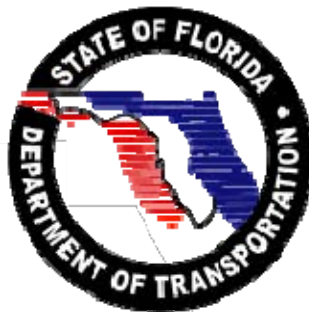


Technical Memorandum

CFRPM v5.0 Model Calibration and Validation Results

Submitted to:

Florida Department of Transportation
District V



Prepared by:

Gannett Fleming, Inc.

Westlake Corporate Center
9119 Corporate Lake Drive Suite 150
Tampa, FL 33634

In Association with:

AECOM Consult, Inc.



Table of Contents

1.0 Introduction.....	1
1.1 The Conversion Process	2
1.2 Study Area	3
1.3 Expanded Number of TAZs	4
1.4 Model Enhancements	6
1.5 CFRPM/OUATS Compatibility	6
1.6 Report Organization.....	7
2.0 External Trips.....	8
2.1 Development of External Station Data.....	8
3.0 Trip Generation	16
3.1 Traffic Analysis Zone (TAZ) Structure.....	16
3.2 Socioeconomic Data	17
3.3 Trip Generation Methodologies	28
3.4 Trip Generation Rates by County	31
3.5 Trip Generation Subarea Balancing	52
3.6 Special Attraction Application.....	58
3.7 Truck Application	59
4.0 Highway Network	61
4.1 Area Type	61
4.2 Facility Type	68
4.3 New Facility Types.....	70
4.4 Free Flow Speed Calculator.....	71
4.5 Capacity Lookup Table	72
4.6 Highway Network Statistics	73
5.0 Highway Path.....	80
5.1 Shortest Highway Path Configuration	80
6.0 Trip Distribution	83
6.1 Trip Distribution Subarea Friction Factors	83
6.2 Trip Distribution Matrix Simplification.....	84
6.3 Trip Length Distribution and Average Trip Length.....	84
7.0 Transit Network.....	92
8.0 Mode Choice	94
8.1 Nested Logit Structure	94
8.2 Auto Ownership Category	95
8.3 Trip Purpose Category	96
8.4 Coefficients and Parameters	96
8.5 Estimates of Trips by Mode.....	102



9.0 Highway Assignment	104
9.1 Bureau of Public Road (BPR) Speed Curves	105
9.2 UROAD Factors	106
9.3 CONFAC Factors.....	106
9.4 VFACTORS File.....	106
9.5 Validation Reports	109
9.6 Traffic Counts	112
9.7 Highway Network Operating Speeds	115
9.8 Ratio of Volume over Counts.....	115
9.9 Vehicle Miles Traveled and Vehicle Hours Traveled	118
9.10 Screenlines / Cutlines	118
9.11 Root Mean Square Error	128
9.12 Overall Highway Assignment	130
10.0 Transit Assignment	131
11.0 Conclusion	132
Appendix A	134



List of Figures

Figure 1. 2005 Base Year CFRPM Regional Network 5

Figure 2. **2005** Base Year CFRPM External Station Location 11

Figure 3. External Trips by Station 14

Figure 4. Year 2005 Population Density Map 22

Figure 5. Year 2005 Employment Density Map 27

Figure 6. Volusia Lifestyles vs. Standard FSUTMS Trip Purposes 31

Figure 7. 2005 Base Year CFRPM HBW Trip Balancing Subareas..... 54

Figure 8. 2005 Base Year CFRPM HBNW Trip Balancing Subareas..... 57

Figure 9. Area Type Calculator..... 66

Figure 10. Year 2005 Area Type Density Map..... 67

Figure 11: Capacity Calculator in the CFRPM v5.0..... 73

Figure 12. 2005 CFRPM Free Flow Time From Downtown Orlando 82

Figure 13. CFRPM Region: HBW Trip Length Distribution..... 87

Figure 14. CFRPM Region: HBSH Trip Length Distribution 87

Figure 15. CFRPM Region: HBSR Trip Length Distribution..... 88

Figure 16. CFRPM Region: HBO Trip Length Distribution 88

Figure 17. CFRPM Region: NHB Trip Length Distribution 89

Figure 18. CFRPM Region: Taxi Trip Length Distribution..... 89

Figure 19. CFRPM Region: Light Truck Trip Length Distribution 90

Figure 20. CFRPM Region: Heavy Truck Trip Length Distribution 90

Figure 21. CFRPM Region: External-to-Internal (EI) Trip Length Distribution 91

Figure 22. CFRPM Region: Total Trip Length Distribution 91

Figure 23. Mode Choice Structure 95

Figure 24. CFRPM Regional Screenline 121

Figure 25. Ocala/Marion County TPO Cutlines 122

Figure 26. Lake-Sumter MPO Cutlines..... 123

Figure 27. Flagler County Cutlines..... 124

Figure 28. Volusia TPO Cutlines 125

Figure 29. Space Coast TPO Cutlines 126

Figure 30. METROPLAN Orlando Cutlines 127

Appendix Figures

Figure A-1. Ocala/Marion County TPO: HBW Trip Length Distribution..... 135

Figure A-2. Ocala/Marion County TPO: HBSH Trip Length Distribution 135

Figure A-3. Ocala/Marion County TPO: HBSR Trip Length Distribution..... 136

Figure A-4. Ocala/Marion County TPO: HBO Trip Length Distribution 136

Figure A-5. Ocala/Marion County TPO: NHB Trip Length Distribution 137

Figure A-6. Ocala/Marion County TPO: Taxi Trip Length Distribution..... 137

Figure A-7. Ocala/Marion County TPO: Light Truck Trip Length Distribution..... 138

Figure A-8. Ocala/Marion County TPO: Heavy Truck Trip Length Distribution 138

Figure A-9. Ocala/Marion County TPO: External-to-Internal (EI) Trip Length Distribution..... 139

Figure A-10. Ocala/Marion County TPO: Total Trip Length Distribution..... 139

Figure A-11. Lake-Sumter MPO: HBW Trip Length Distribution 140



Figure A-12. Lake-Sumter MPO: HBSH Trip Length Distribution 140

Figure A-13. Lake-Sumter MPO: HBSR Trip Length Distribution 141

Figure A-14. Lake-Sumter MPO: HBO Trip Length Distribution..... 141

Figure A-15. Lake-Sumter MPO: NHB Trip Length Distribution 142

Figure A-16. Lake-Sumter MPO: Taxi Trip Length Distribution 142

Figure A-17. Lake-Sumter MPO: Light Truck Trip Length Distribution..... 143

Figure A-18. Lake-Sumter MPO: Heavy Truck Trip Length Distribution..... 143

Figure A-19. Lake-Sumter MPO: External-to-Internal (EI) Trip Length Distribution
..... 144

Figure A-20. Lake-Sumter MPO: Total Trip Length Distribution 144

Figure A-21. Flagler County: HBW Trip Length Distribution 145

Figure A-22. Flagler County: HBSH Trip Length Distribution 145

Figure A-23. Flagler County: HBSR Trip Length Distribution 146

Figure A-24. Flagler County: HBO Trip Length Distribution 146

Figure A-25. Flagler County: NHB Trip Length Distribution 147

Figure A-26. Flagler County: Taxi Trip Length Distribution 147

Figure A-27. Flagler County: Light Truck Trip Length Distribution 148

Figure A-28. Flagler County: Heavy Truck Trip Length Distribution..... 148

Figure A-29. Flagler County: External-to-Internal (EI) Trip Length Distribution .. 149

Figure A-30. Flagler County: Total Trip Length Distribution 149

Figure A-31. Volusia TPO: HBW Trip Length Distribution 150

Figure A-32. Volusia TPO: HBSH Trip Length Distribution..... 150

Figure A-33. Volusia TPO: HBSR Trip Length Distribution..... 151

Figure A-34. Volusia TPO: HBO Trip Length Distribution 151

Figure A-35. Volusia TPO: NHB Trip Length Distribution..... 152

Figure A-36. Volusia TPO: Taxi Trip Length Distribution..... 152

Figure A-37. Volusia TPO: Light Truck Trip Length Distribution 153

Figure A-38. Volusia TPO: Heavy Truck Trip Length Distribution 153

Figure A-39. Volusia TPO: External-to-Internal (EI) Trip Length Distribution..... 154

Figure A-40. Volusia TPO: Total Trip Length Distribution..... 154

Figure A-41. Space Coast TPO: HBW Trip Length Distribution..... 155

Figure A-42. Space Coast TPO: HBSH Trip Length Distribution..... 155

Figure A-43. Space Coast TPO: HBSR Trip Length Distribution..... 156

Figure A-44. Space Coast TPO: HBO Trip Length Distribution 156

Figure A-45. Space Coast TPO: NHB Trip Length Distribution 157

Figure A-46. Space Coast TPO: Taxi Trip Length Distribution..... 157

Figure A-47. Space Coast TPO: Light Truck Trip Length Distribution 158

Figure A-48. Space Coast TPO: Heavy Truck Trip Length Distribution 158

Figure A-49. Space Coast TPO: External-to-Internal (EI) Trip Length Distribution 159

Figure A-50. Space Coast TPO: Total Trip Length Distribution..... 159

Figure A-51. METROPLAN Orlando: HBW Trip Length Distribution..... 160

Figure A-52. METROPLAN Orlando: HBSH Trip Length Distribution 160

Figure A-53. METROPLAN Orlando: HBSR Trip Length Distribution 161

Figure A-54. METROPLAN Orlando: HBO Trip Length Distribution 161

Figure A-55. METROPLAN Orlando: NHB Trip Length Distribution 162

Figure A-56. METROPLAN Orlando: Taxi Trip Length Distribution 162

Figure A-57. METROPLAN Orlando: Light Truck Trip Length Distribution..... 163

Figure A-58. METROPLAN Orlando: Heavy Truck Trip Length Distribution..... 163



Figure A-59. METROPLAN Orlando: External-to-Internal (EI) Trip Length Distribution 164
Figure A-60. METROPLAN Orlando: Total Trip Length Distribution 164



List of Tables

Table 1. External Stations Summary.....	9
Table 2. External-External Trip End Summary.....	12
Table 3. External Trips (EI/IE & EE) Summary Report.....	14
Table 4. Version 4.5 and Version 5.0 TAZ Comparison.....	16
Table 5. Socioeconomic Data Summary.....	19
Table 6. Population Growth Summary.....	21
Table 7. Dwelling Unit Growth Summary.....	23
Table 8. Occupied Dwelling Unit Growth Summary.....	24
Table 9. Employment & School Enrollment Growth Summary.....	26
Table 10. Special Generators.....	28
Table 11. Trip Generation Production Rates by County.....	33
Table 12. Trip Generation User Specified Attraction Rates by County.....	45
Table 13. IE Production Reports.....	50
Table 14. HBW Subarea Balanced Results.....	53
Table 15. HBSH Subarea Balanced Results.....	55
Table 16. HBSR Subarea Balanced Results.....	55
Table 17. HBO Subarea Balanced Results.....	56
Table 18. Trip Generation Summary Report.....	58
Table 19: Generation Rates of Light Truck Trips per unit.....	60
Table 20: Generation Rates of Heavy Truck Trips per unit.....	60
Table 21. Area Types.....	62
Table 22. Area Type Activity Density Thresholds.....	64
Table 23. Phase I, Dynamic Area Type Model Steps.....	65
Table 24. Phase II, Dynamic Area Type Model Steps.....	65
Table 25. Network Facility Type.....	68
Table 26. Per lane Capacity for Facility Type 26.....	71
Table 27. Per lane Capacity for Facility Type 39.....	71
Table 28. Free Flow Speed Equations in the CFRPM v5.0.....	72
Table 29. Number of Links by Area Type and Facility Type.....	74
Table 30. Average Speed by Area Type and Facility Type.....	74
Table 31. Highway Capacity by Area Type and Facility Type.....	75
Table 32. Number of Links by Area Type.....	77
Table 33. Number of Links by Facility Type.....	77
Table 34. Total System Miles by Area Type.....	78
Table 35. Total System Miles by Facility Type.....	78
Table 36. Total Lane Miles by Area Type.....	79
Table 37. Total Lane Miles by Facility Type.....	79
Table 38. Highway Path from Downtown Orlando to UCF.....	81
Table 39. CFRPM Subarea Definition.....	84
Table 40. Average Free Flow Trip Length by Trip Purpose.....	86
Table 41. Average Congested Trip Length by Trip Purpose.....	86



Table 42. Bus Travel Time Comparison (peak period) Error! Bookmark not defined.

Table 43. Bus Travel Time Comparison (off-peak period)..... Error! Bookmark not defined.

Table 44. Mode Choice Coefficients 96

Table 45. Mode Choice Nesting Coefficients..... 97

Table 46. Mode Choice Model Constants for LYNX..... 98

Table 47. Mode Choice Model Constants for Votran 99

Table 48. Mode Choice Model Constants for Space Coast 100

Table 49. Mode Choice Model Constants for SunTran 101

Table 50. HBW Highway Trips Summary 102

Table 51. HBW Transit Trips Summary 102

Table 52. Total Non-Work Highway Trips Summary..... 103

Table 53. Total Non-Work Transit Trips Summary 103

Table 54. VFACTORS File 108

Table 55. HEVAL Validation Model Output Report..... 110

Table 56. HEVAL Analysis Model Output Report..... 111

Table 57. Highway Network Summary Report..... 113

Table 58. Links, Links with Counts, and Percentage of Links with Counts by Facility and Area Type 114

Table 59. Original Highway Speed vs. Congested Highway Speed..... 116

Table 60. Ratio of Estimated Highway Volume over Count..... 117

Table 61. Total Vehicle Miles Traveled (VMT) 118

Table 62. Total Vehicle Hours Traveled (VHT)..... 118

Table 63. Screenline Summary Comparison 119

Table 64. Highway Assignment RMSE Report –Number of Links 128

Table 65. Highway Assignment RMSE Report –RMSE Percent Error 129

Table 66. Highway Assignment..... 130

Table 67. Comparison of Observed and Estimated Boardings.... Error! Bookmark not defined.

Table 68. Comparison of LYNX Observed vs. Estimated Boardings Error! Bookmark not defined.



1.0 Introduction

This Technical Report documents the process to validate the base-year 2005 Central Florida Regional Planning Model version 5.0 (CFRPM v5.0) using the Florida Standard Urban Transportation Model Structure (FSUTMS) with the CUBE Voyager software, version 5.0.2.

There are four basic steps to the process of travel demand forecasting, which include:

- Trip Generation,
- Trip Distribution,
- Mode Choice, and
- Trip Assignment.

These four steps allow the number of trips in a given area to be estimated and then assigned to specific transportation facilities—either highways or transit systems.

The first step, **Trip Generation** determines the total number of trips produced, called productions, each day for each trip purpose in specific geographic areas which are usually referred to as Traffic Analysis Zones (TAZs or zones). The Trip Generation step also determines the number of opportunities, called attractions, available in each geographic area which can satisfy the production trip ends. This step determines the number of trips originating in each TAZ (productions) as well as the number of trip destinations in each TAZ (attractions).

Once the number of trips to be generated in each geographic area is determined, the **Trip Distribution** step is undertaken. The most common means of distributing trips is through the application of a gravity model, a concept which has been borrowed from the physical sciences. In physics, a Newtonian gravity equation is used to calculate how strongly two objects are attracted to one another based upon the mass of the objects and their relative distance from each other. Newton's theory of gravity is commonly used to distribute trips (i.e., how attractive a trip is) based on distance and the area's level of activity. As an example, trips attracted to a shopping mall are inversely proportional to their distance from the mall. Thus, trips generated by homes in a given geographic area are typically attracted to a mall on the same side of town, rather than to a mall in another county. Similarly, these same homeowners would drive further to go to a mall that



has greater “mass” than they would to go to a convenience store, a place with lesser “mass” in terms of attractions. The application of the gravity model can therefore simulate travelers’ destination choices with respect to the distance from those destinations.

While the trip generation step determines the number of trips, and trip distribution determines trip origins and destinations, the **Mode Choice** step determines how trips will occur, or what mode will be used. Through this step the model determines whether trips will occur by automobile or by transit. For highway trips, the Mode Choice step also determines whether the trip maker will drive alone or share a ride with someone else. For transit trips, Mode Choice determines by what type of transit mode the trip will be made (local bus, express bus, or fixed guide-way transit), as well as whether the trip maker can walk to a transit stop or will have to drive to a park-n-ride or kiss-n-ride location.

Finally, the **Trip Assignment** step is used to determine which route the highway and transit trips follow. There are many routes that can be taken to travel between a given origin and destination. This step involves selecting the path that an actual traveler would select. This selection is generally the shortest and/or fastest route between two locations.

Through these four steps, the number of trips likely to occur in an area is estimated; the origins and destinations of those trips are determined; the mode choice is determined; and the trips estimated are assigned to the highway and/or transit routes. Using these steps, travel within a given study area can be simulated with a reasonable degree of accuracy.

1.1 The Conversion Process

As part of the CFRPM v5.0 development process the Florida Department of Transportation (FDOT) District 5 undertook a two-stage conversion of the previous TranPlan version of the model (CFRPM v4.1). Phase 1 of the conversion process converted the CFRPM v4.1 (base year 2000) from TranPlan to Cube Voyager. The end product was a new CFRPM version 4.5 with the same base year as the previous v4.1 model, but was built using Cube Voyager. The TranPlan model provided a point of reference to control the quality of the logic and functionality of the Cube Voyager scripting. The Phase 1 conversion process included the following work:



- Conversion of current TranPlan structure with minimal structural revisions;
- Review of model validation data used in TranPlan validation; and
- Re-validation of Voyager version of the model using the TranPlan version (CFRPM v4.1) as a target.

Phase 2 of the conversion (version 5.0) included more significant structural revisions of the model based on the updated structure of the Orlando Urban Area Transportation Study (OUATS) Voyager model. It also featured an updated validation year (2005) for use in the development of long range transportation plan updates to be adopted in 2010 for the area MPOs/TPOs.

1.2 Study Area

There are five Metropolitan Planning Organizations (MPOs)/Transportation Planning Organizations (TPOs) within the CFRPM study area:

- Ocala/Marion County TPO,
- Lake-Sumter MPO,
- Volusia TPO,
- Space Coast TPO, and
- METROPLAN Orlando.

The CFRPM is the adopted travel demand model for the FDOT District 5, and with this update the CFRPM v5.0 will also be used by four of the five MPOs/TPOs within District 5 to update their Long Range Transportation Plans (LRTPs)¹. The four MPOs/TPOs are:

- Ocala/Marion County TPO,
- Lake-Sumter MPO,
- Volusia TPO, and
- Space Coast TPO.

Figure 1 shows the county boundaries in the CFRPM v5.0 study area. The area encompassed by the model includes all nine counties within FDOT District 5:

- Brevard,
- Flagler,
- Lake,
- Marion,

¹ METROPLAN Orlando used the Orlando Urban Area Transportation Study (OUATS) model to update their LRTP.



- Orange,
- Osceola,
- Seminole,
- Sumter, and
- Volusia.

In addition to the nine counties in District 5, part of Polk County in District 1 and part of Indian River County in District 4 were included within the CFRPM v5.0 study area. Polk and Indian River counties were included to assist with external trips that travel throughout District 5.

Version 4.5 included the northeastern portion of Polk County from Osceola and Lake Counties westward to the I-4/US 27 interchange. To better reflect the trip distribution patterns between Osceola and Lake Counties with Polk County, the model was expanded farther southwest into Polk County to incorporate the area of Haines City. The expansion enabled the model to reflect the trip interactions of the Poinciana and Four Corners areas with the Haines City area in the model.

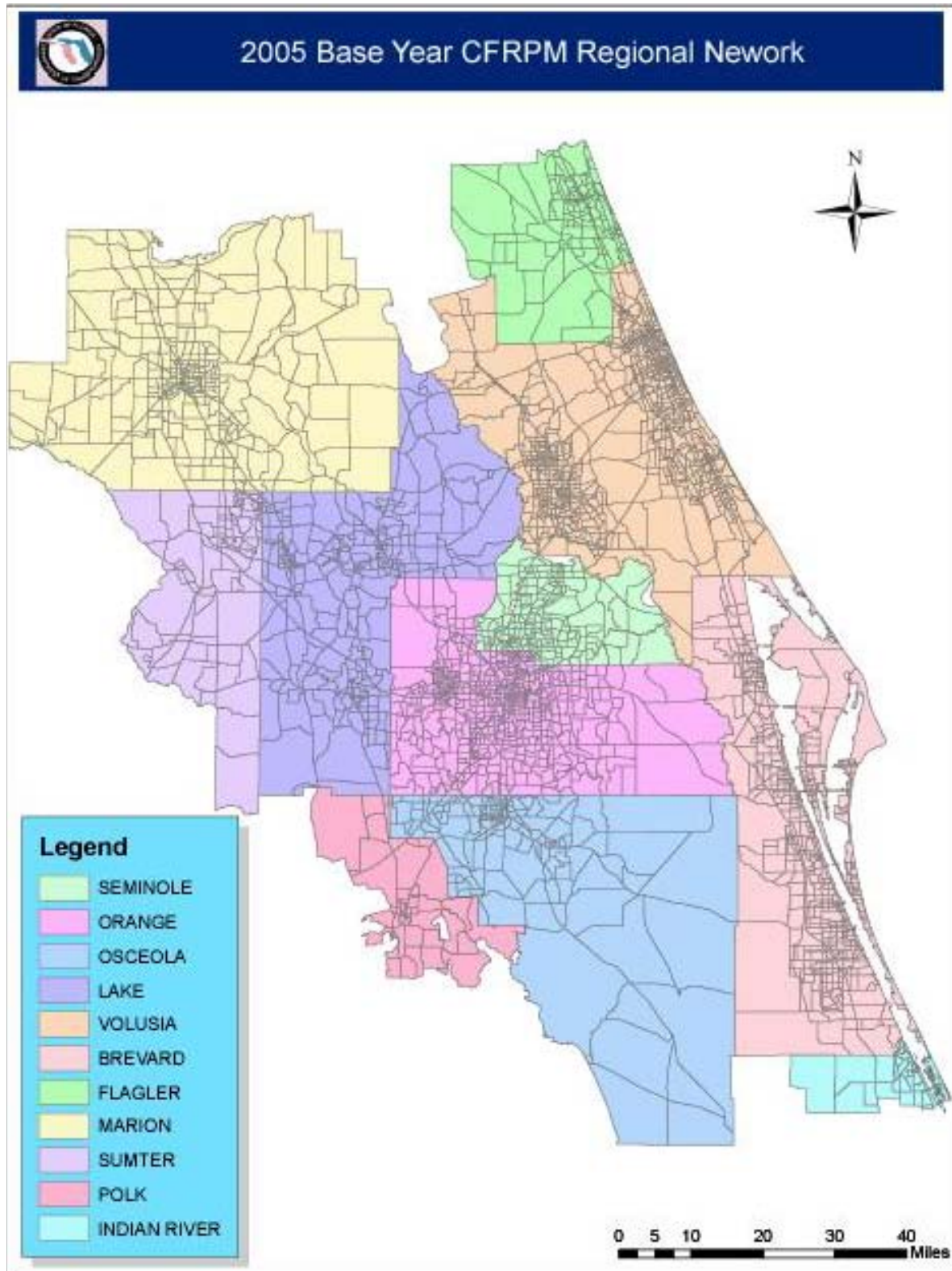
Part of Indian River County was also added to the CFRPM to better reflect the growth of inter-county trips occurring between Brevard and Indian River Counties. Significant population and employment growth is forecasted for southern Brevard County. The CFRPM's expansion into Indian River County greatly improved the analysis of traffic and growth in this area. The expansion into Indian River County extends to just north of SR 60.

1.3 Expanded Number of TAZs

The CFRPM v5.0 was expanded to include more than 1,000 new useable TAZs, plus nearly 650 dummy zones. Some of the new TAZs can be attributed to the addition of including more of Polk County, as well as the new addition of part of Indian River County. The majority of new TAZs come from the splitting of previous zones for each county within FDOT District 5. Once new zones were added to the model, TAZs were re-numbered so that all TAZs within each county would be consecutively numbered throughout the CFRPM.



Figure 1. 2005 Base Year CFRPM Regional Network





1.4 Model Enhancements

A number of model enhancements were made to the CFRPM as part of the validation process for version 5.0. These enhancements were incorporated into the model over the course of the Phase I and Phase II conversion process.

Each of these enhancements is described within this technical report. The principal enhancements in the CFRPM v5.0 include:

- True Shape GIS Highway Network,
- Expanded Model Area,
- Expanded Number of TAZs,
- Trip Generation Rates by County,
- Trip Generation Subarea Balancing,
- Special Attraction Application,
- Trip Distribution Subarea Friction Factors,
- Trip Distribution Matrix Simplification,
- Truck/Taxi Split Application,
- Dynamic Area Type Calculator,
- Free Flow Speed Calculator,
- Capacity Lookup Table,
- New Facility Types, and
- Highway Assignment Improvement.

The Cube Voyager model process includes the use of a database file format for inputs and outputs, including a directory structure for file storage. The report format developed for the CFRPM v5.0 is scripted in HTML and features a user-friendly reporting structure and interface. One of the advantages of the HTML report format is that zonal model statistics can be collapsed to a summary level, making model reports more accessible to users. The HTML reports also include bar charts, pie charts, and graphs, which can be used for graphical presentation of the model's results.

1.5 CFRPM/OUATS Compatibility

The incorporation of the OUATS model (the model used by METROPLAN Orlando) processes into the CFRPM v5.0 involved significant updates and revisions to the regional model include:

- The TAZ boundaries, extents and numbering were retained from the OUATS model;



- The OUATS roadway “stick-figure” network was incorporated, but was updated to a true-shape GIS based network consistent with the rest of the roadway network in the CFRPM v5.0;
- The trip generation rates and structure, with the exception of the income-level stratification, was included; and
- The trip distribution friction factors from the OUATS model were incorporated into the CFRPM v5.0.

1.6 Report Organization

The remainder of this technical memorandum follows the process of the 4-step model. Like most 4-step models, the computer application of the process is further divided into additional steps and is detailed in the following sections:

- External Trips
- Trip Generation
- Highway Network
- Highway Path
- Trip Distribution
- Transit Network
- Mode Choice
- Highway Assignment
- Transit Assignment
- Conclusion



2.0 External Trips

External trips are vehicle trips with at least one trip end (either origin or destination) outside of the study area boundary. Trips with both ends outside of the study area are called External-to-External (EE) or “pass-through” trips. Trips with one end outside of the study area and the other trip end inside the study area are referred to as External-to-Internal (EI) trips or Internal-to-External (IE) trips, depending on which trip end is the production. For Home-Based trips the production trip end is where the traveler’s home is, either inside (an IE trip) or outside (an EI trip) the study area.

Modeling EE trips is the first step in the Florida Standard Urban Transportation Model Structure (FSUTMS). The external trip module requires an EE trip table that contains EE vehicle trips between external stations. These trips are reported in the EE trip table by origin and destination pairs. The remaining external trips (EI or IE) are handled in the trip generation module, but are reported within the External Trips module.

The expansion of the geographic area of the CFRPM to include more of Polk County in FDOT District 1 and part of Indian River County in FDOT District 4 was made to improve the external trip process for the model. As a result the number of external stations increased from 43 to 49 between the previous version 4.5 and the latest version 5.0.

2.1 Development of External Station Data

The development of the external station data for the CFRPM v5.0 involved collecting external traffic counts for 2005, developing EI/EE percent splits, developing the EE trip table, and adjusting the EI friction factors.

Traffic Counts were collected at all 49 external locations. Travel surveys completed for the 2002 Regional Study on Tourism/Commuter Trips were conducted at the boundaries of all 5 MPOs/TPOs in the CFRPM region. The EI/EE percent splits and the EE trip table were developed from the results of these travel surveys. Where data was unavailable to determine the EE/EI splits or the EE trips, the existing CFRPM v4.5 data was used. The 49 external stations in the CFRPM v5.0 are depicted in **Figure 2** and listed below in **Table 1**.

**Table 1. External Stations Summary**

TAZ	County	Location
4501	Indian River County	SR A1A
4502	Indian River County	US 1
4503	Indian River County	58 th Avenue
4504	Indian River County	66 th Avenue
4505	Indian River County	82 nd Avenue
4506	Indian River County	I-95
4507	Indian River County	CR 512
4508	Osceola County	SR 60
4509	Osceola County	SR 91
4510	Osceola County	US 441
4511	Osceola County	SR 60
4512	Polk County	SR 17
4513	Polk County	US 27
4514	Polk County	SR 540
4515	Polk County	SR 542
4516	Polk County	CR 544
4517	Polk County	US 17
4518	Polk County	I-4
4519	Polk County	SR 33
4520	Sumter County	SR 471
4521	Sumter County	SR 50
4522	Sumter County	US 301
4523	Sumter County	I-75
4524	Sumter County	CR 476
4525	Sumter County	CR 48
4526	Sumter County	SR 44
4527	Marion County	SR 200
4528	Marion County	US 41
4529	Marion County	SR 40
4530	Marion County	CR 336
4531	Marion County	US 41
4532	Marion County	SR 464
4533	Marion County	CR 326
4534	Marion County	US 27
4535	Marion County	CR 318
4536	Marion County	CR 320
4537	Marion County	CR 329
4538	Marion County	I-75
4539	Marion County	US 441
4540	Marion County	US 301
4541	Marion County	SR 21



TAZ	County	Location
4542	Marion County	CR 315
4543	Marion County	SR 19
4544	Volusia County	US 17
4545	Flagler County	SR 20
4546	Flagler County	CR 13
4547	Flagler County	I-95
4548	Flagler County	US 1
4549	Flagler County	SR A1A



Figure 2. 2005 Base Year CFRPM External Station Location

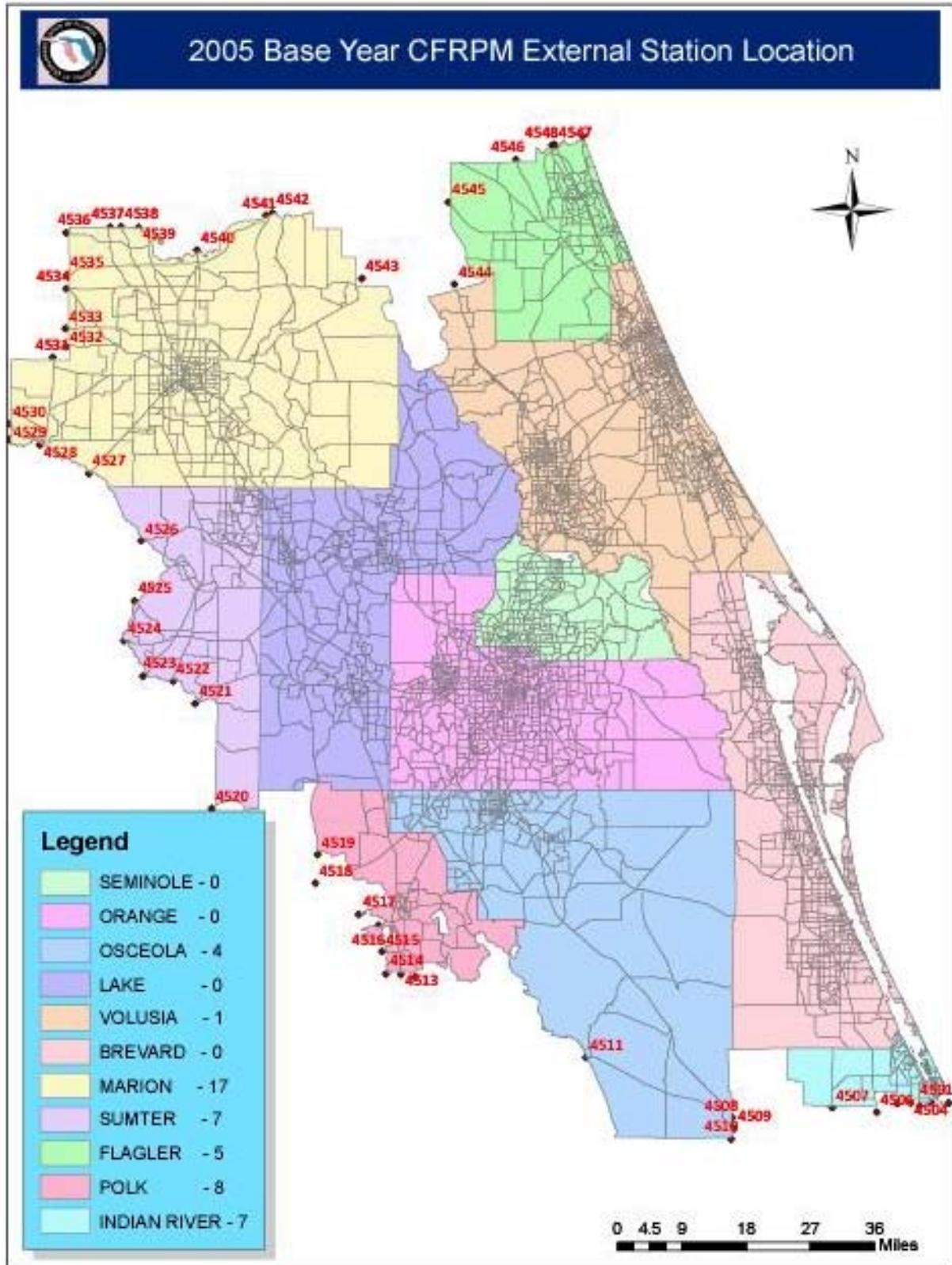




Table 2 lists the external stations and the corresponding trip origins and destinations produced by or attracted to each external station (the numbers highlighted in blue are total trip ends greater than 5,000). **Figure 3** shows the number of trip origins and destinations graphically for any station generating more than 5,000 total trip ends.

Table 2. External-External Trip End Summary

TAZ	Origin/Production	Destination/Attraction	Total Trip Ends	Intrazonal Trips
4501	282	282	564	0
4502	940	940	1,880	0
4503	200	200	400	0
4504	222	222	444	0
4505	0	0	0	0
4506	6,264	6,264	12,528	0
4507	0	0	0	0
4508	1,727	1,727	3,454	0
4509	6,648	6,648	13,296	0
4510	929	929	1,858	0
4511	3,792	3,792	7,584	0
4512	357	357	714	0
4513	6,972	6,972	13,944	0
4514	12,108	12,108	24,216	0
4515	7,164	7,164	14,328	0
4516	660	660	1,320	0
4517	1,043	1,043	2,086	0
4518	5,870	5,870	11,740	0
4519	349	349	698	0
4520	0	0	0	0
4521	271	271	542	0
4522	0	0	0	0
4523	8,066	8,066	16,132	0
4524	0	0	0	0
4525	0	0	0	0
4526	0	0	0	0
4527	714	714	1,428	0
4528	866	866	1,732	0
4529	630	630	1,260	0
4530	281	281	562	0
4531	678	678	1,356	0
4532	0	0	0	0
4533	0	0	0	0
4534	490	490	980	0



TAZ	Origin/Production	Destination/Attraction	Total Trip Ends	Intrazonal Trips
4535	254	254	508	0
4536	0	0	0	0
4537	0	0	0	0
4538	15,687	15,687	31,374	0
4539	516	516	1,032	0
4540	2,809	2,809	5,618	0
4541	219	219	438	0
4542	219	219	438	0
4543	71	71	142	0
4544	118	118	236	0
4545	0	0	0	0
4546	0	0	0	0
4547	6,118	6,118	12,236	0
4548	776	776	1,552	0
4549	0	0	0	0
Total	94,310	94,310	188,620	0



Figure 3. External Trips by Station

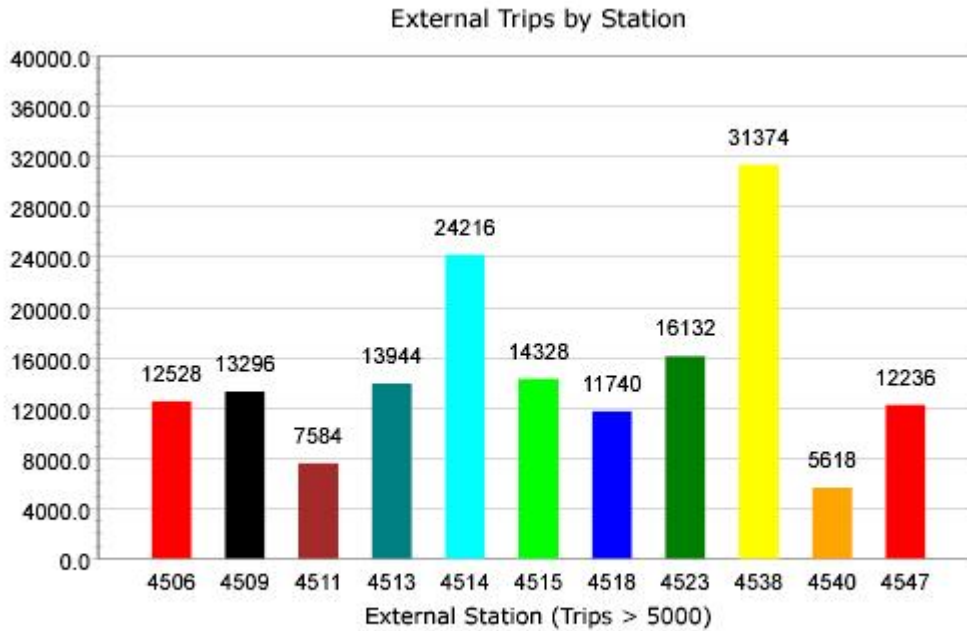


Table 3 lists all external station trips for all 49 external stations. The external trips are categorized for both external-internal and external-external trips.

Table 3. External Trips (EI/IE & EE) Summary Report

TAZ	County	Location	EI/IE Trips	EE Trips	Total Trips	EI/IE Trips %	EE Trips %
4501	Indian River County	SR A1A	13,502	564	14,066	96	4
4502	Indian River County	US 1	27,351	1,880	29,231	94	6
4503	Indian River County	58 th Avenue	9,600	400	10,000	96	4
4504	Indian River County	66 th Avenue	10,655	444	11,099	96	4
4505	Indian River County	82 nd Avenue	220	0	220	100	0
4506	Indian River County	I-95	20,439	12,528	32,967	62	38
4507	Indian River County	CR 512	879	0	879	100	0
4508	Osceola County	SR 60	2,164	3,454	5,618	39	61
4509	Osceola County	SR 91	15,871	13,296	29,167	54	46
4510	Osceola County	US 441	1,580	1,858	3,438	46	54
4511	Osceola County	SR 60	459	7,584	8,043	6	94
4512	Polk County	SR 17	8,200	714	8,914	92	8
4513	Polk County	US 27	24,099	13,944	38,043	63	37
4514	Polk County	SR 540	3,501	24,216	27,717	13	87
4515	Polk County	SR 542	2,302	14,328	16,630	14	86
4516	Polk County	CR 544	15,201	1,320	16,521	92	8



TAZ	County	Location	EI/IE Trips	EE Trips	Total Trips	EI/IE Trips %	EE Trips %
4517	Polk County	US 17	24,002	2,086	26,088	92	8
4518	Polk County	I-4	66,521	11,740	78,261	85	15
4519	Polk County	SR 33	6,345	698	7,043	90	10
4520	Sumter County	SR 471	3,043	0	3,043	100	0
4521	Sumter County	SR 50	7,610	542	8,152	93	7
4522	Sumter County	US 301	4,022	0	4,022	100	0
4523	Sumter County	I-75	27,026	16,132	43,158	63	37
4524	Sumter County	CR 476	4,042	0	4,042	100	0
4525	Sumter County	CR 48	3,779	0	3,779	100	0
4526	Sumter County	SR 44	9,789	0	9,789	100	0
4527	Marion County	SR 200	14,104	1,428	15,532	91	9
4528	Marion County	US 41	19,225	1,732	20,957	92	8
4529	Marion County	SR 40	2,144	1,260	3,404	63	37
4530	Marion County	CR 336	608	562	1,170	52	48
4531	Marion County	US 41	8,750	1,356	10,106	87	13
4532	Marion County	SR 464	2,766	0	2,766	100	0
4533	Marion County	CR 326	2,979	0	2,979	100	0
4534	Marion County	US 27	6,786	980	7,766	87	13
4535	Marion County	CR 318	1,724	508	2,232	77	23
4536	Marion County	CR 320	426	0	426	100	0
4537	Marion County	CR 329	1,170	0	1,170	100	0
4538	Marion County	I-75	34,585	31,374	65,959	52	48
4539	Marion County	US 441	7,159	1,032	8,191	87	13
4540	Marion County	US 301	6,508	5,618	12,126	54	46
4541	Marion County	SR 21	945	438	1,383	68	32
4542	Marion County	CR 315	4,136	438	4,574	90	10
4543	Marion County	SR 19	3,262	142	3,404	96	4
4544	Volusia County	US 17	5,659	236	5,895	96	4
4545	Flagler County	SR 20	4,632	0	4,632	100	0
4546	Flagler County	CR 13	1,516	0	1,516	100	0
4547	Flagler County	I-95	36,711	12,236	48,947	75	25
4548	Flagler County	US 1	8,448	1,552	10,000	84	16
4549	Flagler County	SR A1A	5,474	0	5,474	100	0
Total			491,919	188,620	680,539	72	28



3.0 Trip Generation

Trip Generation is the second step in the Florida Standard Urban Transportation Model Structure (FSUTMS). This step determines the number of trips that originate from each Traffic Analysis Zone (TAZ), which are called productions, or the number of trips that terminate within each TAZ, which are called attractions.

The trip generation for each TAZ is based on a series of cross-classification tables and/or trip generation equations that convert socioeconomic data into person-trip productions and attractions, by trip purpose, and by TAZ. These cross-classification rate tables and/or equations were developed using trip rate data borrowed from other areas as appropriate or, in some cases, are based on actual trip survey data from the respective area.

In Volusia County the trip generation rates are based on the Home Based Travel Survey conducted by the Volusia TPO (formerly the Volusia County MPO) in 2002, which was used to develop lifestyle trip generation rates for trips within the County.

3.1 Traffic Analysis Zone (TAZ) Structure

The CFRPM v5.0 consists of 4,500 TAZs, including 648 dummy zones. Dummy zones are created for future year analyses. Compared to version 4.5, version 5.0 has 1,006 new useable TAZs. The TAZs were developed in coordination with each of the MPOs/TPOs, and Flagler County. The TAZ breakdown is shown in **Table 4**, along with a change in the TAZ numbering between CFRPM version 4.5 and version 5.0.

Table 4. Version 4.5 and Version 5.0 TAZ Comparison

County	Version 4.5			Version 5.0		
	TAZ Range	Internal TAZs	Dummy TAZs	TAZ Range	Internal TAZs	Dummy TAZs
Seminole	1 - 263	212	51	1 - 300	220	80
Orange	264 - 1,025	662	100	301 - 1,100	711	89
Osceola	1,026 - 1,200	106	69	1,101 - 1,350	185	65
Lake	1,201 - 1,500	259	41	1,351 - 1,750	323	77
Volusia	1,501 - 2,450	729	221	1,751 - 2,850	1,052	48
Brevard	2,451 - 3,050	436	164	2,851 - 3,550	650	50
Marion	3,051 - 3,350	241	59	3,551 - 4,000	375	75
Sumter	3,351 - 3,550	88	112	4,001 - 4,150	109	41
Flagler	3,551 - 3,675	95	30	4,151 - 4,350	137	63
Polk	3,676 - 3,700	12	13	4,351 - 4,450	53	47
Indian River	N/A	N/A	N/A	4,451 - 4,500	37	13
Total	1 - 3,700	2,840	860	1 - 4,500	3,852	648



3.2 Socioeconomic Data

Input socioeconomic data in the CFRPM v5.0 was developed in cooperation with the East Central Florida Regional Planning Council (ECFRPC), the FDOT District 5, and each of the MPOs/TPOs, and local governments.

The base-year 2005 socioeconomic data was developed using 2006/2007 county parcel-level GIS files that were aggregated and summarized into Zdata categories based on the Property Appraisers' Department of Revenue (DOR) Use Codes for: single family, multi-family, mobile home (considered single family), hotel/motel/timeshare, commercial, service, industrial, institutional, agricultural, and conservation. Additional data sources were utilized to determine the number of apartments, mobile homes, recreational vehicle spaces, hotel/motel/timeshares, employees, and school location/enrollment totals.

The Future Land Use Allocation Model (FLUAM) methodology was used to distribute the socioeconomic data to individual TAZs. The FLUAM process used population control totals for each county for 2005 that came from the Bureau of Economic and Business Research (BEBR), Florida Population Studies, Volume 39, Bulletin 144 report from 2007 (estimate as of April 1, 2005).

The input data sources used to develop the 2005 socioeconomic data included the following²:

- U.S. Census Bureau (www.census.gov) – Year 2000 files 56, 57 and 58 from the Census Bureau Summary File 3 (SF-3);
- Bureau of Economic and Business Research (www.bebr.ufl.edu) – 2007 report (Florida Population Studies, Volume 39, Bulletin 144)
- Woods & Poole Economics (www.woodsandpoole.com) – 2006 Florida State Profile (State and County Projections to 2030 Employment data);
- InfoUSA (www.infousa.com) – January 2007 employment data for the entire state of Florida – geocoded by Cambridge Systematics with TeleAtlas street base data;
- Florida Department of Business and Professional Regulation, Division of Hotels and Restaurants

² *Socioeconomic Data Production For FDOT 2035 Long Range Transportation Plan And ECFRPC Regional Evacuation Study*, dated March 6, 2008, prepared by Data Transfer Solutions.



(www.myflorida.com/dbpr/hr/index.html) – hotel, motel, timeshare, apartment unit counts (2006);

- Department of Health (www.doh.state.fl.us) – Mobile Home Parks, RV Parks;
- East Central Florida Regional Planning Council (www.ecfrpc.org) – supplied Future Land Use and Parcel GIS files for 2006 and 2007;
- Florida Department of Education (www.fldoe.org) – supplied 2005 school enrollment totals for each county;
- Florida Department of Corrections (www.dc.state.fl.us) – Federal prison counts; and
- County Correction Department websites – County prison counts.

Table 5 shows the 2005 population, dwelling unit and employment data summarized for each county in the CFRPM v5.0. **Figure 4** and **Figure 5** show the Year 2005 population and employment densities, respectively, by TAZ within the Central Florida region.



Table 5. Socioeconomic Data Summary

Socioeconomic Data Summary												
Population												
	Seminole	Orange	Osceola	Lake	Volusia	Brevard	Marion	Sumter	Flagler	Polk	Indian River	Total
Permanent Population	422,630	1,052,479	243,501	263,642	494,631	526,920	305,661	66,447	82,069	80,158	43,266	3,581,404
Hotel/Motel Population	4,896	202,250	76,381	7,220	45,411	20,016	12,894	1,224	1,106	1,746	593	373,737
Total Population	427,526	1,254,729	319,882	270,862	540,042	546,936	318,555	67,671	83,175	81,904	43,859	3,955,141
Dwelling Units												
	Seminole	Orange	Osceola	Lake	Volusia	Brevard	Marion	Sumter	Flagler	Polk	Indian River	Total
Permanently Occupied DUs	162,762	408,292	86,400	111,671	207,714	223,447	126,247	24,724	31,362	30,578	17,452	1,430,649
Seasonally Occupied DUs	1,421	8,134	10,971	8,328	16,252	11,268	5,540	2,477	3,209	8,067	0	75,666
Vacant Dwelling Units	8,567	23,554	5,742	8,529	10,945	12,594	11,549	2,065	4,926	4,439	3,065	95,975
Permanent Hotel/Motel	1,835	13,811	3,397	722	3,205	1,364	1,289	122	238	607	76	26,667
Total Hotel/Motel	5,098	98,083	35,222	3,610	21,368	9,093	6,447	612	681	1,455	505	182,174
Total Occupied Dwelling Units	166,018	430,237	100,768	120,721	227,172	236,079	133,076	27,323	34,809	39,252	17,527	1,532,982
Total Dwelling Units	177,848	538,063	138,335	132,138	256,279	256,402	149,783	29,877	40,178	44,539	21,022	1,784,464
Permanently Occupied Dwelling Units												
	Seminole	Orange	Osceola	Lake	Volusia	Brevard	Marion	Sumter	Flagler	Polk	Indian River	Total
Single Family 0 Auto	3,065	11,419	2,691	3,790	7,667	6,305	4,989	985	801	1,001	319	43,032
Single Family 1 Auto	29,477	80,014	22,751	41,255	62,693	64,345	49,210	12,765	10,700	7,611	4,099	384,920
Single Family 2+ Auto	76,776	169,278	43,009	53,969	90,311	106,986	55,344	10,305	16,421	8,661	8,783	639,843
Multiple Family 0 Auto	3,768	16,560	1,527	1,672	6,611	4,494	1,984	120	319	713	243	38,010
Multiple Family 1 Auto	24,486	71,035	9,180	6,486	23,257	24,005	9,487	298	1,709	6,378	3,079	179,400
Multiple Family 2+ Auto	25,190	59,986	7,244	4,499	17,175	17,313	5,232	250	1,413	6,214	958	145,473
Permanent Hotel/Motel	1,835	13,811	3,397	722	3,205	1,364	1,289	122	238	607	76	26,667
Total Occupied Dwelling Units	166,018	430,237	100,768	120,721	227,172	236,079	133,076	27,323	34,809	39,252	17,527	1,532,982
Employment												
	Seminole	Orange	Osceola	Lake	Volusia	Brevard	Marion	Sumter	Flagler	Polk	Indian River	Total
Industrial Employees	34,917	94,210	9,604	19,808	30,772	60,761	27,552	3,504	3,398	4,694	3,121	292,341
Commercial Employees	56,760	168,417	22,118	24,283	47,268	54,209	28,444	3,256	6,528	5,536	2,203	419,022
Service Employees	122,811	544,730	45,697	57,493	118,746	162,616	63,143	8,523	12,369	11,936	5,113	1,153,177
Total Employees	214,488	807,357	77,419	101,591	196,754	277,596	119,137	15,281	22,297	22,166	10,437	1,864,523
School Enrollment	95,788	308,876	62,673	45,836	95,702	124,064	56,930	7,973	10,646	11,817	5,698	826,003
Ratio Statistics												
	Seminole	Orange	Osceola	Lake	Volusia	Brevard	Marion	Sumter	Flagler	Polk	Indian River	Total
Perm Pop / Occ DU	2.60	2.58	2.82	2.36	2.38	2.36	2.42	2.69	2.62	2.62	2.48	2.50
Total Pop / Occ DU	2.40	2.33	2.31	2.05	2.11	2.13	2.13	2.26	2.07	1.84	2.09	2.22
Ind Emp / Total Emp	0.16	0.12	0.12	0.19	0.16	0.22	0.23	0.23	0.15	0.21	0.30	0.16
Com Emp / Tot Emp	0.26	0.21	0.29	0.24	0.24	0.20	0.24	0.21	0.29	0.25	0.21	0.22
Ser Emp / Tot Emp	0.57	0.67	0.59	0.57	0.60	0.59	0.53	0.56	0.55	0.54	0.49	0.62



Zdata 1 – Trip Production Variables

Trip production variables used in the CFRPM v5.0 are housed in the Zdata 1 file and consist of the following:

- Population classified by single family and multi family
- Dwelling Units (DU) classified by single family and multi family
- Percent of Vacant and Seasonal Dwelling Units
- Hotel/Motel classified by population and units

Population

Population in the CFRPM region, with a total of 3.58 million residents in the year 2005, is 20 percent of the state's population of 17.92 million. As shown in **Table 6**, Orange County with about 1.05 million residents is the region's most populous county, accounting for 29 percent of the region's population. Sumter County (not including the portions of Polk or Indian River Counties) is the least populous with a population of approximately 66,500, which accounts for 2 percent of the region.

The CFRPM region population grew at just slightly under 4 percent per year between 2000 and 2005, which was higher than the State's annual growth of slightly more than 2 percent. Population increased most significantly in Flagler County (not including the portions of Polk or Indian River counties) with an increase of approximately 65 percent, while Brevard County experienced the least amount of proportional growth at less than 11 percent, as seen in **Table 6**. The county-level totals were checked against the BEBR population estimates. A population density map, **Figure 4**, was generated to ensure that the population data was reasonable.

As seen in **Table 6**, the multi-family population and dwelling units decreased in nearly every county between 2000 and 2005. The reason for this result is that in 2000 mobile homes were categorized as multi-family dwelling units, whereas in 2005 they were categorized in the single family dwelling unit category.

Overall, the 2005 population data appears to be consistent with the level of growth that has occurred throughout the Central Florida region.

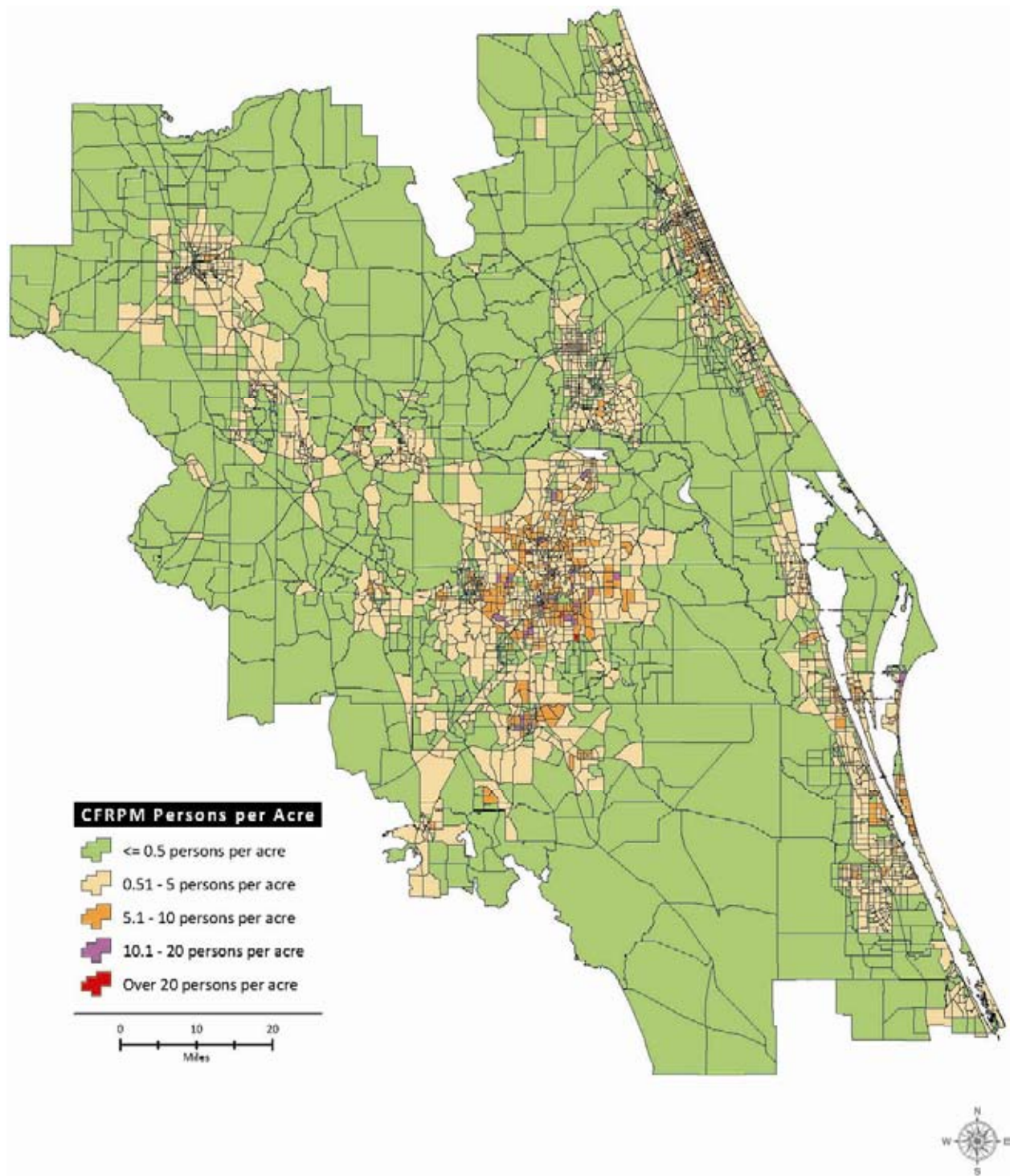


Table 6. Population Growth Summary

2000												
Population												
	Seminole	Orange	Osceola	Lake	Volusia	Brevard	Marion	Sumter	Flagler	Polk	Indian River	Total
Single Family Population	288,258	617,215	124,166	146,630	330,617	353,936	159,682	27,321	41,845	10,802	N/A	2,100,472
Multi-Family Population	77,540	284,591	48,365	64,873	112,958	121,671	100,260	17,474	7,942	8,693	N/A	844,367
Total Population	365,798	901,806	172,531	211,503	443,575	475,607	259,942	44,795	49,787	19,495	N/A	2,944,839
2005												
Population												
	Seminole	Orange	Osceola	Lake	Volusia	Brevard	Marion	Sumter	Flagler	Polk	Indian River	Total
Single Family Population	318,878	729,891	201,857	238,897	395,039	440,543	272,294	64,727	72,332	49,134	34,055	2,817,647
Multi-Family Population	103,752	322,588	41,644	24,745	99,592	86,377	33,367	1,720	9,737	31,024	9,211	763,757
Total Population	422,630	1,052,479	243,501	263,642	494,631	526,920	305,661	66,447	82,069	80,158	43,266	3,581,404
2000 to 2005 Percent Change												
Population												
	Seminole	Orange	Osceola	Lake	Volusia	Brevard	Marion	Sumter	Flagler	Polk	Indian River	Total
Single Family Population	10.62%	18.26%	62.57%	62.93%	19.49%	24.47%	70.52%	136.91%	72.86%	354.86%	N/A	34.14%
Multi-Family Population	33.80%	13.35%	-13.90%	-61.86%	-11.83%	-29.01%	-66.72%	-90.16%	22.60%	256.88%	N/A	-9.55%
Total Population	15.54%	16.71%	41.13%	24.65%	11.51%	10.79%	17.59%	48.34%	64.84%	311.17%	N/A	21.62%



Figure 4. Year 2005 Population Density Map





Dwelling Units

Table 7 shows that there were 1.6 million dwelling units (DU) in the CFRPM region in 2005, with an average of 2.5 persons per dwelling unit. Between 2000 and 2005 the total growth in population (22 percent) was very similar to the total growth in dwelling units (21 percent). Again, similar to multi-family population, the number of multi-family dwelling units decreased in many of the counties between 2000 and 2005. The “housing boom” along with the reclassification of mobile homes into the single family dwelling unit category likely caused this decrease.

Table 7. Dwelling Unit Growth Summary

2000												
Dwelling Units												
	Seminole	Orange	Osceola	Lake	Volusia	Brevard	Marion	Sumter	Flagler	Polk	Indian River	Total
Single Family Dwelling Units	104,738	214,630	49,988	58,218	133,054	134,724	68,346	13,753	19,526	6,655	N/A	803,632
Multi-Family Dwelling Units	45,931	154,904	34,212	46,116	78,884	86,359	53,158	12,119	5,444	6,655	N/A	523,782
Total Dwelling Units	150,669	369,534	84,200	104,334	211,938	221,083	121,504	25,872	24,970	13,310	N/A	1,327,414
2005												
Dwelling Units												
	Seminole	Orange	Osceola	Lake	Volusia	Brevard	Marion	Sumter	Flagler	Polk	Indian River	Total
Single Family Dwelling Units	113,173	275,657	80,798	113,473	175,001	191,599	124,728	28,513	34,628	22,278	14,537	1,174,385
Multi-Family Dwelling Units	59,577	164,323	22,315	15,055	59,910	55,710	18,608	752	4,869	20,806	5,980	427,905
Total Dwelling Units	172,750	439,980	103,113	128,528	234,911	247,309	143,336	29,265	39,497	43,084	20,517	1,602,290
2000 to 2005 Percent Change												
Dwelling Units												
	Seminole	Orange	Osceola	Lake	Volusia	Brevard	Marion	Sumter	Flagler	Polk	Indian River	Total
Single Family Dwelling Units	8.05%	28.43%	61.63%	94.91%	31.53%	42.22%	82.49%	107.32%	77.34%	234.76%	N/A	46.13%
Multi-Family Dwelling Units	29.71%	6.08%	-34.77%	-67.35%	-24.05%	-35.49%	-64.99%	-93.79%	-10.56%	212.64%	N/A	-18.30%
Total Dwelling Units	14.66%	19.06%	22.46%	23.19%	10.84%	11.86%	17.97%	13.11%	58.18%	223.70%	N/A	20.71%

Table 8 shows the breakdown of occupied households by three vehicle ownership categories. Single family households with 2 or more vehicles are the predominant housing preference with nearly 640,000 units, which accounts for almost 45 percent of all households. Of the 1.43 million occupied households, approximately 657,500 are within the 3-county METROPLAN Orlando area, which together constitutes roughly 46 percent of the CFRPM region.

