

**Central Florida Regional Planning Model (CFRPM)  
Version 6.0**

**Technical Memorandum:  
Year 2010 Model Calibration and Validation**

**Prepared for:**

**FLORIDA DEPARTMENT OF TRANSPORTATION  
DISTRICT 5**



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## 1.0 Introduction

The Florida Department of Transportation (FDOT), District Five has contracted with Leftwich Consulting Engineers, Inc. to develop an update to the Central Florida Regional Planning Model (CFRPM) to year 2010 conditions. The model has both a Daily and Time-of-Day (TOD) travel demand component. The CFRPM Version 6.0 Daily Model is to be used in the development of the year 2040 Long Range Transportation Plans for the area Metropolitan Planning Organizations (MPOs) and Transportation Planning Organizations (TPOs) within FDOT District Five.

Specifically, the scope of services for the development of the new CFRPM v6.0 lists several new features to be added to the CFRPM Version 5.0 model (e.g. Household Income, Lifestyle Trip Generation for all counties, a Truck model, incorporating all of Polk County, and Time-of day assignments) to obtain a calibrated model to year 2010 conditions. The methodology builds on the existing CFRPM Version 5.0 Daily and CFRPM version 5.5 TOD models to develop the CFRPM Version 6.0 Model. The efforts have been divided into several tasks (across three Task Work orders) as outlined below:

- Incorporate Polk County into the CFRPM v6.0 Model
  - Development of Highway Network Expansion for Polk County
  - Update GIS Boundary File to include Polk County
  - Update External Trips/Special Attractors to include Polk County
- Lifestyle Model Enhancements
- Income Model Enhancements
- Time-of-Day Model Enhancements – Four Time periods (e.g. Morning, 6:30 AM to 9:00 AM, Midday, 9:00 AM to 3:30 PM, Afternoon, 3:30 PM to 6:30 PM, and Night 6:30 PM to 6:30 AM)
- Truck Model Enhancements – Light Trucks (FHWA classifications 5-7) and Heavy Trucks (FHWA classifications 8-13)
- Model Calibration and Validation

This Technical Memorandum entitled “Year 2010 Model Calibration and Validation” provides a summary of the results of the highway and transit model validation for the CFRPM Version 6.0 Model.

### 1.1 Task Overview

As mentioned above, the documentation of the results of the highway model calibration and validation are presented as part of this task. The following information is presented as part of the model calibration and validation efforts:

- Supporting Project Documentation
- Trip Generation Enhancements
- Daily and TOD Model Description
- External Stations
- Highway Network
- Model Distribution
- Highway and Transit Assignment

### 1.2 CFRPM Study Area

The CFRPM Model is a distinct model in that it encompasses a large area comprised of eleven (11) counties with varying densities and travel characteristics.

The model includes the nine counties represented by FDOT’s District Five as follows: Brevard, Flagler, Lake, Marion, Orange, Osceola, Seminole, Sumter, and Volusia Counties. In addition, the CFRPM v6.0 Model contains all of Polk County and part of Indian River County for purposes of interactions with these areas. **Figure 1-1** shows the CFRPM 6.0 study area. Orange, Seminole, and Osceola are part of the Orlando Urban Area and are distinctly urbanized in both their population and their employment character. Volusia and Lake County are nearby counties with many of its residents traveling to the Orlando area for work. The other counties are more rural in character and thus have more inter-county travel patterns.

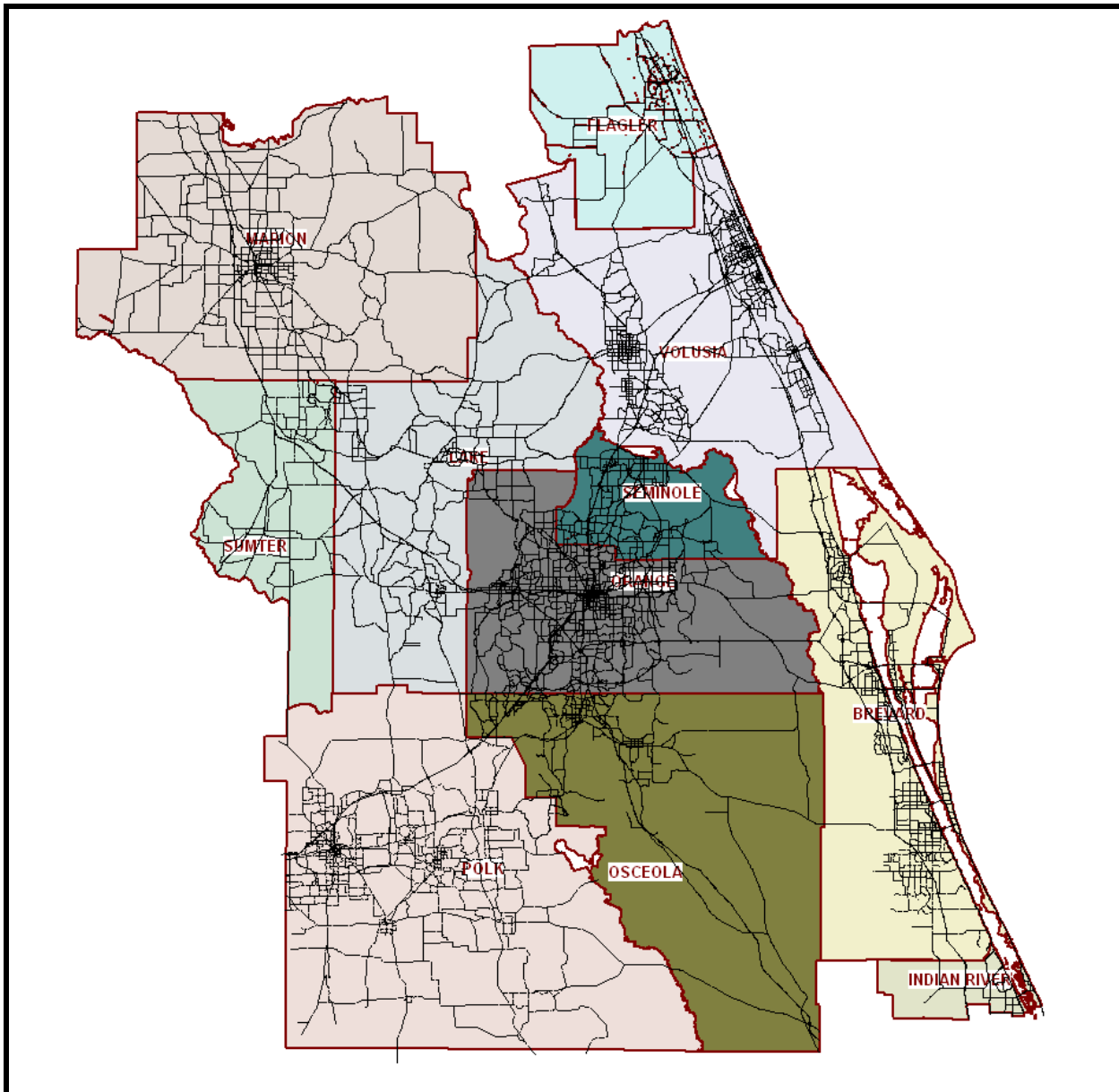
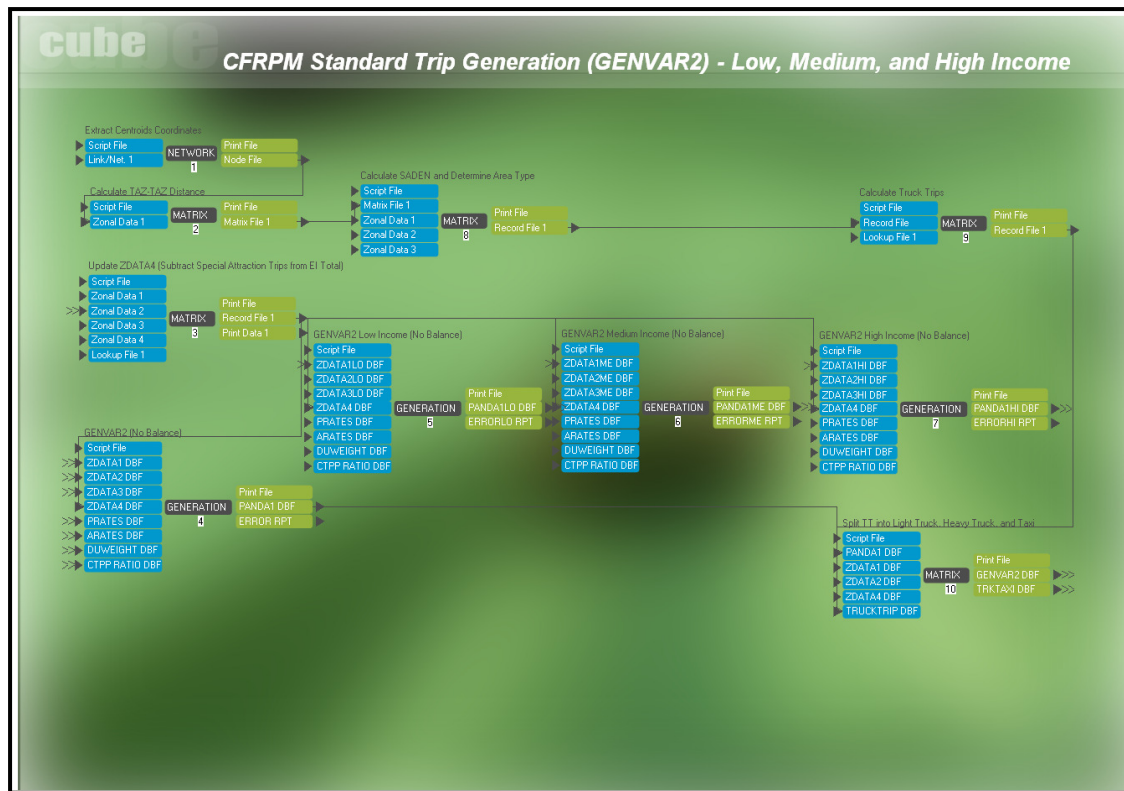


Figure 1-1. Geographic Area Covered by CFRPM Model Version 6.0

### 1.3 Trip Generation – Lifestyle and by Standard Low, Medium, and High Income

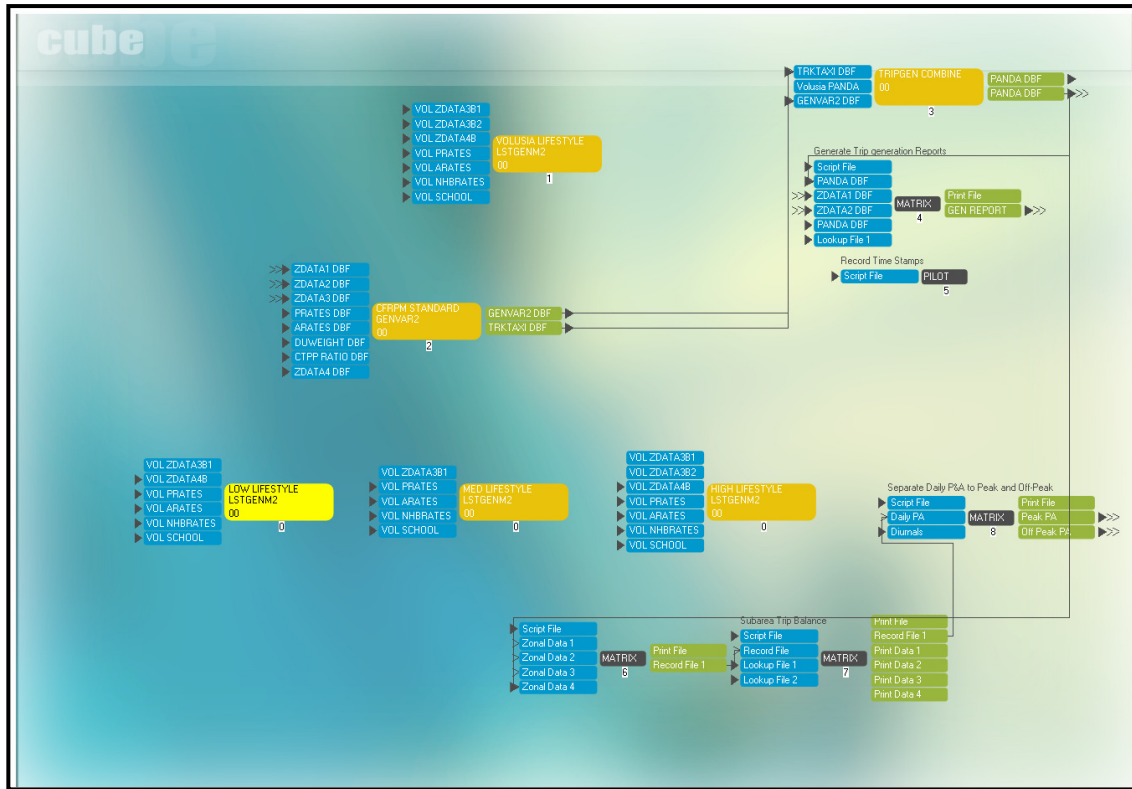
The original concept was to convert CFRPM 5.0 from only using Lifestyle Trip Generation procedure for Volusia County to all Counties in the model. At the same time, households were to be divided into Low, Medium, and High Income for the Standard Trip Generation and then the percentages of Household with and without workers, with and without children, and auto ownership (STP 60 file) was to be applied to end up with Lifestyle trip generation (Productions and Attractions by Trip Purpose) by Low, medium, and High income groups. The CUBE/voyager scripting was done as shown in **Figure 1-2** and testing was performed (under Task Work order 14) with preliminary files (refer to Technical Memorandum: CFRPM “Income” Model testing Summary<sup>8</sup>, for details). Under Task Work Order 17, a “Lifestyle” model framework was developed as a guide to incorporate into the CFRPM 6.0 Model (refer to Technical Memorandum: CFRPM “Lifestyle” Model Framework<sup>7</sup>, for more details).

During the actual validation work for CFRPM 6.0, the scripting was done to incorporate both the Income and Lifestyle procedures as shown in **Figure 1-3**. As testing was being done, it showed that the scripts were making the correct computations and that a set of Productions and Attractions (Ps and As) were available to combine with the Lifestyle generated Ps&As.



**Figure 1-2. Early testing version of Standard Trip Generation Process broken down into Low, Medium, and High Income Productions and Attractions**





**Figure 1-3. Early testing version of Lifestyle Trip Generation Process broken down into Low, Medium, and High Income Productions and Attractions**

However, during the CFRPM 6.0 validation work, using the actual 2010 input files created (Zdata1 and Zdata2 for all counties, split into Low, Medium, and High, based for Zdata2 (Attraction Variables) on percentages provided by FDOT from work done (under a separate contract) with DTS and for Zdata1 on percentages from parcel level land values, the model was not providing good results. In fact, using the Lifestyle Trip Generation process for all Counties did provide good results, but not when combined with the "Income" procedure. The decision was made to not use the "Income" model procedure and just maintain the "Lifestyle" model for the Trip Generation Module.



### 1.4 CFRPM 6.0 Modeling Process

The model calibration and validation performed for the CFRPM Version 5.5 TOD Model was a supplement to the CFRPM Version 5.0 Daily Model and its validation. The validated Version 5.0 Model served as the starting point for the Version 5.5 TOD Model, and was subsequently refined to incorporate TOD input files and resulting validation refinements. Information such as general discussions of the CFRPM Model and the 2005 base year socio-economic data should be referenced from the FDOT document “Technical Memorandum CFRPM v5.0 Model Calibration and Validation Results” dated September 2010<sup>2</sup>. Both of these models were used as Starting point for the development of the CFFRPM v6.0 model.

The CFRPM Version 6.0 Model generally follows the Florida Standard Urbanized Transportation Modeling Structure (FSUTMS)<sup>1</sup>. There is a Daily and a TOD component that applies the general modules of External Trips (EXTERNAL Module), Trip Generation (TRIP GENERATION Module), Highway Network and Build Highway Paths (HIGHWAY NETWORK Module); then for the Daily version, it does Trip Distribution (DISTRIBUTION Module), Build Transit Networks and Build Transit Paths (TRANSIT Module), Mode Choice (MODE CHOICE Module), Transit Assignment (TRANSIT ASSIGNMENT Module), and finally the Highway Assignment (HIGHWAY ASSIGNMENT Module). For the TOD Version, it then does modules of Trip Distribution (DISTRIBUTION Module), Build Transit Networks and Build Transit Paths (TRANSIT Module), Mode Choice (MODE CHOICE Module), Transit Assignment (TRANSIT ASSIGNMENT Module), and finally the Highway Assignment (HIGHWAY ASSIGNMENT Module). The highway Assignment module does a period assignment for AM, MD, PM, and NT time periods and then combines the four assignments into a 24HR assignment that is different from the “Daily” assignment developed in the Daily Model.

Figure 1-4 illustrates the individual modules of the FSUTMS daily modeling process.

