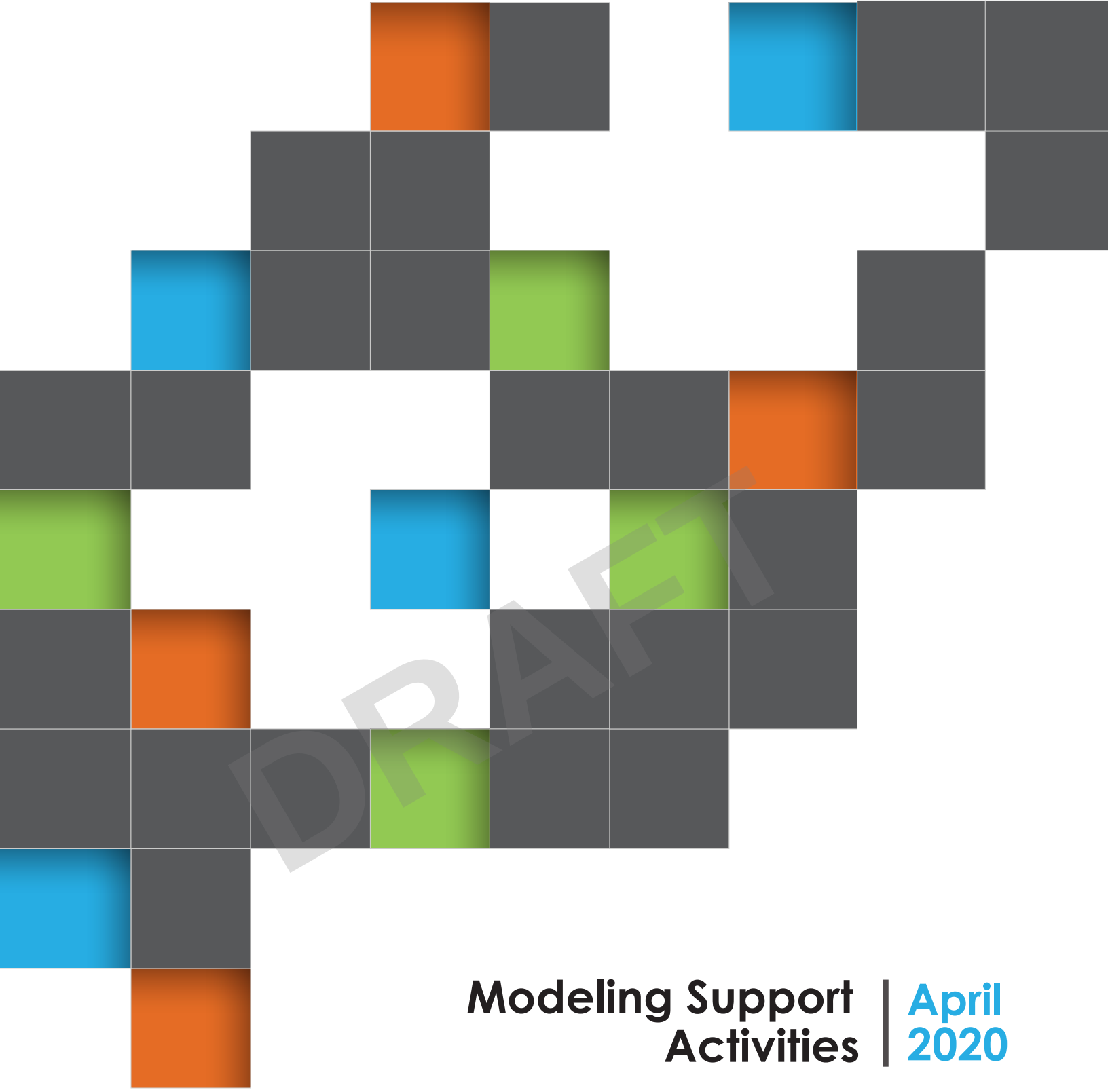

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Modeling Support Activities | April 2020

