit Network | Regional Transit Network | Alternative Growth |
|---|---|---|---|---|
| 1. Job Accessibility by Transit | 53 min. average travel time | ⬆ 9% decrease<br>5 minutes faster | ⬆ 9% decrease<br>5 minutes faster | ⬆ 8% decrease<br>4 minutes faster |
| 2. Walk Access to Transit (High Capacity) | 1 in 20 people<br>2 in 20 jobs | ⬆ 5 in 20 people<br>8 in 20 jobs | ⬆ 5 in 20 people<br>8 in 20 jobs<br>12 in 20 people can drive to an express stop | ⬆ 7 in 20 people<br>10 in 20 jobs<br>12 in 20 people can drive to an express stop |
| 3. Cost Effectiveness | | | | |
| 4. Walk and Bike Access to Activities | 1 in 10 people can walk<br>6 in 10 people can bike | ↔ No change | ↔ No change | ⬆ Marginal increase |
| 5. VMT Reduction | 152 million VMT per day | ⬆ 1% decrease<br>1.6 million less | ⬆ 0.9% decrease<br>1.4 million less | ⬆ 2% decrease<br>2.9 million less |
| 6. Person VMT by mode | 102 million SOV (57%)<br>63 million HOV (35%)<br>5 million transit (3%)<br>9 million walk and bike (5%) | ⬆ -2 million SOV (56%)<br>-1 million HOV (35%)<br>+2 million transit (5%)<br>+/- walk and bike (5%) | ⬆ -2 million SOV (56%)<br>-1 million HOV (35%)<br>+2 million transit (5%)<br>+/- walk and bike (5%) | ⬆ -4.5 million SOV (56%)<br>-1 million HOV (35%)<br>+3 million transit (5%)<br>- 1 million walk and bike (5%) |
| 7. Vehicle Hours of Travel | 5.2 million VHT per day | ⬆ 5% decrease<br>280,000 less | ⬆ 5% decrease<br>270,000 less | ↔ Slight increase |
| 8. Average Drive Time to Work | 27 minutes | ↔ No change | ↔ No change | ↔ No change |
| 9. Mode Share/<br>10. Total Walk/Bike Trips | 47% SOV<br>40% HOV<br>3% transit<br>10% walk and bike | ⬆ -1% SOV (46%)<br>+/- HOV (39%)<br>+2% transit (5%)<br>+/- walk and bike (10%) | ⬆ -1% SOV (46%)<br>+/- HOV (40%)<br>+1% transit (4%)<br>+/- walk and bike (10%) | ⬆ -2% SOV (45%)<br>+/- HOV (39%)<br>+1% transit (4%)<br>+2% walk and bike (12%) |
| 11. Resiliency and Vulnerability | 1 in 4 people subject to SLR<br>1 in 4 jobs subject to SLR | No change | No change | ⬆ Marginal improvement |
| 12. Equity | Equity areas fare better than the population as a whole. | ⬆ Equity areas continue to fare better than the population as a whole. | ⬆ Equity areas continue to fare better than the population as a whole. | ⬆ Equity areas continue to fare better than the population as a whole. |
| 13. Total GHG Emissions | 52,600 tons of $CO_2$ per day | ↔ No change | ↔ No change | ↔ No change |

# 13 Conclusions

Given the region's expected growth and need to proactively explore transportation funding to meet urban area needs, the 2045 RTP explored several important policy and investment questions about South Florida's future. These questions revolved around two main elements:

- **Financial and legislative:** What changes to policy and legislation will allow greater flexibility in how existing revenue sources are used? What new revenue sources can feasibly generate revenue for regional transportation infrastructure?

- **Growth and development:** Are changes in development patterns (density/intensity) necessary to complement regional transportation investments?

Based on the results of the scenarios tested in order to help address these questions, the RTTAC agreed that the following five areas should be advanced for policy considerations:

1. Regional transit is a primary long-term mobility objective
   a. Our population is anticipated to increase by 25%
   b. A regionally connected high-capacity transit system fundamentally changes Southeast Florida's mobility outlook. It is needed to move the amount of people we are anticipating.
   c. Single-occupancy vehicle travel is not sustainable
   d. Car-ownership as the only means to travel is not equitable.
   e. There will always be demand for auto travel and associated congestion but implementing a high-capacity transit system provides Southeast Floridians with viable options.

2. Complementary land use is essential
   a. A major high-capacity transit investment in the region will not be successful without complementary land uses.
   b. Complementary land uses also makes short walk/bike trips possible and further reduces the need for motorized transportation.
   c. Currently, only 1 out of 20 residents can access high-capacity transit from home
   d. Currently, only 1 out of 10 residents can access jobs from high-capacity transit
   e. A majority of new development should occur around existing and future high-capacity transit routes.

3. Shifting existing transportation resources to transit is necessary
   a. The current state funding programs are too restrictive and do not allow for implementing transit investments in the manner needed to serve our rapidly growing urbanized area.
   b. Greater flexibility is needed with existing state highway funding sources so that it may also be used to fund transit investments.
   c. Each dollar spent on transit will have greater impact on moving people than each dollar spent on highways.
   d. We must continue to operate and maintain our highway system.

4. New revenue sources are necessary
    a. Our current revenue projections indicate we will not have enough funding to cover the cost of building, operating and maintaining the desired regional high-capacity transit system.
    b. We will need to seek additional funding sources at all levels (Federal, State, County and Local) to build and operate the regional high-capacity transit system.

5. First/Last Mile is critical
    a. Our current system does not have a complete first/last mile network
    b. We will need to invest in building a complete first/last mile network in order ensure safety, maximize transit ridership, and increase access to jobs and major/critical destinations.
    c. Completing a first/last mile network is consistent with the State's Vision Zero as well as many municipalities in the region.

# 14 Appendices

## Appendix A: RTTAC Scenario Planning Workshop Presentation


## Appendix B: Foursquare ITP Transit Service Recommendations Technical Memorandum including Transit Propensity Maps, Model Flow Maps, and Detailed Cost Estimates

Appendix A:
**RTTAC Scenario Planning Workshop Presentation**

# TODAY'S WORKSHOP

01      Overview (10 minutes)

02      Trend Scenario (20 minutes)

BREAK

03      Regional Transit Scenario (45 minutes)

BREAK

04      Flexible Transit Scenario (45 minutes)

05      Alternative Growth Scenario (20 minutes)

06      Wrap-up and Next Steps (10 minutes)
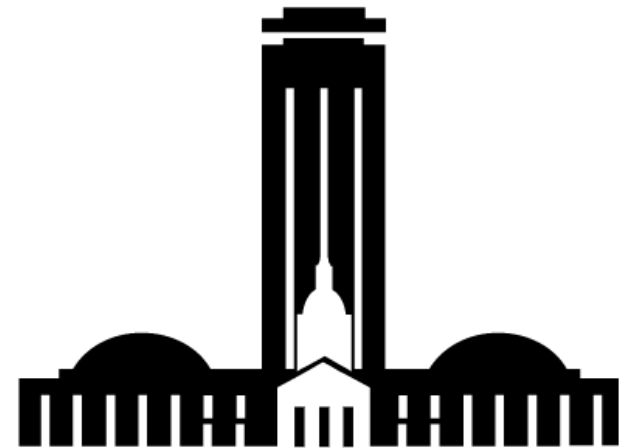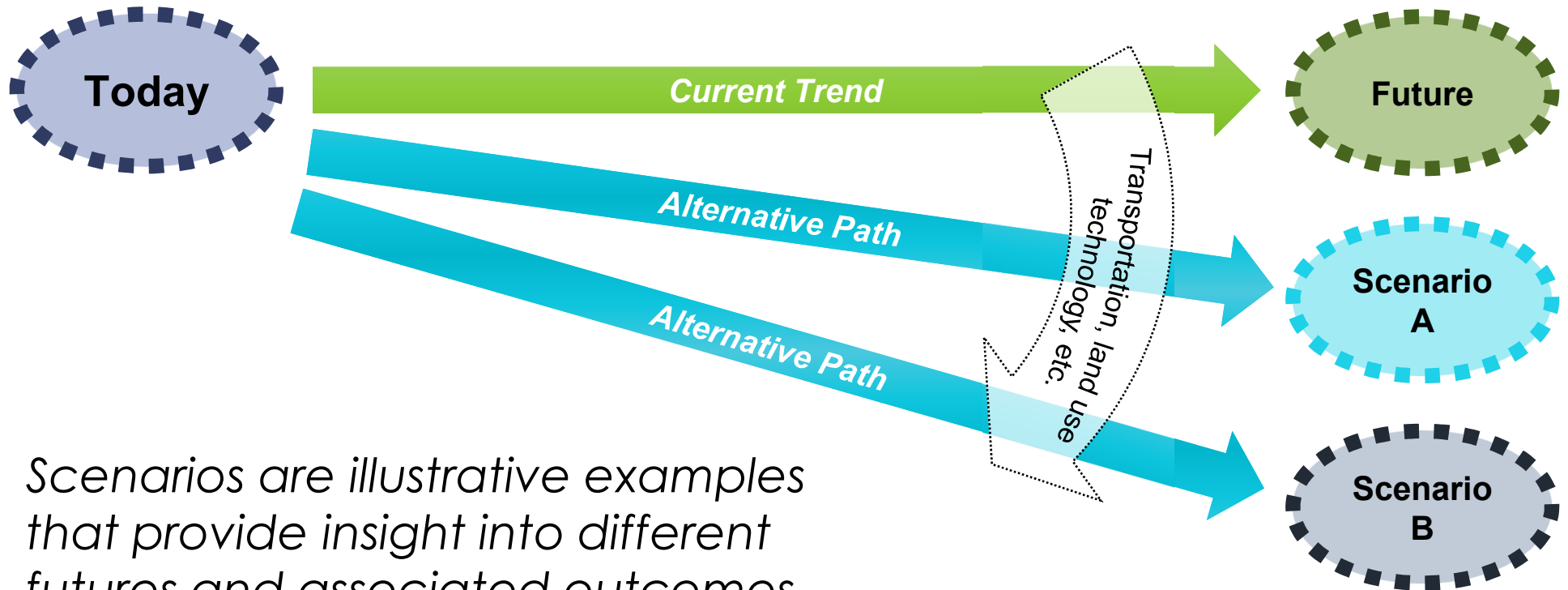
# 01  OVERVIEW

Setting the context

# Compelling solutions

- Policy changes

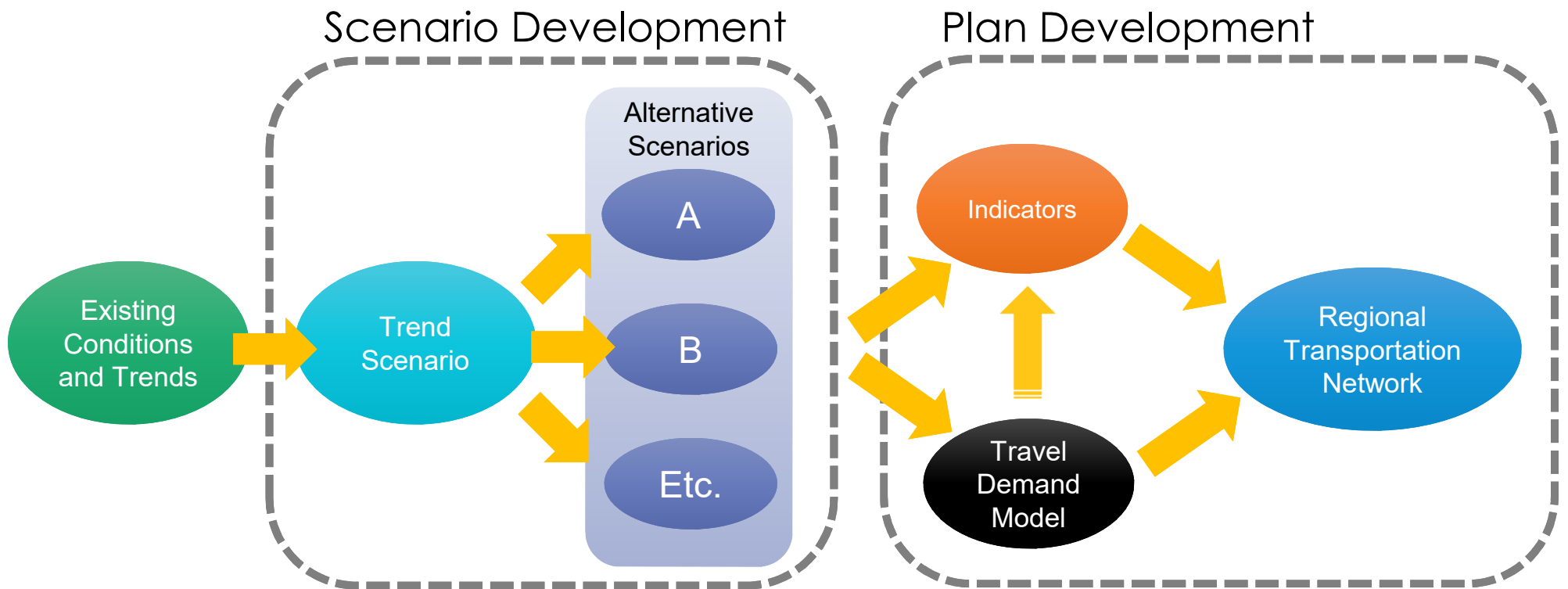- Legislative changes

- What moves the needle?

**2045**

# Scenario Planning



Scenarios are illustrative examples that provide insight into different futures and associated outcomes.
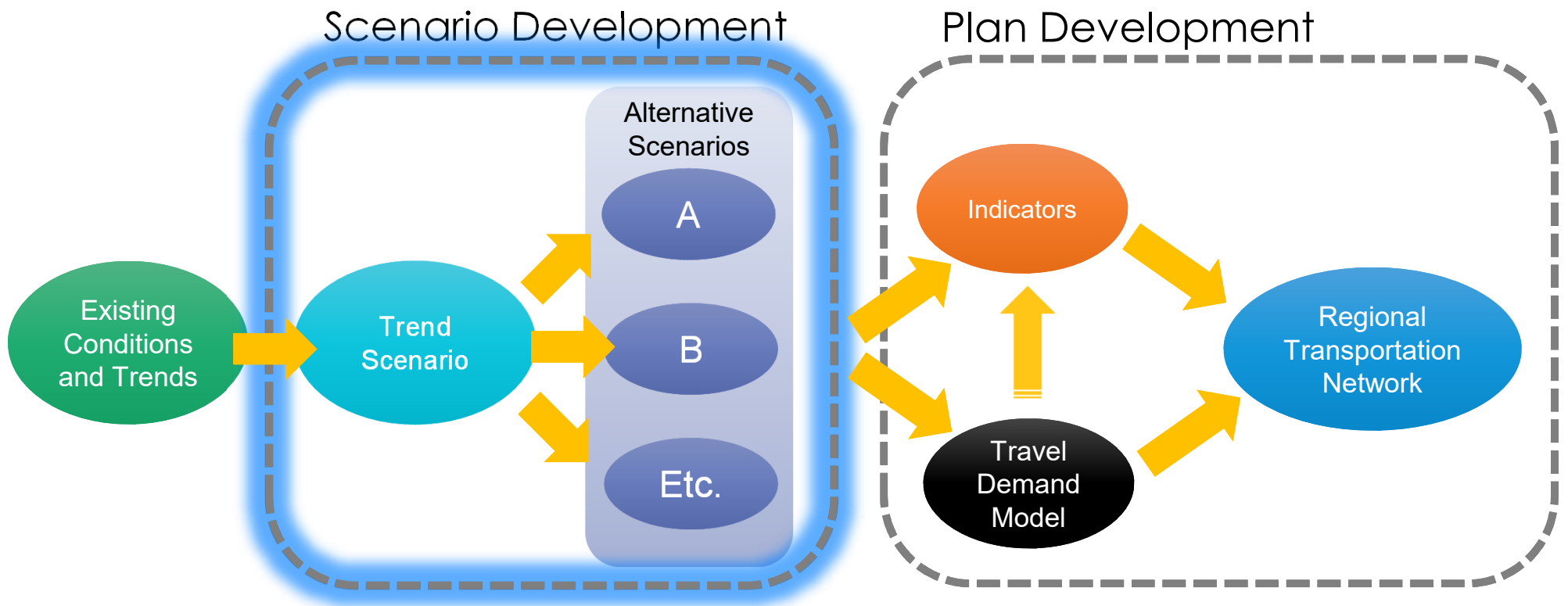
# Process



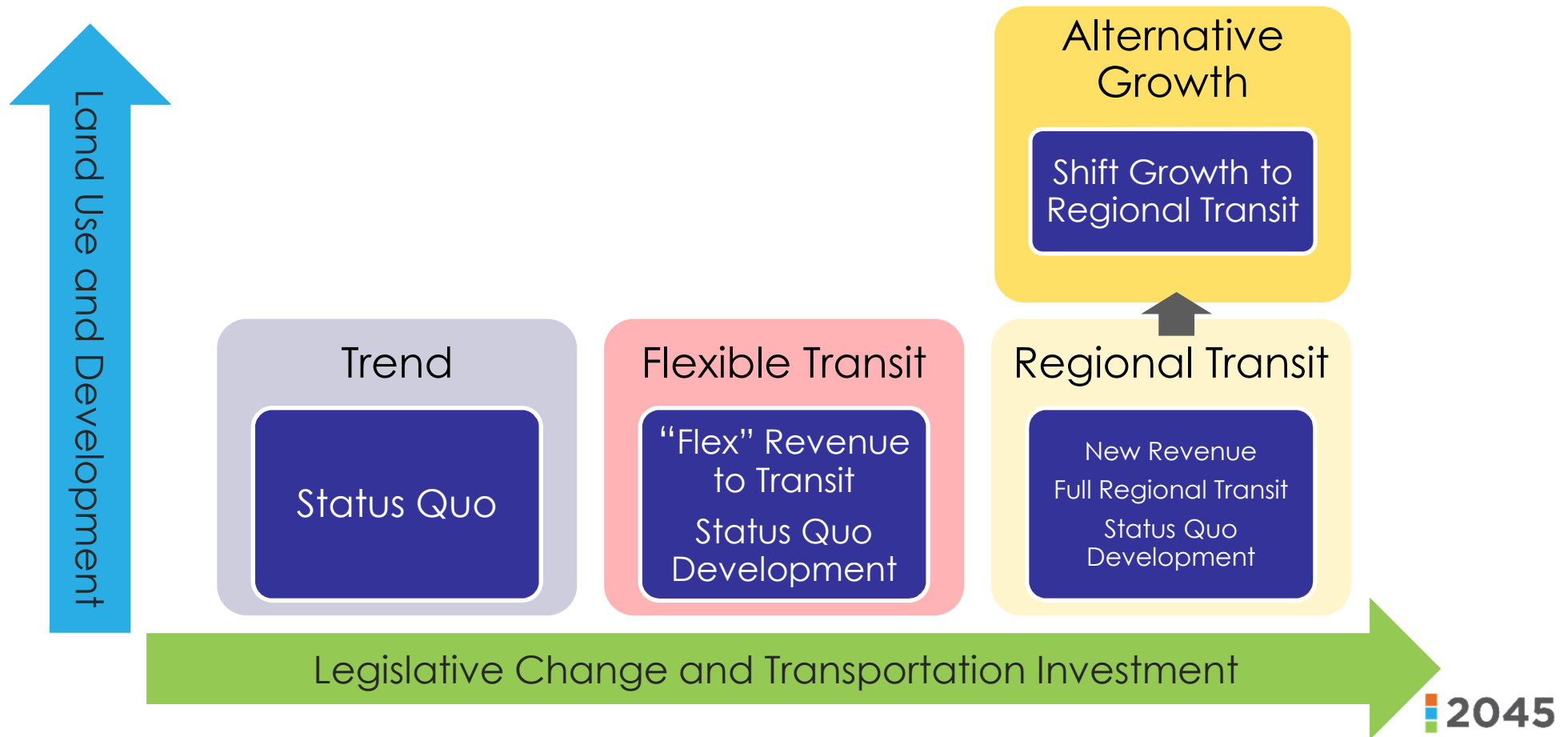Scenario Development

Plan Development

Existing Conditions and Trends → Trend Scenario

Alternative Scenarios: A, B, Etc.

Indicators, Travel Demand Model, Regional Transportation Network

# Today's Workshop



Scenario Development

Plan Development

Existing Conditions and Trends → Trend Scenario → Alternative Scenarios (A, B, Etc.) → Indicators, Travel Demand Model → Regional Transportation Network

2045

# Scenario Planning Framework



**Land Use and Development** (vertical arrow, pointing up)

**Legislative Change and Transportation Investment** (horizontal arrow, pointing right)

**Trend**
Status Quo

**Flexible Transit**
"Flex" Revenue to Transit
Status Quo Development

**Regional Transit**
New Revenue
Full Regional Transit
Status Quo Development

**Alternative Growth**
Shift Growth to Regional Transit

2045

8

# Workshop Objectives

✓Confirm projects and revenue assumptions for Trend Scenario

✓Confirm regional transit network.

✓Agree on preferred new revenue sources.

✓Agree on flexible transit network strategy.

✓Agree on flexible revenue sources and percentages.

✓Agree on percent of 2015-2045 growth to shift to regional transit network.

**2045**
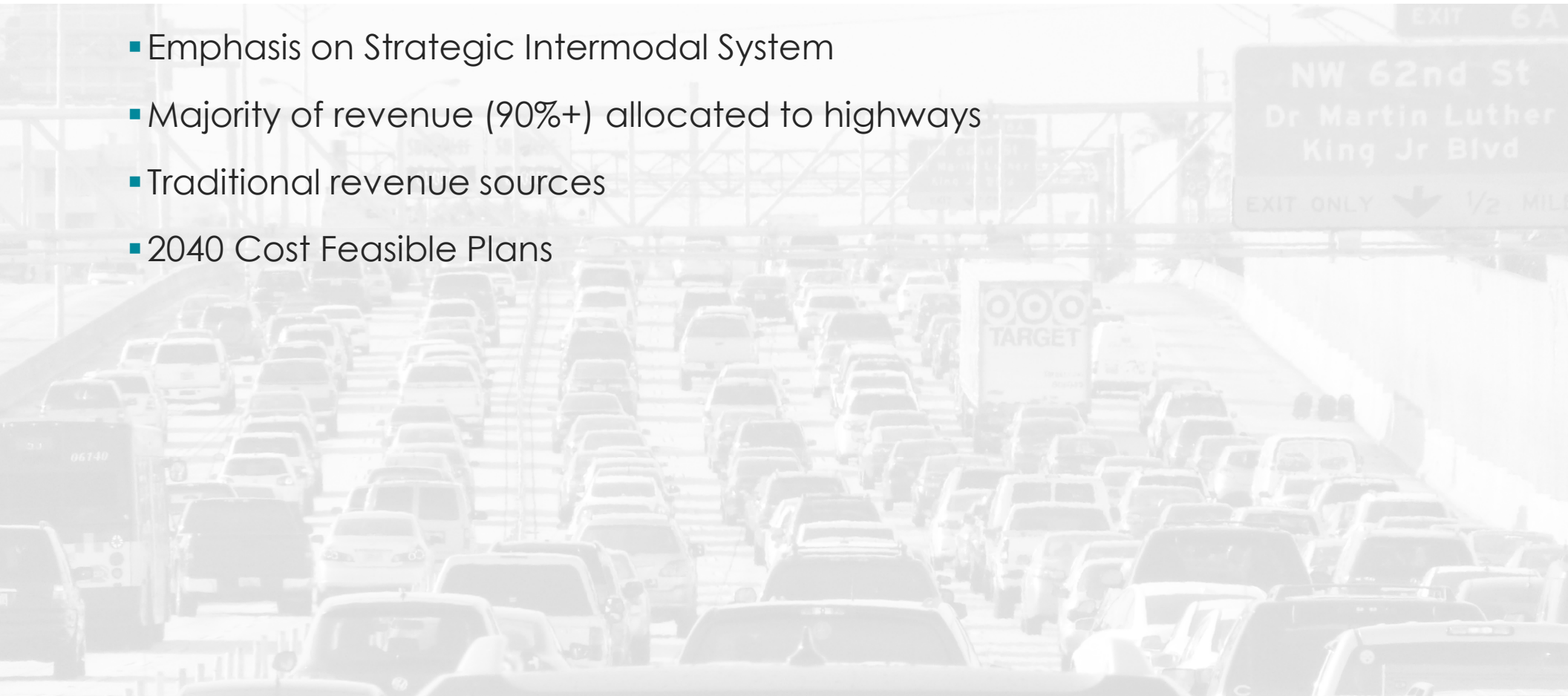
This is the beginning, not the end…
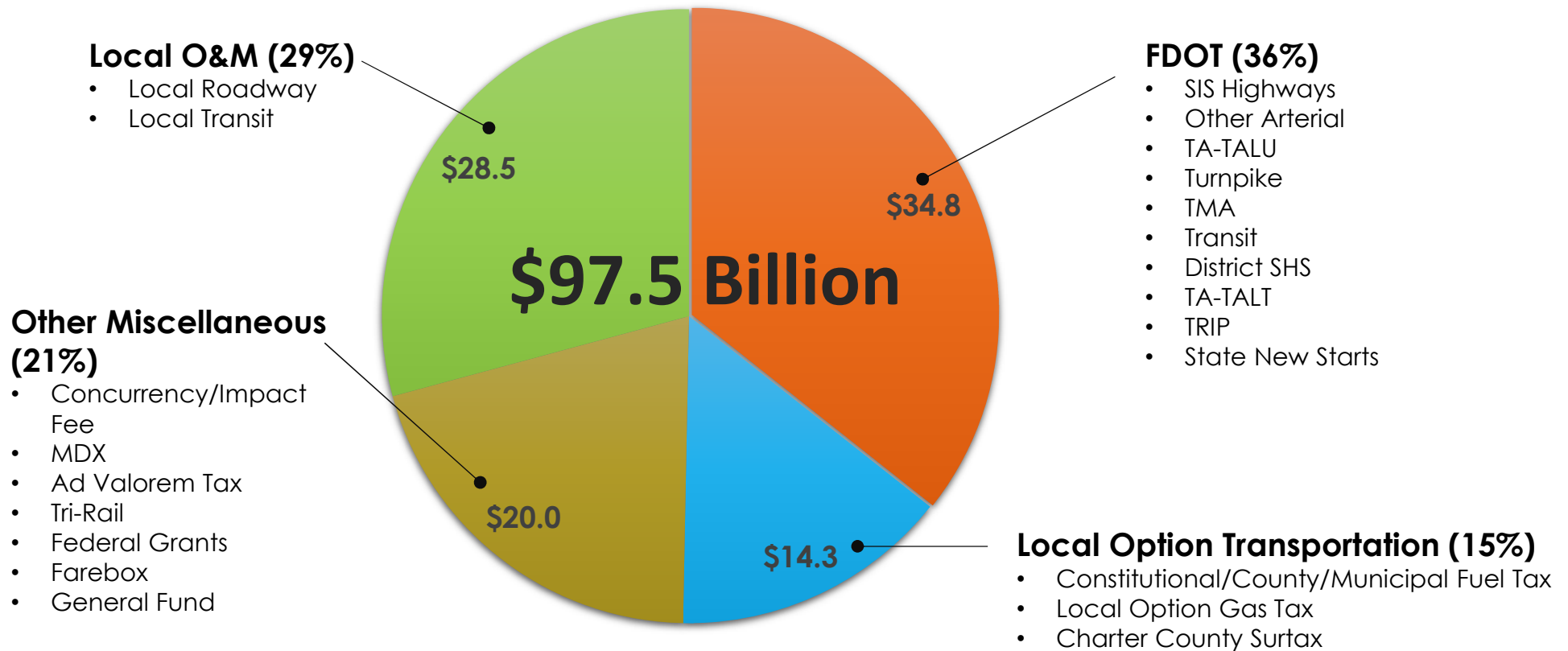
# 02   Trend Scenario