Between 2000 and 2005 zero- and one-vehicle single family households in Seminole and Orange Counties decreased, while the number of multi-family households increased. Conversely, during the same period most of the other



counties increased the number of single family households, while the number of multi-family households decreased. Again, this shift may be explained by the housing-boom and the reclassification of mobile homes.

Overall, the 2005 dwelling unit data appears to be consistent with the level of growth that has occurred throughout the Central Florida region.

Table 8. Occupied Dwelling Unit Growth Summary

2000												
Permanently Occupied Dwelling Units												
	Seminole	Orange	Osceola	Lake	Volusia	Brevard	Marion	Sumter	Flagler	Polk	Indian River	Total
Single Family 0 Auto	4,345	16,064	2,682	2,822	6,717	4,146	2,338	467	406	172	N/A	40,161
Single Family 1 Auto	41,850	95,280	23,632	23,539	52,145	41,811	26,314	5,654	6,203	2,585	N/A	319,012
Single Family 2+ Auto	54,214	90,408	19,675	29,349	64,509	82,165	31,834	5,734	10,939	3,075	N/A	391,902
Multi-Family 0 Auto	2,971	14,011	1,847	2,167	5,549	4,857	4,888	579	199	186	N/A	37,253
Multi-Family 1 Auto	18,632	72,997	16,043	19,651	24,086	30,475	23,033	3,518	1,514	2,563	N/A	212,511
Multi-Family 2+ Auto	18234	53955	12559	19221	31683	34695	15750	5228	2555	3083	N/A	196,962
Total Permanently Occupied DUs	140,246	342,715	76,438	96,749	184,689	198,149	104,157	21,180	21,816	11,664	N/A	1,197,801
2005												
Permanently Occupied Dwelling Units												
	Seminole	Orange	Osceola	Lake	Volusia	Brevard	Marion	Sumter	Flagler	Polk	Indian River	Total
Single Family 0 Auto	3,065	11,419	2,691	3,790	7,667	6,305	4,989	985	801	1,001	319	43,032
Single Family 1 Auto	29,477	80,014	22,751	41,255	62,693	64,345	49,210	12,765	10,700	7,611	4,099	384,920
Single Family 2+ Auto	76,776	169,278	43,009	53,969	90,311	106,986	55,344	10,305	16,421	8,661	8,783	639,843
Multi-Family 0 Auto	3,768	16,560	1,527	1,672	6,611	4,494	1,984	120	319	713	243	38,010
Multi-Family 1 Auto	24,486	71,035	9,180	6,486	23,257	24,005	9,487	298	1,709	6,378	3,079	179,400
Multi-Family 2+ Auto	25,190	59,986	7,244	4,499	17,175	17,313	5,232	250	1,413	6,214	958	145,473
Total Permanently Occupied DUs	162,762	408,292	86,400	111,671	207,714	223,447	126,247	24,724	31,362	30,578	17,452	1,430,649
2000 to 2005 Percent Change												
Permanently Occupied Dwelling Units												
	Seminole	Orange	Osceola	Lake	Volusia	Brevard	Marion	Sumter	Flagler	Polk	Indian River	Total
Single Family 0 Auto	-29.46%	-28.92%	0.34%	34.30%	14.14%	52.07%	113.39%	110.92%	97.29%	481.98%	N/A	7.15%
Single Family 1 Auto	-29.57%	-16.02%	-3.73%	75.26%	20.23%	53.89%	87.01%	125.77%	72.50%	194.43%	N/A	20.66%
Single Family 2+ Auto	41.62%	87.24%	118.60%	83.89%	40.00%	30.21%	73.85%	79.72%	50.11%	181.66%	N/A	63.27%
Multi-Family 0 Auto	26.83%	18.19%	-17.33%	-22.84%	19.14%	-7.47%	-59.41%	-79.27%	60.30%	283.33%	N/A	2.03%
Multi-Family 1 Auto	31.42%	-2.69%	-42.78%	-66.99%	-3.44%	-21.23%	-58.81%	-91.53%	12.88%	148.85%	N/A	-15.58%
Multi-Family 2+ Auto	38.15%	11.18%	-42.32%	-76.59%	-45.79%	-50.10%	-66.78%	-95.22%	-44.70%	101.56%	N/A	-26.14%
Total Permanently Occupied DUs	16.05%	19.13%	13.03%	15.42%	12.47%	12.77%	21.21%	16.73%	43.76%	162.16%	N/A	19.44%



Zdata 2 – Trip Attraction Variables

Trip attraction variables, housed in the Zdata 2 file, consist of the following:

- Employment classified by Commercial, Service and Industrial; and
- School Enrollment for Kindergarten to 12th and College.

The CFRPM v5.0 includes three types of employment: industrial, commercial, and service. Employment in the CFRPM region, with a total of 1.86 million jobs, grew at approximately 14 percent between 2000 and 2005, which is less than the 22 percent growth in population. As shown in **Table 9**, Orange County with about 0.81 million jobs is the region's largest employer, accounting for 43 percent of the region's employment.

Between 2000 and 2005 school enrollment increased nearly 37 percent, which was greater than the rate of growth in employment or population. Osceola County experienced the greatest amount of growth (excluding Polk and Indian River Counties) with more than 87 percent over the five-year period. **Figure 5** is an employment density map depicting the level of employment by TAZ. Overall, the 2005 employment and school enrollment data appears to be consistent with the level of growth that has occurred in the Central Florida region.

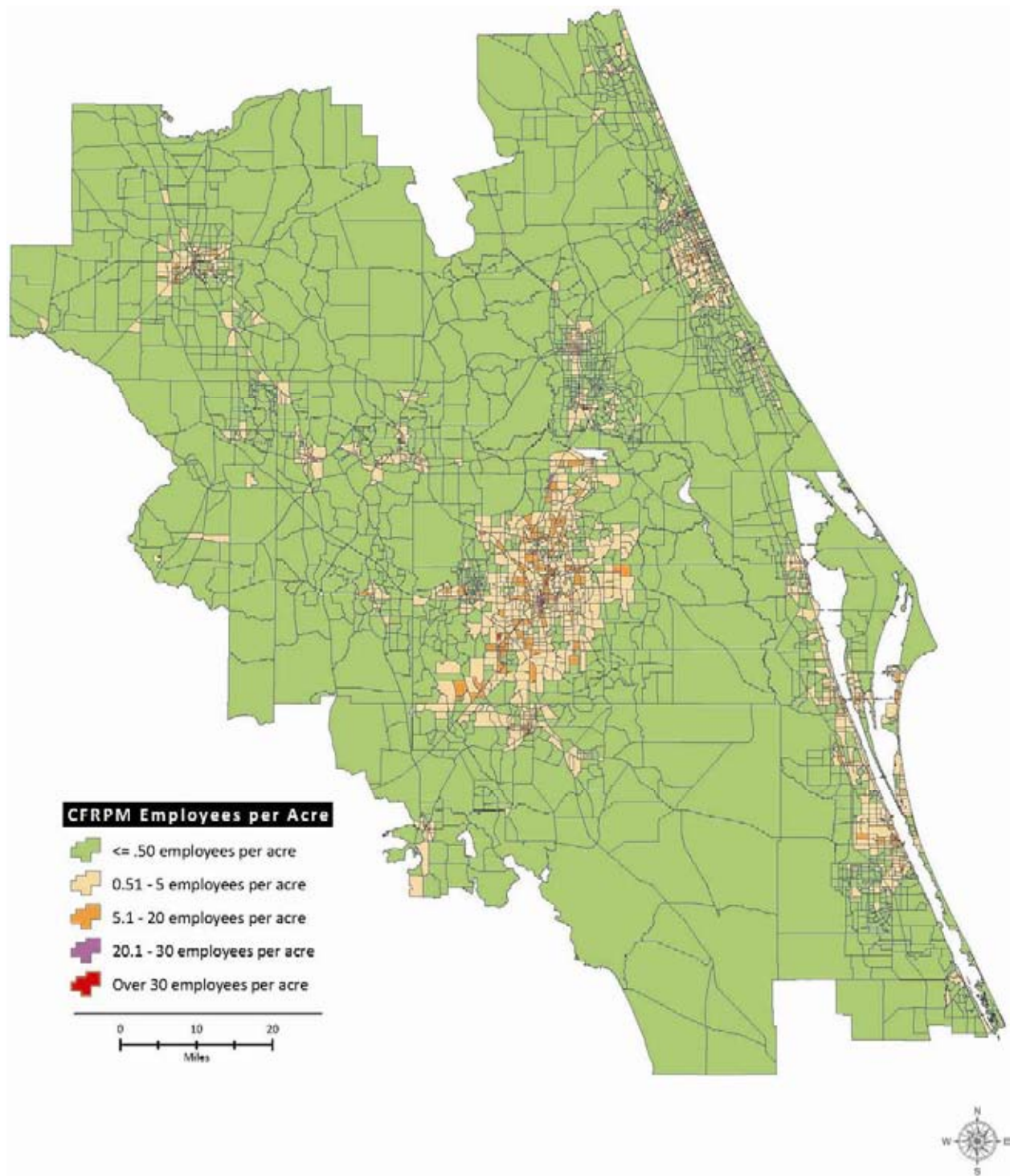


Table 9. Employment & School Enrollment Growth Summary

2000												
Employment & School Enrollment												
	Seminole	Orange	Osceola	Lake	Volusia	Brevard	Marion	Sumter	Flagler	Polk	Indian River	Total
Industrial Employees	30,266	76,583	6,824	18,210	30,184	59,246	26,805	3,170	3,110	378	N/A	254,776
Commercial Employees	52,100	153,644	20,381	21,124	44,546	53,979	27,275	2,607	3,251	1,079	N/A	379,986
Service Employees	104,166	487,929	34,880	47,984	101,335	142,278	59,302	6,886	8,140	1,687	N/A	994,587
Total Employment	186,532	718,156	62,085	87,318	176,065	255,503	113,382	12,663	14,501	3,144	N/A	1,629,349
School Enrollment	69,173	223,251	33,445	32,784	82,623	94,610	52,285	5,900	7,895	1,660	N/A	603,626
2005												
Employment & School Enrollment												
	Seminole	Orange	Osceola	Lake	Volusia	Brevard	Marion	Sumter	Flagler	Polk	Indian River	Total
Industrial Employees	34,917	94,210	9,604	19,808	30,772	60,761	27,552	3,504	3,398	4,694	3,121	292,341
Commercial Employees	56,760	168,417	22,118	24,283	47,268	54,209	28,444	3,256	6,528	5,536	2,203	419,022
Service Employees	122,811	544,730	45,697	57,493	118,746	162,616	63,143	8,523	12,369	11,936	5,113	1,153,177
Total Employment	214,488	807,357	77,419	101,591	196,754	277,596	119,137	15,281	22,297	22,166	10,437	1,864,523
School Enrollment	95,788	308,876	62,673	45,836	95,702	124,064	56,930	7,973	10,646	11,817	5,698	826,003
2000 to 2005 Percent Change												
Employment & School Enrollment												
	Seminole	Orange	Osceola	Lake	Volusia	Brevard	Marion	Sumter	Flagler	Polk	Indian River	Total
Industrial Employees	15.37%	23.02%	40.74%	8.78%	1.95%	2.56%	2.79%	10.54%	9.26%	1141.80%	N/A	14.74%
Commercial Employees	8.94%	9.62%	8.52%	14.95%	6.11%	0.43%	4.29%	24.89%	100.80%	413.07%	N/A	10.27%
Service Employees	17.90%	11.64%	31.01%	19.82%	17.18%	14.29%	6.48%	23.77%	51.95%	607.53%	N/A	15.95%
Total Employment	14.99%	12.42%	24.70%	16.35%	11.75%	8.65%	5.08%	20.67%	53.76%	605.03%	N/A	14.43%
School Enrollment	38.48%	38.35%	87.39%	39.81%	15.83%	31.13%	8.88%	35.14%	34.84%	611.87%	N/A	36.84%



Figure 5. Year 2005 Employment Density Map





Zdata 3 – Special Generators

To replicate trip generation for TAZs with unusual trip rates, the CFRPM uses the "special generator" concept. Special generators are activity centers that have a rate of activity significantly different from the standard trip generation rate utilized in the trip generation model. Special generators are used to adjust the productions or attractions of a zone by trip purpose to a desired level of volume. Usually this activity is concentrated on the attraction side of the equation for both Home-Based (HB) and Non-Home Based (NHB) trip purposes.

A special generators list was obtained from the OUATS model which included activities such as colleges, theme parks, and space/military bases. TAZs that encompass these productions and attractions were subsequently delegated special generators to either add or subtract trips from these areas. **Table 10** shows all of the Special Generators within the CFRPM v5.0.

Table 10. Special Generators

SPECIAL GENERATORS															
ZONE		PRODUCTIONS							ATTRACTIONS						
TAZ	DESCRIPTION	+/-	TRIPS	HBW	HBSH	HBSR	HBO	NHB	+/-	TRIPS	HBW	HBSH	HBSR	HBO	NHB
499	UCF		0	0	0	0	0	0	+	52,000	0	0	0	0	100
630	Valencia Community College		0	0	0	0	0	0	+	20,000	0	0	0	0	100
898	Magic Kingdom	-	4,000	0	23	34	26	17		0	0	0	0	0	0
902	Downtown Disney		0	0	0	0	0	0	-	2,000	32	5	10	20	33
903	EPCOT Center	-	10,000	0	10	10	10	70	-	60,000	32	0	10	25	33
899	Animal Kingdom	-	7,000	0	12	21	17	50		0	0	0	0	0	0
897	Magic Kingdom		0	0	0	0	0	0	-	4,000	0	25	12	24	39
1,104	Disney Area	-	26,000	3	25	39	30	3		0	0	0	0	0	0
2,942	Cape Canaveral Air Base	+	5,000	0	0	0	0	100	+	12,000	0	0	45	0	55
2,940	KSC Training Center		0	0	0	0	0	0	+	15,000	0	0	40	28	32
2,945	KSC Vehicle Assembly		0	0	0	0	0	0	+	5,000	0	10	45	45	0

3.3 Trip Generation Methodologies

As mentioned previously, the CFRPM v5.0 trip generation module was developed based on two methodologies: standard FSUTMS cross-classification and Lifestyles cross-classification. The standard FSUTMS methodology is used for the trip generation for all the counties except Volusia County. In Volusia County, trip generation is based on the Lifestyles methodology. These two methodologies differ in how they calculate trip productions, but both calculate trip attractions in the same way.



Under the standard FSUTMS trip generation methodology, trip productions are based on the following variables:

- Single Family Dwelling Units,
- Single Family Population,
- Multi-Family Dwelling Units,
- Multi-Family Population,
- Seasonal and Vacancy Percentages,
- Auto Ownership,
- Hotel Rooms,
- Hotel Occupancy, and
- Hotel Population.

The standard FSUTMS trip generation methodology generates trips based on the following five trip purposes:

- Home-Based Work (HBW),
- Home-Based Shopping (HBS),
- Home-Based Social Recreational (HBSR),
- Home-Based Other (HBO), and
- Non-Home-Based (NHB).

For Volusia County, the Lifestyles trip generation methodology attempts to distinguish the trip making characteristics of working and non-working households with and without children, as well as permanent and seasonal residents. Under the Lifestyles trip generation methodology, trip productions are based on the following variables:

- Households with Children (HHWC),
- Households without Children (HHNC),
- Vehicles in HHWC,
- Vehicles in HHNC,
- Workers in HHWC,
- Workers in HHNC,
- Persons in HHWC,
- Persons in HHNC, and
- Occupied Hotel Rooms.



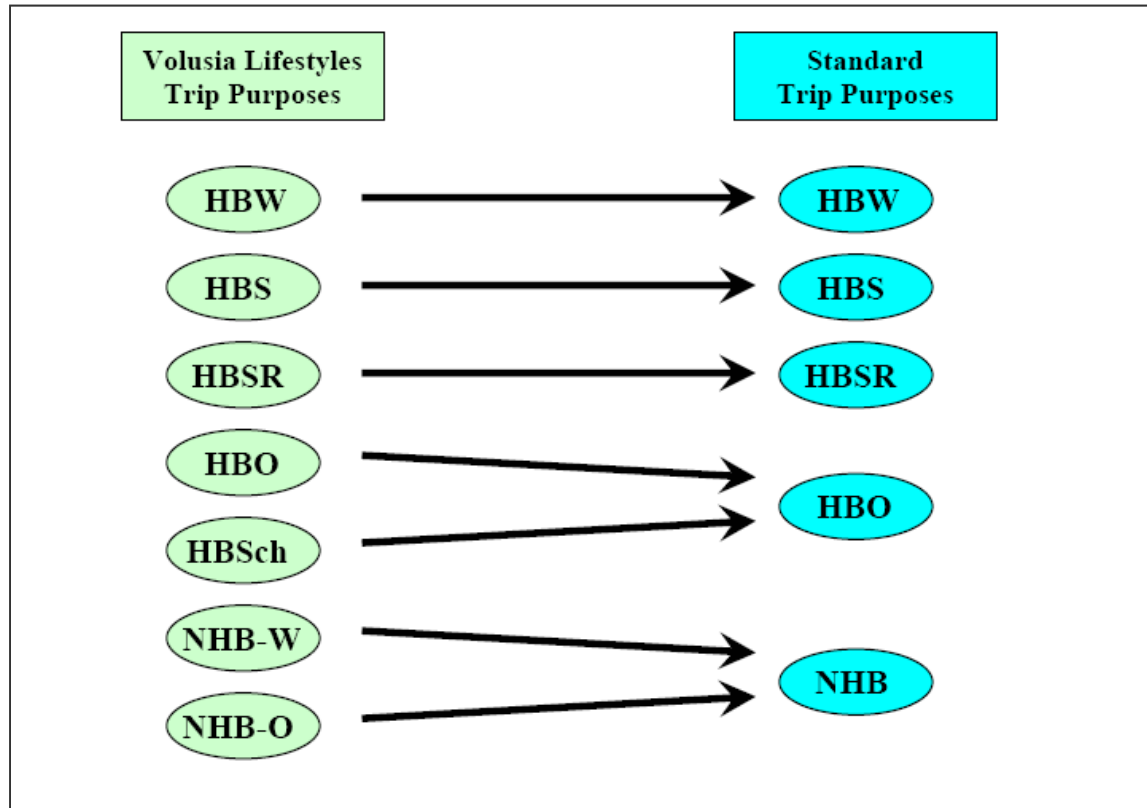
The Lifestyles trip generation methodology generates trips based on the following seven trip purposes:

- Home-Based Work (HBW),
- Home-Based Shopping (HBSH),
- Home-Based Social Recreational (HBSR),
- Home-Based Other (HBO),
- Home-Based School (HBSch),
- Non-Home-Based Work (NHB-W), and
- Non-Home-Based Other (NHB-O).

In order for the Volusia Lifestyles trip generation methodology to be included in the regional model process, the Lifestyles trip purposes must be converted to the standard trip purpose format. **Figure 6** depicts the compression of the seven Lifestyles trip purposes into the standard five trip purposes. Trip productions and attractions are thus summarized in the same manner for all of the Central Florida counties. After the compression of the Volusia County productions and attractions to the standard trip purposes, they are incorporated into the subsequent FSUTMS modules along with the standard trips from the other counties.



Figure 6. Volusia Lifestyles vs. Standard FSUTMS Trip Purposes



After the Volusia Lifestyles trip purposes were compressed into the standard five trip purposes, cross-classification tables and rate equations were applied to each county to calculate productions and attractions by trip purpose.

3.4 Trip Generation Rates by County

The CFRPM v5.0 was enhanced to include trip generation rates for each of the eleven counties in the model (Seminole, Orange, Osceola, Lake, Volusia, Brevard, Marion, Sumter, Flagler, Polk, and Indian River). The previous version of the model (v4.5) used seven trip generation rates for the ten county area (Seminole-West Volusia, Orange, Osceola-Northeast Polk, Brevard-Flagler-East Volusia, Lake-Sumter, Marion, including the Volusia lifestyle trip rates which are used to replace the standard rates).

Allowing each county to have its own set of trip rates provides an enhanced level of flexibility in the future when local travel data by county is available. For example, when the National Household Travel Survey (NHTS) data is available in 2010, District 5 will be able to revisit the current trip rates for possible update.



Below is a summary of the source of trip rates used for each County:

- Seminole County (OUATS trip rates from base year 2004 validation),
- Orange County (OUATS trip rates from base year 2004 validation),
- Osceola County (OUATS trip rates from base year 2004 validation),
- Lake County (FSUTMS standard trip rates),
- Volusia County (CFRPM v4.5 trip rates from base year 2000 Lifestyles model),
- Brevard County (FSUTMS standard trip rates factored up by 10%),
- Marion County (FSUTMS standard trip rates),
- Sumter County (FSUTMS standard trip rates factored down by 20%),
- Flagler County (FSUTMS standard trip rates),
- Polk County (OUATS trip rates from base year 2004 validation), and
- Indian River County (FSUTMS standard trip rates factored down by 20%).

Trip rates by county are shown in **Table 11** and **Table 12**. Internal-External production inputs are also tabulated in **Table 13**.



Table 11. Trip Generation Production Rates by County

County 1 - Seminole County											
Home Based Work Trip Production Rates											
Single Family				Multi-Family				Hotel / Motel			
	Autos/DU				Autos/DU				Autos/DU		
Pers/DU	0	1	2+	Pers/DU	0	1	2+	Pers/DU	0	1	2+
1	0.16	0.39	0.84	1	0.23	0.51	0.73	1	0.14	0.14	0.14
2	0.28	0.62	1.07	2	0.34	0.62	1.01	2	0.11	0.11	0.11
3	0.51	0.84	1.29	3	0.45	0.84	1.18	3	0.09	0.09	0.09
4	0.68	0.91	1.41	4	0.56	0.91	1.24	4	0.05	0.05	0.05
5	0.73	0.96	1.46	5	0.62	0.96	1.29	5	0.05	0.05	0.05
Home Based Shopping Trip Production Rates											
Single Family				Multi-Family				Hotel / Motel			
	Autos/DU				Autos/DU				Autos/DU		
Pers/DU	0	1	2+	Pers/DU	0	1	2+	Pers/DU	0	1	2+
1	0.23	0.34	0.65	1	0.23	0.28	0.45	1	0.16	0.16	0.16
2	0.26	0.62	0.76	2	0.26	0.65	0.79	2	0.72	0.72	0.72
3	0.28	0.72	0.84	3	0.28	0.84	1.04	3	1.13	1.13	1.13
4	0.31	0.81	1.13	4	0.31	1.01	1.18	4	1.40	1.40	1.40
5	0.34	0.84	1.40	5	0.34	1.06	1.26	5	1.63	1.63	1.63
Home Based Social Recreational Trip Production Rates											
Single Family				Multi-Family				Hotel / Motel			
	Autos/DU				Autos/DU				Autos/DU		
Pers/DU	0	1	2+	Pers/DU	0	1	2+	Pers/DU	0	1	2+
1	0.11	0.34	0.34	1	0.16	0.28	0.34	1	0.34	0.34	0.34
2	0.14	0.39	0.42	2	0.19	0.36	0.39	2	0.93	0.93	0.93
3	0.16	0.51	0.56	3	0.23	0.42	0.45	3	1.51	1.51	1.51
4	0.19	0.62	0.70	4	0.26	0.51	0.59	4	2.19	2.19	2.19
5	0.23	0.79	0.86	5	0.28	0.68	0.90	5	3.32	3.32	3.32
Home Based Other Trip Production Rates											
Single Family				Multi-Family				Hotel / Motel			
	Autos/DU				Autos/DU				Autos/DU		
Pers/DU	0	1	2+	Pers/DU	0	1	2+	Pers/DU	0	1	2+
1	0.23	0.45	0.70	1	0.23	0.45	0.68	1	0.28	0.28	0.28
2	0.28	1.01	1.13	2	0.39	0.72	1.04	2	0.68	0.68	0.68
3	0.56	1.83	2.07	3	0.56	1.46	1.97	3	1.18	1.18	1.18
4	0.84	2.58	3.15	4	0.84	2.02	2.98	4	1.86	1.86	1.86
5	1.23	3.60	4.04	5	1.13	2.53	3.66	5	2.47	2.47	2.47



Table 11. Cont'd Trip Generation Production Rates by County

County 2 - Orange County											
Home Based Work Trip Production Rates											
Single Family				Multi-Family				Hotel / Motel			
	Autos/DU				Autos/DU				Autos/DU		
Pers/DU	0	1	2+	Pers/DU	0	1	2+	Pers/DU	0	1	2+
1	0.23	0.53	1.16	1	0.32	0.69	1.01	1	0.18	0.18	0.18
2	0.38	0.85	1.45	2	0.46	0.85	1.38	2	0.15	0.15	0.15
3	0.69	1.16	1.77	3	0.62	1.16	1.62	3	0.12	0.12	0.12
4	0.92	1.23	1.93	4	0.77	1.23	1.69	4	0.07	0.07	0.07
5	1.01	1.32	2.01	5	0.85	1.32	1.77	5	0.07	0.07	0.07
Home Based Shopping Trip Production Rates											
Single Family				Multi-Family				Hotel / Motel			
	Autos/DU				Autos/DU				Autos/DU		
Pers/DU	0	1	2+	Pers/DU	0	1	2+	Pers/DU	0	1	2+
1	0.32	0.46	0.88	1	0.32	0.38	0.62	1	0.23	0.23	0.23
2	0.35	0.85	1.03	2	0.35	0.88	1.08	2	1.01	1.01	1.01
3	0.38	1.01	1.16	3	0.38	1.16	1.42	3	1.54	1.54	1.54
4	0.42	1.12	1.54	4	0.42	1.38	1.62	4	1.93	1.90	1.93
5	0.46	1.16	1.93	5	0.46	1.45	1.73	5	2.23	2.23	2.23
Home Based Social Recreational Trip Production Rates											
Single Family				Multi-Family				Hotel / Motel			
	Autos/DU				Autos/DU				Autos/DU		
Pers/DU	0	1	2+	Pers/DU	0	1	2+	Pers/DU	0	1	2+
1	0.15	0.46	0.46	1	0.23	0.38	0.46	1	0.46	0.46	0.46
2	0.18	0.53	0.57	2	0.28	0.50	0.53	2	1.27	1.27	1.27
3	0.23	0.69	0.77	3	0.32	0.57	0.62	3	2.08	2.08	2.08
4	0.28	0.85	0.96	4	0.35	0.69	0.81	4	2.99	2.99	2.99
5	0.32	1.08	1.19	5	0.38	0.92	1.23	5	4.54	4.54	4.54
Home Based Other Trip Production Rates											
Single Family				Multi-Family				Hotel / Motel			
	Autos/DU				Autos/DU				Autos/DU		
Pers/DU	0	1	2+	Pers/DU	0	1	2+	Pers/DU	0	1	2+
1	0.32	0.62	0.96	1	0.32	0.62	0.92	1	0.38	0.38	0.38
2	0.38	1.38	1.54	2	0.53	1.01	1.42	2	0.92	0.92	0.92
3	0.77	2.49	2.84	3	0.77	2.00	2.70	3	1.62	1.62	1.62
4	1.16	3.52	4.31	4	1.16	2.77	4.08	4	2.54	2.54	2.54
5	1.69	4.93	5.55	5	1.54	3.47	5.01	5	3.38	3.38	3.38



Table 11. Cont'd Trip Generation Production Rates by County

County 3 - Osceola County											
Home Based Work Trip Production Rates											
Single Family				Multi-Family				Hotel / Motel			
	Autos/DU				Autos/DU				Autos/DU		
Pers/DU	0	1	2+	Pers/DU	0	1	2+	Pers/DU	0	1	2+
1	0.29	0.69	1.46	1	0.38	0.87	1.27	1	0.23	0.23	0.23
2	0.49	1.07	1.85	2	0.58	1.07	1.76	2	0.20	0.20	0.20
3	0.87	1.46	2.23	3	0.79	1.46	2.06	3	0.15	0.15	0.15
4	1.18	1.55	2.42	4	0.98	1.55	2.14	4	0.08	0.08	0.08
5	1.27	1.65	2.53	5	1.07	1.65	2.23	5	0.08	0.08	0.08
Home Based Shopping Trip Production Rates											
Single Family				Multi-Family				Hotel / Motel			
	Autos/DU				Autos/DU				Autos/DU		
Pers/DU	0	1	2+	Pers/DU	0	1	2+	Pers/DU	0	1	2+
1	0.38	0.58	1.12	1	0.38	0.49	0.79	1	0.29	0.29	0.29
2	0.44	1.07	1.32	2	0.44	1.12	1.37	2	1.27	1.27	1.27
3	0.49	1.27	1.46	3	0.49	1.46	1.79	3	1.93	1.93	1.93
4	0.54	1.40	1.93	4	0.54	1.76	2.05	4	2.42	2.42	2.42
5	0.58	1.46	2.42	5	0.58	1.85	2.19	5	2.81	2.81	2.81
Home Based Social Recreational Trip Production Rates											
Single Family				Multi-Family				Hotel / Motel			
	Autos/DU				Autos/DU				Autos/DU		
Pers/DU	0	1	2+	Pers/DU	0	1	2+	Pers/DU	0	1	2+
1	0.20	0.58	0.58	1	0.29	0.49	0.58	1	0.58	0.58	0.58
2	0.23	0.68	0.73	2	0.34	0.64	0.68	2	1.61	1.61	1.61
3	0.29	0.87	1.03	3	0.38	0.73	0.79	3	2.62	2.62	2.62
4	0.34	1.07	1.21	4	0.44	0.87	1.03	4	3.80	3.80	3.80
5	0.38	1.37	1.51	5	0.49	1.15	1.55	5	5.73	5.73	5.73
Home Based Other Trip Production Rates											
Single Family				Multi-Family				Hotel / Motel			
	Autos/DU				Autos/DU				Autos/DU		
Pers/DU	0	1	2+	Pers/DU	0	1	2+	Pers/DU	0	1	2+
1	0.38	0.79	1.21	1	0.38	0.79	1.15	1	0.49	0.49	0.49
2	0.49	1.76	1.93	2	0.68	1.27	1.79	2	1.15	1.15	1.15
3	0.98	3.17	3.59	3	0.98	2.52	3.40	3	2.05	2.05	2.05
4	1.46	4.47	5.43	4	1.46	3.51	5.15	4	3.22	3.22	3.22
5	2.13	6.22	6.99	5	1.93	4.38	6.31	5	4.28	4.28	4.28



Table 11. Cont'd Trip Generation Production Rates by County

County 4 - Lake County											
Home Based Work Trip Production Rates											
Single Family				Multi-Family				Hotel / Motel			
	Autos/DU				Autos/DU				Autos/DU		
Pers/DU	0	1	2+	Pers/DU	0	1	2+	Pers/DU	0	1	2+
1	0.40	0.50	1.05	1	0.15	0.45	1.20	1	0.25	0.25	0.25
2	0.80	1.10	2.00	2	0.35	0.65	1.55	2	0.20	0.20	0.20
3	1.15	1.50	2.45	3	0.55	0.90	1.85	3	0.15	0.15	0.15
4	1.40	1.75	2.60	4	0.80	1.00	2.05	4	0.10	0.10	0.10
5	1.55	1.90	2.65	5	1.00	1.10	2.15	5	0.10	0.10	0.10
Home Based Shopping Trip Production Rates											
Single Family				Multi-Family				Hotel / Motel			
	Autos/DU				Autos/DU				Autos/DU		
Pers/DU	0	1	2+	Pers/DU	0	1	2+	Pers/DU	0	1	2+
1	0.30	0.80	0.90	1	0.30	0.50	0.65	1	0.30	0.30	0.30
2	0.35	1.05	1.25	2	0.35	1.25	1.40	2	1.30	1.30	1.30
3	0.40	1.20	1.45	3	0.40	1.50	1.65	3	2.00	2.00	2.00
4	0.45	1.30	1.60	4	0.45	1.65	1.85	4	2.50	2.50	2.50
5	0.45	1.30	1.70	5	0.45	1.70	1.95	5	2.90	2.90	2.90
Home Based Social Recreational Trip Production Rates											
Single Family				Multi-Family				Hotel / Motel			
	Autos/DU				Autos/DU				Autos/DU		
Pers/DU	0	1	2+	Pers/DU	0	1	2+	Pers/DU	0	1	2+
1	0.20	0.65	0.85	1	0.30	0.65	0.75	1	0.60	0.60	0.60
2	0.25	0.85	1.05	2	0.35	1.05	1.20	2	1.65	1.65	1.65
3	0.30	1.10	1.30	3	0.40	1.45	1.65	3	2.70	2.70	2.70
4	0.40	1.35	1.65	4	0.45	1.90	2.20	4	3.90	3.90	3.90
5	0.45	1.70	2.10	5	0.55	2.65	3.05	5	5.90	5.90	5.90
Home Based Other Trip Production Rates											
Single Family				Multi-Family				Hotel / Motel			
	Autos/DU				Autos/DU				Autos/DU		
Pers/DU	0	1	2+	Pers/DU	0	1	2+	Pers/DU	0	1	2+
1	0.20	0.60	0.70	1	0.25	0.80	0.95	1	0.50	0.50	0.50
2	0.30	1.10	1.20	2	0.45	1.20	1.50	2	1.20	1.20	1.20
3	0.55	1.85	2.20	3	0.70	1.60	2.30	3	2.10	2.10	2.10
4	1.00	2.75	3.55	4	1.10	2.10	3.40	4	3.30	3.30	3.30
5	1.60	3.95	5.35	5	1.70	3.00	4.65	5	4.40	4.40	4.40



Table 11. Cont'd Trip Generation Production Rates by County

County 5 - Volusia County											
Home Based Work Trip Production Rates											
Without Children					With Children					Hotel/Motel	
Workers					Workers						
Autos	1	2	3	4+	Autos	1	2	3	4+	Units	Rates
0	0	1.080	2.898	0	0	0	1.080	2.268	0	0	0.356
1	0	1.204	3.231	0	1	0	1.187	2.493	0	1	0.356
2	0	1.440	3.864	0	2	0	1.440	3.024	0	2	0.356
3	0	1.800	4.830	0	3	0	1.800	3.780	0	3	0.356
Home Based Shopping Trip Production Rates											
Without Children					With Children					Hotel/Motel	
Persons					Persons						
Autos	1	2	3	4+	Autos	1	2	3	4+	Units	Rates
0	0.095	0.254	0.413	0.636	0	0	0.400	0.600	0.750	0	0.600
1	0.170	0.454	0.737	1.134	1	0	0.480	0.720	0.900	1	0.600
2	0.240	0.640	1.040	1.600	2	0	0.600	0.900	1.125	2	0.600
3	0.300	0.800	1.300	2.000	3	0	0.724	1.086	1.358	3	0.600
Home Based Social Recreational Trip Production Rates											
Without Children					With Children					Hotel/Motel	
Persons					Persons						
Autos	1	2	3	4+	Autos	1	2	3	4+	Units	Rates
0	0.050	0.080	0.140	0.250	0	0	0.160	0.240	0.360	0	4.915
1	0.100	0.160	0.280	0.500	1	0	0.350	0.524	0.787	1	4.915
2	0.147	0.235	0.412	0.735	2	0	0.520	0.780	1.170	2	4.915
3	0.250	0.400	0.700	1.250	3	0	0.748	1.122	1.683	3	4.915
Home Based School Trip Production Rates											
Without Children					With Children					Hotel/Motel	
Persons					Persons						
Autos	1	2	3	4+	Autos	1	2	3	4+	Units	Rates
0	0.205	0.273	0.512	1.023	0	0	0.528	0.858	1.320	0	0
1	0.214	0.286	0.536	1.071	1	0	0.640	1.040	1.600	1	0
2	0.235	0.313	0.587	1.173	2	0	0.780	1.268	1.950	2	0
3	0.329	0.438	0.822	1.644	3	0	0.982	1.595	2.454	3	0
Home Based Other Trip Production Rates											
Without Children					With Children					Hotel/Motel	
Persons					Persons						
Autos	1	2	3	4+	Autos	1	2	3	4+	Units	Rates
0	0.472	0.942	1.766	2.355	0	0	1.394	2.090	2.787	0	0.450
1	0.493	0.987	1.849	2.466	1	0	1.664	2.496	3.328	1	0.450
2	0.539	1.079	2.024	2.698	2	0	2.059	3.089	4.118	2	0.450
3	0.756	1.511	2.835	3.779	3	0	2.591	3.886	5.182	3	0.450



Non-Home Based Work Trip Production Rates											
Without Children					With Children					Hotel/Motel	
Workers					Workers						
Autos	1	2	3	4+	Autos	1	2	3	4+	Units	Rates
0	0	0.450	0.900	0	0	0	0.625	1.125	0	0	0.237
1	0	0.675	1.350	0	1	0	0.752	1.354	0	1	0.237
2	0	0.855	1.710	0	2	0	0.828	1.490	0	2	0.237
3	0	0.979	1.958	0	3	0	0.856	1.541	0	3	0.237

Non-Home Based Other Trip Production Rates											
Without Children					With Children					Hotel/Motel	
Persons					Persons						
Autos	1	2	3	4+	Autos	1	2	3	4+	Units	Rates
0	0.282	0.451	0.789	1.409	0	0	1.575	2.363	2.954	0	1.640
1	0.423	0.677	1.184	2.115	1	0	1.895	2.842	3.553	1	1.640
2	0.526	0.857	1.500	2.678	2	0	2.085	3.128	3.910	2	1.640
3	0.613	0.981	1.717	3.066	3	0	2.157	3.235	4.045	3	1.640



Table 11. Cont'd Trip Generation Production Rates by County

County 6 - Brevard County											
Home Based Work Trip Production Rates											
Single Family				Multi-Family				Hotel / Motel			
	Autos/DU				Autos/DU				Autos/DU		
Pers/DU	0	1	2+	Pers/DU	0	1	2+	Pers/DU	0	1	2+
1	0.44	0.55	1.16	1	0.17	0.50	1.32	1	0.28	0.28	0.28
2	0.88	1.21	2.20	2	0.39	0.71	1.71	2	0.22	0.22	0.22
3	1.26	1.65	2.69	3	0.60	0.99	2.04	3	0.17	0.17	0.17
4	1.54	1.93	2.86	4	0.88	1.10	2.25	4	0.11	0.11	0.11
5	1.71	2.09	2.92	5	1.10	1.21	2.37	5	0.11	0.11	0.11
Home Based Shopping Trip Production Rates											
Single Family				Multi-Family				Hotel / Motel			
	Autos/DU				Autos/DU				Autos/DU		
Pers/DU	0	1	2+	Pers/DU	0	1	2+	Pers/DU	0	1	2+
1	0.33	0.88	0.99	1	0.33	0.55	0.71	1	0.33	0.33	0.33
2	0.39	1.16	1.38	2	0.39	1.38	1.54	2	1.43	1.43	1.43
3	0.44	1.32	1.60	3	0.44	1.65	1.81	3	2.20	2.20	2.20
4	0.50	1.43	1.76	4	0.50	1.81	2.04	4	2.75	2.75	2.75
5	0.50	1.43	1.87	5	0.50	1.87	2.15	5	3.19	3.19	3.19
Home Based Social Recreational Trip Production Rates											
Single Family				Multi-Family				Hotel / Motel			
	Autos/DU				Autos/DU				Autos/DU		
Pers/DU	0	1	2+	Pers/DU	0	1	2+	Pers/DU	0	1	2+
1	0.22	0.71	0.94	1	0.33	0.71	0.82	1	0.66	0.66	0.66
2	0.28	0.94	1.16	2	0.39	1.16	1.32	2	1.81	1.81	1.81
3	0.33	1.21	1.43	3	0.44	1.60	1.81	3	2.97	2.97	2.97
4	0.44	1.49	1.81	4	0.50	2.09	2.42	4	4.29	4.29	4.29
5	0.50	1.87	2.31	5	0.60	2.92	3.36	5	6.49	6.49	6.49
Home Based Other Trip Production Rates											
Single Family				Multi-Family				Hotel / Motel			
	Autos/DU				Autos/DU				Autos/DU		
Pers/DU	0	1	2+	Pers/DU	0	1	2+	Pers/DU	0	1	2+
1	0.22	0.66	0.77	1	0.28	0.88	1.04	1	0.55	0.55	0.55
2	0.33	1.21	1.32	2	0.50	1.32	1.65	2	1.32	1.32	1.32
3	0.60	2.04	2.42	3	0.77	1.76	2.53	3	2.31	2.31	2.31
4	1.10	3.02	3.90	4	1.21	2.31	3.74	4	3.63	3.63	3.63
5	1.76	4.34	5.88	5	1.87	3.30	5.12	5	4.84	4.84	4.84



Table 11. Cont'd Trip Generation Production Rates by County

County 7 - Marion County											
Home Based Work Trip Production Rates											
Single Family				Multi-Family				Hotel / Motel			
	Autos/DU				Autos/DU				Autos/DU		
Pers/DU	0	1	2+	Pers/DU	0	1	2+	Pers/DU	0	1	2+
1	0.40	0.50	1.05	1	0.15	0.45	1.20	1	0.25	0.25	0.25
2	0.80	1.10	2.00	2	0.35	0.65	1.55	2	0.20	0.20	0.20
3	1.15	1.50	2.45	3	0.55	0.90	1.85	3	0.15	0.15	0.15
4	1.40	1.75	2.60	4	0.80	1.00	2.05	4	0.10	0.10	0.10
5	1.55	1.90	2.65	5	1.00	1.10	2.15	5	0.10	0.10	0.10
Home Based Shopping Trip Production Rates											
Single Family				Multi-Family				Hotel / Motel			
	Autos/DU				Autos/DU				Autos/DU		
Pers/DU	0	1	2+	Pers/DU	0	1	2+	Pers/DU	0	1	2+
1	0.30	0.80	0.90	1	0.30	0.50	0.65	1	0.30	0.30	0.30
2	0.35	1.05	1.25	2	0.35	1.25	1.40	2	1.30	1.30	1.30
3	0.40	1.20	1.45	3	0.40	1.50	1.65	3	2.00	2.00	2.00
4	0.45	1.30	1.60	4	0.45	1.65	1.85	4	2.50	2.50	2.50
5	0.45	1.30	1.70	5	0.45	1.70	1.95	5	2.90	2.90	2.90
Home Based Social Recreational Trip Production Rates											
Single Family				Multi-Family				Hotel / Motel			
	Autos/DU				Autos/DU				Autos/DU		
Pers/DU	0	1	2+	Pers/DU	0	1	2+	Pers/DU	0	1	2+
1	0.20	0.65	0.85	1	0.30	0.65	0.75	1	0.60	0.60	0.60
2	0.25	0.85	1.05	2	0.35	1.05	1.20	2	1.65	1.65	1.65
3	0.30	1.10	1.30	3	0.40	1.45	1.65	3	2.70	2.70	2.70
4	0.40	1.35	1.65	4	0.45	1.90	2.20	4	3.90	3.90	3.90
5	0.45	1.70	2.10	5	0.55	2.65	3.05	5	5.90	5.90	5.90
Home Based Other Trip Production Rates											
Single Family				Multi-Family				Hotel / Motel			
	Autos/DU				Autos/DU				Autos/DU		
Pers/DU	0	1	2+	Pers/DU	0	1	2+	Pers/DU	0	1	2+
1	0.20	0.60	0.70	1	0.25	0.80	0.95	1	0.50	0.50	0.50
2	0.30	1.10	1.20	2	0.45	1.20	1.50	2	1.20	1.20	1.20
3	0.55	1.85	2.20	3	0.70	1.60	2.30	3	2.10	2.10	2.10
4	1.00	2.75	3.55	4	1.10	2.10	3.40	4	3.30	3.30	3.30
5	1.60	3.95	5.35	5	1.70	3.00	4.65	5	4.40	4.40	4.40



Table 11. Cont'd Trip Generation Production Rates by County

County 8 - Sumter County											
Home Based Work Trip Production Rates											
Single Family				Multi-Family				Hotel / Motel			
	Autos/DU				Autos/DU				Autos/DU		
Pers/DU	0	1	2+	Pers/DU	0	1	2+	Pers/DU	0	1	2+
1	0.32	0.40	0.84	1	0.12	0.36	0.96	1	0.20	0.20	0.20
2	0.64	0.88	1.60	2	0.28	0.52	1.24	2	0.16	0.16	0.16
3	0.92	1.20	1.96	3	0.44	0.72	1.48	3	0.12	0.12	0.12
4	1.12	1.40	2.08	4	0.64	0.80	1.64	4	0.08	0.08	0.08
5	1.24	1.52	2.12	5	0.80	0.88	1.72	5	0.08	0.08	0.08
Home Based Shopping Trip Production Rates											
Single Family				Multi-Family				Hotel / Motel			
	Autos/DU				Autos/DU				Autos/DU		
Pers/DU	0	1	2+	Pers/DU	0	1	2+	Pers/DU	0	1	2+
1	0.24	0.64	0.72	1	0.24	0.40	0.52	1	0.24	0.24	0.24
2	0.28	0.84	1.00	2	0.28	1.00	1.12	2	1.04	1.04	1.04
3	0.32	0.96	1.16	3	0.32	1.20	1.32	3	1.60	1.60	1.60
4	0.36	1.04	1.28	4	0.36	1.32	1.48	4	2.00	2.00	2.00
5	0.36	1.04	1.36	5	0.36	1.36	1.56	5	2.32	2.32	2.32
Home Based Social Recreational Trip Production Rates											
Single Family				Multi-Family				Hotel / Motel			
	Autos/DU				Autos/DU				Autos/DU		
Pers/DU	0	1	2+	Pers/DU	0	1	2+	Pers/DU	0	1	2+
1	0.16	0.52	0.68	1	0.24	0.52	0.60	1	0.48	0.48	0.48
2	0.20	0.68	0.84	2	0.28	0.84	0.96	2	1.32	1.32	1.32
3	0.24	0.88	1.04	3	0.32	1.16	1.32	3	2.16	2.16	2.16
4	0.32	1.08	1.32	4	0.36	1.52	1.76	4	3.12	3.12	3.12
5	0.36	1.36	1.68	5	0.44	2.12	2.44	5	4.72	4.72	4.72
Home Based Other Trip Production Rates											
Single Family				Multi-Family				Hotel / Motel			
	Autos/DU				Autos/DU				Autos/DU		
Pers/DU	0	1	2+	Pers/DU	0	1	2+	Pers/DU	0	1	2+
1	0.16	0.48	0.56	1	0.20	0.64	0.76	1	0.40	0.40	0.40
2	0.24	0.88	0.96	2	0.36	0.96	1.20	2	0.96	0.96	0.96
3	0.44	1.48	1.76	3	0.56	1.28	1.84	3	1.68	1.68	1.68
4	0.80	2.20	2.84	4	0.88	1.68	2.72	4	2.64	2.64	2.64
5	1.28	3.16	4.28	5	1.36	2.40	3.72	5	3.52	3.52	3.52



Table 11. Cont'd Trip Generation Production Rates by County

County 9 - Flagler County											
Home Based Work Trip Production Rates											
Single Family				Multi-Family				Hotel / Motel			
	Autos/DU				Autos/DU				Autos/DU		
Pers/DU	0	1	2+	Pers/DU	0	1	2+	Pers/DU	0	1	2+
1	0.40	0.50	1.05	1	0.15	0.45	1.20	1	0.25	0.25	0.25
2	0.80	1.10	2.00	2	0.35	0.65	1.55	2	0.20	0.20	0.20
3	1.15	1.50	2.45	3	0.55	0.90	1.85	3	0.15	0.15	0.15
4	1.40	1.75	2.60	4	0.80	1.00	2.05	4	0.10	0.10	0.10
5	1.55	1.90	2.65	5	1.00	1.10	2.15	5	0.10	0.10	0.10
Home Based Shopping Trip Production Rates											
Single Family				Multi-Family				Hotel / Motel			
	Autos/DU				Autos/DU				Autos/DU		
Pers/DU	0	1	2+	Pers/DU	0	1	2+	Pers/DU	0	1	2+
1	0.30	0.80	0.90	1	0.30	0.50	0.65	1	0.30	0.30	0.30
2	0.35	1.05	1.25	2	0.35	1.25	1.40	2	1.30	1.30	1.30
3	0.40	1.20	1.45	3	0.40	1.50	1.65	3	2.00	2.00	2.00
4	0.45	1.30	1.60	4	0.45	1.65	1.85	4	2.50	2.50	2.50
5	0.45	1.30	1.70	5	0.45	1.70	1.95	5	2.90	2.90	2.90
Home Based Social Recreational Trip Production Rates											
Single Family				Multi-Family				Hotel / Motel			
	Autos/DU				Autos/DU				Autos/DU		
Pers/DU	0	1	2+	Pers/DU	0	1	2+	Pers/DU	0	1	2+
1	0.20	0.65	0.85	1	0.30	0.65	0.75	1	0.60	0.60	0.60
2	0.25	0.85	1.05	2	0.35	1.05	1.20	2	1.65	1.65	1.65
3	0.30	1.10	1.30	3	0.40	1.45	1.65	3	2.70	2.70	2.70
4	0.40	1.35	1.65	4	0.45	1.90	2.20	4	3.90	3.90	3.90
5	0.45	1.70	2.10	5	0.55	2.65	3.05	5	5.90	5.90	5.90
Home Based Other Trip Production Rates											
Single Family				Multi-Family				Hotel / Motel			
	Autos/DU				Autos/DU				Autos/DU		
Pers/DU	0	1	2+	Pers/DU	0	1	2+	Pers/DU	0	1	2+
1	0.20	0.60	0.70	1	0.25	0.80	0.95	1	0.50	0.50	0.50
2	0.30	1.10	1.20	2	0.45	1.20	1.50	2	1.20	1.20	1.20
3	0.55	1.85	2.20	3	0.70	1.60	2.30	3	2.10	2.10	2.10
4	1.00	2.75	3.55	4	1.10	2.10	3.40	4	3.30	3.30	3.30
5	1.60	3.95	5.35	5	1.70	3.00	4.65	5	4.40	4.40	4.40



Table 11. Cont'd Trip Generation Production Rates by County

County 10 - Polk County											
Home Based Work Trip Production Rates											
Single Family				Multi-Family				Hotel / Motel			
	Autos/DU				Autos/DU				Autos/DU		
Pers/DU	0	1	2+	Pers/DU	0	1	2+	Pers/DU	0	1	2+
1	0.07	0.17	0.36	1	0.10	0.22	0.31	1	0.06	0.06	0.06
2	0.12	0.26	0.46	2	0.14	0.26	0.43	2	0.05	0.05	0.05
3	0.22	0.36	0.55	3	0.19	0.36	0.50	3	0.04	0.04	0.04
4	0.29	0.38	0.60	4	0.24	0.38	0.53	4	0.02	0.02	0.02
5	0.31	0.41	0.62	5	0.26	0.41	0.55	5	0.02	0.02	0.02
Home Based Shopping Trip Production Rates											
Single Family				Multi-Family				Hotel / Motel			
	Autos/DU				Autos/DU				Autos/DU		
Pers/DU	0	1	2+	Pers/DU	0	1	2+	Pers/DU	0	1	2+
1	0.10	0.14	0.28	1	0.10	0.12	0.19	1	0.07	0.07	0.07
2	0.11	0.26	0.33	2	0.11	0.28	0.34	2	0.31	0.31	0.31
3	0.12	0.31	0.36	3	0.12	0.36	0.45	3	0.48	0.48	0.48
4	0.14	0.35	0.48	4	0.14	0.43	0.50	4	0.60	0.60	0.60
5	0.14	0.36	0.60	5	0.14	0.46	0.54	5	0.70	0.70	0.70
Home Based Social Recreational Trip Production Rates											
Single Family				Multi-Family				Hotel / Motel			
	Autos/DU				Autos/DU				Autos/DU		
Pers/DU	0	1	2+	Pers/DU	0	1	2+	Pers/DU	0	1	2+
1	0.05	0.14	0.14	1	0.07	0.12	0.14	1	0.14	0.14	0.14
2	0.06	0.17	0.18	2	0.08	0.16	0.17	2	0.40	0.40	0.40
3	0.07	0.22	0.24	3	0.10	0.18	0.19	3	0.65	0.65	0.65
4	0.08	0.26	0.30	4	0.11	0.22	0.26	4	0.94	0.94	0.94
5	0.10	0.34	0.38	5	0.12	0.29	0.38	5	1.42	1.42	1.42
Home Based Other Trip Production Rates											
Single Family				Multi-Family				Hotel / Motel			
	Autos/DU				Autos/DU				Autos/DU		
Pers/DU	0	1	2+	Pers/DU	0	1	2+	Pers/DU	0	1	2+
1	0.10	0.19	0.30	1	0.10	0.19	0.29	1	0.12	0.12	0.12
2	0.12	0.43	0.48	2	0.17	0.31	0.45	2	0.29	0.29	0.29
3	0.24	0.78	0.90	3	0.24	0.62	0.85	3	0.50	0.50	0.50
4	0.36	1.11	1.35	4	0.36	0.86	1.28	4	0.79	0.79	0.79
5	0.53	1.54	1.64	5	0.48	1.09	1.57	5	1.06	1.06	1.06



Table 11. Cont'd Trip Generation Production Rates by County

County 11 - Indian River County											
Home Based Work Trip Production Rates											
Single Family				Multi-Family				Hotel / Motel			
	Autos/DU				Autos/DU				Autos/DU		
Pers/DU	0	1	2+	Pers/DU	0	1	2+	Pers/DU	0	1	2+
1	0.32	0.40	0.84	1	0.12	0.36	0.96	1	0.20	0.20	0.20
2	0.64	0.88	1.60	2	0.28	0.52	1.24	2	0.16	0.16	0.16
3	0.92	1.20	1.96	3	0.44	0.72	1.48	3	0.12	0.12	0.12
4	1.12	1.40	2.08	4	0.64	0.80	1.64	4	0.08	0.08	0.08
5	1.24	1.52	2.12	5	0.80	0.88	1.72	5	0.08	0.08	0.08
Home Based Shopping Trip Production Rates											
Single Family				Multi-Family				Hotel / Motel			
	Autos/DU				Autos/DU				Autos/DU		
Pers/DU	0	1	2+	Pers/DU	0	1	2+	Pers/DU	0	1	2+
1	0.24	0.64	0.72	1	0.24	0.40	0.52	1	0.24	0.24	0.24
2	0.28	0.84	1.00	2	0.28	1.00	1.12	2	1.04	1.04	1.04
3	0.32	0.96	1.16	3	0.32	1.20	1.32	3	1.60	1.60	1.60
4	0.36	1.04	1.28	4	0.36	1.32	1.48	4	2.00	2.00	2.00
5	0.36	1.04	1.36	5	0.36	1.36	1.56	5	2.32	2.32	2.32
Home Based Social Recreational Trip Production Rates											
Single Family				Multi-Family				Hotel / Motel			
	Autos/DU				Autos/DU				Autos/DU		
Pers/DU	0	1	2+	Pers/DU	0	1	2+	Pers/DU	0	1	2+
1	0.16	0.52	0.68	1	0.24	0.52	0.60	1	0.48	0.48	0.48
2	0.20	0.68	0.84	2	0.28	0.84	0.96	2	1.32	1.32	1.32
3	0.24	0.88	1.04	3	0.32	1.16	1.32	3	2.16	2.16	2.16
4	0.32	1.08	1.32	4	0.36	1.52	1.76	4	3.12	3.12	3.12
5	0.36	1.36	1.68	5	0.44	2.12	2.44	5	4.72	4.72	4.72
Home Based Other Trip Production Rates											
Single Family				Multi-Family				Hotel / Motel			
	Autos/DU				Autos/DU				Autos/DU		
Pers/DU	0	1	2+	Pers/DU	0	1	2+	Pers/DU	0	1	2+
1	0.16	0.48	0.56	1	0.20	0.64	0.76	1	0.40	0.40	0.40
2	0.24	0.88	0.96	2	0.36	0.96	1.20	2	0.96	0.96	0.96
3	0.44	1.48	1.76	3	0.56	1.28	1.84	3	1.68	1.68	1.68
4	0.80	2.20	2.84	4	0.88	1.68	2.72	4	2.64	2.64	2.64
5	1.28	3.16	4.28	5	1.36	2.40	3.72	5	3.52	3.52	3.52



Table 12. Trip Generation User Specified Attraction Rates by County

County 1 - Seminole County						
Purpose	Ind. Emp.	Com. Emp.	Ser. Emp.	Total Emp.	Total DUs	School Enr.
HBW	0	0	0	1.74	0	0
HBSH	0	5.90	0	0	0	0
HBSR	0	1.45	1.45	0	0.48	0
HBO	0	1.26	1.26	0	0.20	1.26
NHB	0	2.81	1.36	0	0.30	0
Truck/Taxi	0	0	0	0.41	0.30	0

County 2 - Orange County						
Purpose	Ind. Emp.	Com. Emp.	Ser. Emp.	Total Emp.	Total DUs	School Enr.
HBW	0	0	0	1.74	0	0
HBSH	0	5.89	0	0	0	0
HBSR	0	1.46	1.46	0	0.49	0
HBO	0	1.26	1.26	0	0.20	1.26
NHB	0	2.81	1.70	0	0.29	0
Truck/Taxi	0	0	0	0.43	0.29	0

County 3 - Osceola County						
Purpose	Ind. Emp.	Com. Emp.	Ser. Emp.	Total Emp.	Total DUs	School Enr.
HBW	0	0	0	2.62	0	0
HBSH	0	8.84	0	0	0	0
HBSR	0	2.17	2.17	0	0.73	0
HBO	0	1.88	1.88	0	0.29	1.88
NHB	0	4.20	2.03	0	0.44	0
Truck/Taxi	0	0	0	0.65	0.44	0

County 4 - Lake County						
Purpose	Ind. Emp.	Com. Emp.	Ser. Emp.	Total Emp.	Total DUs	School Enr.
HBW	0	0	0	1.80	0	0
HBSH	0	6.10	0	0	0	0
HBSR	0	1.50	1.50	0	0.50	0
HBO	0	1.30	1.30	0	0.20	1.30
NHB	0	2.90	1.40	0	0.30	0
Truck/Taxi	0	0	0	0.45	0.30	0



Table 12. Cont'd Trip Generation User Specified Attraction Rates by County

County 5 - Volusia County								
Trip Purpose	Area Type	Ind. Emp.	Com. Emp.	Ser. Emp.	Total Emp.	School Enr.	Occ. DU	Occ. H/M
HBW	CBD	1.905	1.745	1.800	0	0	0	0
HBSH	CBD	0	1.032	0.035	0	0	0	0
HBSR	CBD	0	0.832	0.249	0	0	0.504	0.504
HBSC	CBD	0	0	0	0	1.850	0	0
HBO	CBD	0	2.467	0.661	0	0	1.006	1.006
NHBW	CBD	0.157	1.311	0.603	0	0	0.368	0.368
NHBO	CBD	0.185	1.863	0.657	0	0	0.491	0.491
AIRP	CBD	0	0	0	0.081	0	0.050	0.967
4TIRE	CBD	0.142	0.116	0.064	0	0	0.025	0
SUNIT	CBD	0.275	0.241	0.092	0	0	0.074	0
COMB	CBD	0.149	0.070	0.025	0	0	0.029	0
HBW	High Density	1.905	1.745	1.800	0	0	0	0
HBSH	High Density	0	2.993	0.112	0	0	0	0
HBSR	High Density	0	2.173	1.053	0	0	0.685	0.685
HBSC	High Density	0	0	0	0	1.850	0	0
HBO	High Density	0	1.544	3.892	0	0	0.354	0.354
NHBW	High Density	0.157	3.263	1.338	0	0	0.051	0.051
NHBO	High Density	0.135	4.652	1.807	0	0	0.718	0.718
AIRP	High Density	0	0	0	0.081	0	0.050	0.967
4TIRE	High Density	0.142	0.116	0.064	0	0	0.025	0
SUNIT	High Density	0.275	0.241	0.092	0	0	0.074	0
COMB	High Density	0.149	0.070	0.025	0	0	0.029	0
HBW	Medium Density	1.905	1.745	1.800	0	0	0	0
HBSH	Medium Density	0	2.809	0.332	0	0	0	0
HBSR	Medium Density	0	0.574	0.809	0	0	0.333	0.333
HBSC	Medium Density	0	0	0	0	1.850	0	0
HBO	Medium Density	0	1.777	2.585	0	0	0.394	0.394
NHBW	Medium Density	0.180	1.158	0.764	0	0	0.124	0.124
NHBO	Medium Density	0.169	2.728	1.222	0	0	0.295	0.295
AIRP	Medium Density	0	0	0	0.081	0	0.050	0.967
4TIRE	Medium Density	0.142	0.116	0.064	0	0	0.025	0
SUNIT	Medium Density	0.275	0.241	0.092	0	0	0.074	0
COMB	Medium Density	0.149	0.070	0.025	0	0	0.029	0
HBW	Low Density	1.905	1.745	1.800	0	0	0	0
HBSH	Low Density	0	1.643	0.264	0	0	0	0
HBSR	Low Density	0	0.319	0.459	0	0	0.319	0.319
HBSC	Low Density	0	0	0	0	1.850	0	0
HBO	Low Density	0	1.109	1.297	0	0	0.483	0.483
NHBW	Low Density	0.141	0.962	0.522	0	0	0.193	0.193
NHBO	Low Density	0.075	1.888	0.771	0	0	0.334	0.334
AIRP	Low Density	0	0	0	0.081	0	0.050	0.967



County 5 - Volusia County								
Trip Purpose	Area Type	Ind. Emp.	Com. Emp.	Ser. Emp.	Total Emp.	School Enr.	Occ. DU	Occ. H/M
4TIRE	Low Density	0.142	0.116	0.064	0	0	0.025	0
SUNIT	Low Density	0.275	0.241	0.092	0	0	0.074	0
COMB	Low Density	0.149	0.070	0.025	0	0	0.029	0
HBW	Very Low Density	1.905	1.745	1.800	0	0	0	0
HBSH	Very Low Density	0	2.363	0.291	0	0	0	0
HBSR	Very Low Density	0	0.506	0.680	0	0	0.335	0.335
HBSC	Very Low Density	0	0	0	0	1.850	0	0
HBO	Very Low Density	0	1.559	2.126	0	0	0.408	0.408
NHBW	Very Low Density	0.157	1.113	0.696	0	0	0.133	0.133
NHBO	Very Low Density	0.135	2.431	1.071	0	0	0.304	0.304
AIRP	Very Low Density	0	0	0	0.081	0	0.050	0.967
4TIRE	Very Low Density	0.142	0.116	0.064	0	0	0.025	0
SUNIT	Very Low Density	0.275	0.241	0.092	0	0	0.074	0
COMB	Very Low Density	0.149	0.070	0.025	0	0	0.029	0



Table 12. Cont'd Trip Generation User Specified Attraction Rates by County

County 6 - Brevard County						
Purpose	Ind. Emp.	Com. Emp.	Ser. Emp.	Total Emp.	Total DUs	School Enr.
HBW	0	0	0	1.80	0	0
HBSH	0	6.10	0	0	0	0
HBSR	0	1.50	1.50	0	0.50	0
HBO	0	1.30	1.30	0	0.20	1.30
NHB	0	2.90	1.40	0	0.30	0
Truck/Taxi	0	0	0	0.45	0.30	0

County 7 - Marion County						
Purpose	Ind. Emp.	Com. Emp.	Ser. Emp.	Total Emp.	Total DUs	School Enr.
HBW	0	0	0	1.80	0	0
HBSH	0	6.10	0	0	0	0
HBSR	0	1.50	1.50	0	0.50	0
HBO	0	1.30	1.30	0	0.20	1.30
NHB	0	2.90	1.40	0	0.30	0
Truck/Taxi	0	0	0	0.45	0.30	0

County 8 - Sumter County						
Purpose	Ind. Emp.	Com. Emp.	Ser. Emp.	Total Emp.	Total DUs	School Enr.
HBW	0	0	0	1.80	0	0
HBSH	0	6.10	0	0	0	0
HBSR	0	1.50	1.50	0	0.50	0
HBO	0	1.30	1.30	0	0.20	1.30
NHB	0	2.90	1.40	0	0.30	0
Truck/Taxi	0	0	0	0.45	0.30	0

County 9 - Flagler County						
Purpose	Ind. Emp.	Com. Emp.	Ser. Emp.	Total Emp.	Total DUs	School Enr.
HBW	0	0	0	1.80	0	0
HBSH	0	6.10	0	0	0	0
HBSR	0	1.50	1.50	0	0.50	0
HBO	0	1.30	1.30	0	0.20	1.30
NHB	0	2.90	1.40	0	0.30	0
Truck/Taxi	0	0	0	0.45	0.30	0



Table 12. Cont'd Trip Generation User Specified Attraction Rates by County

County 10 - Polk County						
Purpose	Ind. Emp.	Com. Emp.	Ser. Emp.	Total Emp.	Total DUs	School Enr.
HBW	0	0	0	0.79	0	0
HBSH	0	2.67	0	0	0	0
HBSR	0	0.66	0.66	0	0.22	0
HBO	0	0.57	0.57	0	0.09	0.57
NHB	0	1.27	0.62	0	0.13	0
Truck/Taxi	0	0	0	0.20	0.13	0

County 11 - Indian River County						
Purpose	Ind. Emp.	Com. Emp.	Ser. Emp.	Total Emp.	Total DUs	School Enr.
HBW	0	0	0	1.80	0	0
HBSH	0	6.10	0	0	0	0
HBSR	0	1.50	1.50	0	0.50	0
HBO	0	1.30	1.30	0	0.20	1.30
NHB	0	2.90	1.40	0	0.30	0
Truck/Taxi	0	0	0	0.45	0.30	0

Legend:

- HBW: Home Based Work
- HBSH: Home Based Shopping
- HBSR: Home Based Social Recreation
- HBSC: Home Based School*
- HBO: Home Based Other
- NHB: Non Home Based
- NHBW: Non Home Based Work*
- NHBO: Non Home Based Other*
- AIRP: Airport*
- Truck/Taxi: Truck & Taxi
- 4TIRE: 4-Wheeled Truck*
- SUNIT: Single-Unit Truck*
- COMB: Combination Truck-Trailer*

* Trip attraction purpose exclusive to Volusia County.