SOUTHEAST FLORIDA REGIONAL TRANSPORTATION PLAN 2045

Miami-Dade • Broward • Palm Beach

DRAFT TECHNICAL MEMORANDUM

Southeast Florida 2045 Regional Transportation Plan (RTP)

Modeling Support Activities

Date:	April 7, 2020
To:	Regional Transportation Technical Advisory Committee (RTTAC)
From:	Thomas Rossi, Cambridge Systematics, Inc.
cc:	Paul Calvaresi, Broward MPO

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1 Introduction

This technical memorandum documents the all modeling related activities associated with the 2045 Regional Transportation Plan (RTP) including the results from the 2045 cost feasible plan assessment. This work was performed using the officially adopted Version 8 of the Southeast Florida Regional Planning Model (SERPM 8). This work proceeded in coordination with the Regional Transportation Technical Advisory Committee (RTTAC) and the RTTAC Modeling Subcommittee which was established to facilitate coordination of regional travel demand forecasting activities such as SERPM refinement and application during Long Range Transportation Plan (LRTP) updates.

The study area for this effort encompassed Palm Beach County, Broward County, and Miami-Dade County and the associated Metropolitan Planning Organizations (MPOs), as illustrated in Figure 1-1. The

modeling inputs and outputs are summarized herein as well as general observations based on the model results across the various scenarios modeled and tested as part of the 2045 RTP development process.

Figure 1-1 – Study Area

2 Current and Future Background Conditions

A regional profile of growth in demographic, socioeconomic, and travel demand trends was prepared to tell a story about regional travel patterns while also identifying unique characteristics found in each of the three MPOs. In order to plan for regional mobility in the year 2045, it is important to understand how household characteristics and travel patterns are expected to change at both the regional and subarea level.

2.1 Regional Socioeconomic Changes

At the regional and county level, socioeconomic statistics were summarized to identify forecasted trends and ensure that anticipated growth patterns were consistent with the expectations of the project stakeholders. Statistics were compiled by county for 2015 and 2045.

Table 2-1 shows the number of households, and Table 2-2 shows the population. Table 2-3 shows the average household size (persons per household). Overall, the region is expecting nearly 30 percent growth in population from 2015 to 2045, with the highest growth in Miami-Dade County and the lowest in Broward County. Average household size is expected to decline slightly though a very small increase is expected in Palm Beach County.

Table 2-1 – Forecast Change in Households 2015 to 2045

County	2015	2045	Difference	Percentage Difference
Palm Beach	596,000	756,000	160,000	27%
Broward	751,000	950,000	200,000	27%
Miami-Dade	955,000	1,308,000	352,000	37%
Total	2,302,000	3,014,000	712,000	31%

Table 2-2 – Forecast Change in Population 2015 to 2045

County	2015	2045	Difference	Percentage Difference
Palm Beach	1,399,000	1,790,000	391,000	28%
Broward	1,827,000	2,216,000	389,000	21%
Miami-Dade	2,630,000	3,533,000	903,000	34%
Total	5,856,000	7,539,000	1,682,000	29%

Table 2-3 – Forecast Change in Average Household Size 2015 to 2045

County	2015	2045	Difference	Percentage Difference
Palm Beach	2.35	2.37	0.02	1%
Broward	2.43	2.33	-0.10	-4%
Miami-Dade	2.75	2.70	-0.05	-2%
Total	2.54	2.50	-0.04	-2%

Table 2-4 shows the change in the number of automobiles owned. The growth rate in the number of automobiles mirrors the population growth.

Table 2-4 – Forecast Change in Number of Automobiles 2015 to 2045

County	2015	2045	Difference	Percentage Difference
Palm Beach	958,000	1,213,000	255,000	27%
Broward	1,203,000	1,476,000	273,00	23%
Miami-Dade	1,481,000	1,969,000	488,000	33%
Total	3,642,000	4,658,000	1,015,000	28%

Table 2-5 shows the change in employment, and Table 2-6 shows the change in the number of workers per household. Employment is expected to grow at a similar rate to population growth, with slight variations by county. Table 2-7 shows the forecasted change in the employment/population ratio; as shown in the table, the ratios are expected to hold steady.