Setting the context

# Trend Scenario: Our current trajectory

- Emphasis on Strategic Intermodal System

- Majority of revenue (90%+) allocated to highways

- Traditional revenue sources

- 2040 Cost Feasible Plans
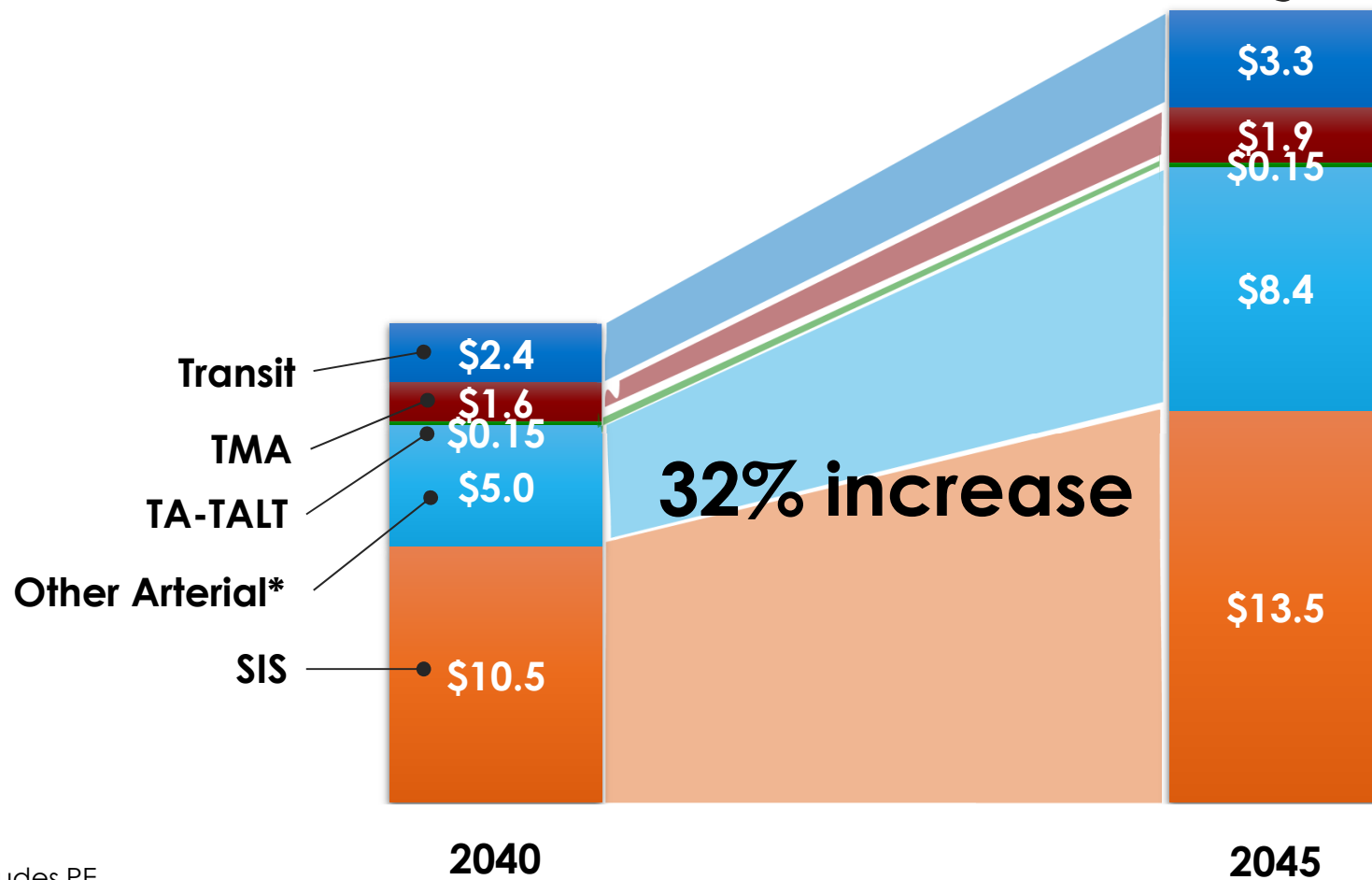
# Trend Revenue: Breakdown of Sources

**Local O&M (29%)**
- Local Roadway
- Local Transit

**FDOT (36%)**
- SIS Highways
- Other Arterial
- TA-TALU
- Turnpike
- TMA
- Transit
- District SHS
- TA-TALT
- TRIP
- State New Starts

**Other Miscellaneous (21%)**
- Concurrency/Impact Fee
- MDX
- Ad Valorem Tax
- Tri-Rail
- Federal Grants
- Farebox
- General Fund

**Local Option Transportation (15%)**
- Constitutional/County/Municipal Fuel Tax
- Local Option Gas Tax
- Charter County Surtax

$28.5

$34.8

$20.0

$14.3

**$97.5 Billion**

Source: 2040 RTP

2045

13

# New For 2045: FDOT Revenue Projections



**Transit** — $2.4
**TMA** — $1.6
**TA-TALT** — $0.15
**Other Arterial*** — $5.0
**SIS** — $10.5

**2040**

$3.3
$1.9
$0.15
$8.4
$13.5

**32% increase**

**2045**

* Includes PE

2045

14

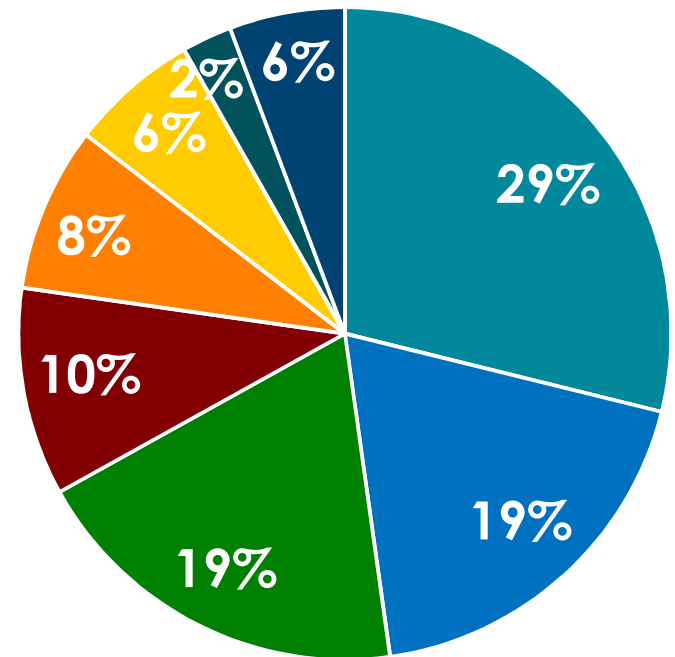# New for 2045: Interstate Toll Revenue



## $1.8 billion by 2045

# Trend Scenario Network

- Status Quo investment scenario represented in 2040 LRTP's

- Focus is on four primary state/federal revenue sources
  - Strategic Intermodal System
  - Florida Turnpike Enterprise
  - Other Arterials & ROW (fka)
  - TMA

- >70% of all capital investments

- State/federal revenues dedicated to roadway-centric program, given constraints

Legend:
- Express Lanes
- Widenings
- Interchange Mods
- Finance
- Transit
- Grade Separations
- New Roads
- Other



2045

# Strategic Intermodal system (SIS)

- SIS revenues represent 47% of all revenues reflected in LRTPs

- 100% of SIS revenues reflected in 2040 LRTPs dedicated to roadway projects

- Grade Separation
- Finance
- Interchange Mod
- Widen
- Express Lanes
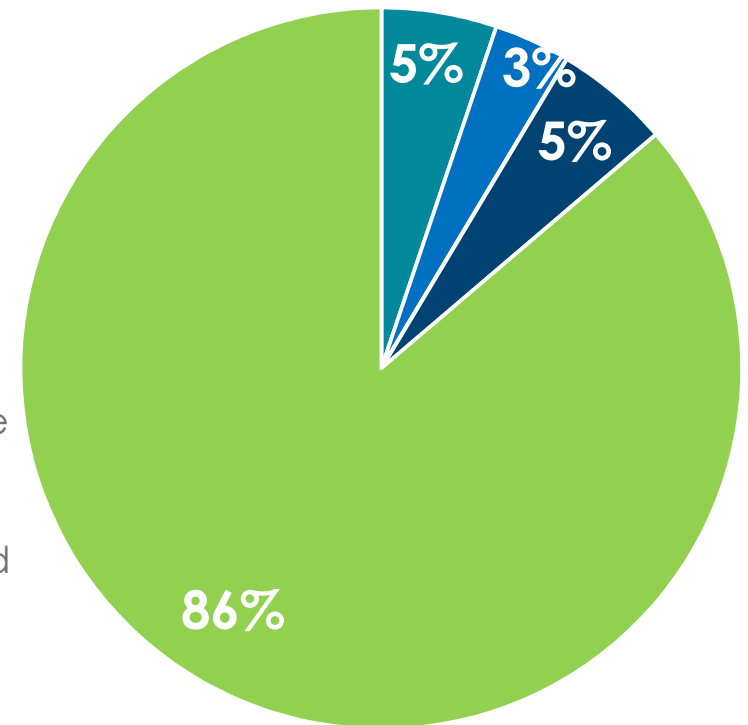- Other
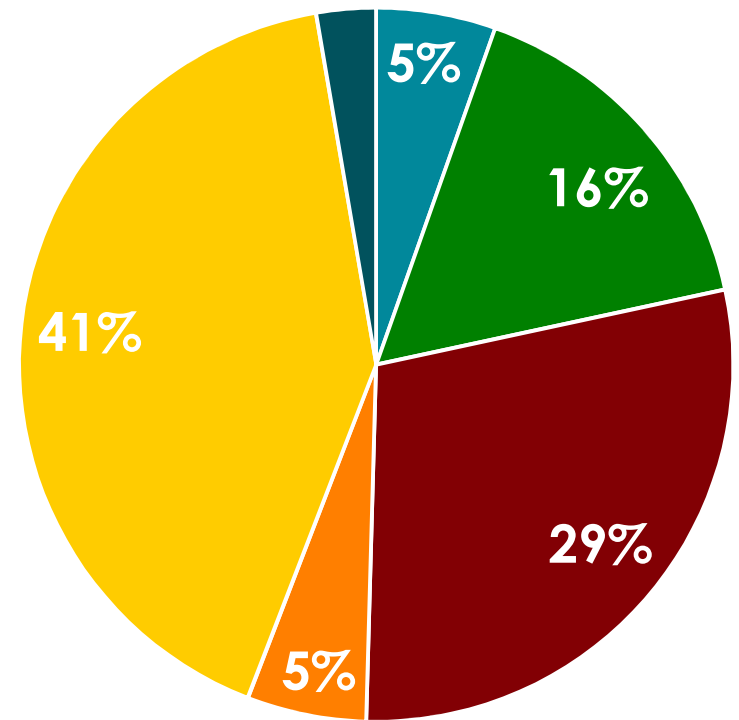
5%

16%

41%

29%

5%

2045

# Florida turnpike enterprise (FTE)

- FTE revenues represent 5% of all revenues reflected in LRTPs

- 100% of FTE revenues in 2040 LRTPs dedicated to roadway projects



Pie chart:
- New Interchange — 5%
- TSM&O — 3%
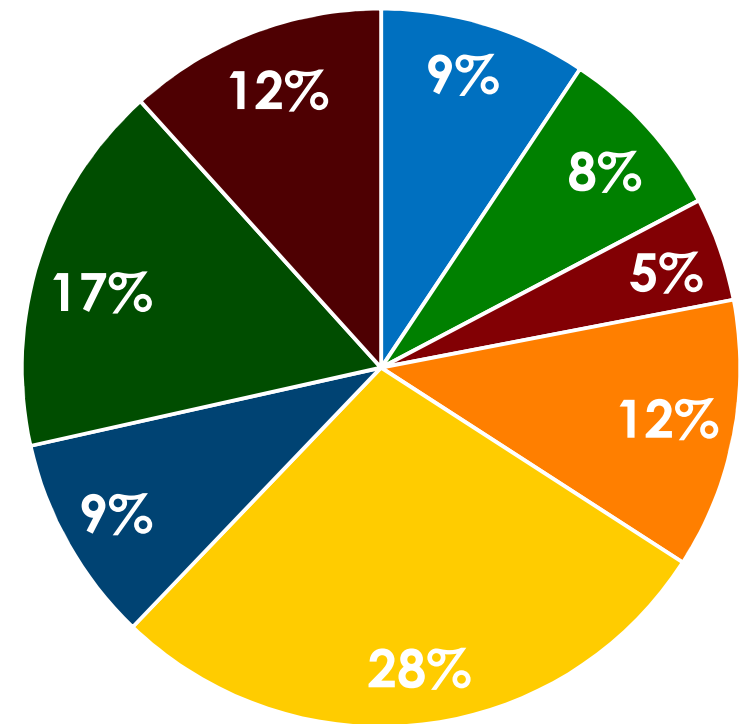- Interchange Mod — 5%
- Widen — 86%
- Express Lanes

2045

18

# Other arterials & row (OA)

- OA revenues represent 18% of all revenues reflected in LRTPs

- OA funds are fairly flexible, with a portion eligible to off-system (non-State roadways) improvements
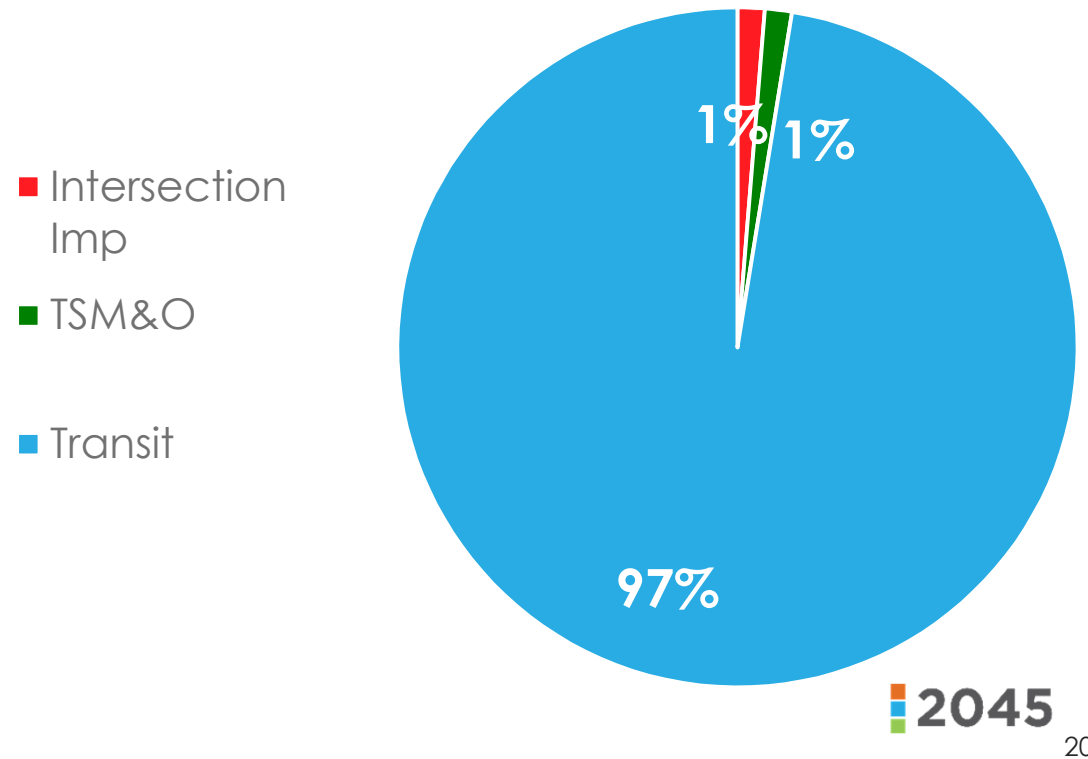
- Intersection Imp
- TSM&O
- New Road
- Grade Separation
- Transit
- Interchange Mod
- Widen
- Express Lanes



2045

# Transportation Management Area (TMA)

- TMA revenues represent 3% of all revenues reflected in LRTPs

- TMA revenue is most flexible source, as reflected in 2040 allocations



Legend:
- Intersection Imp
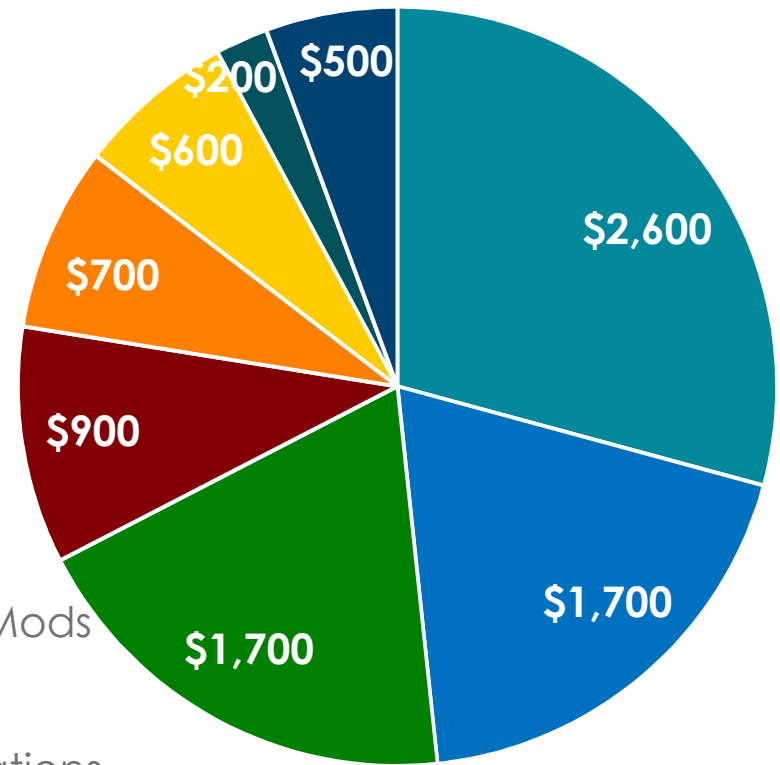- TSM&O
- Transit

1% 1%

97%

2045

# Trend Scenario Network

- Status Quo investment scenario represented in 2040 LRTP's

- Focus is on four primary state/federal revenue sources
  - Strategic Intermodal System
  - Florida Turnpike Enterprise
  - Other Arterials & ROW (fka)
  - TMA

- >70% of all capital investments

- State/federal revenues dedicated to roadway-centric program, given constraints

Legend:
- Express Lanes
- Widenings
- Interchange Mods
- Finance
- Transit
- Grade Separations
- New Roads
- Other

Pie chart values: $2,600; $1,700; $1,700; $900; $700; $600; $200; $500

Note: figures represented in approximate 2013 dollars (in millions) derived from deflation of YOE costs in LRTP's

2045

# Strategic Intermodal System (SIS)

- SIS revenues represent 47% of all revenues reflected in LRTPs

- 100% of SIS revenues reflected in 2040 LRTPs dedicated to roadway projects

Most resource intensive SIS improvements

| Facility | Limits | Improvement |
|---|---|---|
| I-75 | SR 826 to NW 170th St | Widen with Express Lanes |
| SR 826 | SR 826 to NW 154th St | Widen with Express Lanes |
| Okeechobee Rd | SR 826 to Krome Ave | Grade Separations |
| Golden Glades Int | | Interchange Modification |
| I-395 | @ I-95 | Interchange Modification |
| I-595 | I-75 to I-95 | Ultimate Improvement |
| I-95 | PB/BR Co. Line to Linton Blvd | Managed Lanes |
| Port Tunnel | | Financing Repayment |

2045

# Florida Turnpike Enterprise (FTE)

- FTE revenues represent 5% of all revenues reflected in LRTPs

- 100% of FTE revenues in 2040 LRTPs dedicated to roadway projects

Most resource intensive FTE improvements

| Facility | Limits | Improvement |
|---|---|---|
| Turnpike Mainline | PB/BR Co Line to Boynton Beach Blvd | Widen |
| Turnpike Mainline | Okeechobee/Jog Rd to PGA Blvd | Widen |
| HEFT | SW 137th to 216th St | Widen with Express Lanes |
| Turnpike Mainline | Golden Glades to HEFT | Widen |
| Turnpike Mainline | @ Hypoluxo Rd | New interchange |
| HEFT | I-75 to Turnpike Mainline | Widen |

2045

# Other Arterials & ROW (OA)

- OA revenues represent 18% of all revenues reflected in LRTPs

- OA funds are fairly flexible, with a portion eligible to off-system (non-State roadways) improvements

- 81% of OA revenues in 2040 LRTPs dedicated to roadway, 19% to public transit projects

Most resource intensive Other Arterials improvements

| Facility | Limits | Improvement |
|---|---|---|
| NW 36/41 St | HEFT to NW 42nd Ave | Superarterial Express St imp |
| SW 8th St | @ SW 87th Ave, 107th Ave | Grade Separations |
| SW 152nd St | HEFT to US-1 | Widen |
| SR 826 | @ Okeechobee Rd | Ramp Improvements |
| US-1 Busway | @ SR 826 | Construct Ramps |
| NW 36th St | @ NW 72nd Ave | Grade Separation |

2045

# Transportation Management Area (TMA)

- TMA revenues represent 3% of all revenues reflected in LRTPs

- TMA revenue is most flexible source, as reflected in 2040 allocations

- 3% of TMA revenues in 2040 LRTPs dedicated to roadway, 97% to public transit projects

- Top 5 most resource intensive projects include Miami-Dade SMART corridor transit investments