Table 13. IE Production Reports

IE Productions			
TAZ	County	Location	Trips
4,501	Indian River County	A1A @ Indian River County Line	13,502
4,502	Indian River County	US 1 @ Indian River County Line	27,351
4,503	Indian River County	58 th Ave @ Indian River County Line	9,600
4,504	Indian River County	66 th Ave @ Indian River County Line	10,655
4,505	Indian River County	82 nd Ave @ Indian River County Line	220
4,506	Indian River County	I-95 @ Indian River County Line	20,439
4,507	Indian River County	CR 512 @ Indian River County Line	879
4,508	Osceola County	SR 60 @ Indian River County Line	2,164
4,509	Osceola County	SR 91 @ Indian River County Line	15,871
4,510	Osceola County	US 441 @ Indian River County Line	1,580
4,511	Osceola County	SR 60 @ Polk County Line	459
4,512	Polk County	SR 17 @ Polk County Line	8,200
4,513	Polk County	US 27 @ Polk County Line	24,099
4,514	Polk County	SR 540 @ Polk County Line	3,501
4,515	Polk County	SR 542 @ Polk County Line	2,302
4,516	Polk County	CR 544 @ Polk County Line	15,201
4,517	Polk County	US 17 @ Polk County Line	24,002
4,518	Polk County	I-4 @ Polk County Line	66,521
4,519	Polk County	SR 33 @ Polk County Line	6,345
4,520	Sumter County	SR 471 @ Polk County Line	3,043
4,521	Sumter County	SR 50 @ Hernando County Line	7,610
4,522	Sumter County	US 301 @ Hernando County Line	4,022
4,523	Sumter County	I-75 @ Hernando County Line	27,026
4,524	Sumter County	CR 476 @ Hernando County Line	4,042
4,525	Sumter County	CR 48 @ Citrus County Line	3,779
4,526	Sumter County	SR 44 @ Citrus County Line	9,789
4,527	Marion County	SR 200 @ Citrus County Line	14,104
4,528	Marion County	US 41 @ Citrus County Line	19,225
4,529	Marion County	SR 40 @ Levy County Line	2,144
4,530	Marion County	CR 336 @ Levy County Line	608
4,531	Marion County	US 41 @ Levy County Line	8,750
4,532	Marion County	SR 464 @ Levy County Line	2,766
4,533	Marion County	CR 326 @ Levy County Line	2,979
4,534	Marion County	US 27 @ Levy County Line	6,786
4,535	Marion County	CR 318 @ Levy County Line	1,724
4,536	Marion County	CR 320 @ Levy County Line	426
4,537	Marion County	CR 329 @ Alachua County Line	1,170
4,538	Marion County	I-75 @ Alachua County Line	34,585
4,539	Marion County	US 441 @ Alachua County Line	7,159
4,540	Marion County	US 301 @ Alachua County Line	6,508
4,541	Marion County	SR 21 @ Putnam County Line	945
4,542	Marion County	CR 315 @ Putnam County Line	4,136
4,543	Marion County	SR 19 @ Putnam County Line	3,262



IE Productions			
TAZ	County	Location	Trips
4,544	Volusia County	US 17 @ Putnam County Line	5,659
4,545	Flagler County	SR 20 @ Putnam County Line	4,632
4,546	Flagler County	CR 13 @ St. Johns County Line	1,516
4,547	Flagler County	I-95 @ St. Johns County Line	36,711
4,548	Flagler County	US 1 @ St. Johns County Line	8,448
4,549	Flagler County	SR A1A @ St. Johns County Line	5,474

In addition to the five standard trip purposes, there are several additional trip purposes that account for other unique trip characteristics within the CFRPM v5.0. These additional trip purposes include truck trips, tourist trips, airport trips, amusement park trips, and others. In all, there are 31 trip purposes in CFRPM v5.0. These trip purposes include:

- External-External (EE),
- External-Internal (EI),
- Home-Based Work (HBW),
- Home-Based Shopping (HBS),
- Home-Based Social Recreational (HBSR),
- Home-Based Other (HBO),
- Non-Home-Based (NHB),
- Light Truck Internal-Internal (LTII),
- Heavy Truck Internal-Internal (HTII),
- Taxi (Taxi),
- Airport Tourist (APT-T),
- Airport Resident (APT-R),
- Airport External-Internal (APT-EI),
- Orange County Convention Center Tourist (OCCC-T),
- Orange County Convention Center Resident (OCCC-R),
- Orange County Convention Center External-Internal (OCCC-EI),
- Universal Orlando Tourist (UNI-T),
- Universal Orlando Resident (UNI-R),
- Universal Orlando External-Internal (UNI-EI),
- SeaWorld Tourist (SEW-T),
- SeaWorld Resident (SEW-R),
- SeaWorld External-Internal (SEW-EI),
- Disney World Tourist (DIS-T),
- Disney World Resident (DIS-R),



- Disney World External-Internal (DIS-EI),
- Kennedy Space Center Tourist (KSC-T),
- Kennedy Space Center Resident (KSC-R),
- Kennedy Space Center External-Internal (KSC-EI),
- Port Canaveral Tourist (PC-T),
- Port Canaveral Resident (PC-R), and
- Port Canaveral External-Internal (PC-EI).

3.5 Trip Generation Subarea Balancing

The CFRPM v4.5 adjusts the number of trip attractions in each TAZ such that the total number of trip attractions for each purpose matches the trip production totals for the same purpose for the entire model. In the CFRPM v4.5 setup, home related trip attractions are balanced to trip productions at the regional level. However, trip balancing can be conducted at the regional level or at a subarea level. Larger models such as the CFRPM, covering nine counties (along with portions of two additional counties) use subareas as a means to stabilize travel patterns. Trips balanced within these subareas produce a more realistic picture of the study area's travel patterns.

For this reason it was decided to use the subarea balancing methodology in the CFRPM v5.0. The technical memorandum *CFRPM Trip Generation Subarea Balance* takes an in-depth look at this process. The subareas were developed based on travel patterns and trip interchanges from the 2000 CTPP Journey to Work data and the 2002 Volusia County Household Travel Survey. This data was used to better understand these cross-area travel patterns and further to define the subareas based on trip purpose.

Figure 7 displays the subareas for the **Home-Based Work (HBW)** trip purpose and the four subareas are listed below:

- Subarea 1: Seminole, Orange, Osceola, South Lake, West Volusia and Polk
- Subarea 2: East Volusia and Flagler
- Subarea 3: Brevard
- Subarea 4: Sumter and North Lake

For the **Home-Based Non Work** trip purpose, which includes Home based Shopping (HBS), Home Based Social-Recreational (HBSR) and Home based Other (HBO), the subarea definitions were modified. **Figure 8** displays the five subareas for the Home-Based Non Work (HBNW), which are listed below:



- Subarea 1: Seminole, Orange, Osceola and Polk,
- Subarea 2: Lake and Sumter,
- Subarea 3: Brevard,
- Subarea 4: Marion, and
- Subarea 5: Volusia and Flagler.

After trip productions and attractions are generated, the trip ends must be balanced. For home based trips, attractions are balanced to productions and for non-home based trips, productions are balanced to attractions. The unbalanced and balanced results by subarea for the CFRPM v5.0 are tabulated in **Tables 14, 15, 16 and 17.**

Table 14. HBW Subarea Balanced Results

HBW Subarea Balanced Results				
Area	Productions	Unbalanced Attractions	Balanced Attractions	Balancing Factors
Seminole	156,323	373,212	190,820	0.511
Orange	528,436	1,384,960	708,117	0.511
Osceola	167,332	202,842	103,711	0.511
South Lake	90,861	63,652	32,545	0.511
Volusia	125,474	75,492	38,598	0.511
Polk	14,319	17,513	8,954	0.511
SUBAREA 1	1,082,745	2,117,671	1,082,745	0.511
Volusia	202,461	178,022	211,457	1.188
Flagler	56,669	40,135	47,673	1.188
SUBAREA 2	259,130	218,157	259,130	1.188
Brevard	386,775	499,679	393,349	0.787
Indian River	21,362	18,786	14,788	0.787
SUBAREA 3	408,137	518,465	408,137	0.787
North Lake	88,626	119,209	105,237	0.883
Marion	196,327	214,447	189,312	0.883
Sumter	33,880	27,508	24,284	0.883
SUBAREA 4	318,833	361,164	318,833	0.883

The balanced trip productions and attractions by trip purpose and County are tabulated in **Table 18.**



Figure 7. 2005 Base Year CFRPM HBW Trip Balancing Subareas

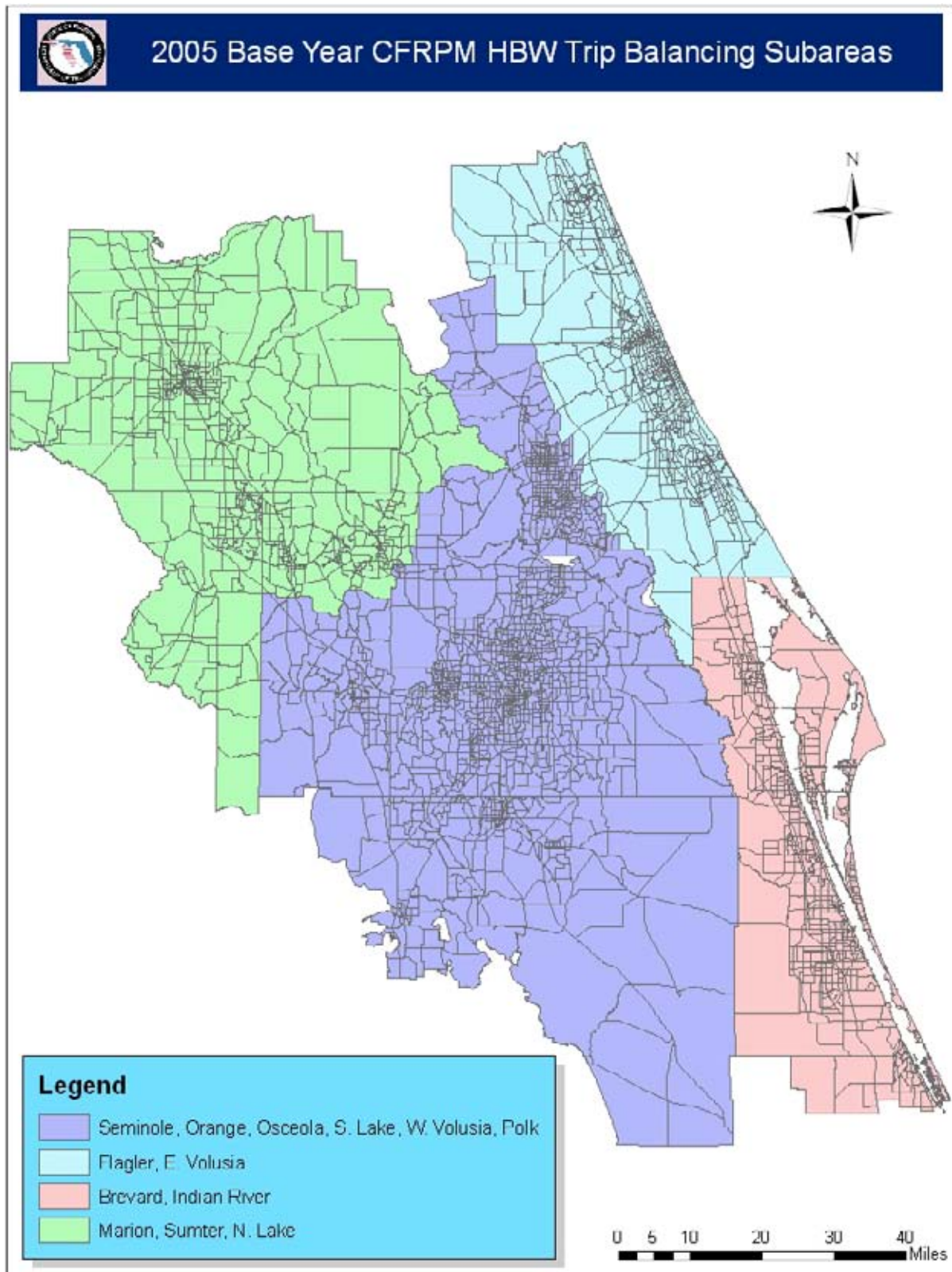




Table 15. HBSH Subarea Balanced Results

HBSH Subarea Balanced Results				
Area	Productions	Unbalanced Attractions	Balanced Attractions	Balancing Factors
Seminole	126,827	334,891	180,092	0.538
Orange	514,453	990,872	532,854	0.538
Osceola	172,548	195,525	105,146	0.538
Polk	12,213	14,783	7,950	0.538
SUBAREA 1	826,041	1,536,071	826,041	0.538
Lake	139,500	148,134	145,728	0.984
Sumter	25,762	19,857	19,534	0.984
SUBAREA 2	165,262	167,991	165,262	0.984
Brevard	306,233	331,192	310,353	0.937
Indian River	16,715	13,441	12,595	0.937
SUBAREA 3	322,948	344,633	322,948	0.937
Marion	156,500	173,527	156,500	0.902
SUBAREA 4	156,500	173,527	156,500	0.902
Volusia	144,051	144,064	146,244	1.015
Flagler	42,616	39,821	40,423	1.015
SUBAREA 5	186,667	183,885	186,667	1.015

Table 16. HBSR Subarea Balanced Results

HBSR Subarea Balanced Results				
Area	Productions	Unbalanced Attractions	Balanced Attractions	Balancing Factors
Seminole	80,565	343,304	119,743	0.349
Orange	407,118	1,250,105	436,032	0.349
Osceola	145,100	222,432	77,583	0.349
Polk	7,903	21,009	7,328	0.349
SUBAREA 1	640,686	1,836,850	640,686	0.349
Lake	133,264	187,010	134,849	0.721
Sumter	24,895	32,326	23,310	0.721
SUBAREA 2	158,159	219,336	158,159	0.721
Brevard	299,316	462,692	301,894	0.652
Indian River	16,439	21,244	13,861	0.652
SUBAREA 3	315,755	483,936	315,755	0.652
Marion	152,177	209,143	152,177	0.728
SUBAREA 4	152,177	209,143	152,177	0.728
Volusia	179,297	168,359	172,250	1.023
Flagler	42,184	48,119	49,231	1.023
SUBAREA 5	221,481	216,478	221,481	1.023



Table 17. HBO Subarea Balanced Results

HBO Subarea Balanced Results				
Area	Productions	Unbalanced Attractions	Balanced Attractions	Balancing Factors
Seminole	266,780	381,500	304,592	0.798
Orange	990,867	1,359,394	1,085,349	0.798
Osceola	343,638	275,218	219,736	0.798
Polk	24,817	20,572	16,425	0.798
SUBAREA 1	1,626,102	2,036,684	1,626,102	0.798
Lake	198,386	191,616	205,379	1.072
Sumter	40,795	31,537	33,802	1.072
SUBAREA 2	239,181	223,153	239,181	1.072
Brevard	439,657	499,089	445,850	0.893
Indian River	24,974	21,024	18,781	0.893
SUBAREA 3	464,631	520,113	464,631	0.893
Marion	226,860	221,762	226,860	1.023
SUBAREA 4	226,860	221,762	226,860	1.023
Volusia	429,161	429,160	448,469	1.045
Flagler	67,698	46,307	48,390	1.045
SUBAREA 5	496,859	475,467	496,859	1.045



Figure 8. 2005 Base Year CFRPM HBNW Trip Balancing Subareas

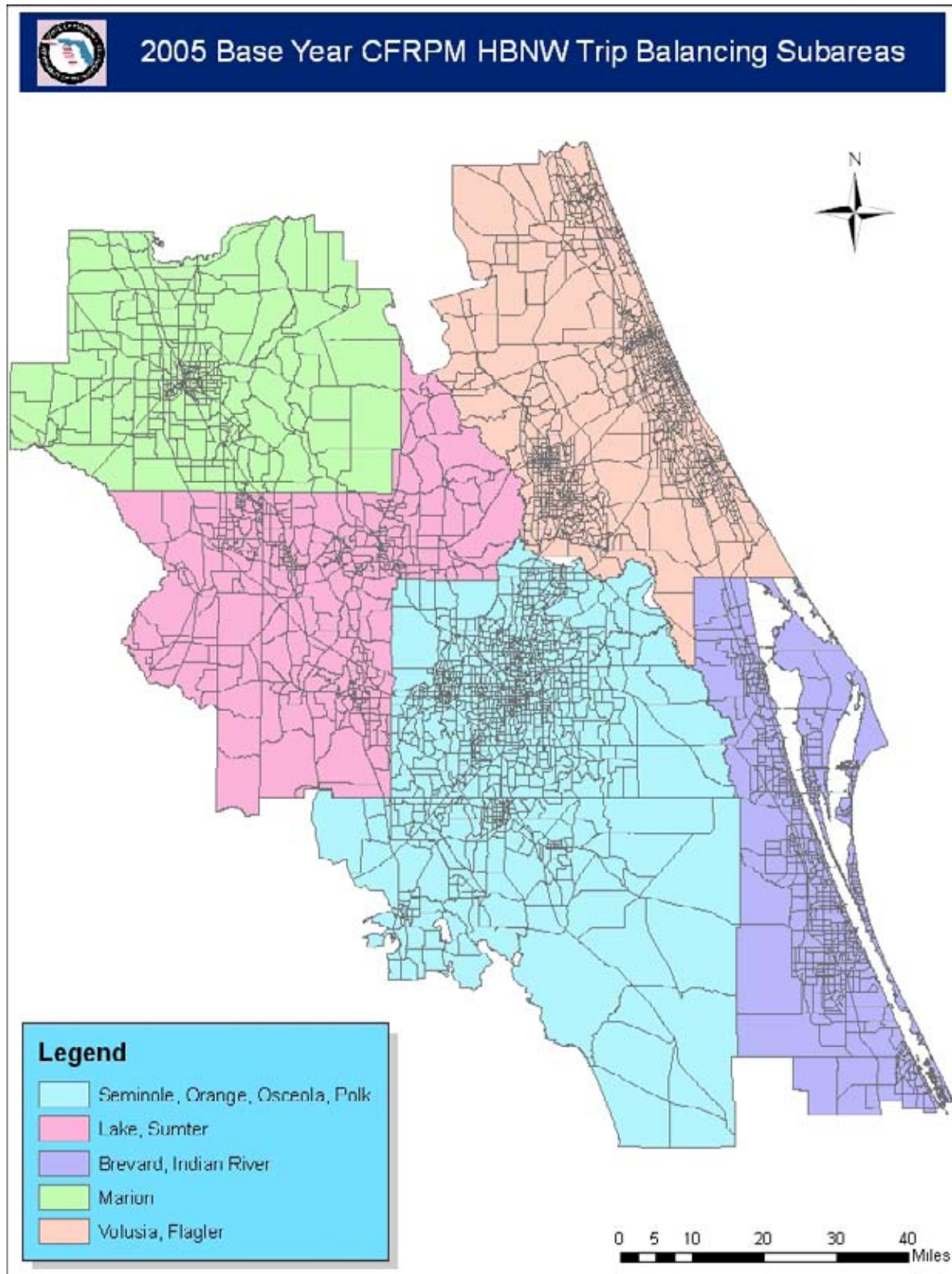




Table 18. Trip Generation Summary Report

Trip Purpose	Seminole	Orange	Osceola	Lake	Volusia	Brevard	Marion	Sumter	Flagler	Polk	Indian River	Total
Productions												
HBW	156,323	528,436	167,332	179,487	327,935	386,775	196,327	33,880	56,669	14,319	21,362	2,068,845
HBSH	126,827	514,453	172,548	139,500	144,051	306,233	156,500	25,762	42,616	12,213	16,715	1,657,418
HBSR	80,565	407,118	145,100	133,264	179,297	299,316	152,177	24,895	42,184	7,903	16,439	1,488,258
HBO	266,780	990,867	343,638	198,386	429,161	439,657	226,860	40,795	67,698	24,817	24,974	3,053,633
NHB	378,344	1,565,688	230,249	189,470	500,402	475,484	213,910	30,157	48,099	20,034	19,706	3,671,543
LTK	121,858	396,432	79,710	71,873	133,840	166,328	83,846	13,338	18,904	18,665	9,462	1,114,256
HTK	26,366	81,559	15,442	16,143	27,000	35,376	23,490	4,332	7,046	7,141	3,710	247,605
TAXI	1,401	4,755	956	840	1,567	1,979	968	157	220	104	108	13,055
EI	0	0	17,394	0	5,645	0	115,440	59,084	54,094	145,114	82,097	478,868
Total	1,158,464	4,489,308	1,172,369	928,963	1,748,898	2,111,148	1,169,518	232,400	337,530	250,310	194,573	13,793,481
Attractions												
HBW	190,820	708,117	103,711	137,781	250,055	393,349	189,312	24,284	47,673	8,954	14,788	2,068,845
HBSH	180,092	532,854	105,146	145,728	146,244	310,353	156,500	19,534	40,423	7,950	12,595	1,657,418
HBSR	119,743	436,032	77,583	134,849	172,250	301,894	152,177	23,310	49,231	7,328	13,861	1,488,258
HBO	304,592	1,085,349	219,736	205,379	448,468	445,850	226,860	33,802	48,390	16,425	18,781	3,053,633
NHB	378,344	1,576,868	231,029	189,470	500,411	470,484	213,910	30,157	48,099	20,034	19,706	3,678,512
LTK	121,858	396,432	79,710	71,873	133,840	166,328	83,846	13,338	18,904	18,665	9,462	1,114,256
HTK	26,366	81,559	15,442	16,143	27,000	35,376	23,490	4,332	7,046	7,141	3,710	247,605
TAXI	1,401	4,755	956	840	1,567	1,979	968	157	220	104	108	13,055
EI	10,628	23,204	20,240	27,340	33,829	23,999	118,343	44,713	47,158	72,883	56,522	478,859
Total	1,333,844	4,845,169	853,554	929,403	1,713,664	2,149,611	1,165,406	193,627	307,145	159,484	149,534	13,800,441

3.6 Special Attraction Application

Visitors and tourists, or non-resident trips, have a tremendous impact on the transportation system throughout the Central Florida area. In 2002, a Regional Study on Tourism/Commuter Trips was performed by FDOT District 5 to collect travel data to gain a better understanding of the travel habits and patterns of visitors and tourists in the Central Florida area. This data has been incorporated into the CFRPM v5.0 in the form of a special attraction program, which utilizes the tourism and commuter survey data as an input.

In the CFRPM v5.0, the purpose of the special attraction program is to calculate and categorize visitor trips to the Central Florida attractions for distribution and assignment onto the CFRPM model network. The technical memorandum *CFRPM 5.0 Special Attraction Program* documents the Special Attraction Program in detail. It presents the methodologies used to develop the input files and factors related to the special attraction program based on survey data collected in the Regional Study on Tourism/Commuter Trips.



The following activity centers are considered special attractions and are included in the special attraction program.

- Orlando International Airport,
- Orange County Convention Center,
- Universal Studios,
- Sea World,
- Walt Disney World (Magic Kingdom, Epcot Center, MGM Studios, Animal Kingdom, Blizzard Beach, Typhoon Lagoon and Downtown Disney/Pleasure Island),
- Kennedy Space Center, and
- Port Canaveral.

The input files and factors developed from the Regional Study include percentage splits of tourist trips, resident trips and external trips; the number of total person trips; and the external trip distribution for special attractors. This data was incorporated into the input files *specatr1_yya.dbf* and *spectra2_yya.dbf* of the CFRPM v5.0 special attraction program.

3.7 Truck Application

In the previous version of the CFRPM, version 4.5, truck trips were generated as a single trip purpose. Factors were then applied to convert truck trips into light and heavy truck trips. The truck model in the CFRPM v5.0 has been updated to include two separate truck trip purposes:

- Light Trucks, and
- Heavy Trucks.

The light truck trips in the CFRPM v5.0 are assumed to be equal to the 4-wheeled truck trips, while heavy truck trips are assumed to be equal to the sum of single-unit truck trips and combination tractor-trailer trips. The following input variables are used in the CFRPM v5.0 truck application:

- Industrial Employees,
- Commercial Employees,
- Service Employees, and
- Households.

These input variables are consistent with the simplified quick-response procedure. In addition, all of these input variables are available in the input zonal data (Zdata 1 and Zdata 2) of the model. The trip generation



coefficients for light truck trips and heavy truck trips are shown in **Table 19** and **Table 20** respectively.

Table 19: Generation Rates of Light Truck Trips per unit

Area Type	Industrial Employee	Commercial Employee	Service Employee	Household
CBD	0.1177	0.0947	0.0520	0.0197
High Density	0.1047	0.0850	0.0467	0.0173
Medium Density	0.1290	0.1040	0.0570	0.0217
Low Density	0.1327	0.1077	0.0590	0.0223
Very Low Density	0.1377	0.1123	0.0620	0.0230

Table 20: Generation Rates of Heavy Truck Trips per unit

Area Type	Industrial Employee	Commercial Employee	Service Employee	Household
CBD	0.8077	0.6003	0.2200	0.1830
High Density	0.4127	0.3107	0.1223	0.0953
Medium Density	0.2107	0.1590	0.0663	0.0497
Low Density	0.4377	0.3200	0.1337	0.0983
Very Low Density	1.0797	0.7737	0.3330	0.2430



4.0 Highway Network

The highway network is the next step in the CFRPM v5.0 FSUTMS model chain. It is in this module that highway system characteristics are described and summary statistics are computed. Characteristics such as number of highway links, system miles, roadway classification, number of lanes, speed, and capacity are input into the model. This module uses roadway characteristics to determine the speeds and capacities of each link in the highway system.

The latest version of the Cube Voyager software allows for the utilization of true shape networks, creating a more accurate geographically integrated network. The CFRPM v5.0 network was built as a true-shape GIS-based network, an improvement over previous versions of the model that used a “stick-figure” network to display traffic flowing from one node to another node through the use of straight lines.

The true-shape network improves the accuracy of the model in terms of GIS calculated distances of highway facilities. This improvement results in a travel demand model that performs better and produces more reasonable forecasts. The transition to a GIS-based network will also provide for better integration with future versions of the Cube modeling engine.

The development of the true-shape network began with the year 2000 CFRPM version 4.5 network and included coordination with FDOT District 5 and MPOs/TPOs to include all roadway capacity improvements that were added to the system between 2000 and 2005 to update the highway network to reflect 2005 roadway conditions. These improvements are then used to develop input speeds and capacities for the model.

4.1 Area Type

Area type is a common variable utilized in travel demand modeling and is used in the Trip Generation, Trip Distribution and Highway Assignment modeling steps. Specifically, the “area type” of a TAZ affects trip rates in Trip Generation, terminal times in Trip Distribution and link capacities in Highway Assignment.

Area types are one-digit codes in the model used to distinguish the type of adjacent land use development along a roadway or corridor. Area types represent various land use densities, i.e., urban, transitioning to urban, and rural conditions. The CFRPM v5.0 implemented a new methodology to



assign an area type to a roadway link. Previously area type was “hard coded” to each roadway link using a 2-digit numbering system that allowed for 14 different area types. The new methodology dynamically calculates the “activity density” for each TAZ and then assigns each TAZ an Area Type based on 5 standard land use categories as shown below in **Table 21**. Subsequently, area type is then assigned to each roadway link. Not only does this methodology provide a systematic process in assigning area types to roadway links, it also provides a means of easily mapping area type by TAZ that was not previously available. In addition, each TAZ and link area type will be automatically updated based on future forecasted socioeconomic data, a feature that will be highly beneficial and efficient in forecast year model applications. This process is described in greater detail below.

Table 21. Area Types

Area Type	Description
1	CBD (Old AT = 1, CBD)
2	High Density (Old AT = 2, CBD Fringe)
3	Medium Density (Old AT = 4, Outlying Business District)
4	Low Density (Old AT = 3, Residential)
5	Very Low Density (Old AT = 5, Rural)

Traditionally, the area type of a TAZ is coded manually on network facilities based on existing socio-economic conditions. Subsequently, future year model networks retained the initial area type assigned to the base year network; therefore, making it a static attribute. In reality, land uses are dynamic and change as growth occurs over time. As a result, changes in land use will not be reflected in future year models, which will impact trip generation rates and network link capacities for future years.

To address the area type issue, the CFRPM v5.0 incorporates a dynamic area type calculation into the travel demand model process. The model calculates the area type of a TAZ dynamically. Area types are estimated based upon land use density ratio variables.

Area types are determined through the use of a linear discriminate statistical model, which identifies a linear combination of independent variables that best characterizes the differences among groups, or in this case, area types. The linear regression equation is as follows:

$$D = \beta_0 + \beta_1*(X1) + \beta_2*(X2) + \beta_3*(X3) \dots$$



The value "D" (discriminate scores) in the above equation will differ for each area type classification. The independent variables are listed below:

- Land Use Variables: % Residential, % Commercial / Industrial, % Agricultural / Vacant,
- Density Variables: Dwelling Unit Density, Employment Density, and
- Ratio Variable: Ratio of Employment Density to Dwelling Unit Density.

In Trip Generation, the new area types are used as a means of refining trip generation rates, and in network development they are used to refine highway capacities when building highway skims.

The new dynamic area type is based on the *activity density* within each TAZ. Zonal activity density is determined by examining a number of variables such as population, employment, and land area (acres). When calculating the land area of a TAZ, "non-usable" areas such as water, parks, and right-of-way(s) are excluded. Specifically, activity density is determined using the following equation:

$$\begin{aligned} \text{ADEN}_i &= [\text{POP}_i + \beta * \text{EMP}_i] / \text{AREA}_i \\ &= \text{PDEN}_i + \beta * \text{EDEN}_i \end{aligned}$$

Where:

ADEN_i = activity density in zone i

POP_i = population in zone i

EMP_i = total employment in zone i

AREA_i = total "usable" area of zone i in acres

PDEN_i = population density (population divided by usable area) in zone i

EDEN_i = employment density (employment divided by usable area) in zone i

β = regional population to employment ratio

The new dynamic area type categories are discrete variables based upon an established range(s) of values derived from the aforementioned equation. The CFRPM v5.0 activity density based area types are listed in **Table 22**, along with their associated activity density threshold ranges.

**Table 22. Area Type Activity Density Thresholds**

Area Type	Activity Density (TAZ) Range
1. CBD (Old AT = 1, CBD)	hard coded
2. High Density (Old AT = 2, CBD Fringe)	≥ 35
3. Medium Density (Old AT = 4, Outlying Business District)	8.50 to 34.99
4. Low Density (Old AT = 3, Residential)	0.90 to 8.49
5. Very Low Density (Old AT = 5, Rural)	0.00 to 0.89

During the calculation process, existing area types are extracted from the network in order to retain the central business district (CBD) areas. In other words, the existing CBD zones are held constant and are not subjected to the dynamic area type calculation. Area type calculations are applied only to non-CBD areas.

Assignment of area types to the highway network is based on the zonal activity density of TAZs within an influence area of one mile from the mid-link point. The population and employment of all TAZs within a one-mile radius is accumulated to define the new density-based area types. In addition, population and employment densities for each TAZ are used to determine each zone's terminal time.

Overall, the new area type calculation occurs in two phases. In Phase I, the density based area type is developed. This results in a new area type that is tied to the centroid of each TAZ. The process for calculating the new dynamic area type is detailed step-by-step in **Tables 23** and **24** and is illustrated in **Figure 9**.



Table 23. Phase I, Dynamic Area Type Model Steps

Step	Description	Summary
1	Compute TAZ to TAZ Distance	Calculate the distance from each centroid: $\frac{\sqrt{(xTAZ_{origin} - xTAZ_{destination})^2 + (yTAZ_{origin} - yTAZ_{destination})^2}}{5,280}$
2	Preserve existing CBD zones	The CBD zones are not dynamically calculated but hardcoded in the GIS shape file CFRPM5_TAZ.DBF after being examined by FDOT and MPO/TPO staff.
3	Calculate Population Density and Employment Density	Population, employment, and usable areas (in acres) are summarized within a one mile radius for each zone. Total population includes single family, multiple family and hotel/motel population. Water body areas are subtracted from the total geometric area of each TAZ to obtain the usable areas.
4	Calculate the Activity Density	Calculate the activity density: Activity Density = Population Density + 2.097 * Employment Density
5	Compute Density-Based Area Type and Output to DBF File	The new area type is calculated based on the activity density and threshold value shown in Table 22. The new calculated area types are stored in a new DBF file CFRPM_NEWAREA.DBF.

In Phase II, the zone-based area type is transferred to the link-level by writing out an input network with Area Type as a new link attribute. This new area type is used in the development of link-level capacities. The process for assigning area types to the link attributes is outlined in **Table 24**.

Table 24. Phase II, Dynamic Area Type Model Steps

Step	Description	Summary
1	Upload NEWAREA to Internal TAZ Nodes	The CFRPM_NEWAREA.DBF containing the new calculated area type is appended to the network as a node attribute.
2	Transfer NEWAREA to Nearest Links from Internal TAZs	The new node-level area types are transferred to the link-level using a “nearest neighbor” approach. This is done by calculating the mid-point for each link, then determining which TAZ the mid-point is closest to.
3	Create the New Network Attribute	A new network attribute A1T is created that contains the dynamically calculated area type for each link, which is used to look up the LOS E capacity. This results in different capacities for each link as the social-economic data changes.

The dynamic area type calculator in the CFRPM v5.0 is illustrated below in **Figure 9**. **Figure 10** is a map of the dynamically calculated Area Types by TAZ.



Figure 9. Area Type Calculator

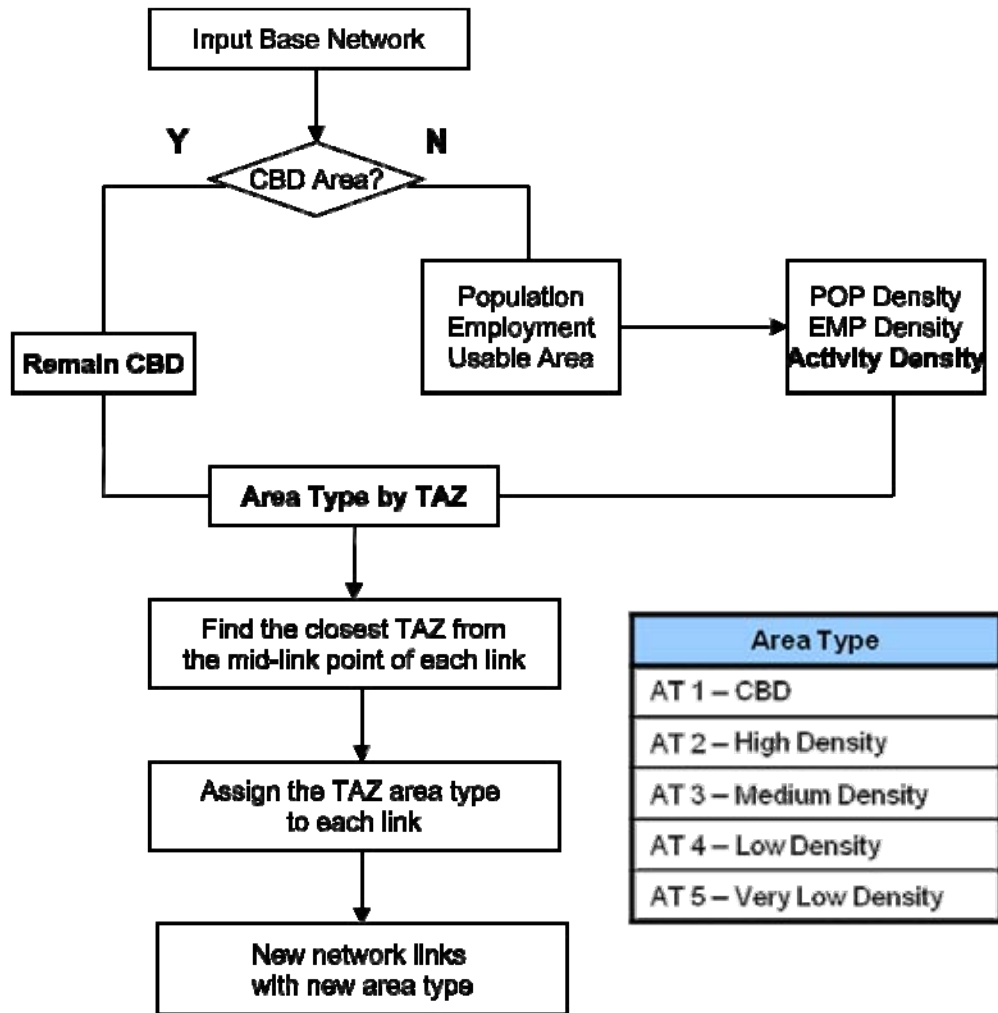
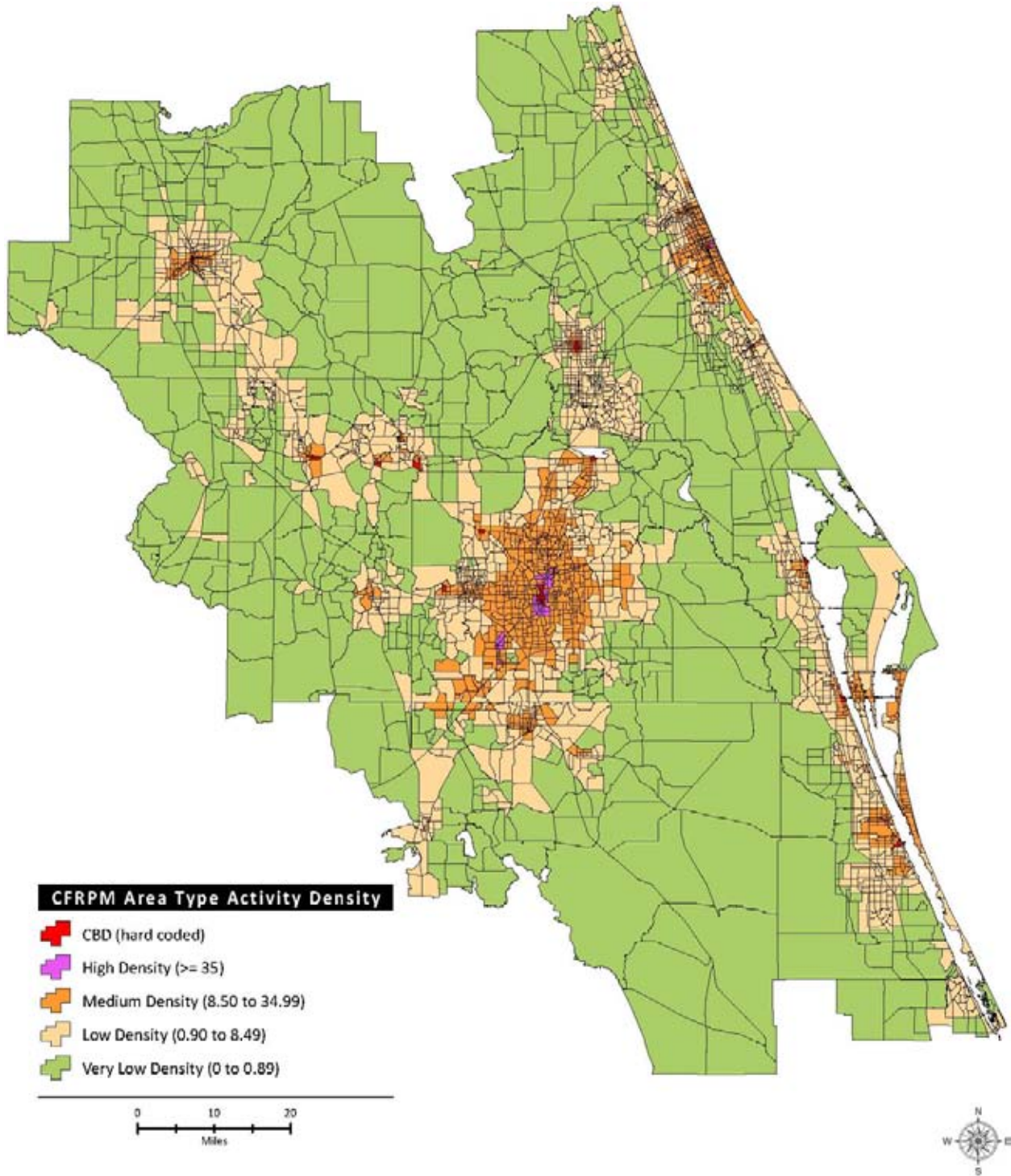




Figure 10. Year 2005 Area Type Density Map





4.2 Facility Type

Facility types are used in CFRPM v5.0 to identify the roadway classification of links in the highway network. These facility types are based on adopted FDOT facility classifications and local comprehensive plans. Typical facility types classify links as freeways, arterials, collectors, or centroid connectors. The facility types in the CFRPM v5.0 are listed in **Table 25**.

Table 25. Network Facility Type

Facility Type	Description
1X -- Freeways and Expressways	
11	Urban Freeway Group 1 (cities of 500,000 or more)
12	Other Freeway (not in Group 1)
16	Controlled Access Expressways
17	Controlled Access Parkways
2X -- Divided Arterials	
21	Divided Arterial Unsignalized (55 mph)
22	Divided Arterial Unsignalized (45 mph)
23	Divided Arterial Class I
24	Divided Arterial Class II
25	Divided Arterial Class III / IV
26	Divided Signalized Arterial with High Capacity
3X -- Undivided Arterials	
31	Undivided Arterial Unsignalized with Turn Bays
32	Undivided Arterial Class I with Turn Bays
33	Undivided Arterial Class II with Turn Bays
34	Undivided Arterial Class III / IV with Turn Bays
35	Undivided Arterial Unsignalized without Turn Bays
36	Undivided Arterial Class I without Turn Bays
37	Undivided Arterial Class II without Turn Bays
38	Undivided Arterial Class III / IV without Turn Bays
39	Undivided Signalized Arterial with High Capacity
4X -- Collectors	
41	Major Local Divided Roadway
42	Major Local Undivided Roadway with Turn Bays
43	Major Local Undivided Roadway without Turn Bays
44	Other Local Divided Roadway



Facility Type	Description
45	Other Local Undivided Roadway with Turn Bays
46	Other Local Divided Roadway without Turn Bays
47	Low Speed Local Collector
48	Very Low Speed Local Collector
5X -- Centroid Connectors	
51	Basic Centroid Connector
52	External Station Centroid Connector
53	Dummy Zone Centroid Connector
54	Dummy Link for Dummy Centroid
6X -- One-Way Facilities	
61	One-Way Facilities Unsignalized
62	One-Way Facilities Class I
63	One-Way Facilities Class II
64	One-Way Facilities Class III / IV
66	Frontage Road Class I
68	Frontage Road Class III / IV
7X -- Ramps	
71	Freeway On / Off Ramp
72	Freeway On / Off Loop Ramp
73	Other On / Off Ramp
74	Other On / Off Loop Ramp
75	Freeway-to-Freeway Ramp
8X -- HOV Facilities	
81	Freeway Group 1 HOV Lane (Barrier Separated)
82	Other Freeway HOV Lane (Barrier Separated)
83	Freeway Group 1 HOV Lane (Non-Barrier Separated)
84	Other Freeway HOV Lane (Non-Barrier Separated)
85	Non Freeway HOV Lane
86	AM & PM Peak HOV Ramp
87	AM Peak Only HOV Ramp
88	PM Peak Only HOV Ramp
89	All Day HOV Ramp
9X -- Toll Facilities	
91	Toll Facility – Florida Turnpike
92	Toll Facility – SR 408



Facility Type	Description
93	Toll Facility – SR 417
94	Toll Facility – SR 429
95	Toll Facility – SR 528
96	Toll Facility – Osceola Parkway
97	Acceleration Lanes - Toll Facility
98	Deceleration Lanes - Toll Facility

4.3 New Facility Types

During the validation of the CFRPM v5.0, it was observed that the capacities on some regional facilities were not being accurately estimated by the model. These facilities were not well represented by the traditional FSUTMS facility type definitions. In order to adequately estimate capacities on these facilities, two new facility types were developed in coordination with FDOT District 5 and FDOT Central Office. The two new facility types in the CFRPM v5.0 are:

- FT 26: "Divided Signalized Arterial with High Capacity"
- FT 39: "Undivided Signalized Arterial with High Capacity"

Table 26 and **Table 27** shows the updated capacity for facility types "26" and "39" respectively. The capacities shown in the table are hourly, per lane, LOS E capacities.



Table 26. Per lane Capacity for Facility Type 26

FT	Lanes	Daily	Area Type				
			CBD	High Density	Medium Density	Low Density	Very Low Density
26	1	20,300	985	985	985	985	1,060
26	2	40,500	982	982	982	982	1,433
26	3	60,800	983	983	983	983	1,433
26	4	81,000	982	982	982	982	1,433

Table 27. Per lane Capacity for Facility Type 39

FT	Lanes	Daily	Area Type				
			CBD	High Density	Medium Density	Low Density	Very Low Density
39	1	19,200	931	931	931	931	1,060
39	2	38,500	934	934	934	934	1,363
39	3	57,700	933	933	933	933	1,363
39	4	77,000	934	934	934	934	1,363

4.4 Free Flow Speed Calculator

The previous version of the CFRPM, version 4.5, used a lookup table to estimate free flow speeds. Each link’s facility type, area type and number of lanes were used as variables to look up free flow speed.

The CFRPM v5.0 uses posted speed limits as an input to estimate the free flow speed for each link. A linear equation, which varies by facility type, is used to estimate each link’s free flow speed based on the link’s posted speed.

A speed survey was conducted in the year 2008 to gather data on the free flow and posted speed limits on various roadway facility types. The roadways were classified into the following categories:

- Expressway,
- Uninterrupted Facilities,
- Divided Arterials,
- Undivided Arterials,
- Collectors, and
- One-way Facilities.



A linear regression analysis was used to determine the relationship between the free flow speed and posted speed for each of the six facility types. The linear regression equation for each roadway type is shown in **Table 28**. These linear regression equations, in conjunction with posted speeds, are used to estimate free flow speeds.

Table 28. Free Flow Speed Equations in the CFRPM v5.0

Name	Facility Type	Equation
Expressways	1x, 9x	Free Flow Speed = 0.4238 * Posted Speed + 39.2530
Uninterrupted Facilities	21,22,31,35	Free Flow Speed = 0.7396 * Posted Speed + 17.9110
Divided Arterials	2x	Free Flow Speed = 0.7459 * Posted Speed + 7.0000
Undivided Arterials	3x	Free Flow Speed = 0.7042 * Posted Speed + 7.6621
Collectors	4x	Free Flow Speed = 0.6806 * Posted Speed + 9.3663
One-way Facilities	6x	Free Flow Speed = 0.7040 * Posted Speed + 8.2200

Notes: For centroid connectors and ramps the free flow speed was set equal to the posted speed

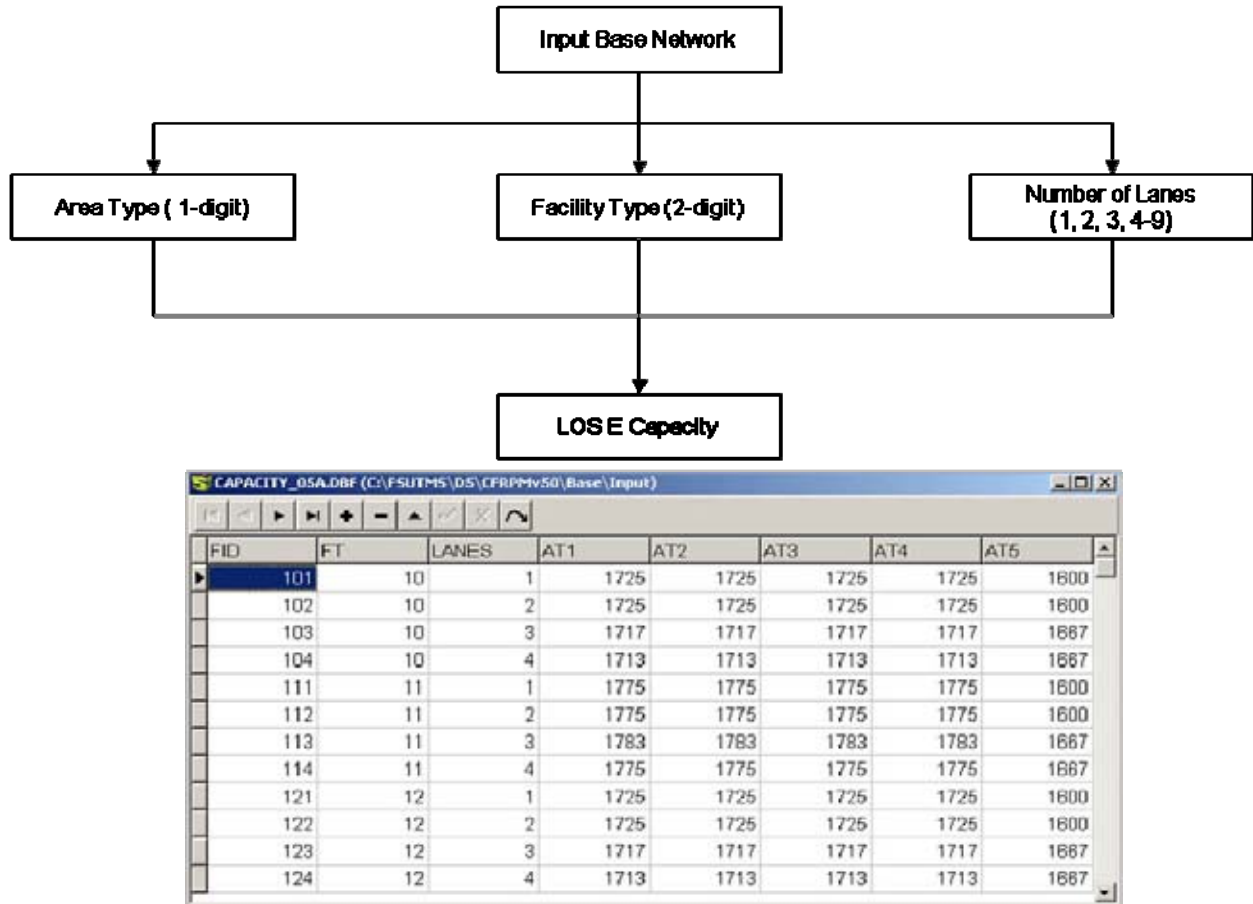
In addition to the above facility types, speed data on ramps were also collected, which were used to develop advisory speeds. These generalized speeds were used as inputs for each ramp in the CFRPM v5.0.

4.5 Capacity Lookup Table

The CFRPM v5.0 uses a lookup table to estimate link capacities. The 1-digit link area type and 2-digit link facility type are used as lookup variables. The capacity table used in the model was based on the 2-digit capacity table provided by the FDOT Central Office. The capacity table had to be modified to convert the 2-digit area type to a 1-digit area type compatible with the new CFRPM v5.0 area type definitions. In addition, the order of the capacities within the table for old area type 3 (residential) and old area type 4 (outlying business district) were reversed so the capacities for the new area types would follow a logical density progression. Consistent with FSUTMS standards, LOS E capacities were used as inputs to the model. **Figure 11** illustrates the capacity lookup procedure in the CFRPM v5.0 setup.



Figure 11: Capacity Calculator in the CFRPM v5.0



4.6 Highway Network Statistics

Once the free flow speed and the capacity are calculated for each link, the uncongested travel time on a link is calculated using the free-flow speed (described in Section 4.4) and the total distance of the link. **Table 29** shows the number of links by area type and facility type in the CFRPM v5.0, while **Tables 30** and **31** summarize the highway link free-flow speeds and capacities by area type and facility type in the existing 2005 network. Since some area type-facility type combinations didn't exist in 2005, a value of zero is displayed in these cells in the tables below.