Table 2-5 – Forecast Change in Employment 2015 to 2045

County	2015	2045	Difference	Percentage Difference
Palm Beach	720,000	931,000	210,000	29%
Broward	960,000	1,240,000	280,000	29%
Miami-Dade	1,332,000	1,813,000	481,000	36%
Total	3,013,000	3,984,000	971,000	32%

Table 2-6 – Forecast Change in Workers per Household 2015 to 2045

County	2015	2045	Difference	Percentage Difference
Palm Beach	0.96	0.98	0.02	2%
Broward	1.09	1.09	0.00	0%
Miami-Dade	1.13	1.16	0.04	3%
Total	1.07	1.09	0.02	2%

Table 2-7 – Forecast Change in Employment to Population Ratio 2015 to 2045

County	2015	2045	Difference	Percentage Difference
Palm Beach	0.51	0.52	0.01	1%
Broward	0.53	0.56	0.03	6%
Miami-Dade	0.51	0.51	0.01	0%
Total	0.51	0.53	0.01	3%

Table 2-8 shows the change in school enrollment. The growth is lower than the overall growth in population, reflecting the trend of the aging of the population in Southeast Florida.

Table 2-8 – Forecast Change in School Enrollment 2015 to 2045

County	2015	2045	Difference	Percentage Difference
Palm Beach	248,000	316,000	67,000	27%
Broward	359,000	377,000	18,000	5%
Miami-Dade	663,000	778,000	115,000	17%
Total	1,271,000	1,471,000	200,000	16%

Table 2-9 shows the change in hotel/motel units. The percentage growth is similar to that for population, with noticeably higher growth expected in Palm Beach County.

Table 2-9 – Forecast Change in Hotel/Motel Units 2015 to 2045

County	2015	2045	Difference	Percentage Difference
Palm Beach	17,000	28,000	11,000	63%
Broward	31,000	41,000	10,000	32%
Miami-Dade	55,000	71,000	15,000	28%
Total	103,000	139,000	36,000	35%

2.2 Travel Demand and Commuting Patterns

In addition to summarizing socioeconomic information at the regional and county level, it was important to identify 2015 travel demand and commuting patterns. Table 2-10 and Table 2-11 provide a summary of home-work locations from the 2016 Southeast Florida Regional Travel Survey, highlighting the existing commuting patterns in the region. Intra-county movements are the most significant, but there is also some significant intercounty commuting, most notably from Broward to Miami-Dade.

Table 2-10 – 2016 Southeast Florida Regional Travel Survey Worker Flows

County	Palm Beach	Broward	Miami-Dade
Palm Beach	386,000	49,000	9,000
Broward	37,000	458,000	175,000
Miami-Dade	10,000	68,000	794,000

Table 2-11 – 2016 Southeast Florida Regional Travel Survey Distribution of Workplace Location of Residents in Each Jurisdiction

County	Palm Beach	Broward	Miami-Dade
Palm Beach	87%	11%	2%
Broward	6%	68%	26%
Miami-Dade	1%	8%	91%

Table 2-12 presents travel demand measures representative of "existing conditions" based on output from the 2015 model run. Summary model measures presented are total person trips made by county residents, vehicle miles traveled by county, and transit trips made by county residents. Section 4 presents model measures for the 2045 cost feasible scenario.

Table 2-12 – 2016 Southeast Florida Regional Travel Survey Worker Flows

	Palm Beach	Broward	Miami-Dade	Total
Total Person Trips	4,354,000	5,734,000	8,150,000	18,239,000
Total Daily Vehicle Miles Traveled	31,993,000	37,784,000	46,384,000	116,174,000
Total Daily Transit Trips	35,000	87,000	237,000	359,000

3 2045 Scenario Concepts

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[1]. To help answer those questions, a set of four scenario concepts, as shown in Figure 3-1, 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. The first version of the scenarios was crafted in September 2018 at an RTTAC meeting/workshop. The RTP consultant team coordinated with RTTAC members October 2018 through July 2019 to complete the scenario evaluations.