# Trend Scenario: For discussion

- 2040 Cost Feasible Plans as basis for Trend
  - This is our current trajectory
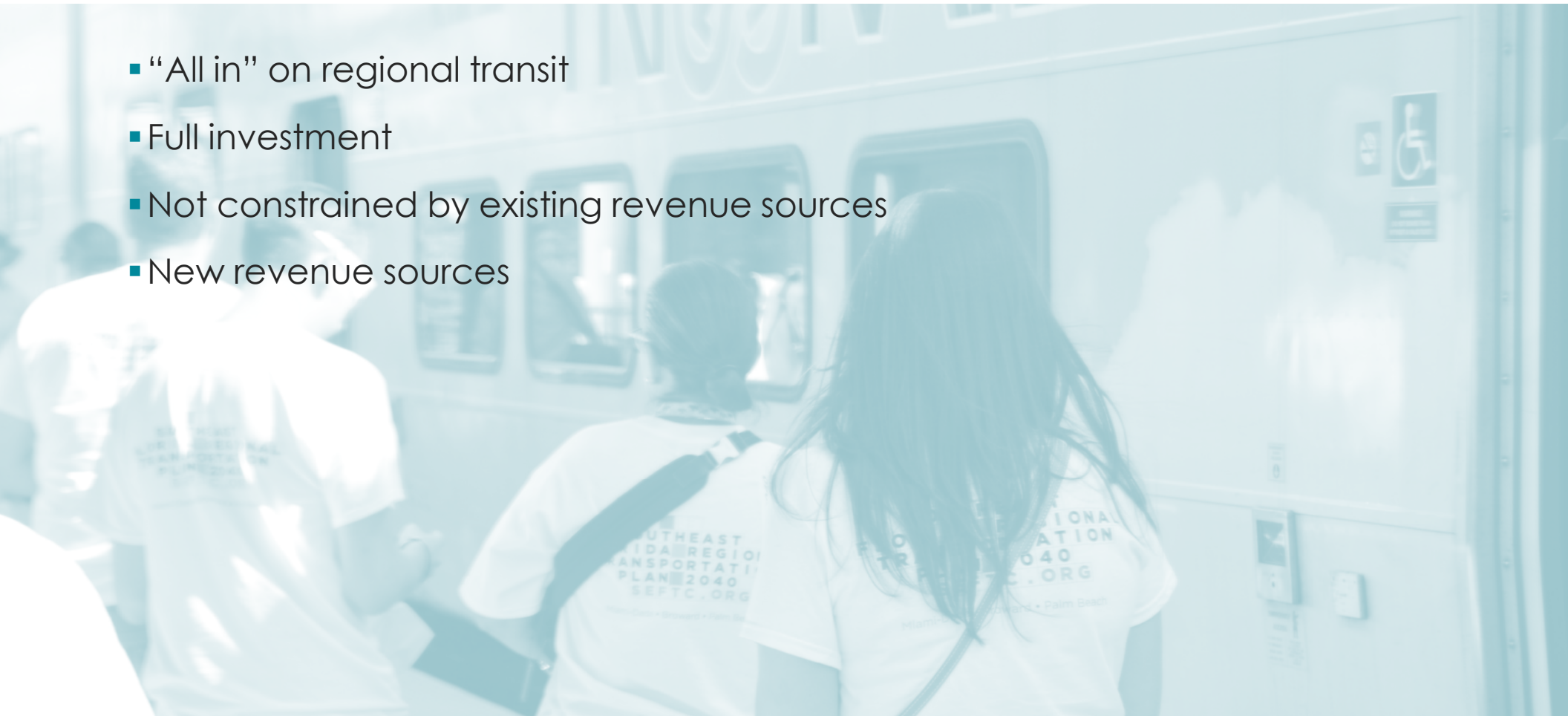  - Most recent adopted plans with amendments
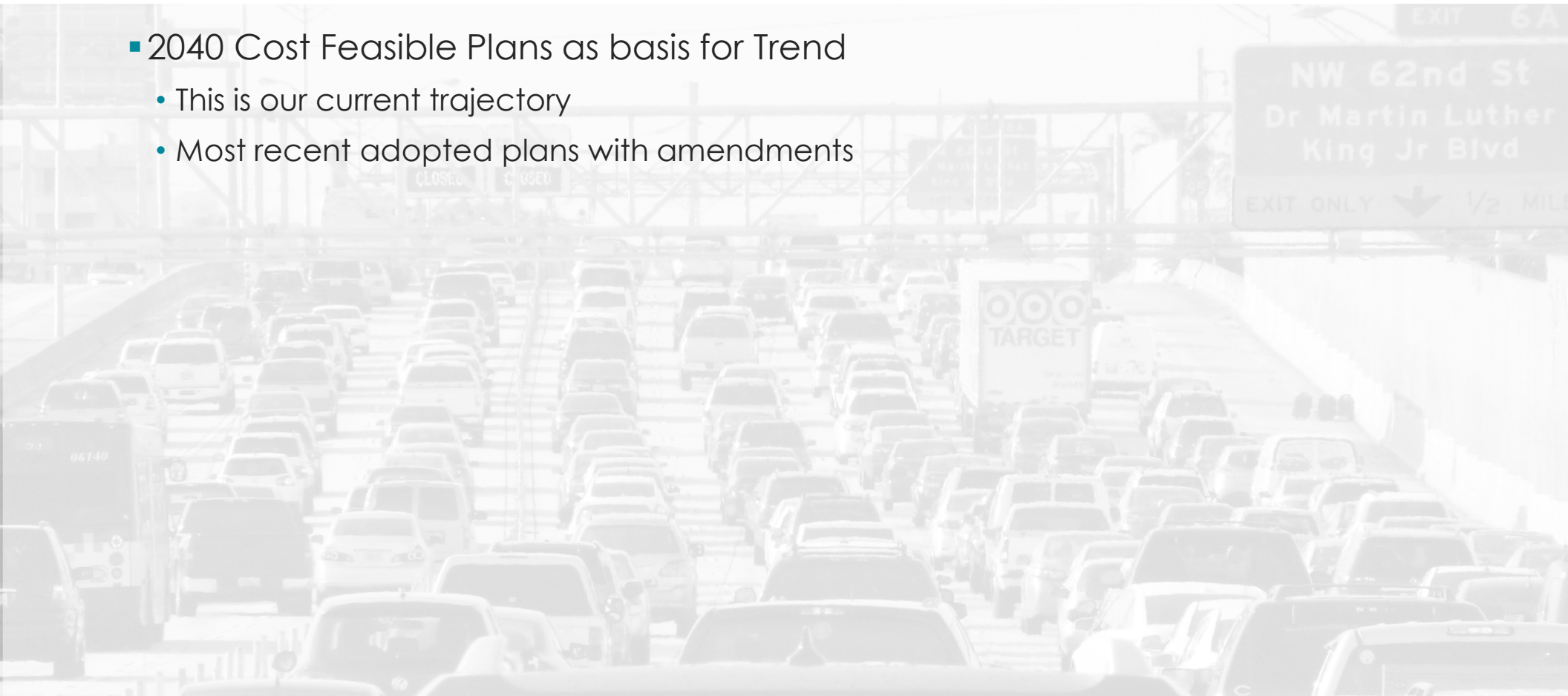
# 03  Regional Transit Scenario

A new direction for South Florida

2045

# Regional Transit Scenario

- "All in" on regional transit

- Full investment

- Not constrained by existing revenue sources

- New revenue sources

# REGIONAL TRANSIT
## SCENARIO

Four types of transit recommendations were developed using a combination of census data, population/employment densities, and travel demand model trip flows.

## CR Commuter Routes

Route that provides convenient weekday service, connecting workers to the region's largest job centers.

## HCT High Capacity Transit

Corridors that warrant infrastructure improvements, from TSP to fixed guideway, to meet future travel demands.

## FTN Frequent Transit Network

Defined areas where a high volume of local travel circulating within it supports a network of high frequency routes.

## TTF Transit Transfer Facilities

Locations where high capacity transit routes and/or local bus service converge for transfer opportunities.
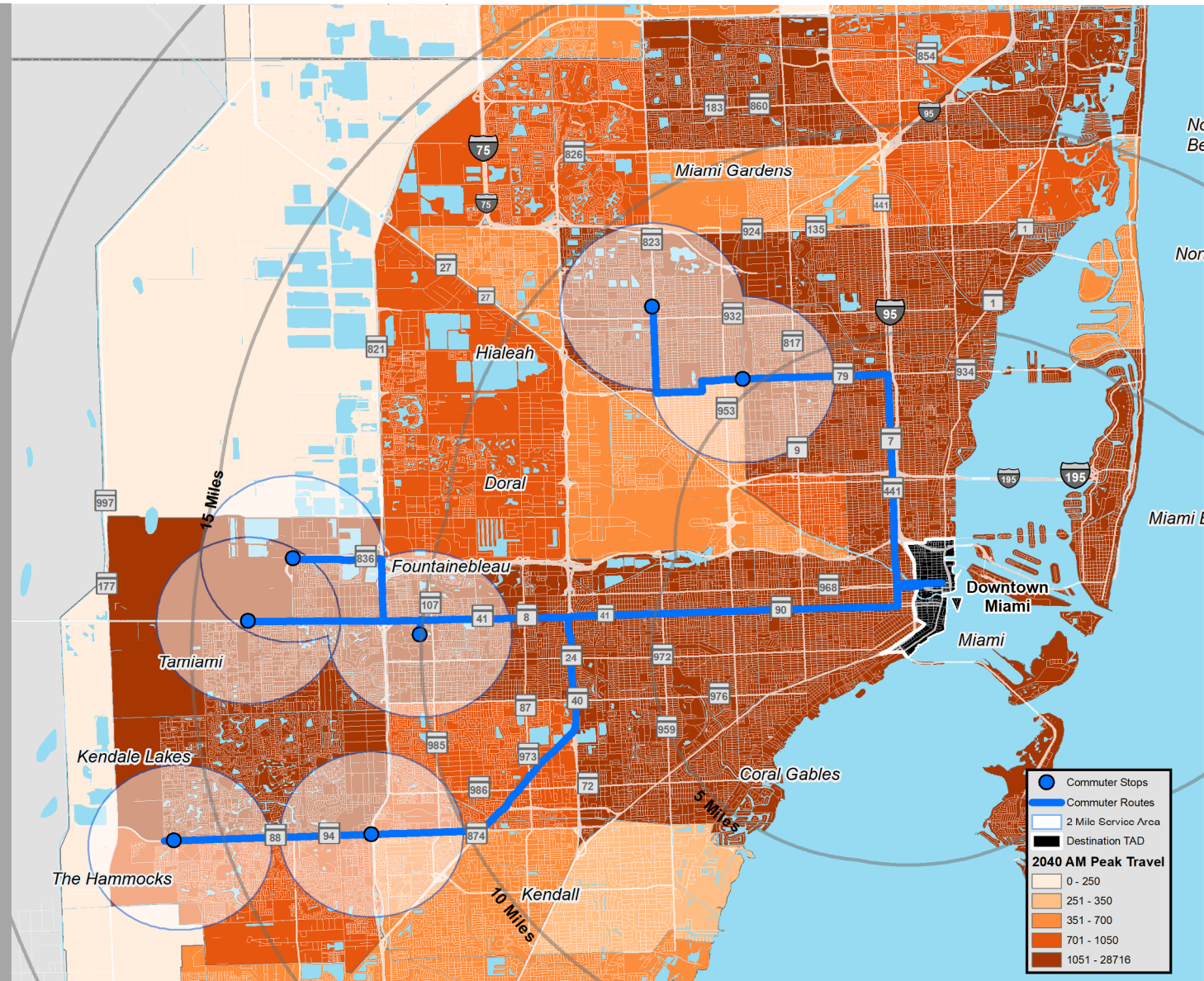
# CR

## COMMUTER ROUTES

Route that provides convenient weekday service, connecting workers to the region's largest job centers.

**MINIMUM LEVEL OF SERVICE :**
- 4 trips per day

**CONSIDERATIONS:**
- LODES Employment Count
- 2040 Peak Hour Work Based Travel (TAD to TAD)
- Existing and Planned Park and Rides



**Legend:**
- Commuter Stops
- Commuter Routes
- 2 Mile Service Area
- Destination TAD

**2040 AM Peak Travel**
- 0 - 250
- 251 - 350
- 351 - 700
- 701 - 1050
- 1051 - 28716

# HCT

## HIGH CAPACITY TRANSIT (HCT)

Corridors that warrant infrastructure improvements, from TSP to fixed guideway, to meet future travel demands.

**MINIMUM LEVEL OF SERVICE :**
- 10-minute frequency
- 18 hour service span

**CONSIDERATIONS:**
- Major Roadways and Arterials
- 2040 Daily Travel (TAD to TAD)
- All Day Propensity (Activity and Transit Oriented)
- LODES Employment Count
- ACS Population Count
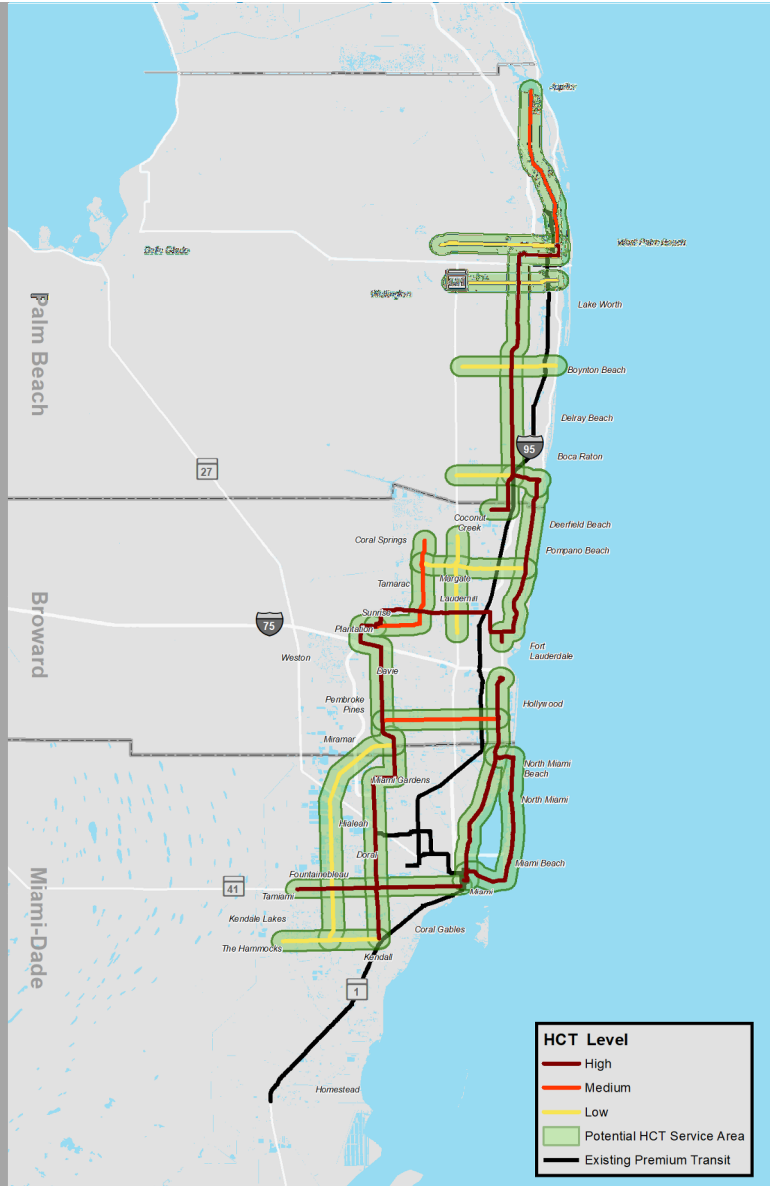


*Step 1: Define types of High Capacity Transit*

*Step 2: Map the 2040 daily travel flows between TADs.*

*Step 3: Assign an all day transit propensity score to individual roadway segments.*

*Step 4: Assign each identified corridor a level of investment.*
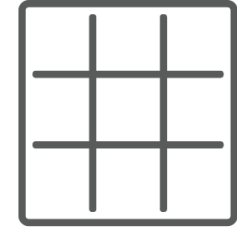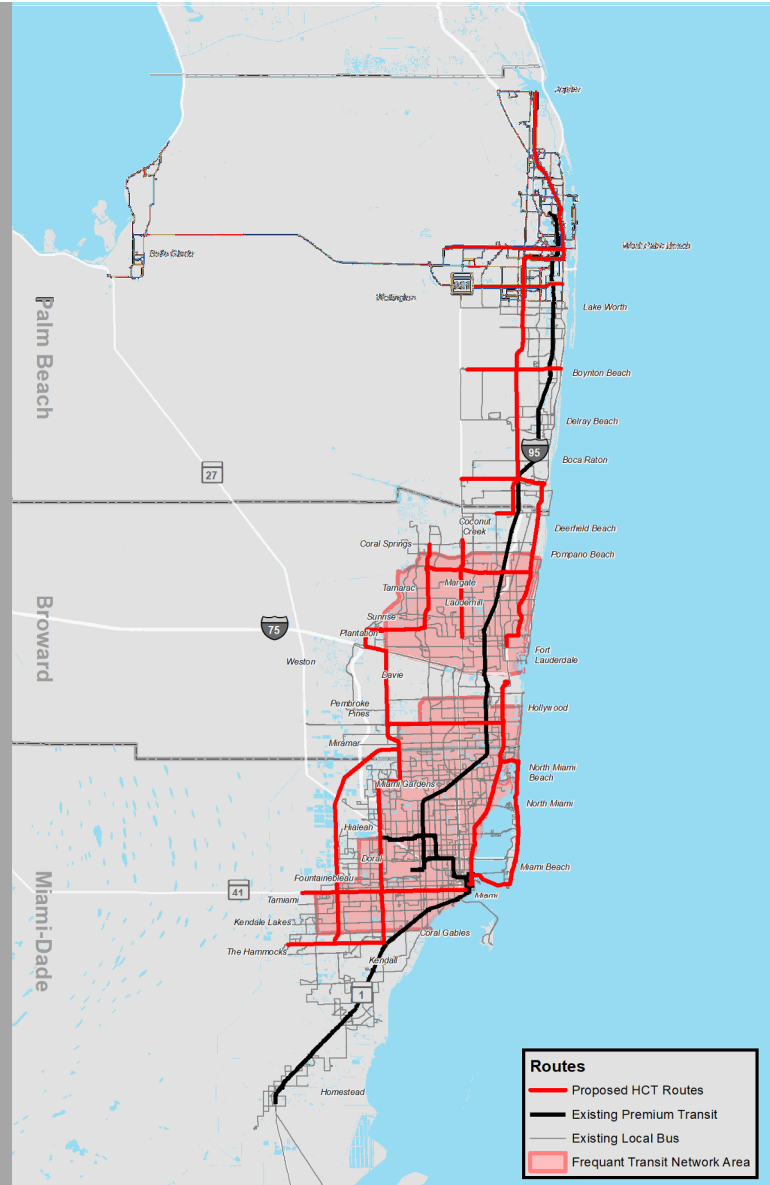
31

# FTN
## FREQUENT TRANSIT NETWORK

Defined areas that would support a network of high frequency routes, covers adjacent areas with a high volume of local travel circulating within.

**MINIMUM LEVEL OF SERVICE :**
- 10-minute peak frequency (6 hours)
- 15-minute off-peak frequency (12 hours)
- 0.5 to 1 mile spacing

**CONSIDERATIONS:**
- 2040 Daily Travel (TAD to TAD)



*Step 1: Evaluate the density of origins and destinations within a TAZ.*

*Step 2: Define areas that can support a frequent transit network based on the density of trips per 1/2 mile.*

*Step 3: Compare initial frequent transit network areas against the roadway network and existing/proposed HCT routes.*

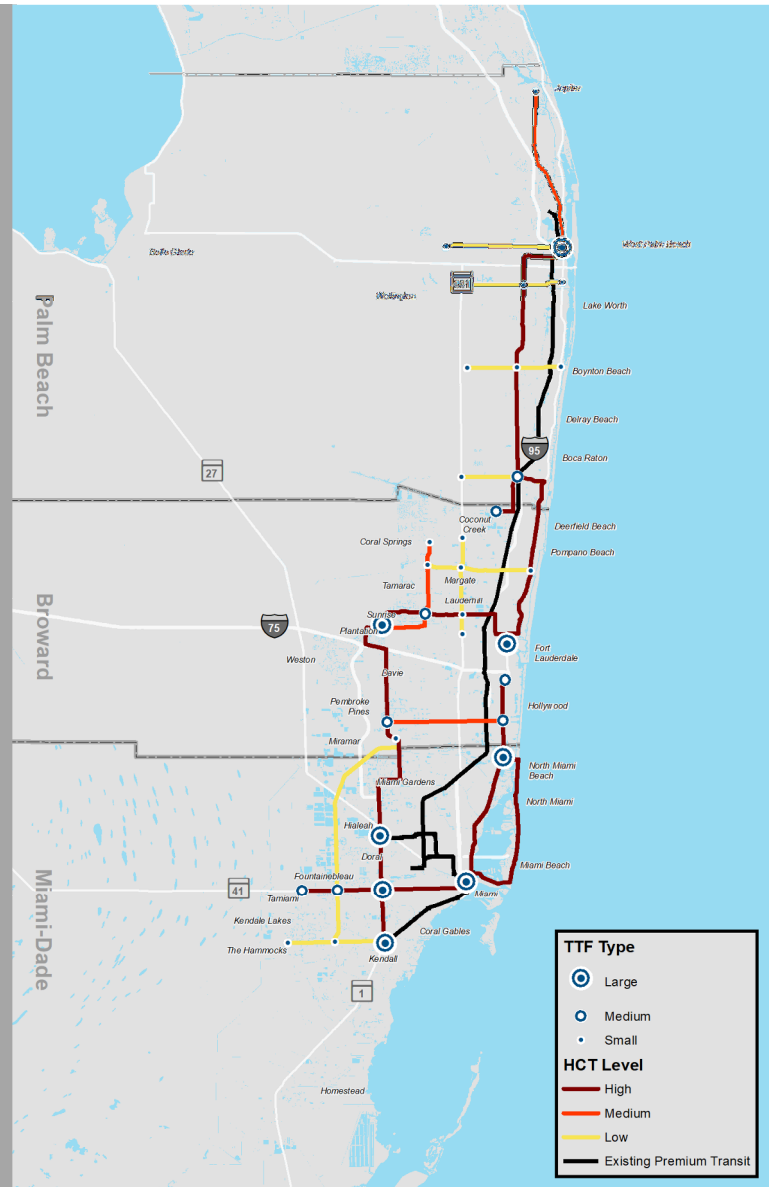*Step 4: Assign East-West and North-South routes along all major arterials within the zone.*

# TTF

## TRANSIT TRANSFER FACILITIES

Locations where high capacity transit routes and/or local bus service converge for transfer opportunities.

**CONSIDERATIONS:**
- HCT Routes



**TTF Type**
- ◉ Large
- ○ Medium
- · Small

**HCT Level**
- ▬ High
- ▬ Medium
- ▬ Low
- ▬ Existing Premium Transit

DM

**Step 1: Define types of Transit Transfer Facilities (Small, Medium, Large).**

**Step 2: Identify HCT termini and important transfer points within the HCT network.**

**Step 3: Assign each location a TTF based on the level of investment and number of HCT routes.**
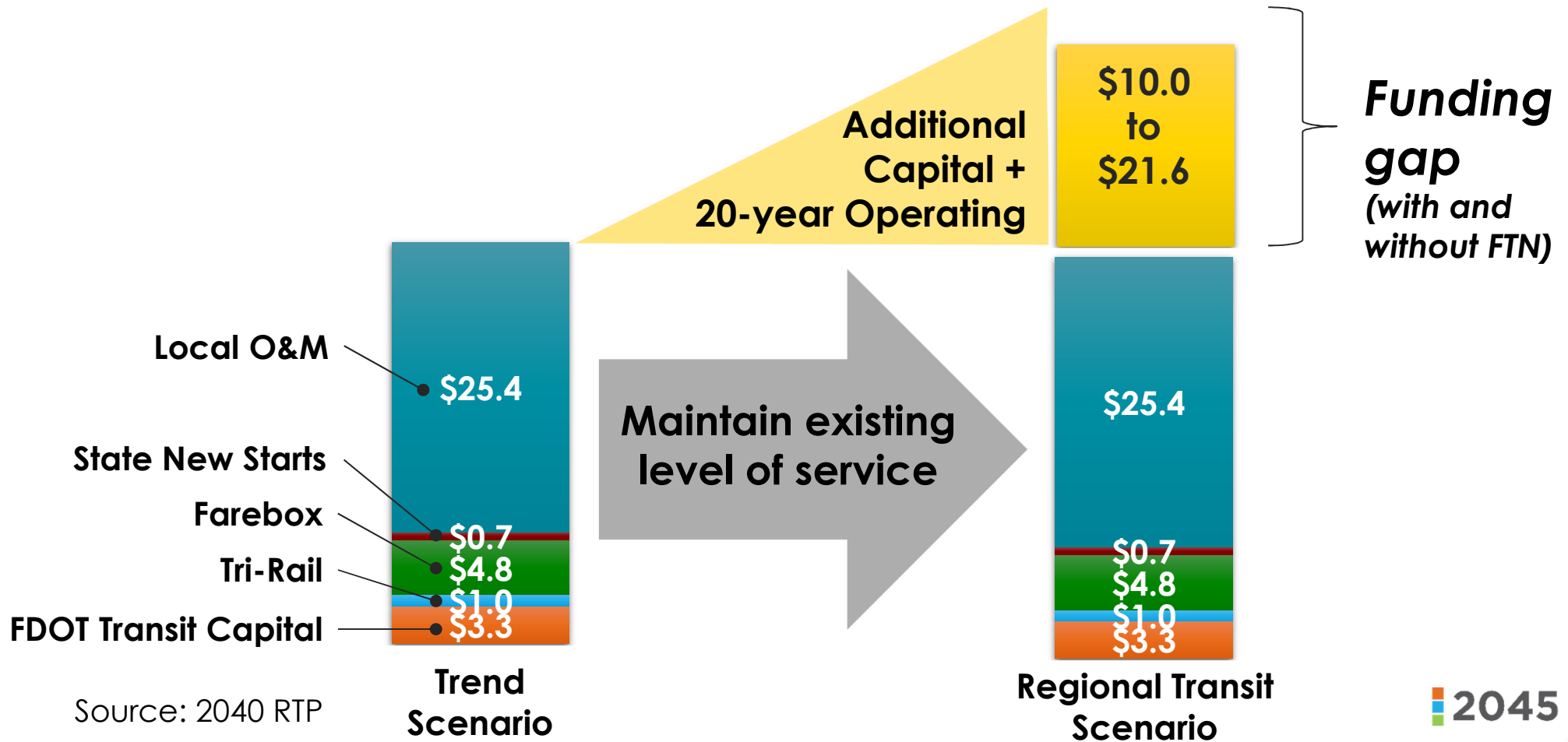
33

# Hands-on Exercise and Discussion

- Are there any major improvements missing from recommendations?

- Are there any included improvements that should be removed from consideration (or modified)?

# Regional Transit Scenario: Funding Gap



Funding gap *(with and without FTN)*

$10.0 to $21.6

Additional Capital + 20-year Operating

Maintain existing level of service

Local O&M — $25.4
State New Starts
Farebox — $0.7
Tri-Rail — $4.8
FDOT Transit Capital — $1.0 / $3.3

Trend Scenario

$25.4
$0.7
$4.8
$1.0
$3.3

Regional Transit Scenario

Source: 2040 RTP

2045

35

# Potential New Revenue Sources

| | Revenue Source | Rate | Unit | 21-year Potential ($ Millions) | Viability | Stability |
|---|---|---|---|---|---|---|
| **Primary** | Sales Tax | 0.50% | | $19,000 | M | M |
| | Payroll Tax | 0.5% | | $10,000 | L | M |
| | Property Tax Ad Valorem | $ 0.25 | c/$1k val | $ 4,000 | L | M |
| | Congestion Pricing/M Lanes | $ 1.30 | $/mi | $ 2,000 | M | M |
| | Gas Tax (Miami-Dade) | $ 0.02 | c/gal | $ 600 | M | L |
| | Hotel Occupancy | 0.50% | | $ 500 | M | H |
| | Parking fee | $ 0.50 | | $ 60 | L | H |
| **Secondary** | Increase 1 to 5 cents fuel tax | $ 0.01 | | $ 1,100 | L | M |
| | Motor fuel sales tax | $ 0.01 | | $ 1,000 | L | M |
| | Fuel/motor vehicle tag fee tax | | | | L | H |
| | Cordon pricing | $10.00 | | $ 3,500 | L | H |
| | Value capture/Tax increment finance | From base | | $ 2,000 | M | M |
| | Surcharge fees (rental car) | $ 2.00 | | $ 1,800 | L | M |

**045**

# Discussion

- Are there any other revenue sources not in the preliminary set that should be considered?