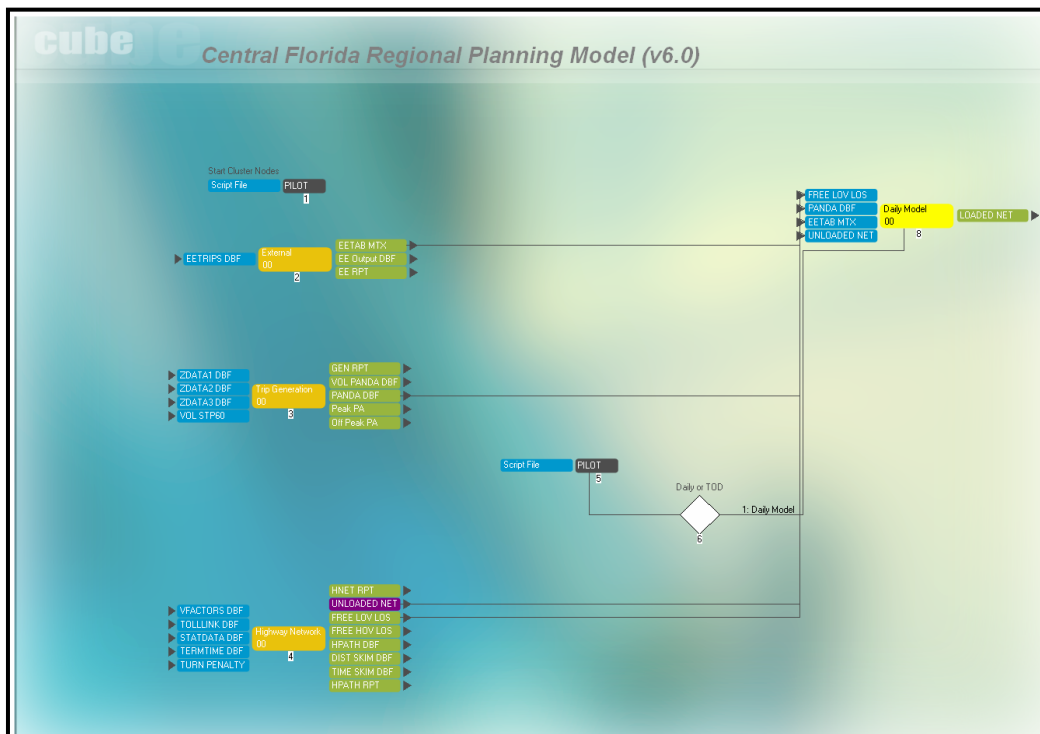


Figure 1-4. FSUTMS Model Flow Process used by CFRPM Version 6.0

## 2.0 General Project Overview

This Technical Memorandum “Year 2010 Model Calibration and Validation” adds to a series of technical memoranda, which have been prepared for the CFRPM Version 2005 5.5 TOD Model development work. The individual technical memorandum (TM) provides documentation of specific components of the Model development. The following serves as an overview the technical memoranda and the role they each represent in the calibration and validation of the Version 5.5 Model, the base for the CFRPM v6.0 model:

- TM “Literature Review of TOD Models”: Documents the current TOD modeling efforts within Florida and nationally.
- TM “Development of TOD Framework”: Presents the model flowchart and framework for the CFRPM Version 5.5 TOD Model, along with an analysis of future data requirements.
- TM “Update CFRPM Model Structure and CUBE/Voyager Scripts”: Revises scripts and related programs to implement the recommended TOD model framework, along with assessment of quad versus dual-quad processor optimizations.
- TM “Development of Peak Periods”: Details the efforts involved in the selection and identification of the TOD periods to be used for the Version 5.5 Model.
- TM “Review Traffic Count Data in Current 2005 CFRPM Model Network”: Provides a review of traffic count locations in the CFRPM Version 5.0 base year 2005 model network along with adjustments made based on electronically collected TOD counts.
- TM “Surrogate Traffic Count Data for 2005 CFRPM Model”: Summarizes the procedures used to develop base year 2005 TOD counts for locations where only daily counts are available.
- TM “Model Calibration and Validation Performance Measures and Standards”: Outlines the standards which will be evaluated for the TOD model validation results.

In summary, the above documents served as the basis for the development of the CFRPM v6.0 Year 2010 Daily and TOD models and provided general direction and recommendation on validation performance evaluations and criteria utilized.

In addition to the technical memoranda, several other deliverables have also been prepared for the CFRPM Version 5.5 Model. These items relate to the development of travel corridor observed speeds and the development of BPR curves. Updated Friction Factor curves and other model input files have also been derived. Detailed descriptions of the additional components are provided as part of this Technical Memorandum “Model Calibration and Validation.”

## 3.0 Description of TOD Model

As indicated previously, several technical memoranda were prepared to develop the set-up for the CFRPM Version 5.5 TOD Model. Technical Memoranda “Development of TOD Framework” and “Update CFRPM Model Structure and CUBE/Voyager Scripts” provide a description of the scripts used by the Model for each of the FSUTMS modules. **Figure 3-1** shows the CFRPM Version 5.5 Model Flow Chart. The Technical Memorandum “Update CFRPM Model Structure and CUBE/Voyager Scripts” provides detailed review of the flow charts for individual Modules. As indicated in the figure, separate pathways are taken for the Daily model assignment and the TOD peak period assignments. A combined 24-hour model is also achieved by adding the individual time period highway assignments (four) into one.

### 3.1 TOD Peak Periods

The peak periods were developed in the Technical Memorandum “Literature Review of TOD Models.” The derivation of the four time periods was based on a thorough review of local traffic counts and the Trip Purposes from the 2008 National Household Travel Survey (NHTS) and their daily distribution patterns, along with LYNX transit service. Numerous Project Team meetings and correspondences were conducted in order to establish the time periods which best represents the CFRPM Version 5.5 TOD Model. Ultimately, the Orange County traffic count and the NHTS HBW distribution patterns were selected as the premise for the TOD periods, with verifications from the LYNX transit services and the CFRPM Version 5.5 travel speed corridor studies (including those associated with I-4). The following summarizes the TOD periods utilized by the CFRPM Version 5.5 Model:

- AM Period from 6:30 a.m. to 9:00 a.m.
- MD Period from 9:00 a.m. to 3:30 p.m.
- PM Period from 3:30 p.m. to 6:30 p.m.
- NT Period from 6:30 p.m. to 6:30 a.m.

The AM and PM Peak Periods are further referred to as the Peak Period and the MD and NT Periods are referred to as the Off-Peak Period. The Peak and Off-Peak Periods are utilized in the TOD Model through the Mode Choice Module, with the individual Periods used in the Highway Assignments. The same time periods have been utilized for CFRPM 6.0.

### 3.2 Model Trip Purposes

Version 6.0 Model includes the same Trip Purposes as Version 5.0 Model. They are as follows:

- Home-Based Work (HBW)
- Home-Based Shopping (HBSHOP)
- Home-Based Social Recreation (HBSOCREC)
- Home-Based Other (HBO)
- Non-Home Based (NHB)

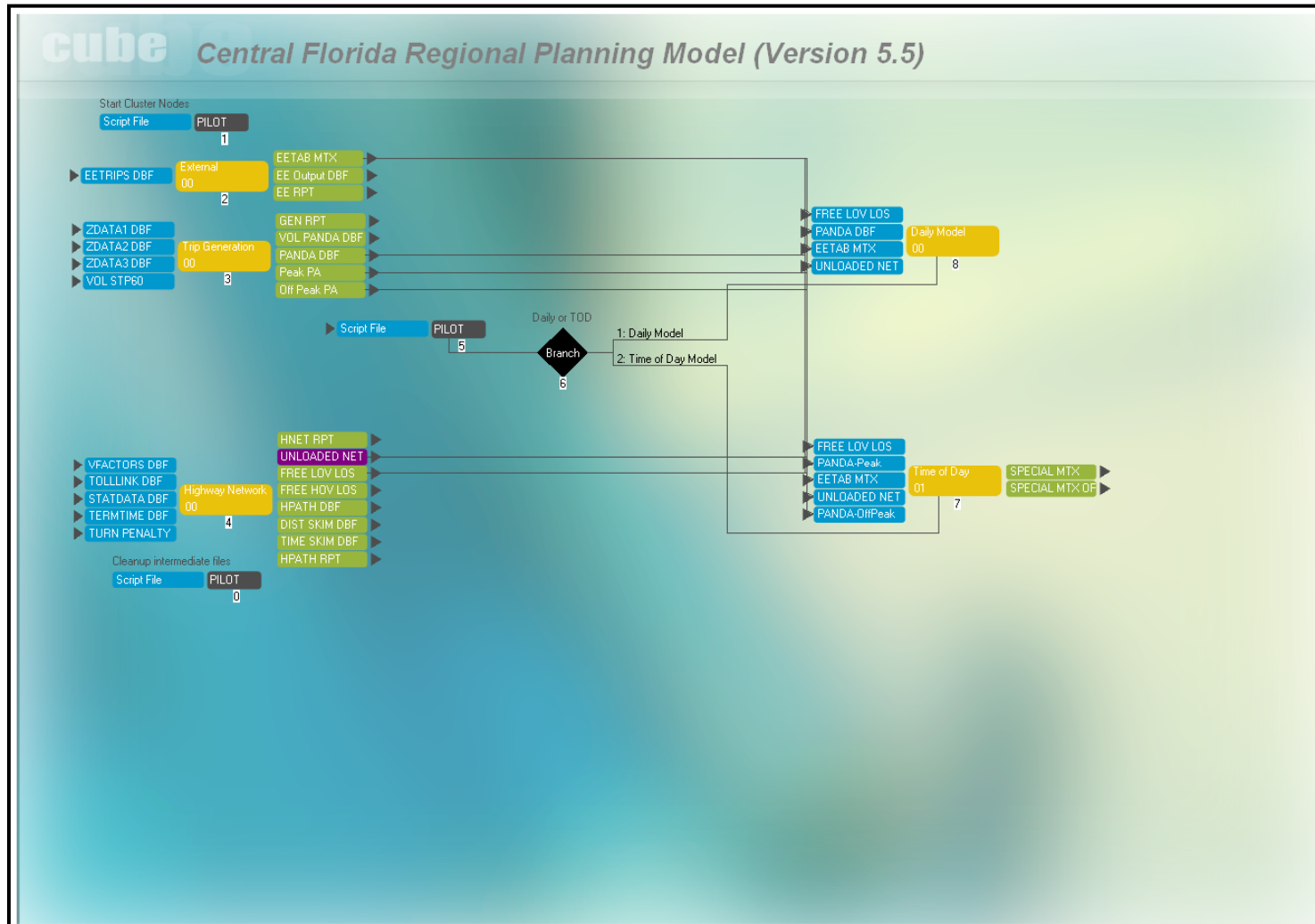


Figure 3-1. FSUTMS Model Flow Process used by CFRPM Version 5.5

- External-External (EE)
- External-Internal (EI)
- 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 Tourist (DIS-T)
- Disney Resident (DIS-R)
- Disney External-Internal (DIS-EI)
- Kennedy Space Center Tourist (KSC-T)
- Kennedy Space Center (KSC-R)
- Kennedy Space Center External-Internal (KSC-EI)
- Port Canaveral Tourist (DIS-T)
- Port Canaveral Resident (DIS-R)
- Port Canaveral External-Internal (DIS-EI)

## 4.0 External Stations

External Stations exist in a model to represent the traffic entering and exiting the model boundary. There are two types of external trips, namely External-Internal and External-External trips. The External-Internal trips are those trips that start outside of a model network, entering at the roadway that crosses the model boundary, and are destined within the model network. External-External trips, on the other hand, are those trips that start outside and end outside of a model network, and as such are trips passing through the network without stopping inside.

Modeling external trips is accomplished in the External Module. Locations where external trips enter and exit the model network are referred to as external stations. A few changes were made to the external station locations to accommodate all of Polk County. The external stations are numbered sequentially in a clockwise direction starting at A1A in Indian River and ending at A1A in St. Johns County. **Table 4-1** provides a summary of the External Station locations and includes the County and roadway descriptions associated with each station. The External trips are summarized in **Table 4-2** and the External-External trip interchanges are presented in **Table 4-3**.

## 5.0 Highway Network

The Highway Network Module contains the information relating to the roadways simulated by the Model. Each roadway is represented by a set of nodes and links, which represent its physical location. Various attributes then describes the characteristics of the individual roadway

**Table 4-1  
CFRPM Version 6.0 External Station Locations**

TAZ	LOCATION	County
5351	A1A	Indian River County Line
5352	US 1	Indian River County Line
5353	58th Ave	Indian River County Line
5354	66th Ave	Indian River County Line
5355	82nd Ave	Indian River County Line
5356	I-95	Indian River County Line
5357	CR 512	Indian River County Line
5358	SR 60	Indian River County Line
5359	SR 91	Indian River County Line
5360	US 441	Indian River County Line
5361	CR 64	Polk County Line
5362	US 27	Polk County Line
5363	US 17	Polk County Line
5364	SR 37	Polk County Line
5365	CR 674	Polk County Line
5366	CR 540	Polk County Line
5367	CR 676	Polk County Line
5368	SR 50	Polk County Line
5369	OLD MUL	Polk County Line
5370	Medulla Rd	Polk County Line
5371	Fancy Farm Rd	Polk County Line
5372	Rice Rd	Polk County Line
5373	US 92	Polk County Line
5374	I-4	Polk County Line
5375	CR 582	Polk County Line
5376	Deeson Rd	Polk County Line
5377	US 98	Polk County Line
5378	SR 50	Hernando County Line
5379	US 301	Hernando County Line
5380	I-75	Hernando County Line
5381	CR 476	Hernando County Line
5382	CR 48	Citrus County Line
5383	SR 44	Citrus County Line
5384	SR 200	Citrus County Line
5385	US 41	Citrus County Line
5386	SR 40	Levy County Line
5387	CR 336	Levy County Line
5388	US 41	Levy County Line
5389	SR 464	Levy County Line
5390	CR 326	Levy County Line
5391	US 27	Levy County Line
5392	CR 318	Levy County Line
5393	CR 320	Levy County Line
5394	CR 329	Alachua County Line
5395	I-75	Alachua County Line
5396	US 441	Alachua County Line
5397	US 301	Alachua County Line
5398	SR 21	Putnam County Line
5399	CR 315	Putnam County Line
5400	SR 19	Putnam County Line
5401	US 17	Putnam County Line
5402	SR 20	Putnam County Line
5403	CR 13	St. Johns County Line
5404	I-95	St. Johns County Line
5405	US 1	St. Johns County Line
5406	A1A	St. Johns County Line

**Table 4-2  
CFRPM Version 6.0 Daily External Trip Summary**

TAZ	County	Location	EI/IE Trips	EE Trips	Total Trips	EI/IE Trips %	EE Trips %
5351	Indian River County Line	A1A	8,157	110	8,267	99	1
5352	Indian River County Line	US 1	6,820	1,796	8,616	79	21
5353	Indian River County Line	58th Ave	6,897	78	6,975	99	1
5354	Indian River County Line	66th Ave	7,785	86	7,871	99	1
5355	Indian River County Line	82nd Ave	298	0	298	100	0
5356	Indian River County Line	I-95	25,875	9,080	34,955	74	26
5357	Indian River County Line	CR 512	4000	0	4000	100	0
5358	Indian River County Line	SR 60	3,395	1,552	4,947	69	31
5359	Indian River County Line	SR 91	19,775	6,544	26,319	75	25
5360	Indian River County Line	US 441	1,456	1,034	2,490	58	42
5361	Polk County Line	CR 64	399	0	399	100	0
5362	Polk County Line	US 27	19,325	0	19,325	100	0
5363	Polk County Line	US 17	8,567	0	8,567	100	0
5364	Polk County Line	SR 37	2,286	0	2,286	100	0
5365	Polk County Line	CR 674	1,689	0	1,689	100	0
5366	Polk County Line	CR 540	6,171	0	6,171	100	0
5367	Polk County Line	CR 676	1,097	0	1,097	100	0
5368	Polk County Line	SR 50	16,431	0	16,431	100	0
5369	Polk County Line	OLD MUL	772	0	772	100	0
5370	Polk County Line	Medulla Rd	2,278	0	2,278	100	0
5371	Polk County Line	Fancy Farm Rd	82	0	82	100	0
5372	Polk County Line	Rice Rd	167	0	167	100	0
5373	Polk County Line	US 92	8,257	0	8,257	100	0
5374	Polk County Line	I-4	112,484	500	112,984	100	0
5375	Polk County Line	CR 582	5,324	0	5,324	100	0
5376	Polk County Line	Deeson Rd	7,073	0	7,073	100	0
5377	Polk County Line	US 98	7,933	0	7,933	100	0
5378	Hernando County Line	SR 50	5,094	182	5,276	97	3
5379	Hernando County Line	US 301	3,580	0	3,580	100	0
5380	Hernando County Line	I-75	22172	16132	38,304	58	42
5381	Hernando County Line	CR 476	2,583	0	2,583	100	0
5382	Citrus County Line	CR 48	4,750	0	4,750	100	0
5383	Citrus County Line	SR 44	8,791	0	8,791	100	0
5384	Citrus County Line	SR 200	13,132	1424	14,556	90	10
5385	Citrus County Line	US 41	18,337	1606	19,943	92	8
5386	Levy County Line	SR 40	1954	1134	3088	63	37
5387	Levy County Line	CR 336	1,111	562	1,673	66	34
5388	Levy County Line	US 41	2,842	1,356	4,198	68	32
5389	Levy County Line	SR 464	1,187	0	1,187	100	0
5390	Levy County Line	CR 326	1,384	0	1,384	100	0
5391	Levy County Line	US 27	4949	1033	5,982	83	17
5392	Levy County Line	CR 318	2,658	508	3,166	84	16
5393	Levy County Line	CR 320	406	0	406	100	0
5394	Alachua County Line	CR 329	1,148	37	1,185	97	3
5395	Alachua County Line	I-75	26,309	22993	49,302	53	47
5396	Alachua County Line	US 441	7,323	624	7,947	92	8
5397	Alachua County Line	US 301	6,194	5,038	11,232	55	45
5398	Putnam County Line	SR 21	617	438	1,055	58	42
5399	Putnam County Line	CR 315	1,304	438	1,742	75	25
5400	Putnam County Line	SR 19	2,149	142	2,291	94	6
5401	Putnam County Line	US 17	4,097	138	4,235	97	3
5402	Putnam County Line	SR 20	3,977	10	3,987	100	0
5403	St. Johns County Line	CR 13	3,081	0	3,081	100	0
5404	St. Johns County Line	I-95	43,285	8,569	51,854	83	17
5405	St. Johns County Line	US 1	9,721	1,552	11,273	86	14
5406	St. Johns County Line	A1A	2,984	0	2,984	100	0
<b>Total</b>			<b>491,912</b>	<b>84,696</b>	<b>576,608</b>	<b>85</b>	<b>15</b>





links (e.g. area type, facility type, capacities, traffic count, and speeds). A general overview of the CFRPM Version 6.0 Model network is described here.