Figure 3-1 – Scenario Concepts

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.

[1] Josselyn, J., F. Saraceno, K. Tilbury, and M. Milkovits. "Southeast Florida 2045 Regional Transportation Plan (RTP): DRAFT Trend and Alternative Scenarios Report Deliverable." Technical Memorandum to Paul Calvaresi and William Cross (Broward MPO), December 2, 2019.

3.1 Trend Scenario

The Trend Scenario was the default condition. It describes a future in which the region stays on the 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. Key assumptions include:

- A merger of the 2040 Cost Feasible Plan and 2045 Existing Plus Committed (E+C) Network
- 2045 socioeconomic data submitted in 2018 to the RTP team
- 2045 FDOT forecasts plus 2040 Cost Feasible Plan related revenue forecasts not related to state funds

3.2 Flexible Transit Scenario

This scenario rethinks how existing revenue sources are traditionally allocated and "flexes" future funding from highways to transit. The scenario operates within the constraints of existing revenue sources, and so future transit investments are limited to projects that can be funded with existing highway expenditures shifted to transit. Key assumptions include:

- A focus on High Capacity Transit (HCT) corridors to maximize high quality premium transit
- A multi-level HCT System developed by the RTTAC
- Existing premium transit remains in place (express bus and rail)
- Transit Transfer Facilities where HCT routes intersect and at HCT termini
- High and Medium HCT transit stations in locations per RTTAC guidance
- 2045 socioeconomic data submitted in 2018 to the RTP team
- 2045 FDOT forecasts plus 2040 Cost Feasible Plan related revenue forecasts not related to state funds
- Flex 30 to 50 percent of "SIS Highways Construction & ROW," "Managed Lanes," and "Other Roads & ROW" programs to transit/multimodal investments

3.3 Regional Transit Scenario

This scenario assumes 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. Key assumptions include:

- A multi-level HCT system (33 corridors) developed by the RTTAC
- 38 commuter bus routes with limited stops operating in the peak periods only
- Existing premium transit remains in place (express bus and rail)
- 67 Transit Transfer Facilities where HCT routes intersect and at HCT termini
- High and Medium HCT transit stations in locations per RTTAC guidance
- 2045 socioeconomic data submitted in 2018 to the RTP team
- 2045 FDOT forecasts plus 2040 Cost Feasible Plan related revenue forecasts not related to state funds
- New major revenue source (sales tax) assumed

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3.4 Alternative Growth & Development Scenario

The Alternative Growth & Development Scenario builds on the Regional Transit Scenario by assuming changes to growth and development to complement regional transportation investments. More specifically, this scenario shifts a large share of the region's population and employment growth to compact locations surrounding high capacity transit corridors. Key assumptions include:

- Same assumptions for transit system as for the Regional Transit Scenario
- 75 percent of new population growth and 75 percent of new employment growth within ½ mile of HCT
- 2045 FDOT forecasts plus 2040 Cost Feasible Plan related revenue forecasts not related to state funds
- New major revenue source (sales tax) assumed

3.5 Performance Measures

The RTP team used various modeling tools, including a preliminary version of SERPM 8, to produce performance measures. It should be noted that the analysis took place before the development of SERPM 8 and its official adoption were completed. The performance measure estimates discussed in this chapter therefore are not based on the version of SERPM 8 officially adopted by the RTTAC-MS and should not be compared to the results presented in Chapter 4, which are based on the officially adopted model.

The intent of the measures was to help the region understand the large-scale differences across the scenarios when compared to the Trend Scenario. Figure 3-2 summarizes the performance measure analysis results.