- Are there any revenue sources in the preliminary set that should not be considered?
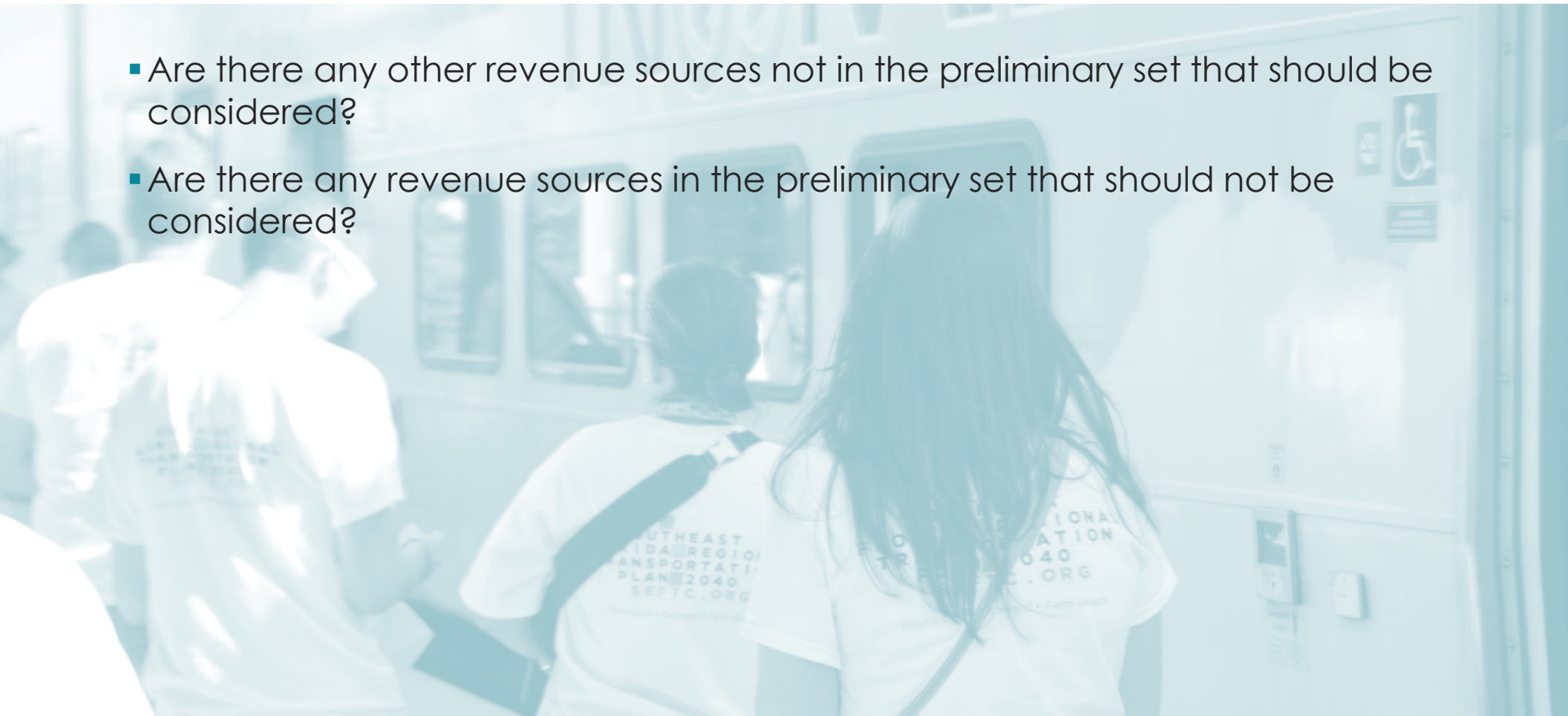
# Interactive Exercise

- Mix and match potential revenue sources.

# What one word would you use to describe yourself?

# Which new revenue source do you like best?

Sales tax

Payroll tax

Property tax ad valorem

Managed lanes/congestion pricing

Gas tax (Miami-Dade)

Hotel occupancy

Parking fee

Increase 1 to 5 cents fuel tax

Motor fuel sales tax

Cordon pricing
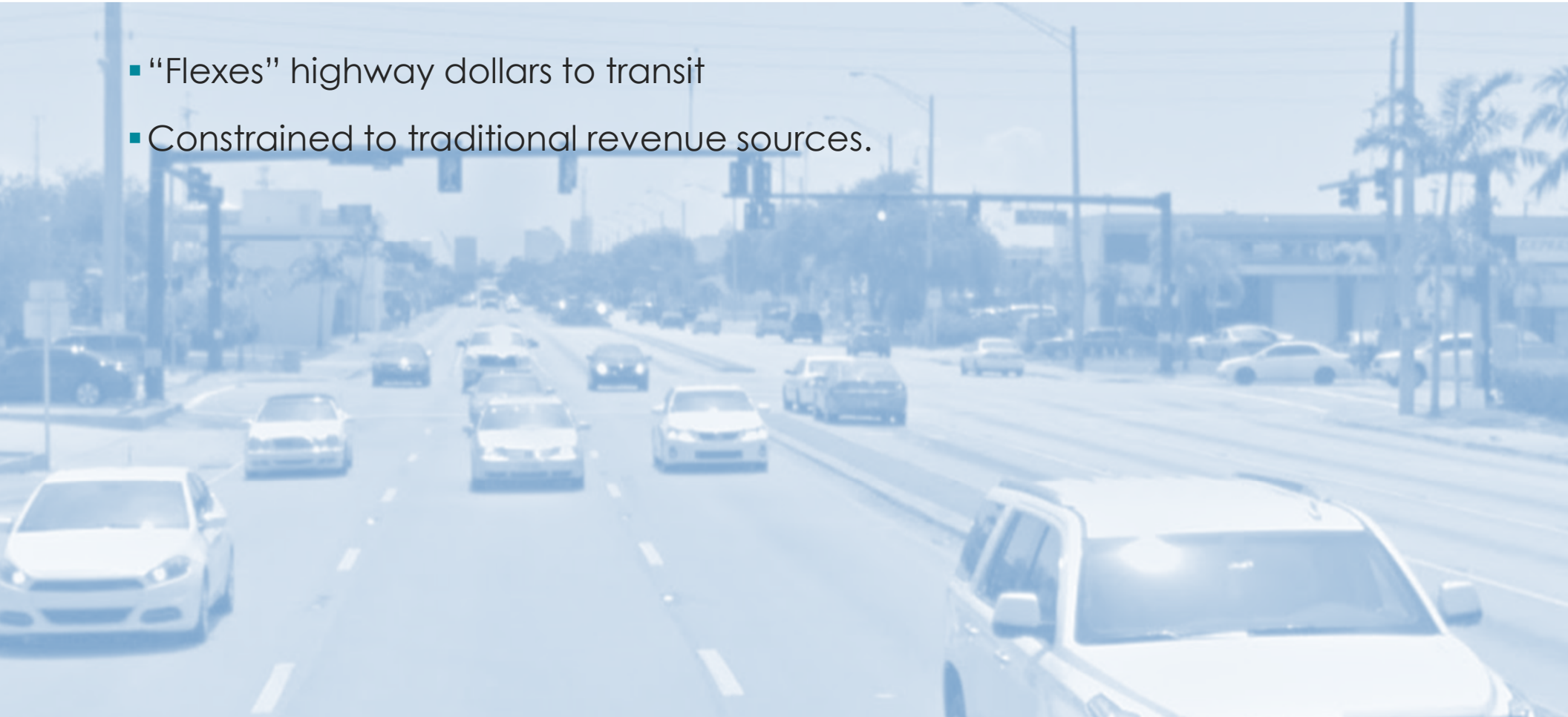
Rental car surcharge

# 04 Flexible Transit Scenario
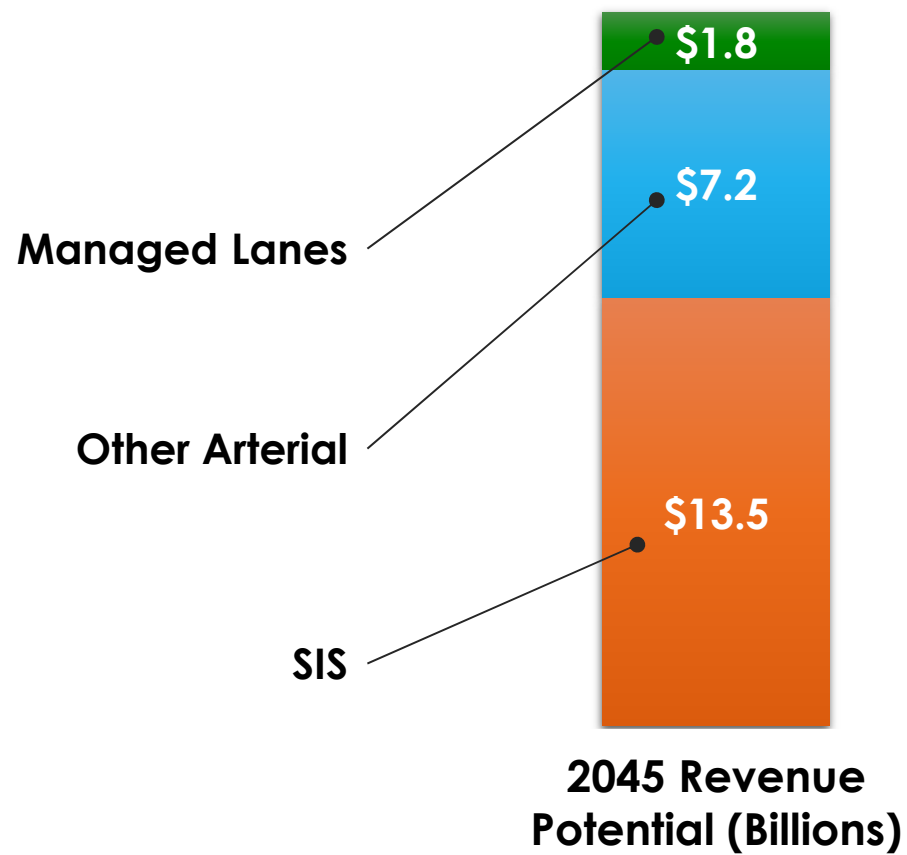
Re-thinking our transportation dollars

2045

# Flexible Transit Scenario

- "Flexes" highway dollars to transit

- Constrained to traditional revenue sources.

# Revenue Flexibility: Top Candidates



Managed Lanes — $1.8

Other Arterial — $7.2

SIS — $13.5

**2045 Revenue Potential (Billions)**

2045

# Barriers to Flexibility

- Strategic Intermodal System
  - FS 339.61 states 50% of new discretionary capacity funds to SIS & Emerging SIS to SIS
  - Policy guidance 75%
  - Funded HwyTrFnd per T26, USC
  - *Option: Change project eligibility definition*

- FDOT Other Arterial & ROW
  - Flex from other identified arterial needs. Guidance is 10% off system

- Freeway managed lanes
  - Change to 388.166 FS limits transit to on-facility.
  - Other eligible + debt service, O&M, improvement on system or SHS

- MDX revenue for capital
  - FS 348

2045

# Discussion

- Are there any existing roadway revenue sources missing from consideration for flexing?

- Are there any existing roadway revenue sources in the preliminary set that should not be considered (SIS, FTE, Managed Lane Rev, Other Arterials)?
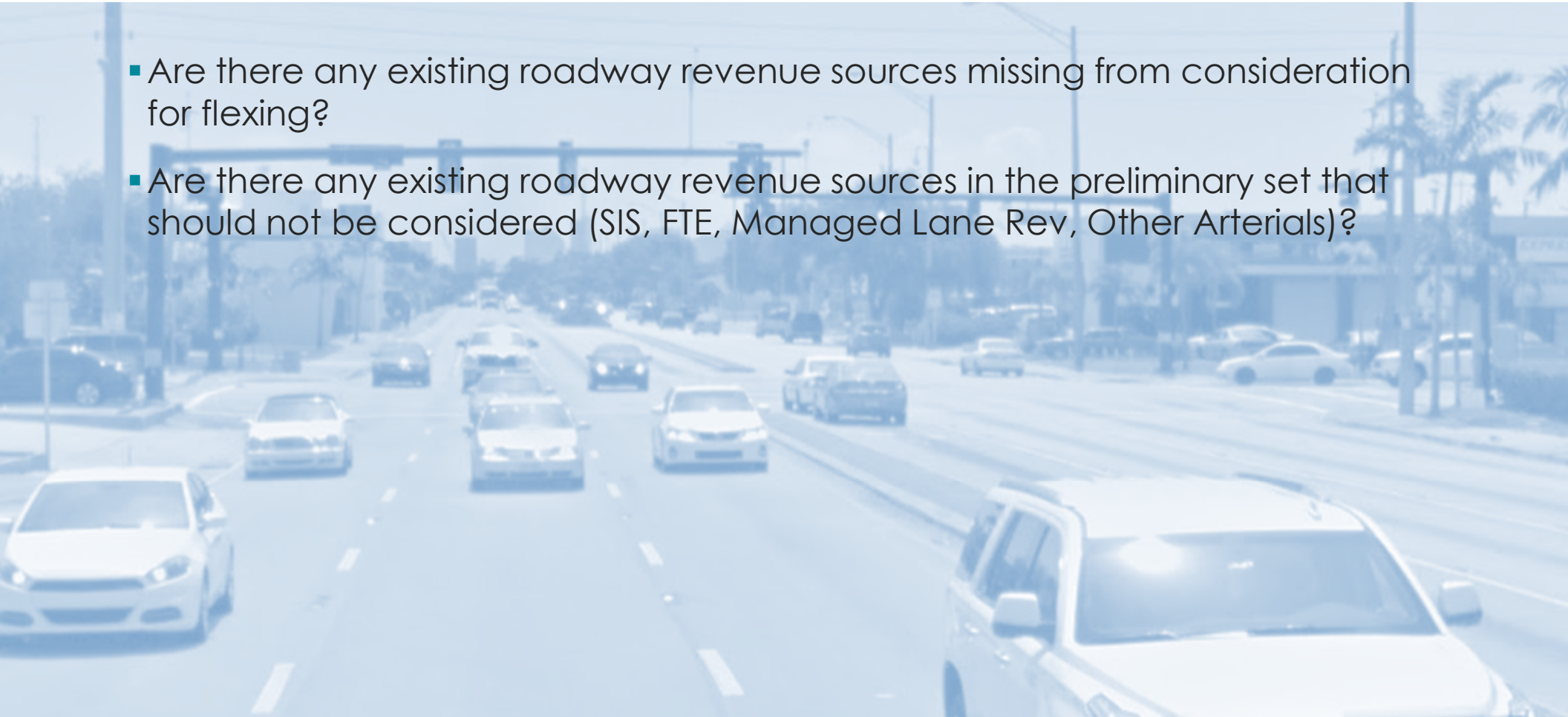
# FLEXIBLE TRANSIT
## SCENARIO

Assumes limited funding available to flex requiring a strategic approach to identification of transit improvements

## FLEX 1

PERFORMANCE

No Commuter Bus, all HCT, six SMART Plan corridors, and Tri-Rail

## FLEX 3

Coverage 2
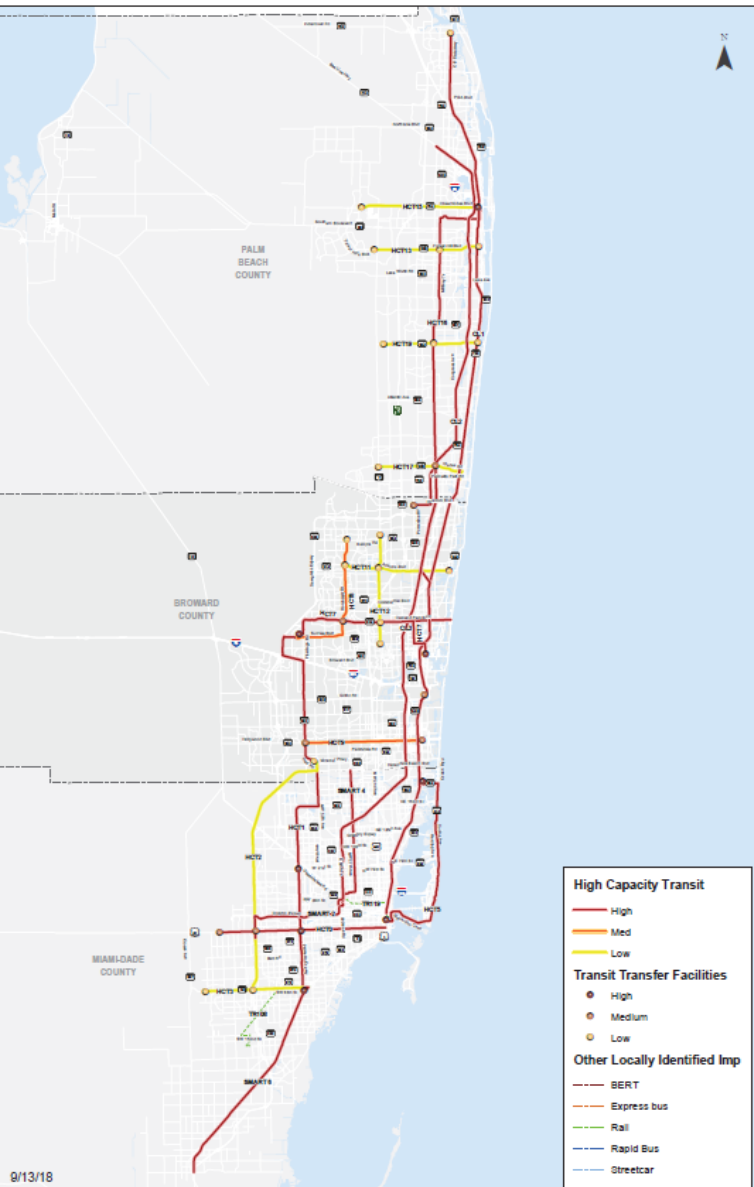
All services included, downgrade all HCT to Low, SMART Plan and Tri-Rail included.
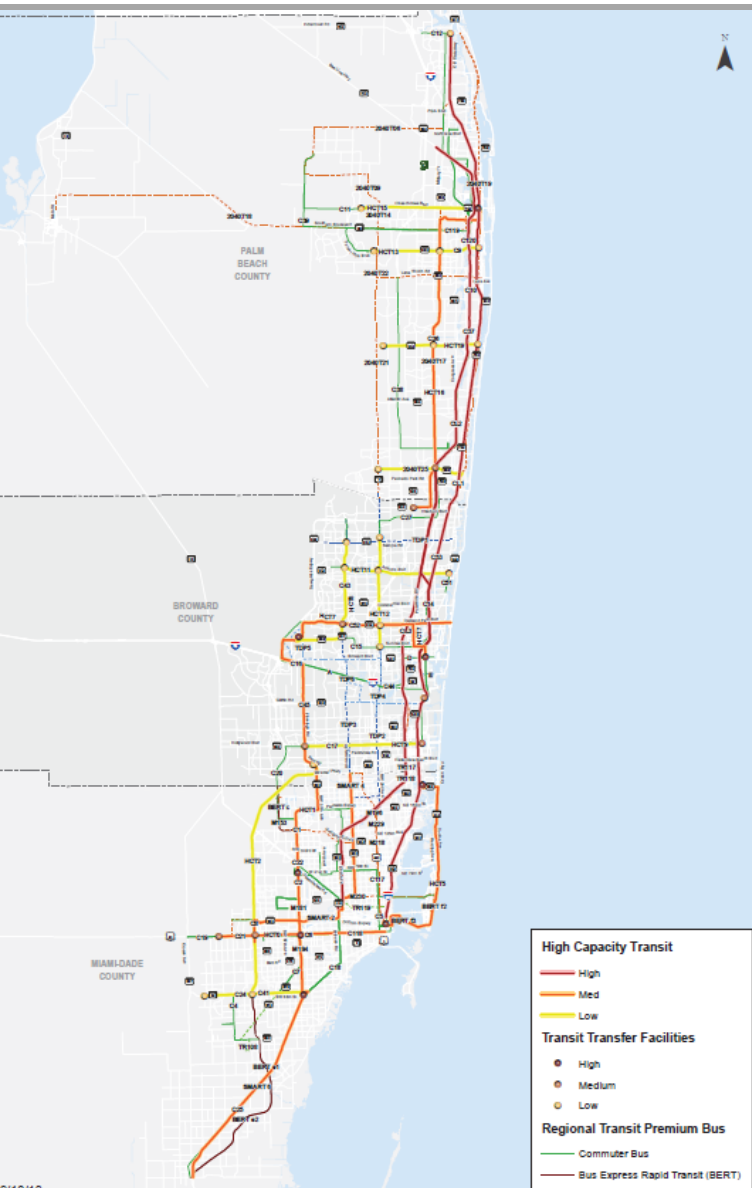
## FLEX 2

COVERAGE 1

All services included, downgrade HCT one level, SMART Plan and Tri-Rail included.

Performance Example

# Coverage 1 Example

Coverage 2 Example
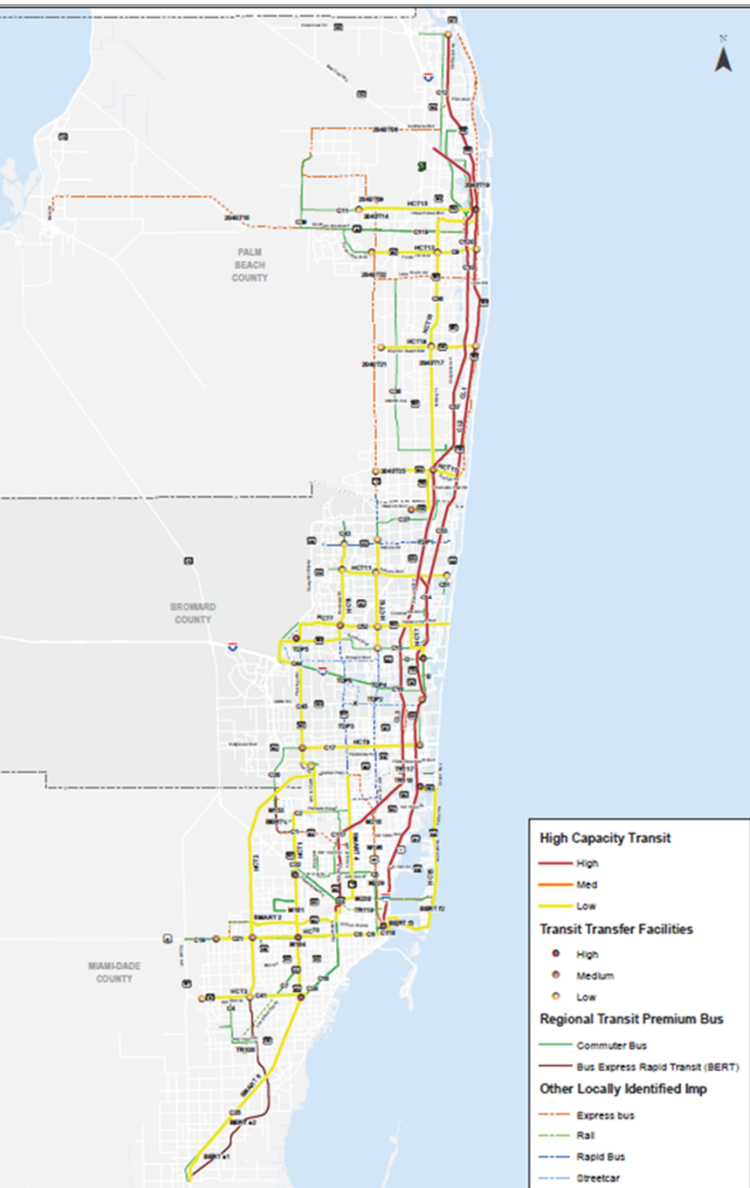
# COSTS

## Commuter

**BUS**

Route miles, speed, span, and number of trips used to derive revenue hours and vehicle requirements.

## FTN

**Frequent Transit Network**

Route miles, speed, span, and number of trips used to derive revenue hours and vehicle requirements.

## TTF

**Transit Transfer Facilities**

Based on costs of similar sized facilities in existing local plans

## HCT

**High Capacity Transit**

Low: Similar service in Washington State

Medium: Combination of low-end BRT from 4 corridors in 2015 Miami-Dade BRT Implementation Plan.

High BRT: Combination of high-end BRT from 4 corridors in 2015 Miami-Dade BRT

High LRT: Average cost of all SMART Plan corridors (excluding commuter rail)

# RECONCILIATION

## Step 1

Collect and map all recommendations from 2040 LRTPs and TDPs.

## Step 2

Compare recommendations and identify those that align and those that do not.

## Step 3

Make minor changes where possible to bring recommendations into alignment.

## Step 4

Develop complete database/network of recommendations.

# Discussion and Map Exercise

- Are there any major improvements that MUST be included in the flexible transit scenario?

- Are there any included improvements that should be removed from consideration?

- Are we more interested in performance strategy (highest and best technology) or a coverage strategy (maximize coverage of system)? Is there a third strategy to consider?

# Interactive Exercise

- Mix-and-match flexible revenue sources and percent shift.

# Poll Question:
# Are the proposed flex amounts...

A. Too high.

B. Too low.

C. Just right.

# Are the proposed flex amounts...

Too
high

Too
low

Just
right

# Poll Question:
## The amount of flexed SIS funds should be…

A. 15% ($2.03 billion).

B. 25% ($3.38 billion).

C. 30% ($4.05 billion).

D. More than 30%.

E. Less than 15%.

# The amount of flexed SIS funds should be…

15% ($2.0 billion)

25% (%3.4 billion)

30% ($4.1 billion)

More than 30%

Less than 15%

Start the presentation to see live content. Still no live content? Install the app or get help at **PollEv.com/app**

57

# Poll Question:
## The amount of flexed OA funds should be...

A. 15% ($1.08 billion).

B. 25% ($1.80 billion).

C. 30% ($2.16 billion).

D. More than 30%.

E. Less than 15%

# The amount of flexed OA funds should be...

15% ($1.1 billion)

25% ($1.8 billion)

30% ($2.2 billion)

More than 30%

Less than 15%

# Poll Question:
## The amount of flexed MDX funds should be...

A. 15% ($0.33 billion).

B. 25% ($0.55 billion).

C. 30% ($0.66 billion).

D. More than 30%.

E. Less than 15%

# The amount of flexed MDX funds should be...

15% ($0.33 billion)

25% ($0.55 billion)

30% ($0.66 billion)

More than 30%

Less than 15%

Start the presentation to see live content. Still no live content? Install the app or get help at PollEv.com/app

61

# Poll Question:
## The amount of flexed managed lane funds should be…

A.  15% ($0.24 billion).

B.  25% ($0.45 billion).

C.  30% ($0.54 billion).

D.  More than 30%.

E.  Less than 15%

# The amount of flexed managed lane funds should be...

15% ($0.24 billion)

25% ($0.45 billion)

30% ($0.54 billion)

More than 30%

Less than 15%

Start the presentation to see live content. Still no live content? Install the app or get help at **PollEv.com/app**

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# 04  Alternative Growth Scenario

Complementing our regional transit vision

2045

# Alternative Growth Scenario

- Introduces changes to growth and development patterns

- Shifts population and employment growth

- Compact locations surrounding regional transit

# How much growth?



1.6 million more people

Palm Beach + 356,000

Broward + 351,000

Dade + 846,000

# How much growth?

Palm Beach + 210,000
Broward + 280,000
Dade + 474,000

965,000 more jobs

2045

67

Growth is focused here. How much?