### 5.1 Area Types and Facility Types

In CFRPM Version 6.0 as in CFRPM 5.0, “Area Types are one-digit codes used in the model to designate the type of adjacent land use development along a roadway or corridor.” As with CFRPM 5.0, version 6.0 includes a refinement to earlier versions which had the Area Types “hard coded” for each roadway link. The refined method is based on “activity density” for each TAZ (please refer to documentation for CFRPM Version 5.0 for further detail). Five Area Types are used in the Model. Table 5-1 summarizes the CFRPM v6.0 Area Types.

**Table 5-1**  
**CFRPM Version 6.0 Description of 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)

The Facility Types utilized by the CFRPM Version 6.0 are based on adopted FDOT facility classifications and local comprehensive plans and relate to facilities designated as freeways, arterials, collectors, and centroid connectors. **Table 5-2** summaries the different facility types employed by the CFRPM Model. The Version 6.0 model network is consistent with the latest version of the CFRPM Version 5.0 Model.

**Table 5-3** illustrates the number of links by Area Type and Facility Type. **Table 5-4** provides the Total System Miles by Facility Type and Area Type. **Table 5-5** provides the Total Lane Miles by Facility Type and Area Type.

### 5.2 Capacities

**Table 5-6** provides the Average Capacities for individual links according to Area Type and Facility Type. CFRPM Version 6.0 uses the capacity lookup tables that have been updated based on the FDOT 2009 Level of Service (LOS) Handbook provided by FDOT Central Office modeling staff. The speeds coded in the network are based on actual Posted Speeds for each facility.

### 5.3 Traffic Counts

A critical component to the model calibration and validation is the identification of base year traffic counts. One of the parameters for evaluating the model results is the model’s ability to reasonably replicate in-field traffic counts for the base year. Since the CFRPM Version 6.0 Model has a TOD component, a separate task was assigned to develop traffic counts by TOD Peak Periods. Specifically, electronic versions of the counts were obtained from the various area agencies in 15-minute format, and when necessary 1-hour or daily formats. TOD counts by direction were coded into the 2010 network for the AM, MD, PM, and NT periods. **Table 5-7** summarizes the TOD traffic count statistics (e.g. percentage of links with counts) for CFRPM version 6.0 Model. **Table 5-8** shows the Daily Percentages of Links with Counts.

**Table 5-2**  
**CFRPM Version 6.0 Description of Facility Types**

Facility Type	Description
<b>1X -- Freeways and Expressways</b>	
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
<b>2X -- Divided Arterials</b>	
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
<b>3X -- Undivided Arterials</b>	
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
<b>4X--Collectors</b>	
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
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
<b>5X -- Centroid Connectors</b>	
51	Basic Centroid Connector
52	External Station Centroid Connector
53	Dummy Zone Centroid Connector
54	Dummy Link for Dummy Centroid
<b>6X -- One-Way Facilities</b>	
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
<b>7X--Ramps</b>	
71	FreewayOn/OffRamp
72	Freeway On /Off Loop Ramp
73	OtherOn/OffRamp
74	Other On /Off Loop Ramp
75	Freeway-to-Freeway Ramp
<b>8X -- HOV Facilities</b>	
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	AllDayHOVRamp
<b>9X -- Toll Facilities</b>	
91	Toll Facility-- Florida Turnpike
92	Toll Facility -- SR 408
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

**Table 5-3**  
**CFRPM Version 6.0 Number of Links by Area Types and by 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	29	35	146	219	187	616
Divided Arterials	121	186	1,822	2,154	1,181	5,464
Undivided Arterials	102	78	478	1,048	1,040	2,746
Collectors	327	301	2,198	4,161	3,319	10,306
One-Way Facilities	89	32	64	145	63	393
Ramps	49	89	358	414	277	1,187
HOV Facilities	0	0	0	0	0	0
Toll Facilities	12	69	377	449	284	1,191
<b>Total</b>	<b>729</b>	<b>790</b>	<b>5,443</b>	<b>8,590</b>	<b>6,351</b>	<b>21,903</b>

**Table 5-4**  
**CFRPM Version 6.0 Total System Miles by Facility Type and Area Type**

System Miles by Facility Type and Area Type						
Facility Type	CBD	High Density	Medium Density	Low Density	Very Low Density	Total
Freeways and Expressways	30	29	118	225	293	694
Divided Arterials	28	52	492	615	476	1,663
Undivided Arterials	31	32	182	417	629	1,291
Collectors	88	92	720	1,502	1,658	4,060
One-Way Facilities	8	6	14	28	9	65
Ramps	7	25	95	109	57	293
HOV Facilities	0	0	0	0	0	0
Toll Facilities	6	19	148	232	245	651
<b>Total</b>	<b>196</b>	<b>255</b>	<b>1,769</b>	<b>3,129</b>	<b>3,367</b>	<b>8,716</b>

**Table 5-5**  
**CFRPM Version 6.0 Total Lane Miles by Facility Type and Area Type**

Lane Miles by Facility Type and Area Type						
Facility Type	CBD	High Density	Medium Density	Low Density	Very Low Density	Total
Freeways and Expressways	81	80	363	600	727	1,851
Divided Arterials	110	219	2,216	2,541	1,925	7,011
Undivided Arterials	71	76	416	908	1,319	2,790
Collectors	190	209	1,693	3,251	3,428	8,772
One-Way Facilities	23	14	32	58	16	143
Ramps	8	30	119	122	70	348
HOV Facilities	0	0	0	0	0	0
Toll Facilities	10	44	343	477	474	1,347
<b>Total</b>	<b>493</b>	<b>672</b>	<b>5,181</b>	<b>7,958</b>	<b>7,959</b>	<b>22,261</b>

**Table 5-6**  
**CFRPM Version 6.0 Highway Average 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)	2048	2048	2048	2048	1833	2005
12	Other Freeway (not in Group 1)	2048	2048	2048	2048	1833	2005
16	Controlled Access Expressways	2048	2048	2048	2048	1833	2005
17	Controlled Access Parkways	2048	2048	2048	2048	1833	2005
21	Divided Arterial Unsignalized (55 mph)	1788	1788	1788	1788	1560	1742
22	Divided Arterial Unsignalized (45 mph)	1788	1788	1788	1788	1560	1742
23	Divided Arterial Class I	968	968	968	968	795	933
24	Divided Arterial Class II	933	933	933	933	795	905
25	Divided Arterial Class III / IV	850	850	850	850	795	839
26	Divided Signalized Arterial with High Capacity	850	850	850	850	795	839
31	Undivided Arterial Unsignalized with Turn Bays	1703	1703	1703	1703	1480	1658
32	Undivided Arterial Class I with Turn Bays	920	920	920	920	1330	1002
33	Undivided Arterial Class II with Turn Bays	888	888	888	888	755	861
34	Undivided Arterial Class III/IV with Turn Bays	808	808	808	808	755	797
35	Undivided Arterial Unsignalized without Turn Bays	808	1345	1345	1345	1180	1205
36	Undivided Arterial Class I without Turn Bays	730	730	730	730	1060	796
37	Undivided Arterial Class II without Turn Bays	703	703	703	703	598	682
38	Undivided Arterial Class III/IV without Turn Bays	640	640	640	640	598	632
39	Undivided Signalized Arterial with High Capacity	640	640	640	640	598	632
41	Major Local Divided Roadway	768	838	838	838	1040	864
42	Major Local Undivided Roadway with Turn Bays	723	798	798	798	1040	831
43	Major Local Undivided Roadway without Turn Bays	555	608	608	608	1040	684
44	Other Local Divided Roadway	605	605	605	605	1040	692
45	Other Local Undivided Roadway with Turn Bays	575	575	575	575	1020	664
46	Other Local Divided Roadway without Turn Bays	458	458	458	458	1010	568
47	Low Speed Local Collector	458	458	458	458	1010	568
48	Very Low Speed Local Collector	458	458	458	458	1010	568
61	One-Way Facilities Unsignalized	770	1618	1618	1618	1348	1394
62	One-Way Facilities Class I	873	873	873	873	718	842
63	One-Way Facilities Class II	843	843	843	843	718	818
64	One-Way Facilities Class III / IV	770	770	770	770	718	760
66	Frontage Road Class I	873	873	873	873	718	842
68	Frontage Road Class III / IV	770	853	853	770	718	793
71	Freeway On /Off Ramp	1618	1618	1618	1618	1803	1655
72	Freeway On/Off Loop Ramp	770	843	873	843	1803	1026
73	Other On/Off Ramp	1618	1618	1618	1618	1803	1655
74	Other On/Off Loop Ramp	770	843	873	843	1803	1026
75	Freeway-to-Freeway Ramp	1618	1618	1618	1618	1803	1655
91	Toll Facility - Turnpike	2048	2048	2048	2048	1833	2005
92	Toll Facility - SR 408	2048	2048	2048	2048	1833	2005
93	Toll Facility - SR 417	2048	2048	2048	2048	1833	2005
94	Toll Facility - SR 429	1788	1788	1788	1788	1560	1742
95	Toll Facility - SR 528	1703	1703	1703	1703	1480	1658
96	Toll Facility - Osceola Parkway	1703	1703	1703	1703	1480	1658
97	Acceleration Lanes - Toll Facility	1618	1618	1618	1618	1803	1655
98	Deceleration Lanes -Toll Facility	1618	1618	1618	1618	1803	1655
<b>Average</b>		<b>1167</b>	<b>1206</b>	<b>1207</b>	<b>1204</b>	<b>1256</b>	<b>1208</b>

**Table 5-7**  
**CFRPM Version 6.0 Percentage of Links with TOD Counts**

TOD Percentage of Links with Counts						
Facility Type	CBD	High Density	Medium Density	Low Density	Very Low Density	Total
Freeway	51.70	28.60	29.50	33.80	27.30	<b>31.30</b>
Divided Arterial	20.70	25.80	34.10	27.60	19.70	<b>27.90</b>
Undivided Arterial	14.70	25.60	26.80	18.10	10.70	<b>16.90</b>
Collector	2.10	3.70	12.60	7.10	3.00	<b>6.70</b>
One Way Facilities	13.50	6.30	34.40	23.40	17.50	<b>20.60</b>
Ramps	16.30	16.90	15.60	12.30	10.80	<b>13.50</b>
Toll Facilities	8.30	10.10	15.90	15.40	9.90	<b>13.90</b>
<b>Average</b>	<b>11.40</b>	<b>14.30</b>	<b>22.20</b>	<b>15.30</b>	<b>8.90</b>	<b>15.00</b>

**Table 5-8**  
**CFRPM Version 6.0 Percentage of Links with Daily Counts**

24 HR Percentage of Links with Counts						
Facility Type	CBD	High Density	Medium Density	Low Density	Very Low Density	Total
Freeway	51.70	28.60	33.60	34.20	27.80	<b>32.60</b>
Divided Arterial	21.50	26.90	34.90	28.70	20.70	<b>28.80</b>
Undivided Arterial	19.60	30.80	28.70	21.50	15.30	<b>20.60</b>
Collector	2.40	4.30	16.70	10.20	5.20	<b>9.60</b>
One Way Facilities	14.60	6.30	35.90	24.80	20.60	<b>22.10</b>
Ramps	30.60	20.20	18.70	18.10	17.70	<b>18.90</b>
Toll Facilities	8.30	10.10	16.40	15.40	10.60	<b>14.20</b>
<b>Average</b>	<b>13.40</b>	<b>15.70</b>	<b>24.60</b>	<b>17.70</b>	<b>11.30</b>	<b>17.40</b>

## 5.4 Screenlines

The Screenlines are set to study the traffic patterns associated with traffic crossing a particular corridor and are usually located along major roadway facilities associated with the network. Cutlines, on the other hand, reflect a specific location where the travel patterns are reviewed for general reference. **Figure 5-1** illustrates the Screenlines and Cutlines utilized by the CFRPM 6.0 Model and are presented with respect to the link count locations (the original CFRPM Version 5.0 Model screenline and cutline figures are included in **Appendix A**). No adjustments have been made from the Version 5.0 Model in terms of the general location of screenlines/cutlines for CFRPM 6.0.

## 6.0 Model Distribution

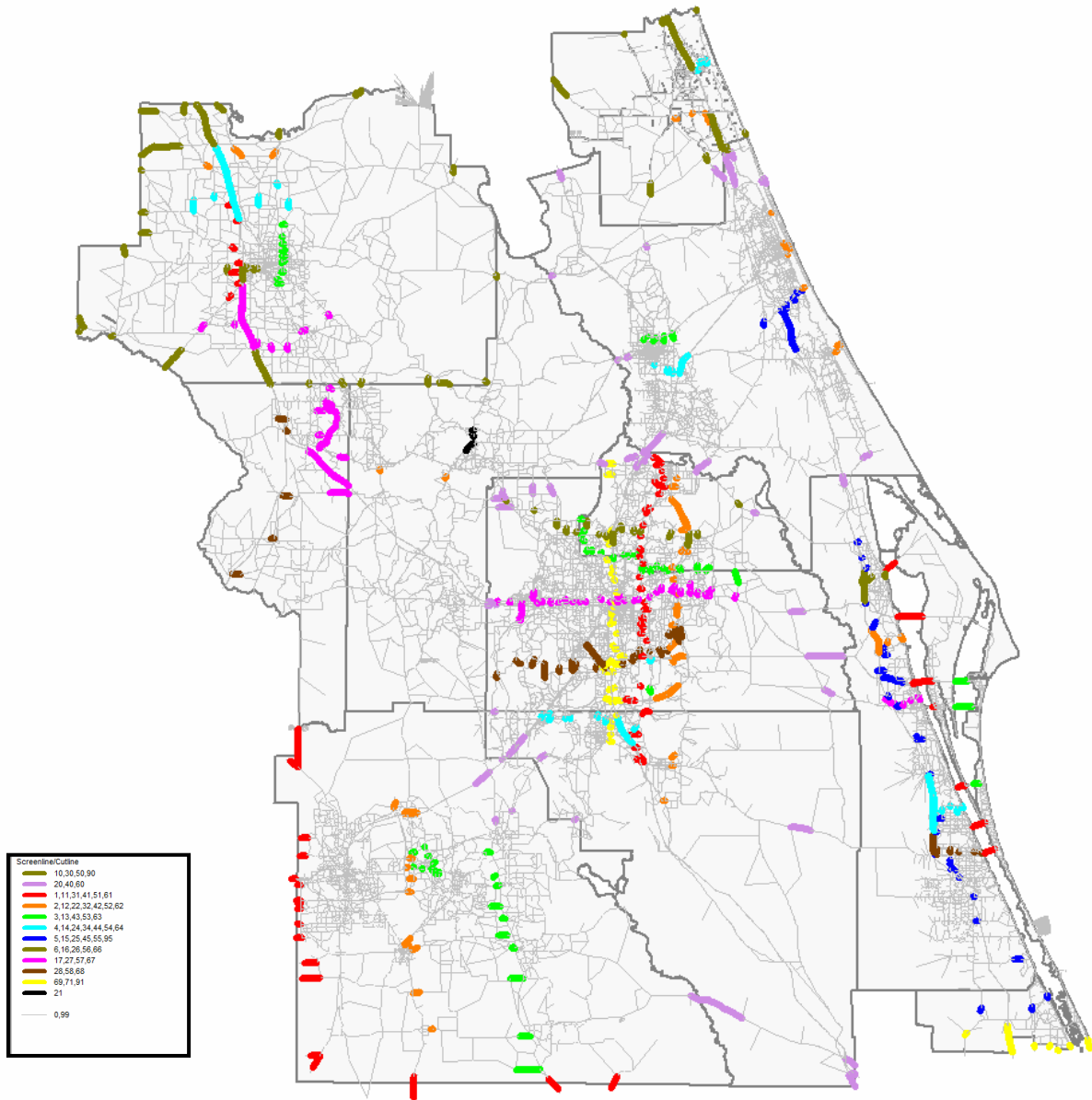
The following provides an overview of the Diurnal Factors, the Sub-Area Balancing, the Friction Factors, and the resulting average trip lengths associated with the CFRPM Version 6.0 Model.

### 6.1 Diurnal Factors

The Trip Distribution Module takes the trip productions and attractions generated in the Trip Generation Module and distributes the trips. For the CFRPM Version 5.5 TOD Model, the trip productions and attractions are based on Diurnal factors that serve to categorize daily trips into TOD period trips. For purposes of the trip distribution, the Diurnal-derived productions and attractions are initially distributed according to Peak and Off-Peak periods and do not distinguish between the individual time periods (e.g. AM, PM, MD, NT). The individual time period components of the Diurnal Factors are utilized during the Traffic Assignment Module.



Figure 5-1  
CFRPM Version 6.0 Screenline/Cutline Locations



**Table 6-1** summarizes the Diurnal Factors applied for each of the Purpose Types (HBW, HBNW, and NHB) according to Peak and Off-Peak Fractions (F\_PK, F\_OP) and individual period to corresponding Peak or Off-Peak Fractions (F\_AM, F\_MID, F\_PM, F\_NT), along with PA Factors for each TOD period (PA\_AMP, PA\_MID, PA\_PMP, PA\_NT). The trip purposes HBSHOP, HBSOSCREC, and HBO only need Peak and Off-Peak diurnal percentages because the factors for the HBNW (sum of three purposes) are used for the fractions and PA factors. The factors were derived from the 2008 National Household Travel Survey (NHTS) and take into account the travel characteristics reported by the surveyed households. The presented Original Diurnal Factors are the factors therefore derived directly from the NHTS survey. Minor refinements were made to the factors to ensure that the proper number of trips was distributed amongst the four time periods. This was achieved by comparing the ratio of the modeled traffic assignment to the observed traffic counts, in other words TOD model volume-to-count ratios, along with the TOD Vehicle-Mile-Traveled (VMT) volume-to-count ratios. The Final Validated Diurnal Factors represents the factors used by the CFRPM Version 6.0 TOD Model to achieve time-of-day trips.