Figure 3-1 – Scenario Concepts

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

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:

- Regional transit is a primary long-term mobility objective.
- Complementary land use is essential and supporting first/last mile infrastructure is critical to ensure safety, maximize transit ridership, and increase access to jobs and major/critical destinations.
- Shifting existing transportation resources to transit is necessary.
- New revenue sources are necessary.

4 Regional Cost Feasible Plan Assessment

The regional cost feasible plan used inputs supplied by each regional Metropolitan Planning Organization. Each MPO developed a priority list of multimodal cost feasible projects that could be implemented within the planning time horizon from identified sources of funding. The regional assessment work proceeded in two rounds, with a draft cost feasible plan round providing interim transportation modeling results and measures, and a final cost feasible plan round, based on the adopted LRTP for each regional MPO.

The subsections that follow present the cost feasible definition and measures derived from the final model runs performed for each scenario.

4.1 Cost Feasible Network Definition

The regional cost feasible network was assembled through coordination with the project stakeholders, including receiving lists of their roadway and transit project nominations.

A total of 404 cost feasible projects were included in the cost feasible network, including 339 roadway projects and 65 transit projects. Table 4-1 provides a quick reference summary of the lists of projects from each of the MPOs.

Table 4-1 – 2016 Quick Summary of Cost Feasible Network Project Types by Jurisdiction

County	Roadway Projects	Transit Projects	Total Projects
Palm Beach	133 (89%)	17 (11%)	150
Broward	71 (92%)	6 (8%)	77
Miami-Dade	135 (76%)	42 (24%)	177
Total	339 (84%)	65 (16%)	404

Note: This summary does not account for programs and bicycle/pedestrian-scale projects.

Major highway projects (i.e., over $250 Million cost) in the regional cost feasible network by county included:

Palm Beach County

- Florida's Turnpike managed lanes
- I-95 managed lanes from Linton Blvd. to Southern Boulevard
- Add freight roadway capacity to US 27 from Broward County to Hendry County

Broward County

- Modify interchange of I-95 at Hillsboro Boulevard
- Modify interchange of I-95 at Griffin Road
- I-595 managed lanes, east of I-75 to west of I-95
- Sawgrass Expressway/SR-869, widen from 6 to 10 lanes with express lanes and interchange improvements
- Construct interchange, SR-7 at Commercial Boulevard
- Add highway capacity on I-95 from SR-84 to south of Broward Boulevard

Miami-Dade County

- Elevate Okeechobee Road over NW 116 Way and Miami Canal, interchange improvements
- SR 826 (Palmetto Expy.) eastbound Ramp to SR 9A/ I-95 NB
- SR 826 (Palmetto Expy.), add lanes & reconstruct from I-75 North of Canal C-8 Bridge
- SR 836 (Dolphin Expy.)/I-395, bridge replacement/add lanes from west of I-95 to Macarthur Cause Bridge
- SR 25 (Okeechobee Rd), depress mainline and add service road from east of NW 116 Way to east of NW 87 Avenue
- SR 826 (Palmetto Expy.), managed lanes from US 1 to SR 836
- I-95 from US 1 to Broward County Line, managed lanes/capacity/operations
- Florida's Turnpike, Golden Glades Interchange improvements
- Florida's Turnpike, widen from Golden Glades Interchange/I-95 to SR 821
- Kendall Pkwy/SR 836 (Dolphin Expy.) SW extension, new multimodal corridor
- SR 924 (Gratigny Expy.) Parkway West, new extension to SR 821

Major transit projects (i.e., over $250 Million total cost) included in the cost feasible plan network included:

Broward

- University Drive Rapid Bus, Coconut Creek (Sample Road) to Miami-Dade County Line (Golden Glades Interchange)
- Hollywood/Pines Blvd. Rapid Bus, Flamingo Road (Pembroke Pines) to Hollywood (Young Circle)

Miami-Dade

- Implement Bus Rapid Transit (BRT) along South Dade Transitway
- North Corridor, Elevated Fixed Guideway Rapid Transit connecting MLK Station to Unity Station