Table 29. Number of Links by Area Type and Facility Type

Number of Links by Area Type and Facility Type						
Facility Type	CBD	High Density	Medium Density	Low Density	Very Low Density	Total
Freeways and Expressways	16	29	125	175	134	479
Divided Arterials	114	108	2,024	1,702	331	4,279
Undivided Arterials	81	38	479	1,025	680	2,303
Collectors	286	179	2,246	3,395	1,523	7,629
One-Way Facilities	137	30	125	69	0	361
Ramps	37	50	331	341	202	961
HOV Facilities	0	0	0	0	0	0
Toll Facilities	5	13	224	283	174	699
Total	676	447	5,554	6,990	3,044	16,711

Table 30. Average Speed by Area Type and Facility Type

Average Speed by Area Type and Facility Type							
FT	Description	CBD	High Density	Medium Density	Low Density	Very Low Density	Average
11	Urban Freeway Group 1 (cities of 500,000 or more)	60.0	61.1	63.2	65.7	0	62.2
12	Other Freeway (not in Group 1)	0	0	66.0	67.6	68.6	67.7
16	Controlled Access Expressways	0	0	0	62.1	63.0	62.3
17	Controlled Access Parkways	0	0	63.0	63.0	63.0	63.0
21	Divided Arterial Unsignalized (55 mph)	53.0	0	52.6	56.4	58.4	56.6
22	Divided Arterial Unsignalized (45 mph)	45.2	43.4	48.2	50.4	52.5	49.0
23	Divided Arterial Class I	32.7	35.3	38.8	41.4	46.2	40.1
24	Divided Arterial Class II	32.8	32.5	38.7	43.2	0	38.1
25	Divided Arterial Class III / IV	37.0	34.3	34.2	0	51.8	37.3
26	Divided Signalized Arterial with High Capacity	33.0	0	40.9	43.4	44.0	42.7
31	Undivided Arterial Unsignalized with Turn Bays	43.5	42.0	45.5	52.2	57.5	54.0
32	Undivided Arterial Class I with Turn Bays	30.2	30.4	33.1	37.9	42.9	36.9
33	Undivided Arterial Class II with Turn Bays	27.4	0	32.5	37.2	49.7	36.8
34	Undivided Arterial Class III / IV with Turn Bays	0	0	32.0	32.0	0	32.0
35	Undivided Arterial Unsignalized without Turn Bays	49.8	0	46.5	49.2	56.8	52.7
36	Undivided Arterial Class I without Turn Bays	28.7	29.0	32.7	39.4	43.5	37.0
37	Undivided Arterial Class II without Turn Bays	0	30.5	31.8	32.0	46.0	32.1
38	Undivided Arterial Class III / IV without Turn Bays	0	0	32.0	0	0	32.0
39	Undivided Signalized Arterial with High Capacity	0	0	0	42.5	0	42.5
41	Major Local Divided Roadway	30.6	30.7	33.9	35.5	39.1	34.5
42	Major Local Undivided Roadway with Turn Bays	27.9	27.7	30.8	34.6	38.3	32.3
43	Major Local Undivided Roadway without Turn Bays	29.9	27.1	31.6	35.1	39.9	35.5



Average Speed by Area Type and Facility Type							
FT	Description	CBD	High Density	Medium Density	Low Density	Very Low Density	Average
44	Other Local Divided Roadway	26.4	30.0	32.7	36.0	39.1	33.3
45	Other Local Undivided Roadway with Turn Bays	29.6	27.5	30.0	34.3	41.0	32.3
46	Other Local Divided Roadway without Turn Bays	30.4	28.4	31.0	34.4	39.9	35.6
47	Low Speed Local Collector	28.4	26.0	29.0	30.6	35.7	30.4
48	Very Low Speed Local Collector	23.0	0	26.0	27.0	30.8	26.0
61	One-Way Facilities Unsignalized	33.0	0	34.0	37.2	0	34.4
62	One-Way Facilities Class I	32.0	29.0	32.4	35.9	0	33.9
63	One-Way Facilities Class II	30.3	0	36.0	0	0	30.8
64	One-Way Facilities Class III / IV	28.1	29.0	31.3	0	0	29.0
66	Frontage Road Class I	0	0	0	37.9	0	37.9
68	Frontage Road Class III / IV	0	0	0	26.0	0	26.0
71	Freeway On / Off Ramp	38.1	40.0	40.0	40.0	40.0	39.9
72	Freeway On / Off Loop Ramp	35.0	35.0	35.0	35.0	35.0	35.0
73	Other On / Off Ramp	0	40.0	40.0	40.0	40.0	40.0
74	Other On / Off Loop Ramp	0	30.0	30.0	32.1	30.0	30.8
75	Freeway-to-Freeway Ramp	45.0	40.0	40.0	40.9	41.3	40.7
91	Toll Facility - Turnpike	0	0	69.0	69.0	69.0	69.0
92	Toll Facility - SR 408	63.0	63.0	65.6	65.8	0	65.4
93	Toll Facility - SR 417	0	0	65.9	67.0	67.0	66.7
94	Toll Facility - SR 429	0	0	67.0	67.0	67.0	67.0
95	Toll Facility - SR 528	0	56.0	63.0	64.6	67.9	65.4
96	Toll Facility - Osceola Parkway	0	0	63.0	63.0	0	63.0
97	Acceleration Lanes - Toll Facility	0	54.0	54.0	55.1	56.4	55.1
98	Deceleration Lanes - Toll Facility	0	0	54.0	54.0	54.0	54.0
Average		31.5	34.3	36.9	40.2	46.4	39.7

Table 31. Highway Capacity by Area Type and Facility Type

Average Capacity by Area Type and Facility Type							
FT	Description	CBD	High Density	Medium Density	Low Density	Very Low Density	Average
11	Urban Freeway Group 1 (cities of 500,000 or more)	1,956	1,957	1,955	1,953	0	1,956
12	Other Freeway (not in Group 1)	0	0	1,889	1,896	1,777	1,851
16	Controlled Access Expressways	0	0	0	1,898	1,760	1,881
17	Controlled Access Parkways	0	0	1,894	1,889	1,785	1,851
21	Divided Arterial Unsignalized (55 mph)	1,628	0	1,628	1,627	1,431	1,553
22	Divided Arterial Unsignalized (45 mph)	1,628	1,607	1,626	1,624	1,247	1,579
23	Divided Arterial Class I	833	833	832	832	1,390	861
24	Divided Arterial Class II	789	790	789	791	0	790
25	Divided Arterial Class III / IV	768	768	769	0	768	768
26	Divided Signalized Arterial with High Capacity	982	0	982	982	1,433	992
31	Undivided Arterial Unsignalized with Turn Bays	1,505	1,505	1,525	1,508	1,107	1,327



Average Capacity by Area Type and Facility Type							
FT	Description	CBD	High Density	Medium Density	Low Density	Very Low Density	Average
32	Undivided Arterial Class I with Turn Bays	790	791	790	790	1,084	839
33	Undivided Arterial Class II with Turn Bays	740	0	746	744	725	738
34	Undivided Arterial Class III / IV with Turn Bays	0	0	700	700	0	700
35	Undivided Arterial Unsignalized without Turn Bays	1,204	0	1,204	1,205	1,045	1,127
36	Undivided Arterial Class I without Turn Bays	627	626	629	631	1,005	726
37	Undivided Arterial Class II without Turn Bays	0	593	593	592	1,045	612
38	Undivided Arterial Class III / IV without Turn Bays	0	0	560	0	0	560
39	Undivided Signalized Arterial with High Capacity	0	0	0	931	0	931
41	Major Local Divided Roadway	768	750	753	753	1,045	763
42	Major Local Undivided Roadway with Turn Bays	710	708	706	705	1,045	722
43	Major Local Undivided Roadway without Turn Bays	531	564	564	564	1,045	683
44	Other Local Divided Roadway	558	573	567	563	1,045	603
45	Other Local Undivided Roadway with Turn Bays	531	533	531	530	1,060	572
46	Other Local Divided Roadway without Turn Bays	425	426	424	424	1,005	629
47	Low Speed Local Collector	426	424	424	424	1,005	509
48	Very Low Speed Local Collector	424	0	425	425	1,005	491
61	One-Way Facilities Unsignalized	1,445	0	1,465	1,461	0	1,464
62	One-Way Facilities Class I	749	750	749	750	0	749
63	One-Way Facilities Class II	715	0	711	0	0	714
64	One-Way Facilities Class III / IV	688	692	691	0	0	690
66	Frontage Road Class I	0	0	0	749	0	749
68	Frontage Road Class III / IV	0	0	0	672	0	672
71	Freeway On / Off Ramp	1,445	1,445	1,445	1,445	1,206	1,396
72	Freeway On / Off Loop Ramp	672	710	710	758	645	713
73	Other On / Off Ramp	0	1,445	1,445	1,445	1,206	1,410
74	Other On / Off Loop Ramp	0	710	710	758	645	704
75	Freeway-to-Freeway Ramp	1,725	1,725	1,725	1,725	1,600	1,683
91	Toll Facility - Turnpike	0	0	1,953	1,953	1,953	1,953
92	Toll Facility - SR 408	1,961	1,955	1,956	1,953	0	1,955
93	Toll Facility - SR 417	0	0	1,956	1,953	1,953	1,954
94	Toll Facility - SR 429	0	0	1,953	1,953	1,953	1,953
95	Toll Facility - SR 528	0	1,953	1,954	1,954	1,953	1,954
96	Toll Facility - Osceola Parkway	0	0	1,628	1,628	0	1,628
97	Acceleration Lanes - Toll Facility	0	1,445	1,445	1,445	1,206	1,379
98	Deceleration Lanes - Toll Facility	0	0	710	758	645	722
Average		747	910	836	837	1,155	893

Table 32 and **Table 33** summarize model links by Area Type and Facility Type (except for centroid connectors, toll booth links, two way links sharing the same A node and B node). The total system miles and lane miles for these links are also summarized in **Tables 34 – 37**.



Table 32. Number of Links by Area Type

Number of Links by Area Type												
Area Type	Seminole	Orange	Osceola	Lake	Volusia	Brevard	Marion	Sumter	Flagler	Polk	Indian River	Total
CBD	24	353	12	45	81	81	80	0	0	0	0	676
High Density	0	434	0	0	13	0	0	0	0	0	0	447
Medium Density	612	2,431	402	113	967	737	274	0	11	7	0	5,554
Low Density	464	986	429	565	1,770	1,335	632	177	237	245	150	6,990
Very Low Density	70	364	258	428	500	200	630	251	163	83	97	3,044
Total	1,170	4,568	1,101	1,151	3,331	2,353	1,616	428	411	335	247	16,711

Table 33. Number of Links by Facility Type

Number of Links by Facility Type												
Area Type	Seminole	Orange	Osceola	Lake	Volusia	Brevard	Marion	Sumter	Flagler	Polk	Indian River	Total
Freeway	40	110	40	0	85	117	27	20	13	12	15	479
Div Arterial	386	1,194	248	251	770	847	359	36	68	67	53	4,279
Udv Arterial	153	366	74	181	595	318	279	109	138	35	55	2,303
Collector	462	1,748	552	619	1,774	878	893	237	152	202	112	7,629
One Way	0	213	0	33	10	44	31	0	30	0	0	361
Ramps	69	441	88	29	97	149	27	20	10	19	12	961
HOV Lanes	0	0	0	0	0	0	0	0	0	0	0	0
Tollway	60	496	99	38	0	0	0	6	0	0	0	699
Total	1,170	4,568	1,101	1,151	3,331	2,353	1,616	428	411	335	247	16,711



Table 34. Total System Miles by Area Type

Total System Miles by Area Type												
Area Type	Seminole	Orange	Osceola	Lake	Volusia	Brevard	Marion	Sumter	Flagler	Polk	Indian River	Total
CBD	3.85	44.37	1.72	9.75	10.56	14.64	6.32	0	0	0	0	91.21
High Density	0	88.17	0	0	2.20	0	0	0	0	0	0	90.37
Medium Density	176.71	716.55	112.62	33.61	183.25	192.81	61.95	0	3.63	1.34	0	1,482.47
Low Density	195.19	472.60	198.64	246.33	550.33	561.25	304.54	94.65	103.26	111.05	42.91	2,880.75
Very Low Density	49.85	259.85	365.81	358.67	377.75	210.85	650.67	247.51	170.95	88.82	59.71	2,840.44
Total	425.60	1,581.54	678.79	648.36	1,124.09	979.55	1,023.48	342.16	277.84	201.21	102.62	7,385.24

Table 35. Total System Miles by Facility Type

Total System Miles by Facility Type												
Area Type	Seminole	Orange	Osceola	Lake	Volusia	Brevard	Marion	Sumter	Flagler	Polk	Indian River	Total
Freeway	28.69	52.45	22.93	0	146.30	188.49	76.60	57.97	37.31	14.89	16.19	641.82
Div Arterial	102.50	354.26	71.44	95.39	180.16	285.85	133.12	15.20	32.66	34.69	14.18	1,319.45
Udv Arterial	62.21	131.65	68.97	137.11	226.19	145.22	187.96	88.66	106.32	24.16	23.43	1,201.88
Collector	168.20	573.72	353.67	356.49	540.86	308.93	614.26	152.91	91.60	121.55	47.58	3,329.77
One Way	0	34.05	0	4.60	1.99	10.97	3.26	0	6.75	0	0	61.62
Ramps	24.18	125.00	24.36	3.60	28.59	40.09	8.28	5.88	3.20	5.92	1.24	270.34
HOV Lanes	0	0	0	0	0	0	0	0	0	0	0	0
Tollway	39.82	310.41	137.42	51.17	0	0	0	21.54	0	0	0	560.36
Total	425.60	1,581.54	678.79	648.36	1,124.09	979.55	1,023.48	342.16	277.84	201.21	102.62	7,385.24



Table 36. Total Lane Miles by Area Type

Total Lane Miles by Area Type												
Area Type	Seminole	Orange	Osceola	Lake	Volusia	Brevard	Marion	Sumter	Flagler	Polk	Indian River	Total
CBD	8.64	120.91	4.40	26.74	26.78	39.05	18.34	0	0	0	0	244.86
High Density	0	238.47	0	0	6.06	0	0	0	0	0	0	244.53
Medium Density	571.59	2,197.04	314.74	100.56	525.52	590.50	187.68	0	11.80	2.68	0	4,502.11
Low Density	512.13	1,221.83	502.29	622.63	1,314.55	1,392.55	774.89	226.11	246.35	285.08	110.44	7,208.85
Very Low Density	104.32	554.25	739.19	757.61	810.44	512.43	1,438.16	523.31	371.29	207.95	123.52	6,142.47
Total	1,196.68	4,332.50	1,560.62	1,507.54	2,683.35	2,534.53	2,419.07	749.42	629.44	495.71	233.96	18,342.82

Table 37. Total Lane Miles by Facility Type

Total Lane Miles by Facility Type												
Area Type	Seminole	Orange	Osceola	Lake	Volusia	Brevard	Marion	Sumter	Flagler	Polk	Indian River	Total
Freeway	94.77	202.32	54.52	0	308.86	388.30	229.80	130.20	74.62	44.67	32.38	1,560.44
Div Arterial	464.10	1,554.21	289.96	397.00	745.34	1,118.62	543.64	60.80	128.48	151.62	53.10	5,506.87
Udv Arterial	138.80	340.47	138.08	279.20	488.88	309.68	383.00	193.86	218.38	49.80	49.40	2,589.55
Collector	393.02	1,381.52	770.40	719.24	1,105.02	651.63	1,247.94	315.60	191.26	243.70	97.84	7,117.17
One Way	0	79.04	0	8.95	3.98	22.66	6.41	0	13.50	0	0	134.54
Ramps	30.80	149.84	36.68	4.53	31.27	43.64	8.28	5.88	3.20	5.92	1.24	321.28
HOV Lanes	0	0	0	0	0	0	0	0	0	0	0	0
Tollway	75.19	625.10	270.98	98.62	0	0	0	43.08	0	0	0	1,112.97
Total	1,196.68	4,332.50	1,560.62	1,507.54	2,683.35	2,534.53	2,419.07	749.42	629.44	495.71	233.96	18,342.82



5.0 Highway Path

The fourth module in the CFRPM v5.0 FSUTMS model chain is the highway path building step (HPATH). The HPATH module identifies the minimum uncongested travel time path between each pair of zones for use later in the model chain. Path selection is important to the modeling process, as it has a significant impact on the final distribution of trips generated during the GEN step of the model. The skimmed Level of Service matrices for both low occupancy vehicles (LOV) and high occupancy vehicles (HOV) are used in the next step of the modeling process, trip distribution, and therefore determine the travel patterns of the whole study area.

5.1 Shortest Highway Path Configuration

The highway path module identifies the minimum uncongested time path between each TAZ pair in the network. For each TAZ pair, the minimum uncongested path is determined based on the path with the least impedance. Minimum path calculations are based on the following impedance variables:

- In-vehicle travel time,
- Prohibited movements,
- Penalized movements,
- Toll Cost, and
- Toll Service Time.

The minimum uncongested paths are critical inputs for the trip distribution and highway assignment modules. These paths are also used as inputs into the mode choice model and are also used for transit speed calculations. **Table 38** provides an example of an origin-destination pair from downtown Orlando (TAZ 718) to UCF (TAZ 499) as specified by two catalog keys {FromNode} and {ToNode}. Statistics for this route include travel distance, travel time, turn penalty, toll equivalent time, toll service time, deceleration and acceleration delay. **Figure 12** shows the free flow travel time from downtown Orlando to all other throughout the Central Florida region in 10 minute increments, from 10 minutes to 3 hours.

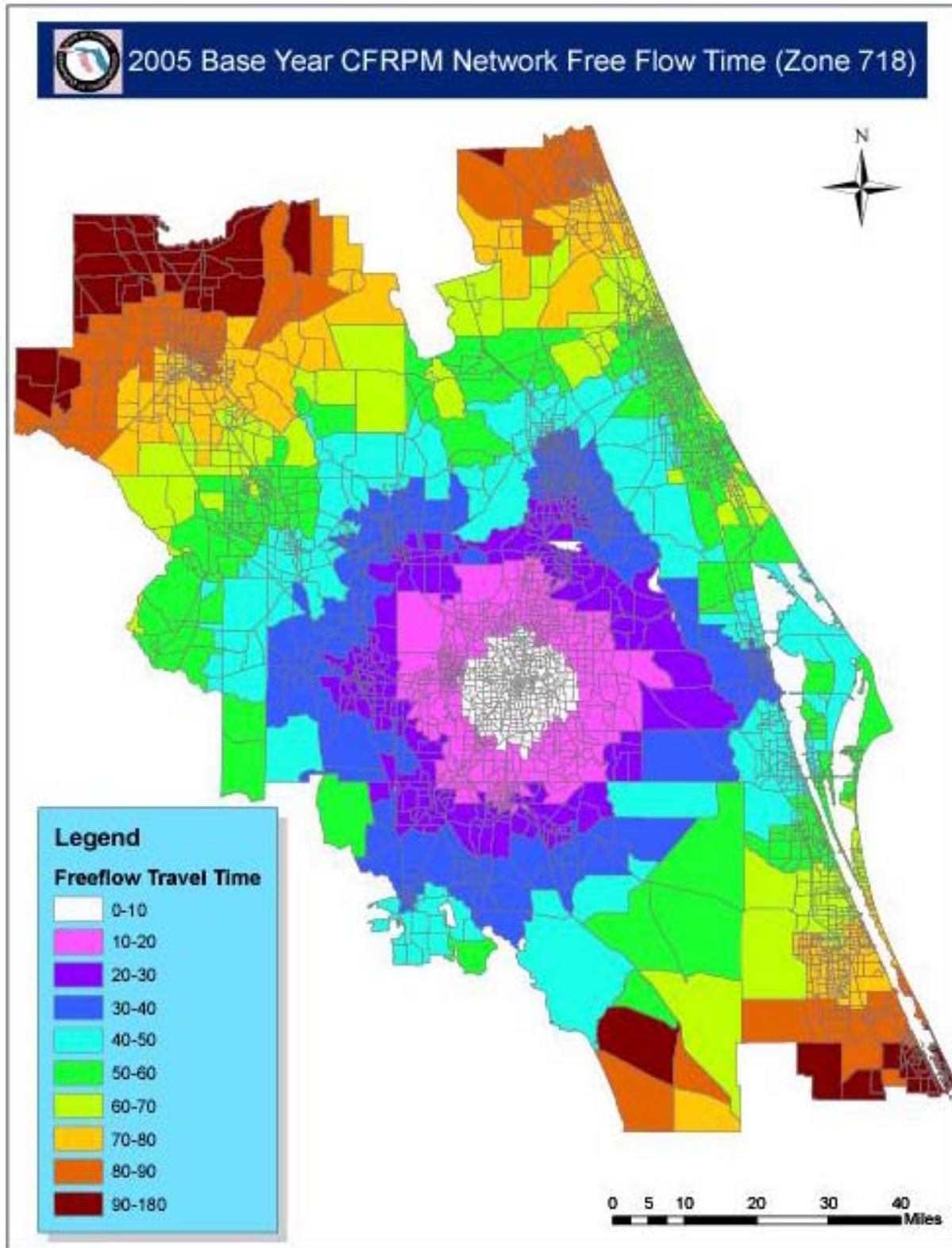


Table 38. Highway Path from Downtown Orlando to UCF

Anode	Bnode	Distance(Mile)	Time(Min)	Penalty(Min)	TollEqui(Min)	Service(Min)	Dece/Acce(Min)
718	17058	0.04	0.15	0	0	0	0
17058	17068	0.03	0.07	0	0	0	0
17068	17055	0.02	0.05	0	0	0	0
17055	17013	0.11	0.26	0	0	0	0
17013	16990	0.06	0.15	0	0	0	0
16990	16977	0.03	0.07	0	0	0	0
16977	16991	0.10	0.20	0	0	0	0
16991	16989	0.07	0.14	0	0	0	0
16989	16998	0.03	0.07	0	0	0	0
16998	17021	0.16	0.24	0	0	0	0
17021	17051	0.21	0.21	0	0	0	0
17051	17140	0.46	0.45	0	0	0	0
17140	17181	0.28	0.27	0	0	0	0
17181	17311	0.99	0.95	0	0	0	0
17311	17344	0.32	0.31	0	0	0	0
17344	17427	0.55	0.53	0	0	0	0.09
17427	17437	0.05	0	0	2.25	0.08	0
17437	17484	0.38	0.34	0	0	0	0.22
17484	17564	0.99	0.89	0	0	0	0
17564	17617	0.78	0.70	0	0	0	0
17617	17685	0.50	0.45	0	0	0	0
17685	17724	0.34	0.31	0	0	0	0
17724	17786	0.48	0.46	0	0	0	0
17786	17889	0.55	0.52	0	0	0	0
17889	17940	0.23	0.22	0	0	0	0
17940	17980	0.20	0.18	0	0	0	0
17980	18125	0.74	0.67	0	0	0	0
18125	18252	0.99	0.89	0	0	0	0.09
18252	18271	0.09	0	0	1.50	0.08	0
18271	18348	0.39	0.35	0	0	0	0.22
18348	18409	0.45	0.68	0	0	0	0
18409	18411	0.03	0.04	0	0	0	0
18411	18423	0.19	0.28	0	0	0	0
18423	18447	0.54	0.80	0	0	0	0
18447	18474	0.69	1.02	0	0	0	0
18474	18494	0.53	0.78	0	0	0	0
18494	18507	0.49	0.73	0	0	0	0
18507	18514	0.13	0.27	0	0	0	0
18514	18512	0.03	0.06	0	0	0	0
18512	499	0.26	0.85	0	0	0	0
Total= 20.15		13.51	15.61	0	3.75	0.17	0.62



Figure 12. 2005 CFRPM Free Flow Time From Downtown Orlando





6.0 Trip Distribution

The fifth module in the CFRPM v5.0 FSUTMS model chain is trip distribution. The trip distribution step involves the conversion of productions and attractions by zone to person trip tables. The trip distribution process is based on the classic gravity model that assesses the attractiveness of two TAZs based on the number of productions and attractions in those zones as well as the relative distance (or time) between them. The major input to the trip distribution module is a series of friction factor tables for each trip purpose. The friction factor tables determine the relative probability of a trip being satisfied given the value of impedance, or separation, between zones.

6.1 Trip Distribution Subarea Friction Factors

The model trip distribution process estimates travel patterns between trip origins and destinations. The trip distribution model uses the following information:

- Trip productions and attractions by TAZ (Traffic Analysis Zone);
- Travel impedance is travel time. Terminal time and toll cost are also considered as additional travel impedance; and
- Trip Length frequency, represented by friction factors.

The gravity model is utilized to connect trip productions and attractions by trip purpose. Trips are distributed across TAZs based on the number of productions and attractions and the travel impedances between them.

In the previous version of the model, version 4.5, a single set of friction factors were used for all trip purposes across the region. The CFRPM was originally developed and combined from the five MPO/TPO models, wherein each MPO/TPO model had its own set of friction factors. The analysis documented in the technical memorandum *Develop Subarea Friction Factor in CFRPM Submitted to Florida Department of Transportation District V*, June 6, 2008 concluded that multiple friction factors using reasonable subarea definitions would be beneficial in predicting region-wide travel patterns with more accuracy. Based on this conclusion, the CFRPM v5.0 was updated to include six sets of friction factors—one set for each MPO/TPO, plus a regional set of friction factors for Truck, Taxi and EI trips. The five MPO/TPO models include:



- Ocala/Marion County TPO – Ocala Area Transportation Study (OATS),
- Lake-Sumter MPO – Lake County Transportation System (LCTS),
- Volusia TPO – Volusia County Urban Area Study (VCUATS),
- Space Coast TPO – Brevard Area Study (BATS), and
- METROPLAN Orlando – Orlando Urban Area Transportation Study (OUATS).

Table 39 shows the relationship between subareas and the corresponding MPO/TPO model from which the friction factors were borrowed. The subarea friction factors from **Table 39** were used for HBW, HBNW, and NHB trips. Regional friction factors were used for Truck, Taxi and EI trip purposes and were borrowed from the CFRPM v4.5 model. The EI trips from Osceola County were observed to have comparably longer trip lengths and therefore a different set of friction factors were used.

Table 39. CFRPM Subarea Definition

Counties	Friction Factor Model Source
METROPLAN Orlando (Seminole, Orange, Osceola ³), and Polk	OUATS (Cube Voyager)
Brevard and Indian River	BATS (Tranplan)
Lake	LCTS (Tranplan)
Marion	OATS (Tranplan)
Sumter	Calibrated CFRPM v4.5 (Cube Voyager)
Volusia and Flagler	Calibrated CFRPM v4.5 (Cube Voyager) ⁴

6.2 Trip Distribution Matrix Simplification

The matrix manipulation operations have been simplified by redefining HOV and LOV trips within the trip distribution module before the pre-assignment step. Taxi trips were classified as HOV trips, while EI/IE and EE trips were classified as LOV trips.

6.3 Trip Length Distribution and Average Trip Length

The update of the CFRPM v5.0 included the incorporation of subarea friction factors into the model.

³ The friction factors for EI trips in Osceola County were estimated from the cordon line survey data.

⁴ The CFRPM v4.5 friction factors were adjusted during validation to develop friction factors for Volusia, Flagler, and Sumter Counties.



The CFRPM v5.0 uses seven calibrated friction factor curves to distribute trips. Six of the friction factor curves are used for the HBW, HBSH, HBSR, HBO, and NHB trip purposes for the following sub-areas/counties:

- METROPLAN Orlando (Orange, Osceola, Seminole Counties) and Polk County,
- Brevard and Indian River Counties,
- Lake County,
- Marion County,
- Sumter County, and
- Volusia and Flagler Counties.

The seventh friction factor curve is a Districtwide friction factor curve, and is used for light trucks (LTK), heavy trucks (HTK), taxis (TAXI), and external-internal (EI) trip purposes.

Average free flow and congested trip lengths for the CFRPM v5.0 are summarized by trip purpose and are shown in **Table 40** and **Table 41**, respectively. **Figures 13** through **22** show the trip length frequency distribution curves for HBW, HBSH, HBSR, HBO, NHB, Taxi, Light Truck, Heavy Truck, External-Internal, and Total trips for the entire CFRPM region. Additionally, **Figures A-1** through **A-60** in **Appendix A** illustrate the trip length frequency distribution curves for each of the MPO/TPO/County areas.



Table 40. Average Free Flow Trip Length by Trip Purpose

Trip Purpose	Total Trips	Trip-Minutes	Average Minutes	Trip-Miles	Average Miles
HBW	2,068,831	42,535,333	20.560	26,083,413	12.608
HBSH	1,657,407	26,282,833	15.858	15,612,386	9.420
HBSR	1,488,246	24,673,161	16.579	14,197,881	9.540
HBO	3,053,630	49,960,996	16.361	28,988,744	9.493
NHB	3,671,543	56,122,256	15.286	31,348,803	8.538
LTK	1,114,253	16,336,106	14.661	9,023,335	8.098
HTK	247,582	3,669,308	14.821	2,032,439	8.209
TAXI	13,011	186,001	14.296	101,080	7.769
IE	478,864	16,940,705	35.377	12,549,314	26.206

Table 41. Average Congested Trip Length by Trip Purpose

Trip Purpose	Total Trips	Trip-Minutes	Average Minutes	Trip-Miles	Average Miles
HBW	2,068,831	51,936,627	25.104	26,596,871	12.856
HBSH	1,657,407	31,192,078	18.820	15,818,266	9.544
HBSR	1,488,246	29,822,672	20.039	14,499,256	9.743
HBO	3,053,630	59,201,050	19.387	29,349,133	9.611
NHB	3,671,543	68,981,712	18.788	31,878,211	8.683
LTK	1,114,253	19,628,836	17.616	9,134,435	8.198
HTK	247,582	4,365,112	17.631	2,047,004	8.268
TAXI	13,011	223,931	17.211	102,139	7.850
IE	478,864	19,522,296	40.768	12,824,435	26.781



Figure 13. CFRPM Region: HBW Trip Length Distribution

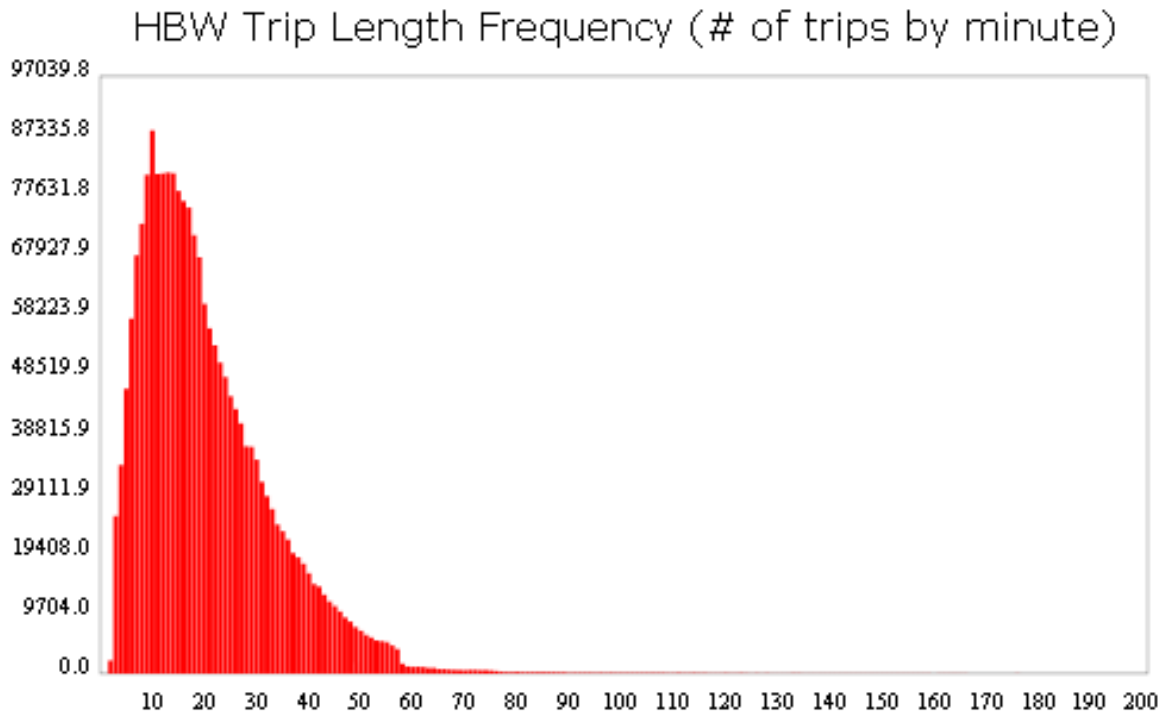


Figure 14. CFRPM Region: HBSH Trip Length Distribution

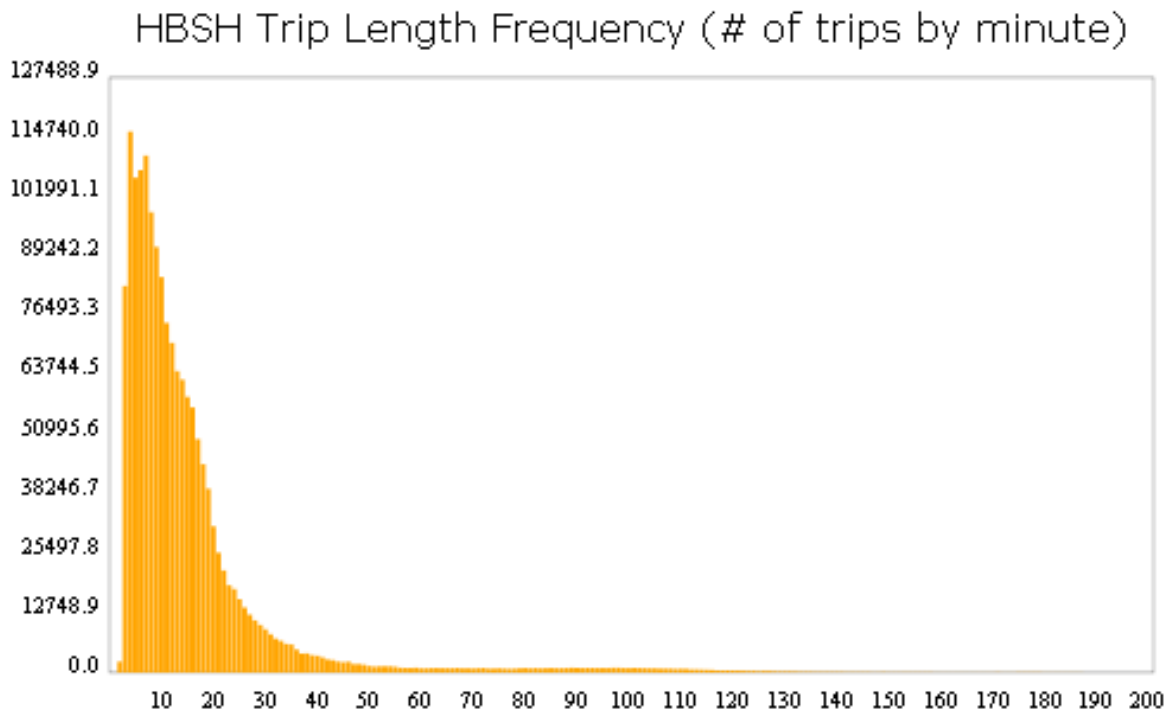




Figure 15. CFRPM Region: HBSR Trip Length Distribution

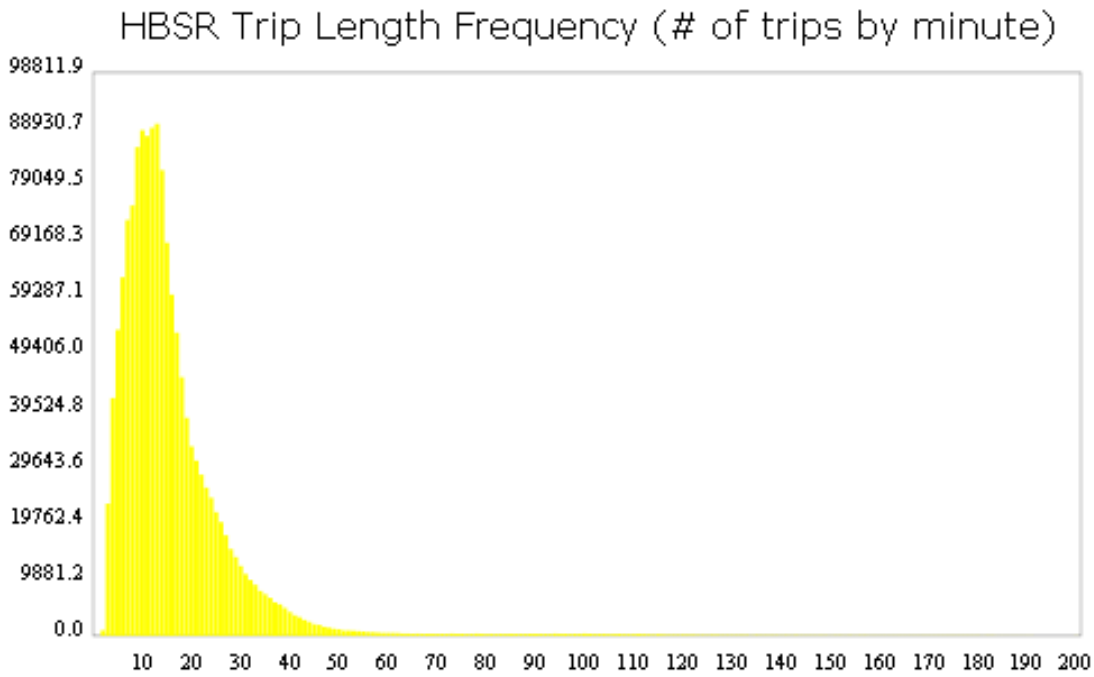


Figure 16. CFRPM Region: HBO Trip Length Distribution

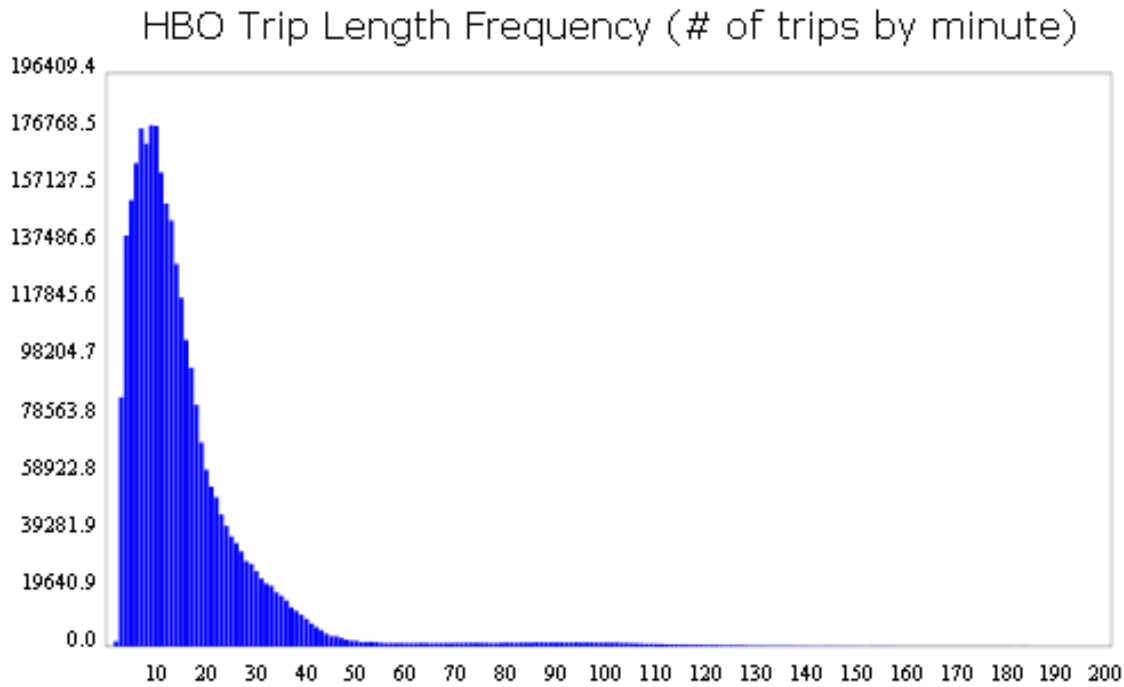




Figure 17. CFRPM Region: NHB Trip Length Distribution

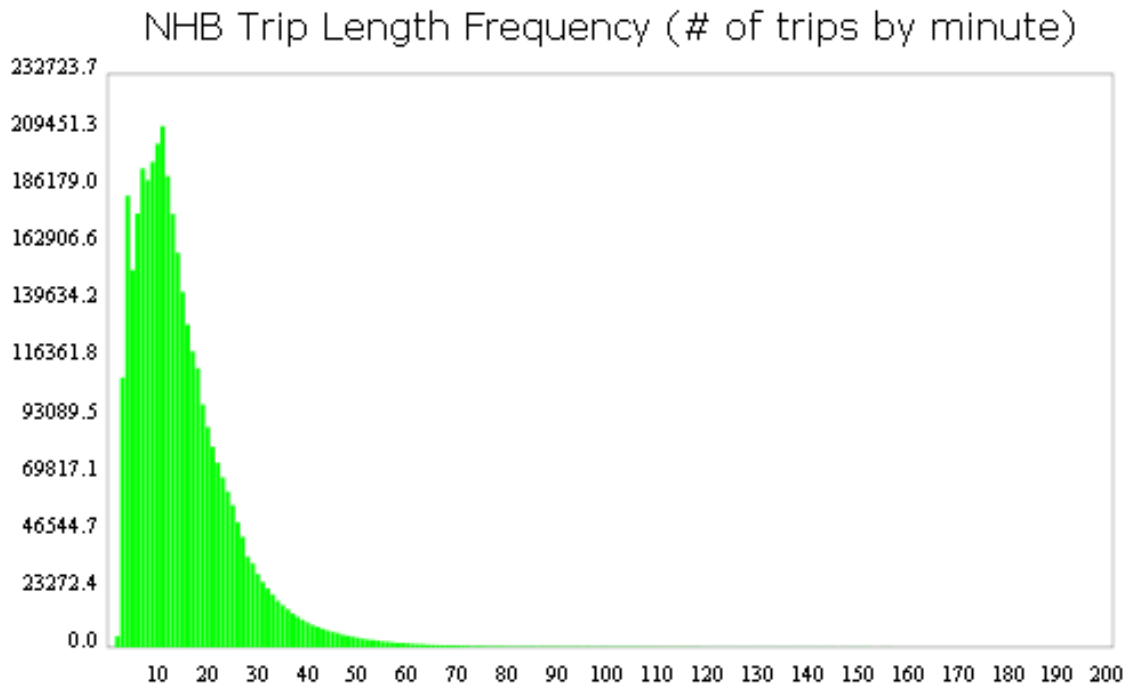


Figure 18. CFRPM Region: Taxi Trip Length Distribution

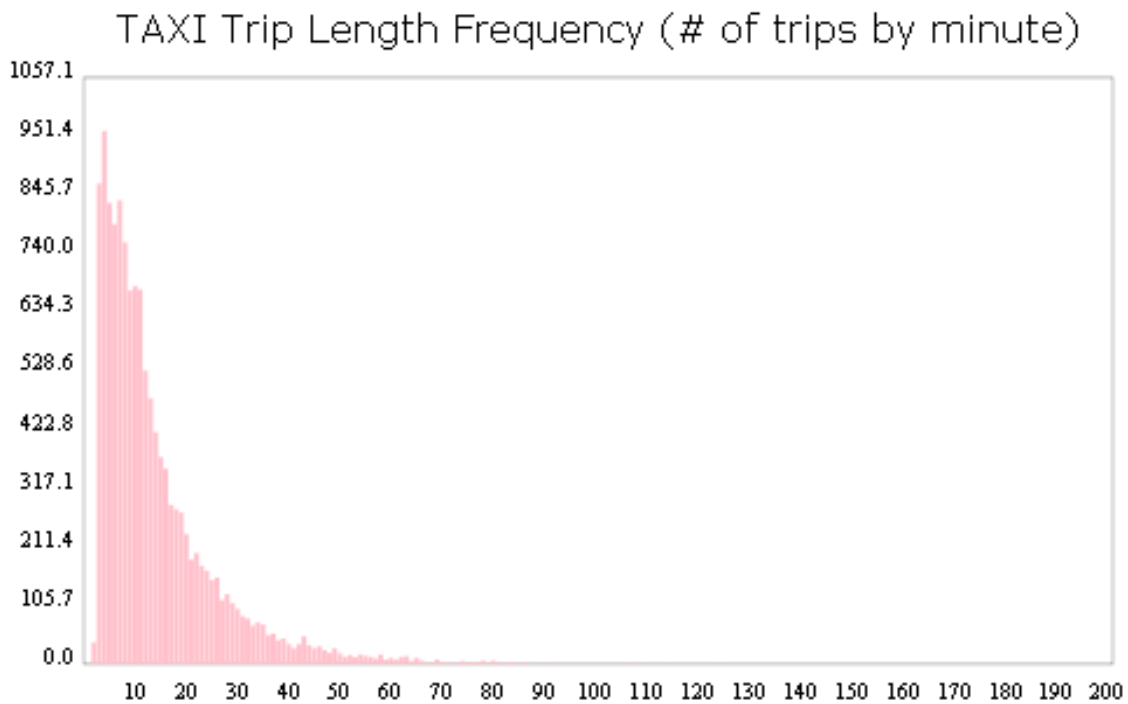




Figure 19. CFRPM Region: Light Truck Trip Length Distribution

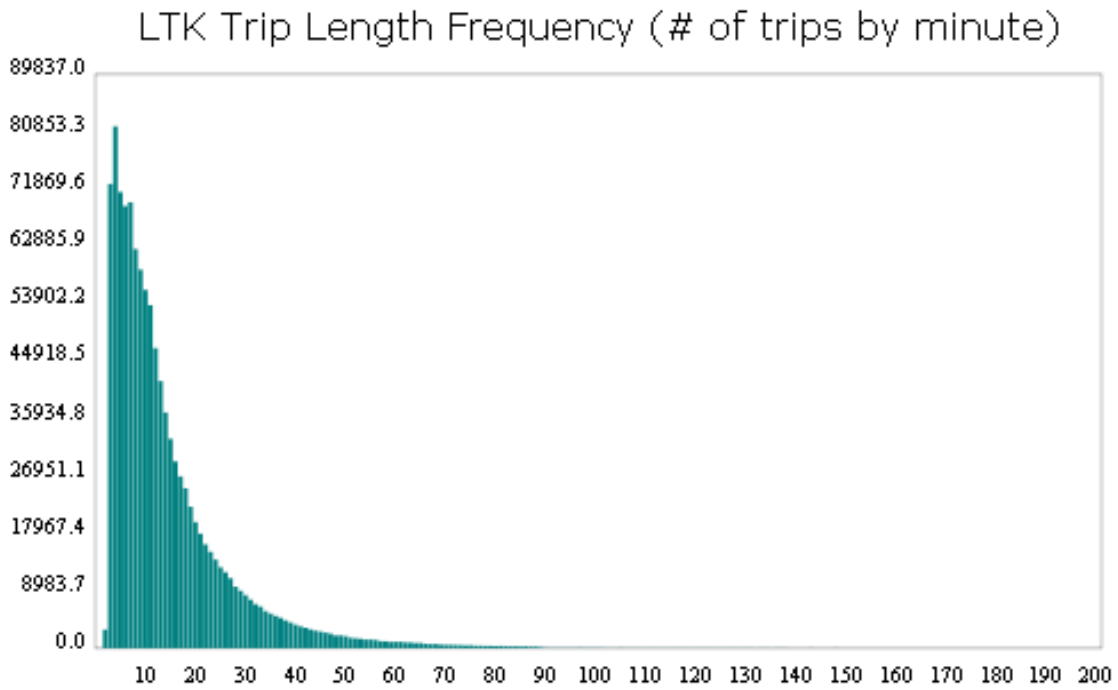


Figure 20. CFRPM Region: Heavy Truck Trip Length Distribution

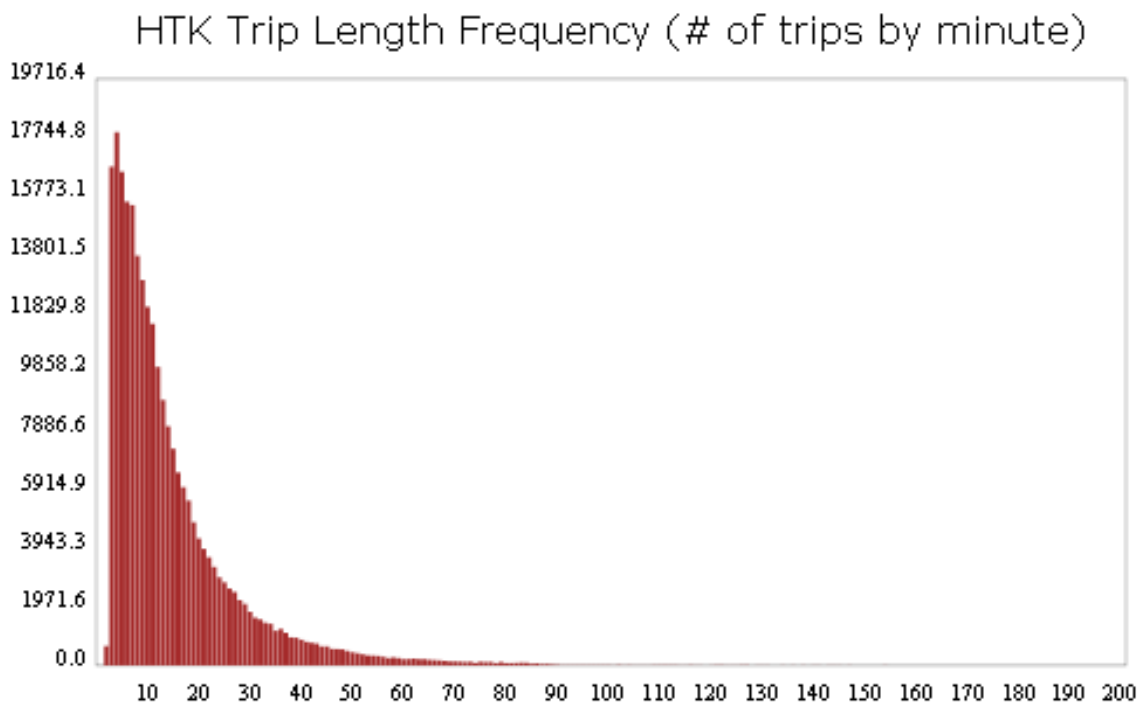




Figure 21. CFRPM Region: External-to-Internal (EI) Trip Length Distribution

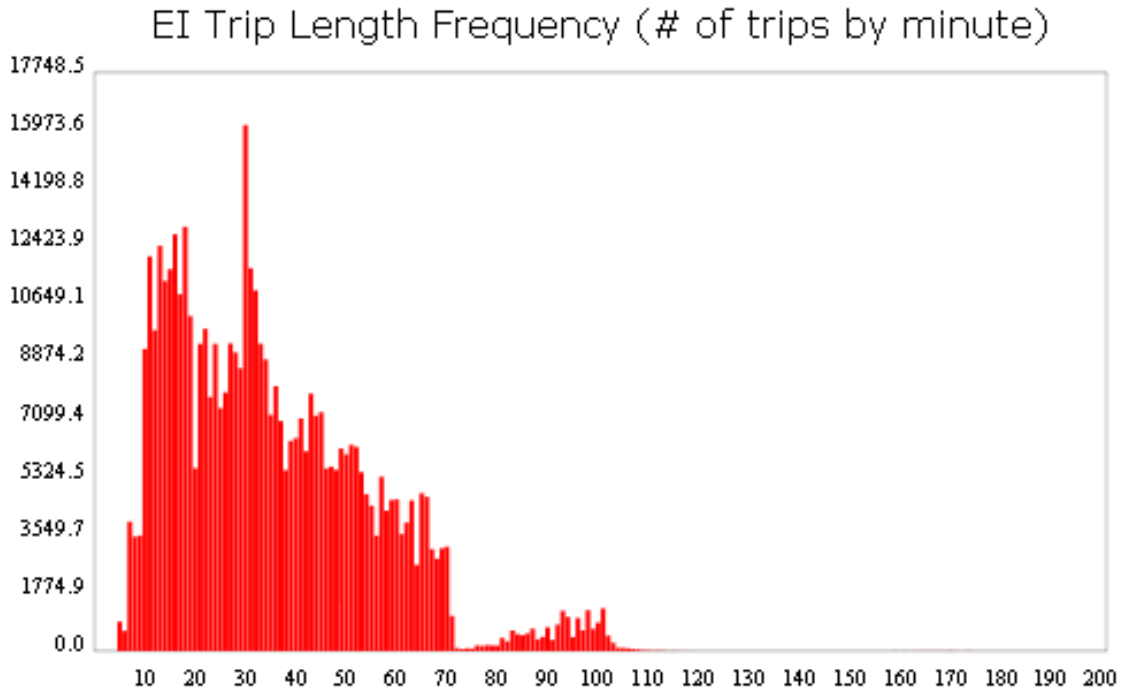
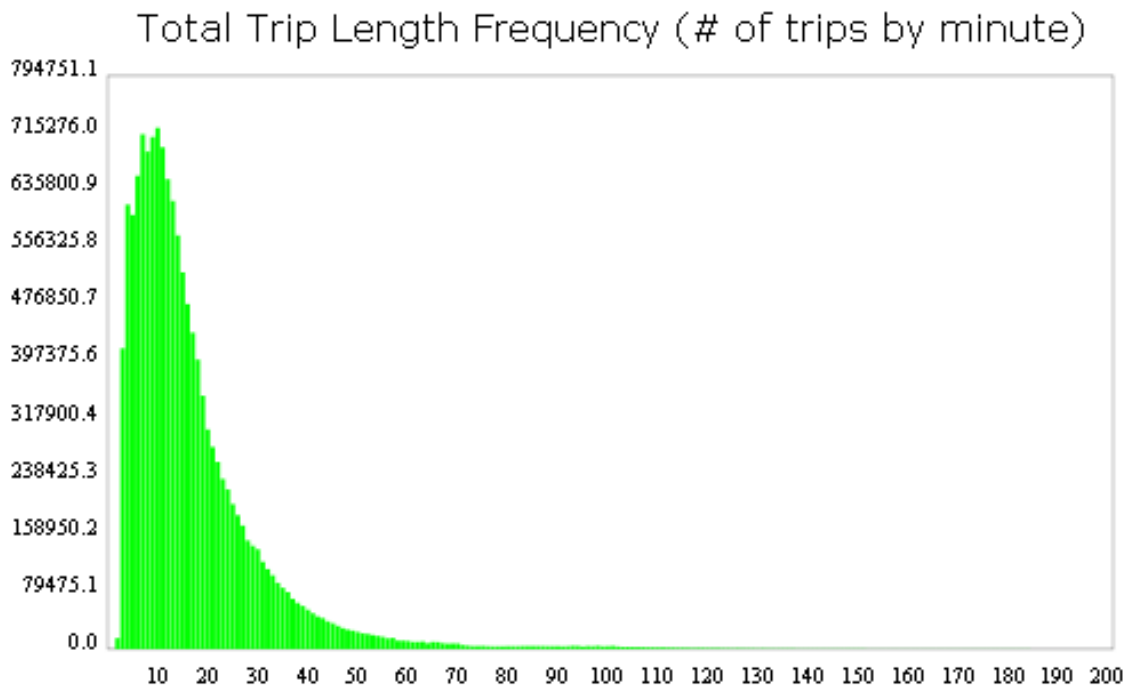


Figure 22. CFRPM Region: Total Trip Length Distribution





7.0 Transit Network

The sixth module in the CFRPM v5.0 FSUTMS model chain is the transit network built from the input highway link and transit line data. The Base Year 2005 network validation for the CFRPM v5.0 transit network consists of four of the region's five transit agencies that provide fixed route service: LYNX (Central Florida Regional Transportation Authority, serving Orange, Osceola, and Seminole Counties); Votran (serving Volusia County); Space Coast Area Transit (serving Brevard County); and SunTran (serving Marion County). The fifth fixed route transit system in Central Florida is LakeXpress (serving Lake County), but this system did not begin operations until 2007, and therefore is not included in the 2005 base year validation system. This section documents the development of the base year 2005 regional transit network for validation for the CFRPM v5.0.

It is important to have travel times that reflect the actual conditions experienced by travelers. Consequently, the bus end-to-end travel times were reviewed for consistency with their observed times from the public timetables. Public timetables tend to be "padded" so that the schedule can be maintained evenly throughout the day, but still represent the overall bus speed.

The transit speeds were calibrated so that they generally represented observed conditions. LYNX and Space Coast buses were reviewed by their service areas, while the SunTran and Votran systems were reviewed in their entirety.

Bus travel times were calibrated separately for the peak period (shown in **Table 42**) and the off-peak period (shown in **Table 43**). In the columns titled "average difference (in minutes)," positive values indicate that the model generated bus times are slower than the observed times. Negative values indicate modeled buses are faster than observed. Overall, results appear reasonable given the observed data and 24-hour auto speeds.



Table 42. Bus Travel Time Comparison (peak period)

Agency	Group/Area	Average difference (minutes)	Average Absolute difference (percent)	%RMSE
LYNX	Northeast	3.84	17%	9.3
	Southeast	3.21	13%	8.1
	Southwest	1.27	19%	13.2
	Northwest	3.07	10%	7.5
	Express	1.17	2%	1.2
	LYMMO	0.57	5%	0.6
Votran		0.94	15%	8.3
Space Coast	Titusville	0.50	10%	4.1
	Melbourne	2.43	10%	6.9
SunTran		-1.48	10%	5.2

Table 43. Bus Travel Time Comparison (off-peak period)

Agency	Group/Area	Average difference (minutes)	Average Absolute difference (percent)	%RMSE
LYNX	Northeast	-0.60	12%	7.3
	Southeast	-1.62	13%	8.5
	Southwest	0.33	20%	10.8
	Northwest	2.26	8%	7.2
	Express	-1.92	3%	1.9
	LYMMO	-2.88	24%	2.9
Votran		-0.27	15%	7.9
Space Coast	Titusville	-2.96	9%	3.9
	Melbourne	1.26	8%	6.6
SunTran		1.58	12%	4.8



8.0 Mode Choice

The eighth module in the CFRPM v5.0 FSUTMS model chain is the mode choice module (MODE). It estimates how many person trips will travel by each available mode. The Mode Choice model does this by determining the probability of using each available mode for traveling between each pair of zones, and then using those probabilities to stratify trips among available modes. The CFRPM v5.0 adopted the Mode Choice modeling procedure used for the Miami North Corridor Study, approved by FTA, and is fully compatible within the existing FSUTMS framework. This section describes the Nested Logit Model structures for use in this Mode Choice model and the validation results for the Base Year 2005.

In the mode choice module, person trips are split to highway vehicle trips and transit trips. These splits are based on a host of mode split coefficients and constants for the model area that quantify the relative utilities of the available modes or options. The coefficients and constants are applied to the impedances estimated in previous model steps.

The mode choice model is executed twice, once each for the peak and off-peak periods, rather than eight times, twice for each of the four transit networks, as in previous versions of the CFRPM. This reduces model execution time and greatly simplifies the model scripts. MPO/TPO codes were added to the zonal land use file (A1DECK.TEM) to facilitate this change.

8.1 Nested Logit Structure

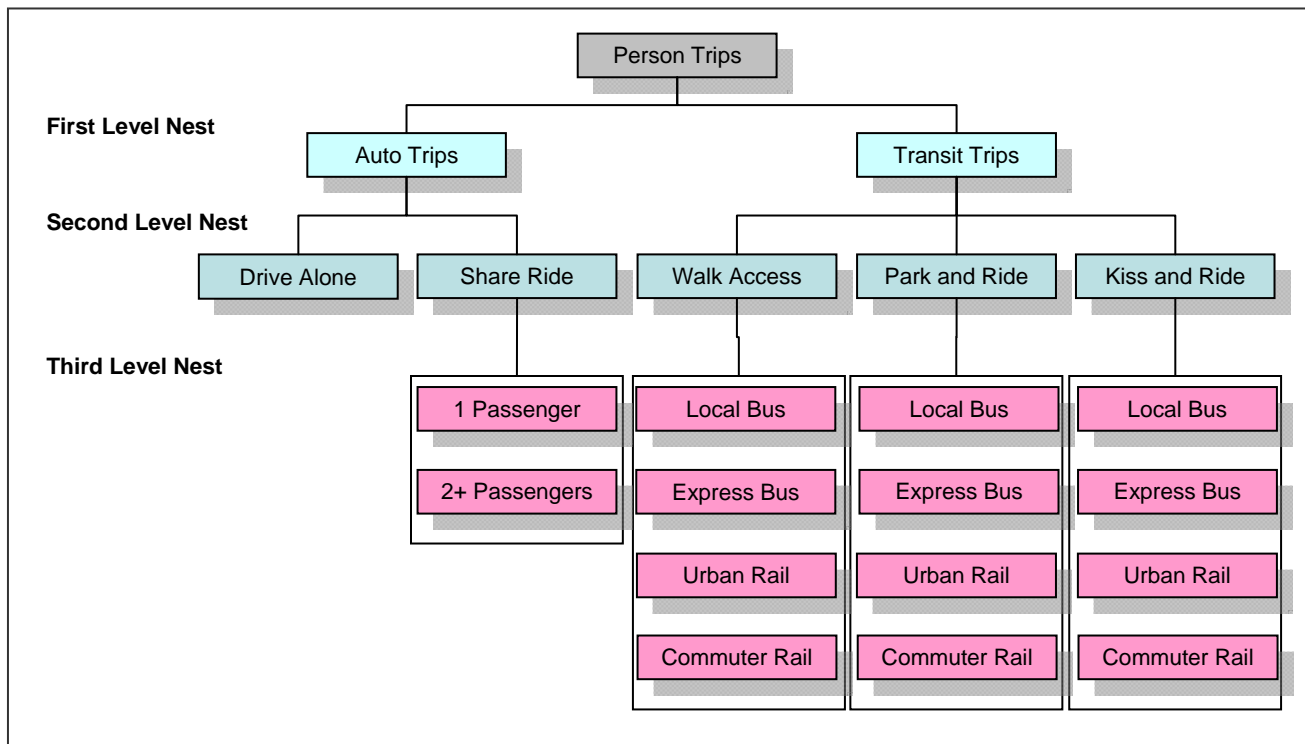
The Mode Choice Model uses a nested logit structure that assumes alternative modes compete with each other, but only at the same level within the nest. In addition, alternative modes of a lower level are assumed to be more sensitive to changes in service attributes than those of an upper level, this causes them to be more elastic than they would be in a multinomial structure.

The sensitivity of each mode is estimated using a nesting coefficient using a range of zero to one. It is inversely proportional to the sequential product of all nesting coefficients of the upper-level nests including the current level. The nesting coefficient is used to calculate market share relative to the other nests at the same level. Therefore, if a nesting coefficient is equal to one, the corresponding nested structure becomes identical to a multinomial structure.



The design of the CFRPM Mode Choice model consists of a three-level nested structure as illustrated in **Figure 23**. In the primary nest, total person trips are divided into "Auto" trips and "Transit" trips. In the secondary nest, the auto trips are split into "Drive Alone" trips and "Shared Ride" trips, and the transit trips are split into "Walk Access" trips, "Park and Ride Access" trips and "Kiss and Ride Access" trips. In the third nest, shared ride trips are further divided into "One Passenger" and "Two+ Passengers". On the transit side, the Walk Access trips, Park and Ride Access trips, and Kiss and Ride Access trips are divided into "Local Bus" trips, "Express Bus" trips, "Urban Rail" trips, and "Commuter Rail" trips.

Figure 23. Mode Choice Structure



8.2 Auto Ownership Category

Auto ownership was accepted as one of the major variables for defining the trip-making characteristics of travelers. As the average number of automobiles per household has increased over the years, it has been necessary to increase the number auto ownership categories. The CFRPM v5.0 mode choice program has three categories of auto ownership: 0-auto households, 1-auto households, and 2+ auto households.



8.3 Trip Purpose Category

Three trip purposes are used in the CFRPM v5.0 as follows:

- Home-Based Work trips (HBW);
- Home-Based Non-work trips, other, (HBO); and
- Non-Home Based trips (NHB).

The Home-Based Shopping (HBSH) trips, Home-Based Social / Recreation (HBSR) trips, Home-Based School (HBSC) trips and Home-Based Other (HBO) trips are combined into Home-Based Non-Work (HBNW), or HBO trips.