Final Validated Diurnal Factors are also presented for Special Attractions, namely the Orlando Airport (MCO), the Orange County Convention Center (OCC), Universal Studios (UNI), SeaWorld (SEW), Disney (DIS), I-Drive (IDR), Kennedy Space Center (KSC), and Port Canaveral (PTC). The Diurnal Factors for the Special Attractions are based on data developed by HNTB for this project. The Special Attractions Diurnal Factors are used to designate the Special Attractions File from daily generations into TOD generations (see **Appendix B** for Special Attractions File).

Diurnal Factors for Taxi were set at 0.6 for F\_PK and at 0.4 for F\_OP. For EI trips, the factors were set at 0.45 for F\_PK and at 0.55 for F\_OP. LOV, HOV, LTRK, HTRK are used at the external stations to define Peak Period vehicle occupancy and truck traffic components.

## 6.2 Sub-Area Balancing

As CFRPM v 5.0, CFRPM Version 6.0 also utilizes Sub-Area Balancing for distribution of trips within the region. For HBW trips, the sub-areas are broken into the following four (4) subareas that are related to the HBW travel patterns of the region:

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

For the HBNW trips, the following five (5) subareas are applied:

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

During the development of the CFRPM v5.5 model, a detailed assessment of the sub-areas was performed by reviewing the 2008 NHTS travel logs. The longitude and latitude pairs for each the beginning and the end of each trip was converted into equivalent Origin and Destinations (e.g. Traffic Analysis Zones), with distinction for the number of NHTS-weighted trips corresponding with each trip. **Figure 6-1** illustrates the HBW travel pairs and **Figure 6-2** illustrates the HBNW travel pairs, with distinction for the number of NHTS-weighted trips

corresponding with each trip. Included in the figures are the Version 5.5 Sub-Area Balancing subareas that have been colored to distinguish between the different categories.

**Table 6-1  
CFRPM Version 6.0 Diurnal Factors**

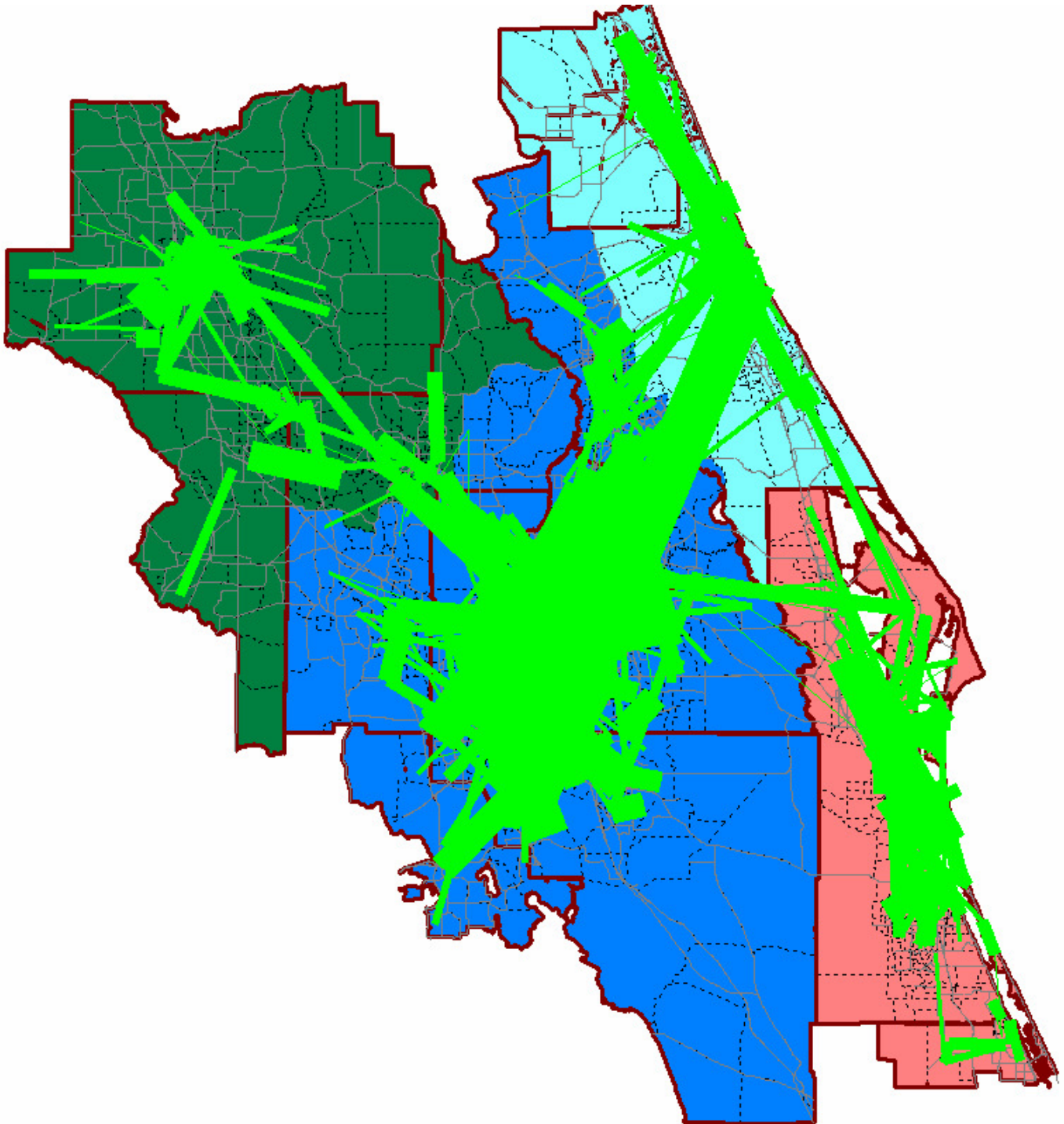
**Original 2008 NHTS Factors**

PURPOSE	PERIOD	F_PK	F_OP	F_AMP	F_MID	F_PMP	F_NT	PA_AMP	PA_MID	PA_PMP	PA_NT
HBW	PK			0.566		0.434		0.979		0.076	
HBW	OP				0.496		0.504		0.556		0.436
HBW	ALL	0.574	0.426								
HBNW	PK			0.375		0.625		0.754		0.407	
HBNW	OP				0.672		0.328		0.503		0.317
HBNW	ALL	0.370	0.630								
HBSH	ALL	0.297	0.703								
HBSR	ALL	0.291	0.709								
HBO	ALL	0.476	0.524								
NHB	PK			0.316		0.684		0.500		0.500	
NHB	OP				0.857		0.143		0.500		0.500
NHB	ALL	0.321	0.679								

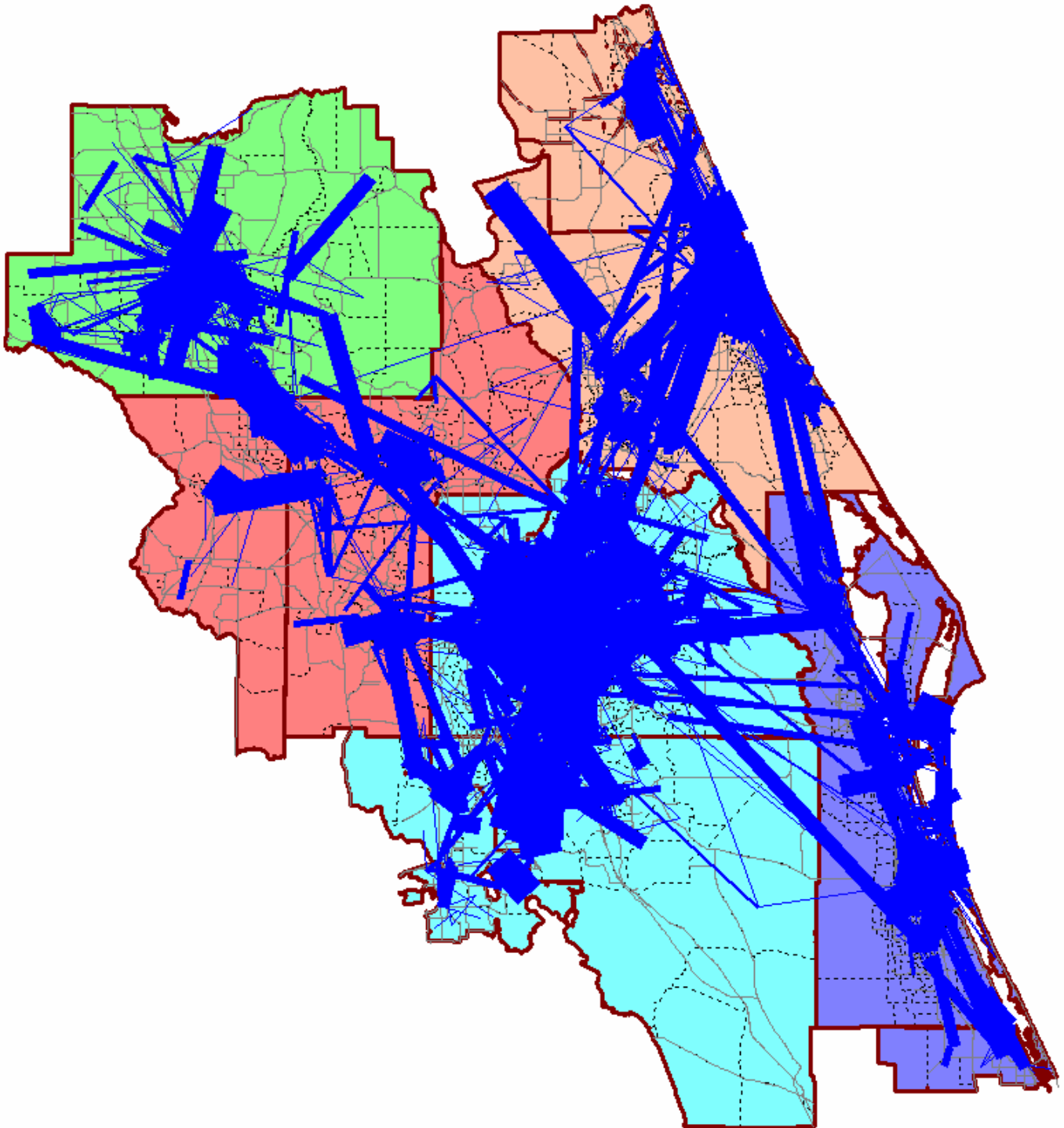
**Final Validated Diurnal Factors**

PURPOSE	PERIOD	F_PK	F_OP	F_AMP	F_MID	F_PMP	F_NT	PA_AMP	PA_MID	PA_PMP	PA_NT
HBW	PK			0.538		0.463		0.979		0.076	
HBW	OP				0.433		0.567		0.556		0.436
HBW	ALL	0.546	0.455								
HBNW	PK			0.357		0.644		0.754		0.407	
HBNW	OP				0.587		0.413		0.503		0.317
HBNW	ALL	0.352	0.649								
HBSH	ALL	0.282	0.718								
HBSR	ALL	0.277	0.724								
HBO	ALL	0.452	0.548								
NHB	PK			0.300		0.700		0.500		0.500	
NHB	OP				0.748		0.252		0.500		0.500
NHB	ALL	0.305	0.695								
Taxi	ALL	0.600	0.400								
EI	ALL	0.450	0.550								
SPEC	LOV			0.141	0.411	0.210	0.238	0.567	0.489	0.428	0.528
SPEC	HOV			0.141	0.411	0.210	0.238	0.567	0.489	0.428	0.528
SPEC	LTRK			0.172	0.466	0.191	0.172	0.567	0.489	0.428	0.528
SPEC	HTRK			0.140	0.441	0.147	0.272	0.567	0.489	0.428	0.528
MCO	ALL			0.111	0.463	0.221	0.205	0.500	0.500	0.500	0.500
OCC	ALL			0.048	0.608	0.206	0.138	0.500	0.500	0.500	0.500
UNI	ALL			0.077	0.483	0.281	0.158	0.500	0.500	0.500	0.500
SEW	ALL			0.056	0.482	0.273	0.189	0.500	0.500	0.500	0.500
DIS	ALL			0.110	0.456	0.255	0.179	0.500	0.500	0.500	0.500
IDR	ALL			0.300	0.200	0.300	0.200	0.500	0.500	0.500	0.500
KSC	ALL			0.000	0.612	0.384	0.004	0.500	0.500	0.500	0.500
PTC	ALL			0.022	0.808	0.141	0.029	0.500	0.500	0.500	0.500

Figure 6-1  
CFRPM Version 5.5 Review of HBW Sub-Area Balancing Using 2008 NHTS



**Figure 6-2**  
**CFRPM Version 5.5 Review of HBNW Sub-Area Balancing Using 2008 NHTS**





The figures show that the CFRPM Version 5.5 Sub-Area Balancing provides reasonable representation of the travel patterns within the region. The only area where a potential adjustment to the Sub-Area Balancing could be considered would be to include an additional eastern portion of Lake County with the HBW Orlando Urban Area grouping (e.g. Orange, Seminole, Osceola, South Lake, West Volusia, and Polk). No adjustment was made to the Sub-Areas, though, based on agreement by the Project Team.

### 6.3 Friction Factors

The model distribution step of the FSUTMS model chain is based on the gravity model. Essentially trip productions are balanced to trip attractions based on the weighted desirability of the attractions. Friction Factors are used in the gravity model to represent the effect of travel impedance. The 2008 NHTS travel data was reviewed for application to the CFRPM Version 5.5 TOD Model, as described below.

First Origin and Destination pairs were obtained by Trip Purpose from the NHTS data. Based on the NHTS Origin and Destination pairs, and their corresponding TAZ Production and Attractions, Friction Factor tables were developed by Trip Purpose and by Peak and Off-Peak periods. Separate Friction Factor curves were created for each for the six (6) Metropolitan Planning Organization's (MPOs) based Friction Factor sets contained in the original CFRPM Version 5.0 Model, as indicated below:

- Brevard and Indian River (previously BATS)
- Lake (previously LCTS)
- Marion (previously OATS)
- Orange, Osceola, Polk, and Seminole (previously OUATS)
- Sumter (previously CFRPM5.0 Sumter)
- Volusia and Flagler (previously VCATS)

The Friction Factor tables and corresponding curves obtained from the NHTS data is limited to 9,018 travel logs, which are then aggregated into the five (5) Trip Purposes (HBW, HBSHOP, HBSOCREC, HBO, and NHB) and into the two periods (Peak and Off-Peak). When combined with the six (6) MPO areas, there are in all 60 separate Friction Factor sets. The travel logs for the 60 sub-categories range from 5 to 584 entries, depending on the location and the individual Trip Purpose. Based on the NHTS trip purposes and trip locations, the AM Congested speed assignment was used to develop trip lengths for the Peak Origin and Destination pairs and the MD Free Flow speed assignment was used for the Off-Peak pairs. The model trip length were used because the NHTS responses were not deemed reliable. This is due to the fact that respondents do not always report accurate times and, in fact, tend to round off their trip lengths. Furthermore, terminal times are not being included in the NHTS travel survey times.

With the limited number of entries and the great variation in resulting trip lengths derived from the model for the Origin and Destination pairs, only 15 percent of the 60 Friction Factor curves could be accurately developed. In lieu of making manual adjustments to the other 85 percent, the reported NHTS trip lengths and their corresponding Peak-to-Off-Peak ratios were used, by Trip Purpose, to adjust the MPO based CFRPM Version 5.0 Friction Factors. In doing so, the original Friction Factors were established as the Off-Peak Friction Factors and the NHTS ratio of Peak-to-Off-Peak was applied to derive the Peak Friction Factors. **Table 6-2** presents the NHTS Peak-to-Off-Peak ratios, by MPO model area. The CFRPM Version 5.5 Peak and Off-Peak Friction Factor tables, along with the detailed NHTS trip length summations by MPO area and by Trip Purpose, are provided in **Appendix C**. The same friction factor files have been used for CFRPM 6.0.

**Table 6-2**  
**CFRPM Version 5.5 Referenced 2008 NHTS Trip Length Peak-to-Off-Peak Ratios**

PEAK	BATS	LAKE	MARION	OUATS	SUMTER	VCATS
HBW	21.5	31.8	17.8	30.1	39.5	23.7
HBSHOP	12.1	10.6	13.3	13.9	20.0	15.6
HBSOCREC	15.3	16.0	13.4	17.0	21.6	24.1
HBO	15.1	23.3	19.2	15.5	17.5	17.6
NHB	12.3	20.5	16.0	20.7	9.7	19.7

OFFPEAK	BATS	LAKE	MARION	OUATS	SUMTER	VCATS
HBW	18.0	26.3	19.9	26.7	21.3	22.9
HBSHOP	12.3	18.8	17.9	12.2	13.0	14.2
HBSOCREC	18.3	17.2	20.3	16.6	29.4	18.2
HBO	15.4	20.9	19.8	17.1	27.0	18.1
NHB	13.8	14.4	12.7	16.0	13.4	14.8

RATIO	BATS	LAKE	MARION	OUATS	SUMTER	VCATS
HBW	1.19	1.21	0.89	1.13	1.85	1.03
HBSHOP	0.98	0.56	0.74	1.14	1.54	1.10
HBSOCREC	0.84	0.93	0.66	1.02	0.73	1.32
HBO	0.98	1.11	0.97	0.91	0.65	0.97
NHB	0.89	1.42	1.26	1.29	0.72	1.33



## 6.4 Model Average Trip Lengths

Based on CFRPM Version 6.0 trip distribution, which uses the previously described input files as a basis for its gravity model balancing, average trip lengths were reported by the Model for each Trip Purpose. The trip lengths by Trip Purpose are presented in **Tables 6-3** and **6-4** for each the Off-Peak (Average Free Flow speeds) and the Peak (Congested speeds).