WEST PALM BEACH

MIAMI

FORT LAUDERDALE

LEGEND

- ⬚ City Boundaries
- 🟠 Existing Brightline Stations
- 🟢 Existing Tri-Rail Stations
- 🔵 Existing MetroRail Stations
- ━ Tri-Rail Coastal Link
- ━ Proposed Regional Transit Network
- ━ SMART Corridors
- ▨ MAZs within Half Mile of Regional Transit

0   5   10        20 Miles

N

# Population and Employment Growth Potential



**Station Area MAZ Gross Developable Area**

Multiplied by

**Gross Density and Intensity**

Florida TOD Design Guidelines

Minus

**Existing (2015) Population and Employment**

Equals

**2045 Growth Potential**
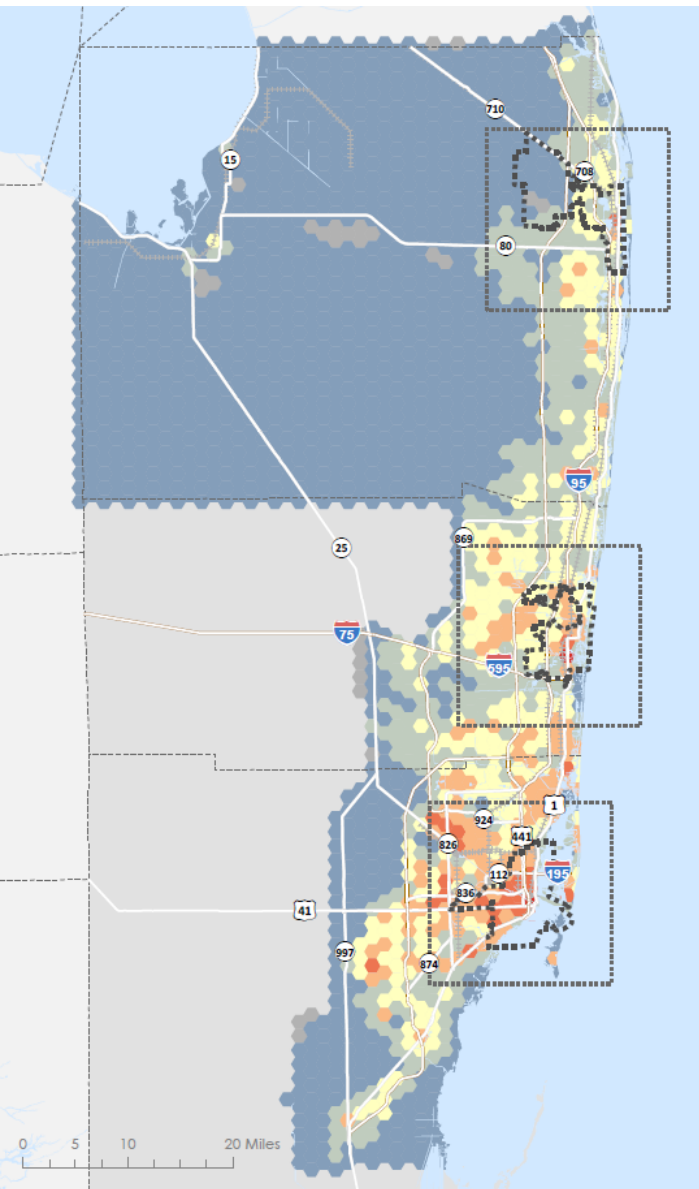
WEST PALM BEACH
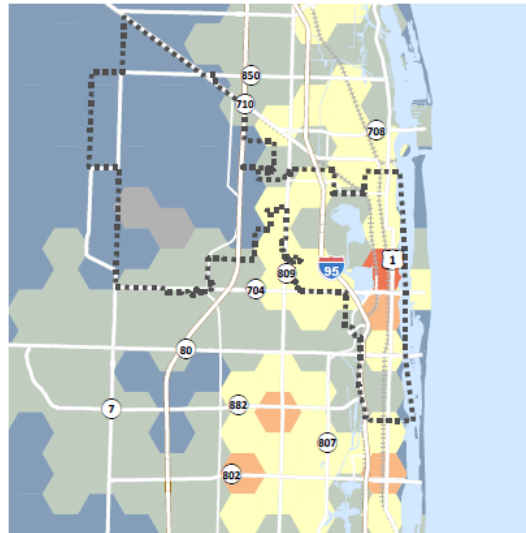
FORT LAUDERDALE

MIAMI

2015 POPULATION AND EMPLOYMENT

- N/A
- 1 - 3
- 4 - 10
- 11 - 15
- 16 - 25
- 26 - 50
- 51+
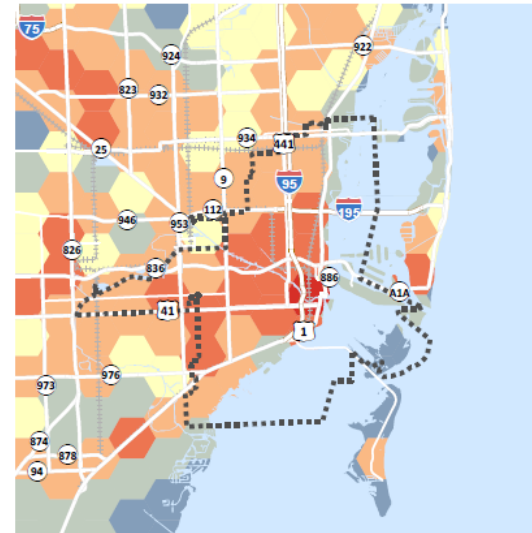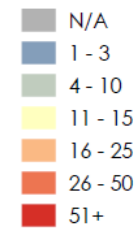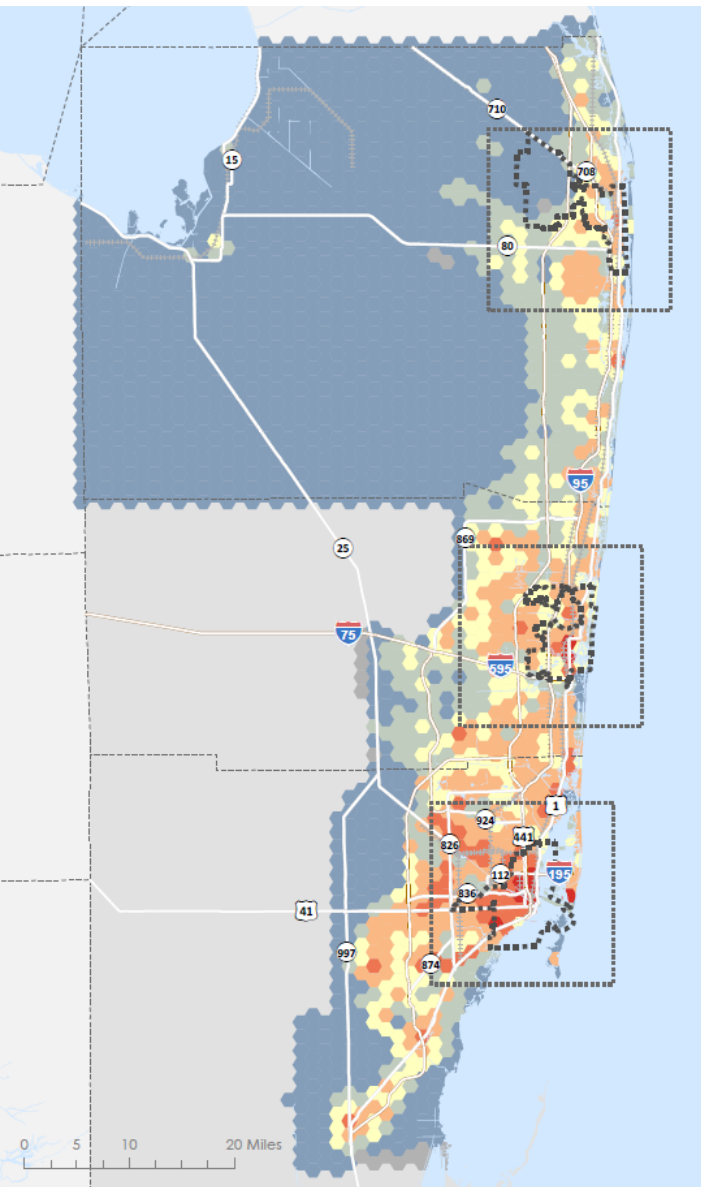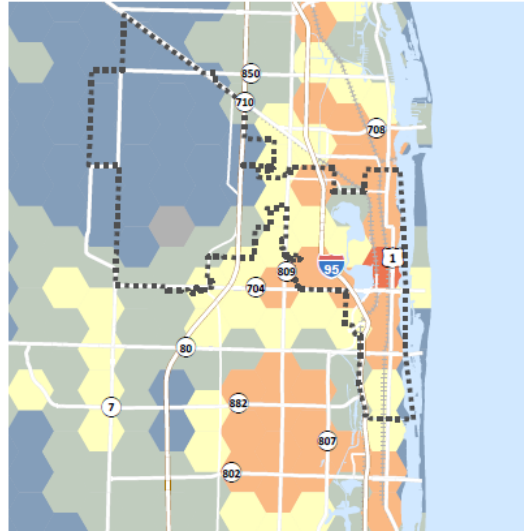
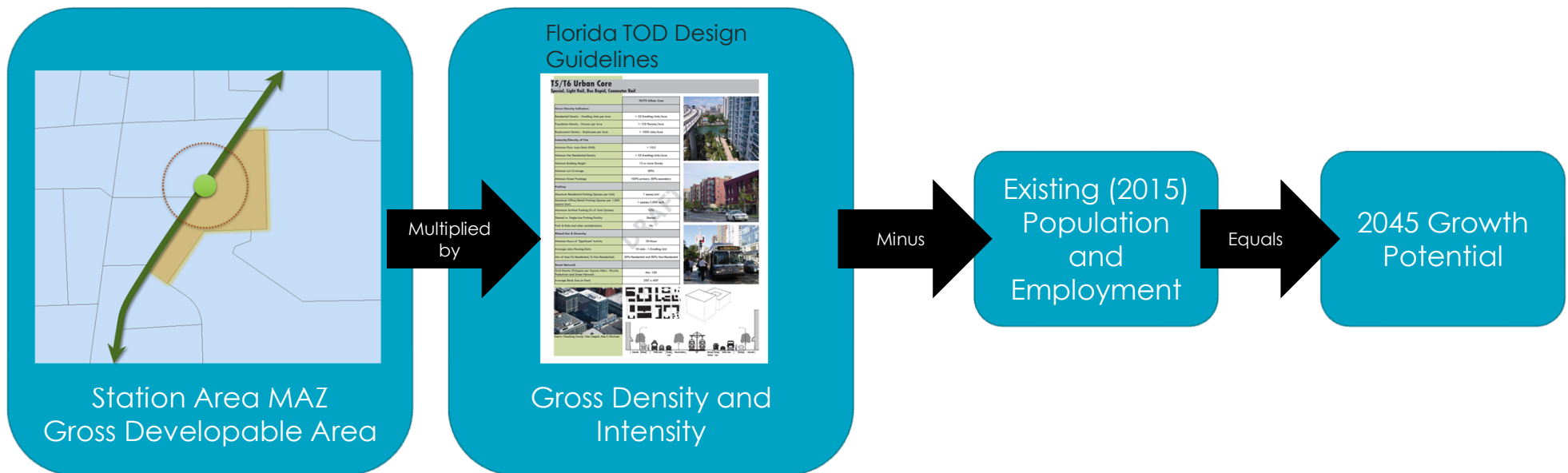## WEST PALM BEACH
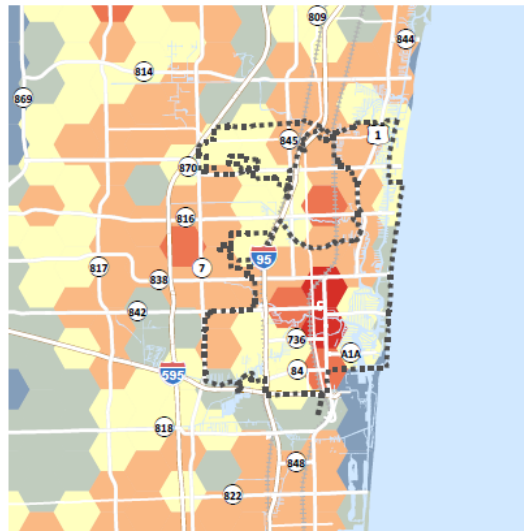
## FORT LAUDERDALE
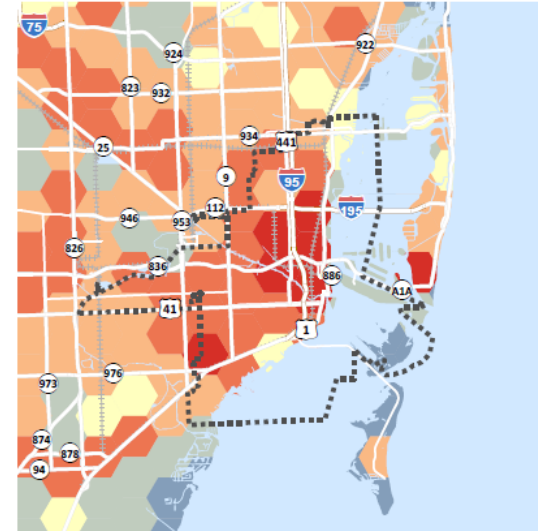
## MIAMI

### 2045 TREND POPULATION AND EMPLOYMENT

| | |
|---|---|
| ⬜ | N/A |
| 🟦 | 1 - 3 |
| 🟩 | 4 - 10 |
| 🟨 | 11 - 15 |
| 🟧 | 16 - 25 |
| 🟧 | 26 - 50 |
| 🟥 | 51+ |

0  5  10  20 Miles

N
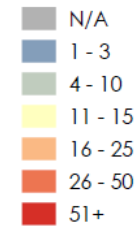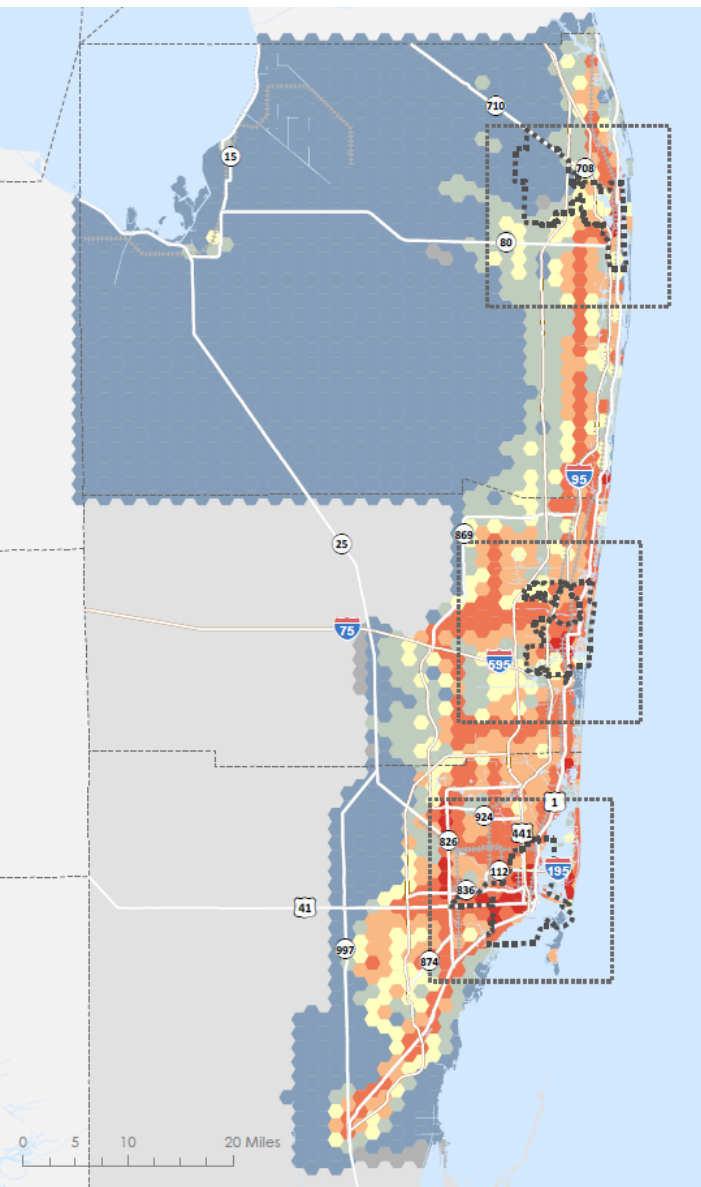
WEST PALM BEACH
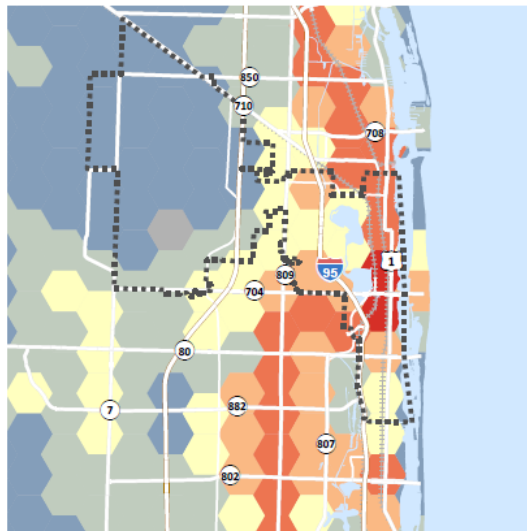
FORT LAUDERDALE
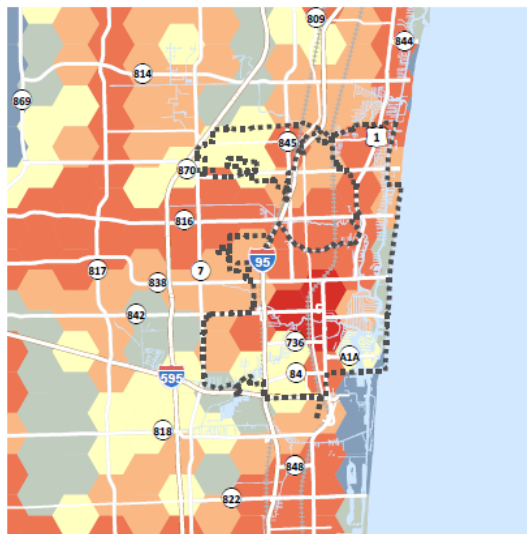
MIAMI
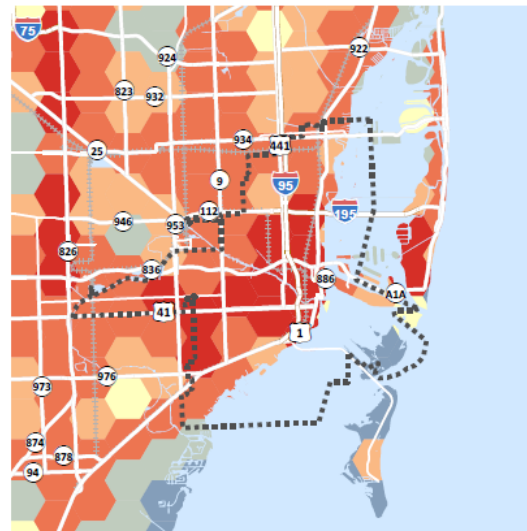
2045 POPULATION AND
EMPLOYMENT PER ACRE WITH
HALF MILE STATION AREA
BUILDOUT POTENTIAL

N/A
1 - 3
4 - 10
11 - 15
16 - 25
26 - 50
51+

0    5    10    20 Miles
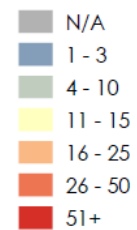
# Station Area Growth Potential

- There are currently **1.5 million people** and **1.2 million jobs** within ½ mile of the HCT network.
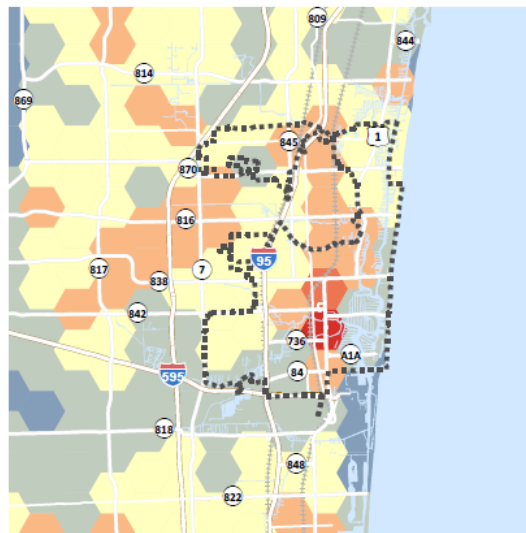
- Under the Trend, a total of **2.0 million people** and **1.6 million jobs** will be located there.

- Our growth potential is **6.0 million people** and **3.9 million jobs**.

Jobs — 1.2
People — 1.5

**Today (2015)**

1.6
2.0

**Trend Scenario (2045)**

3.9
6.0

**Growth Potential**
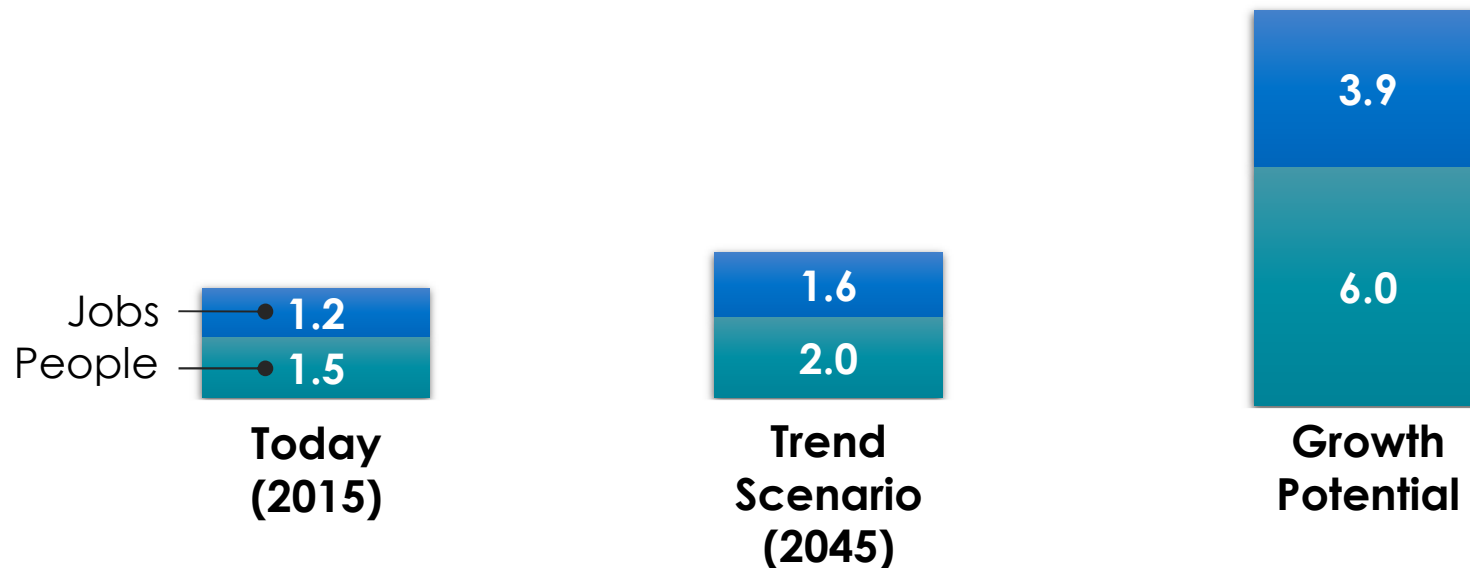
2045

# Discussion and Map Exercise

- How much of the 1.6 million additional people and 965,000 additional jobs by 2045 should be shifted to regional transit corridors?

- Are there specific regional transit corridor locations within each county that should receive more growth than others?

# Poll Question:
# How much 2015-2045 growth to shift to transit?

A. 50% (about 780,000 people and 480,000 jobs)

B. 75% (about 1.2 million people and 720,000 jobs)

C. Higher than 75%

D. Lower than 50%

Note: Under the Trend, about 36% of new population and 41% of new jobs will be located around high capacity transit.

2045

# How much 2015-2045 growth should be located around high capacity transit?

50% (about 780,000 people and 480,000 jobs)

75% (about 1.2 million people and 720,000 jobs)

Higher than 75%

Lower than 50%

Note: Under the Trend, about 36% of new population and 41% of new jobs will be located around high capacity transit.

# 06   Wrap-up and Next Steps

Where do we go from here?