8.4 Coefficients and Parameters

The utility of a mode is assumed to be a function of attributes that describe the level of service (LOS) provided by the mode, weighted by coefficients. A mode specific constant, also known as a mode bias constant, is also typically included as an adjustment parameter that accounts for the effects of variables not included in the utility computation.

The coefficients were modified to conform to the new FSUTMS modeling standards. The path-builder and the mode choice model use the same coefficients to convert the different travel costs into their equivalent in-vehicle travel time minutes. **Table 44** shows the mode choice coefficients used in the CFRPM v5.0.

Table 44. Mode Choice Coefficients

HBW	HBNW	NHB	Variables
-0.0500	-0.0250	-0.0500	Transit Walk Time, Highway Terminal Time
-0.0250	-0.0125	-0.0250	Transit Auto Access Time
-0.0250	-0.0125	-0.0250	Transit Run Time, Highway Run Time
-0.0500	-0.0250	-0.0500	Transit First Wait < 7 Minutes
-0.0500	-0.0250	-0.0500	Transit First Wait > 7 Minutes
-0.0500	-0.0250	-0.0500	Transit Transfer Time
-0.1250	-0.0625	-0.1250	Transit Number of Transfers
-0.0025	-0.0025	-0.0050	Transit Fare
-0.0025	-0.0025	-0.0050	Highway Auto Operating Costs
-0.0025	-0.0025	-0.0050	Highway Parking Costs
-0.0220	-0.0125	-0.0250	HOV Time Difference

The nesting coefficients values are the same as used in the CFRPM v4.1. **Table 45** shows the value of these coefficients used in the mode choice model.

**Table 45. Mode Choice Nesting Coefficients**

HBW	HBNW	NHB	Nesting Labels
0.3000	0.3000	0.3000	Transit Nesting
0.5000	0.5000	0.5000	Walk Access Nesting
0.5000	0.5000	0.5000	Park-Ride Access Nesting
0.8000	0.8000	0.8000	Highway Nesting
0.2000	0.2000	0.2000	Shared Ride Nesting
0.5000	0.5000	0.5000	Kiss-Ride Access Nesting

The mode choice model was calibrated for the HBW, HBNW, and NHB trip purposes. The special attraction purposes were not calibrated due to the lack of observed data and most of them do not experience tangible public transit service in the current set of alternatives.

The calibration of the mode choice model was reasonable. High-magnitude bias constants were an issue for some zero-car household sub-modes. The large constants are likely because the distribution of zero-car households does not produce a substantial amount of trips on interchanges with adequate transit service.

The bias constants for the LYNX, Votran, Space Coast and SunTran service areas are shown in **Tables 46, 47, 48, and 49**, respectively. Transit constants from SunTran are used for Lake County forecasting purposes. Lake County did not have any transit service in the 2005 base year, so it was assumed that the modal options and sensitivities likely to occur in Lake County in the future would be similar to existing characteristics and modal sensitivities in the Ocala region.



Table 46. Mode Choice Model Constants for LYNX

		-2.11250	WALK TO LOCAL TRANSIT MODAL CONSTANT
5.99000	1.44480		- FOR MARKET 1 HOUSEHOLDS
-0.98000	-2.81340		- FOR MARKET 2 HOUSEHOLDS
-0.47280	-2.31020		- FOR MARKET 3 HOUSEHOLDS
0.50000	-0.20000	0.55000	- FOR DOWNTOWN ATTRACTIONS
0.20000	-0.30000	0.50000	- FOR EXURBAN PRODUCTIONS
0.70000	0.10000	0.10000	- FOR EXURBAN ATTRACTIONS
			WALK TO PREMIUM TRANSIT MODAL CONSTANT
0.00000	0.00000	0.00000	- FOR EXPRESS BUS PATHS
0.00000	0.00000	0.00000	- FOR URBAN RAIL PATHS
0.00000	0.00000	0.00000	- FOR COMMUTER RAIL PATHS
0.00000	0.00000	0.00000	- FOR DOWNTOWN ATTRACTIONS
0.00000	0.00000	0.00000	- FOR EXURBAN PRODUCTIONS
0.00000	0.00000	0.00000	- FOR EXURBAN ATTRACTIONS
		-2.85500	PARK-RIDE TRANSIT MODAL CONSTANT
0.00000	0.00000		- FOR MARKET 1 HOUSEHOLDS
-2.02700	-3.33600		- FOR MARKET 2 HOUSEHOLDS
-2.84980	-3.73470		- FOR MARKET 3 HOUSEHOLDS
0.00000	0.00000	0.00000	- FOR EXPRESS BUS PATHS
0.00000	0.00000	0.00000	- FOR URBAN RAIL PATHS
0.00000	0.00000	0.00000	- FOR COMMUTER RAIL PATHS
0.60000	0.30000	0.00000	- FOR DOWNTOWN ATTRACTIONS
-0.80000	-0.80000	-0.10000	- FOR EXURBAN PRODUCTIONS
0.19000	0.25000	-0.10000	- FOR EXURBAN ATTRACTIONS
		-2.82500	KISS-RIDE TRANSIT MODAL CONSTANT
-6.86000	-0.42920		- FOR MARKET 1 HOUSEHOLDS
-1.58770	-3.71000		- FOR MARKET 2 HOUSEHOLDS
-2.50970	-3.81000		- FOR MARKET 3 HOUSEHOLDS
0.00000	0.00000	0.00000	- FOR EXPRESS BUS PATHS
0.00000	0.00000	0.00000	- FOR URBAN RAIL PATHS
0.00000	0.00000	0.00000	- FOR COMMUTER RAIL PATHS
0.90000	0.30000	0.40000	- FOR DOWNTOWN ATTRACTIONS
-1.00000	-0.50000	0.20000	- FOR EXURBAN PRODUCTIONS
-0.45000	.00000	0.15000	- FOR EXURBAN ATTRACTIONS
.00000	.00000	.00000	ONE PER VEHICLE HIGHWAY MODAL CONSTANT
.00000	.00000	.00000	- FOR MARKET 1 HOUSEHOLDS
.00000	.00000	.00000	- FOR MARKET 2 HOUSEHOLDS
.00000	.00000	.00000	- FOR MARKET 3 HOUSEHOLDS
.00000	.00000	.00000	- FOR DOWNTOWN ATTRACTIONS
			- FOR EXURBAN PRODUCTIONS
			- FOR EXURBAN ATTRACTIONS
0.00000	.00000	-.39500	TWO PER VEHICLE HIGHWAY MODAL CONSTANT
-9.41000	0.32000	.00000	- FOR MARKET 1 HOUSEHOLDS
-1.17000	0.22500	.00000	- FOR MARKET 2 HOUSEHOLDS
-1.96000	-0.03000	.00000	- FOR MARKET 3 HOUSEHOLDS
.40000	.00000	.00000	- FOR DOWNTOWN ATTRACTIONS
0.00000	0.00000	0.00000	- FOR EXURBAN PRODUCTIONS
0.00000	0.00000	0.00000	- FOR EXURBAN ATTRACTIONS
.00000	.00000	-.63100	THREE+ PER VEHICLE HIGHWAY MODAL CONST
-9.62800	0.30000	.00000	- FOR MARKET 1 HOUSEHOLDS
-1.46000	0.14300	.00000	- FOR MARKET 2 HOUSEHOLDS
-2.25000	-0.27000	.00000	- FOR MARKET 3 HOUSEHOLDS
.40000	.00000	.00000	- FOR DOWNTOWN ATTRACTIONS
0.00000	0.00000	0.00000	- FOR EXURBAN PRODUCTIONS
0.00000	0.00000	0.00000	- FOR EXURBAN ATTRACTIONS
0.0			HBW/OP : 1/VEH, 0 CAR
0.0			HBW/OP : 1/VEH, 1 CAR
0.0			HBW/OP : 1/VEH, 2+ CAR
-0.3560			HBW/OP : 2/VEH, 0 CAR
-1.0160			HBW/OP : 2/VEH, 1 CAR
-1.7760			HBW/OP : 2/VEH, 2+ CAR
-0.5270			HBW/OP : 3+/VEH, 0 CAR
-1.2370			HBW/OP : 3+/VEH, 1 CAR
-1.9970			HBW/OP : 3+/VEH, 2+ CAR



Table 47. Mode Choice Model Constants for Votran

		-2.34650	WALK TO LOCAL TRANSIT MODAL CONSTANT
2.94899	1.63055		- FOR MARKET 1 HOUSEHOLDS
-2.06400	-3.75950		- FOR MARKET 2 HOUSEHOLDS
-3.15650	-4.06000		- FOR MARKET 3 HOUSEHOLDS
1.02850	0.72600	0.72600	- FOR DOWNTOWN ATTRACTIONS
0.70000	0.50000	0.10000	- FOR EXURBAN PRODUCTIONS
0.50000	0.50000	0.10000	- FOR EXURBAN ATTRACTIONS
			WALK TO PREMIUM TRANSIT MODAL CONSTANT
0.00000	0.00000	0.00000	- FOR EXPRESS BUS PATHS
0.00000	0.00000	0.00000	- FOR URBAN RAIL PATHS
0.00000	0.00000	0.00000	- FOR COMMUTER RAIL PATHS
0.00000	0.00000	0.00000	- FOR DOWNTOWN ATTRACTIONS
0.00000	0.00000	0.00000	- FOR EXURBAN PRODUCTIONS
0.00000	0.00000	0.00000	- FOR EXURBAN ATTRACTIONS
		-1.32937	PARK-RIDE TRANSIT MODAL CONSTANT
0.00000	1.21568		- FOR MARKET 1 HOUSEHOLDS
-2.22000	-4.35146		- FOR MARKET 2 HOUSEHOLDS
-3.54000	-5.43613		- FOR MARKET 3 HOUSEHOLDS
0.00000	0.00000	0.00000	- FOR EXPRESS BUS PATHS
0.00000	0.00000	0.00000	- FOR URBAN RAIL PATHS
0.00000	0.00000	0.00000	- FOR COMMUTER RAIL PATHS
0.55000	.55000	.55000	- FOR DOWNTOWN ATTRACTIONS
0.00000	.00000	.00000	- FOR EXURBAN PRODUCTIONS
0.00000	.00000	-0.10000	- FOR EXURBAN ATTRACTIONS
		-1.06050	KISS-RIDE TRANSIT MODAL CONSTANT
3.49700	1.11097		- FOR MARKET 1 HOUSEHOLDS
-1.71000	-4.05479		- FOR MARKET 2 HOUSEHOLDS
-3.38000	-5.14480		- FOR MARKET 3 HOUSEHOLDS
0.00000	0.00000	0.00000	- FOR EXPRESS BUS PATHS
0.00000	0.00000	0.00000	- FOR URBAN RAIL PATHS
0.00000	0.00000	0.00000	- FOR COMMUTER RAIL PATHS
.55000	.55000	.55000	- FOR DOWNTOWN ATTRACTIONS
.00000	.00000	.00000	- FOR EXURBAN PRODUCTIONS
.00000	.00000	-0.10000	- FOR EXURBAN ATTRACTIONS
.00000	.00000	.00000	ONE PER VEHICLE HIGHWAY MODAL CONSTANT
.00000	.00000	.00000	- FOR MARKET 1 HOUSEHOLDS
.00000	.00000	.00000	- FOR MARKET 2 HOUSEHOLDS
.00000	.00000	.00000	- FOR MARKET 3 HOUSEHOLDS
.00000	.00000	.00000	- FOR DOWNTOWN ATTRACTIONS
			- FOR EXURBAN PRODUCTIONS
			- FOR EXURBAN ATTRACTIONS
.00000	.00000	-.39400	TWO PER VEHICLE HIGHWAY MODAL CONSTANT
-0.35000	.33700	.00000	- FOR MARKET 1 HOUSEHOLDS
-1.02000	0.24500	.00000	- FOR MARKET 2 HOUSEHOLDS
-1.76200	-0.03000	.00000	- FOR MARKET 3 HOUSEHOLDS
.40000	.00000	.00000	- FOR DOWNTOWN ATTRACTIONS
0.00000	0.00000	0.00000	- FOR EXURBAN PRODUCTIONS
0.00000	0.00000	0.00000	- FOR EXURBAN ATTRACTIONS
.00000	.00000	-.60200	THREE+ PER VEHICLE HIGHWAY MODAL CONST
-0.51000	0.30900	.00000	- FOR MARKET 1 HOUSEHOLDS
-1.22000	0.18500	.00000	- FOR MARKET 2 HOUSEHOLDS
-1.97000	-0.24000	.00000	- FOR MARKET 3 HOUSEHOLDS
.40000	.00000	.00000	- FOR DOWNTOWN ATTRACTIONS
0.00000	0.00000	0.00000	- FOR EXURBAN PRODUCTIONS
0.00000	0.00000	0.00000	- FOR EXURBAN ATTRACTIONS
0.0			HBW/OP : 1/VEH, 0 CAR
0.0			HBW/OP : 1/VEH, 1 CAR
0.0			HBW/OP : 1/VEH, 2+ CAR
-0.3560			HBW/OP : 2/VEH, 0 CAR
-1.0160			HBW/OP : 2/VEH, 1 CAR
-1.7760			HBW/OP : 2/VEH, 2+ CAR
-0.5270			HBW/OP : 3+/VEH, 0 CAR
-1.2370			HBW/OP : 3+/VEH, 1 CAR
-1.9970			HBW/OP : 3+/VEH, 2+ CAR



Table 48. Mode Choice Model Constants for Space Coast

		-2.25100	WALK TO LOCAL TRANSIT MODAL CONSTANT
2.49913	1.29470		- FOR MARKET 1 HOUSEHOLDS
-2.55837	-3.89850		- FOR MARKET 2 HOUSEHOLDS
-3.46354	-4.85800		- FOR MARKET 3 HOUSEHOLDS
1.02850	.72600	.72600	- FOR DOWNTOWN ATTRACTIONS
-0.40000	-0.30000	0.00000	- FOR EXURBAN PRODUCTIONS
0.00000	0.00000	0.00000	- FOR EXURBAN ATTRACTIONS
			WALK TO PREMIUM TRANSIT MODAL CONSTANT
0.00000	0.00000	0.00000	- FOR EXPRESS BUS PATHS
0.00000	0.00000	0.00000	- FOR URBAN RAIL PATHS
0.00000	0.00000	0.00000	- FOR COMMUTER RAIL PATHS
0.00000	0.00000	0.00000	- FOR DOWNTOWN ATTRACTIONS
0.00000	0.00000	0.00000	- FOR EXURBAN PRODUCTIONS
0.00000	0.00000	0.00000	- FOR EXURBAN ATTRACTIONS
			-8.50000 PARK-RIDE TRANSIT MODAL CONSTANT
1.99030	1.04748		- FOR MARKET 1 HOUSEHOLDS
-4.91576	-9.85000		- FOR MARKET 2 HOUSEHOLDS
-3.62376	-9.69000		- FOR MARKET 3 HOUSEHOLDS
0.00000	0.00000	0.00000	- FOR EXPRESS BUS PATHS
0.00000	0.00000	0.00000	- FOR URBAN RAIL PATHS
0.00000	0.00000	0.00000	- FOR COMMUTER RAIL PATHS
.55000	0.55000	.55000	- FOR DOWNTOWN ATTRACTIONS
.00000	-0.40000	.00000	- FOR EXURBAN PRODUCTIONS
.00000	0.00000	-0.10000	- FOR EXURBAN ATTRACTIONS
			-2.46000 KISS-RIDE TRANSIT MODAL CONSTANT
1.82920	-0.08500		- FOR MARKET 1 HOUSEHOLDS
-3.15243	-4.87500		- FOR MARKET 2 HOUSEHOLDS
-6.77185	-5.34500		- FOR MARKET 3 HOUSEHOLDS
0.00000	0.00000	0.00000	- FOR EXPRESS BUS PATHS
0.00000	0.00000	0.00000	- FOR URBAN RAIL PATHS
0.00000	0.00000	0.00000	- FOR COMMUTER RAIL PATHS
.55000	.55000	.55000	- FOR DOWNTOWN ATTRACTIONS
.00000	-0.20000	.00000	- FOR EXURBAN PRODUCTIONS
.00000	.00000	-0.10000	- FOR EXURBAN ATTRACTIONS
.00000	.00000	.00000	ONE PER VEHICLE HIGHWAY MODAL CONSTANT
.00000	.00000	.00000	- FOR MARKET 1 HOUSEHOLDS
.00000	.00000	.00000	- FOR MARKET 2 HOUSEHOLDS
.00000	.00000	.00000	- FOR MARKET 3 HOUSEHOLDS
.00000	.00000	.00000	- FOR DOWNTOWN ATTRACTIONS
			- FOR EXURBAN PRODUCTIONS
			- FOR EXURBAN ATTRACTIONS
.00000	.00000	-.37150	TWO PER VEHICLE HIGHWAY MODAL CONSTANT
-0.27862	.37000	.00000	- FOR MARKET 1 HOUSEHOLDS
-0.93796	0.30000	.00000	- FOR MARKET 2 HOUSEHOLDS
-1.69694	-0.05500	.00000	- FOR MARKET 3 HOUSEHOLDS
.40000	.00000	.00000	- FOR DOWNTOWN ATTRACTIONS
0.00000	0.00000	0.00000	- FOR EXURBAN PRODUCTIONS
0.00000	0.00000	0.00000	- FOR EXURBAN ATTRACTIONS
.00000	.00000	-.57500	THREE+ PER VEHICLE HIGHWAY MODAL CONST
-0.45274	.33100	.00000	- FOR MARKET 1 HOUSEHOLDS
-1.16198	0.25000	.00000	- FOR MARKET 2 HOUSEHOLDS
-1.92392	-0.26000	.00000	- FOR MARKET 3 HOUSEHOLDS
.40000	.00000	.00000	- FOR DOWNTOWN ATTRACTIONS
0.00000	0.00000	0.00000	- FOR EXURBAN PRODUCTIONS
0.00000	0.00000	0.00000	- FOR EXURBAN ATTRACTIONS
0.0			HBW/OP : 1/VEH, 0 CAR
0.0			HBW/OP : 1/VEH, 1 CAR
0.0			HBW/OP : 1/VEH, 2+ CAR
-0.3560			HBW/OP : 2/VEH, 0 CAR
-1.0160			HBW/OP : 2/VEH, 1 CAR
-1.7760			HBW/OP : 2/VEH, 2+ CAR
-0.5270			HBW/OP : 3+/VEH, 0 CAR
-1.2370			HBW/OP : 3+/VEH, 1 CAR
-1.9970			HBW/OP : 3+/VEH, 2+ CAR



Table 49. Mode Choice Model Constants for SunTran

		-1.48800	WALK TO LOCAL TRANSIT MODAL CONSTANT
-6.55000	1.57500		- FOR MARKET 1 HOUSEHOLDS
-1.90000	-3.15500		- FOR MARKET 2 HOUSEHOLDS
-2.43000	-3.74900		- FOR MARKET 3 HOUSEHOLDS
1.02850	.72600	.72600	- FOR DOWNTOWN ATTRACTIONS
-0.40000	-0.30000	-0.15000	- FOR EXURBAN PRODUCTIONS
0.00000	0.00000	-0.25000	- FOR EXURBAN ATTRACTIONS
			WALK TO PREMIUM TRANSIT MODAL CONSTANT
0.00000	0.00000	0.00000	- FOR EXPRESS BUS PATHS
0.00000	0.00000	0.00000	- FOR URBAN RAIL PATHS
0.00000	0.00000	0.00000	- FOR COMMUTER RAIL PATHS
0.00000	0.00000	0.00000	- FOR DOWNTOWN ATTRACTIONS
0.00000	0.00000	0.00000	- FOR EXURBAN PRODUCTIONS
0.00000	0.00000	0.00000	- FOR EXURBAN ATTRACTIONS
		-3.42537	PARK-RIDE TRANSIT MODAL CONSTANT
5.00008	1.21568		- FOR MARKET 1 HOUSEHOLDS
-1.39442	-2.22146		- FOR MARKET 2 HOUSEHOLDS
-2.36605	-2.25613		- FOR MARKET 3 HOUSEHOLDS
0.00000	0.00000	0.00000	- FOR EXPRESS BUS PATHS
0.00000	0.00000	0.00000	- FOR URBAN RAIL PATHS
0.00000	0.00000	0.00000	- FOR COMMUTER RAIL PATHS
.55000	.55000	.55000	- FOR DOWNTOWN ATTRACTIONS
.00000	.00000	.00000	- FOR EXURBAN PRODUCTIONS
.00000	.00000	-0.10000	- FOR EXURBAN ATTRACTIONS
		-3.44950	KISS-RIDE TRANSIT MODAL CONSTANT
5.00000	1.13097		- FOR MARKET 1 HOUSEHOLDS
-1.33424	-2.38279		- FOR MARKET 2 HOUSEHOLDS
-2.50647	-2.55840		- FOR MARKET 3 HOUSEHOLDS
0.00000	0.00000	0.00000	- FOR EXPRESS BUS PATHS
0.00000	0.00000	0.00000	- FOR URBAN RAIL PATHS
0.00000	0.00000	0.00000	- FOR COMMUTER RAIL PATHS
.55000	.55000	.55000	- FOR DOWNTOWN ATTRACTIONS
.00000	.00000	.00000	- FOR EXURBAN PRODUCTIONS
.00000	.00000	-0.10000	- FOR EXURBAN ATTRACTIONS
.00000	.00000	.00000	ONE PER VEHICLE HIGHWAY MODAL CONSTANT
.00000	.00000	.00000	- FOR MARKET 1 HOUSEHOLDS
.00000	.00000	.00000	- FOR MARKET 2 HOUSEHOLDS
.00000	.00000	.00000	- FOR MARKET 3 HOUSEHOLDS
.00000	.00000	.00000	- FOR DOWNTOWN ATTRACTIONS
			- FOR EXURBAN PRODUCTIONS
			- FOR EXURBAN ATTRACTIONS
.00000	.00000	- .36400	TWO PER VEHICLE HIGHWAY MODAL CONSTANT
-9.48900	.28800	.00000	- FOR MARKET 1 HOUSEHOLDS
-1.14900	0.22500	.00000	- FOR MARKET 2 HOUSEHOLDS
-1.70900	-0.12500	.00000	- FOR MARKET 3 HOUSEHOLDS
.40000	.00000	.00000	- FOR DOWNTOWN ATTRACTIONS
0.00000	0.00000	0.00000	- FOR EXURBAN PRODUCTIONS
0.00000	0.00000	0.00000	- FOR EXURBAN ATTRACTIONS
.00000	.00000	- .57100	THREE+ PER VEHICLE HIGHWAY MODAL CONST
-9.59500	.21100	.00000	- FOR MARKET 1 HOUSEHOLDS
-1.30300	0.13000	.00000	- FOR MARKET 2 HOUSEHOLDS
-2.06500	-0.34000	.00000	- FOR MARKET 3 HOUSEHOLDS
.40000	.00000	.00000	- FOR DOWNTOWN ATTRACTIONS
0.00000	0.00000	0.00000	- FOR EXURBAN PRODUCTIONS
0.00000	0.00000	0.00000	- FOR EXURBAN ATTRACTIONS
0.0			HBW/OP : 1/VEH, 0 CAR
0.0			HBW/OP : 1/VEH, 1 CAR
0.0			HBW/OP : 1/VEH, 2+ CAR
-0.3560			HBW/OP : 2/VEH, 0 CAR
-1.0160			HBW/OP : 2/VEH, 1 CAR
-1.7760			HBW/OP : 2/VEH, 2+ CAR
-0.5270			HBW/OP : 3+/VEH, 0 CAR
-1.2370			HBW/OP : 3+/VEH, 1 CAR
-1.9970			HBW/OP : 3+/VEH, 2+ CAR



8.5 Estimates of Trips by Mode

Table 50 presents the highway person trips, highway vehicle trips, total transit trips and the total person trips for each MPO/TPO in the CFRPM study area for the HBW purpose. It also shows the auto occupancy rates for each county and for the study area as a whole as calculated by the Mode Choice model. **Table 51** shows the breakdown of HBW transit trips by mode for each MPO/TPO and the totals for each mode.

Table 52 and **Table 53** present the Total Non-Work highway and transit trips by mode and by MPO/TPO in the same manner as **Table 50** and **Table 51** do for HBW trips.

Table 50. HBW Highway Trips Summary

MPO/TPO/ County	Highway Person Trips				Highway Vehicle Trips				Auto Occ.	Total	
	Drive Alone	Shared Ride 2	Shared Ride 3+	Person Total	Drive Alone	Shared Ride 2	Shared Ride 3+	Vehicle Total		Transit Trips	Person Trips
METROPLAN	714,329	100,400	27,168	841,897	714,329	50,201	8,753	773,283	1.089	24,358	866,255
Volusia/Flagler	311,380	50,692	19,937	382,009	311,380	25,324	6,286	342,990	1.114	2,577	384,585
Space Coast	328,440	56,880	21,535	406,855	328,440	28,442	6,823	363,705	1.119	1,252	408,107
Ocala/Marion	158,137	26,906	10,970	196,014	158,137	13,448	3,480	175,064	1.120	312	196,325
Lake-Sumter	171,984	29,322	12,058	213,364	171,984	14,655	3,826	190,464	1.120	0	213,364
Total	1,684,269	264,201	91,668	2,040,138	1,684,269	132,070	29,168	1,845,506	1.105	28,499	2,068,637

Table 51. HBW Transit Trips Summary

Transit Agency	Transit Trips								
	Walk			Park and Ride			Kiss and Ride		
	Local Bus	Premium	Walk Total	Local Bus	Premium	PnR Total	Local Bus	Premium	KnR Total
LYNX	21,932	0	21,932	209	0	209	2,218	0	2,218
Votran	2,359	0	2,359	13	0	13	205	0	205
Space Coast	1,116	0	1,116	16	0	16	121	0	121
SunTran	312	0	312	0	0	0	0	0	0
LakeXpress	0	0	0	0	0	0	0	0	0
Total	25,718	0	25,718	238	0	238	2,543	0	2,543



Table 52. Total Non-Work Highway Trips Summary

MPO/TPO/ County	Highway Person Trips				Highway Vehicle Trips				Total		
	Drive Alone	Shared Ride 2	Shared Ride 3+	Person Total	Drive Alone	Shared Ride 2	Shared Ride 3+	Vehicle Total	Auto Occ.	Transit Trips	Person Trips
METROPLAN	2,438,871	1,857,307	927,889	5,224,067	2,438,871	928,808	273,750	3,641,429	1.435	26,152	5,250,219
Volusia/Flagler	655,588	494,959	299,081	1,449,627	655,588	247,601	88,160	991,349	1.462	3,843	1,453,470
Space Coast	716,327	550,571	328,764	1,595,663	716,327	275,327	96,577	1,088,232	1.466	2,853	1,598,515
Ocala/Marion	344,623	265,726	138,370	748,718	344,623	132,859	40,593	518,075	1.445	701	749,419
Lake-Sumter	341,683	282,429	158,098	782,210	341,683	141,212	46,407	529,302	1.478	0	782,210
Total	4,497,091	3,450,992	1,852,202	9,800,285	4,497,091	1,725,807	545,488	6,768,386	1.448	33,548	9,833,833

Table 53. Total Non-Work Transit Trips Summary

Transit Agency	Transit Trips								
	Walk			Park and Ride			Kiss and Ride		
	Local Bus	Premium	Walk Total	Local Bus	Premium	PnR Total	Local Bus	Premium	KnR Total
LYNX	23,215	0	23,215	1,323	0	1,323	1,614	0	1,614
Votran	3,609	0	3,609	33	0	33	200	0	200
Space Coast	2,710	0	2,710	0	0	0	143	0	143
SunTran	701	0	701	0	0	0	0	0	0
LakeXpress	0	0	0	0	0	0	0	0	0
Total	30,235	0	30,235	1,356	0	1,356	1,957	0	1,957



9.0 Highway Assignment

The ninth step in the CFRPM v5.0 is the highway assignment (HASSIGN) module. HASSIGN determines the routes for which automobile and truck trips will follow from TAZ to TAZ and assigns those trips to the highway network. The HASSIGN module allocates vehicle trips to the minimum impedance path between each pair of zones in the highway network. This is accomplished through an equilibrium assignment process. This process utilizes a series of iterations until equilibrium is achieved when additional trips can no longer be made without increasing the total travel time of all trips in the network. The evaluation of the highway assignment model is based on comparisons between observed traffic counts and model estimated volumes.

Simulated traffic volumes are compared to traffic counts to determine whether the coded highway network reasonably represents the highway system, and to determine whether the various assumptions used in the model chain are reasonable. The highway assignment evaluation reports are also generated to compare simulated volumes with the traffic counts.

Following the mode choice module, highway vehicle trips are loaded onto the highway network. This occurs in highway assignment, where the routes vehicles will take on the highway network to travel between origin and destination TAZs is determined. Vehicle trips are assigned to the path that has the minimum impedance, i.e. shortest travel time. The highway assignment process runs through multiple iterations, with each new iteration based on congested network travel times from the previous iteration. Congested network travel time is calculated link by link for each iteration based on the CFRPM v5.0 volume/capacity time adjustment curves. This iterative process continues until equilibrium is achieved. In the CFRPM v5.0, equilibrium occurs when any additional trip on the highway network will increase the total travel time of all trips on the network.

The CFRPM v5.0 was developed using the Cube-Voyager software platform. At the time of model validation, the highway assignment algorithm in Cube-Voyager did not provide the option of an alternative algorithm for faster convergence. A potential future enhancement to the assignment process may be to explore the merits of the bi-conjugate assignment algorithm that is available in the new version of the Cube-Voyager software. Since the CFRPM v5.0 has a total of 648 dummy zones, the highway assignment script



file in the model was modified to exclude these dummy zones. This modification led to a faster run time.

9.1 Bureau of Public Road (BPR) Speed Curves

One of the enhancements in the CFRPM highway assignment process is the incorporation of multiple BPR Curves based on the facility type of the roadways. BPR curves determine both the level of congestion (the volume/capacity (v/c) ratio at which speed begins to deteriorate) and the rate at which they deteriorate as congestion increases. The earliest versions of the CFRPM used only a single volume-delay relationship for all facilities.

Using different BPR curves for different types of facilities recognizes that each facility type has its own unique characteristics for responding to congestion. The BPR equation is as follows:

Where:
$$S = S_f / \{1 + \alpha(V / C)^\beta\}$$

S = estimated congested speed C = practical capacity
 S_f = uncongested (free flow) speed α = 0.15 to 0.30
 V = volume β = 4.5 to 8.5

Since travel time "T" is distance divided by speed, the above equation can be expressed as:

Where:
$$T = T_f / \{1 + \alpha(V / C)^\beta\}$$

T = congested link travel time
 T_f = uncongested link travel time
 V = assigned link traffic volume
 C = link capacity
 α, β = coefficients

It should be noted that the BPR curve is not sensitive to the impacts of signal spacing, timing and coordination. The BPR curve also does not accurately estimate speeds for v/c ratios of greater than 1.0. Different values of alpha and beta parameters were tested along with speed and capacities for different facilities.



9.2 UROAD Factors

The BPR volume-delay relationship and UROAD factors work together. The volume-delay relationship assumes practical capacity, while the UROAD factors convert actual capacity (LOS E) to practical capacity (LOS C).

The capacity table used for the Base Year 2005 validation of the CFRPM v5.0 assumed actual capacity at LOS E. The application of variable UROAD factors, by facility type, allowed approximation of LOS C, a condition at which trips generally begin diverting to less congested facilities.

9.3 CONFAC Factors

The CONFAC parameter was used in the highway assignment process to factor roadway capacities from hourly to daily equivalents to calculate daily volume/capacity ratios. The highway capacities are converted from hourly to daily capacities because the model calculates daily volumes, but the input capacities are in peak hour equivalents. The CONFAC parameter enables the CFRPM v5.0 to compute daily volume/capacity ratios that are used in the BPR volume-delay function.

9.4 VFACTORS File

The VFACTORS file houses the BPR Curves (level of service coefficient and exponent), UROAD factors, and CONFAC factors in a single computer file. The CFRPM v5.0 uses a VFACTORS file that is consistent with the FSUTMS standard VFACTORS file, with a few notable exceptions. Those differences are:

- New Facility Type 26 (Divided Signalized Arterial with High Capacity) uses the same factors as Facility Type 23 (Divided Arterial Class 1);
- New Facility Type 39 (Undivided Signalized Arterial with High Capacity) uses the same factors as Facility Type 32 (Undivided Arterial Class 1 with Turn Bays);
- Facility Type 75 (Freeway-to-Freeway Ramp) uses the same factors as standard Facility Type 79 (Freeway-to-Freeway High-Speed Ramp);
- Facility Type 91 (Florida Turnpike) uses the Florida Turnpike recommended factors;
- Facility Type 92 (SR 408) uses the same factors as Facility Types 11 and 12 (Urban Freeway Group 1 (cities of 500,000 or more) and Other Freeway (not in Group 1));



- Facility Type 93 (SR 417) uses the same factors as Facility Types 11 and 12 (Urban Freeway Group 1 (cities of 500,000 or more) and Other Freeway (not in Group 1));
- Facility Type 94 (SR 429) uses the same factors as Facility Types 11 and 12 (Urban Freeway Group 1 (cities of 500,000 or more) and Other Freeway (not in Group 1));
- Facility Type 95 (SR 528) uses the same factors as Facility Types 11 and 12 (Urban Freeway Group 1 (cities of 500,000 or more) and Other Freeway (not in Group 1)); and
- Facility Type 96 (Osceola Parkway) uses the same factors as standard Facility Type 94 (Divided Arterial Toll Facility).

Table 54 shows the VFACTORS file with the variable BPR LOS Coefficient, variable BPR Exponent, UROAD, and CONFAC values by facility type used for the CFRPM v5.0.



Table 54. VFACTORS File

Facility Type	UROAD Factor	CONFAC Factor	BPR Coefficient	BPR Exponent	Facility Type	UROAD Factor	CONFAC Factor	BPR Coefficient	BPR Exponent
10	0.6800	0.1000	0.1500	6.5000	55	1.0000	0.1000	0.1500	4.5000
11	0.6800	0.0900	0.1500	6.5000	56	1.0000	0.1000	0.1500	4.5000
12	0.6800	0.0900	0.1500	6.5000	57	1.0000	0.1000	0.1500	4.5000
13	1.0000	0.1000	0.1500	6.5000	58	1.0000	0.1000	0.1500	4.5000
14	1.0000	0.1000	0.1500	6.5000	59	1.0000	0.1000	0.1500	4.5000
15	0.6800	0.1000	0.1500	6.5000	60	0.9600	0.1000	0.1500	4.5000
16	0.6800	0.1000	0.1500	6.5000	61	0.6800	0.1000	0.1500	4.5000
17	0.6800	0.1000	0.1500	6.5000	62	0.8100	0.1000	0.1500	4.5000
18	1.0000	0.1000	0.1500	6.5000	63	0.9500	0.1000	0.1500	4.5000
19	0.6800	0.1000	0.1500	6.5000	64	0.9600	0.1000	0.1500	4.5000
20	0.9200	0.1000	0.1500	5.5000	65	0.6800	0.1000	0.1500	4.5000
21	0.7300	0.1000	0.1500	5.5000	66	0.8100	0.1000	0.1500	4.5000
22	0.7300	0.1000	0.1500	5.5000	67	0.9500	0.1000	0.1500	4.5000
23	0.8100	0.1000	0.1500	5.5000	68	0.9600	0.1000	0.1500	4.5000
24	0.9500	0.1000	0.1500	5.5000	69	1.0000	0.1000	0.1500	4.5000
25	0.9600	0.1000	0.1500	5.5000	70	0.6800	0.1000	0.1500	6.5000
26	0.8100	0.1000	0.1500	5.5000	71	0.5100	0.1000	0.1500	6.5000
27	1.0000	0.1000	0.1500	5.5000	72	0.9200	0.1000	0.1500	6.5000
28	1.0000	0.1000	0.1500	5.5000	73	0.5100	0.1000	0.1500	6.5000
29	1.0000	0.1000	0.1500	5.5000	74	0.9200	0.1000	0.1500	6.5000
30	0.9200	0.1000	0.1500	4.5000	75	0.6800	0.0900	0.1500	6.5000
31	0.6800	0.1000	0.1500	4.5000	76	0.9200	0.1000	0.1500	6.5000
32	0.8100	0.1000	0.1500	4.5000	77	0.5100	0.1000	0.1500	6.5000
33	0.9500	0.1000	0.1500	4.5000	78	0.9200	0.1000	0.1500	6.5000
34	0.8800	0.1000	0.1500	4.5000	79	0.6800	0.0900	0.1500	6.5000
35	0.6800	0.1000	0.1500	4.5000	80	0.6800	0.1000	0.3000	8.5000
36	0.8100	0.1000	0.1500	4.5000	81	0.6800	0.1000	0.3000	8.5000
37	0.9500	0.1000	0.1500	4.5000	82	0.6800	0.1000	0.3000	8.5000
38	0.9600	0.1000	0.1500	4.5000	83	0.6800	0.1000	0.3000	8.5000
39	0.8100	0.1000	0.1500	4.5000	84	0.6800	0.1000	0.3000	8.5000
40	0.8600	0.1000	0.1500	4.5000	85	0.6800	0.1000	0.3000	8.5000
41	0.9200	0.1000	0.1500	4.5000	86	0.6800	0.1000	0.3000	8.5000
42	0.9200	0.1000	0.1500	4.5000	87	0.6800	0.1000	0.3000	8.5000
43	0.9200	0.1000	0.1500	4.5000	88	0.6800	0.1000	0.3000	8.5000
44	0.8600	0.1000	0.1500	4.5000	89	0.6800	0.1000	0.3000	8.5000
45	0.8600	0.1000	0.1500	4.5000	90	0.6800	0.1000	0.1500	6.5000
46	0.8600	0.1000	0.1500	4.5000	91	0.7500	0.1000	0.1500	4.0000
47	0.8600	0.1000	0.1500	4.5000	92	0.6800	0.0900	0.1500	6.5000
48	0.8600	0.1000	0.1500	4.5000	93	0.6800	0.0900	0.1500	6.5000
49	1.0000	0.1000	0.1500	4.5000	94	0.6800	0.0900	0.1500	6.5000
50	1.0000	0.1000	0.1500	4.5000	95	0.6800	0.0900	0.1500	6.5000
51	1.0000	0.1000	0.1500	4.5000	96	0.6800	0.1000	0.1500	5.5000
52	1.0000	0.1000	0.1500	4.5000	97	0.5100	0.1000	0.1500	6.5000
53	1.0000	0.1000	0.1500	4.5000	98	0.5100	0.1000	0.1500	6.5000
54	1.0000	0.1000	0.1500	4.5000	99	1.0000	0.1000	0.1500	6.5000



9.5 Validation Reports

The highway assignment evaluation reports are used successfully in many areas of Florida to perform systems evaluation activities and to assist in the model validation process. These reports are programmed using the Cube Voyager scripting language. The reports are in HTML format so they can be viewed using Internet Explorer. The loaded link records created in the highway assignment model are used as input to create these reports.

The highway assignment evaluation reports are generated in one of two modes. One mode allows the user to print a variety of reports designed to report validation statistics. The other mode is used for model application results analysis. The validation mode does not require any input data other than the loaded link record file. It creates 27 reports as listed in **Table 55**. The analysis mode requires a series of input parameters to calculate the number of accidents, emissions, fuel consumption, and construction costs in addition to the loaded link record file. In addition to displaying the parameters specified for each run, the analysis mode generates 33 reports as shown in **Table 56**. Since this documentation is for the CFRPM v5.0 validation, only the validation mode reports are shown in Sections 9.6 through 9.12.

**Table 55. HEVAL Validation Model Output Report**

HEVAL Validation Model Output Report	
Report #	Report
1	Links with no assigned volume
2	Total number of links by AT, FT and NL
3	Link percentages by AT, FT and NL
4	Percentage of links with counts by AT, FT and NL
5	Total system miles by AT, FT and NL
6	Total lane miles by AT, FT and NL
7	Total directional system miles by AT, FT and NL
8	Average link length using system miles by AT, FT and NL
9	Total VMT using volumes on links with counts by AT, FT and NL
10	Total VMT using counts on links with counts by AT, FT and NL
11	Ratio of volume over counts VMT by AT, FT and NL
12	Total VHT using volumes on links with counts by AT, FT and NL
13	Total VHT using counts on links with counts by AT, FT and NL
14	Ratio of volume over count VHT, by AT, FT and NL
15	Total volume on all links with counts by AT, FT and NL
16	Total count volume by AT, FT and NL
17	Ratio of volume over count by AT, FT and NL
18	Total volume on all links by AT, FT and NL
19	Volume percentages on all links by AT, FT and NL
20	Average total volumes on all links by AT, FT and NL
21	Total VMT for all links using volumes by AT, FT and NL
22	Total VHT for all links using volumes by AT, FT and NL
23	Original speeds (MPH) by AT, FT and NL
24	Congested speeds (MPH) by AT, FT and NL
25	Percent change in speeds by AT, FT and NL
26	Screen-line summaries by screen-line and link
27	Overall Statistics

Legend:

AT: Area Type VMT: Vehicle Miles Traveled
 FT: Facility Type VHT: Vehicle Hours Traveled
 NL: Number of Lanes



Table 56. HEVAL Analysis Model Output Report

HEVAL Analysis Model Output Report	
Report #	Report
1	Total system miles by AT and FT
2	Total lane miles by AT and FT
3	Total directional system miles by AT and FT
4	Average link length using system miles by AT and FT
5	Total VMT using volumes on links with capacities by AT and FT
6	Total VMT using capacities by AT and FT
7	Ratio of volume over capacities VMT by AT and FT
8	Total VHT using volumes on links with capacities by AT and FT
9	Total VHT using capacities by AT and FT
10	Ratio of volume over capacities VHT by AT and FT
11	Total volumes on all links with capacities by AT and FT
12	Total capacities by AT and FT
13	Ratio of volume over capacities by AT and FT
14	Total volumes on all links by AT and FT
15	Volume percentages on all links by AT and FT
16	Average total volumes on all links by AT and FT
17	Original speeds (MPH) by AT and FT
18	Congested speeds (MPH) by AT and FT
19	Percent change in speed by AT and FT
20	Total accident occurrences by AT and FT
21	Total injury occurrences by AT and FT
22	Total fatality occurrences by AT and FT
23	Total emissions of carbon monoxide (kilograms) by AT and FT
24	Total emissions of hydrocarbons (kilograms) by AT and FT
25	Total emissions by oxides of nitrogen (kilograms) by AT and FT
26	Total fuel use (gals) by AT and FT
27	Total new lane mileage by AT and FT
28	Total construction cost (X \$1000) by AT and FT
29	Total delay due to congestion by AT and FT
30	Miles of roadway at each level of service by FT
31	Percent of mileage at each level of service by FT
32	Screenline summaries by Screenline and link
33	Overall Statistics

Legend:

AT: Area Type VMT: Vehicle Miles Traveled
 FT: Facility Type VHT: Vehicle Hours Traveled
 NL: Number of Lanes



9.6 Traffic Counts

Traffic counts for the CFRPM were obtained through a variety of sources. Traffic counts provide the basis for the highway assignment evaluation and are inputs into the model as link attributes.

One key to a successful highway model validation is the availability of accurate and sufficient traffic counts. During the validation of the Base Year 2005 network for the CFRPM v5.0 development process, traffic count data was reviewed prior to being input into the model. Counts that were inconsistent with historical trends or were otherwise illogical were reviewed and re-estimated based on trend analyses for the most suspect counts. However, if no means could be found to reconcile a traffic count with surrounding counts or historical trends, the count was discarded.

Attempts were made to ensure that sufficient counts were included in the model for all available area type and facility type combinations. **Table 57** details the summary statistics for the Base Year 2005 highway network and **Table 58** presents the percentage of links with counts for all area type and facility type combinations. There are traffic counts for 3,716 links, representing about 22.24% of the 16,711 links in the highway network. Overall, all area types are fairly represented with traffic counts with percentage of counts on links ranging from 16.1% to 23.7% of each area type's total links, with an average of 22.2%.



Table 57. Highway Network Summary Report

Highway Network Summary Report												
Description	Seminole	Orange	Osceola	Lake	Volusia	Brevard	Marion	Sumter	Flagler	Polk	Indian River	Total
Total Number of Links	1,170	4,568	1,101	1,151	3,331	2,353	1,616	428	411	335	247	16,711
Total System Miles	426	1,582	679	648	1,124	980	1,023	342	278	201	103	7,385
Total Lane Miles	1,197	4,332	1,561	1,508	2,683	2,535	2,419	749	629	496	234	18,343
VMT Using Volumes(K)	3,775	12,319	2,757	2,059	5,411	8,208	4,614	2,305	1,475	951	277	44,156
VMT Using Counts(K)	4,122	12,669	2,821	2,042	5,150	7,976	4,314	2,257	1,501	1,025	274	44,155
Total VMT Ratio	0.92	0.97	0.98	1.01	1.05	1.03	1.07	1.02	0.98	0.93	1.01	1.00
VHT Using Volumes(K)	102	352	78	52	124	182	91	38	26	20	6	1,076
VHT Using Counts(K)	113	361	80	52	121	182	85	38	26	22	6	1,090
Total VHT Ratio	0.90	0.98	0.98	0.99	1.03	1.00	1.06	1.00	0.99	0.93	1.01	0.99
Original Speed (MPH)	39.55	39.47	41.19	41.63	37.17	39.42	40.52	42.71	45.88	41.00	42.15	39.68
Congested Speed (MPH)	35.79	34.04	36.53	38.57	35.44	37.15	38.51	42.14	44.33	38.18	38.45	36.40
Volume / Count Ratio	0.93	0.96	0.97	0.97	0.93	0.95	1.04	0.94	1.01	0.93	1.05	0.96



Table 58. Links, Links with Counts, and Percentage of Links with Counts by Facility and Area Type

Total Number of Links						
Facility Type	CBD	High Density	Medium Density	Low Density	Very Low Density	Total
Freeways and Expressways	16	29	125	175	134	479
Divided Arterials	114	108	2,024	1,702	331	4,279
Undivided Arterials	81	38	479	1,025	680	2,303
Collectors	286	179	2,246	3,395	1,523	7,629
One-Way Facilities	137	30	125	69	0	361
Ramps	37	50	331	341	202	961
Toll Facilities	5	13	224	283	174	699
Total	676	447	5,554	6,990	3,044	16,711

Total Number of Links with Counts						
Facility Type	CBD	High Density	Medium Density	Low Density	Very Low Density	Total
Freeways and Expressways	8	11	38	61	61	179
Divided Arterials	22	29	617	450	69	1,187
Undivided Arterials	17	11	109	267	156	560
Collectors	18	10	373	596	252	1,249
One-Way Facilities	29	3	34	14	0	80
Ramps	14	19	93	116	78	320
Toll Facilities	1	3	55	59	23	141
Total	109	86	1,319	1,563	639	3,716

Percentage of Links with Counts						
Facility Type	CBD	High Density	Medium Density	Low Density	Very Low Density	Total
Freeways and Expressways	50.0	37.9	30.4	34.9	45.5	37.4
Divided Arterials	19.3	26.9	30.5	26.4	20.8	27.7
Undivided Arterials	21.0	28.9	22.8	26.0	22.9	24.3
Collectors	6.3	5.6	16.6	17.6	16.5	16.4
One-Way Facilities	21.2	10.0	27.2	20.3	0.0	22.2
Ramps	37.8	38.0	28.1	34.0	38.6	33.3
Toll Facilities	20.0	23.1	24.6	20.8	13.2	20.2
Total	16.1	19.2	23.7	22.4	21.0	22.2



9.7 Highway Network Operating Speeds

Comparisons between uncongested and congested highway operating speeds are reliable indicators of congestion and associated delays. **Table 59** presents a summary of uncongested and congested network operating speeds for all links with counts by area type and facility type. Post-assignment network speeds reflect a substantial decrease in operating speeds for all facility type and area type combinations. In particular, freeway speed decreased by 21 percent, while the overall regional speed decreased nearly 11 percent due to congestion for links with counts.

9.8 Ratio of Volume over Counts

Volume to count ratios are another indicator for determining the overall performance of the highway assignment model. Volume to count ratios are categorized by area type and facility type, screen-line volume over count ratios, and root mean square error (RMSE). Each of these statistics measures the deviation of estimated versus observed traffic volumes. Results of these comparisons suggest that the highway assignment generally reflects observed vehicular traffic patterns.

Volume to count ratios by area type and facility type act as performance measures of trip generation as well as trip distribution characteristics in the model. The volume to count ratios stratified by area type and facility type are presented in **Table 60**. The overall volume to count ratio is lowest for the medium and low density area types with a ratio of 0.94. The highest is for the very low density area type at 1.10. However, the overall ratio is 0.96, indicating that the model is performing well relative to these performance measures.



Table 59. Original Highway Speeds vs. Congested Highway Speeds for Links with Counts

Original Highway Speeds (MPH)						
Facility Type	CBD	High Density	Medium Density	Low Density	Very Low Density	Total
Freeways	60.44	61.40	64.46	67.50	68.19	66.40
Divided Arterials	35.12	33.62	39.56	42.99	52.16	41.37
Undivided Arterials	29.25	30.39	34.95	42.58	51.64	42.97
Collectors	29.78	30.12	32.98	36.13	41.33	36.10
One-Way Facilities	30.68	29.34	32.65	35.63	0	32.33
Ramps	35.00	39.74	38.98	39.18	39.42	39.03
Toll Facilities	62.56	62.56	65.57	66.84	67.81	66.38
Total	34.24	38.57	38.90	41.81	48.30	41.60

Congested Highway Speeds (MPH)						
Facility Type	CBD	High Density	Medium Density	Low Density	Very Low Density	Total
Freeways	23.00	28.58	42.32	57.20	61.96	52.38
Divided Arterials	29.61	26.79	33.38	38.28	50.14	35.98
Undivided Arterials	25.90	25.86	30.99	38.92	48.43	39.37
Collectors	28.99	26.12	30.37	34.04	41.04	34.22
One-Way Facilities	26.44	27.86	26.83	32.61	0	27.74
Ramps	25.78	27.96	30.42	34.23	35.53	32.70
Toll Facilities	54.53	54.03	59.55	61.79	60.26	60.45
Total	27.34	28.07	33.30	38.05	45.84	37.16



Table 60. Ratio of Estimated Highway Volume over Count

Total Volumes with Counts						
Facility Type	CBD	High Density	Medium Density	Low Density	Very Low Density	Total
Freeways	707,503	840,565	2,545,953	2,058,772	1,771,054	7,923,847
Divided Arterials	732,811	1,017,209	21,642,658	12,441,231	1,491,170	37,325,079
Undivided Arterials	279,438	241,650	1,727,363	3,676,070	1,791,504	7,716,024
Collectors	92,416	122,778	4,076,329	4,638,630	1,164,348	10,094,501
One-Way Facilities	484,364	36,571	529,279	165,465	0	1,215,678
Ramps	121,353	204,197	838,202	720,411	381,711	2,265,875
Toll Facilities	48,071	113,955	1,421,755	1,391,014	525,935	3,500,731
Total	2,465,956	2,576,925	32,781,541	25,091,592	7,125,722	70,041,736

Total Counts						
Facility Type	CBD	High Density	Medium Density	Low Density	Very Low Density	Total
Freeways	783,674	859,862	2,650,085	1,977,388	1,690,725	7,961,734
Divided Arterials	718,506	894,676	23,015,260	13,109,823	1,336,426	39,074,691
Undivided Arterials	280,638	189,118	1,863,442	3,882,266	1,515,164	7,730,628
Collectors	127,784	127,752	4,462,600	5,466,028	1,088,006	11,272,170
One-Way Facilities	463,286	35,603	494,604	184,062	0	1,177,555
Ramps	95,411	201,226	876,598	661,144	365,282	2,199,661
Toll Facilities	59,184	120,918	1,595,356	1,447,215	508,379	3,731,052
Total	2,528,483	2,429,155	34,957,945	26,727,926	6,503,982	73,147,491

Volume to Count Ratios for Links with Counts						
Facility Type	CBD	High Density	Medium Density	Low Density	Very Low Density	Total
Freeways	0.90	0.98	0.96	1.04	1.05	1.00
Divided Arterials	1.02	1.14	0.94	0.95	1.12	0.96
Undivided Arterials	1.00	1.28	0.93	0.95	1.18	1.00
Collectors	0.72	0.96	0.91	0.85	1.07	0.90
One-Way Facilities	1.05	1.03	1.07	0.90	0	1.03
Ramps	1.27	1.01	0.96	1.09	1.04	1.03
Toll Facilities	0.81	0.94	0.89	0.96	1.03	0.94
Total	0.98	1.06	0.94	0.94	1.10	0.96



9.9 Vehicle Miles Traveled and Vehicle Hours Traveled

Vehicle miles traveled (VMT) is calculated by multiplying assigned volumes to link distances. Similarly, assigned volumes multiplied by travel time is equal to vehicle hours traveled (VHT). These are useful measures of system demand that provide insight into other network attributes, such as fuel consumption and emissions. **Table 61** shows VMT by facility type and area type and **Table 62** summarizes VHT by facility type and area type.

Table 61. Total Vehicle Miles Traveled (VMT)

Total Vehicle Miles Traveled (VMT)						
Facility Type	CBD	High Density	Medium Density	Low Density	Very Low Density	Total
Freeways	401,595	887,755	4,025,391	8,316,868	8,753,838	22,385,447
Divided Arterials	486,457	641,543	16,204,071	15,249,299	4,138,257	36,719,625
Undivided Arterials	130,691	138,732	1,673,517	5,143,486	6,411,118	13,497,544
Collectors	265,270	318,019	4,811,525	7,893,303	4,275,593	17,563,710
One-Way Facilities	203,807	54,363	326,915	223,611	0	808,695
Ramps	50,492	154,488	670,599	560,545	275,843	1,711,967
Toll Facilities	52,175	70,688	2,488,854	3,871,517	4,416,274	10,899,507
Total	1,590,485	2,265,587	30,200,871	41,258,629	28,270,923	103,586,496

Table 62. Total Vehicle Hours Traveled (VHT)

Total Vehicle Hours Traveled (VHT)						
Facility Type	CBD	High Density	Medium Density	Low Density	Very Low Density	Total
Freeways	15,737	32,445	107,661	161,611	144,336	461,790
Divided Arterials	16,743	25,377	522,097	417,603	80,677	1,062,498
Undivided Arterials	5,301	5,428	54,921	134,541	136,013	336,204
Collectors	10,157	13,267	168,035	243,001	102,607	537,068
One-Way Facilities	8,663	2,153	13,761	7,967	0	32,543
Ramps	2,383	6,071	26,548	21,688	9,246	65,937
Toll Facilities	873	1,288	45,785	65,940	68,126	182,012
Total	59,858	86,029	938,808	1,052,351	541,005	2,678,051

9.10 Screenlines / Cutlines

In addition to aggregate summaries of traffic counts and network speeds by area type and facility type, screenline and cutline summaries are produced by the HEVAL report as another means of assessing the model's performance. Screenlines are collections of counts that summarize select traffic movements throughout the region. Cutlines are similar to screenlines,



but are shorter and cross corridors rather than regional flows. For screenlines and/or cutlines with volumes over 50,000 vehicles per day (VPD), estimated traffic volumes should be within 10 percent of observed volumes. Estimated traffic volumes for screenlines and cutlines with less than 50,000 VPD should be within 20 percent of observed traffic volumes. Screenline and cutline volume-over-count ratios are summarized in **Table 63**. **Figures 24** through **30** illustrate the CFRPM regional screenline as well as the individual MPO/TPO/County cutlines.