## 7.0 Highway Assignment

The results of the calibration and validation of the Model is herein presented in relation to the highway assignment statistics.

### 7.1 Validation Assignment Files

The VFACTOR and Capacity Factor files utilized by the Model are described along with their relationship to the Model's traffic assignment.

#### 7.1.1 VFACTORS File

The CFRPM Version 5.0 VFACTORS file was used as the basis for the development of a refined VFACTORS file for CFRPM 5.5 while taking into consideration observations made for the travel corridors (e.g. observed traffic speeds and volumes). The VFACTORS file is comprised of UROAD factors, BPR coefficients, and BPR exponents that are used by the model to relate volumes to delays for each of the model facility types based on a curvilinear relationship associated with the three components (e.g. BPR curves). The following illustrates the BPR curve equation:

$$S = S_f / ( 1 + \alpha ( V / C )^\beta )$$

Where:

**S** is observed speed

**S<sub>f</sub>** is model free-flow speed

**α, β** are the coefficient and exponential parameters of the BPR curve

**C** is model capacity

**V** is observed traffic volume

As an overview, for CFRPM Version 5.5, the free-flow speed is based on a calculated equation that uses posted speeds and facility types. The model capacity is based on a look-up table, which references facility type and area type. Other components are derived based on the in-field observed data and the results of fitting the BPR curves based on the adjustment of the alpha and beta parameters. The final CFRPM 5.5 VFACTORS file was used for CFRPM 6.0.

**Table 6-3**  
**CFRPM Version 6.0 Off-Peak Average Length by Trip Purpose**

Trip Purpose	Total Trips	Trip-Minutes	Average Minutes	Trip-Miles	Average Miles
HBW	2,293,252	47,875,568	20.88	29,475,784	12.85
HBSH	1,456,719	22,847,901	15.68	13,496,561	9.27
HBSR	1,376,295	27,425,011	19.93	16,975,982	12.34
HBO	3,523,399	57,968,766	16.45	33,554,791	9.52
NHB	4,457,355	69,452,608	15.58	38,941,250	8.74
LTK	1,313,458	19,094,756	14.54	10,521,874	8.01
HTK	300,381	4,247,641	14.14	2,344,858	7.81
TAXI	14,582	209,371	14.36	113,788	7.80
IE	479,686	14,373,453	29.96	10,730,464	22.37

**Table 6-4**  
**CFRPM Version 6.0 Peak Average Trip Length by Trip Purpose**

Trip Purpose	Total Trips	Trip-Minutes	Average Minutes	Trip-Miles	Average Miles
HBW	2,293,252	66,053,517	28.80	31,376,158	13.68
HBSH	1,456,719	30,632,488	21.03	14,089,649	9.67
HBSR	1,376,295	38,177,560	27.74	18,185,659	13.21
HBO	3,523,399	76,214,003	21.63	34,993,990	9.93
NHB	4,457,355	94,247,916	21.14	41,078,060	9.22
LTK	1,313,458	25,314,110	19.27	11,062,457	8.42
HTK	300,381	5,667,444	18.87	2,451,779	8.16
TAXI	14,582	279,790	19.19	119,902	8.22
IE	479,686	16,060,732	33.48	10,896,036	22.72

The CFRPM Version 6.0 VFACTORS file (same as the CFRPM 5.5 version) is provided in **Table 7-1** and includes highlights for those facility types that were modified. Notably, the freeway Facility Types 11 and 12 were based on data gathered for the I-4 corridor. Since the travel speeds and travel volumes were not collected at the same time, a best fit was made using the data, which was available.

#### ***UROAD Factors***

The UROAD factor component of the BPR curves is used to convert the “possible” capacity (LOS E) to a “practical” capacity (LOS C). Essentially, the volume-to-delay relationship and the UROAD factors work together. LOS C is used for the CFRPM Version 5.5 Model due to the fact that the Orlando Urban area and other areas of the region are not saturated in terms of capacity. The CFRPM uses factors ranging from 0.51 to 1.00 depending on the facility type. The same UROAD factors have been used for CFRPM 6.0.

#### ***CONFAC Factors***

The CONFAC factors are the adjustments used during the BPR curve development to convert hourly model capacities to daily model capacities. The CFRPM Version 5.5 Model uses factors of 0.09 for Facility Types 11 and 12 and 0.10 for remaining facility types, and are consistent with the Version 5.0 Model. The same CONFAC factors have been used for CFRPM 6.0.

#### ***BPR Coefficients and Exponents***

The BPR Coefficient represents the alpha value of the BPR curve and the BPR Exponent represents the beta value. The final BPR curve is achieved by adjusting these parameters until a fit is obtained for the curve in comparison to the corresponding data points for congested to uncongested speed and volume to capacity. **Table 7-1** includes the individual facility type BPR Coefficient and Exponent values. The same BPR coefficients and exponents have been used for CFRPM 6.0.

#### **7.1.2 Capacity Factors**

Traditionally, Capacity factors are contained in the FSUTMS Model to convert hourly model capacities into daily capacities. For purposes of this TOD Model, the Capacity factors represent the proportioning of the peak hour capacities to capacities associated with each individual Peak Period (e.g. AM, MD, PM, and NT). For the CFRPM Version 5.5 Model and also used for CFRPM 6.0, the capacity factors are named respectively the AMCAPFAC, MDCAPFAC, PMCAPFAC, and NTCAPFAC factors and are included in the “Key” area of CUBE/Voyager catalog. **Table 7-2** presents the Model TOD Capacity Factors.

**Table 7-1**  
**CFRPM Version 6.0 Adjusted VFACTOR File**

Facility Type	UROAD Factor	CONFAC Factor	BPR Coefficient	BPR Exponent	Facility Type	UROAD Factor	CONFAC Factor	BPR Coefficient	BPR Exponent
10	0.68000	0.10000	0.15000	6.50000	55	1.00000	0.10000	0.15000	4.50000
11	0.68000	0.09000	0.75000	8.50000	56	1.00000	0.10000	0.15000	4.50000
12	0.68000	0.09000	0.75000	8.50000	57	1.00000	0.10000	0.15000	4.50000
13	1.00000	0.10000	0.15000	6.50000	58	1.00000	0.10000	0.15000	4.50000
14	1.00000	0.10000	0.15000	6.50000	59	1.00000	0.10000	0.15000	4.50000
15	0.68000	0.10000	0.15000	6.50000	60	0.96000	0.10000	0.15000	4.50000
16	0.68000	0.10000	0.15000	6.50000	61	0.68000	0.10000	0.15000	4.50000
17	0.68000	0.10000	0.15000	6.50000	62	0.81000	0.10000	0.15000	4.50000
18	1.00000	0.10000	0.15000	6.50000	63	0.95000	0.10000	0.15000	4.50000
19	0.68000	0.10000	0.15000	6.50000	64	0.96000	0.10000	0.15000	4.50000
20	0.92000	0.10000	0.15000	5.50000	65	0.68000	0.10000	0.15000	4.50000
21	0.73000	0.10000	0.15000	8.50000	66	0.81000	0.10000	0.15000	4.50000
22	0.73000	0.10000	0.75000	4.50000	67	0.95000	0.10000	0.15000	4.50000
23	0.81000	0.10000	0.75000	4.50000	68	0.96000	0.10000	0.15000	4.50000
24	0.95000	0.10000	0.75000	4.50000	69	1.00000	0.10000	0.15000	4.50000
25	0.96000	0.10000	0.15000	8.50000	70	0.68000	0.10000	0.15000	6.50000
26	0.81000	0.10000	0.15000	8.50000	71	0.51000	0.10000	0.15000	6.50000
27	1.00000	0.10000	0.15000	5.50000	72	0.92000	0.10000	0.15000	6.50000
28	1.00000	0.10000	0.15000	5.50000	73	0.51000	0.10000	0.15000	6.50000
29	1.00000	0.10000	0.15000	5.50000	74	0.92000	0.10000	0.15000	6.50000
30	0.92000	0.10000	0.15000	4.50000	75	0.68000	0.09000	0.15000	6.50000
31	0.68000	0.10000	0.15000	8.50000	76	0.92000	0.10000	0.15000	6.50000
32	0.81000	0.10000	0.15000	8.50000	77	0.51000	0.10000	0.15000	6.50000
33	0.95000	0.10000	0.75000	4.50000	78	0.92000	0.10000	0.15000	6.50000
34	0.88000	0.10000	0.15000	4.50000	79	0.68000	0.09000	0.15000	6.50000
35	0.68000	0.10000	0.15000	4.50000	80	0.68000	0.10000	0.30000	8.50000
36	0.81000	0.10000	0.75000	4.50000	81	0.68000	0.10000	0.30000	8.50000
37	0.95000	0.10000	0.15000	4.50000	82	0.68000	0.10000	0.30000	8.50000
38	0.96000	0.10000	0.15000	4.50000	83	0.68000	0.10000	0.30000	8.50000
39	0.81000	0.10000	0.15000	4.50000	84	0.68000	0.10000	0.30000	8.50000
40	0.86000	0.10000	0.15000	4.50000	85	0.68000	0.10000	0.30000	8.50000
41	0.92000	0.10000	0.15000	8.50000	86	0.68000	0.10000	0.30000	8.50000
42	0.92000	0.10000	0.75000	8.50000	87	0.68000	0.10000	0.30000	8.50000
43	0.92000	0.10000	0.15000	8.50000	88	0.68000	0.10000	0.30000	8.50000
44	0.86000	0.10000	0.15000	4.50000	89	0.68000	0.10000	0.30000	8.50000
45	0.86000	0.10000	0.15000	4.50000	90	0.68000	0.10000	0.15000	6.50000
46	0.86000	0.10000	0.75000	4.50000	91	0.75000	0.10000	0.15000	3.00000
47	0.86000	0.10000	0.15000	4.50000	92	0.68000	0.09000	0.15000	6.50000
48	0.86000	0.10000	0.15000	4.50000	93	0.68000	0.09000	0.15000	6.50000
49	1.00000	0.10000	0.15000	4.50000	94	0.68000	0.09000	0.15000	6.50000
50	1.00000	0.10000	0.15000	4.50000	95	0.68000	0.09000	0.15000	6.50000
51	1.00000	0.10000	0.15000	4.50000	96	0.68000	0.10000	0.15000	5.50000
52	1.00000	0.10000	0.15000	4.50000	97	0.51000	0.10000	0.15000	6.50000
53	1.00000	0.10000	0.15000	4.50000	98	0.51000	0.10000	0.15000	6.50000
54	1.00000	0.10000	0.15000	4.50000	99	1.00000	0.10000	0.15000	6.50000

Modified for v5.5.

**Table 7-2**  
**CFRPM Version 6.0 Hourly-to-TOD Capacity Factors**

Catalog Key Name	Factor
AMCAPFAC	2.5
MDCAPFAC	6.0
PMCAPFAC	3.0
NTCAPFAC	10.0

## 7.2 General Validation Results

FDOT has established guidelines to be achieved for daily model highway assignments. The Traffic Assignment Accuracy Levels are defined in **Table 7-3** and serve as the general guidelines for evaluating the CFRPM Version 6.0 Model, with specific model standards having been developed for the TOD period evaluations.

**Table 7-3**  
**FDOT Traditional Daily Traffic Assignment Accuracy Levels**

Validation Check	Scale of Computation	Level of Accuracy
Assigned VMT/Count VMT	Area	± 5%
Assigned VHT/Count VHT	Area	± 5%
Volume-Count Ratio	Screenlines	± 10% (> 50,000 VPD) ± 20% (< 50,000 VPD)
Volume-Count Ratio	Cutlines	± 10% (> 50,000 VPD) ± 20% (< 50,000 VPD)
Assigned VMT/Count VMT	Facility Type, Area Type, No. of Lanes	± 15% (> 100,000 VPD) ± 25% (< 100,000 VPD)
Assigned VHT/Count VHT	Facility Type, Area Type, No. of Lanes	± 15% (> 20,000 VPD) ± 25% (< 20,000 VPD)
Percent Root Mean Square Error	Area	35% - 50%
Percent Root Mean Square Error	Link Volume Groups	± 10% (> 50,000 VPD) ± 20% (< 50,000 VPD)

### 7.2.1 Systemwide Statistics

Systemwide model statistics are reflected in the HASSIGN.RPT output file for the model assignment. Included in the statistics are information on links and corresponding mileage, Vehicle-Miles-Traveled (VMT) and Vehicle-Hours-Traveled (VHT), and average speeds. **Table 7-4** summarizes the overall systemwide statistics for the Daily model. The key items in the table are the VMT and VHT, which are 1.03 and 1.04, respectively. These are well within the +/- 5% requirement at the systemwide level.

Systemwide model statistics for each of the eleven (11) counties contained within the CFRPM 6.0 network are presented in **Table 7-5**. As indicated in **Table 7-5**, all of the counties meet the overall area standards for %RMSE. They range from a low of 29.07 (Flagler) to high of 38.35 (Volusia), well within the 35-50% standard previously shown in **Table 7-3**. Individual County ratios for VMT and VHT are within +/- 10 percent. For Volume-to-Count ratios, again all of the County ratios are within +/- 10%.

**Table 7-4**  
**CFRPM Version 6.0 Overall Systemwide Daily Model Statistics**

Measurement	Values Measured
	Daily
TOTAL_NUMBER OF LINKS	21,903
TOTAL SYSTEM MILES	8,716.43
TOTAL LANE MILES	22,262.51
TOTAL DIRECTIONAL MILES	15,687.42
TOTAL VMT USING VOLUMES (LINKS WITH COUNTS)	45,487,935
TOTAL VMT USING COUNTS (LINKS WITH COUNTS)	44,370,976
TOTAL VMT V/C (LINKS WITH COUNTS)	1.03
TOTAL VHT USING VOLUMES (LINKS WITH COUNTS)	1,244,293
TOTAL VHT USING COUNTS (LINKS WITH COUNTS)	1,198,295
TOTAL VHT V/C (LINKS WITH COUNTS)	1.04
TOTAL VOLUMES ALL LINKS	287,402,573
AVERAGE TOTAL VOLUME	13,121.61
TOTAL VMT ALL LINKS	110,051,268
TOTAL VHT ALL LINKS	3,060,509
TOTAL ORIGINAL SPEED (MPH)	39.70
TOTAL CONGESTED SPEED (MPH)	36.50

**Table 7-5**  
**CFRPM Version 6.0 Systemwide Daily Model Statistics by County**

Description	Seminole	Orange	Osceola	Lake	Volusia	Brevard	Marion	Sumter	Flagler	Polk	Indian River	CFRPM Total
Total Number of Links	1,204	4,896	1,231	1,293	3,404	2,485	1,705	536	425	4477	247	<b>21,903</b>
Total System Miles	431	1,628	692	681	1,136	991	1,008	368	284	1395	103	<b>8,716</b>
Total Lane Miles	1,241	4,640	1,686	1,621	2,810	2,610	2,445	836	702	3439	234	<b>22,263</b>
VMT Using Volumes (000s)	4,219	14,889	2,672	2,024	5,140	7,007	3,158	1,788	1,298	3071	216	<b>45,487</b>
VMT Using Counts (000s)	4,088	14,006	2,465	1,881	5,044	7,333	3,183	1,854	1,385	2,915	211	<b>44,370</b>
Total VMT Ratio	1.03	1.06	1.08	1.08	1.02	0.96	0.99	0.96	0.94	1.05	1.02	<b>1.03</b>
VHT Using Volumes (000s)	128	493	104	55	129	153	61	29	21	62	4	<b>1,244</b>
VHT Using Counts (000s)	125	453	95	51	127	165	62	31	23	59	4	<b>1,198</b>
Total VHT Ratio	1.02	1.09	1.10	1.07	1.02	0.93	0.98	0.96	0.95	1.05	1.05	<b>1.04</b>
Original Speed (MPH)	39.77	40.17	41.89	41.18	37.27	39.44	40.60	41.97	46.53	39.00	42.15	<b>39.75</b>
Congested Speed (MPH)	34.52	33.61	36.29	37.69	35.67	37.94	39.10	41.21	45.14	37.44	40.34	<b>36.56</b>
Volume / Count Ratio	1.08	1.10	1.05	1.06	0.99	0.90	0.94	0.92	1.02	1.02	1.00	<b>1.03</b>
Percent RMSE	32.67	34.42	34.41	31.72	38.35	31.50	33.53	31.92	29.07	33.75	36.03	<b>34.72</b>

### 7.2.2 VMT and VHT by Area Type and Facility Type

For Vehicle Miles of travel (VMT) and Vehicle Hours of Travel (VHT) results, a summation by Area Type and by Facility Type has also been prepared. The VMT and VHT serve as useful measures for reviewing fuel consumption and is traditionally reported for travel demand forecasting models. **Tables 7-6** and **7-7** indicate the CFRPM Version 6.0 Daily model results for VMT and VHT, respectively.

## 7.3 Count Validation Results

The count validation results are provided relative to the model links, screenlines, and percent Root Mean Squared Error (RMSE).

### 7.3.1 Link Volume-to-Observed Count Ratios

In addition to systemwide statistics, detailed Model Volume-to-Observed Count ratios are calculated by Facility Type and Area Type. **Table 7-8** provides the Volumes-to-Count ratios for the Daily and 24-hour total (addition of four time periods). As indicated in the table, all but the High Density Area Type meet the volume-to-count ratio standard of plus or minus 10 percent for the Daily and 24HR model assignments.