2045

# Next Steps

- October RTTAC
  - Refined scenarios
  - Confirm performance measures OR indicators

- November/December RTTAC
  - Scenario results

- 2019
  - Plan and policy development

2045

Appendix B:

**Foursquare ITP Transit Service Recommendations Technical Memorandum including Transit Propensity Maps, Model Flow Maps, and Detailed Cost Estimates**

# 1.   PURPOSE OF EFFORT

This memo outlines the process used by the study team to create the transit service recommendations for the *2045 Southeast Florida Regional Transportation Plan* (RTP). In order to model out a set of future development scenarios for Southeast Florida, the team had to prepare different conceptual recommendations for how the transit system might look. These recommendations were initially identified through a data analysis that resulted in a list of gaps and needs. From there, the team prepared a set of recommendations focused on:

- A regional high-capacity transit network. While the network is modal neutral, a high-capacity transit network would consist of BRT or rail-based transit that provides greater speed and capacity than a conventional bus service.
- Major transit transfer facilities that would serve as hubs for the region's transit network.
- A commuter bus network which provides regional connections to key employment centers.

As this was a high-level exercise, the recommendations make several general assumptions about service characteristics, costs, and ridership.

# 2.   DATA

This study utilized a wide range of data to support the analysis. In addition to data, existing plans provided an important basis for identifying gaps and developing recommendations.

## 2.1.   Data Sources

The following sources were used in our quantitative analysis for this study, notably as the underlying data behind the transit propensity and travel flow analyses:

- 2012-2016 American Community Survey (ACS)
- 2010 Decennial Census
- 2015 Longitudinal Employer-Household Dynamics (LEHD)
- Southeast Florida Regional Planning Model (SERPM) 7, 2040
- National Transit Database (NTD), 2016

Data from the US Census Bureau reports on the socio-economic and demographic characteristics of the study area, including factors like age, income, commuting method, and population density. The SERPM model forecasts travel between traffic analysis districts (TADs) across Southeast Florida for the current year and 2040. The future year figures are based on projects of population and employment growth in the region. Finally, the NTD data provides standardized statistics of transit agency performance in the region, including costs and ridership.

## 2.2.   Existing Plans

The following studies were utilized to develop and refine the recommended transit network developed for this analysis. Where possible, existing plans provide the basis for transit improvement cost estimates.

- Tri-Rail Coastal Link (TRCL) Project Update, *South Florida Regional Planning Council*

- Palm Beach 2040 LRTP, *Palm Beach Transportation Planning Agency*
- Palm Beach Transit Development Plan 2017-2026, *PalmTran*
- Commitment 2040: The Long-Range Transportation Plan for Broward County, *Broward Metropolitan Planning Organization*
- BCT Connected: Transit Development Plan 2018-2027, *Broward County Transit*
- Miami-Dade 2040: Long Range Transportation Plan (LRTP), *Miami-Dade Metropolitan Planning Organization*
- The Strategic Miami Area Rapid Transit (SMART) Plan, *Miami-Dade Transportation Planning Organization*
- Miami-Dade Transit Ahead: 2019-2028 Transit Development Plan, *Miami-Dade Transit*
- Bus Rapid Transit Implementation Plan, *Miami-Dade Metropolitan Planning Organization*
- Beach Corridor Transit Connection Study, *Miami-Dade Metropolitan Planning Organization*

# 3.  METHODOLOGY/ANALYSIS

The team utilized a data-intensive methodology to develop the recommendations of the study. Early in the study process, four types of transit recommendations were defined: (1) high-capacity transit network, (2) frequent transit network, (3) transit transfer facilities, and (4) commuter bus service. A transit propensity analysis was conducted that estimates the overall level of transportation demand and suitability of public transit in meeting that demand. The propensity analysis, coupled with data on existing travel flows and transit service, allowed the team to identify gaps and formulate recommendations.

## 3.1.  Propensity Analysis

The study team ran a transit propensity model to understand the demand for transit use across the region. The model results in four indices that describe different attributes of transit demand:

- Transit Oriented Origin Index: Measures demand for all-day transit service.
- Commuter Origin Index: Measures demand for peak commuter-oriented transit service.
- Workplace Destination Index: Measures level of attraction for commuters based on job density.
- Activity Destination Index: Measures level of attraction for transit-oriented populations based on density of activity and destinations.

Each index is comprised of weighted categories, and each weighted category is comprised of data obtained from 2012 – 2016 American Community Survey (ACS), the 2010

*Figure 1: Overview of Methodology Process*
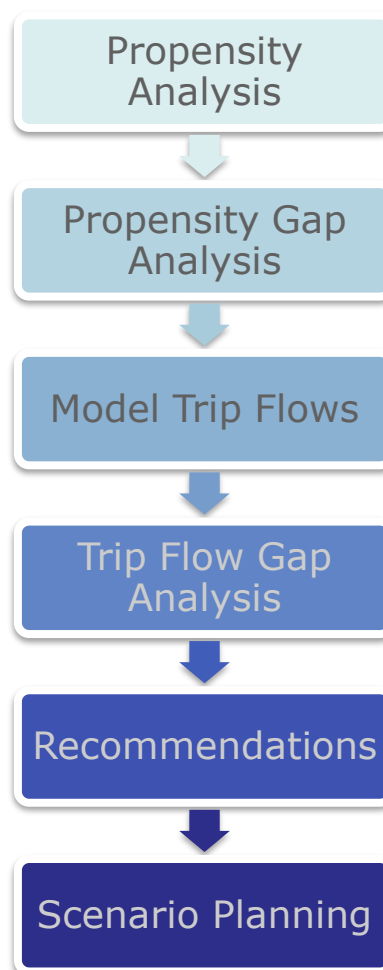


Propensity Analysis

Propensity Gap Analysis

Model Trip Flows

Trip Flow Gap Analysis

Recommendations

Scenario Planning

decennial Census, and 2015 Longitudinal Employer-Household Dynamics (LEHD) data. Only the portions of the study area that reach a minimum threshold of job and population density are considered for further analysis.

Weights were determined based on the relative significance of each factor to transit in each county based on a regression model and previous experience with Florida transit systems. The following weights were used for the Foursquare ITP propensity model as submitted February 23, 2018.

*Table 1: Description of Factors and Weighting Utilized by the Propensity Model*

| Propensity Index | Category | Propensity Weights | | |
|---|---|---|---|---|
| | | Broward | Miami-Dade | Palm Beach |
| Transit-Oriented Origin Index | Age (Youth and Seniors) | 5 | 5 | 5 |
| | Population (Total Population and Non-White or Hispanic) | 13 | 14 | 16 |
| | Income (Persons with income less than 150 percent of poverty line) | 22 | 6 | 25 |
| | Vehicle Ownership (Zero-car households) | 55 | 45 | 45 |
| | Vehicle Ownership (One-car households) | 5 | 29 | 9 |
| | Disability Status | 5 | 5 | 5 |
| Commuter Origin Index | Labor Force | 70 | 70 | 70 |
| | Non-SOV Commute Mode | 30 | 30 | 30 |
| Workplace Destination Index | Employment | 100 | 100 | 100 |
| Activity Destination Index | Retail & Restaurant | 20 | 20 | 20 |
| | Recreation & Entertainment | 10 | 10 | 10 |
| | Healthcare & Social Assistance | 35 | 35 | 35 |
| | Education | 25 | 25 | 25 |
| | Government | 10 | 10 | 10 |

## 3.1.    Model Travel Flow Analysis

SERPM 7 data was used to map 2010 and 2040 trip flows between Traffic Analysis Districts (TADs), for both peak and all-day. Peak flows represent SOV and transit bi-directional trips for the AM peak period. All-day flows represent all trips, for all modes, for 24-hours. This information was than coupled with the propensity analysis to identify travel demand that could be well served by improved public transit. For example, heavy flows between an area of high transit-oriented origin and activity destination index scores would be better suited for transit than high travel flows between two areas that score poorly in the propensity indices.

*Figure 2: Map Showing Areas with the Greater All-Day Transit Propensity in the Region.*
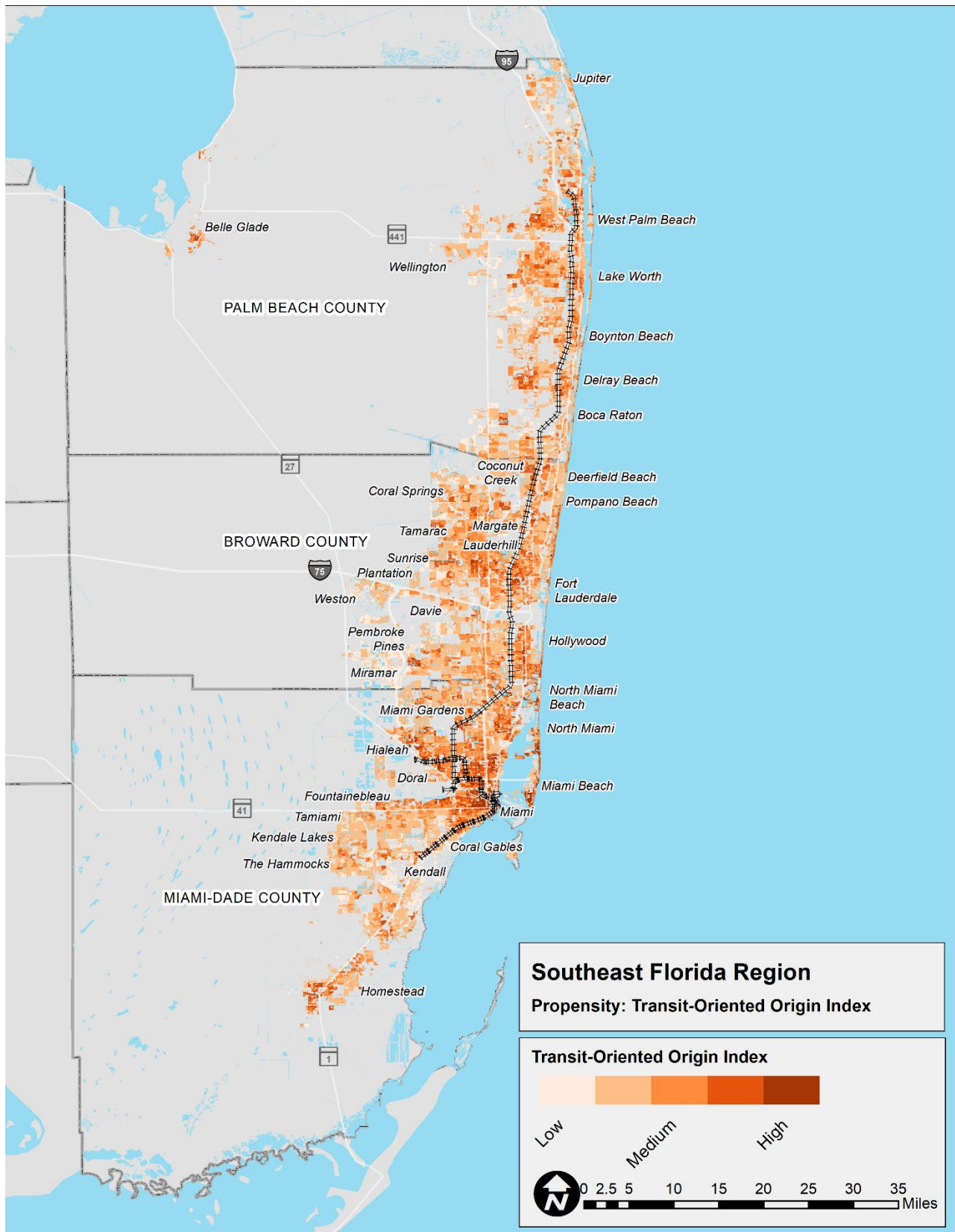
## 3.2. Defining Gaps and Recommendations

### 3.2.1. Analysis to Identify High-Capacity Transit Network

***Step 1: Define Levels of Investment***

High Capacity Transit (HCT) can describe a wide range of transit investments, from new Metrorail lines to bus rapid transit. To acknowledge that one model of high-capacity transit may not fit the travel needs across the region, the study team identified three basic levels of investment:

- Low Investment HCT: Limited-stop express bus service with some transit priority treatments.
- Medium Investment HCT: Similar to Low Investment HCT but with portions containing dedicated travel lanes or business access and transit (BAT) lanes (at a minimum during peak periods).
- High Investment HCT: BRT or rail-based transit operating in a dedicated fixed-guideway.

***Step 2: Identify HCT Corridors Based on Intersection of Travel Flows and Transit Propensity***

Utilizing travel flows from the SERPM 7 model, the team overlaid all-day transit-oriented propensity and travel flow desire lines. Corridors for investment were identified based on where travel flow and high transit propensity overlap. These corridors follow key roads within the region but were drawn as buffers around roads to avoid identifying specific routing for HCT investments.

*Figure 3: Example of HCT Corridor, with Transit Propensity and Travel Flow Data Overlaid*
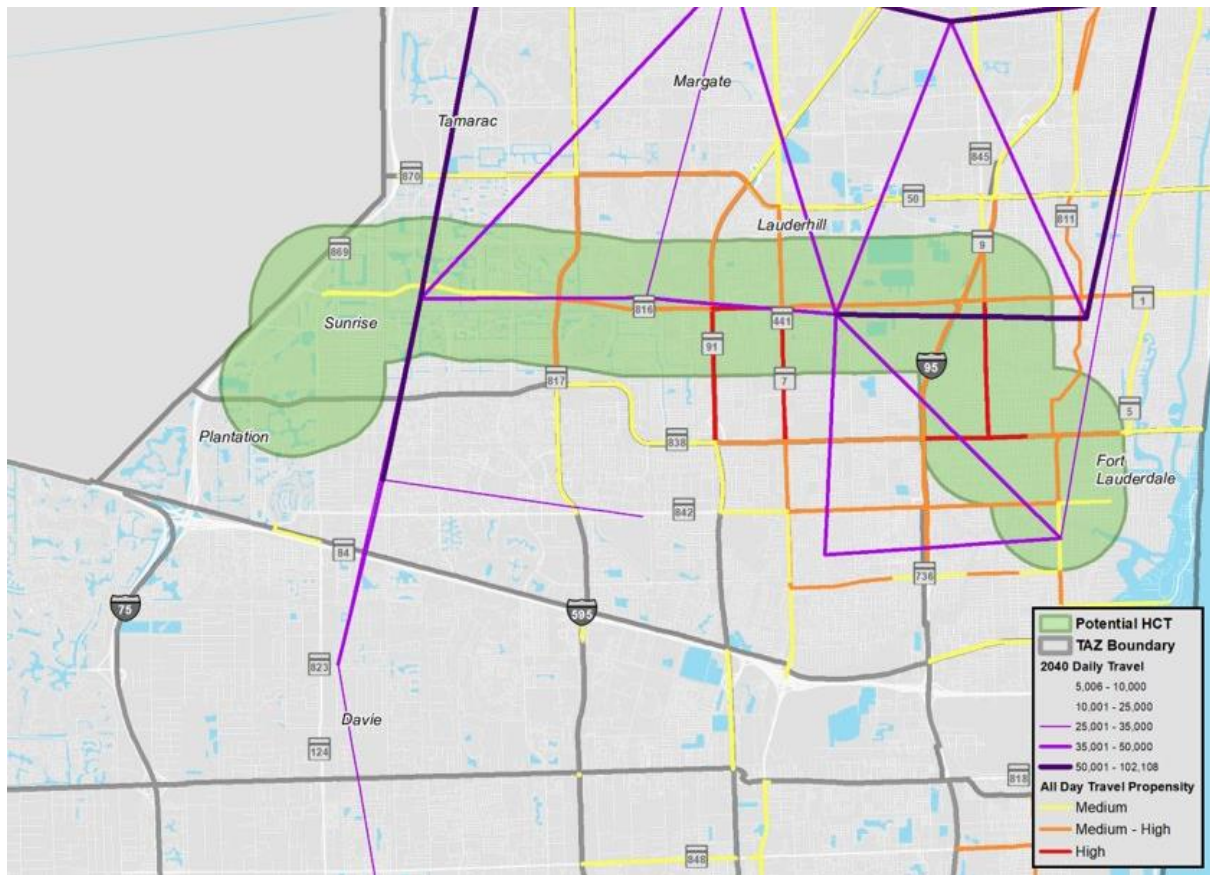
### Step 3: Assign Level of Investment

Once the corridors are identified, the study team assigned each corridor a level of investment based on the underlying transit propensity and travel flows. The few corridors with very high transit propensity and heavy travel flows, were selected as High Investment HCT corridors. This process of assigning investment levels was relative to the level of flows by County. The travel flows were evaluated in ranges and those ranges associated with the investment level. The propensity was utilized as a guide for the corridor alignment, and other factors such as land use type, major activity centers, transfer locations, network value and potential route termini anchors were also considered.

### Step 4: Reconcile Proposed HCT Network with Existing Plans

Many proposals for transit throughout the Southeast Florida region exist across different local- and county-level plans. The final step in determining alignments and levels of HCT routes was to reconcile the proposed HCT network with these existing plans. Stakeholders throughout the Southeast Florida region were consulted according to the process detailed in Section 7 of this report, and the final HCT network adjusted, to reflect the most up-to-date understanding of regional transit goals.

## 3.2.2. Analysis to Identify Transit Transfer Facilities

Transit transfer facilities are major hubs where several transit routes are expected to come together. These locations would feature upgraded amenities for passengers.

### Step 1: Define Levels of Transit Transfer Facility (TTF) Investment

Like with the HCT network, TTFs can be implemented with varying degrees of investment. The team defined three levels of TTFs:

- Low Investment TTF: Upgrade on-street transit stop with shelter, benches, lighting, and real-time arrival information.
- Medium Investment TTF: Off-Street facilities with a covered waiting area and part-time staffing. These would serve as transfer nodes between several routes.
- High Investment TTF: Major off-street facilities with indoor waiting area, restrooms, and full-time staffing.

*Figure 4: Initial Proposed HCT Corridors by Level of Investment*



### Step 2: Identify Location of TTFs

The location and level of investment of TTFs was based on the proposed High-Capacity Transit Network. Locations at the end of HCT corridors, or at the intersection of two low, or the crossing of a low and medium HCT corridor were assigned a low investment TTF. Locations where a more than one low investment HCT

corridor intersected with a medium HCT corridor, the crossing of a low investment HCT corridor with a high investment HCT corridor, or the crossing of two medium investment HCT corridors was assigned a medium investment TTF. Finally, any location where two or more medium or high investment HCT corridors cross would be assigned a high investment TTF.

*Figure 5: Location of Proposed Transit Transfer Facilities (TTF)*
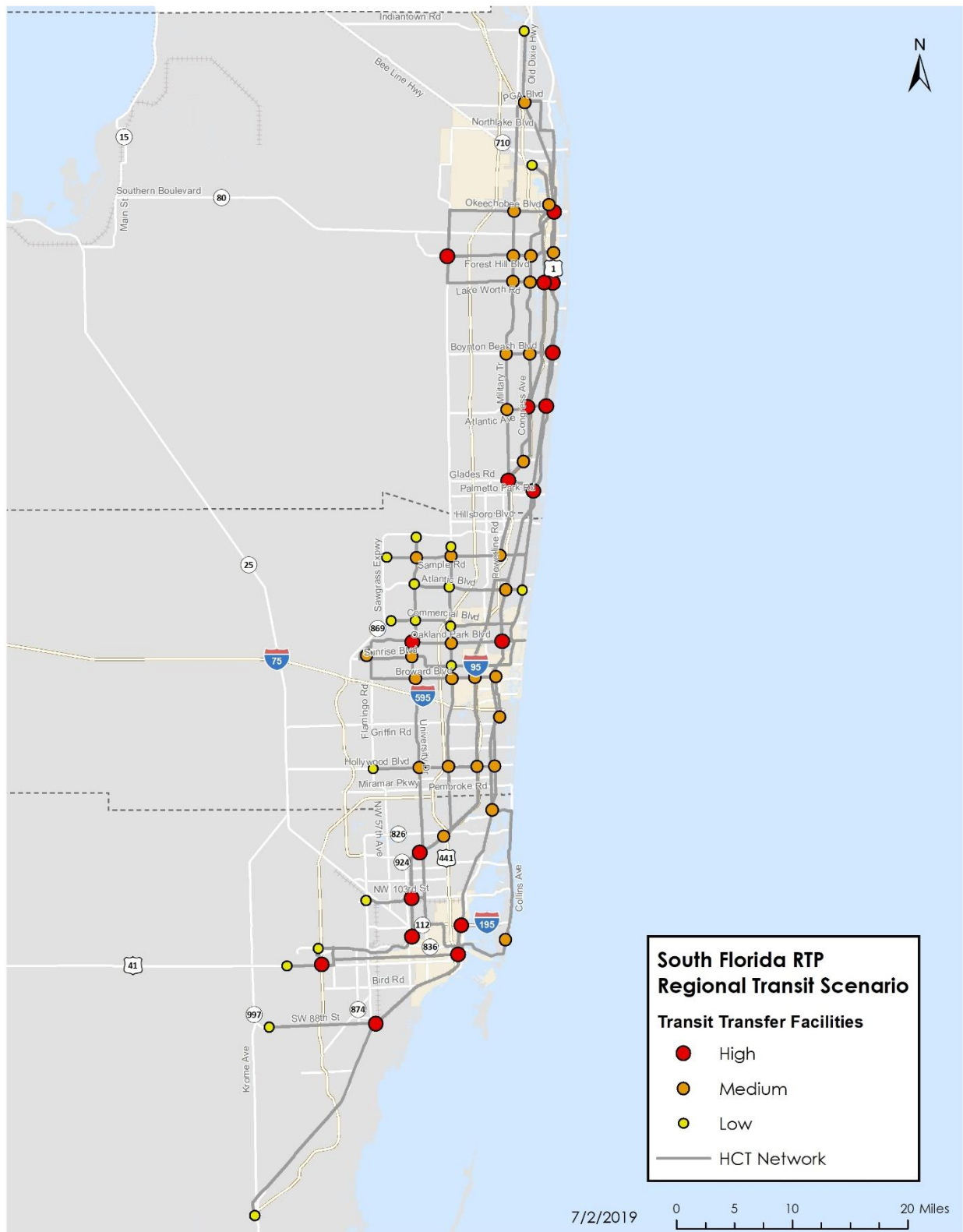
### 3.2.3. Analysis to Identify Commuter Bus

The final network type defined by the study was the Commuter Bus network. Commuter bus routes are peak-only express bus service to major employment centers. These routes have at least two trips per day in each direction.

*Step 1: Aggregate Employment Data to TADs*

Employment data was aggregated to the TAD level to allow the team to identify the region's top 26 employment destinations

*Step 2: Filter Out Employment Destinations that Do Not Meet Screening Criteria*

Of the 26 top employment destinations, ten were screened out for not meeting the minimum requirements for commuter bus service:

1. Commuters travel to the employment site more than 5 miles. Trips under 5 miles are better served by other types of transit service.
2. There is at least one TAD outside the 5-mile radius that generates approximately 1,000 trips in the AM peak to the respective employment center.

*Step 3: Draw Commuter Routes*

The team drew commuter routes that connect the 16 employment centers that met the criteria in Step 2, to TADs with a minimum of approximately 1,000 trips a day to the employment center. Where possible, corridors connected multiple residential areas generating commuter trips. Routes were designed to take advantage of existing Park & Rides. In places where no Park & Ride was available to serve the travel need, additional Park & Rides were proposed. A small number of additional commuter routes were added at the discretion of relevant stakeholders.

*Figure 6: Proposed Miami-Dade Commuter Bus Network*
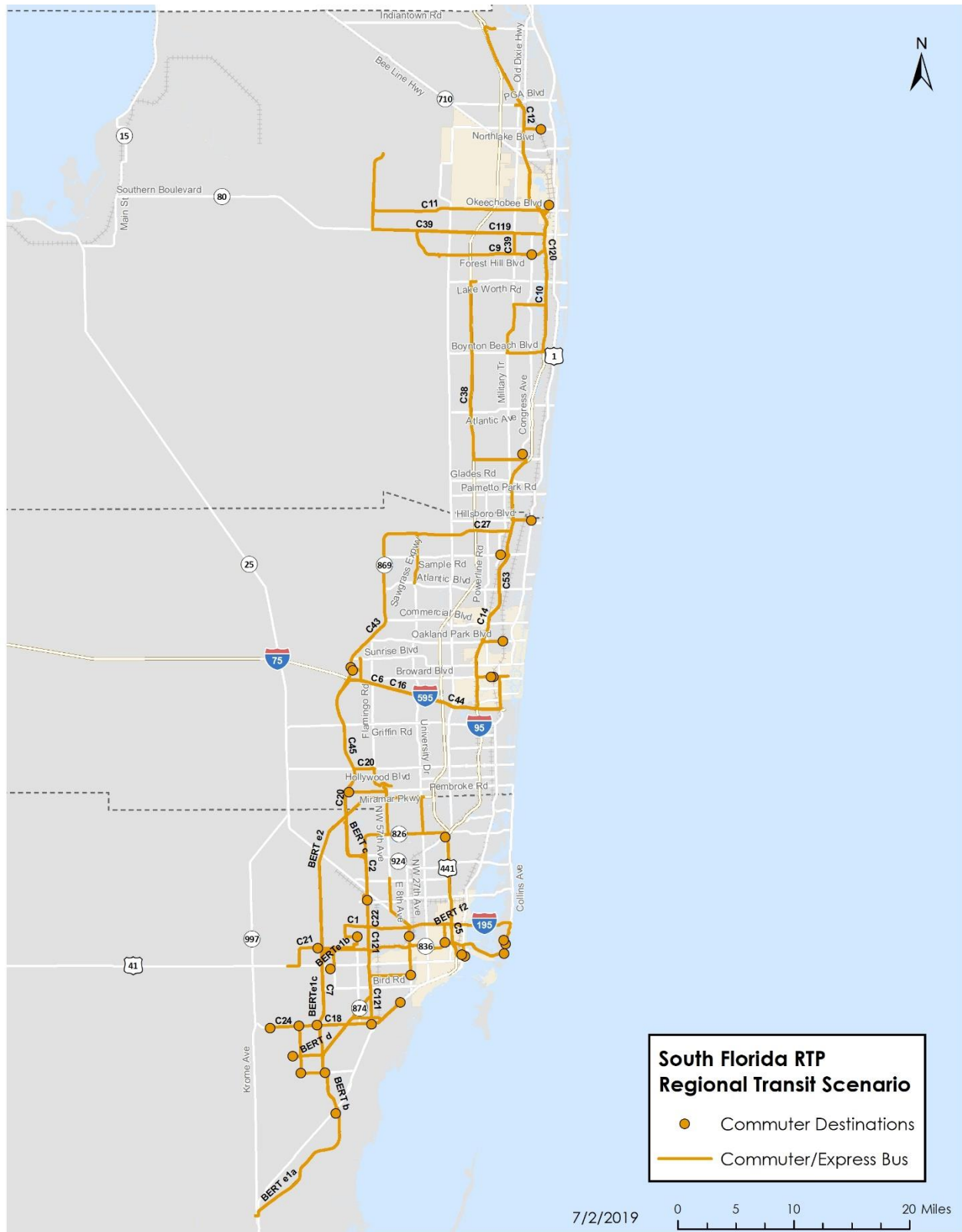
# 4.   PRELIMINARY RECOMMENDATIONS

A summary map of the preliminary proposed transit improvements (excluding the Commuter Bus network for clarity) is shown in **Figure 7**. This network was later modified based on feedback from the RTTAC Workshop. The preliminary recommendations included:

- 46 Commuter Bus Routes
- 17 HCT Corridors, including: 6 High Investment corridors; 3 Medium Investment Corridors; and, 8 Low Investment Corridors
- 35 Transit Transfer Centers, including: 8 High Investment locations; 8 Medium Investment locations; and, 19 Low Investment Locations
- Frequent Transit Networks in Broward and Miami-Dade County (which were dropped entirely from final recommendations)

*Figure 7: Preliminary Proposed Regional Transit Network*

# 5. SERVICE ASSUMPTIONS

Service assumptions were agreed to by the RTTAC. All service assumptions are documented in the Trend and Alternative Scenarios Report.