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- Kendall Corridor, Rapid Transit connecting the West Kendall Transit Terminal to the Dadeland area Metrorail Stations
- Beach Corridor, Rapid Transit connecting Midtown/Miami CBD to Miami Beach Convention Center area.
- East-West Corridor, Rapid Transit connecting western Miami-Dade County to downtown Miami via the MIC
- Flagler Corridor, Implement Bus Rapid Transit Service from Tamiami Station to Downtown Intermodal Terminal

4.2 Future Scenario Conditions

This subsection presents summaries comparing the 2045 cost feasible and 2015 base scenario networks and their performance under 2045 conditions.

Roadway Network Enhancements

Table 4-2 summarizes the roadway lane miles added by jurisdiction. Table 4-3 summarizes roadway lane miles added by facility type. The projects in the 2045 cost feasible plan increase highway capacity by about 12 percent in lane miles, with Mimi-Dade County having a slightly higher increase than Palm Beach and Broward Counties. More than half of the capacity increase is on limited access roadways, which include freeways, toll roads, and other uninterrupted roadways.

Table 4-2 – Roadway Snapshot – Lane Miles Added by Jurisdiction

County	2015	2045	Difference	Percentage Difference
Palm Beach	5,100	5,600	600	11%
Broward	5,000	5,400	400	10%
Miami-Dade	6,000	6,900	900	15%
Total	16,000	17,900	1,900	12%

Table 4-3 – Roadway Snapshot – Lane Miles Added by Facility Type

County	2015	2045	Difference	Percentage Difference
Limited Access	3,400	4,500	1,100	33%
High Speed Arterials	8,600	9,100	500	6%
Low Speed Roadways	4,000	4,300	300	7%
Total	16,000	17,900	2,000	12%

Model Results – Average Trip Length

Table 4-4 shows the average work tour distances in miles by county for the two scenarios. Table 4-5 shows the average (regional) tour distances in miles by purposes for the two scenarios. The trip purpose is classified based on the destination of the trips. Overall, there is a very slight decrease in average trip length. Average home to work distances are expected to decrease slightly while tours for other purposes are expected to show small increases. The small differences may be due to the fact that work tours are more likely to occur in the peak when the existing congestion in the region is expected to increase even more by 2045.

Table 4-4 – Average Work Tour Distance by County (miles)

County	2015	2045
Palm Beach	13.3	12.9
Broward	15.5	15.3
Miami-Dade	13.3	13.2
Total	13.8	13.6

Table 4-5 – Average (Regional) Tour Distances by Purpose (miles)

Trip Purpose	2015	2045
Work	13.8	13.6
School: Grades K-8	3.2	3.3
School: Grades 9-12	3.8	3.9
University	9.3	9.1
Shop	16.9	17.4
Maintenance	11.7	11.9
Escort	9.8	10.0
Visiting	14.2	14.6
Eating Out	13.0	13.5
Discretionary	13.3	13.6

Model Results – Mode Choice

Table 4-6 and Table 4-7 highlight the mode choice results obtained in the SERPM 8 model application for the 2015 base and 2045 cost feasible scenarios. The cost feasible network appears to increase the transit mode share, reflecting the increased transit level of service due to the added transit projects, as well as increased highway congestion. The small increase in carpool share for Palm Beach County may reflect the managed lanes added to Florida's Turnpike and I-95.

Table 4-6 – 2015 Base Year Mode Choice

County	Drive Alone	Carpool	Transit	Non-Motorized/ School Bus
Palm Beach	57.4%	33.6%	0.8%	8.2%
Broward	55.5%	34.5%	1.5%	8.4%
Miami-Dade	50.5%	36.4%	2.9%	10.2%
Total	53.7%	35.2%	2.0%	9.2%

Table 4-7 – 2045 Cost Feasible Mode Choice

County	Drive Alone	Carpool	Transit	Non-Motorized/ School Bus
Palm Beach	56.2%	34.6%	0.8%	8.4%
Broward	55.5%	33.9%	1.7%	8.9%
Miami-Dade	49.2%	35.3%	3.6%	11.9%
Total	52.8%	34.7%	2.4%	10.2%