Based on the Technical Memorandum “Model Calibration and Validation Performance Measures and Standards” literature review, the model statistics compare relatively to other TOD models which document volume-to-count ratios for TOD periods. The comparison to the Southeast Regional Planning Model (SERPM) Version 6.5<sup>3</sup>, Memphis<sup>4</sup>, and the Sacramento<sup>5</sup> TOD model results are provided in **Table 7-9**. CFRPM Version 6.0, along with SERPM Version 6.5, provides the best volume-to-count ratio statistic comparisons. Memphis also achieves reasonable volume results for all TOD periods with all periods less than nine (9) percent different from the traffic counts. Sacramento emphasizes the validation to its AM and PM peak periods.

### 7.3.2 Screenline Volume-to-Observed Count Ratios

Volume-to-Count ratios are also reported for Screenlines and Cutlines within the CFRPM 6.0 network. The FDOT daily standards for Screenlines and Cutlines are plus or minus 10 percent for over 50,000 vehicles per day and plus or minus 20 percent for less than 50,000 vehicles per day, as previously shown in **Table 7-3**. As shown in **Table 7-10**, the FDOT daily standard is achieved for a majority of the locations. Only 14 of the 42 Screenlines/Cutlines do not meet the daily standard. The overall V/C ratio for all screenlines is 1.03 and the system total V/C ratio is 1.03 for all links with counts.



**Table 7-6**  
**CFRPM Version 6.0 Total Vehicle Miles Traveled (VMT) for Daily Model**

Daily Total Vehicle Miles Traveled (VMT)						
Facility Type	CBD	High Density	Medium Density	Low Density	Very Low Density	Total
Freeways	864,709	1,179,227	4,914,541	6,406,520	7,876,600	<b>21,241,596</b>
Divided Arterials	557,402	1,507,751	15,482,668	14,199,065	9,323,486	<b>41,070,372</b>
Undivided Arterials	324,264	270,753	2,191,205	4,455,073	6,253,477	<b>13,494,773</b>
Collectors	374,775	613,164	5,856,933	7,414,841	5,947,416	<b>20,207,129</b>
One-Way Facilities	151,280	72,828	248,593	345,448	55,897	<b>874,046</b>
Ramps	66,123	244,865	671,059	570,116	319,632	<b>1,871,795</b>
Toll Facilities	59,827	358,148	3,342,322	4,197,495	3,333,764	<b>11,291,556</b>
<b>Total</b>	<b>2,398,379</b>	<b>4,246,736</b>	<b>32,707,322</b>	<b>37,588,559</b>	<b>33,110,271</b>	<b>110,051,268</b>

**Table 7-7**  
**CFRPM Version 6.0 Total Vehicle Hours Traveled (VMT) for Daily Model**

Daily Total Vehicle Hours Traveled (VHT)						
Facility Type	CBD	High Density	Medium Density	Low Density	Very Low Density	Total
Freeways	22,240	40,106	137,721	131,446	159,107	<b>490,620</b>
Divided Arterials	16,196	64,581	553,128	401,958	226,242	<b>1,262,104</b>
Undivided Arterials	9,835	8,296	62,685	116,095	138,512	<b>335,423</b>
Collectors	13,050	21,812	215,209	270,540	161,141	<b>681,752</b>
One-Way Facilities	6,354	2,637	11,832	11,575	1,664	<b>34,062</b>
Ramps	2,857	11,585	27,656	21,438	10,879	<b>74,417</b>
Toll Facilities	1,000	7,486	53,993	69,859	49,794	<b>182,132</b>
<b>Total</b>	<b>71,532</b>	<b>156,503</b>	<b>1,062,224</b>	<b>1,022,912</b>	<b>747,338</b>	<b>3,060,509</b>

**Table 7-8**  
**CFRPM Version 6.0 Daily Volume-to-Count Ratios**

Daily Volume to Count Ratios for Links with Counts						
Facility Type	CBD	High Density	Medium Density	Low Density	Very Low Density	Total
Freeways	0.88	0.94	0.96	0.98	1.02	<b>0.97</b>
Divided Arterials	1.04	1.20	1.07	0.98	0.95	<b>1.03</b>
Undivided Arterials	1.07	1.07	1.11	1.01	1.24	<b>1.10</b>
Collectors	0.76	1.38	1.15	0.95	1.02	<b>1.05</b>
One-Way Facilities	1.65	2.30	1.53	1.00	0.81	<b>1.21</b>
Ramps	1.34	1.15	1.00	1.05	1.23	<b>1.09</b>
Toll Facilities	0.88	1.00	0.96	1.02	1.00	<b>0.99</b>
<b>Total</b>	<b>1.03</b>	<b>1.13</b>	<b>1.07</b>	<b>0.98</b>	<b>1.02</b>	<b>1.03</b>

24HR Volume to Count Ratios for Links with Counts						
Facility Type	CBD	High Density	Medium Density	Low Density	Very Low Density	Total
Freeways	1.25	1.23	1.21	1.12	1.11	<b>1.17</b>
Divided Arterials	1.12	1.27	1.10	0.98	1.04	<b>1.06</b>
Undivided Arterials	1.04	0.98	1.03	0.98	1.14	<b>1.03</b>
Collectors	0.60	1.95	1.03	0.94	0.98	<b>0.99</b>
One-Way Facilities	1.18	1.73	1.53	0.96	0.72	<b>1.11</b>
Ramps	1.55	1.40	1.20	1.19	1.22	<b>1.24</b>
Toll Facilities	1.05	1.15	1.01	1.01	1.01	<b>1.02</b>
<b>Total</b>	<b>1.17</b>	<b>1.26</b>	<b>1.09</b>	<b>0.99</b>	<b>1.06</b>	<b>1.06</b>

**Table 7-9**  
**Comparison to Other TOD Model Volume-to-Count Ratios (by TOD Period)**

MODEL	AM	PM	MD	NT	Daily 24-Hour
CFRPM 6.0	1.06	1.01	1.07	1.08	1.04
CFRPM 5.5	0.98	0.94	1.00	1.00	0.98
SERPM 6.5	1.01	1.01	1.00		1.00
Memphis, Tennessee	1.09	1.05	0.93	0.94	0.99
Sacramento, California	1.03	1.01	0.88	0.78	0.92

**Table 7-10**  
**CFRPM Version 6.0 Daily Model Screenline/Cutlines Volume-to-Count Ratios**

Daily					
Screenline Number	Number of Links	Estimated Volume	Count	V/C Ratio	
1	32	198,708	199,090	1.00	
2	12	179,875	164,300	1.09	
3	7	82,209	68,683	1.20	
4	3	80,968	93,403	0.87	
10	28	131,319	129,940	1.01	
11	10	91,271	101,948	0.90	
12	4	21,541	19,076	1.13	
13	10	100,125	118,256	0.85	
14	4	83,786	78,322	1.07	
16	4	97,226	97,940	0.99	
17	10	145,333	163,638	0.89	
20	6	147,044	171,700	0.86	
21	6	30,524	31,624	0.97	
22	2	39,892	35,430	1.13	
27	20	146,948	149,758	0.98	
28	4	13,474	15,120	0.89	
30	12	132,521	134,958	0.98	
32	8	35,262	33,474	1.05	
40	18	317,641	281,104	1.13	
42	16	171,965	165,180	1.04	
43	6	45,221	47,888	0.94	
44	4	93,652	90,376	1.04	
45	12	114,537	120,828	0.95	
51	16	205,752	227,810	0.90	
52	2	50,202	45,500	1.10	
53	6	77,017	89,402	0.86	
54	10	140,701	144,670	0.97	
55	46	432,371	430,770	1.00	
56	7	86,018	104,695	0.82	
57	8	94,682	113,478	0.83	
58	14	195,698	197,774	0.99	
60	42	600,888	550,566	1.09	
61	44	722,617	719,810	1.00	
62	36	566,716	580,972	0.98	
63	38	686,921	596,682	1.15	
64	12	214,990	182,242	1.18	
66	34	472,025	456,648	1.03	
67	62	880,550	896,300	0.98	
68	40	893,215	806,370	1.11	
69	55	1,014,112	982,992	1.03	
71	12	67,023	66,250	1.01	
95	4	31,199	31,660	0.99	
98	1,170	11,701,493	11,303,059	1.04	
<b>Screenline Totals</b>	<b>1,896</b>	<b>21,635,233</b>	<b>21,039,686</b>	<b>1.03</b>	
99	5,011	57,798,618	55,871,764	1.03	
<b>System Totals</b>	<b>6,907</b>	<b>79,433,851</b>	<b>76,911,450</b>	<b>1.03</b>	

### 7.3.3 Modeled-to-Observed Percent RMSE

Florida adheres to a set of percent RMSE standards for daily model validations, as demonstrated in **Table 7-11**. The standards are based on traffic count ranges from 1 to 500,000 daily volumes. For the count range from 1 to 5,000 daily volumes, no distinction is provided for lower count groups. Since the TOD period counts represent a component of the daily traffic counts, a significant number of the CFRPM Version 6.0 observed peak period traffic counts exist within this lower count range and therefore require guidelines that are more refined.

As documented in the Technical Memorandum “Model Calibration and Validation Performance Measures and Standards,” a set of RMSE guidelines for the TOD Peak Period assignments was established as referenced in **Table 7-12**. The TOD RMSE guidelines were refined to seven (7) individual lower count groups, as compared to the FDOT eleven (11) daily count groups, and were based on a general assessment of the “Add A Lane/Drop A Lane” premise associated with the accuracy level of traditional travel demand forecasts. A RMSE range for the overall TOD assignment was also prepared and represents a range of 42 to 90 Percent RMSE. In addition to the individual TOD periods, an overall %RMSE standard for the combined daily TOD assignment is established as being between 35 and 50, as documented in the technical memorandum. The reason for a different standard for the daily TOD assignment, as compared to the FDOT standard for non-TOD daily models, is the fact that the combined daily TOD assignment includes the various TOD period assignments. Specifically, the NT period assignment does not provide for adequate number of iterations to adjust for individual network routes and thus provides a less accurate assignment; especially as it relates to I-4. Therefore, it would be unrealistic to achieve a combined daily TOD assignment which could be compared directly to a daily only assignment (e.g. without TOD components). Finally, it should be noted that the presented %RMSE guidelines have not been designed to account for specific variations in individual peak period lengths (e.g. 2.5, 3, 6.5, and 12 hours for the AM, PM, MD, and NT periods, respectively), beyond the referenced higher Percent RMSEs for lower count groups and the overall TOD Peak period RMSE higher range. Potentially, separate Percent RMSE guidelines could exist for each TOD period. A similar set of guidelines was prepared for traffic assignment of Trucks in the “Central Florida Regional Planning Model Version 5.0 with Truck Component” Technical Memorandum “Model Calibration and Validation (Final) dated March 29, 2013, by Leftwich Consulting Engineers, Inc. for FDOT District Five<sup>9</sup>. **Table 7-13** shows the Guidelines derived for Truck %RMSE.

**Table 7-13** presents the CFRPM 6.0 Daily model (e.g. LOV, HOV, Light Truck, and Heavy Truck trip purposes) validation Percent RMSE statistics. The count ranges used are the same as those presented in **Table 7-11** with the FDOT Standards. As indicated, the individual count ranges for volume groups 3 through 10 are within the allowed %RMSE range. For Volume groups 1 and 2, the lowest count ranges, the Model %RMSE is 75.06% (allowed range is 45-55%) and 49.15% (allowed range is 35-45%), respectively. For Volume Group 11, the highest count range in the model, the %RMSE is 18.38% (allowed range is 14-15%). The overall %RMSE is 34.72%, well within the allowed range of 32-39%. The Daily model meets the guideline for model volume-to-count ratio with 1.03 (accepted range is 0.95 to 1.05).

In addition to %RMSE statistics for all vehicles, the CFRPM Version 6.0 Model's Truck Component (e.g. Light and Heavy Truck Purposes) statistics are presented in **Table 7-15**. These statistics are based on comparisons of truck volumes (Light and Heavy truck purposes combined into one) against Truck Counts (total truck count). As indicated in **Table 7-15**, the validated CFRPM Version 6.0 Model statistics for Trucks are well within the allowed ranges presented in **Table 7-13**.

**Table 7-11  
FDOT Daily Model Percent RMSE Standards**

Daily Group	Count Range		Allowed %RMSE Range	
1	1	5,000	45	55
2	5,000	10,000	35	45
3	10,000	20,000	27	35
4	20,000	30,000	24	27
5	30,000	40,000	22	24
6	40,000	50,000	20	22
7	50,000	60,000	18	20
8	60,000	70,000	17	18
9	70,000	80,000	16	17
10	80,000	90,000	15	16
11	90,000	100,000	14	15
12	100,000	500,000	Less than	14
All	1	500,000	32	39

**Table 7-12  
CFRPM Version 6.0 TOD Model Percent RMSE Standards**

TOD Group	Count Range		Allowed %RMSE Range	
1	1	500	60	160
2	500	1,250	50	140
3	1,250	2,500	44	94
4	2,500	5,000	38	60
5	5,000	10,000	32	42
6	10,000	20,000	27	35
7	20,000	50,000	Less than	27
TOD All	1	50,000	42	90
TOD Daily	1	500,000	35	50

**Table 7-13  
Truck Percent RMSE Derived Guidelines**

Count Group	Truck Volume Count Range		Allowed %RMSE Range	
1	1	1,250	50	140
2	1,250	2,500	44	94
3	2,500	5,000	38	60
4	5,000	10,000	32	42
5	10,000	20,000	27	35
6	20,000	50,000	Less than	27
TOD All	1	50,000	42	90

**Table 7-14**  
**CFRPM Version 6.0 Daily Model Percent RMSE Statistics – All Vehicles**

CFRPM6 v6.0 Daily Counts							
Vol Group	Count Range	Model %RMSE	Allowed RMSE Range	Volume	Count	Volume/Count	No of Links
1	1-5,000	75.06%	45 - 55%	7,453,920	6,478,237	1.15	1,796
2	5,000-10,000	49.15%	35 - 45%	16,783,788	15,533,502	1.08	2,136
3	10,000-20,000	29.02%	27 - 35%	31,625,659	31,212,820	1.01	2,186
4	20,000-30,000	22.22%	24 - 27%	14,273,279	13,838,456	1.03	582
5	30,000-40,000	15.03%	22 - 24%	3,781,668	3,979,018	0.95	116
6	40,000-50,000	19.40%	20 - 22%	788,500	848,284	0.93	19
7	50,000-60,000	5.84%	18 - 20%	999,395	997,914	1.00	18
8	60,000-70,000	14.41%	17 - 18%	1,114,197	1,174,721	0.95	18
9	70,000-80,000	10.63%	16 - 17%	1,265,822	1,338,590	0.95	18
10	80,000-90,000	12.68%	15 - 16%	1,189,186	1,327,908	0.90	16
11	90,000-100,000	18.38%	14 - 15%	158,411	182,000	0.87	2
<b>ALL</b>	<b>1-500,000</b>	<b>34.72%</b>	<b>32 - 39%</b>	<b>79,433,825</b>	<b>76,911,450</b>	<b>1.03</b>	<b>6,907</b>

**Table 7-15**  
**CFRPM Version 6.0 Daily Model Percent RMSE Statistics – Trucks**

CFRPM6 v6.0 Truck Daily Counts							
Vol Group	Count Range	Model %RMSE	Allowed RMSE Range	Volume	Count	Volume/Count	No of Links
1	1-1250	129.72%	50 -160%	215,197	109,170	1.97	110
2	1,250-2,500	76.87%	44 - 94%	239,153	167,093	1.43	98
3	2,500-5,000	29.34%	38 - 60%	253,733	275,900	0.92	77
4	5,000-10,000	21.55%	32 - 42%	436,679	476,486	0.92	72
5	10,000-20,000	n/a	27 - 35%	n/a	n/a	n/a	n/a
<b>ALL</b>	<b>1-50,000</b>	<b>44.13%</b>	<b>42 - 90%</b>	<b>1,144,762</b>	<b>1,028,649</b>	<b>1.11</b>	<b>357</b>

**Table 7-16** presents the CFRPM 6.0 TOD model validation Percent RMSE statistics for the four time periods (e.g. AM, MD, PM, and NT) and the 24HR sum. As indicated, the individual Peak Periods all meet the guidelines for model volume-to-count Percent RMSE comparisons for each of the count groups. The overall Percent RMSE is also met for each Peak Period and is respectively 45.56 percent, 43.97 percent, 38.00 percent, and 66.09 percent for the AM, MD, PM, and NT Peak Periods. For the Combined 24-Hour Daily assignment, it is 40.10 percent and is well below the 50 percent guideline.

A comparison is provided for the CFRPM Version 6.0 Model in relation to the limited number of TOD models available that report Percent RMSEs for lower count groups, based on the documented literature review for the Technical Memorandum “Model Calibration and Validation Performance Measures and Standards.” As indicated in **Table 7-17**, the validated CFRPM Version 6.0 Model statistics are relatively comparable to the reported Percent RMSEs for the Atlanta and Ohio TOD models<sup>6</sup> that include lower count ranges with their daily model statistics for percent RMSE. Further, the overall TOD Percent RMSEs for the individual Peak Periods are also consistent with the limited literature review data available for TOD model statistics (SERPM Version 6.5 and Sacramento TOD models) as demonstrated in **Table 7-18**. As indicated, the CFRPM 6.0 TOD higher NT Peak Period Percent RMSE compares closely to the results of the Sacramento TOD Model. All other Peak Periods are within the high-30 to lower-40 range for all reviewed TOD Models.