# 6. DEVELOPMENT OF COST ESTIMATES

Table 2 lists the assumptions used to estimate the capital and operating costs associated with the recommended transit network. These were high-level cost estimates based on comparable costs from other studies conducted in Southeast Florida region and nationwide. In the case of the High Capacity Transit network, two separate costs were prepared for High Investment HCT: a generic value which applied to most corridors, and an estimate for Light Rail based on a 2013 cost estimate for BayLink.

*Table 2: Cost Assumptions*

| Type | Capital Cost per Unit | Unit | Operating Cost per Unit | Unit | Assumption Notes |
|---|---|---|---|---|---|
| **Commuter Transit** | $600,000 | per vehicle | $215 | revenue hour | 2016 Miami Dade Transit average cost per hour (NTD). Assume 30 mph operating speeds. Trips differ by route and are derived from internal analysis. |
| **High Capacity Transit** | | | | | |
| Low Investment | $1,750,000 | per mile | $500,000 | per mile | Per mile cost for SWIFT BRT in Washington State. Example of shoulder running BRT with enhanced stops but limited ROW treatment. |
| Medium Investment | $5,500,000 | per mile | $500,000 | per mile | Combination of low-end BRT capital cost estimate across 4 corridors in 2015 Miami-Dade BRT Implementation Plan. Figures inflated to 2018 $s. O&M costs based on same source and rounded to nearest $100k. |
| High 1 (Generic BRT with extensive dedicated ROW) | $14,500,000 | per mile | $500,000 | per mile | Combination of high-end BRT capital cost estimate across 4 corridors in 2015 Miami-Dade BRT Implementation Plan. Figures inflated to 2018 $s. O&M costs based on same source and rounded to nearest $100k. |
| High 2 (BayLink LRT costs) | $73,800,000 | per mile | $3,500,000 | per mile | Capital cost based on average cost per mile for all SMART corridors, excluding Northeast which is commuter rail. O&M estimate from 2015 Beach Corridor Study (DC Low Cost Alt) with a 5-minute peak headway and 10-minute off peak headway. |
| **Transit Center** | | | | | |
| Small Generic | $1,500,000 | | | | Ballpark of smaller projects in LRTP including Miami Beach Transfer Center, SW 88 St Transit Center. |
| Medium Generic | $12,500,000 | | | | West Kendall Transit Center |
| High Generic | $35,000,000 | | | | Lynx Central Station, Orlando, FL - $35 million (2018 $). $7.5 million subtracted, estimate for cost of 68,000 sf extra office space on site. Inflated to 2018 dollars using RS Means |

FOURSQUARE ITP
INTEGRATED TRANSPORTATION PLANNING

| Type | Capital Cost per Unit | Unit | Operating Cost per Unit | Unit | Assumption Notes |
|---|---|---|---|---|---|
| | | | | | construction cost adjustment figures: https://www.rsmeansonline.com/references/unit/refpdf/hci.pdf |
| Enhance Existing | $1,500,000 | | | | Cost of implementing improvements at existing transit centers to accommodate new routes. Estimate only for new bus bays. Based on "small" cost estimate. |

# 7.  REVISING RECOMMENDATIONS FOR SCENARIO PLANNING

## 7.1.  RTTAC Workshop

On September 21st, 2018 a workshop was held at the Broward County MPO. The purpose of the workshop was to develop alternative scenarios for consideration as part of the 2045 South Florida Regional Transportation Plan (RTP). During the workshop it was expected that RTTAC members would provide input and feedback that would help shape critical assumptions about transportation projects and strategies, revenue sources, and growth and development.

The workshop was framed around two primary elements and four scenario concepts. The two main elements included:
- Financial and legislative: What changes to policy and legislation will allow greater flexibility in how existing revenue sources are used? What new revenue sources can feasibly generate revenue for regional transportation infrastructure?
- Growth and development: Are changes in development patterns (density/intensity) necessary to complement regional transportation investments?

To help answer those questions, a set of distinct scenarios concepts were created as follows:

1. Trend: Current funding practices, transportation investment and land use decisions.
2. Flexible Transit: Creating flexibility in existing revenue sources to enable a "flexing" of funds to new transit investment.
3. Regional Transit: New revenue sources to fully build out a regional transit network.
4. Alternative Growth and Development: Shifting future growth to compact locations in close proximity to regional transit.

The goal of the Scenario Workshop was to flesh out these scenarios in greater detail, reaching consensus on major assumptions, such as where and how much revenue flexibility, best candidates for new revenue, future transit networks and the location and amount of shifts in growth and development.

The purpose of the Workshop is to start a high-level discussion of alternative scenarios and to answer important questions about underlying assumptions. The workshop was a starting point for an exploration of different approaches and associated outcomes for our future. Decisions on projects, policies or any other final recommendations for the 2045 RTP were not made during the workshop.

The workshop had six main objectives:

1. Agree on projects and revenue assumptions for Trend Scenario

2. Confirm regional transit network.
3. Agreement on preferred new revenue sources.
4. Agree on flexible transit network strategy.
5. Agree on flexible revenue sources and percentages.
6. Agree on percent of 2015-2045 growth to shift to regional transit network.

During the workshop consultants presented the concept of each scenario, the methodology to develop recommendations, and key assumptions about level of service and costs. As previously noted, the transit recommendations were comprised of High Capacity Transit (HCT), Commuter Bus, a Frequent Transit Network (FTN), and Transit Transfer Facilities (TTF). Within the Flexible Transit Scenario these recommendations were further segregated into three sub-scenarios titled Flex 1, Flex 2, and Flex 3. The reasoning behind this scenario was the assumption that there would be limited funding to "flex" requiring a more strategic approach to identifying recommendations and their level of investment.

Flex 1 (Performance), included all High Capacity Transit recommendations, the SMART Plan, and Tri-Rail. Flex 2 (Coverage 1) included all recommendations, SMART Plan, and Tri-Rail, but all of the HCT recommendations were downgraded one level. So HCT High became Medium, and HCT Medium became Low. Flex 3 (Coverage 2) included all recommendations, SMART Plan, and Tri-Rail, but all of the HCT recommendations were downgraded two Low.

After this information was presented workshop attendees were encouraged to review plots of the scenarios, ask questions, and provide feedback either verbally or in writing, the latter of which was done directly onto the map plots. In this fashion attendees were able to "make edits" or recommendations directly onto the maps by drawing lines, crossing out elements, and adding notes. In addition to the recommendations additional maps were provided for reference including mode trip flows, commuter origin-destination pair maps, and transit propensity maps.

In addition to the feedback that was received during the workshop, many attendees submitted additional comments electronically afterwards. All the comments, edits, and recommendations were compiled into a database and reviewed by the consultant team. Whenever possible edits and recommendations were adopted, and where not clear explanations were developed as to why not. In many cases those recommendations not adopted were a result of them not applying, due simply to limitations in how the information could be graphically represented on the maps.

## 7.2.  Reviewing Plan Elements with Counties

During the scenario evaluation portion of this study in late 2018 and early 2019, the Counties were involved in their own internal processes to develop transit recommendations. As a result, several meetings were convened to reconcile transit recommendations between those developed through the RTP process and those developed through internal County processes. In general, this was accomplished by the Counties suggesting revisions to recommendations, e.g., modifying commuter bus origin-destination locations or changing the corridor or level of HCT. In some cases, Counties also suggested additional recommendations for the HCT. For each suggested recommendation the consultant team would analyze if the change could be supported by proximity to transit propensity, alignment with model trip flows, or value to the network and provide feedback to the Counties. Through this process a final network was developed.

# 8. FINAL RECOMMENDATIONS/NETWORKS

Following the revisions based on feedback from the RTTAC Workshop, and further meetings with project stakeholders, the final recommendations include:

- 38 Commuter Bus Routes
- 33 HCT Corridors, including: 18 High Investment corridors; 10 Medium Investment Corridors; and 5 Low Investment Corridors
- 67 Transit Transfer Centers, including: 18 High Investment locations; 31 Medium Investment locations; and 18 Low Investment Locations.

## 8.1. High Capacity Transit (HCT) Network

The final recommendations include 33 HCT corridors in the region, totaling approximately $11.2 billion in capital costs. The HCT network assumes a range of investment types, from enhancing existing bus routes with transit priority features, to building out new fixed-guideway transit lines. The system would cost approximately $531 million per year to operate. Table 3 summarizes the number of HCT corridors, and sum of costs by each corridor's primary jurisdiction. Costs for routes in Miami-Dade that are part of the SMART network are estimated using figures from the Miami-Dade TPO. Figure 8 maps out the proposed network.

*Table 3: Summary of HCT Network Capital and Operating Costs by Jurisdictions*

| County | Number of Corridors | Route Miles | Capital Costs | Annual Operating Costs |
|---|---|---|---|---|
| Broward | 12 | 161 | $2,563,500,000 | $161,800,000 |
| Miami-Dade | 8 | 92 | $5,089,500,000 | $174,400,000 |
| Palm Beach | 10 | 140 | $2,781,900,000 | $154,300,000 |
| Coastal Link (multi-county) | 3 | 175 | $800,000,000 | $40,000,000 |
| **Total** | **33** | **568** | **$11,234,900,000** | **$530,500,000** |

*for corridors that cross jurisdictions, figures allocated to district with the most corridor miles.

## 8.2. Transit Transfer Facility (TTF)

The final recommendations call for 67 transit transfer facilities. As discussed in the prior section, the TTFs have been categorized by low, medium, or high investment facilities. Medium and high investment facilities would be located off-street, with high-investment facilities including significant infrastructure investments like indoor waiting areas. Low-investment transfer facilities would be an enhanced on-street facility. The facility locations are based on where existing and proposed major transit routes intersect one another. Eighteen facilities are marked for high-investment, 31 are medium-investment facilities, and 18 are low-investment facilities.

*Table 4: Summary of Transit Transfer Facility Costs by Level of Investment*

| Level of Investment | Count | Capital Costs |
|---|---|---|
| High | 18 | $630,000,000 |
| Medium | 31 | $387,500,000 |
| Low | 18 | $27,000,000 |
| **Total** | **67** | **$1,044,500,000** |

*Figure 8: HCT Network*
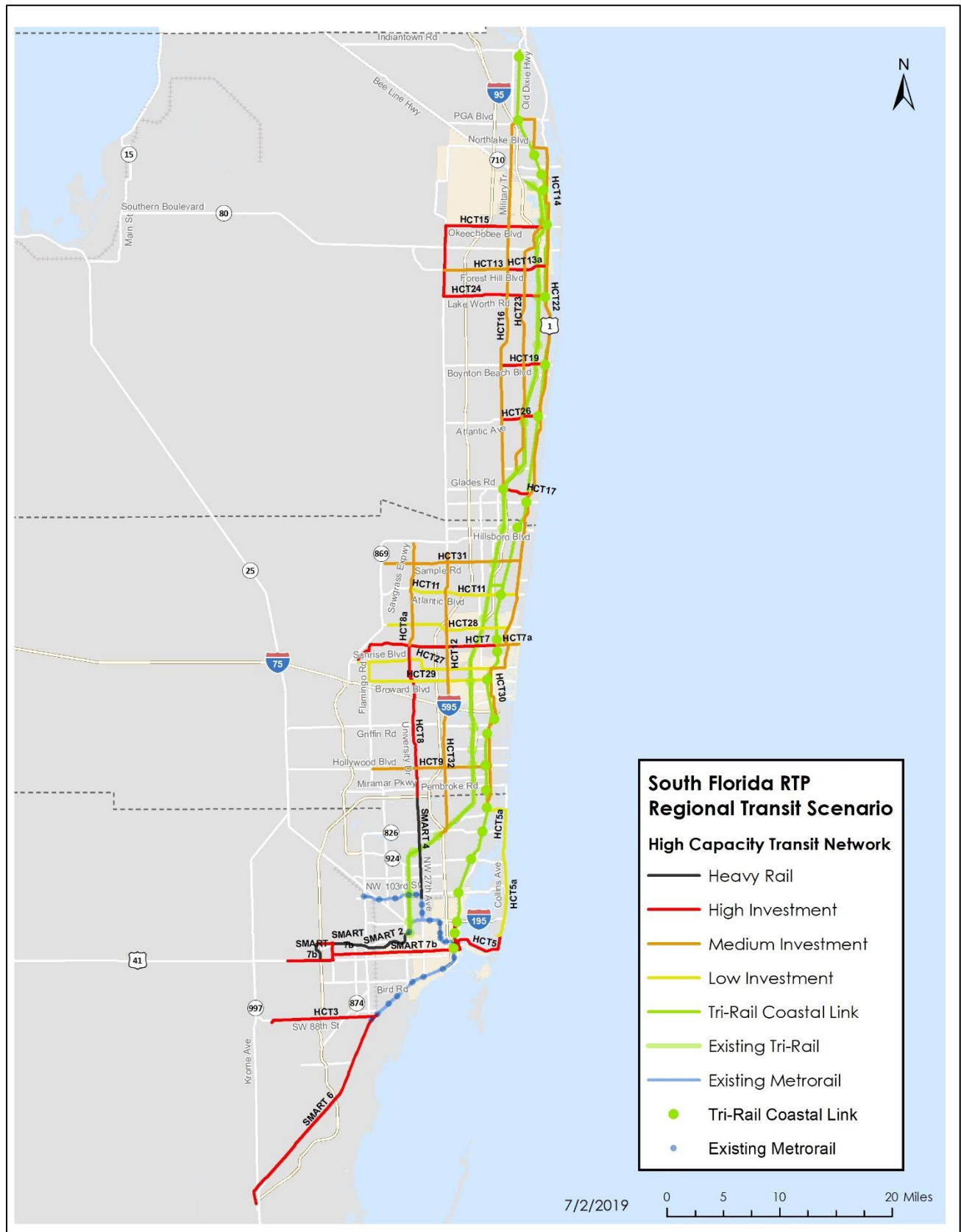
*Figure 9: Transit Transfer Facilities*
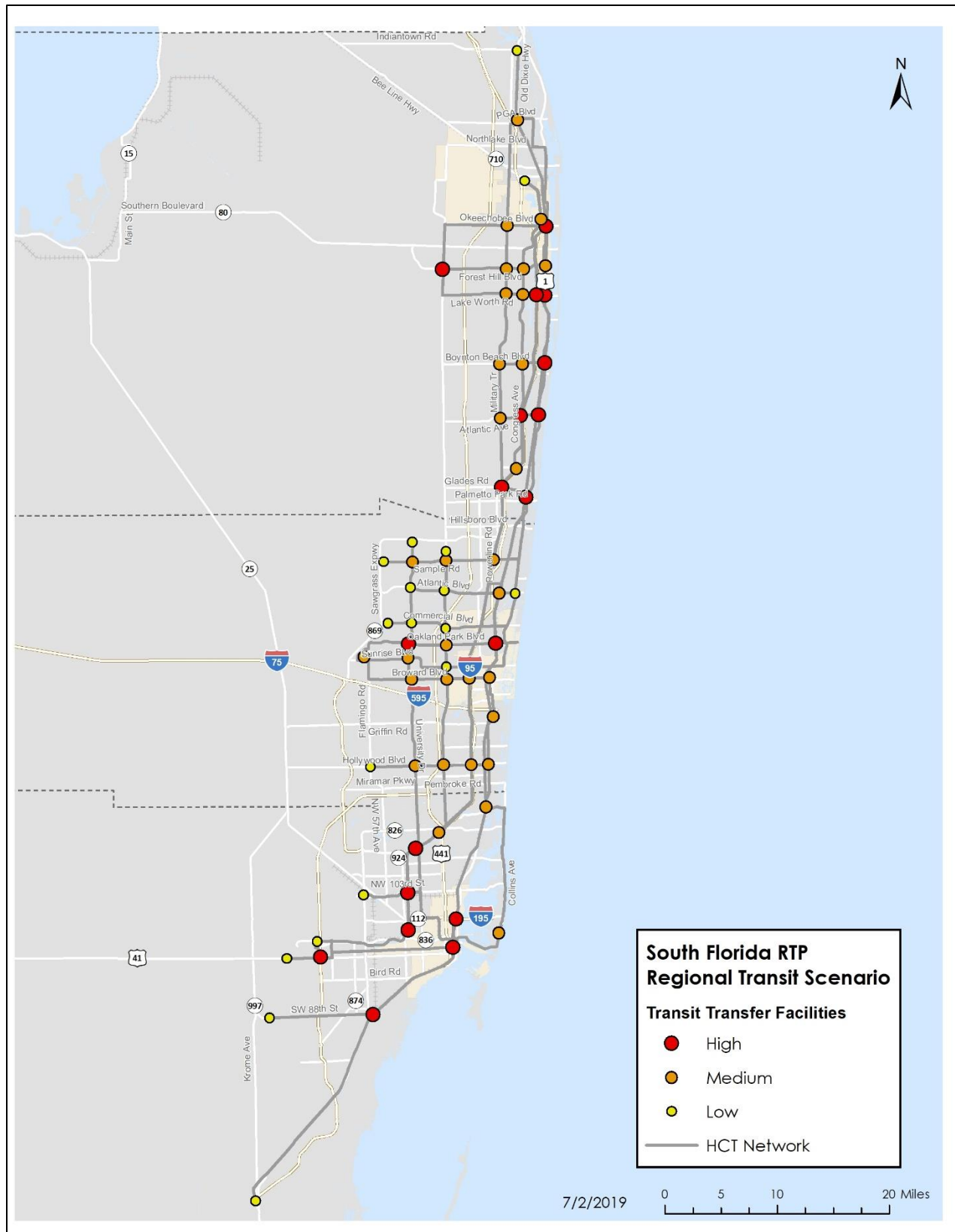
## 8.3.  Commuter Bus Network

The final recommendations identify 38 commuter bus routes to serve the Southeast Florida region. These routes would run during peak periods only and provide express service to major employment centers in the region. Table 5 summarizes the cost and scope of the commuter bus network and Figure 10 shows the location of proposed routes.

*Table 5: Summary of Commuter Bus Recommendations*

|  | Statistics |
|---|---|
| Count | 38 |
| Peak Vehicles | 103 |
| Annual Revenue Hours | 154,500 |
| Capital Costs | $61,800,000 |
| Annual Operating Costs | $32,200,000 |

*Figure 10: Commuter Bus Network*
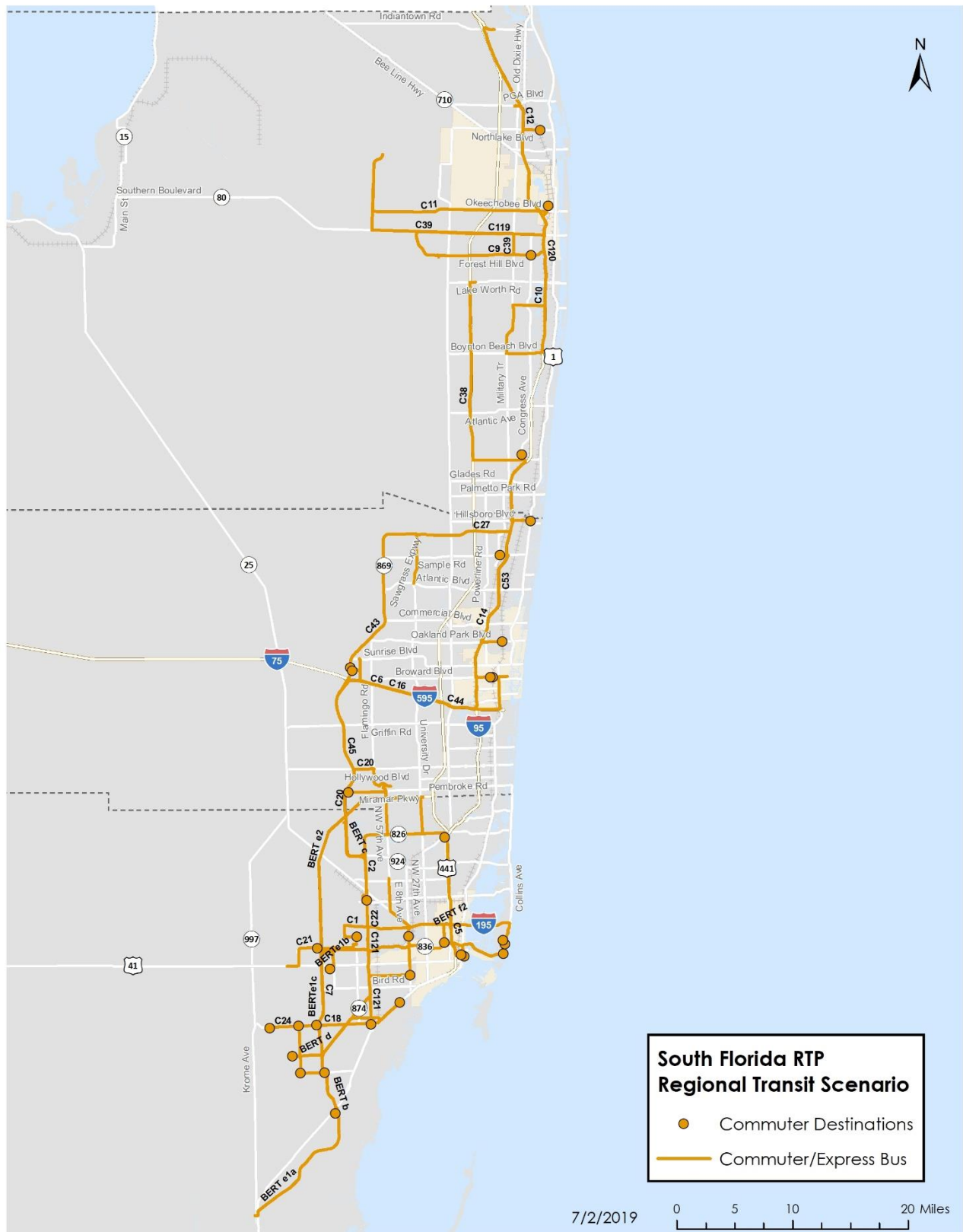
# 9. APPENDICES

## 9.1. Transit Propensity Maps

## Propensity Methodology

The transit propensity model generates four indices that focus on transit-oriented populations, commuter populations, employment destinations, and activity destinations. The analysis combines different metrics typically used to estimate potential transit ridership, such as population density, employment density, and the locations of transit-dependent populations.

Each index is comprised of weighted categories, and each weighted category is comprised of data obtained from 2012 – 2016 American Community Survey (ACS), the 2010 decennial Census, and 2015 Longitudinal Employer-Household Dynamics (LEHD) data. Only the portions of the study area that reach a minimum threshold of job and population density are considered for further analysis.

Weights were determined based on the relative significance of each factor to transit in each county based on a regression model and previous experience with Florida transit systems. The following categories were used for the Foursquare ITP propensity model as submitted February 23, 2018.

| Propensity Index | Category |
|---|---|
| **Transit-Oriented Origin Index** | Age (Youth and Seniors) |
| | Population (Total Population and Non-White or Hispanic) |
| | Income (Persons with income less than 150 percent of poverty line) |
| | Vehicle Ownership (Zero-car households) |
| | Vehicle Ownership (One-car households) |
| | Disability Status |
| **Commuter Origin Index** | Labor Force |
| | Non-SOV Commute Mode |
| **Workplace Destination Index** | Employment |
| **Activity Destination Index** | Retail & Restaurant |
| | Recreation & Entertainment |
| | Healthcare & Social Assistance |
| | Education |
| | Government |

## Viewing Propensity Maps

Bus and rail transit layers in propensity PDF maps can be toggled on and off using Adobe Acrobat Reader software. To do so, look for the layers icon on the left-hand corner of the screen. After expanding the list of layers, you can toggle transit layers on and off.