Table 4-8 and Table 4-9 provide a summary of the transit assignment results from the 2015 base and 2045 cost feasible scenarios. In total, the assignment results reflect the growth in transit boardings that result from the growth in population and the forecast mode share shift. It should be kept in mind that transit ridership in each of the scenarios is affected not only by the transit service provided but also the impact of congestion on mode shifts. Also, in reviewing the table, the reader is reminded that the model reports regional rail boardings by system rather than by jurisdiction.

Table 4-8 – Transit Boardings by Operator

Transit Operator	2015	2045	Change	Percentage Change
Tri-Rail	15,300	21,800	6,500	43%
I-95 Express Buses	3,900	4,100	200	5%
MDT	331,300	586,700	255,400	77%
BCT	118,900	169,900	51,000	43%
Palm Tran	41,600	50,700	9,100	22%
Total Transit Boardings	**511,000**	**833,200**	**322,200**	**63%**
Total Transit Linked Trips	**358,300**	**557,800**	**199,400**	**56%**
Boardings / Linked Trip	**1.43**	**1.49**	**0.06**	**5%**

Table 4-9 – Transit Boardings by Mode

Transit Operator	2015	2045	Change	Percentage Change
Commuter Rail / Shuttle	15,300	21,800	6,500	43%
Urban Rail	82,100	159,400	77,300	94%
BRT/LRT	0	57,700	57,700	N/A
I-95 Express	7,200	25,600	18,400	258%
Local	374,200	498,300	124,200	33%
Circulator	32,400	70,400	38,000	117%
Total Transit Boardings	**511,000**	**833,200**	**322,200**	**63%**
Total Transit Linked Trips	**358,300**	**557,800**	**199,400**	**56%**
Boardings / Linked Trip	**1.43**	**1.49**	**0.06**	**5%**

Model Results – Highway Performance Measures

Table 4-10 provides a summary of VMT growth by jurisdiction. As a region, vehicle-miles of traveled (VMT) is expected to increase by about 30 percent from the 2015 base to the 2045 cost feasible network. This is consistent with the similar expected percentage growth in population in the region. As is the case with expected population growth, the percentage growth in VMT is higher in Miami-Dade County than in the other two counties; this effect appears to be dampened somewhat by the higher congestion levels in Miami-Dade County.

Table 4-10 – Summary of VMT by Jurisdiction, 2015 Base and 2045 Cost Feasible Scenarios

County	2015	2045	Percentage Change
Palm Beach	31,993,000	41,353,000	29%
Broward	37,784,000	48,534,000	28%
Miami-Dade	46,384,000	60,705,000	31%
Total	116,161,000	150,592,000	30%

Table 4-11 summarizes VMT from the model by facility type and by jurisdiction. Freeways showed the smallest increase by facility type, reflecting the higher volumes and the capacity constraints on existing freeways Note that the percentage changes in some cells in this table reflect substantial changes in the number of lane-miles between the 2015 base and 2045 cost feasible scenarios. For example, all HOV lanes in Miami-Dade and Broward Counties and most of the HOV lanes in Palm Beach County are to be converted to managed lanes. The number of lane-miles for toll roads in all counties is expected to nearly double, as is the number of uninterrupted roadway lane-miles in Miami-Dade County.

Table 4-11 – Summary of Change in VMT by Jurisdiction and Facility Type

County	Freeways	Uninterrupted Roadways	High Speed Arterial	Low Speed Arterial	Ramps	HOV Lanes	Toll Roads	All Facilities
Palm Beach	11%	55%	31%	35%	22%	-77%	107%	29%
Broward	15%	37%	24%	35%	36%	-100%	92%	28%
Miami-Dade	4%	140%	21%	31%	20%	-100%	68%	31%
Total	10%	71%	25%	32%	26%	-84%	82%	30%