**Table 7-16**  
**CFRPM Version 6.0 Model Percent RMSE Statistics by Period and 24HR**

AM							
Vol Grp	Count Range	Model RMSE(%)	Allow RMSE Range	Volume	Count	Volume/Count	No of Links
1	1-500	140.61%	60 -160%	139,369	98,549	1.41	252
2	500-1,250	68.62%	50 -140%	1,545,009	1,398,999	1.10	1,566
3	1,250-2,500	44.83%	44 - 94%	3,816,623	3,659,031	1.04	2,036
4	2,500-5,000	34.80%	38 - 60%	3,670,441	3,456,150	1.06	1,049
5	5,000-10,000	27.95%	32 - 42%	848,226	855,724	0.99	133
6	10,000-20,000	21.31%	27 - 35%	547,631	504,657	1.09	41
7	20,000-50,000	0.00%	LT 27 %	0	0	0.00	0
ALL	1-50,000	45.56%	42 - 90%	10,567,299	9,973,110	1.06	5,077

MD							
Vol Grp	Count Range	Model RMSE(%)	Allow RMSE Range	Volume	Count	Volume/Count	No of Links
1	1-500	0.00%	60 -160%	0	0	0.00	0
2	500-1,250	103.65%	50 -140%	69,204	48,002	1.44	43
3	1,250-2,500	71.88%	44 - 94%	2,045,932	1,803,878	1.13	914
4	2,500-5,000	53.12%	38 - 60%	7,693,735	7,395,674	1.04	2,034
5	5,000-10,000	36.58%	32 - 42%	12,870,094	12,317,800	1.04	1782
6	10,000-20,000	28.22%	27 - 35%	3,645,740	3,189,723	1.14	260
7	20,000-50,000	22.93%	LT 27 %	1,586,973	1,354,309	1.17	48
ALL	1-50,000	43.97%	42 - 90%	27,911,678	26,109,386	1.07	5,081

PM							
Vol Grp	Count Range	Model RMSE(%)	Allow RMSE Range	Volume	Count	Volume/Count	No of Links
1	1-500	0.00%	60 -160%	0	0	0.00	0
2	500-1,250	65.47%	50 -140%	593,174	578,714	1.02	515
3	1,250-2,500	47.04%	44 - 94%	3,705,551	3,733,514	0.99	2,053
4	2,500-5,000	31.40%	38 - 60%	7,003,828	7,099,605	0.99	2,025
5	5,000-10,000	29.54%	32 - 42%	2,855,109	2,706,229	1.06	431
6	10,000-20,000	23.92%	27 - 35%	874,370	758,185	1.15	56
7	20,000-50,000	0.00%	LT 27 %	0	0	0.00	0
ALL	1-50,000	38.00%	42 - 90%	15,032,032	14,876,247	1.01	5,080

NT							
Vol Grp	Count Range	Model RMSE(%)	Allow RMSE Range	Volume	Count	Volume/Count	No of Links
1	1-500	139.63%	60 -160%	5,012	3,496	1.43	9
2	500-1,250	65.36%	50 -140%	749,550	739,136	1.01	749
3	1,250-2,500	66.47%	44 - 94%	3,486,001	3,402,659	1.02	1,876
4	2,500-5,000	45.94%	38 - 60%	6,335,833	6,220,606	1.02	1,799
5	5,000-10,000	43.15%	32 - 42%	4,025,872	3,640,228	1.11	554
6	10,000-20,000	59.33%	27 - 35%	1,240,374	934,893	1.33	68
7	20,000-50,000	58.16%	LT 27 %	839,103	568,642	1.48	25
ALL	1-50,000	66.09%	42 - 90%	16,681,745	15,509,660	1.08	5,080

24Hr							
Vol Grp	Count Range	Model RMSE(%)	Allow RMSE Range	Volume	Count	Volume/Count	No of Links
1	1-5,000	70.24%	45 - 55%	2,612,458	2,847,765	0.92	717
2	5,000-10,000	48.86%	35 - 45%	14,528,871	14,787,349	0.98	2,015
3	10,000-20,000	33.00%	27 - 35%	31,286,558	30,792,044	1.02	2,157
4	20,000-30,000	31.16%	24 - 27%	15,385,302	13,674,999	1.13	575
5	30,000-40,000	22.36%	22 - 24%	4,148,206	3,946,818	1.05	115
6	40,000-50,000	25.47%	20 - 22%	950,022	848,284	1.12	19
7	50,000-60,000	20.92%	18 - 20%	1,157,057	997,914	1.16	18
8	60,000-70,000	31.99%	17 - 18%	1,444,230	1,174,721	1.23	18
9	70,000-80,000	32.40%	16 - 17%	1,341,162	1,047,090	1.28	14
10	80,000-90,000	26.76%	15 - 16%	1,521,819	1,245,650	1.22	15
11	90,000-100,000	37.41%	14 - 15%	230,085	182,000	1.26	2
12	100,000-500,000	0.00%	LT 14 %	0	0	0.00	0
ALL	1-500,000	40.10%	32 - 39%	74,605,770	71,544,634	1.04	5,665



**Table 7-17**  
**Comparison to Other TOD Models Percent RMSE (by Version 5.5 Count Ranges)**

CFRPM Version 5.5 TOD RMSE Count Groups			Percent RMSE					
Group No.	Count Range		Atlanta*	Mid-Ohio*	CFRPM Version 5.5		CFRPM Version 6.0	
			Daily		AM	PM	AM	PM
1	1	500	306	220	103	115	141	n/a
2'	500	1,250	122	90	62	64	69	65
3'	1,250	2,500	80	58	40	42	45	47
4'	2,500	5,000	47-57	45-50	29	29	35	31
5'	5,000	10,000	38-44	34-44	30	23	28	30
6	10,000	20,000	23-35	23-32	18	19	21	24
7'	20,000	50,000	12-24	15-23	0	22	n/a	n/a

\*Source: "The Travel Forecasting Model Set for the Atlanta Region, 2008 Documentation", Atlanta Regional Commission.

Refences "MORPC Model Validation-Summary", Ohio Department of Transportation.

Reported %RMSE have been compiled into relative CFRPM5.5 count groupings, with low and high %RMSEs presented.

\*Note: Indicates Atlanta/Mid-Ohio count groups that are slightly different from CFRPM5.5 count groups.

**Table 7-18**  
**Comparison to Other TOD Models Percent RMSE (by TOD Periods)**

MODEL	AM	PM	MD	NT
CFRPM 6.0	45.6	38.0	44.0	66.1
CFRPM 5.5	41.8	35.1	38.0	65.5
SERPM 6.5	42.0	35.6	33.0	
Sacramento, California	39	38	37	60

## 8.0 Transit Assignment

The CFRPM version 6.0 model includes the mass transit systems in place in the year 2010 for LYNX in the Orlando Metro area, Space Coast Area Transit (SCAT) in Brevard County, Voltran in Volusia County, LakeXpress in Lake County, and Suntran in Marion County). The CFRPM version 5.0 year 2005 bus routes were updated to 2010 routes (TROUTE\_10A.LIN file). The PCWALK\_10A.DAT (percent walk by TAZ) file was updated accordingly.

The model-wide observed ridership for 2010 was obtained from the different transit operators within the District (e.g. LYNX, SCAT, Voltran, LakeXpress, and Suntran, GIS shapefiles and other system characteristics data was obtained for the year 2010 system. The total observed daily average transit ridership for 2010 was 101,047 and the model predicted ridership is 104,813 as shown in **Table 8-1**.

**Table 8-1**  
**CFRPM 6.0 Year 2010 Transit Ridership Summary**

Systemwide Transit	2010 Observed Daily Ridership	2010 Model Daily Ridership	Ratio (M/O)
<b>Totals</b>	<b>101,047</b>	<b>104,813</b>	<b>1.037</b>

The transit assignment ratio of Daily Model ridership to observed ridership is 1.037. This ratio is very close to the +/- 3% criteria set by FDOT for transit validation at the system wide level.

## 9.0 Summary of Model Calibration and Validation

Leftwich Consulting Engineers, Inc. has completed the model validation and calibration for the CFRPM Version 6.05 Daily and TOD Model. As documented in this report, the Version 6.0 Model provides a good model validation representation of year 2010 conditions, as confirmed by the following statistics:

### Daily Model:

- The Overall %RMSE for the Daily Model is 34.72.
- The Overall V/C Ratio for the Daily Model is 1.03.

### Time-of-day Model:

- Peak Period V/C Ratios for AM (1.06), MD (1.07), PM (1.01) and NT (1.08)
- Peak Period %RMSE for AM (45.6), MD (44.0), PM (38.00), and NT (66.1)
- The Overall %RMSE for the Combined 24-Hour Model is 40.1
- The Overall V/C Ratio for the Combined 24-Hour Model is 1.04

As indicated above, the Version 6.0 Daily and TOD Models meet all general guidelines for a validated model, based on traffic count comparisons.

This technical memorandum has been prepared as the final product for the CFRPM Version 6.0 Daily and TOD Model documentation. The CFRPM version 6.0 Model represents the current validated model for FDOT District Five.

## 10.0 Final Observations

The technical memorandum has documented the data and results of the CFRPM Version 6.0 Model with the main emphasis on year 2010 count data matching.

The CFRPM v6.0 daily model is ready to be utilized for its intended principal purpose, the development of the area MPOs/TPOs Long Range Transportation Plans for the year 2040.

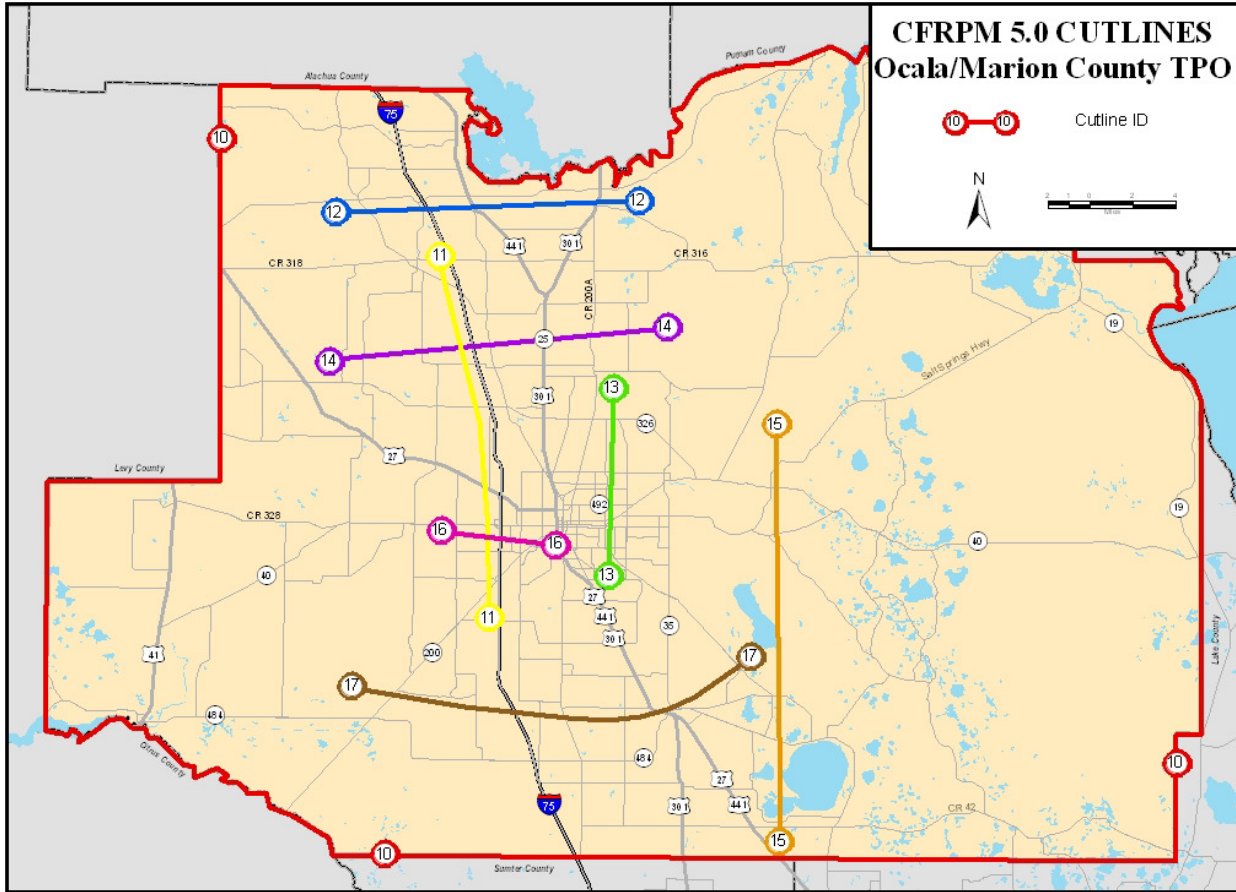
## References

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3. **“Technical Reports 1 & 2: Model Data Calibration and Validation” for SERPM Version 6.5**, Florida Department of Transportation District Four, prepared by The Corradino Group, October 2008.
4. **“Appendix E-Travel Demand Model Technical Memorandum for 2030 Long-Range Transportation Plan”**, Memphis Metropolitan Planning Organization, Transportation Planning Section, prepared by Kimley-Horn and Associates, Inc., March 2008.
5. **“Sacramento Regional Travel Demand Model Version 2007 (SACMET 07): Model Reference Report, Review Draft”**, Sacramento Area Council of Governments, November 2008.
6. **“The Travel Forecasting Model Set for Atlanta Region, 2008 Documentation”**, Atlanta Regional Commission, 2008.
7. **“Technical Memorandum: CFRPM “Lifestyle” Model Framework (Final)” for CFRPM v6.0 Update**, Florida Department of Transportation District Five, prepared by Leftwich Consulting Engineers, Inc., March 14, 2012.
8. **“Technical Memorandum: CFRPM “Income” Model Testing Summary (Final)” for CFRPM v6.0 Update**, Florida Department of Transportation District Five, prepared by Leftwich Consulting Engineers, Inc., March 24, 2013.
9. **“Technical Memorandum: Model Calibration and Validation (Final)” for Central Florida Regional Planning Model Version 5.0 with Truck Component**, Florida Department of Transportation District Five, prepared by Leftwich Consulting Engineers, Inc., March 29, 2013.