Table 63. Screenline/Cutline Summary Comparison

Screenline/ Cutline	Number of Links	Estimated Volume	Count	V/C Ratio	Desired Accuracy Level
10	52	318,881	308,940	1.03	10%
11	14	120,903	110,958	1.09	10%
12	6	26,766	23,676	1.13	20%
13	22	98,719	105,058	0.94	10%
14	12	107,753	97,344	1.11	10%
15	12	42,000	42,656	0.98	20%
16	12	147,809	143,676	1.03	10%
17	18	189,132	192,348	0.98	10%
21	6	33,395	32,124	1.04	20%
22	4	65,941	70,744	0.93	10%
23	10	42,077	39,078	1.08	20%
24	8	84,774	86,744	0.98	10%
25	8	107,344	115,428	0.93	10%
26	10	33,004	29,450	1.12	20%
27	14	104,750	108,412	0.97	10%
28	10	42,540	38,476	1.11	20%
30	18	168,334	156,764	1.07	10%
31	4	11,331	11,290	1.00	20%
32	8	39,276	34,580	1.14	20%
33	2	5,163	4,894	1.05	20%
34	10	49,593	50,380	0.98	10%
35	8	31,233	28,752	1.09	20%
40	8	236,722	207,448	1.14	10%
41	10	126,353	105,618	1.20	10%
42	12	166,821	156,384	1.07	10%



Screenline/ Cutline	Number of Links	Estimated Volume	Count	V/C Ratio	Desired Accuracy Level
43	6	58,955	62,264	0.95	10%
44	4	110,253	120,746	0.91	10%
45	14	134,734	141,096	0.95	10%
50	20	216,355	180,464	1.20	10%
51	14	270,335	270,096	1.00	10%
52	6	93,484	78,578	1.19	10%
53	6	113,384	108,880	1.04	10%
54	10	164,676	163,224	1.01	10%
55	50	470,809	502,002	0.94	10%
56	8	101,706	103,878	0.98	10%
57	14	128,587	142,536	0.90	10%
58	12	216,308	237,014	0.91	10%
60	14	174,768	167,740	1.04	10%
61	62	827,827	947,930	0.87	10%
62	40	542,158	603,466	0.90	10%
63	40	502,860	530,798	0.95	10%
64	24	450,980	416,628	1.08	10%
66	36	422,013	492,292	0.86	10%
67	56	755,397	825,443	0.92	10%
68	38	694,656	673,844	1.03	10%
69	56	1,069,731	1,057,958	1.01	10%
71	14	98,492	98,462	1.00	10%
73	26	386,425	419,754	0.92	10%
91	10	52,674	63,376	0.83	10%
95	6	44,082	42,584	1.04	20%
Screenline/ Cutline Totals	884	10,502,261	10,752,275	0.98	
99	5,819	59,539,475	62,395,216	0.95	
System Totals	6,703	70,041,736	73,147,491	0.96	



Figure 24. CFRPM Regional Screenline

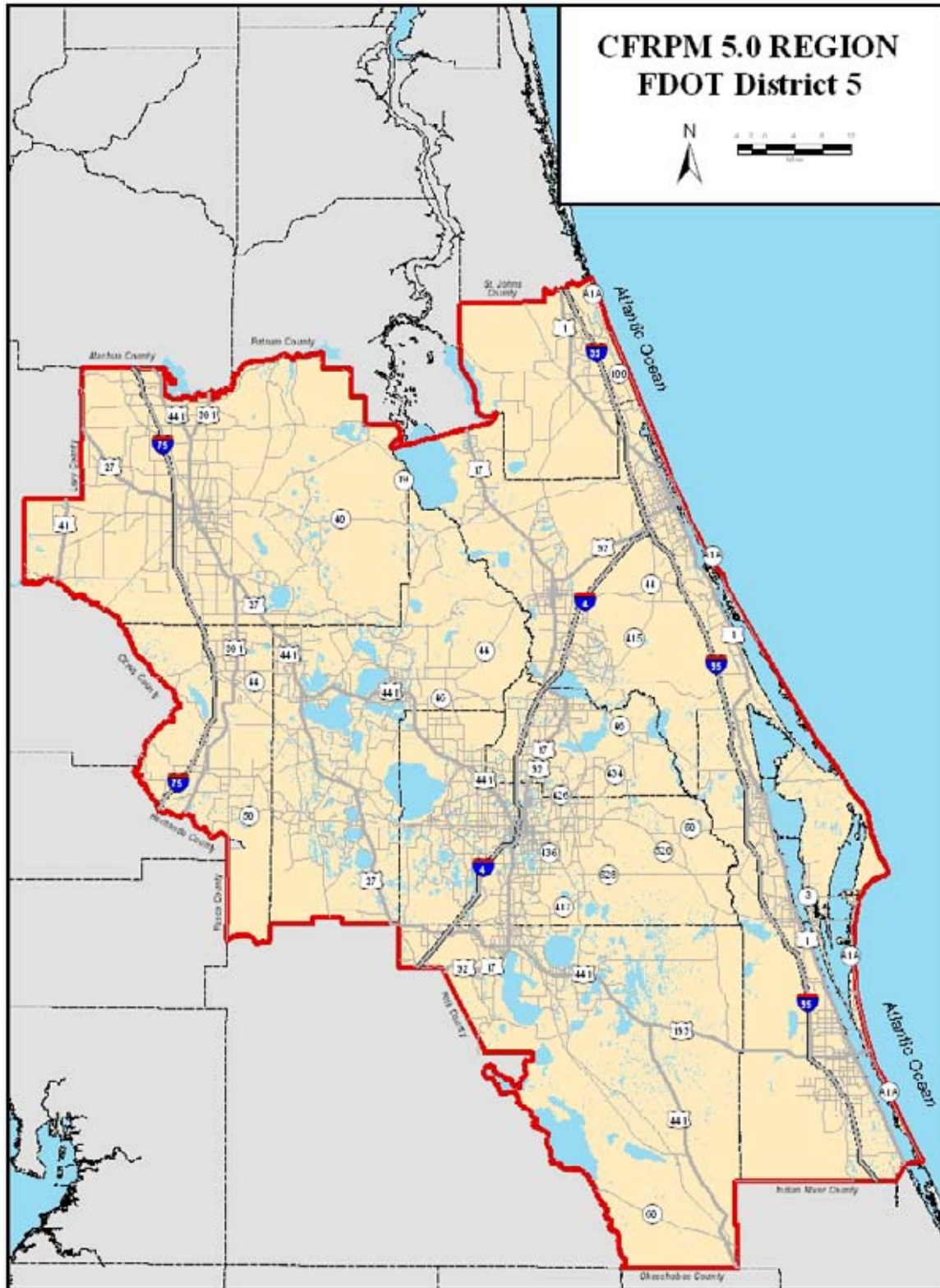




Figure 26. Lake-Summer MPO Cutlines

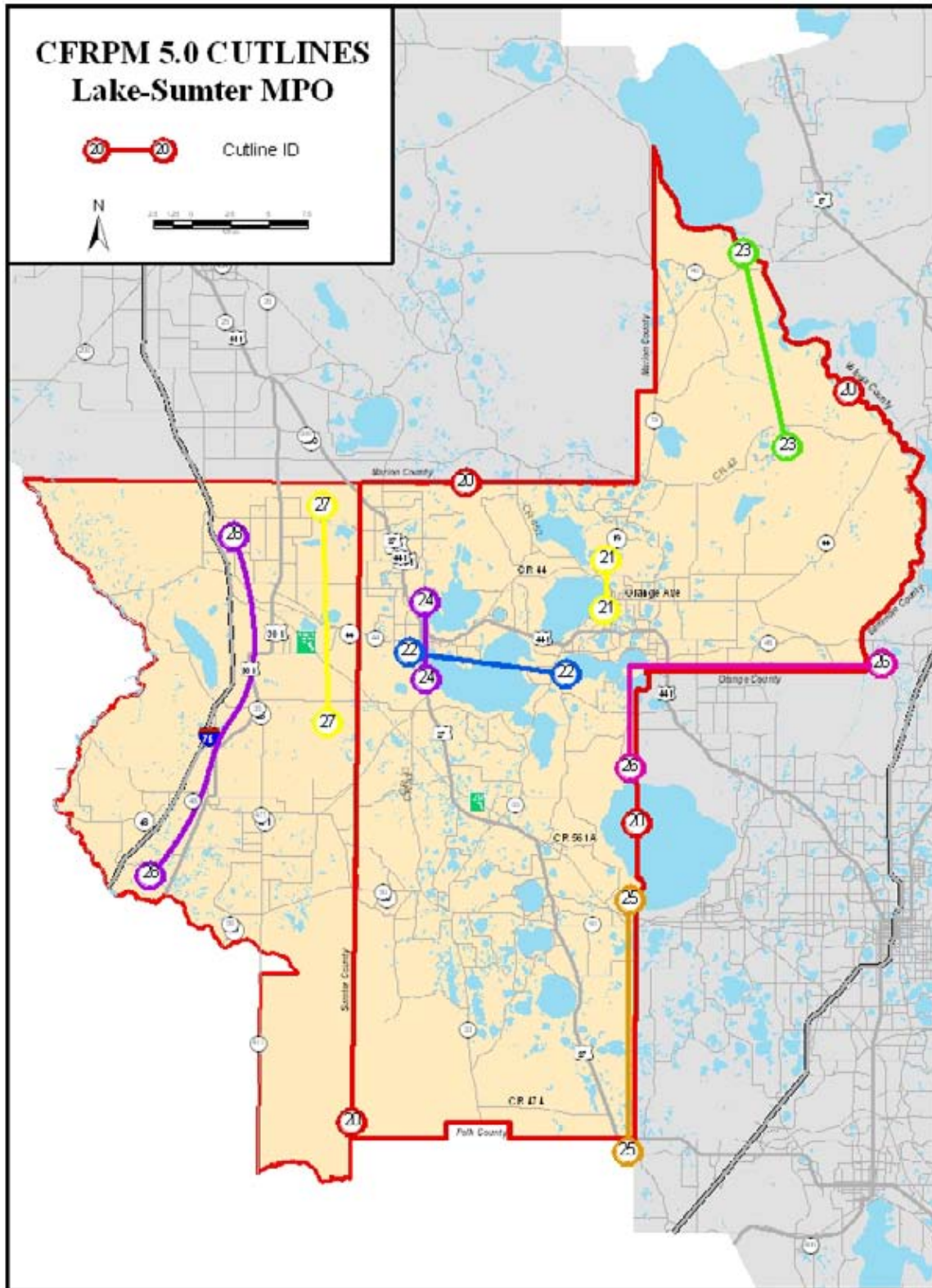




Figure 27. Flagler County Cutlines

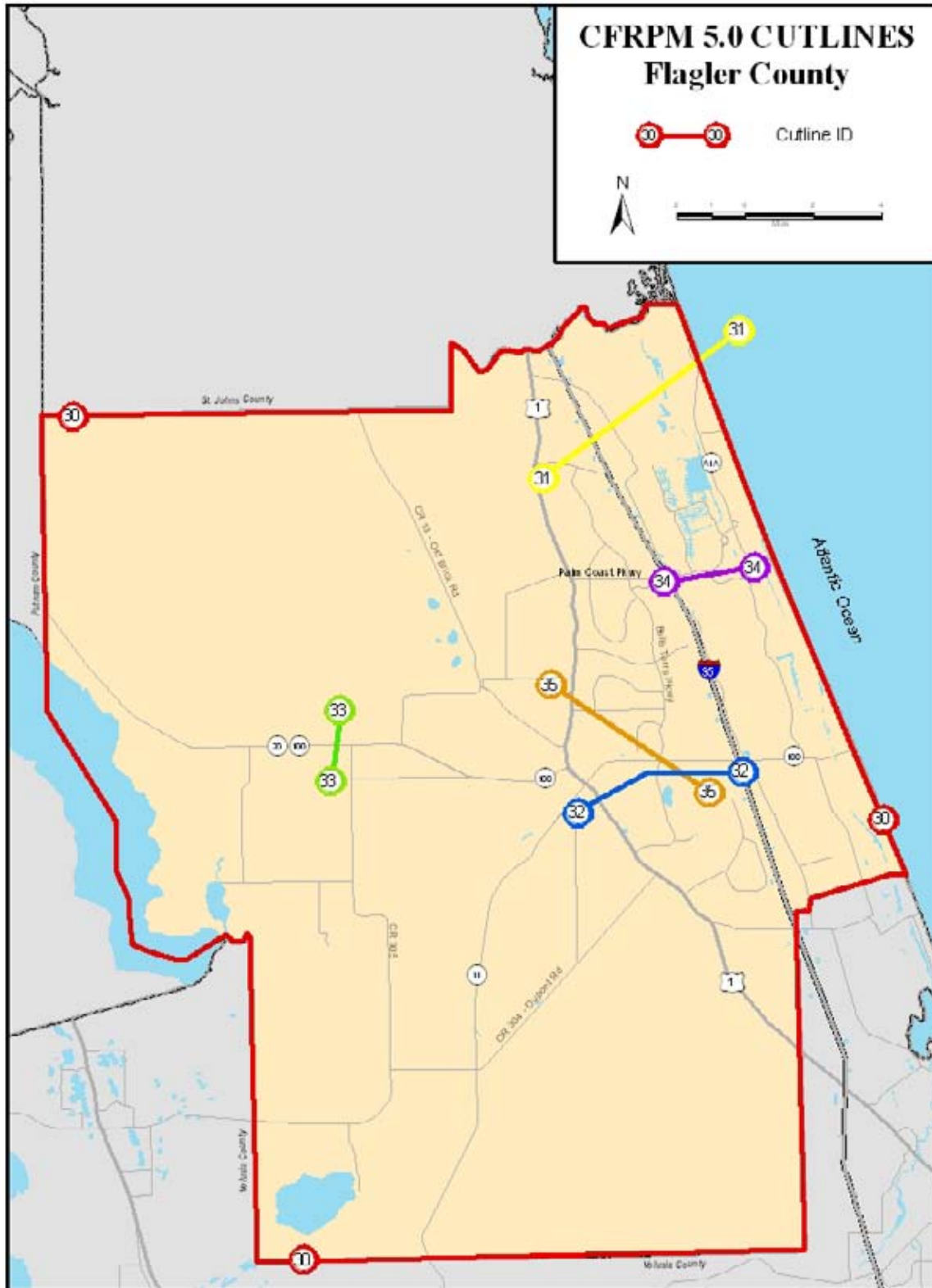




Figure 28. Volusia TPO Cutlines

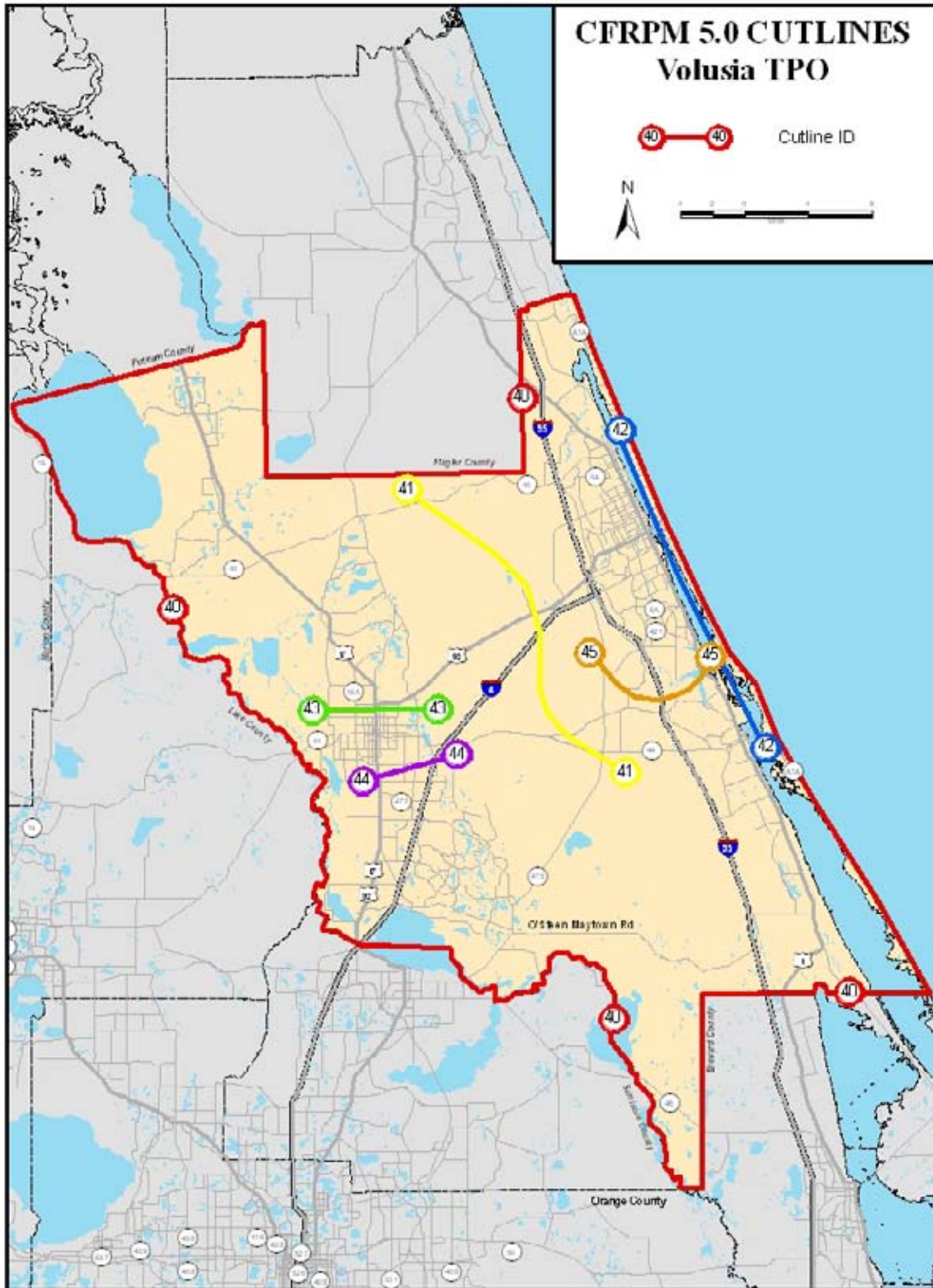




Figure 29. Space Coast TPO Cutlines

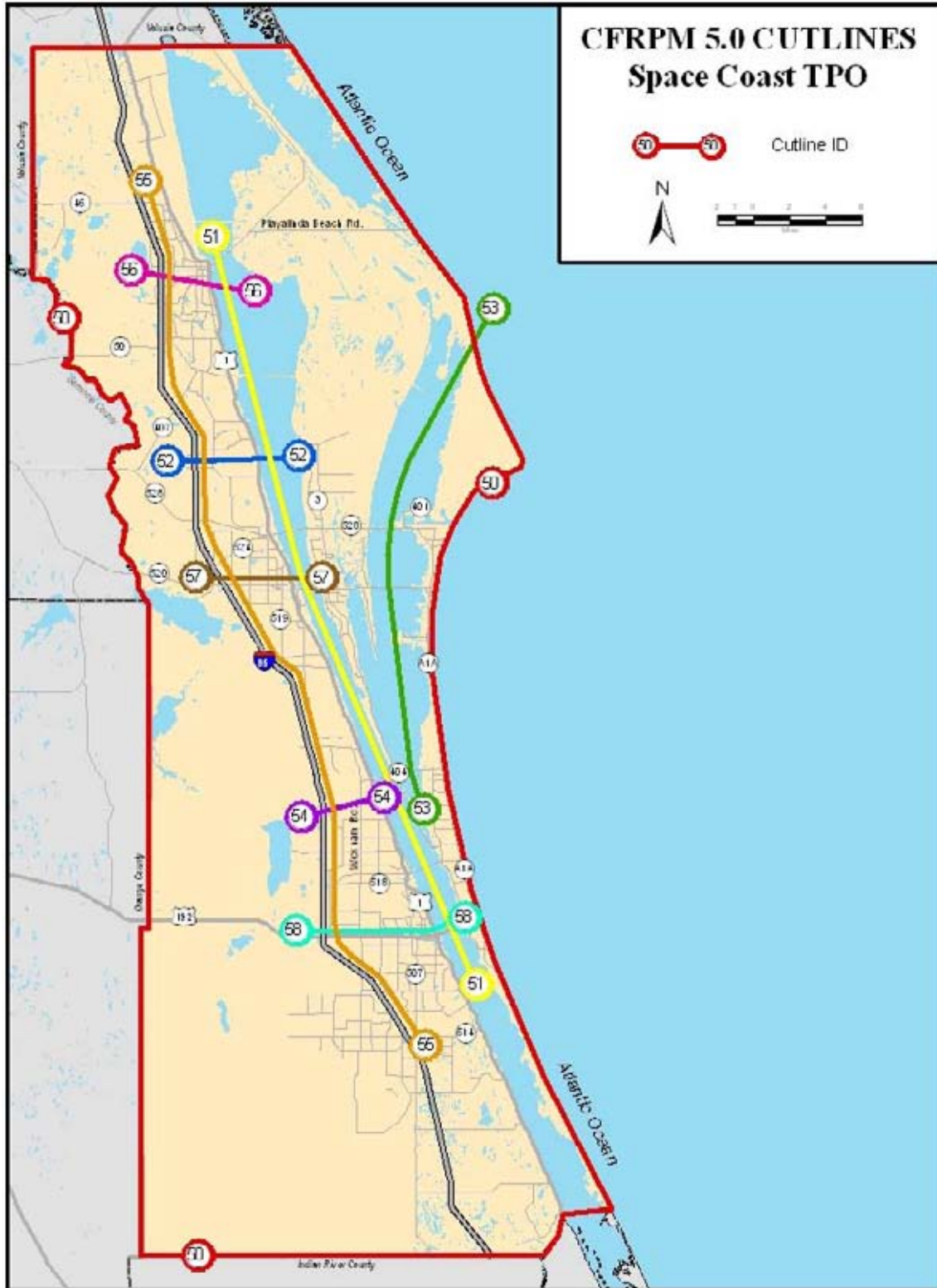
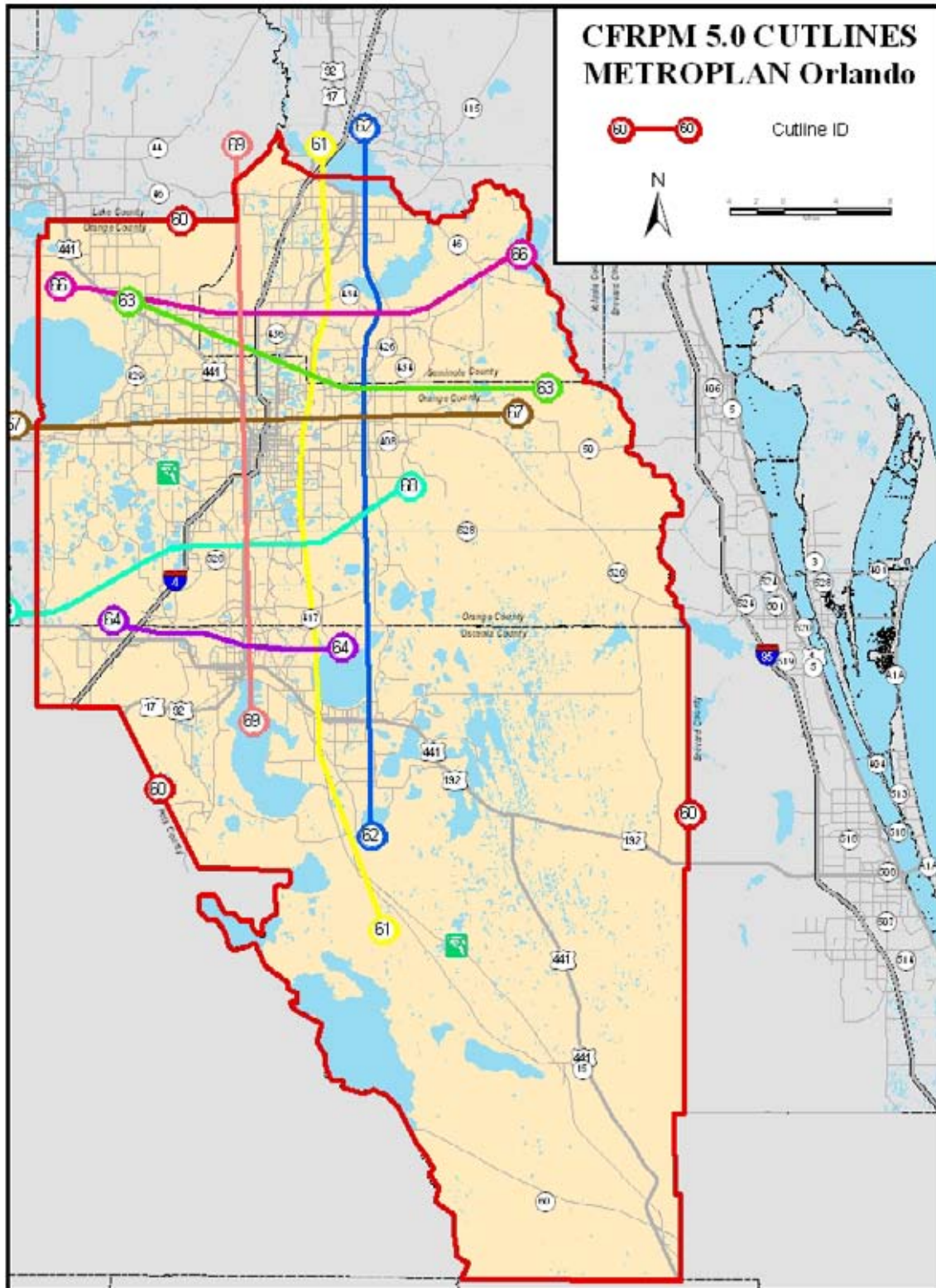




Figure 30. METROPLAN Orlando Cutlines





9.11 Root Mean Square Error

Percent Root Mean Square Error (RMSE) is an aggregate measure of how well the total model chain was validated relative to traffic counts representing total area-wide assignment. Percent RMSE provides a comparison of estimated traffic volumes to observed counts by volume groups of different ranges for all links for which traffic counts are available. The smaller the percent RMSE there is in the model, the higher the level of confidence there is in the model's ability to replicate existing traffic. RMSE is the standard measure of error in system planning models, including the CFRPM. A summary of RMSE and maximum desirable percent error is presented in **Table 64** and **Table 65**.

Table 64. Highway Assignment RMSE Report –Number of Links

RMSE Group Counts														
GROUP	Low Range	High Range	Seminole	Orange	Osceola	Lake	Volusia	Brevard	Marion	Sumter	Flagler	Polk	Indian River	Study Area
<= 5K	-	-	202	366	156	240	222	212	446	156	115	57	34	2,206
5K - 10K	-	-	216	464	130	94	297	247	157	62	48	31	23	1,769
10K - 20K	-	-	238	539	99	106	239	375	111	8	30	12	10	1,767
20K - 30K	-	-	83	317	56	24	30	137	12	8	7	18	0	692
30K - 40K	-	-	26	94	10	0	10	14	10	3	4	2	0	173
40K - 50K	-	-	4	14	6	0	6	4	2	0	0	2	0	38
50K - 60K	-	-	2	6	0	0	2	0	0	0	0	0	0	10
60K - 70K	-	-	4	6	2	0	0	0	0	0	0	0	0	12
70K - 80K	-	-	2	4	0	0	0	0	0	0	0	0	0	6
80K - 90K	-	-	0	14	0	0	0	0	0	0	0	0	0	14
90K -100K	-	-	0	10	0	0	0	0	0	0	0	0	0	10
>100K	-	-	0	6	0	0	0	0	0	0	0	0	0	6
Overall	-	-	777	1,840	459	464	806	989	738	237	204	122	67	6,703

As depicted in **Table 65**, the overall Base Year 2005 CFRPM v5.0 result is well within the desirable percent root mean square error established by FDOT. However, on low traffic volume facilities (<5,000 VPD), the percent error is above the established maximum desirable percent error for Seminole, Orange, and Osceola counties; as well as in Orange County for facilities with volumes between 5,000 and 10,000 VPD. Future validation will require additional effort within the METROPLAN Orlando area.



Table 65. Highway Assignment RMSE Report –RMSE Percent Error

Percent RMSE Error														
GROUP	Low Range	High Range	Seminole	Orange	Osceola	Lake	Volusia	Brevard	Marion	Sumter	Flagler	Polk	Indian River	Study Area
<= 5K	45.00	55.00	62.22	66.43	73.15	52.97	53.60	52.46	50.27	53.24	54.16	49.88	48.15	58.46
5K - 10K	35.00	45.00	41.10	47.87	42.44	32.16	42.99	38.00	35.00	34.59	44.60	34.48	41.95	41.97
10K - 20K	27.00	35.00	33.58	29.39	29.88	21.73	26.38	26.79	20.44	20.99	29.29	4.14	14.47	27.91
20K - 30K	24.00	27.00	19.86	22.85	21.80	24.30	21.16	21.82	24.69	3.95	10.27	22.27	0	21.98
30K - 40K	22.00	24.00	13.32	21.13	15.94	0	9.05	7.72	7.98	18.92	15.18	0.11	0	17.46
40K - 50K	20.00	22.00	19.65	15.11	17.28	0	11.86	15.58	0.93	0	0	10.10	0	15.07
50K - 60K	18.00	20.00	4.67	13.72	0	0	12.88	0	0	0	0	0	0	12.26
60K - 70K	17.00	18.00	6.83	16.16	17.27	0	0	0	0	0	0	0	0	13.81
70K - 80K	16.00	17.00	11.78	11.35	0	0	0	0	0	0	0	0	0	11.49
80K - 90K	15.00	16.00	0	7.68	0	0	0	0	0	0	0	0	0	7.68
90K -100K	14.00	15.00	0	11.74	0	0	0	0	0	0	0	0	0	11.74
>100K	14.00	14.00	0	10.64	0	0	0	0	0	0	0	0	0	10.64
Overall	32.00	39.00	31.88	29.49	34.34	33.30	33.15	29.33	33.43	36.88	38.43	27.62	34.80	32.13



9.12 Overall Highway Assignment

Overall highway evaluation measures indicate a high degree of correlation between observed and estimated traffic volumes as forecasted by the CFRPM for the Base Year 2005 network. Input and output model speeds are reasonable and reflect appropriate relationships to one another. Screenline summaries, volume to count ratios, and root mean square error summaries each indicate that the model is a reliable tool for system-level transportation planning analyses. The total VMT and VHT volume to count ratios are 1.00 and 0.99 respectively. The detailed statistics are shown below in **Table 66**.

Table 66. Highway Assignment

2005 Highway Assignment Results	
OVERALL STATISTICS	CFRPM v5.0
Total Number of Links	16,711
Total System Miles	7,385.24
Total Lane Miles	18,342.82
Total Directional Miles	13,208.54
Total VMT Using Volumes (Links with Counts)	44,156,708
Total VMT Using Counts (Links with Counts)	44,155,674
Total VMT V/C (Links with Counts)	1.00
Total VHT Using Volumes (Links with Counts)	1,076,097
Total VHT Using Counts (Links with Counts)	1,090,906
Total VHT V/C (Links with Counts)	0.99
Total Volumes all Links	248,192,028
Average Total Volume	14,853.79
Total VMT all Links	103,575,764
Total VHT all Links	2,677,783
Total Original Speed (MPH)	39.60
Total Congested Speed (MPH)	36.40



10.0 Transit Assignment

The tenth step in the CFRPM v5.0 is the transit assignment (TASSIGN) module. Transit assignment is the process of allocating the transit trips estimated in the Mode Choice model to the transit network. These assigned transit trips can be identified by all transit modes that were used in traveling to a destination. Transit trips are measured by route and represent unlinked trips by mode. Transit trips are allocated independently of highway trips.

Daily transit assignment by trip purpose is used in the CFRPM. The daily Home-Based Work (HBW) trips are assigned to the peak period, or AM network. This network contains all of the transit service routes and associated characteristics for transit services provided during peak commuting periods. The daily Non-Work trips, Home-Based Non-Work (HBNW or HBO) and Non-Home Based (NHB) trip purposes, are assigned to the off-peak period, or midday network. This network describes the average off-peak period transit service characteristics typically associated with late morning and afternoon schedules. Transit unlinked trips are summarized by the TASSIGN module based on output from the TNET, TPATH and MODE modules.

The transit trips estimated by the mode choice model are assigned to the transit paths generated by Public Transport (PT) module. The assignment gives an estimation of the total number of boarding for each route, and the results can be compared to observed values by operator and line.

Table 67 shows the observed and the estimated daily boardings for each transit operator. Overall, the boardings estimated by the model are in general agreement (within 15%) of the observed boardings. This shows that the model adequately reflects the amount of transit demand by operator in the region.

Table 67. Comparison of Observed and Estimated Boardings

System	Observed Boardings	Estimated Boardings	Relative Difference
LYNX	81,649	78,453	-4%
Votran	7,549	8,475	12%
Space Coast	5,378	5,669	5%
SunTran	1,259	1,226	-3%
Districtwide	95,835	93,823	-2%



Table 68 provides a more detailed review of the validation for LYNX. Routes were grouped in different categories to help identify areas of concern when using the model for transit forecasting. Radial routes, those traveling between the suburbs and downtown Orlando, were grouped into four geographic areas according to their dominant route pattern. Two routes, Link 200 and LYMMO, were given their own category due to their unique service.

Table 68. Comparison of LYNX Observed vs. Estimated Boardings

Agency	Group/Area	Observed Boardings	Estimated Boardings	Relative Difference
LYNX	Northeast	14,556	18,573	28%
	Southeast	14,399	17,835	24%
	Southwest	29,220	20,127	-31%
	Northwest	19,024	18,449	-3%
	Link 200	46	604	1213%
	LYMMO	4,404	2,865	-35%

This table shows that while the model generally reflects transit usage across the region, it does not adequately capture some key LYNX travel markets. Transit travel in the Northeast and Southeast districts is over-estimated while travel within the Southwest district is under-estimated. The model over-estimates the market for the Link 200 express service, while under-estimating the market for the downtown circulator, LYMMO.

While the CFRPM v5.0 transit model validation efforts followed the state of practice, **Table 68** indicates that in the future these efforts should be expanded to include geographic, express and circulator markets. This would require the necessary transit data and corresponding functionality in the CFRPM.

11.0 Conclusion

This Technical Report described the process that was undertaken to validate the base year 2005 Central Florida Regional Planning Model, version 5.0 (CFRPM v5.0). The validation of the CFRPM v5.0 base year model was carried out using the Florida Standard Urban Transportation Model Structure (FSUTMS) in the CUBE Voyager software, version 5.0.2.

A number of model enhancements were made to the CFRPM as part of the validation process. These enhancements included using a: true-shape GIS



highway network, an expanded model area, expanded number of TAZs, trip generation rates by county, trip generation subarea balancing, special attraction application, trip distribution subarea friction factors, trip distribution matrix simplification, truck split application, dynamic area type calculator, free flow speed calculator, capacity lookup table, new facility types, and highway assignment improvement.

The validation of the CFRPM v5.0 showed that the model replicated the observed trip patterns reasonably well. Overall regional speed on all links decreased approximately by 8 percent due to congestion. The overall volume to count ratio is 0.96, while the overall RMSE of 32.13 is within the desirable range set by FDOT. The total VMT and VHT volume to count ratios are 1.00 and 0.99 respectively. All of the highway evaluation measures indicated a high level of correlation between observed and estimated traffic volumes forecasted by the CFRPM v5.0. It can be concluded that the CFRPM v5.0 is a reliable tool for system level transportation planning analyses.



Appendix A - Trip Length Distribution Curves



Figure A-1. Ocala/Marion County TPO: HBW Trip Length Distribution

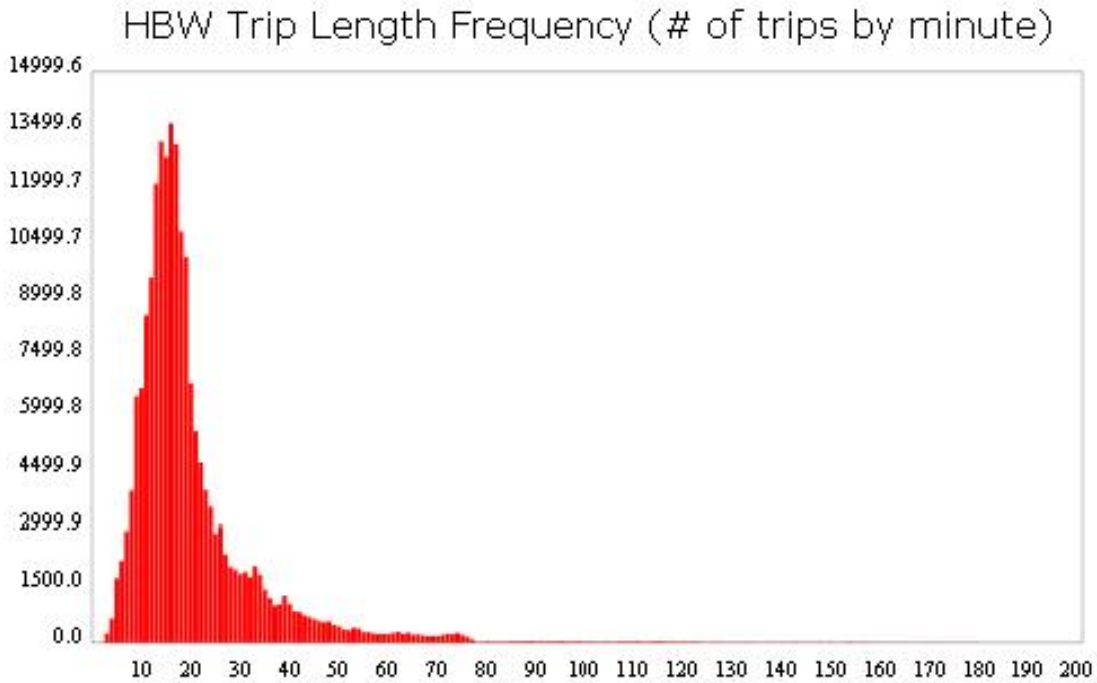


Figure A-2. Ocala/Marion County TPO: HBSH Trip Length Distribution

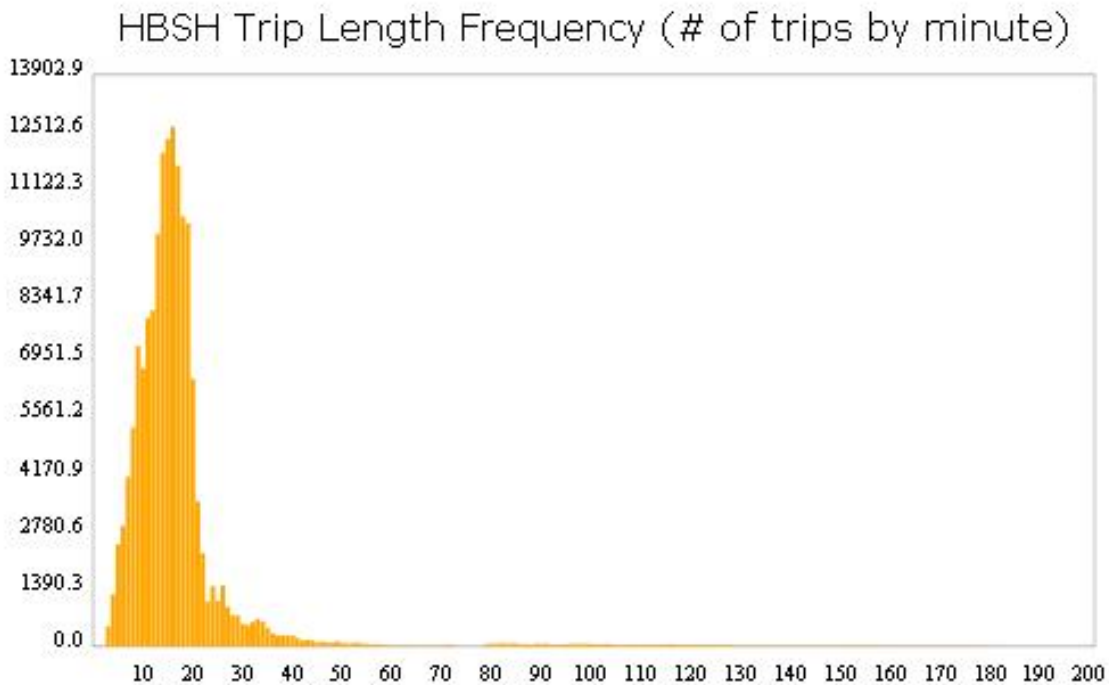




Figure A-3. Ocala/Marion County TPO: HBSR Trip Length Distribution

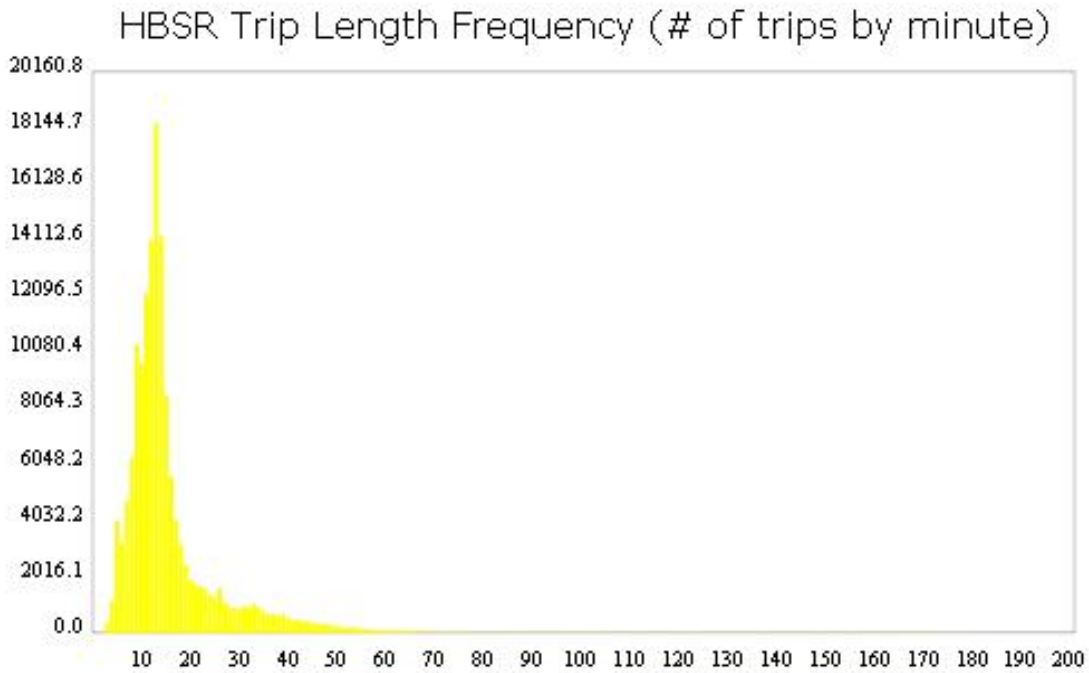


Figure A-4. Ocala/Marion County TPO: HBO Trip Length Distribution

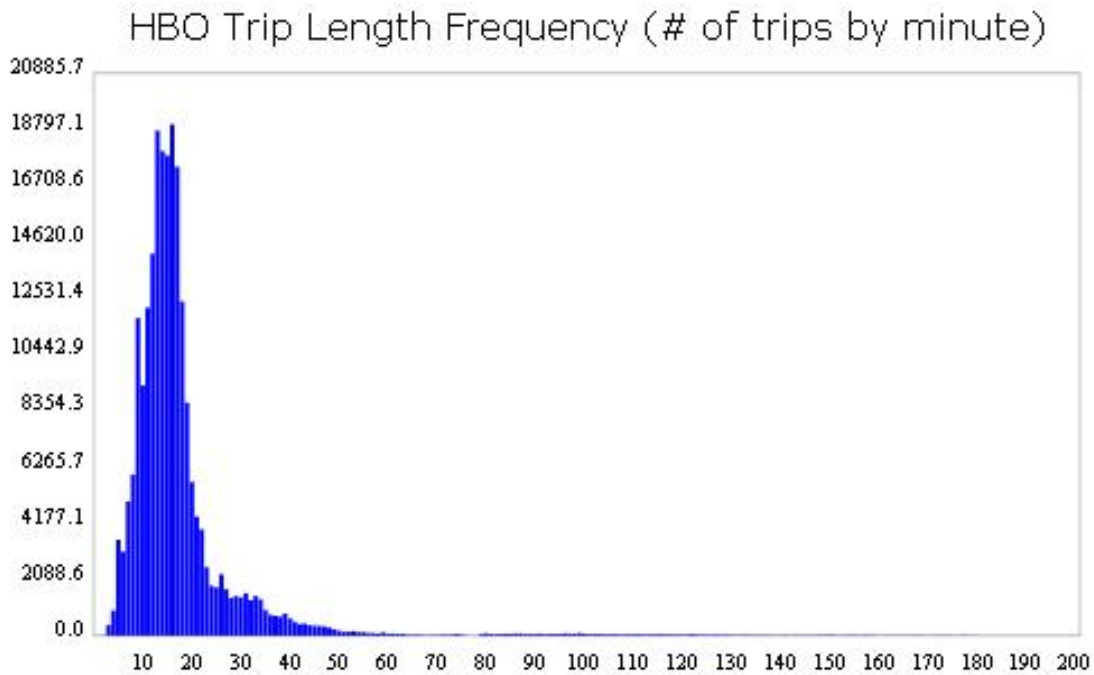




Figure A-5. Ocala/Marion County TPO: NHB Trip Length Distribution

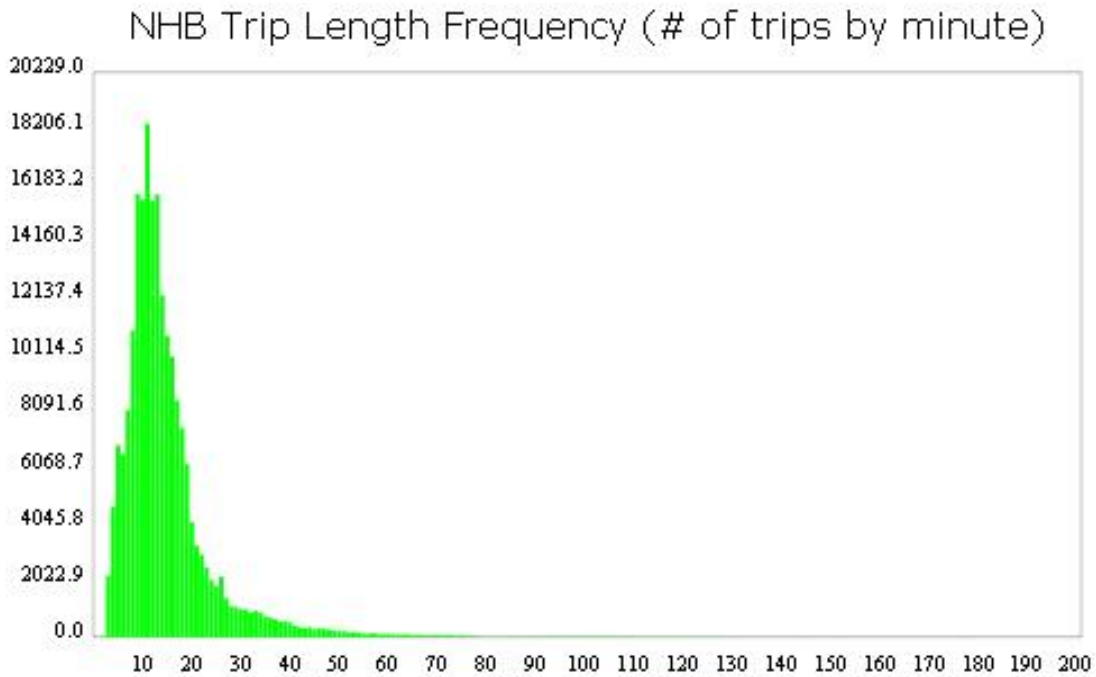


Figure A-6. Ocala/Marion County TPO: Taxi Trip Length Distribution

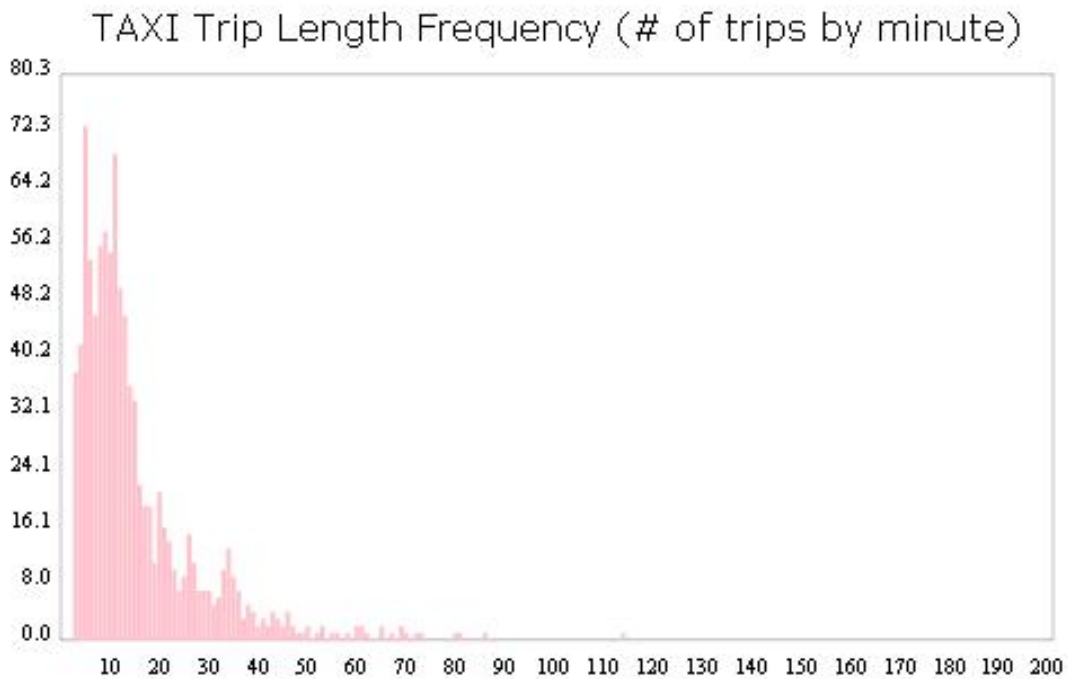




Figure A-7. Ocala/Marion County TPO: Light Truck Trip Length Distribution

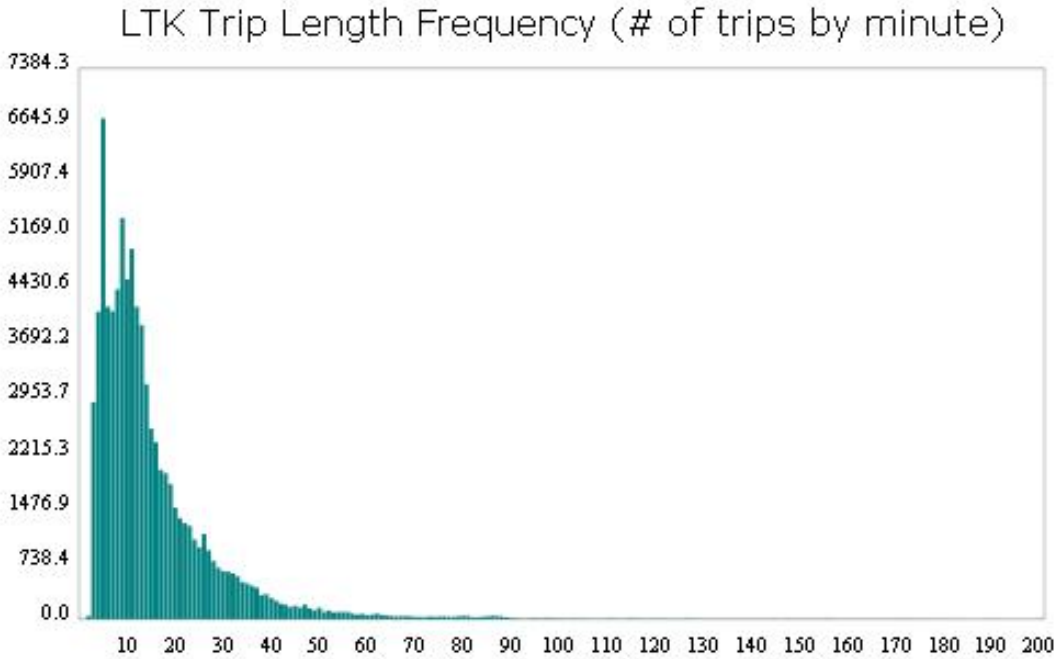


Figure A-8. Ocala/Marion County TPO: Heavy Truck Trip Length Distribution

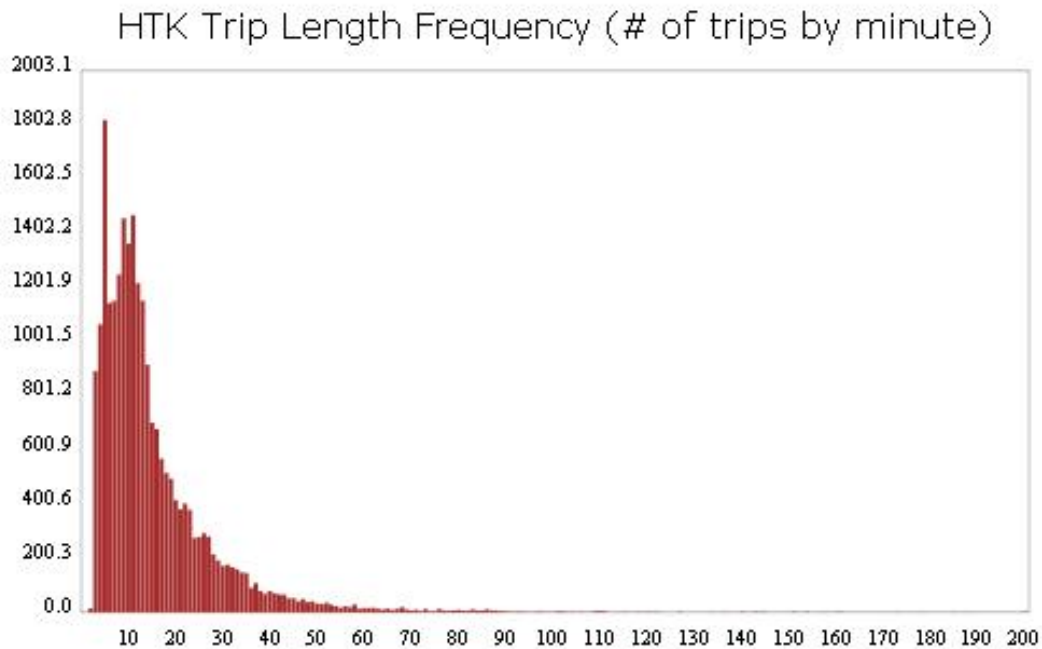




Figure A-9. Ocala/Marion County TPO: External-to-Internal (EI) Trip Length Distribution