All Day Travel Propensity Along Major Roads or Arterials

Low
|
Medium
|
High

## 9.2.  Model Flow Maps

**2040 Daily Travel**

5,006 - 10,000

10,001 - 25,000

25,001 - 35,000

35,001 - 50,000

50,001 - 102,108

TAD Boundary
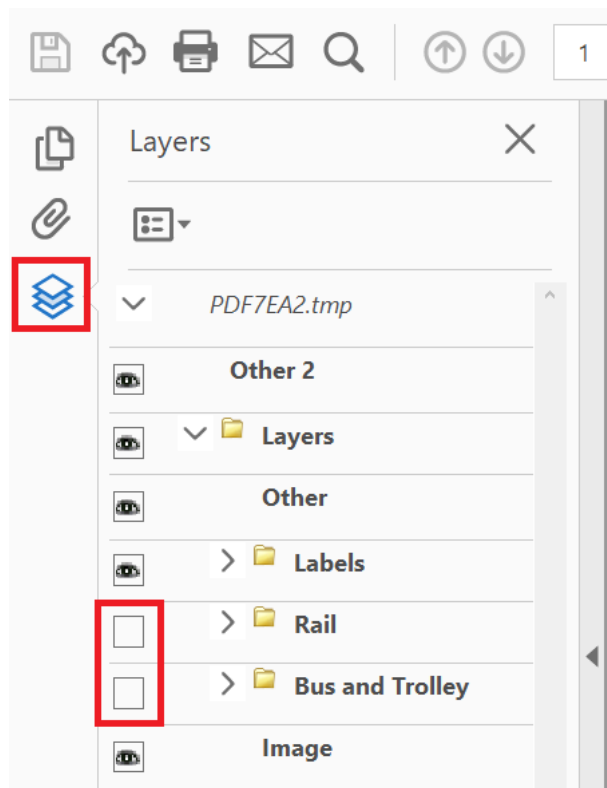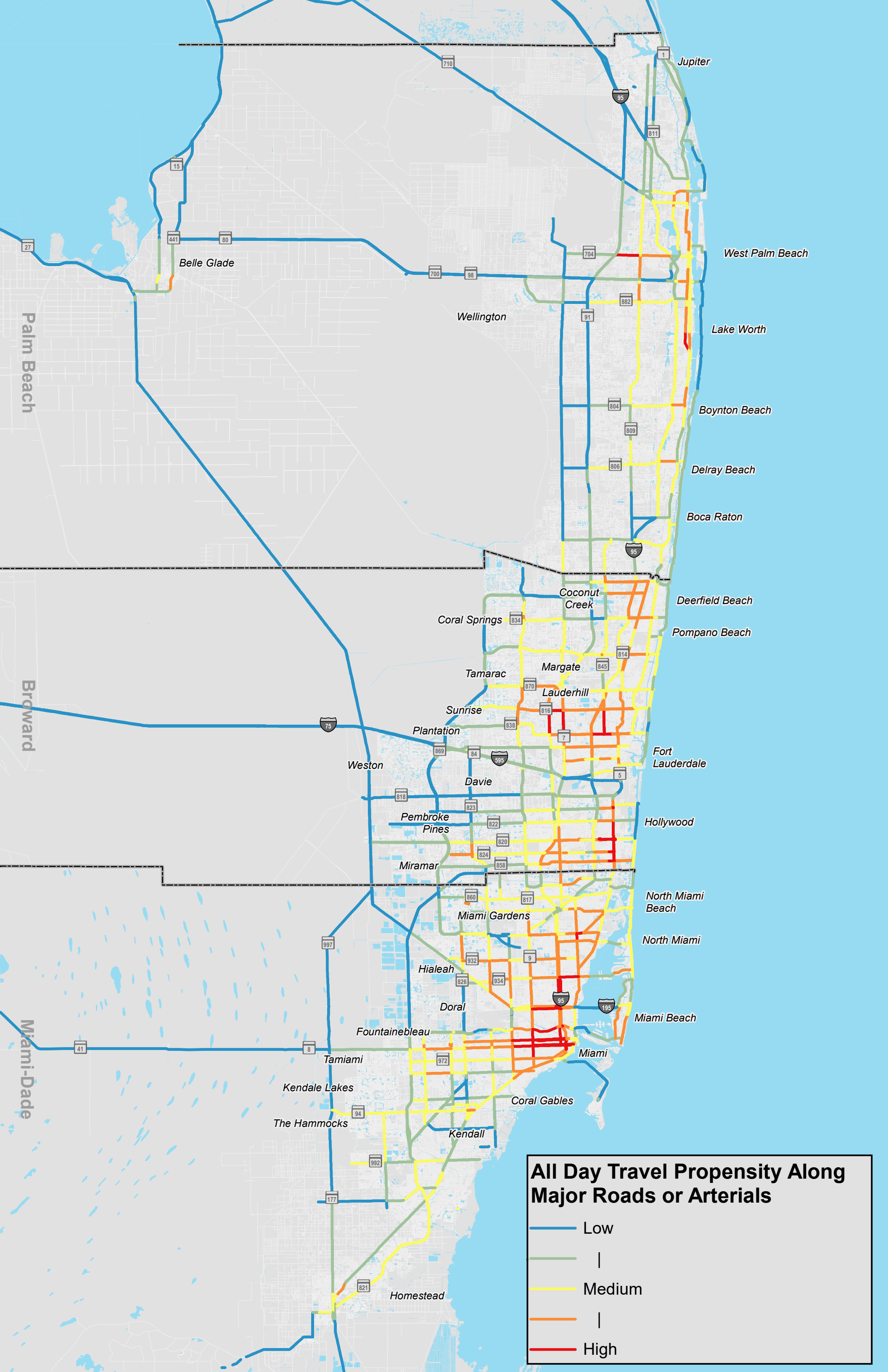
## 9.3.    Detailed Cost Estimates

*Table 6: List of HCT Corridors and Costs*

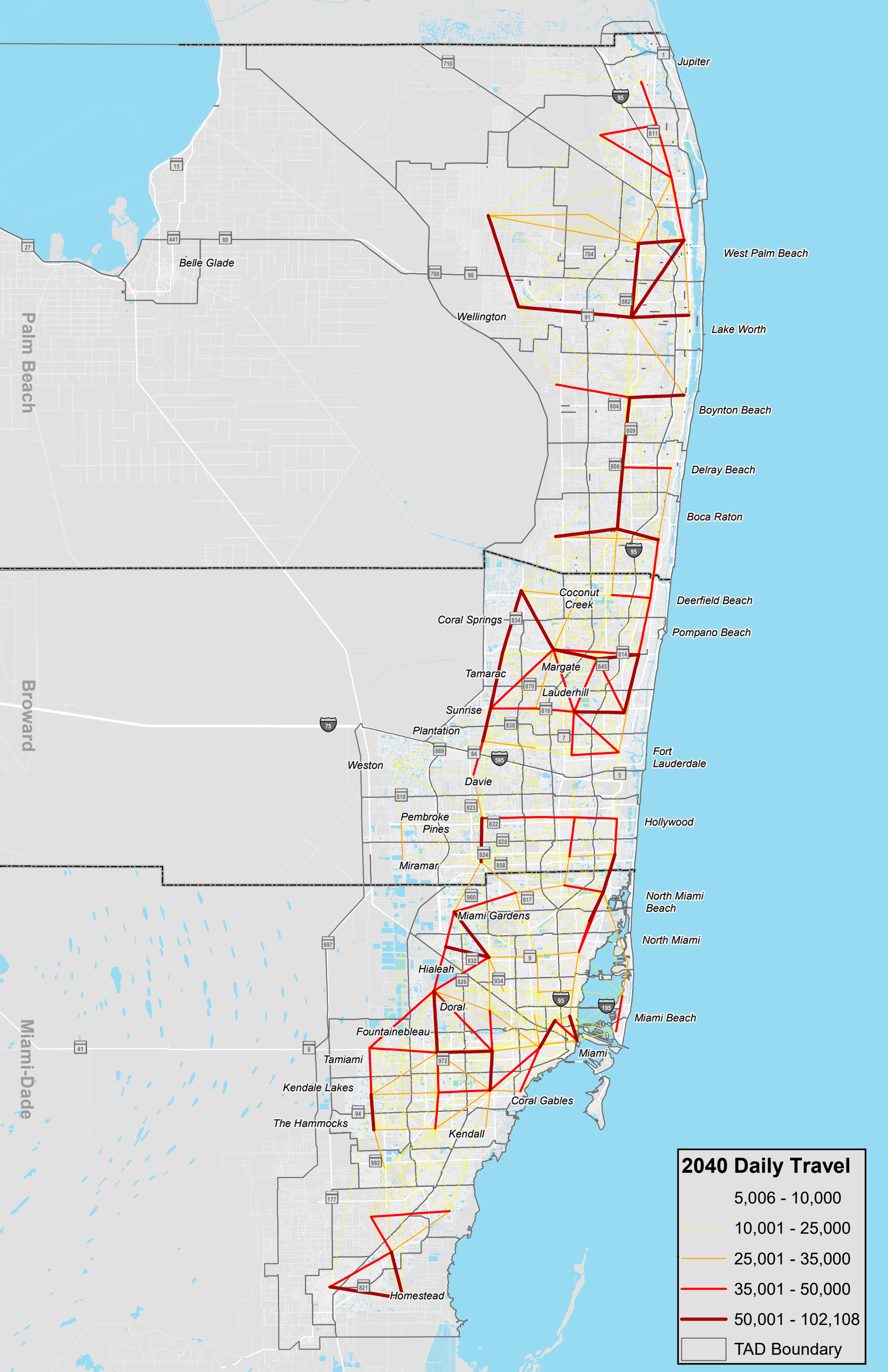| Primary Jurisdiction | ID | Level of Investment | Name | Length (Miles) | Capital Costs | Annual Operating Costs |
|---|---|---|---|---|---|---|
| Miami-Dade | HCT3* | High | West Kendall Transit Terminal | 10.15 | $200,000,000 | $10,100,000 |
| Miami-Dade | HCT5* | High | Downtown Miami | 9.37 | $1,175,800,000 | $30,500,000 |
| Miami-Dade | HCT5a* | Low | Miami Beach Convention Center | 13.46 | $270,000,000 | $6,700,000 |
| Miami-Dade | SMART 2* | High | SW 147th Ave | 11.50 | $1,540,000,000 | $46,000,000 |
| Miami-Dade | SMART 4* | High | Miami Intermodal Center (MIC) | 8.95 | $1,344,000,000 | $35,800,000 |
| Miami-Dade | SMART 6* | High | Florida City | 20.70 | $300,000,000 | $36,200,000 |
| Miami-Dade | SMART 7b | High-1 | Downtown Miami | 4.50 | $65,300,000 | $2,300,000 |
| Miami-Dade | SMART 7a | High-1 | Downtown Miami | 13.41 | $194,500,000 | $6,700,000 |
| **Miami-Dade HCT Totals** | | | | | **$5,089,500,000** | **$174,400,000** |
| Broward | HCT7 | High-2 | Oakland Park | 13.45 | $992,500,000 | $47,100,000 |
| Broward | HCT7a | Medium | Oakland Park | 1.93 | $10,600,000 | $1,000,000 |
| Broward | HCT8 | High-2 | University Drive | 13.59 | $1,003,200,000 | $47,600,000 |
| Broward | HCT8a | Medium | University Drive | 9.28 | $51,000,000 | $4,600,000 |
| Broward | HCT9 | Medium | Pines/ Hollywood Blvd | 10.41 | $57,300,000 | $5,200,000 |
| Broward | HCT11 | Low | W Atlantic Blvd | 9.58 | $16,800,000 | $4,800,000 |
| Broward | HCT27 | Low | Sunrise Blvd | 12.64 | $22,100,000 | $6,300,000 |
| Broward | HCT28 | Low | Commercial Blvd | 10.96 | $19,200,000 | $5,500,000 |
| Broward | HCT29 | Low | Broward Blvd | 12.48 | $21,800,000 | $6,200,000 |
| Broward | HCT30 | Medium | US-1 | 29.46 | $162,000,000 | $14,700,000 |
| Broward | HCT31 | Medium | Sample Rd | 12.09 | $66,500,000 | $6,000,000 |
| Broward | HCT32 | Medium | SR-7 | 25.52 | $140,400,000 | $12,800,000 |
| **Broward HCT Totals** | | | | | **$2,563,500,000** | **$161,800,000** |
| Palm Beach | HCT13 | Medium | Forest Hill Blvd | 5.64 | $31,000,000 | $2,800,000 |
| Palm Beach | HCT13a | LRT | Forest Hill Blvd | 3.59 | $264,800,000 | $12,600,000 |
| Palm Beach | HCT15 | LRT | Okeechobee Blvd | 13.05 | $963,300,000 | $45,700,000 |
| Palm Beach | HCT16 | Medium | Military Trl | 33.38 | $183,600,000 | $16,700,000 |
| Palm Beach | HCT17 | BRT | Glades Rd | 2.52 | $36,500,000 | $1,300,000 |
| Palm Beach | HCT19 | BRT | W Boynton Beach Blvd | 4.02 | $58,300,000 | $2,000,000 |
| Palm Beach | HCT22 | Medium | US-1 | 38.51 | $211,800,000 | $19,300,000 |
| Palm Beach | HCT23 | Medium | Congress Ave | 24.04 | $132,200,000 | $12,000,000 |
| Palm Beach | HCT24 | LRT | Lake Worth Rd | 11.51 | $849,700,000 | $40,300,000 |
| Palm Beach | HCT26 | BRT | Atlantic Ave | 3.50 | $50,700,000 | $1,700,000 |
| **Palm Beach HCT Totals** | | | | | **$2,781,900,000** | **$154,300,000** |
| Multi- County | CL1, CL2, CL3 | High | TriRail Coastal Link Corridor | 175.25 | $800,000,000 | $40,000,000 |
| **Coastal Link Total** | | | | | **$800,000,000** | **$40,000,000** |
| **Totals for Region** | | | | | **$11,234,900,000** | **$530,500,000** |

*Table 7: Transit Transfer Facility Details*

| Jurisdiction | ID | Level of Investment | Name | Capital Cost |
|---|---|---|---|---|
| Broward | TTC1 | Low | Lakewood Mall | $1,500,000 |
| Broward | TTC2 | Low | Pompano Beach | $1,500,000 |
| Broward | TTC3 | Medium | South Lakes Shopping Plaza | $12,500,000 |
| Broward | TTC4 | High | Sunrise Town Center | $35,000,000 |
| Broward | TTC5 | Medium | Peppertree Plaza | $12,500,000 |
| Broward | TTC6 | Medium | Coral Springs | $12,500,000 |
| Broward | TTC7 | Medium | Sawgrass Mall | $12,500,000 |
| Broward | TTC8 | Medium | Fort Lauderdale | $12,500,000 |
| Broward | TTC9 | Low | Lauderhill Mall | $1,500,000 |
| Broward | TTC10 | Low | Coral Square | $1,500,000 |
| Broward | TTC11 | Medium | Hollywood CBD | $12,500,000 |
| Broward | TTC12 | Low | Pembroke Lakes Mall | $1,500,000 |
| Broward | TTC13 | Medium | Fort Lauderdale-Hollywood International Airport | $12,500,000 |
| Broward | TTC14 | Medium | Pembroke Pines | $12,500,000 |
| Broward | TTC15 | Medium | Hollywood Station | $12,500,000 |
| Broward | TTC16 | High | Oakland Park Coastal Link | $35,000,000 |
| Broward | TTC17 | Low | Sawgrass Springs | $1,500,000 |
| Broward | TTC18 | Medium | Pompano Beach Tri-Rail | $12,500,000 |
| Broward | TTC19 | Medium | Pompano Beach Coastal Link | $12,500,000 |
| Broward | TTC20 | Low | Sunrise West | $1,500,000 |
| Broward | TTC21 | Low | University Dr / Commercial Blvd | $1,500,000 |
| Broward | TTC22 | Low | Commercial Blvd / SR-7 | $1,500,000 |
| Broward | TTC23 | Medium | Sunrise Blvd / University Dr | $12,500,000 |
| Broward | TTC24 | Medium | Broward Blvd / University Dr | $12,500,000 |
| Broward | TTC25 | Medium | SR-7 / Broward Blvd | $12,500,000 |
| Broward | TTC26 | Medium | Fort Lauderdale Broward Tri-Rail | $12,500,000 |
| Broward | TTC27 | Medium | Hollywood Blvd / SR-7 | $12,500,000 |
| Broward | TTC28 | Low | University Dr / Sawgrass Expwy | $1,500,000 |
| Broward | TTC29 | Low | SR-7 / Wiles Rd | $1,500,000 |
| **Broward TTF Total** | | | | $286,500,000 |
| Miami-Dade | TTC30 | Medium | Aventura Mall | $12,500,000 |
| Miami-Dade | TTC31 | High | Government Center | $35,000,000 |
| Miami-Dade | TTC32 | High | Florida International University | $35,000,000 |
| Miami-Dade | TTC33 | Low | Palmetto | $1,500,000 |
| Miami-Dade | TTC34 | Low | Kendall Plaza | $1,500,000 |
| Miami-Dade | TTC35 | Low | Laroc Plaza | $1,500,000 |
| Miami-Dade | TTC36 | High | Dadeland | $35,000,000 |
| Miami-Dade | TTC37 | Low | Homestead | $1,500,000 |
| Miami-Dade | TTC38 | High | Miami International Airport | $35,000,000 |
| Miami-Dade | TTC39 | High | Tri-Rail / Metrolink Transfer | $35,000,000 |

| Jurisdiction | ID | Level of Investment | Name | Capital Cost |
|---|---|---|---|---|
| Miami-Dade | TTC40 | High | Opa-locka Station | $35,000,000 |
| Miami-Dade | TTC41 | Medium | Miami Beach | $12,500,000 |
| Miami-Dade | TTC42 | High | Midtown Miami | $35,000,000 |
| Miami-Dade | TTC43 | Low | Tamiami Cemex | $1,500,000 |
| Miami-Dade | TTC44 | Medium | Opa-locka Station | $12,500,000 |
| **Miami-Dade TTF Total** | | | | $290,000,000 |
| Palm Beach | TTC45 | High | Downtown West Palm Beach | $35,000,000 |
| Palm Beach | TTC46 | Medium | West Palm Plaza | $12,500,000 |
| Palm Beach | TTC47 | Medium | Boynton West | $12,500,000 |
| Palm Beach | TTC48 | High | Town Center at Boca Raton | $35,000,000 |
| Palm Beach | TTC49 | High | Boynton Beach Coastal Link | $35,000,000 |
| Palm Beach | TTC50 | Medium | Parker Ridge | $12,500,000 |
| Palm Beach | TTC51 | High | The Mall at Wellington Green | $35,000,000 |
| Palm Beach | TTC52 | Low | Jupiter | $1,500,000 |
| Palm Beach | TTC53 | Low | Mangonia Park | $1,500,000 |
| Palm Beach | TTC54 | High | Mizner Park | $35,000,000 |
| Palm Beach | TTC55 | Medium | Okeechobee Blvd / Military Tr | $12,500,000 |
| Palm Beach | TTC56 | Medium | The Gardens | $12,500,000 |
| Palm Beach | TTC57 | Medium | Congress Ave / Forest Hill Blvd | $12,500,000 |
| Palm Beach | TTC58 | Medium | Military Tr / Lake Worth Rd | $12,500,000 |
| Palm Beach | TTC59 | Medium | Congress Ave / Lake Worth Rd | $12,500,000 |
| Palm Beach | TTC60 | High | Lake Worth Coastal Link | $35,000,000 |
| Palm Beach | TTC61 | Medium | Congress Ave / Boynton Beach Blvd | $12,500,000 |
| Palm Beach | TTC62 | Medium | Military Tr / Atlantic Ave | $12,500,000 |
| Palm Beach | TTC63 | High | Atlantic Ave / Congress Ave / Tri-Rail | $35,000,000 |
| Palm Beach | TTC64 | High | Delray Beach Coastal Link | $35,000,000 |
| Palm Beach | TTC65 | Medium | West Palm Beach Tri-Rail | $12,500,000 |
| Palm Beach | TTC66 | Medium | Boca Raton Tri-Rail | $12,500,000 |
| Palm Beach | TTC67 | High | Lake Worth Tri-Rail | $35,000,000 |
| **Palm Beach TTF Totals** | | | | $468,000,000 |
| **Totals for Region** | | | | $1,044,500,000 |

*Table 8: Details of Commuter Bus Recommendations*

| Jurisdiction | ID | Name | Peak Vehicles | Capital Cost | Operating Quantity (Rev. Hours) | Annual Operating Cost |
|---|---|---|---|---|---|---|
| Broward | C6 | Miramar to Downtown Ft Lauderdale (Broward Central Terminal) | 2.00 | $1,200,000 | 3,000 | $600,000 |
| Broward | C14 | Pompano PnR to Downtown Ft Lauderdale (Broward Central Terminal) | 2.00 | $1,200,000 | 3,000 | $600,000 |
| Broward | C16 | Sawgrass Mills Mall to Downtown Ft Lauderdale (Broward Central Terminal) | 2.50 | $1,500,000 | 3,752 | $800,000 |
| Broward | C43 | Magnolia Shoppes plaza to Plantation | 2.40 | $1,400,000 | 3,602 | $800,000 |
| Broward | C44 | Sawgrass Corporate Park to Downtown Ft Lauderdale (Broward Central Terminal) | 2.69 | $1,600,000 | 4,036 | $900,000 |
| Broward | C45 | Miramar to Plantation | 2.62 | $1,600,000 | 3,932 | $800,000 |
| Broward | C53 | Deerfield Beach to Coral Heights | 2.30 | $1,400,000 | 3,452 | $700,000 |
| **Broward Commuter Totals** | | | 17 | $9,900,000 | 24,774 | $5,300,000 |
| Miami-Dade | C1 | Unity Station/NW 27th Ave to Doral / Medley | 3.00 | $1,800,000 | 4,500 | $1,000,000 |
| Miami-Dade | C2 | cb Smith PnR - Pembroke Pines to Doral / Medley | 3.38 | $2,000,000 | 5,076 | $1,100,000 |
| Miami-Dade | C5 | Hialeah to Downtown Miami (Miami Central Station) | 1.83 | $1,100,000 | 2,746 | $600,000 |
| Miami-Dade | C6 | Miramar to Downtown Ft Lauderdale (Broward Central Terminal) | 4.00 | $2,400,000 | 6,000 | $1,300,000 |
| Miami-Dade | C7 | W Kendall Transit Terminal to Downtown Miami (Miami Central Station) | 3.74 | $2,200,000 | 5,604 | $1,200,000 |
| Miami-Dade | C18 | W Kendall Transit Terminal to Miami Springs / Miami International Airport | 3.25 | $1,900,000 | 4,871 | $1,000,000 |
| Miami-Dade | C20 | Pembroke Lakes Mall to Miami Springs / Miami International Airport | 3.34 | $2,000,000 | 5,006 | $1,100,000 |
| Miami-Dade | C21 | Tamiami Station to Coral Gables | 2.23 | $1,300,000 | 3,351 | $700,000 |
| Miami-Dade | C22 | I-75/HEFT PnR to Coral Gables | 3.00 | $1,800,000 | 4,500 | $1,000,000 |
| Miami-Dade | C24 | W Kendall Transit Terminal to Coral Gables | 2.35 | $1,400,000 | 3,524 | $800,000 |
| Miami-Dade | C118 | FIU/Panther Station to Miami Beach | 2.66 | $1,600,000 | 3,989 | $900,000 |
| Miami-Dade | C121 | Golden Glades Interchange to Dadeland | 3.67 | $2,200,000 | 5,501 | $1,200,000 |
| Miami-Dade | BERT b | Homestead to Doral/Medley | 4.85 | $2,900,000 | 7270 | $1,600,000 |
| Miami-Dade | BERT c | Ronald Reagan Tpk to Okeechobee | 1.19 | $700,000 | 1786 | $400,000 |
| Miami-Dade | BERT d | Miami Exec. Airport to South Miami / Coral Gables via Kendall | 1.57 | $900,000 | 2362 | $500,000 |
| Miami-Dade | BERT e1a | Homestead to Dadeland | 3.38 | $2,000,000 | 5072 | $1,100,000 |
| Miami-Dade | BERT e1b | Cutler Bay (south) to Doral/Medley | 2.65 | $1,600,000 | 3969 | $900,000 |
| Miami-Dade | BERT e1c | Cuter Bay (north) to Doral/Medley via Miami Executive Airport | 2.71 | $1,600,000 | 4058 | $900,000 |
| Miami-Dade | BERT e2 | Dolphin Station to North Miami-Dade | 2.39 | $1,400,000 | 3590 | $800,000 |
| Miami-Dade | BERT f1 | Miami Beach Conv. Ctr to Golden Glades | 1.78 | $1,100,000 | 2674 | $600,000 |
| Miami-Dade | BERT f2 | Miami Beach Conv. Ctr to Civic Center | 1.09 | $700,000 | 1636 | $400,000 |
| Miami-Dade | BERT f3 | Miami Beach Conv. Ctr to Downtown Miami | 0.73 | $400,000 | 1089 | $200,000 |
| **Miami-Dade Commuter Totals** | | | 59 | $35,300,000 | 88,175 | $19,000,000 |
| Palm Beach | C9 | Wellington (Crestwood Square) to West Palm Beach (Brightline station) | 2.66 | $1,600,000 | 3,992 | $900,000 |
| Palm Beach | C10 | Boynton Beach (Military and BB Blvd) to West Palm Beach (Brightline station) | 2.49 | $1,500,000 | 3,739 | $800,000 |
| Palm Beach | C11 | Loxahatchee to West Palm Beach (Brightline station) | 3.23 | $1,900,000 | 4,852 | $1,000,000 |

FOURSQUARE ITP
INTEGRATED TRANSPORTATION PLANNING

| Jurisdiction | ID | Name | Peak Vehicles | Capital Cost | Operating Quantity (Rev. Hours) | Annual Operating Cost |
|---|---|---|---|---|---|---|
| **Palm Beach** | C12 | Jupiter to West Palm Beach (Brightline station) | 3.00 | $1,800,000 | 4,500 | $1,000,000 |
| **Palm Beach** | C27 | Coral Square Mall to Boca Raton (Innovation Campus) | 3.00 | $1,800,000 | 4,500 | $1,000,000 |
| **Palm Beach** | C38 | Wellington to Boca Raton (Innovation Campus) | 3.17 | $1,900,000 | 4,761 | $1,000,000 |
| **Palm Beach** | C39 | Loxahatchee to Green Acres / Palm Springs | 2.98 | $1,800,000 | 4,476 | $1,000,000 |
| **Palm Beach** | C119 | Wellington (Crestwood Square) to Lake Park/North Palm Beach | 3.43 | $2,100,000 | 5,140 | $1,100,000 |
| **Palm Beach** | C120 | Boynton Beach (Military and BB Blvd) to Lake Park/North Palm Beach | 3.70 | $2,200,000 | 5,549 | $1,200,000 |
| **Palm Beach Commuter Totals** | | | 28 | $16,600,000 | 41,510 | $8,900,000 |
| **Totals for Region** | | | 103 | $61,800,000 | 154,459 | $33,200,000 |

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