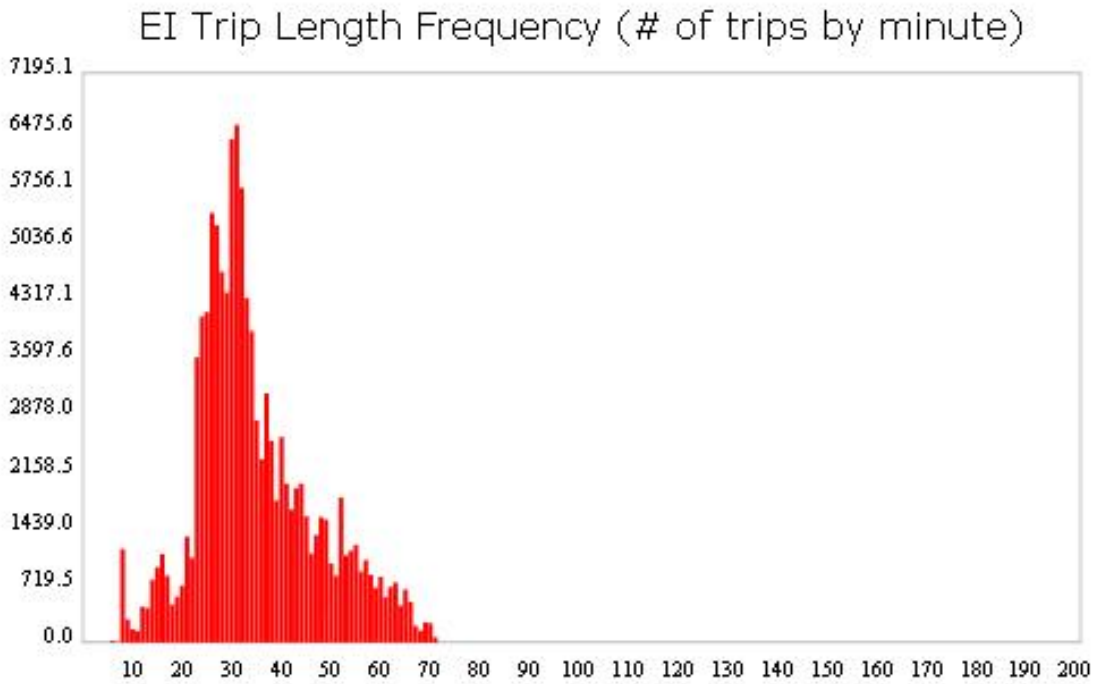


Figure A-10. Ocala/Marion County TPO: Total Trip Length Distribution

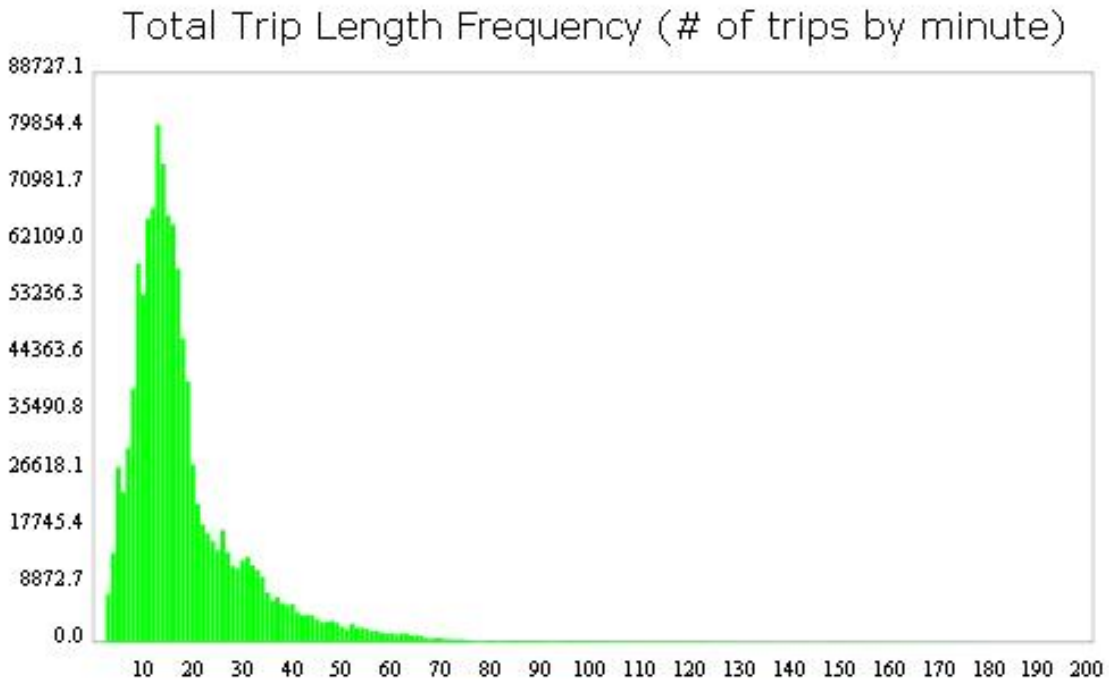




Figure A-11. Lake-Sumter MPO: HBW Trip Length Distribution

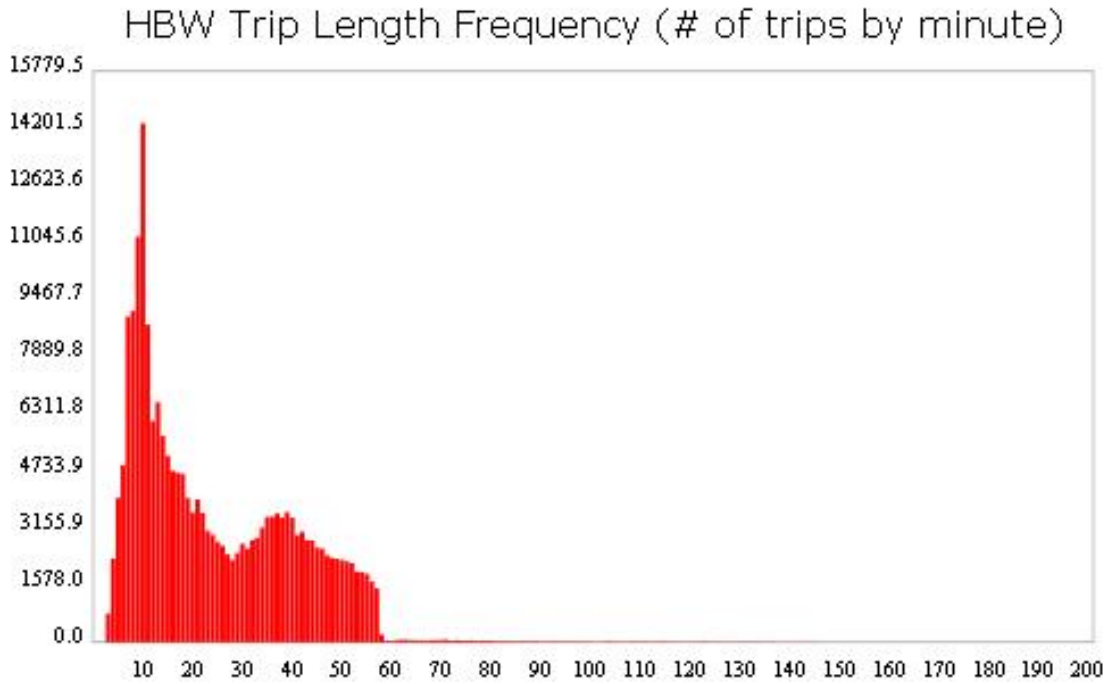


Figure A-12. Lake-Sumter MPO: HBSH Trip Length Distribution

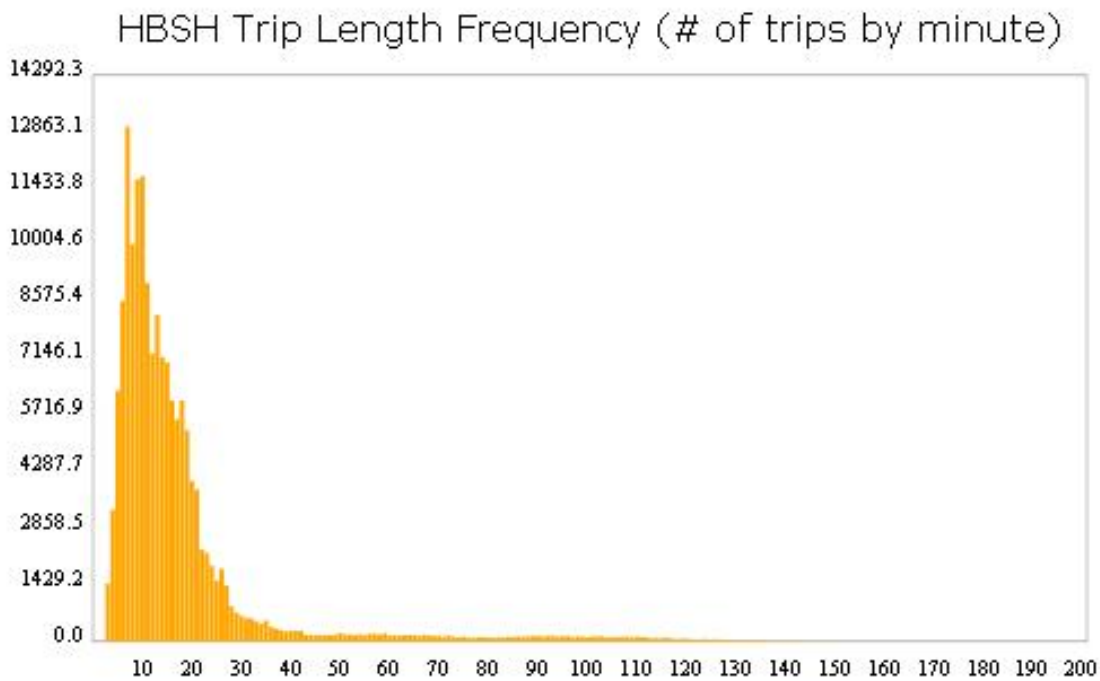




Figure A-13. Lake-Sumter MPO: HBSR Trip Length Distribution

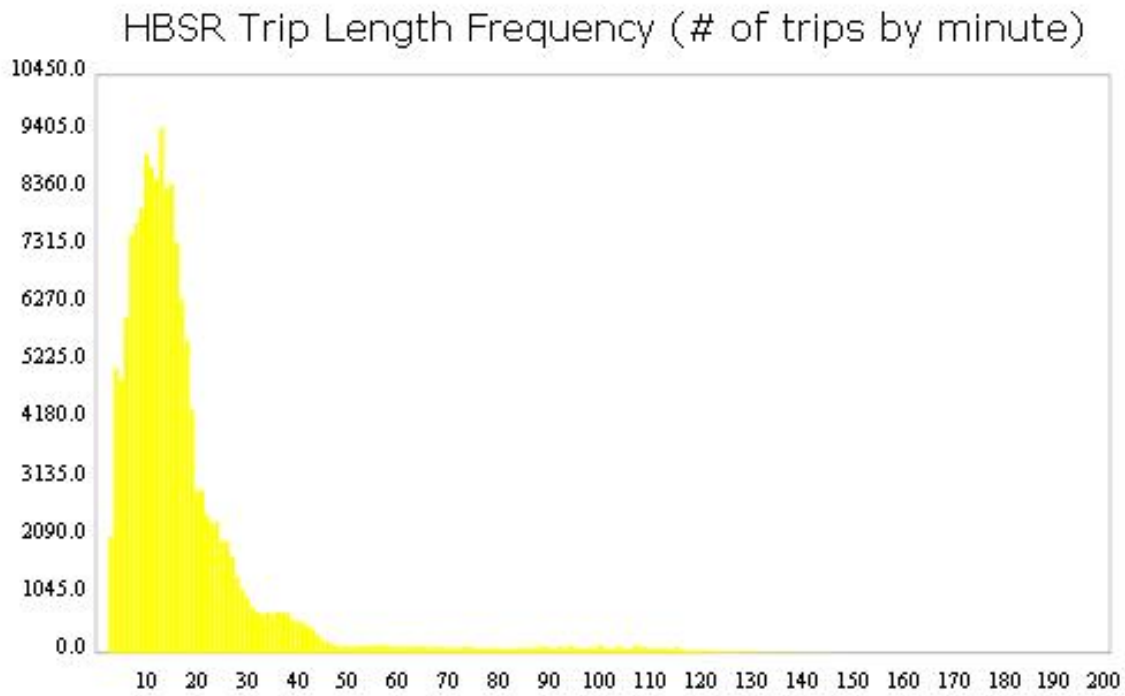


Figure A-14. Lake-Sumter MPO: HBO Trip Length Distribution

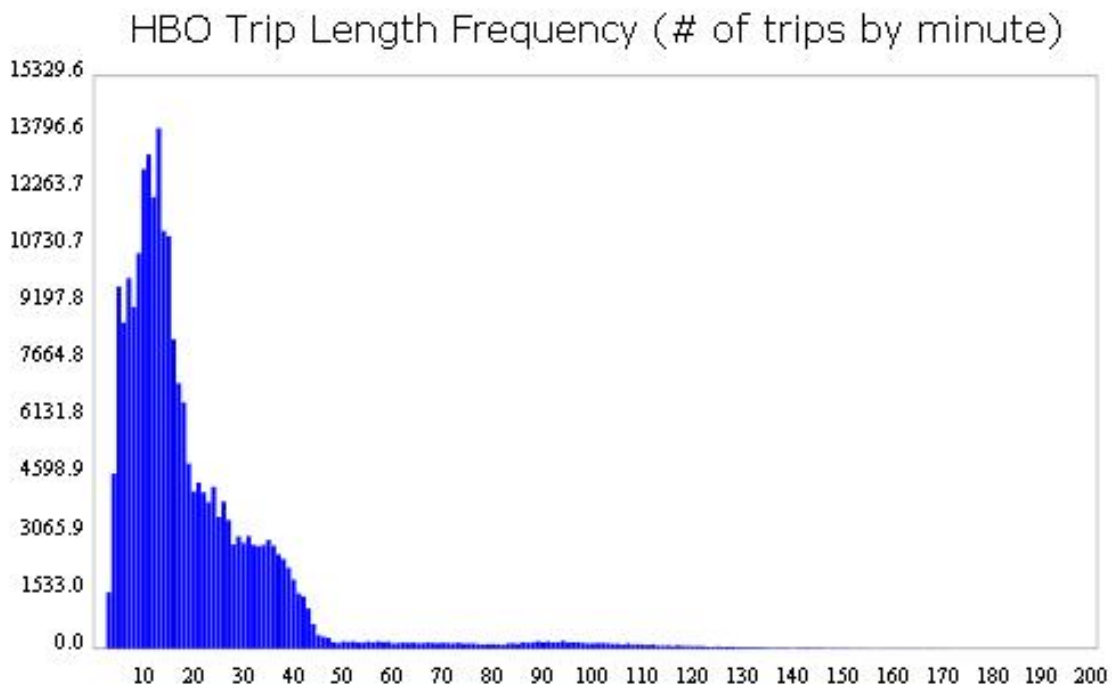




Figure A-15. Lake-Sumter MPO: NHB Trip Length Distribution

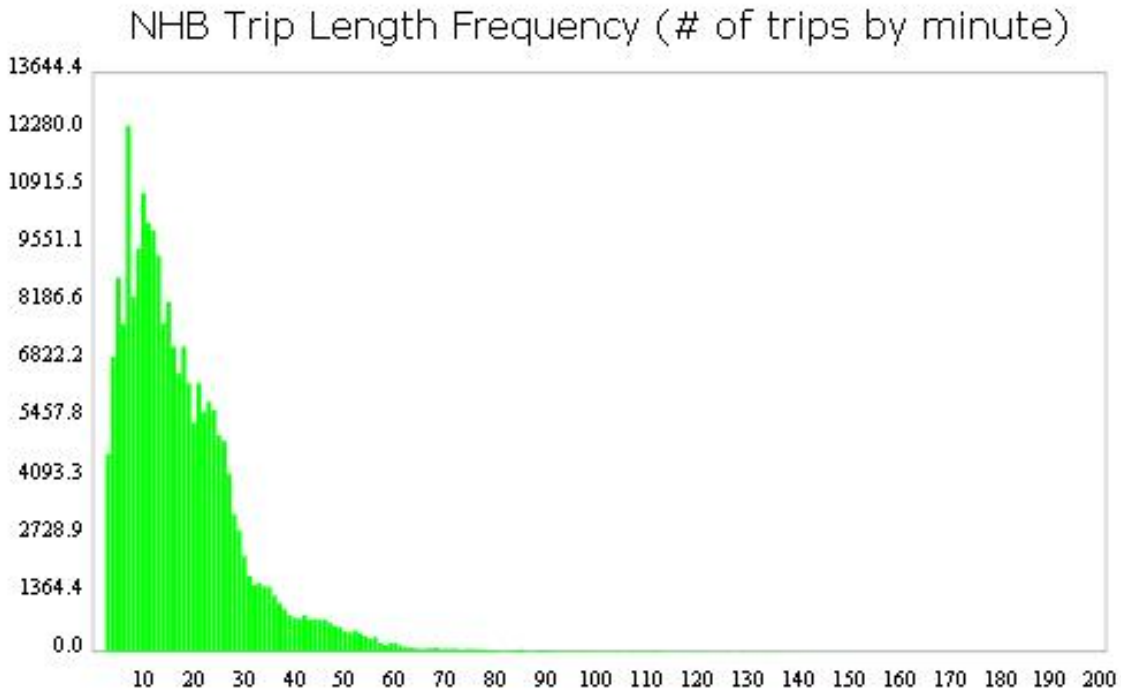


Figure A-16. Lake-Sumter MPO: Taxi Trip Length Distribution

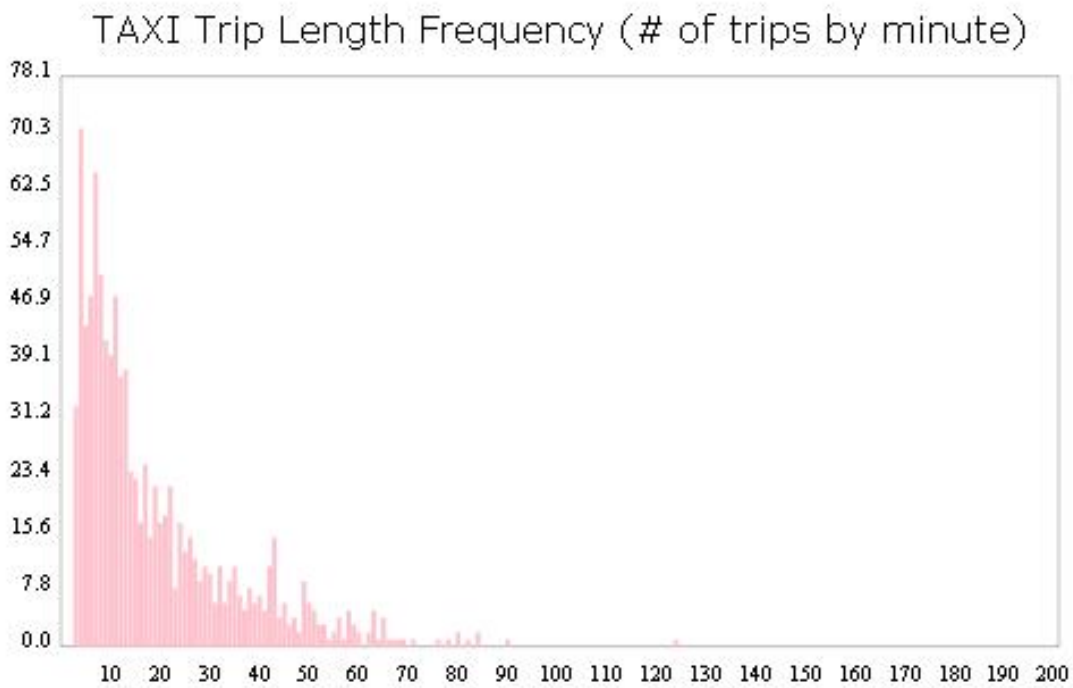




Figure A-17. Lake-Sumter MPO: Light Truck Trip Length Distribution

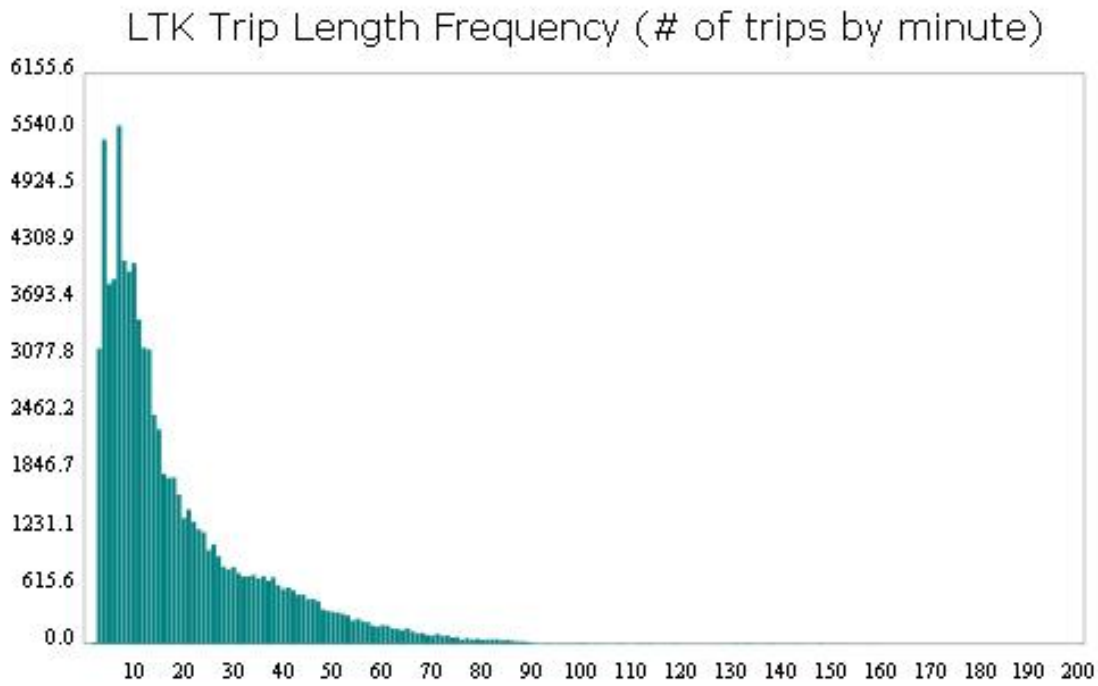


Figure A-18. Lake-Sumter MPO: Heavy Truck Trip Length Distribution

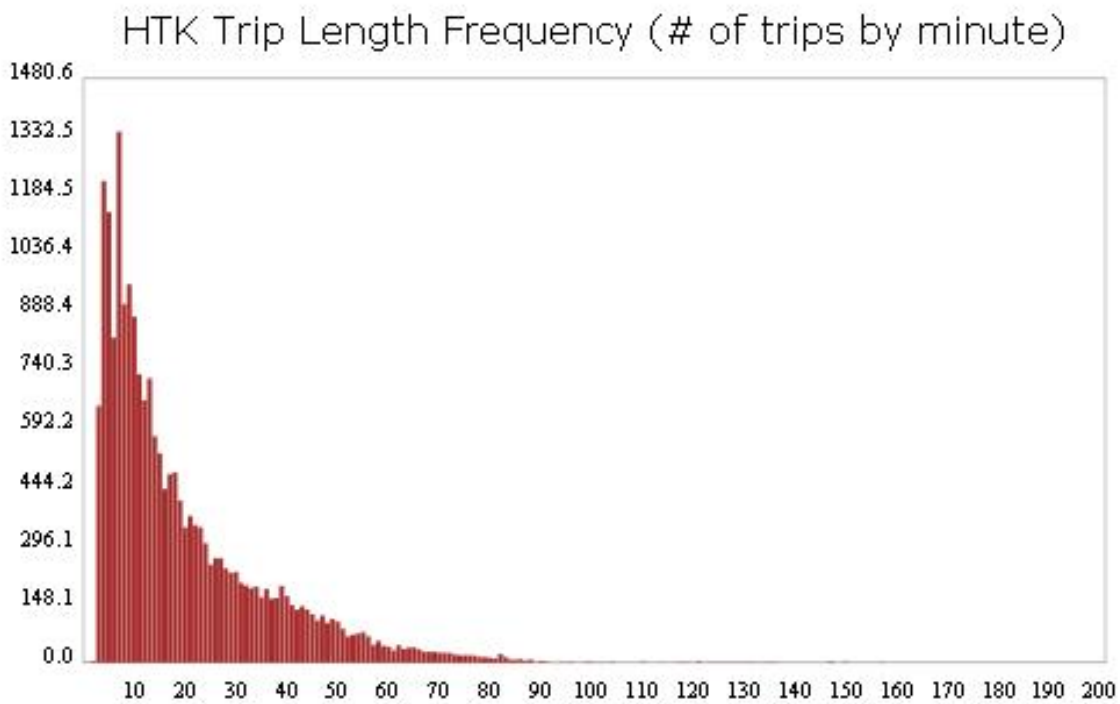




Figure A-19. Lake-Sumter MPO: External-to-Internal (EI) Trip Length Distribution

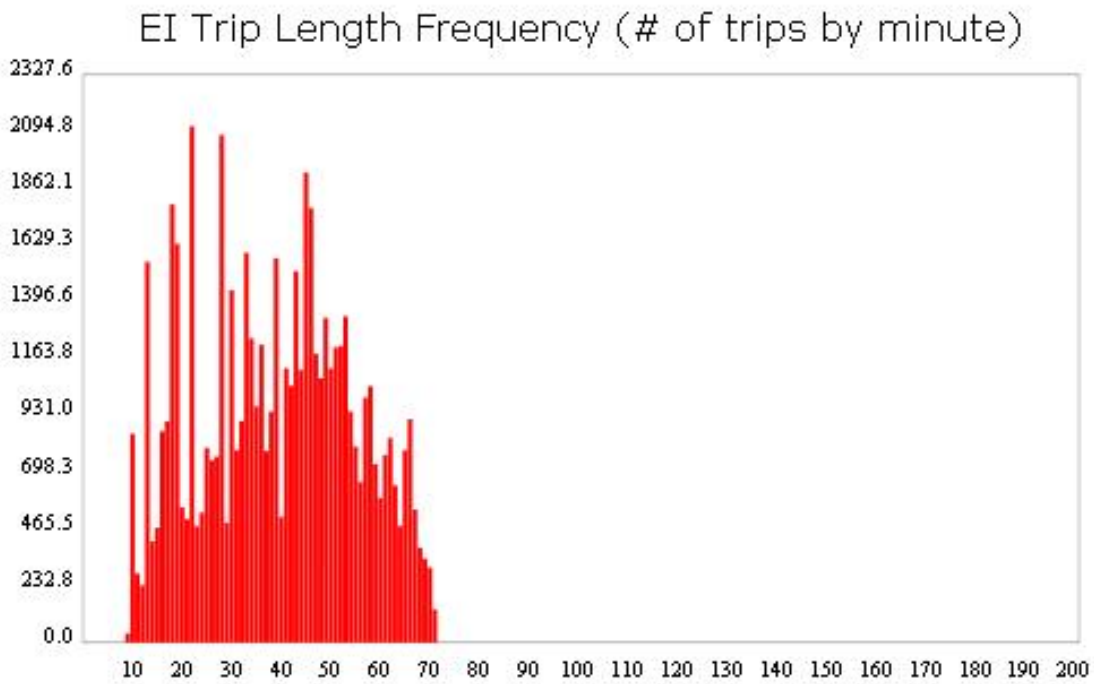


Figure A-20. Lake-Sumter MPO: Total Trip Length Distribution

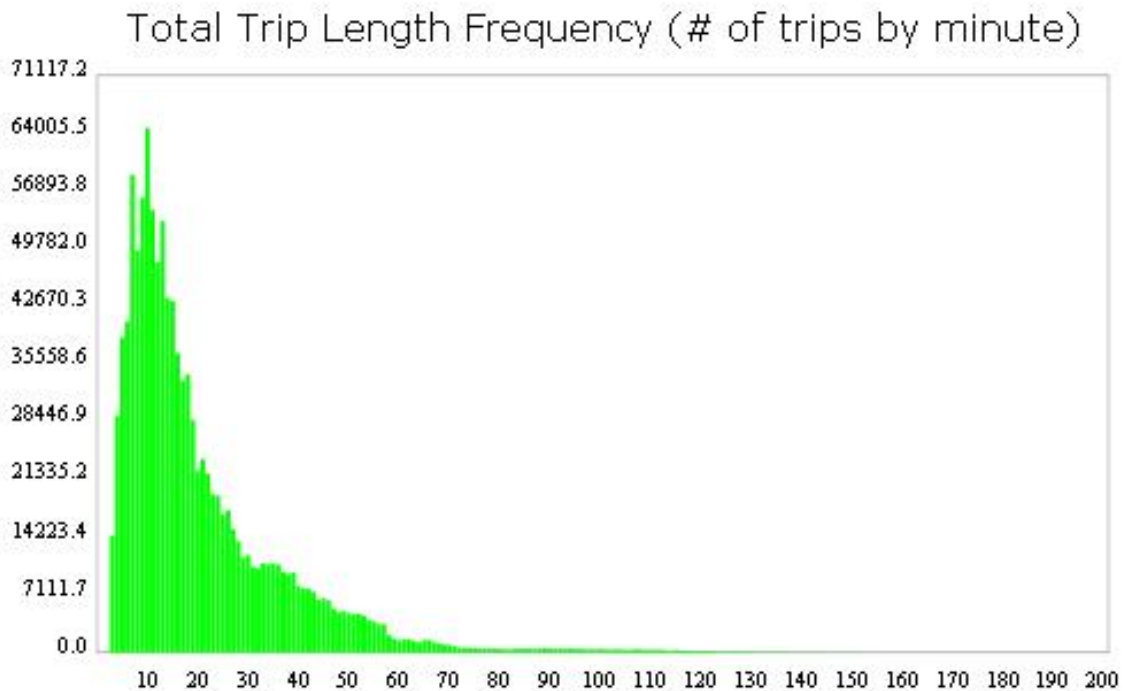




Figure A-21. Flagler County: HBW Trip Length Distribution

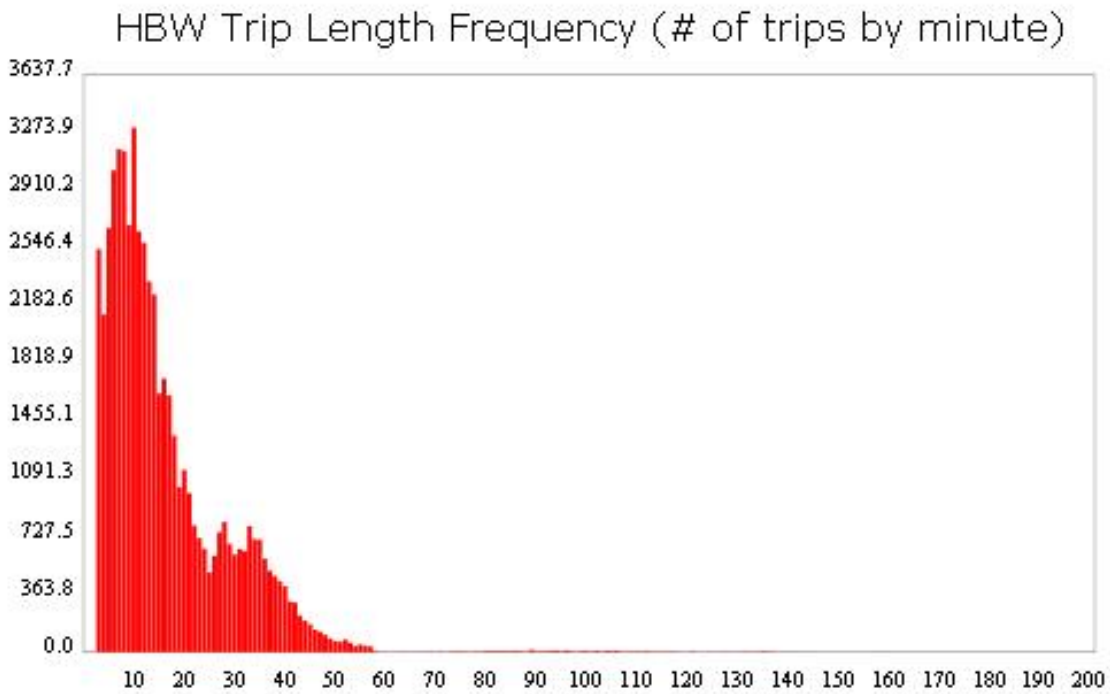


Figure A-22. Flagler County: HBSH Trip Length Distribution

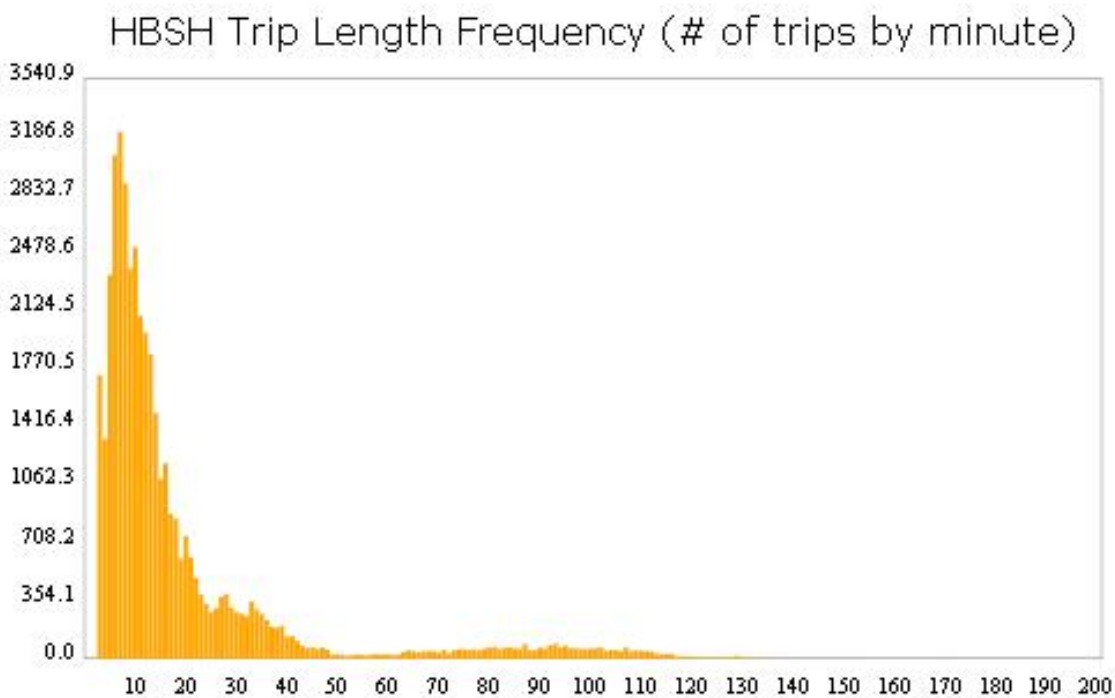




Figure A-23. Flagler County: HBSR Trip Length Distribution

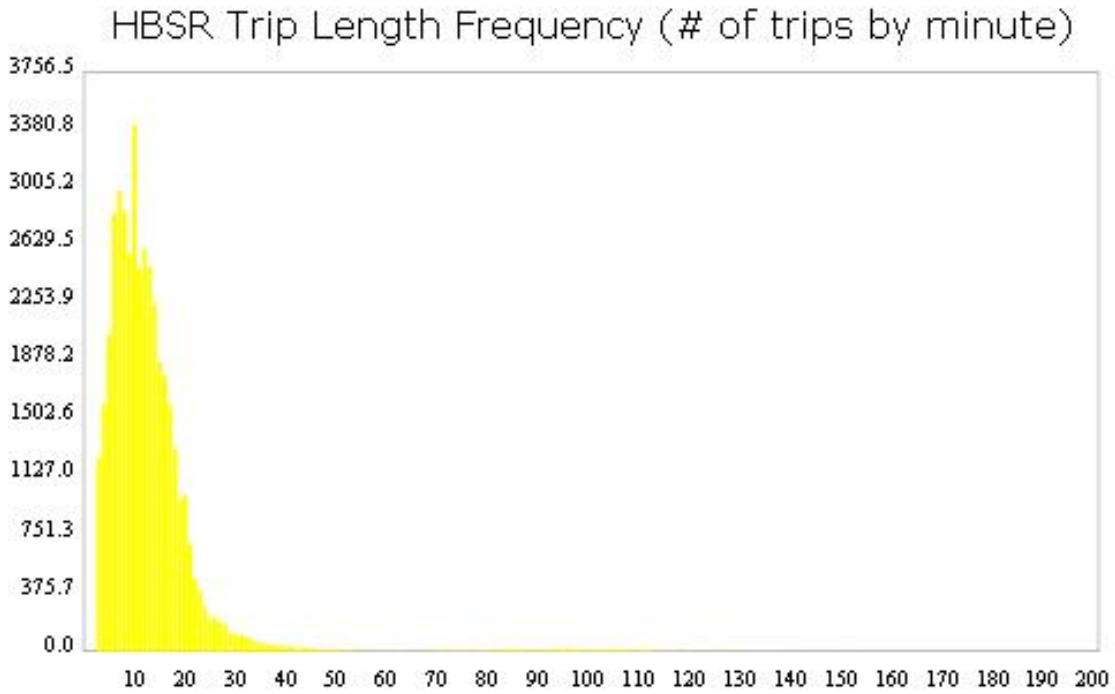


Figure A-24. Flagler County: HBO Trip Length Distribution

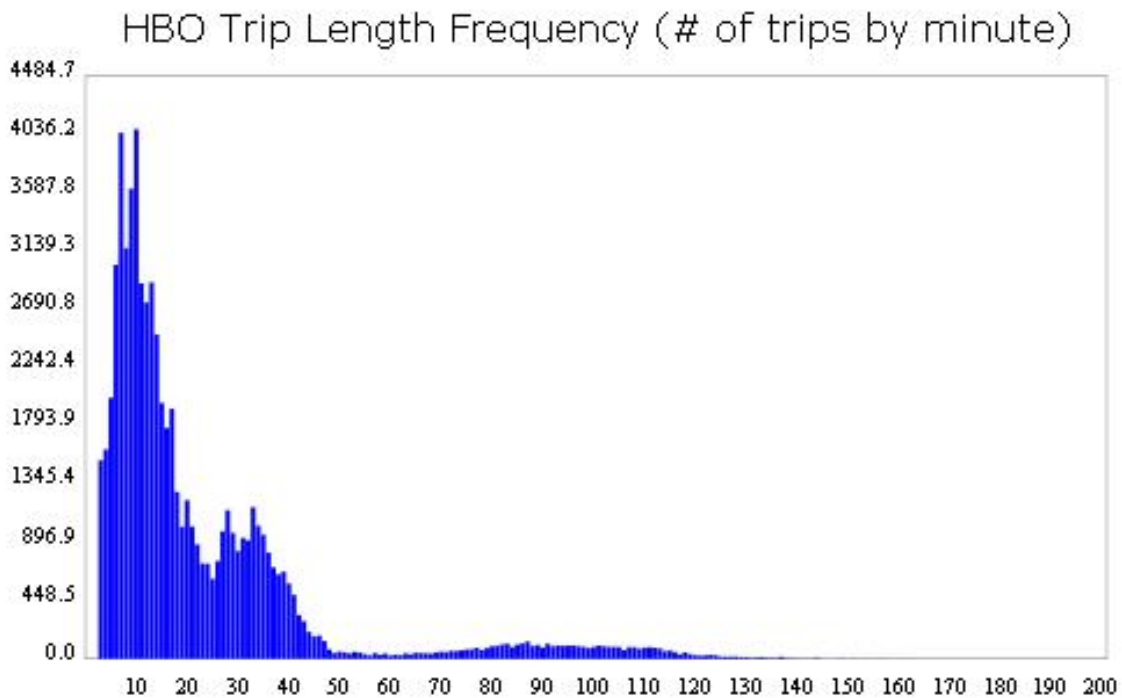




Figure A-25. Flagler County: NHB Trip Length Distribution

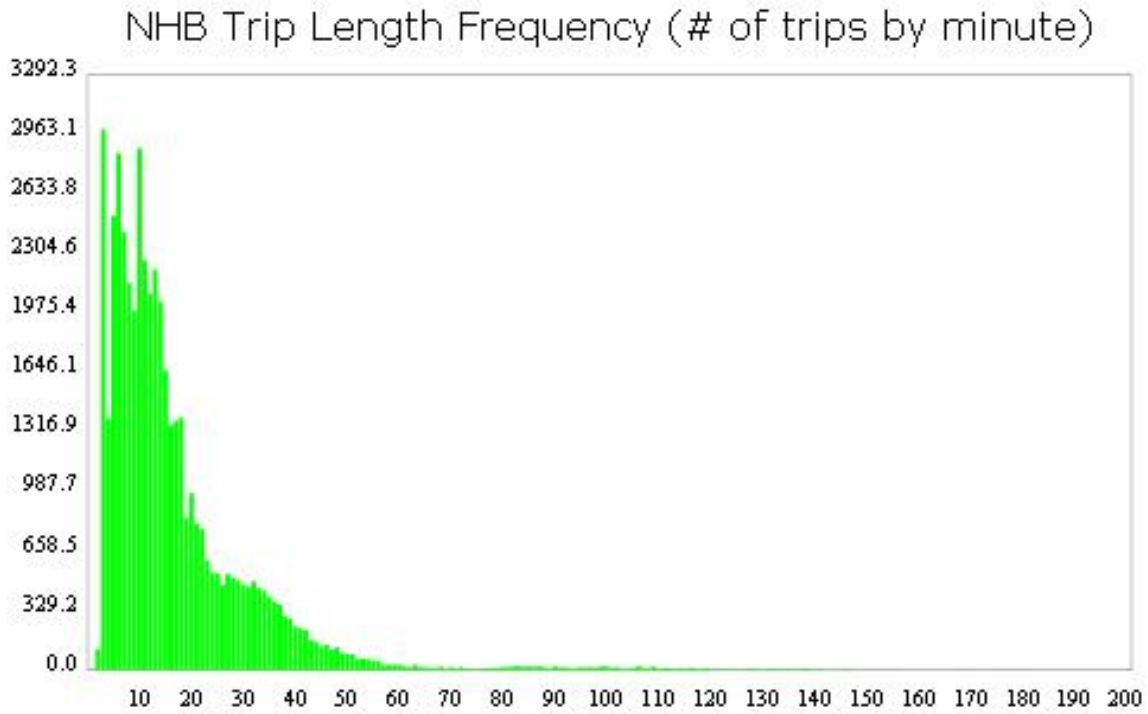


Figure A-26. Flagler County: Taxi Trip Length Distribution

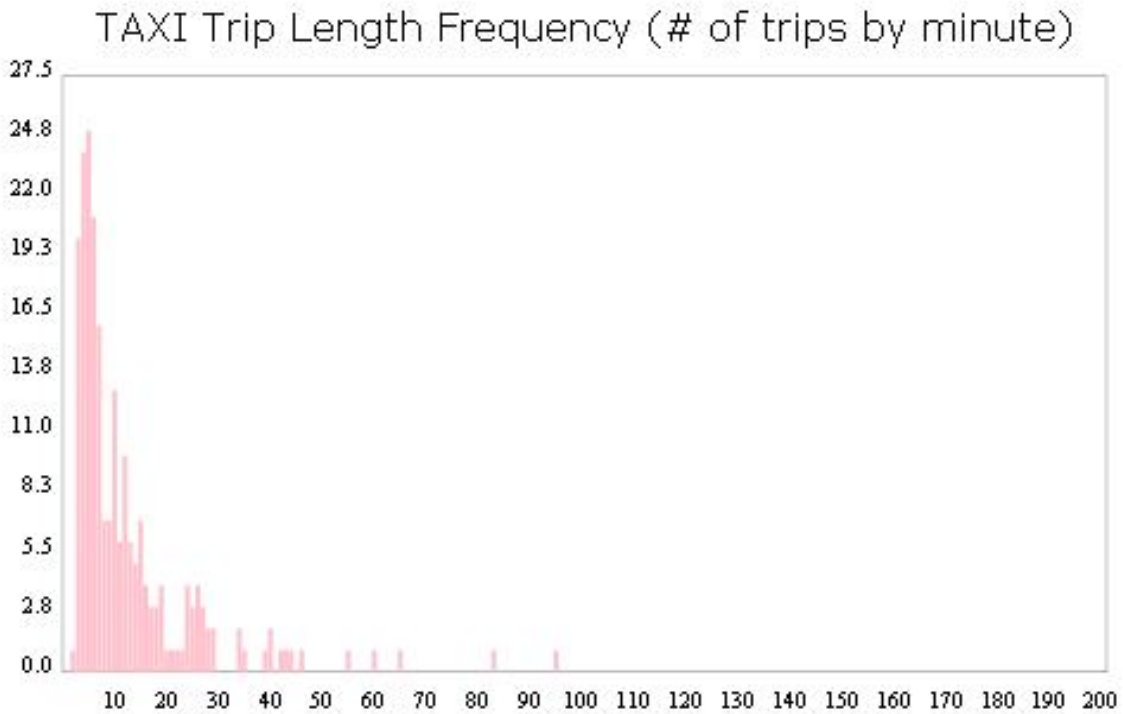




Figure A-27. Flagler County: Light Truck Trip Length Distribution

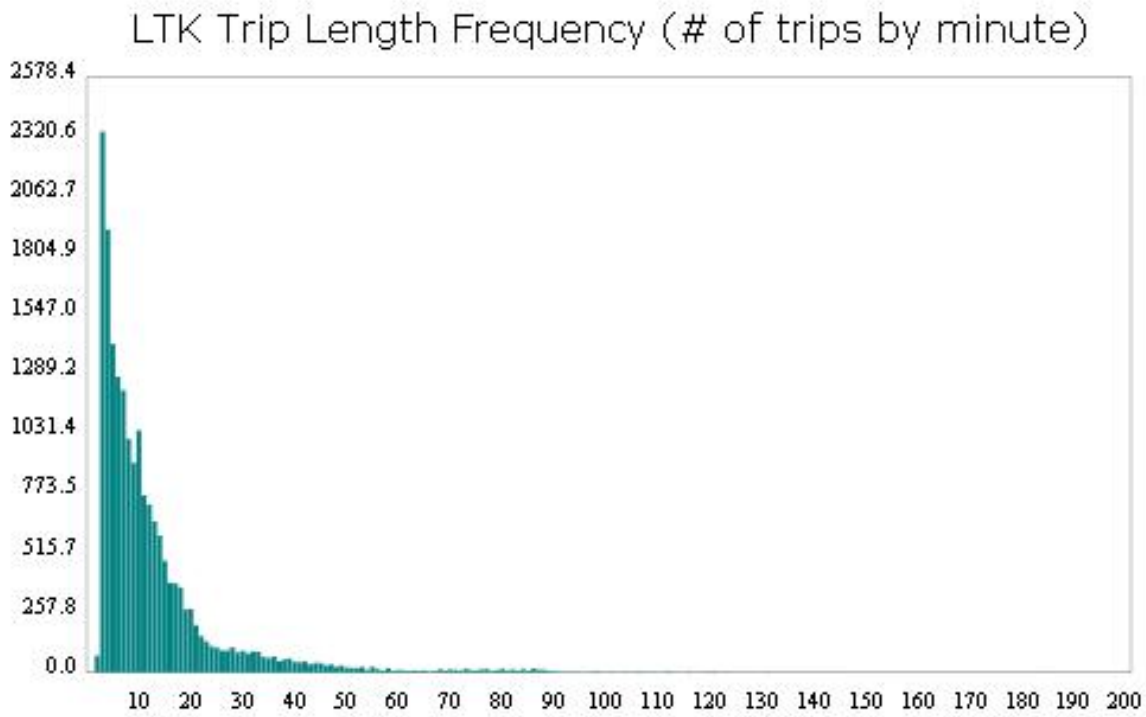


Figure A-28. Flagler County: Heavy Truck Trip Length Distribution

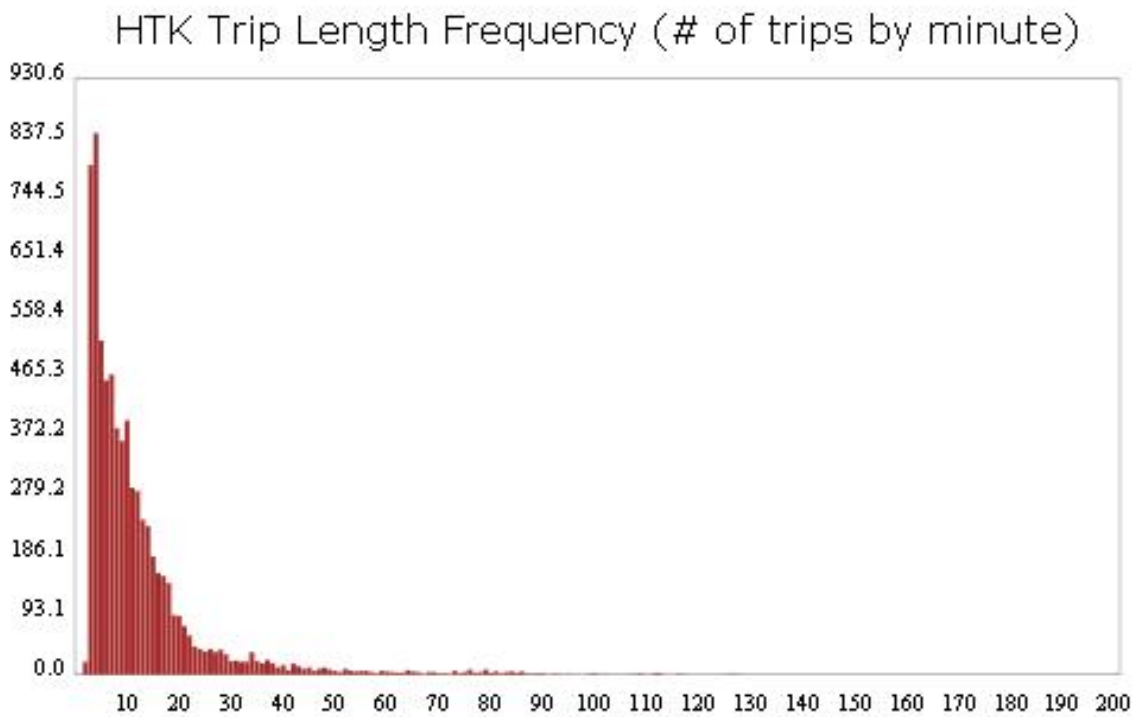




Figure A-29. Flagler County: External-to-Internal (EI) Trip Length Distribution

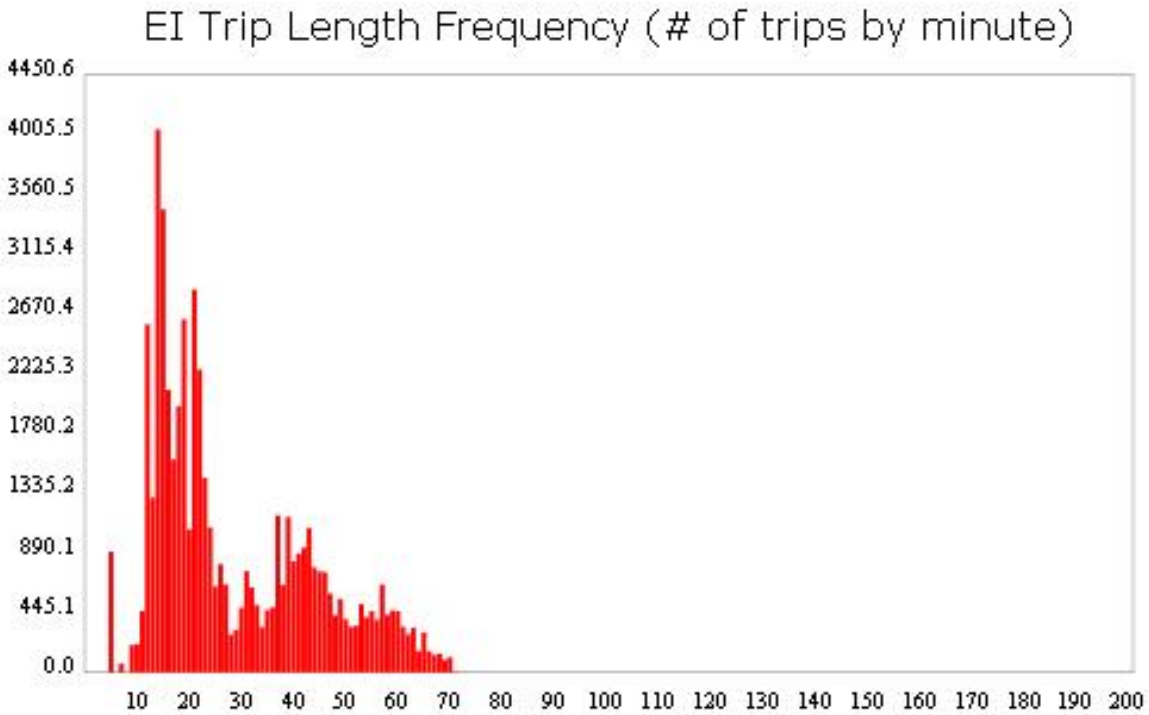


Figure A-30. Flagler County: Total Trip Length Distribution

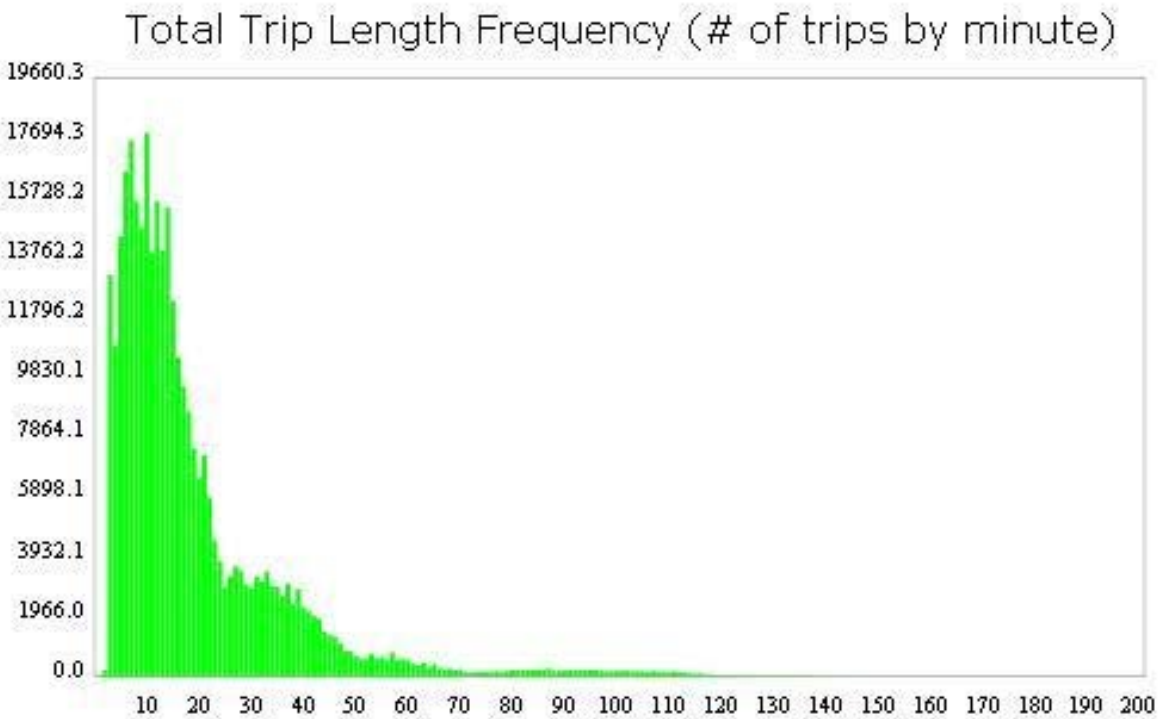




Figure A-31. Volusia TPO: HBW Trip Length Distribution

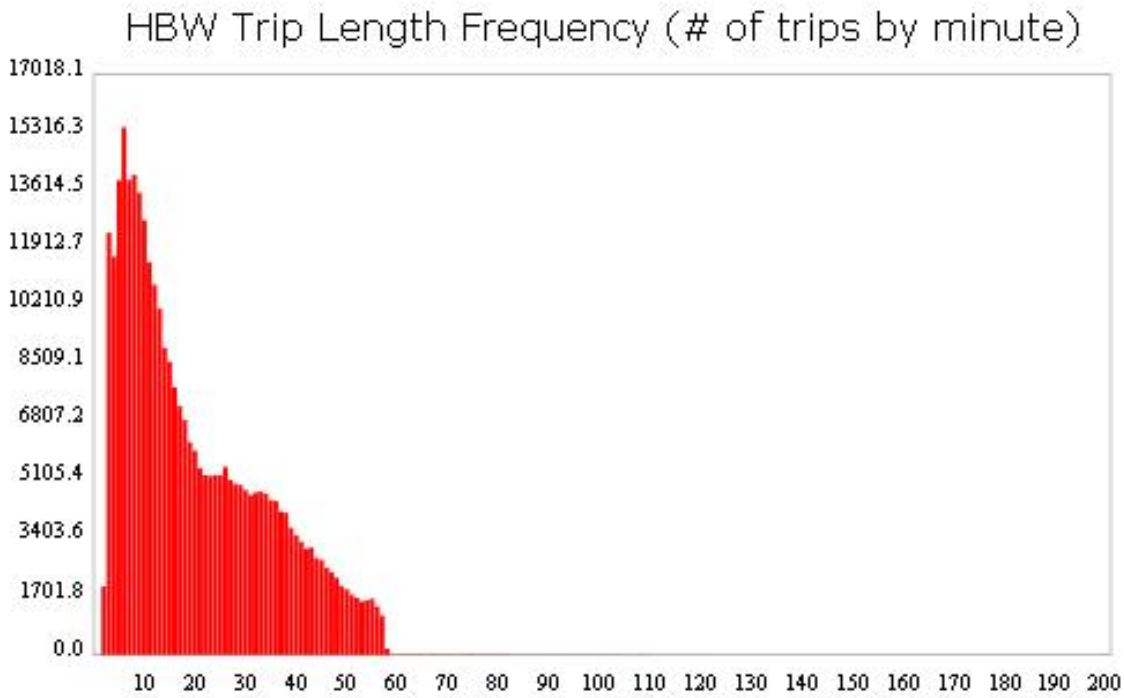


Figure A-32. Volusia TPO: HBSH Trip Length Distribution

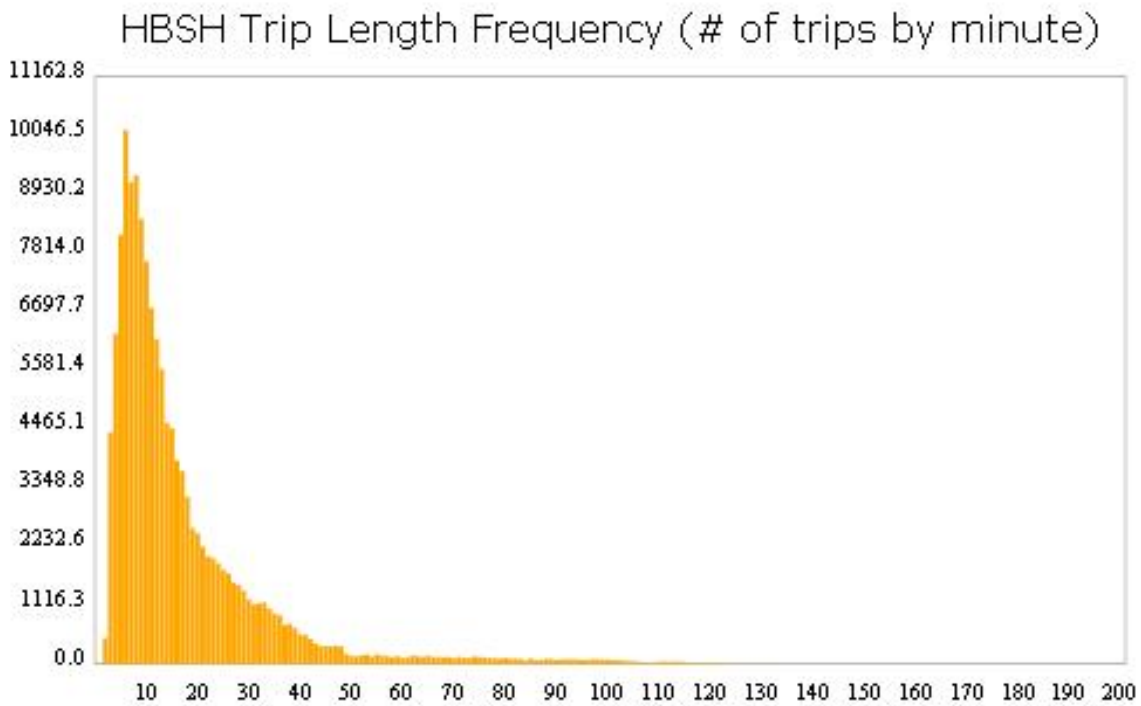




Figure A-33. Volusia TPO: HBSR Trip Length Distribution

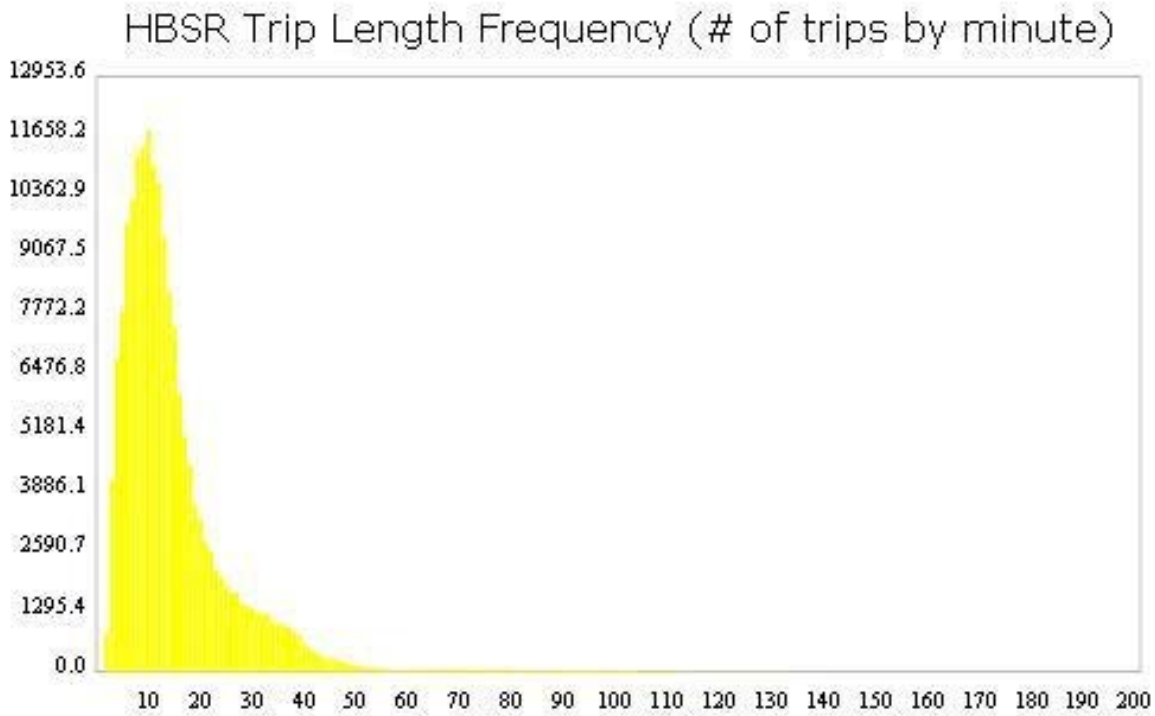


Figure A-34. Volusia TPO: HBO Trip Length Distribution

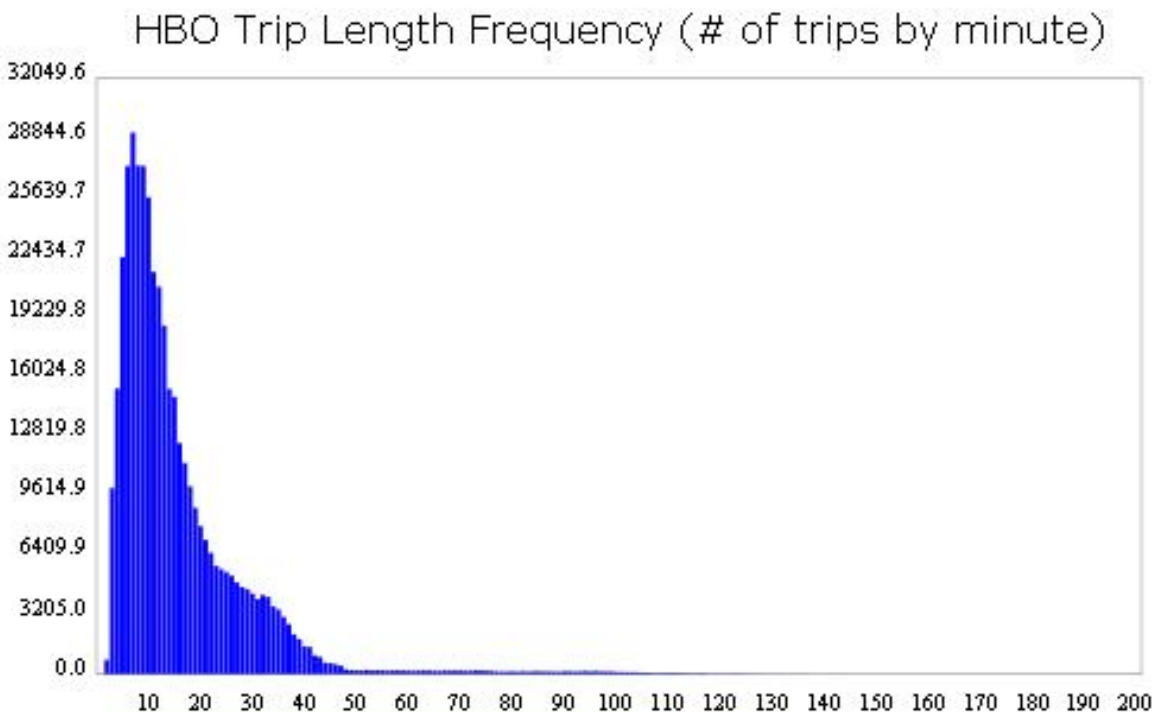




Figure A-35. Volusia TPO: NHB Trip Length Distribution

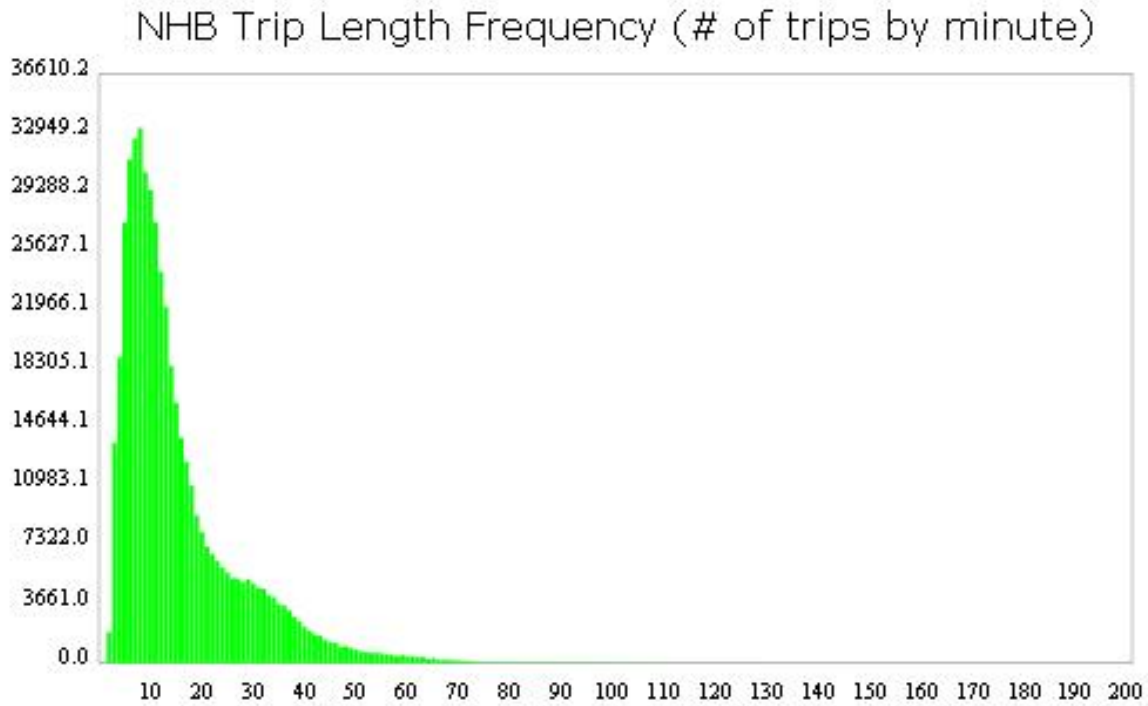


Figure A-36. Volusia TPO: Taxi Trip Length Distribution

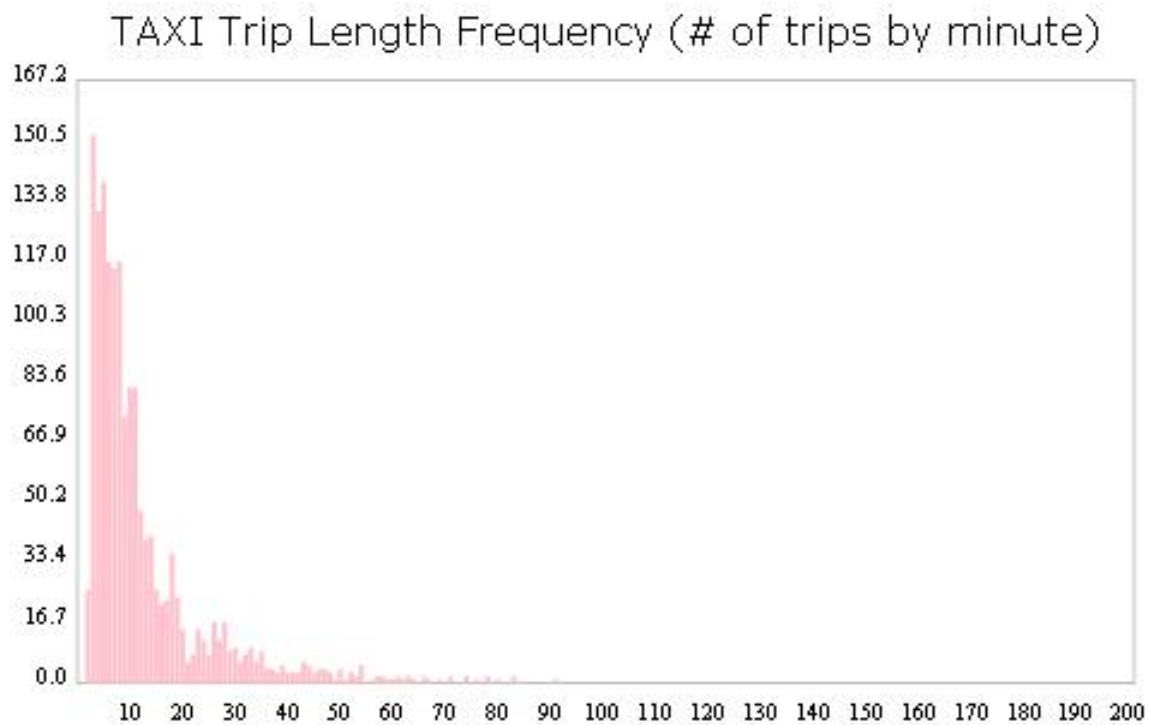




Figure A-37. Volusia TPO: Light Truck Trip Length Distribution

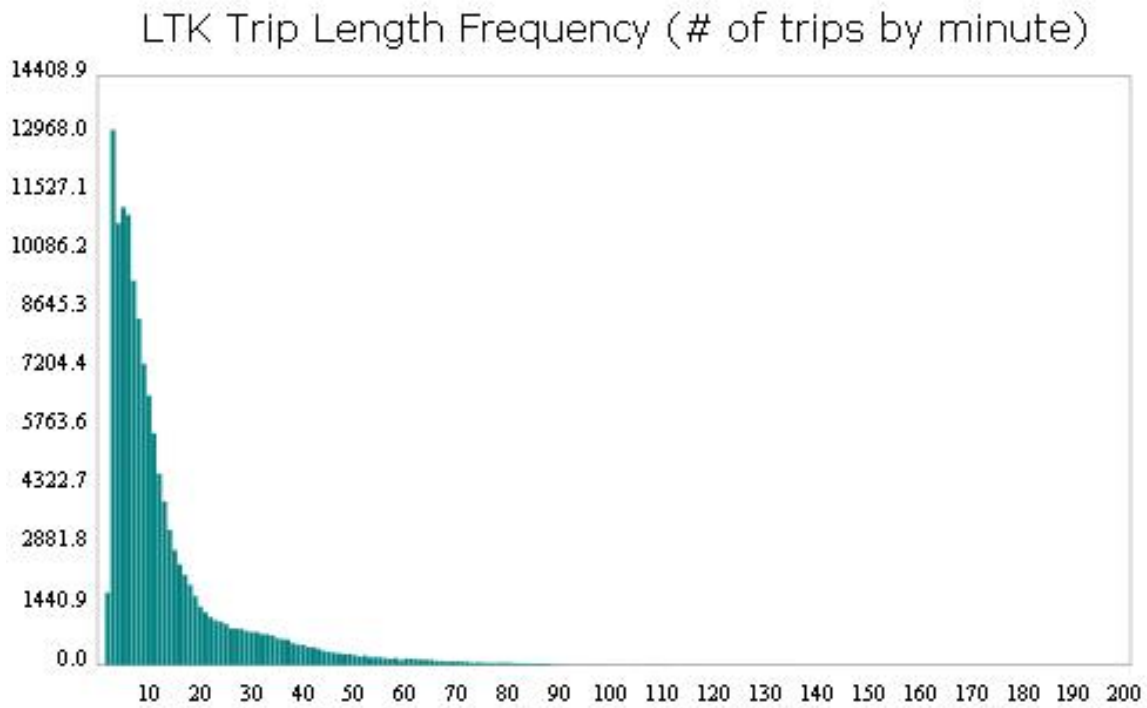


Figure A-38. Volusia TPO: Heavy Truck Trip Length Distribution

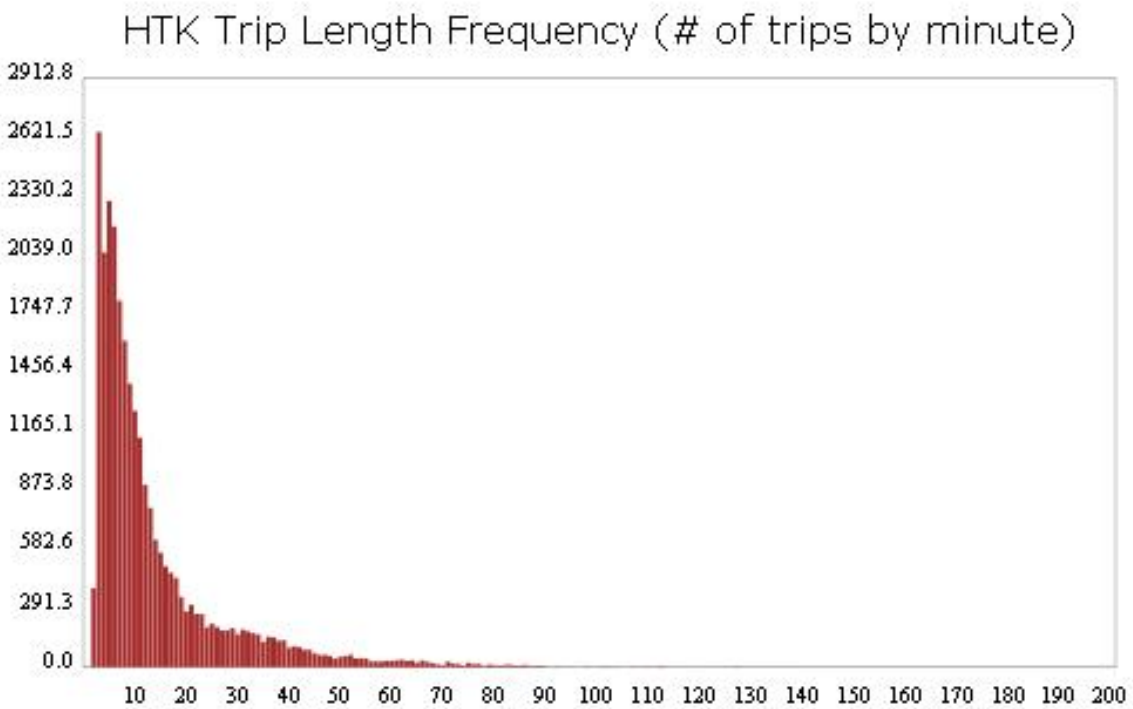




Figure A-39. Volusia TPO: External-to-Internal (EI) Trip Length Distribution

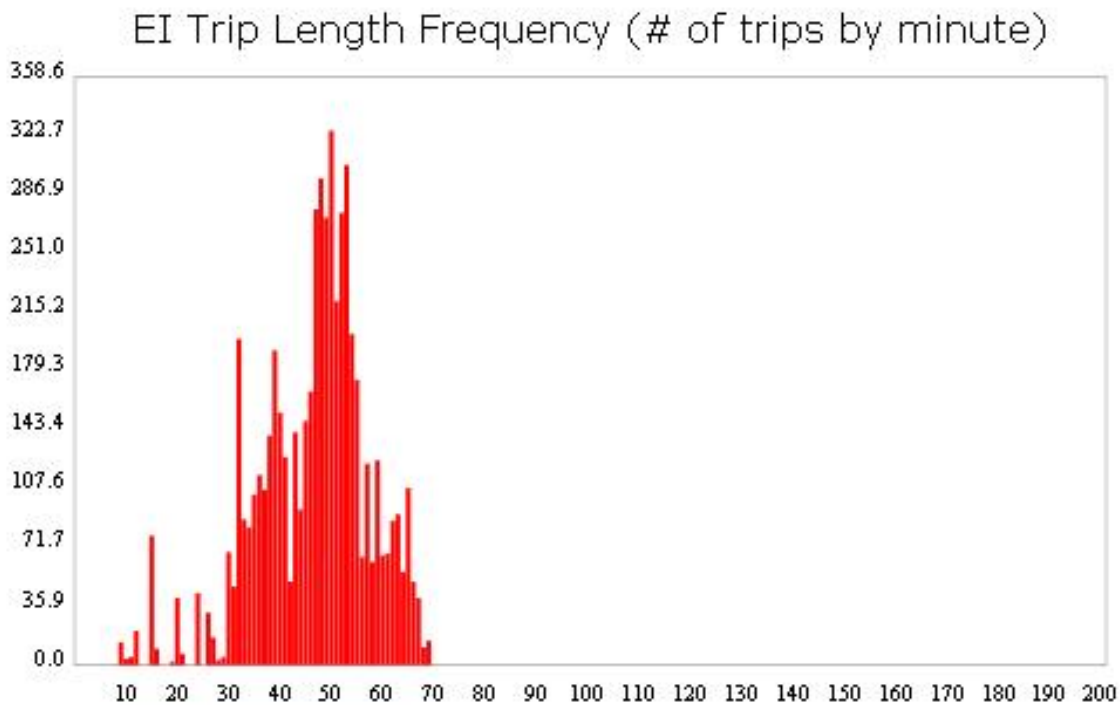


Figure A-40. Volusia TPO: Total Trip Length Distribution

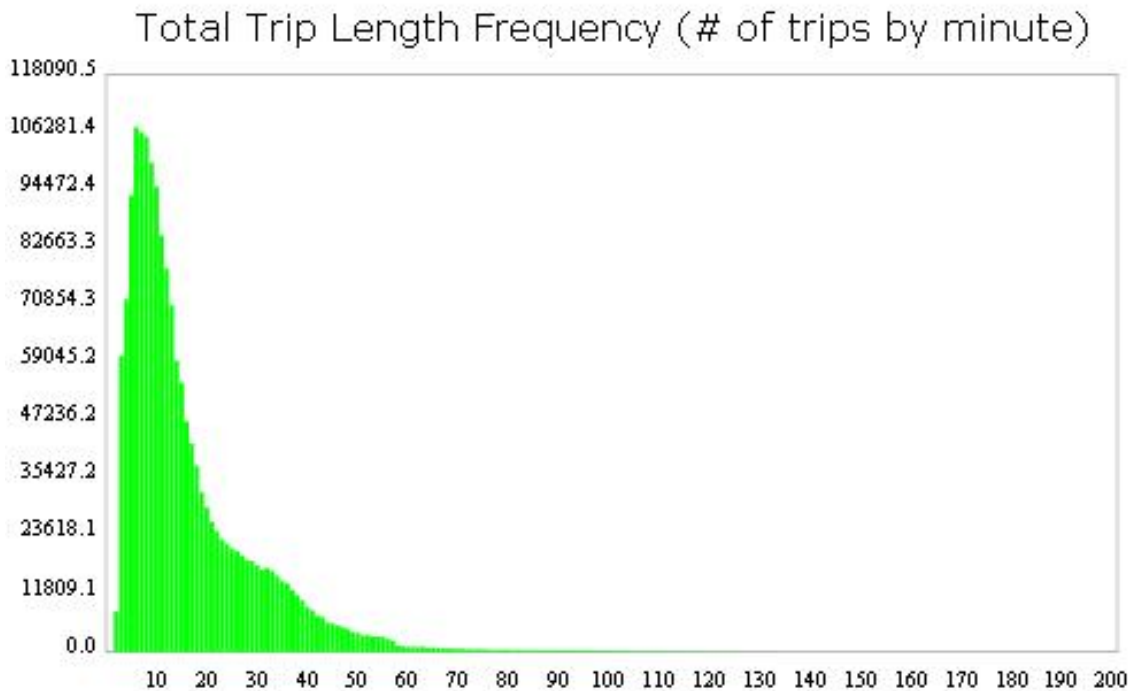




Figure A-41. Space Coast TPO: HBW Trip Length Distribution

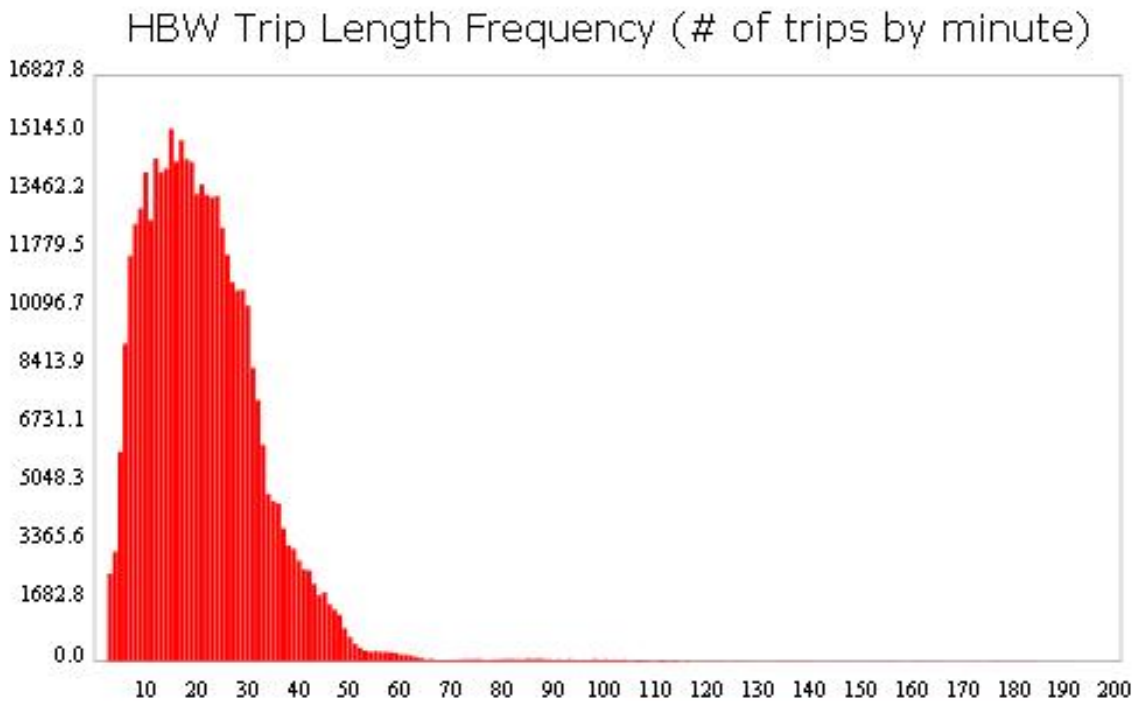


Figure A-42. Space Coast TPO: HBSH Trip Length Distribution

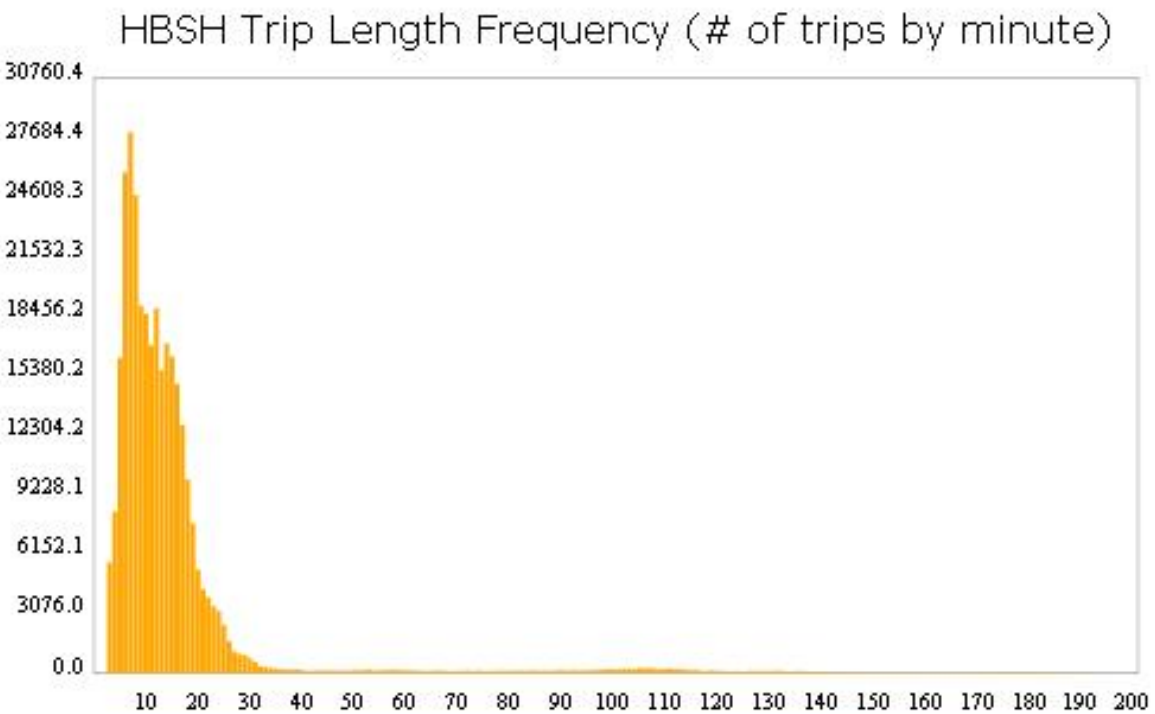




Figure A-43. Space Coast TPO: HBSR Trip Length Distribution

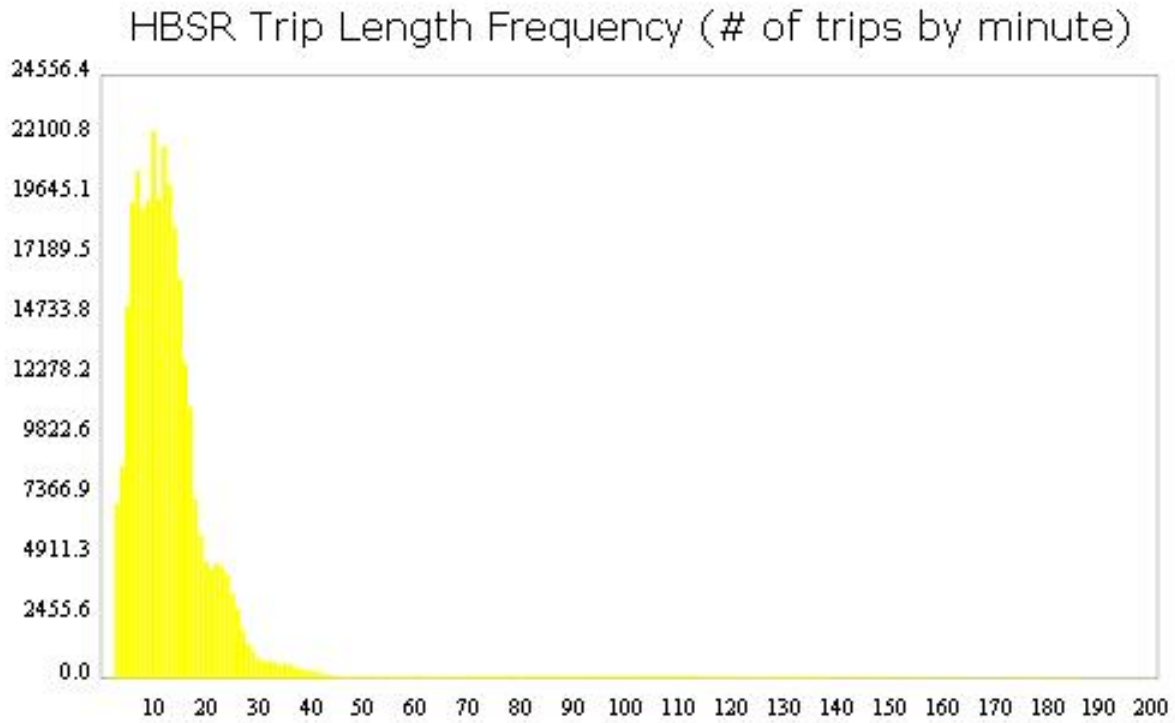


Figure A-44. Space Coast TPO: HBO Trip Length Distribution

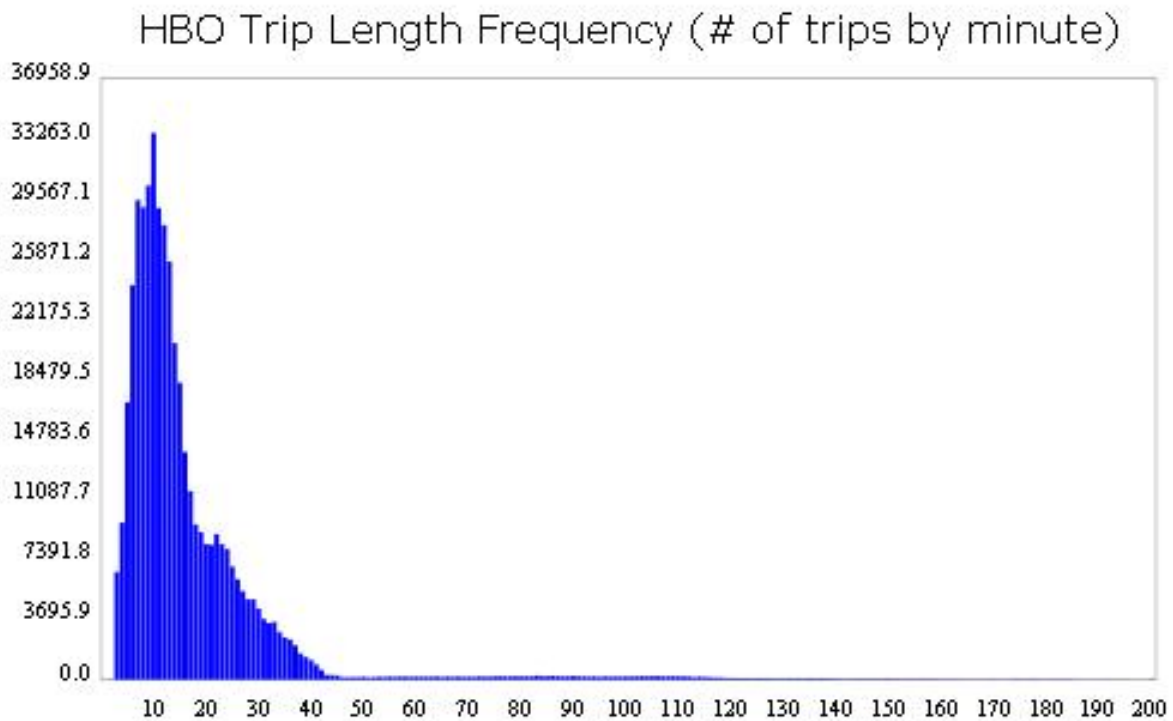




Figure A-45. Space Coast TPO: NHB Trip Length Distribution

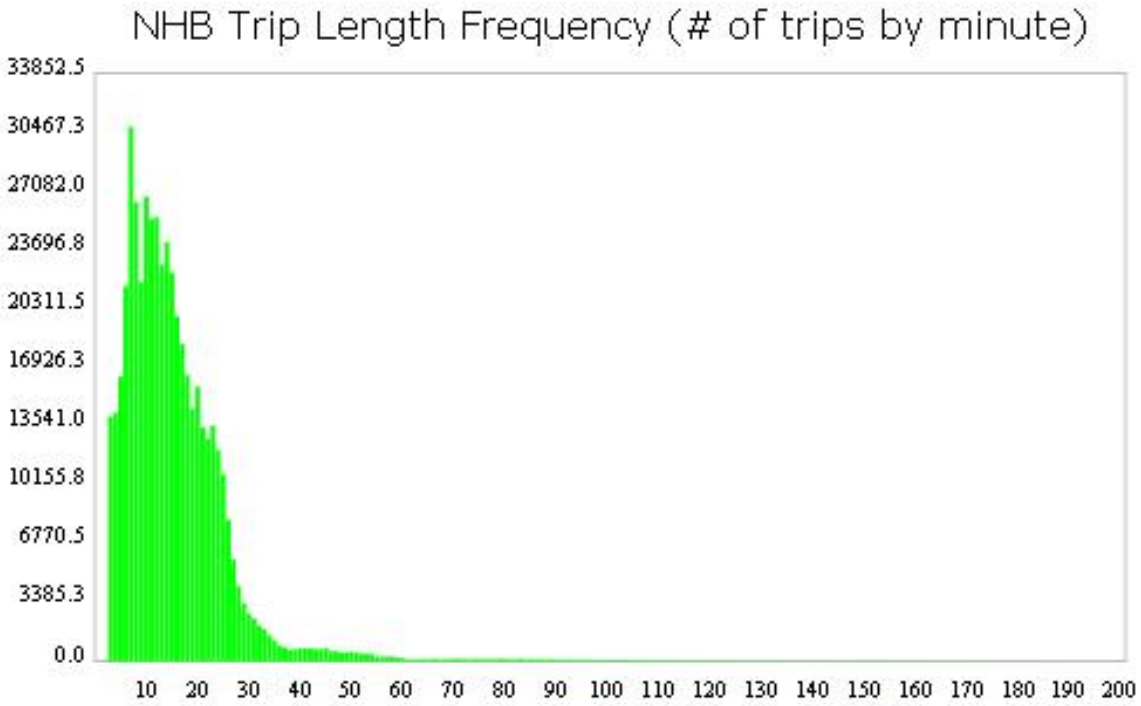


Figure A-46. Space Coast TPO: Taxi Trip Length Distribution

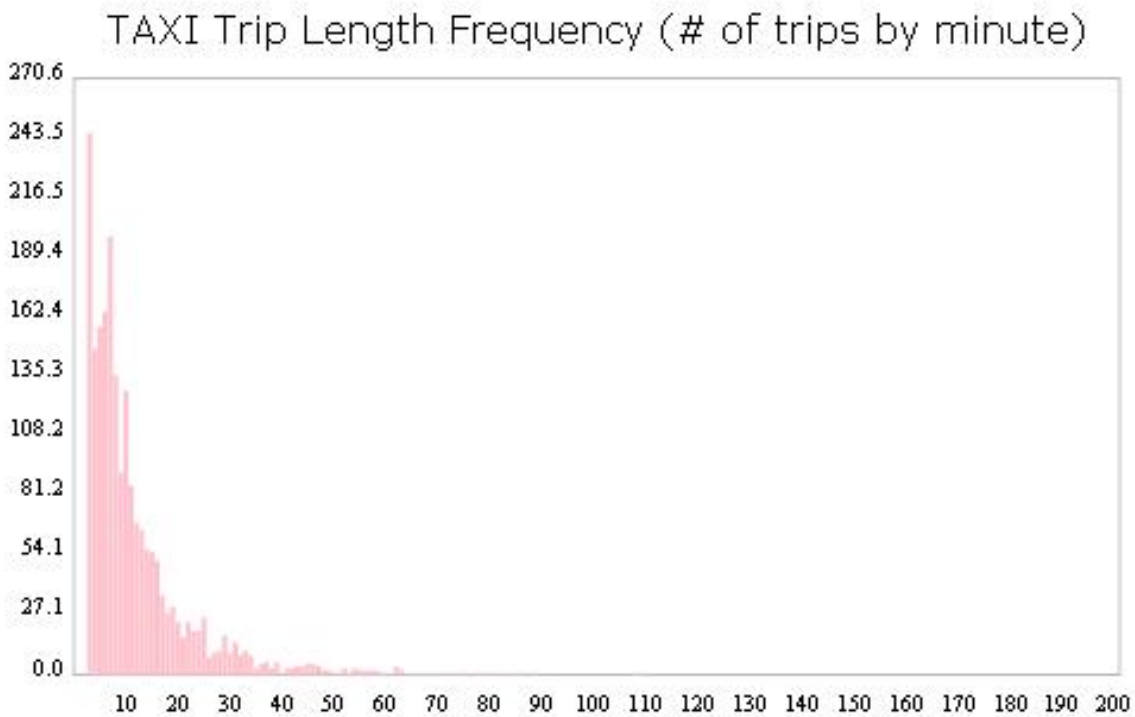




Figure A-47. Space Coast TPO: Light Truck Trip Length Distribution

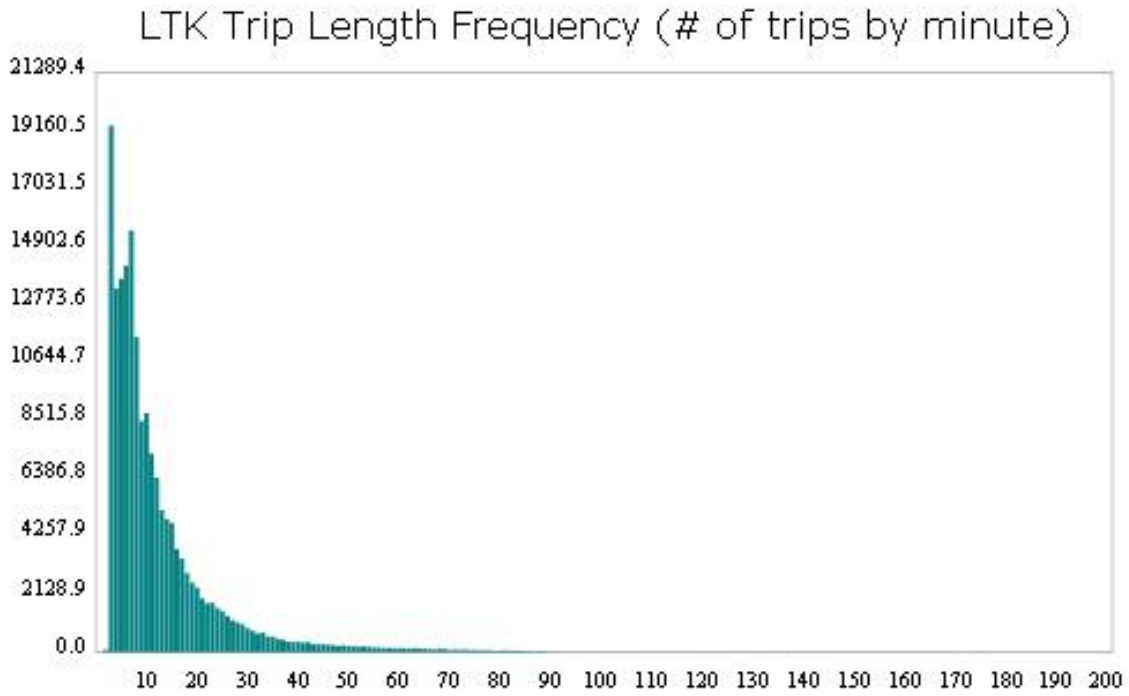


Figure A-48. Space Coast TPO: Heavy Truck Trip Length Distribution

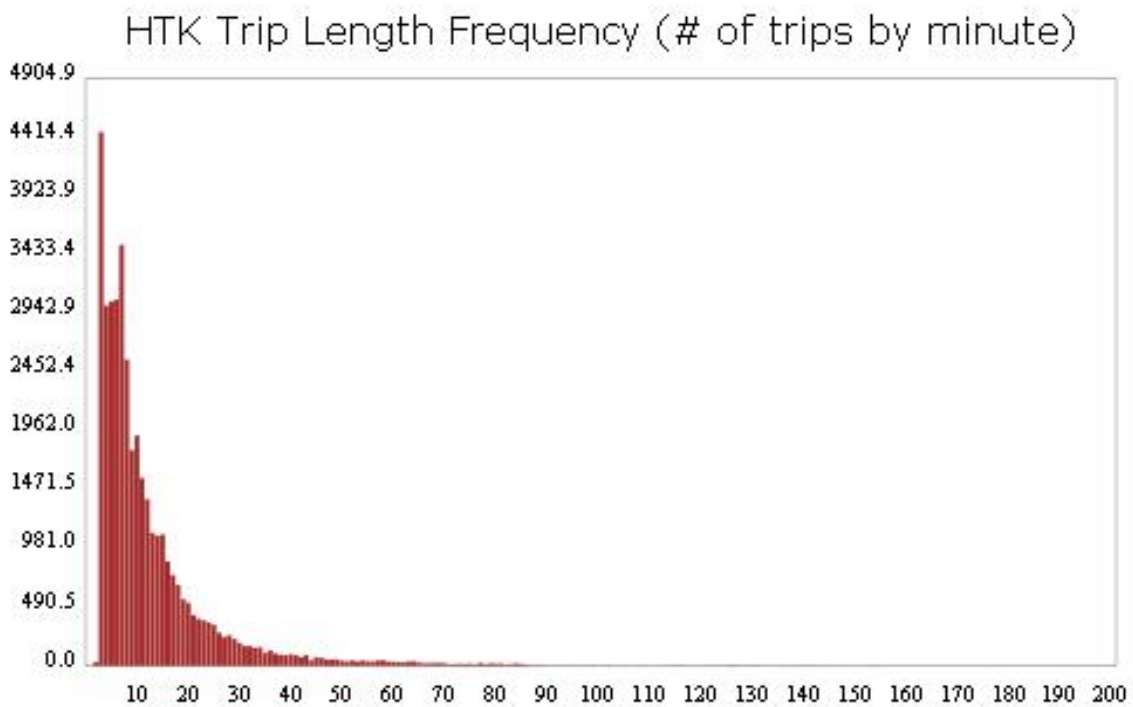




Figure A-49. Space Coast TPO: External-to-Internal (EI) Trip Length Distribution

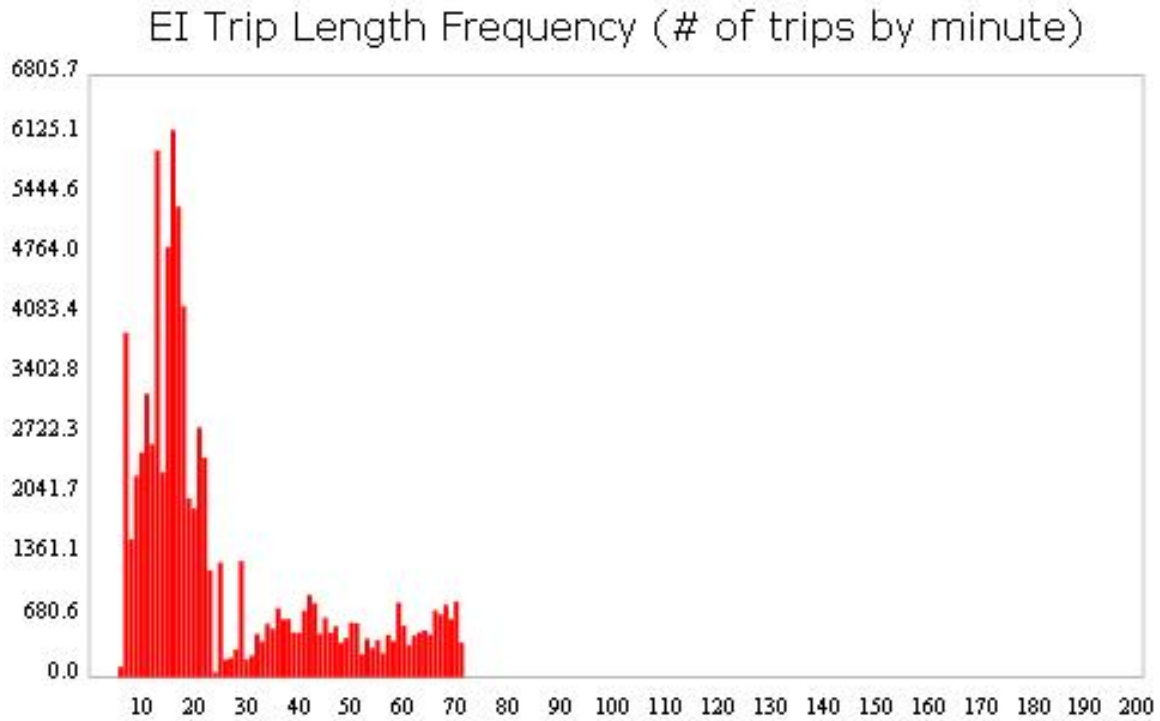


Figure A-50. Space Coast TPO: Total Trip Length Distribution

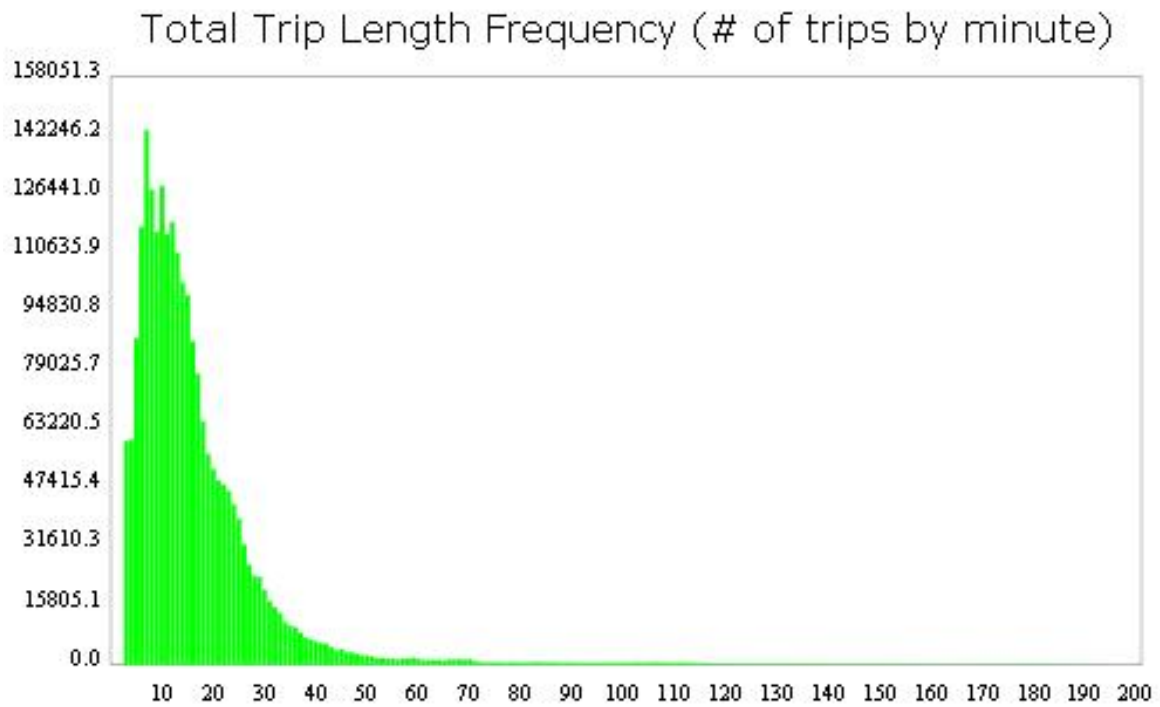




Figure A-51. METROPLAN Orlando: HBW Trip Length Distribution

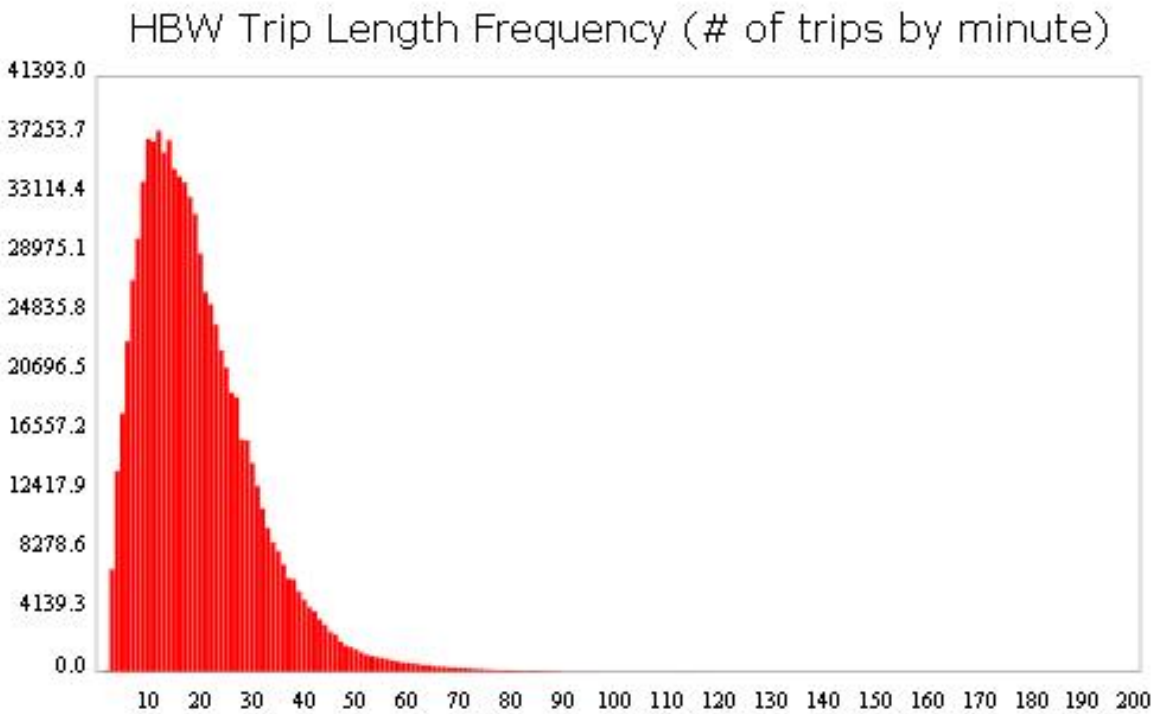


Figure A-52. METROPLAN Orlando: HBSH Trip Length Distribution

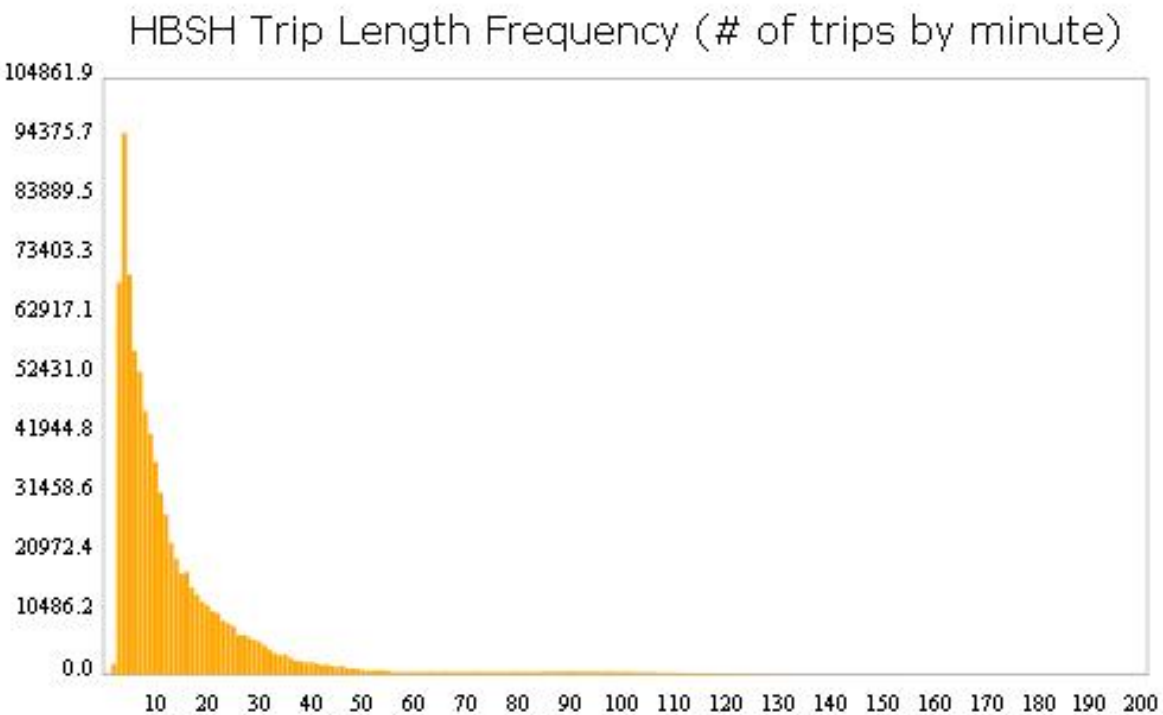




Figure A-53. METROPLAN Orlando: HBSR Trip Length Distribution

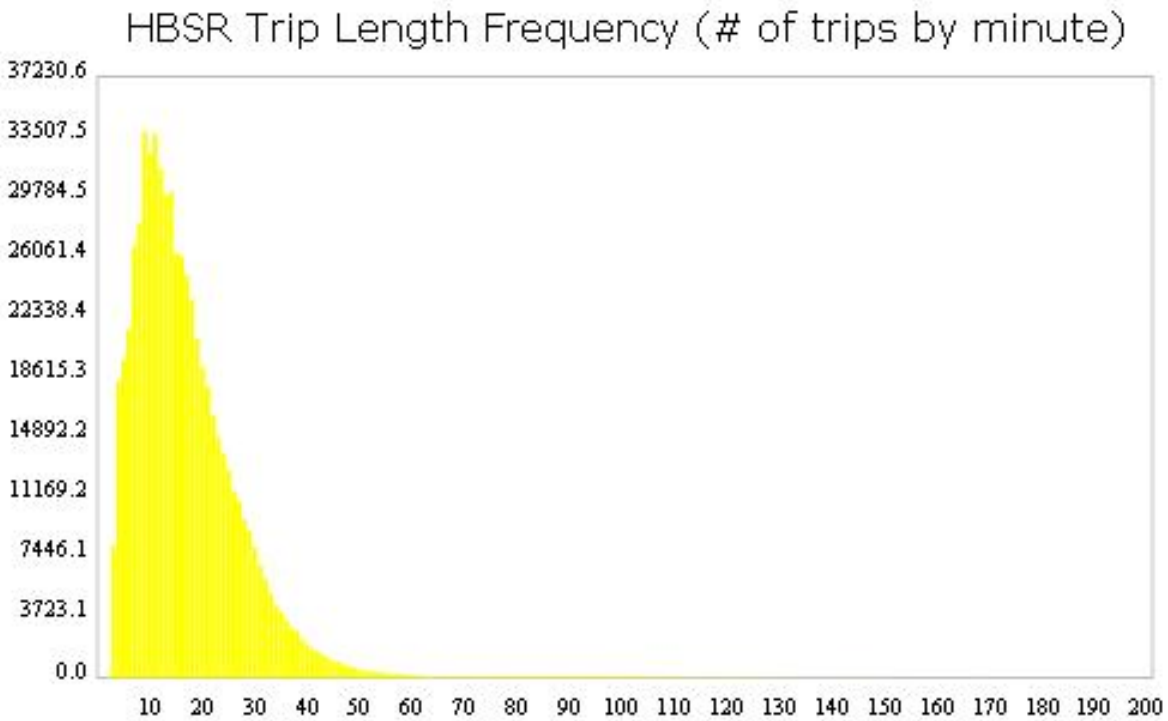


Figure A-54. METROPLAN Orlando: HBO Trip Length Distribution

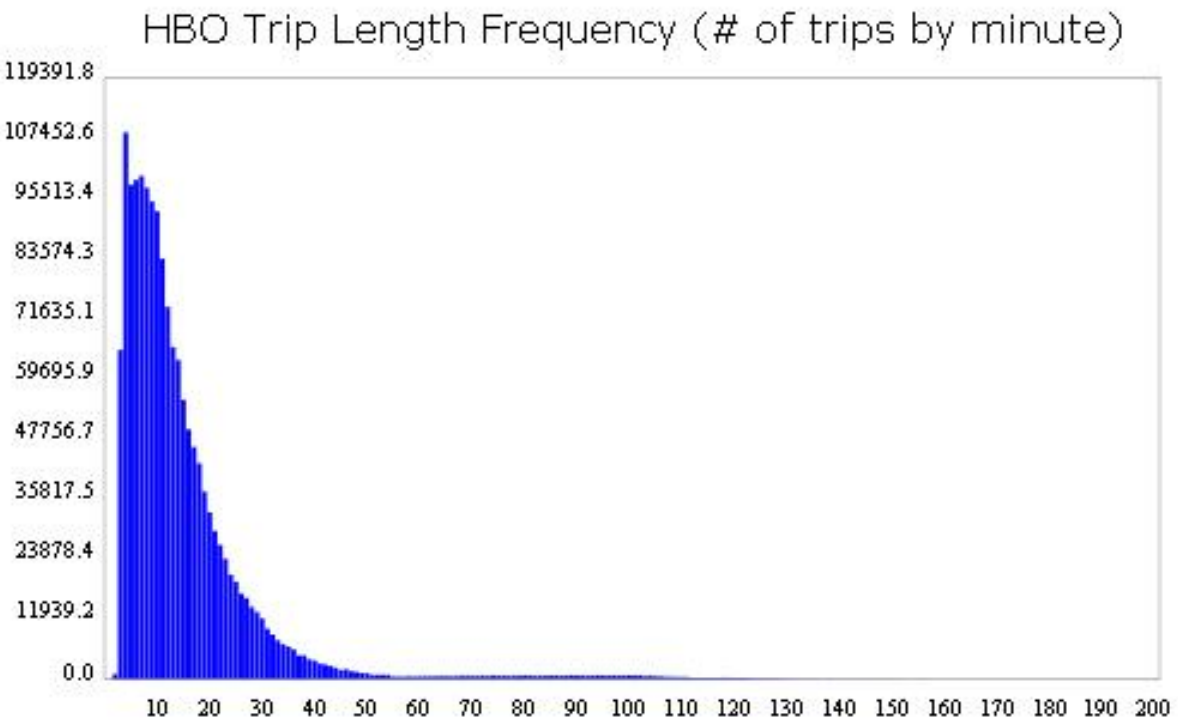




Figure A-55. METROPLAN Orlando: NHB Trip Length Distribution

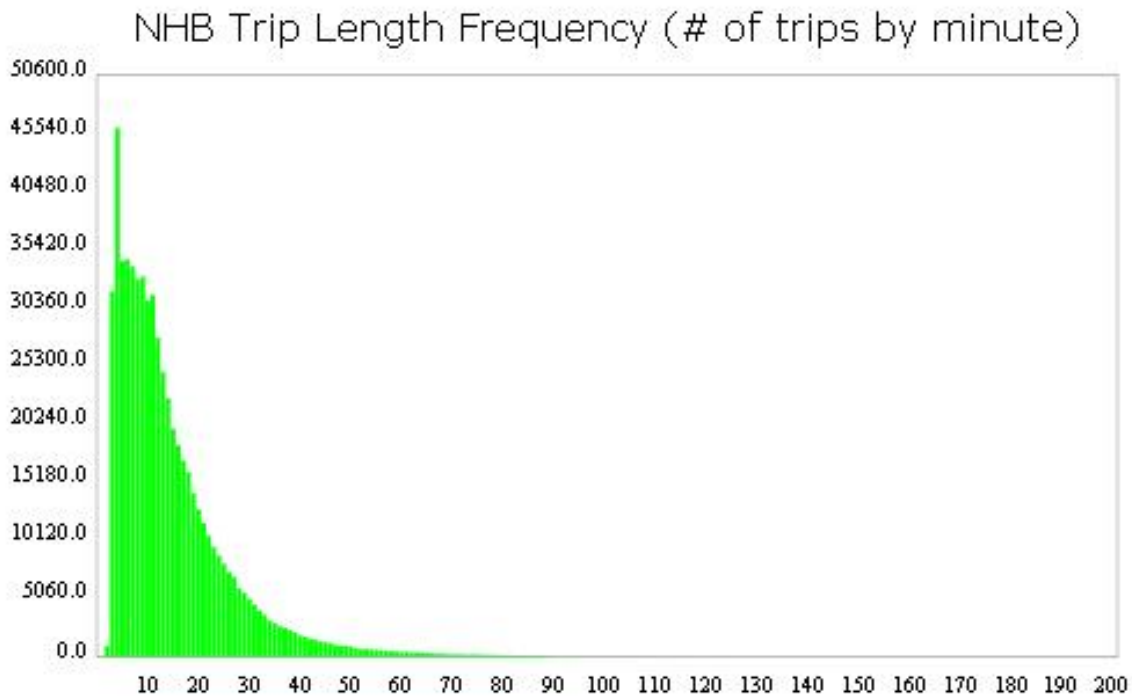


Figure A-56. METROPLAN Orlando: Taxi Trip Length Distribution

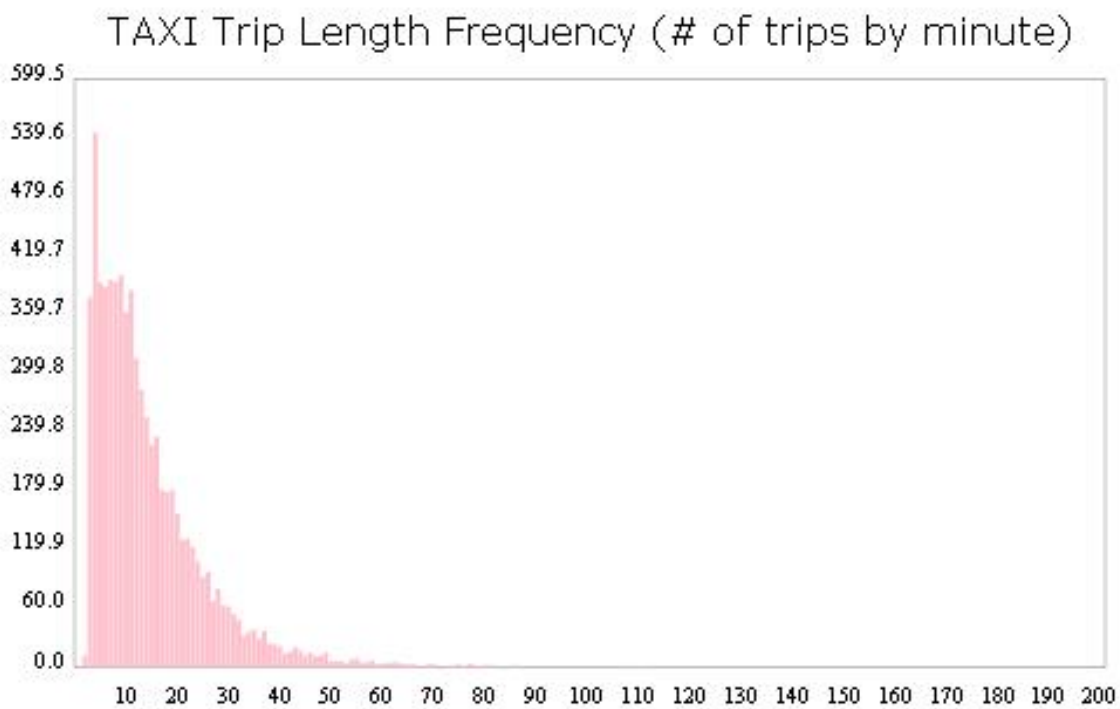




Figure A-57. METROPLAN Orlando: Light Truck Trip Length Distribution

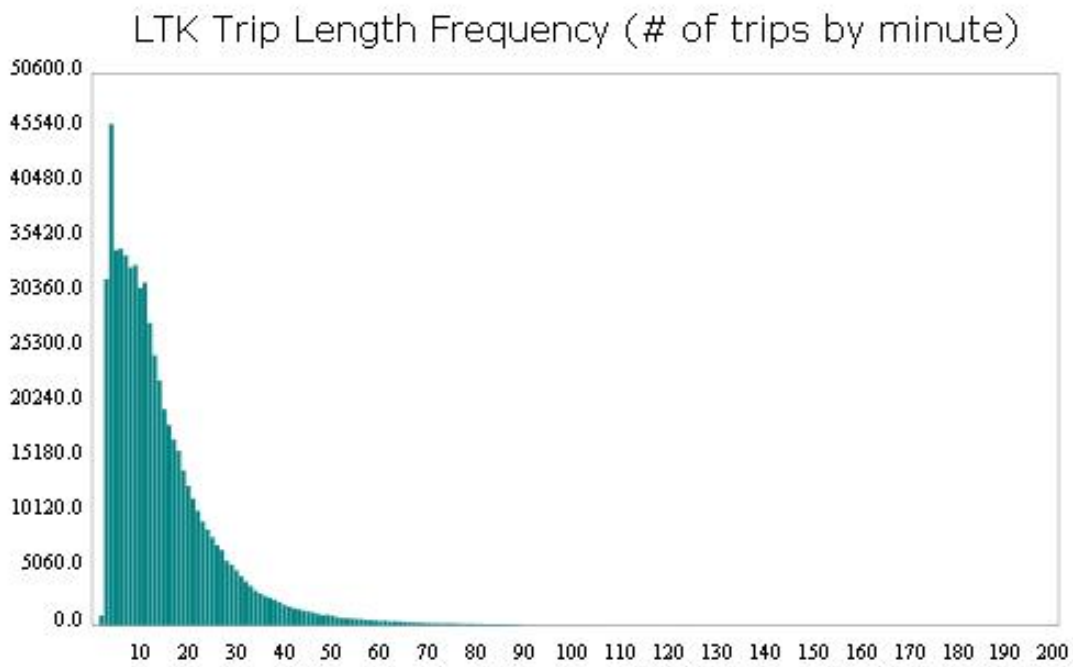


Figure A-58. METROPLAN Orlando: Heavy Truck Trip Length Distribution

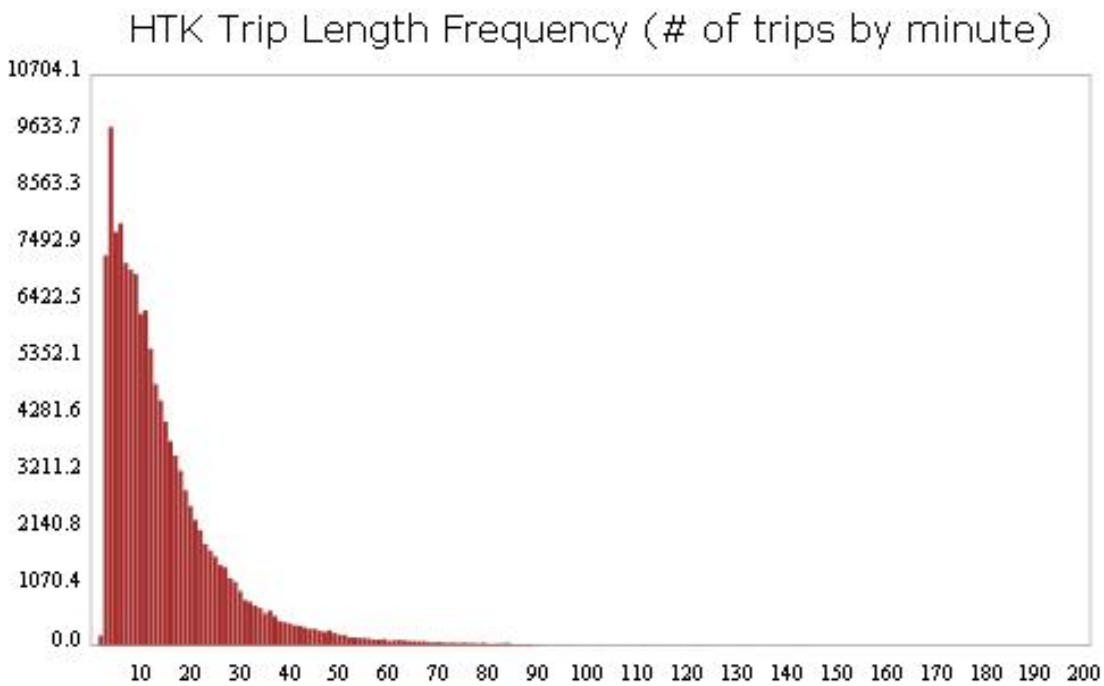




Figure A-59. METROPLAN Orlando: External-to-Internal (EI) Trip Length Distribution

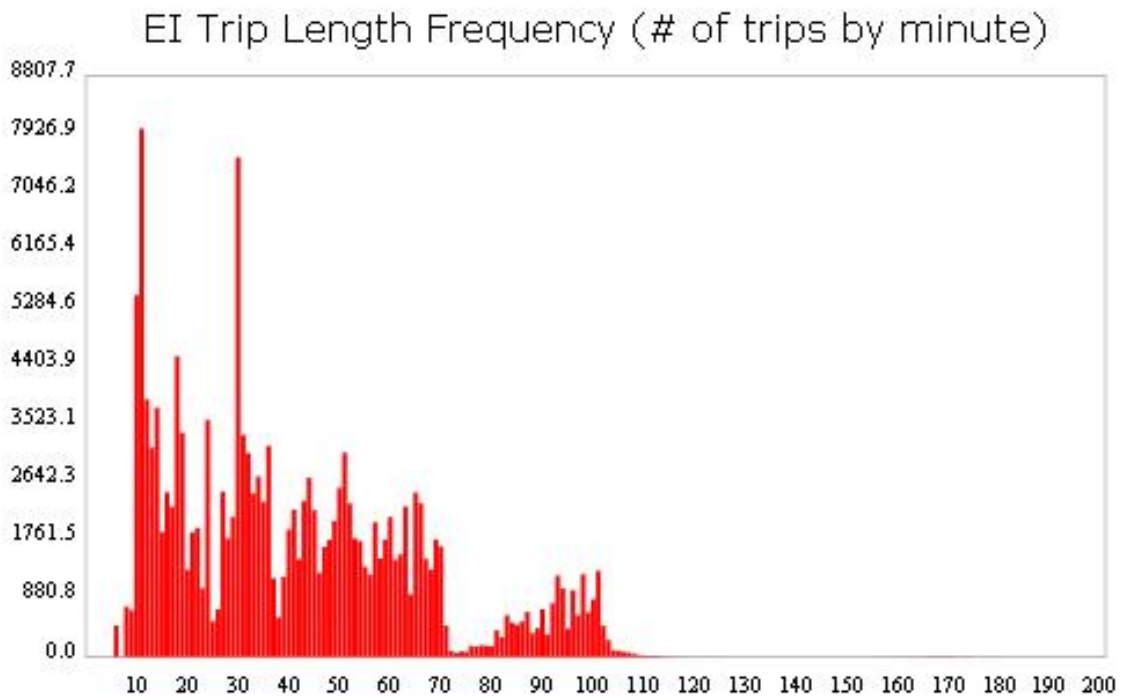


Figure A-60. METROPLAN Orlando: Total Trip Length Distribution