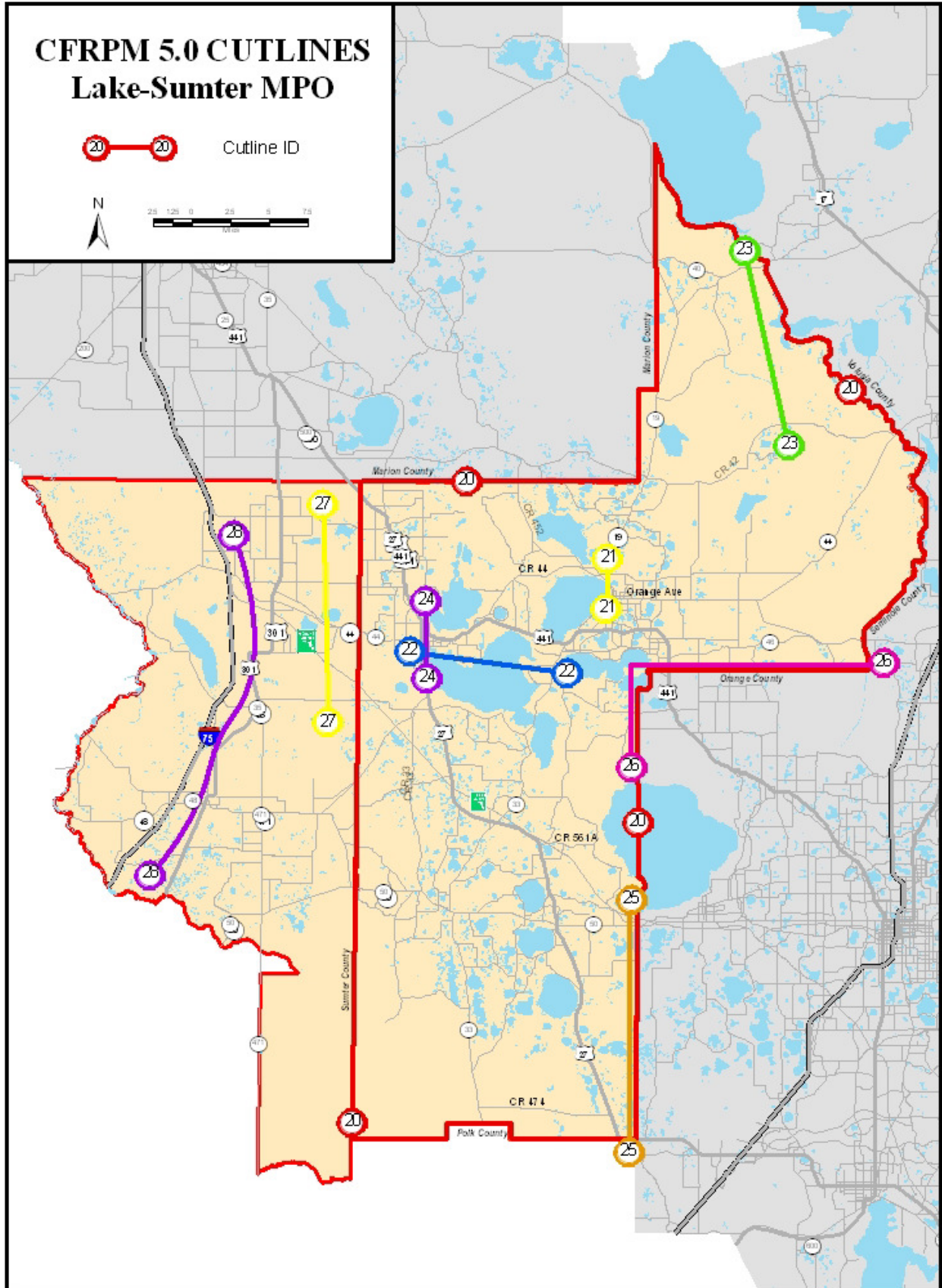
## **APPENDICES**

**Appendix A:  
CFRPM Version 5.0 Screenline/Cutline Location Maps**

## Appendix A 1 Ocala/Marion County TPO Cutlines

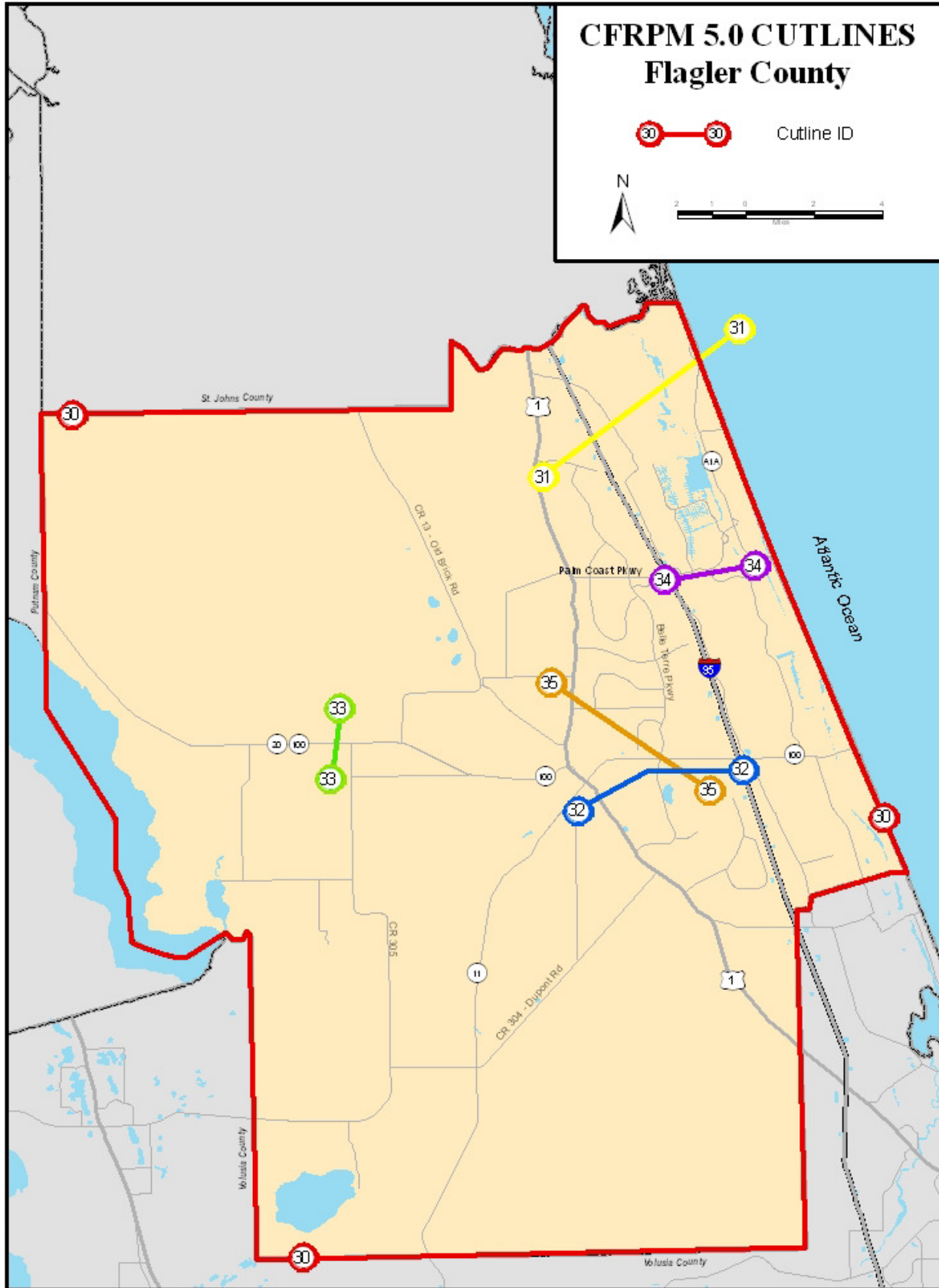


## Appendix A-2 Lake-Sumter MPO Cutlines

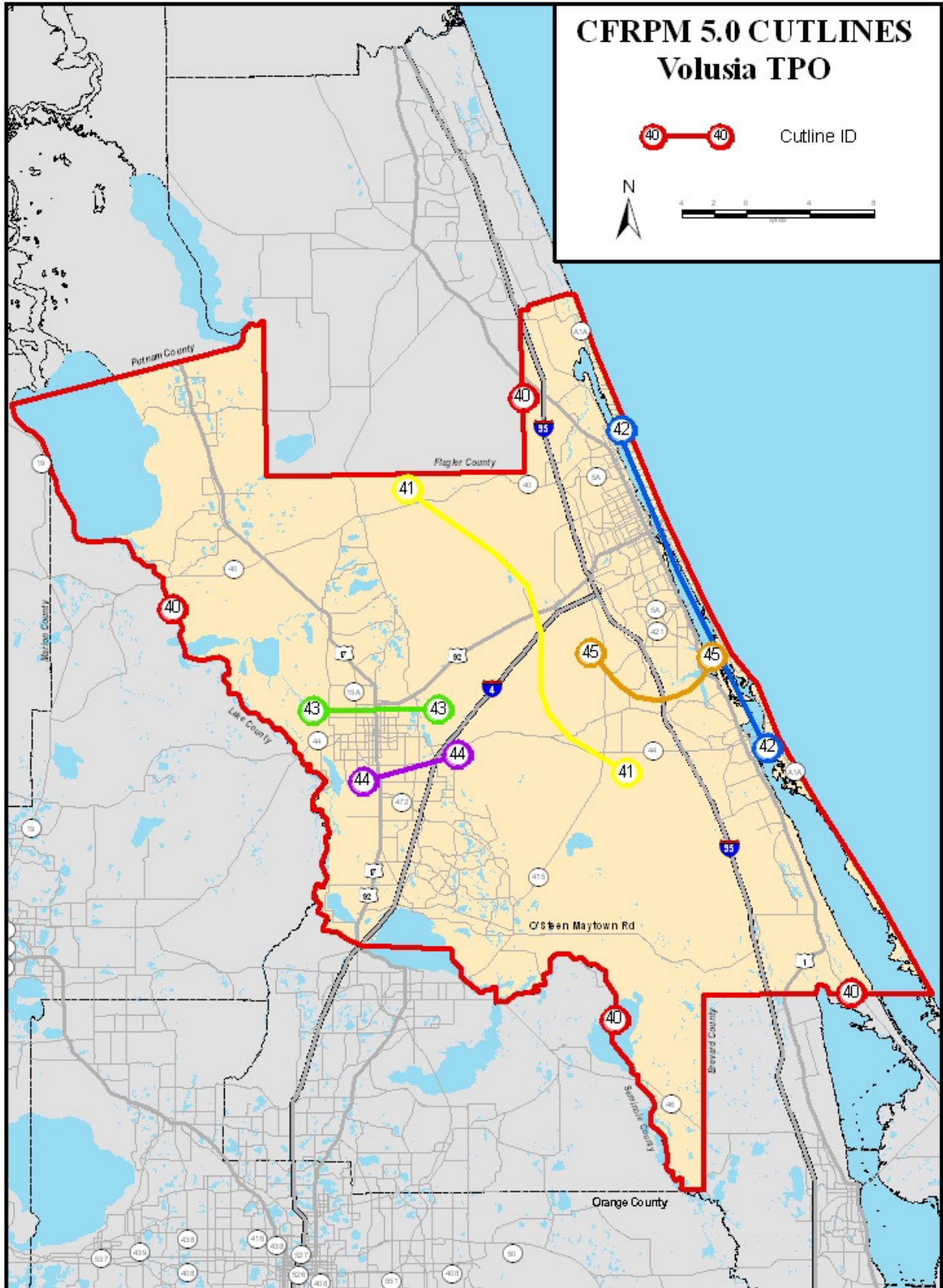




### Appendix A-3 Flagler County Cutlines



### Appendix A-4 Volusia TPO Cutlines









**Appendix B:  
Special Attractions File**

# Central Florida Regional Planning Model (CFRPM) Version 6.0

Tech Memo: Year 2010 Model Calibration and Validation

## Special Attractions File SPECATR1\_10A.dbf for CFRPM 6.0

COUNTER	ZONE	PRODS	VISRATE	RESRATE	EXTRATE	APTFLAG	DISTRICT	GROUP	DESCR
1	977	89,038	69.90%	26.81%	3.29%	1	1	1	Orlando International Airport
2	978	0	69.90%	26.81%	3.29%	2	1	1	Orlando International Airport exp
3	928	50,000	34.72%	38.47%	26.81%	0	2	2	Orange County Convention Center
4	927	0	34.72%	38.47%	26.81%	0	2	2	Orange County Convention Center exp
5	799	0	80.57%	10.92%	8.51%	0	3	3	Universal Orlando
6	801	84,770	80.57%	10.92%	8.51%	0	3	3	Universal Orlando Expansion
7	931	17,270	70.63%	16.98%	12.39%	0	4	4	Sea World
8	908	2,542	88.05%	4.98%	6.97%	0	5	5	Typhoon Lagoon
9	902	17,662	71.64%	22.64%	5.72%	0	6	5	Pleasure Island / Downtown Disney
10	905	15,709	94.44%	4.44%	1.12%	0	7	5	MGM Studios
11	900	13,105	91.61%	4.64%	3.75%	0	8	5	Animal Kingdom
12	903	31,450	91.44%	4.52%	4.05%	0	9	5	EPCOT Center
13	899	3,903	85.77%	8.30%	5.93%	0	10	5	Blizzard Beach
14	898	28,339	93.50%	4.02%	2.48%	0	11	5	Magic Kingdom
15	2,994	5,090	77.64%	11.53%	10.83%	0	12	6	Kennedy Space Center
16	3,182	15,336	36.87%	37.32%	25.81%	0	13	7	Port Canaveral

**Appendix C:  
Off-Peak and Peak Friction Factor Tables & 2008 NHTS Trip Lengths  
(BATS, LCTS, OATS, OUATS, Sumter, and VCATS MPO Areas)**

**Central Florida Regional Planning Model (CFRPM) Version 6.0**

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**Reported NHTS Trip Lengths**

County	Trip Purpose	Trip (Logs)	Trips (Wgtd)	Avg Min (Logs)	Avg Min (Wgtd)	PK/OFF Ratio
BREVARD	HBO PK	140	34,252,234	15.9	15.1	
INDIAN RIVER	HBO PK	3	165,089	12.3	10.6	
<b>Total</b>	<b>HBO PK</b>	<b>143</b>	<b>34,417,323</b>	<b>15.9</b>	<b>15.1</b>	
BREVARD	HBO OFF	200	36,120,062	17.2	15.7	0.98
INDIAN RIVER	HBO OFF	15	2,485,393	16.8	10.8	
<b>Total</b>	<b>HBO OFF</b>	<b>215</b>	<b>38,605,455</b>	<b>17.2</b>	<b>15.4</b>	
BREVARD	HBSHOP PK	157	22,872,275	12.1	12.3	
INDIAN RIVER	HBSHOP PK	14	1,765,079	7.4	8.7	
<b>Total</b>	<b>HBSHOP PK</b>	<b>171</b>	<b>24,637,353</b>	<b>11.7</b>	<b>12.1</b>	
BREVARD	HBSHOP OFF	304	42,001,266	13.0	11.8	0.98
INDIAN RIVER	HBSHOP OFF	23	3,371,279	15.0	18.1	
<b>Total</b>	<b>HBSHOP OFF</b>	<b>327</b>	<b>45,372,545</b>	<b>13.1</b>	<b>12.3</b>	
BREVARD	HBSOCREC PK	39	8,664,279	16.0	17.5	
INDIAN RIVER	HBSOCREC PK	4	2,099,284	6.8	6.3	
<b>Total</b>	<b>HBSOCREC PK</b>	<b>43</b>	<b>10,763,563</b>	<b>15.2</b>	<b>15.3</b>	
BREVARD	HBSOCREC OFF	95	15,715,687	17.3	15.6	0.84
INDIAN RIVER	HBSOCREC OFF	11	2,646,117	17.7	34.6	
<b>Total</b>	<b>HBSOCREC OFF</b>	<b>106</b>	<b>18,361,804</b>	<b>17.3</b>	<b>18.3</b>	
BREVARD	HBW PK	150	43,330,723	20.7	21.7	
INDIAN RIVER	HBW PK	7	2,112,939	12.4	17.0	
<b>Total</b>	<b>HBW PK</b>	<b>157</b>	<b>45,443,662</b>	<b>20.3</b>	<b>21.5</b>	
BREVARD	HBW OFF	88	29,529,236	20.4	18.0	1.19
INDIAN RIVER	HBW OFF	5	889,079	17.0	15.1	
<b>Total</b>	<b>HBW OFF</b>	<b>93</b>	<b>30,418,315</b>	<b>20.2</b>	<b>18.0</b>	
BREVARD	NHB PK	140	33,789,343	13.0	11.9	
INDIAN RIVER	NHB PK	4	783,131	15.5	26.7	
<b>Total</b>	<b>NHB PK</b>	<b>144</b>	<b>34,572,474</b>	<b>13.1</b>	<b>12.3</b>	
BREVARD	NHB OFF	341	62,769,842	13.9	13.8	0.89
INDIAN RIVER	NHB OFF	45	7,383,012	15.6	14.0	
<b>Total</b>	<b>NHB OFF</b>	<b>386</b>	<b>70,152,853</b>	<b>14.1</b>	<b>13.8</b>	
<b>Area Total</b>	<b>PK</b>	<b>658</b>	<b>149,834,375</b>	<b>15.2</b>	<b>15.9</b>	
<b>Area Total</b>	<b>OFF</b>	<b>1127</b>	<b>202,910,972</b>	<b>15.2</b>	<b>14.8</b>	
<b>AREA TOTAL</b>	<b>ALL</b>	<b>1785</b>	<b>352,745,347</b>	<b>15.2</b>	<b>15.3</b>	
LAKE	HBO PK	39	8,752,009	23.3	23.3	1.11
LAKE	HBO OFF	66	10,066,454	19.5	20.9	
LAKE	HBSHOP PK	36	7,123,835	12.5	10.6	0.56
LAKE	HBSHOP OFF	114	17,175,887	16.6	18.8	
LAKE	HBSOCREC PK	24	3,014,506	15.0	16.0	0.93
LAKE	HBSOCREC OFF	44	4,619,733	12.4	17.2	
LAKE	HBW PK	41	11,916,304	28.4	31.8	1.21
LAKE	HBW OFF	29	7,418,682	26.1	26.3	
LAKE	NHB PK	44	8,925,783	19.6	20.5	1.42
LAKE	NHB OFF	133	19,872,729	14.9	14.4	
<b>Area Total</b>	<b>PK</b>	<b>184</b>	<b>39,732,437</b>	<b>20.4</b>	<b>22.4</b>	
<b>Area Total</b>	<b>OFF</b>	<b>386</b>	<b>59,153,485</b>	<b>16.8</b>	<b>18.5</b>	
<b>AREA TOTAL</b>	<b>ALL</b>	<b>570</b>	<b>98,885,922</b>	<b>17.9</b>	<b>20.0</b>	
MARION	HBO PK	83	22,529,901	17.8	19.2	0.97
MARION	HBO OFF	113	26,258,241	17.2	19.8	
MARION	HBSHOP PK	71	14,380,568	16.0	13.3	0.74
MARION	HBSHOP OFF	238	30,643,245	17.2	17.9	
MARION	HBSOCREC PK	36	4,475,197	13.5	13.4	0.66
MARION	HBSOCREC OFF	64	11,009,560	17.3	20.3	
MARION	HBW PK	62	15,918,377	21.3	17.8	0.89
MARION	HBW OFF	38	13,329,127	20.4	19.9	
MARION	NHB PK	66	15,760,131	16.2	16.0	1.26
MARION	NHB OFF	203	34,306,080	13.2	12.7	
<b>Area Total</b>	<b>PK</b>	<b>318</b>	<b>73,064,173</b>	<b>17.3</b>	<b>16.7</b>	
<b>Area Total</b>	<b>OFF</b>	<b>656</b>	<b>115,546,253</b>	<b>16.2</b>	<b>17.2</b>	
<b>AREA TOTAL</b>	<b>ALL</b>	<b>974</b>	<b>188,610,426</b>	<b>16.5</b>	<b>17.0</b>	



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**Reported NHTS Trip Lengths (Cont'd)**

County	Trip Purpose	Trip (Logs)	Trips (Wgtd)	Avg Min (Logs)	Avg Min (Wgtd)	PK/OFF Ratio
ORANGE	HBO PK	163	56,836,122	17.5	16.0	
OSCEOLA	HBO PK	48	20,080,127	15.5	13.7	
POLK	HBO PK	12	4,259,376	17.9	20.2	
SEMINOLE	HBO PK	108	28,814,642	17.4	15.0	
<b>Total</b>	<b>HBO PK</b>	<b>331</b>	<b>109,990,267</b>	<b>17.2</b>	<b>15.5</b>	
ORANGE	HBO OFF	196	59,859,780	18.4	15.4	0.91
OSCEOLA	HBO OFF	44	12,697,219	23.6	24.9	
POLK	HBO OFF	13	3,608,501	21.3	33.5	
SEMINOLE	HBO OFF	145	35,060,596	16.6	15.6	
<b>Total</b>	<b>HBO OFF</b>	<b>398</b>	<b>111,226,095</b>	<b>18.4</b>	<b>17.1</b>	
ORANGE	HBSHOP PK	137	35,321,496	13.8	14.1	
OSCEOLA	HBSHOP PK	34	5,838,339	15.1	14.0	
POLK	HBSHOP PK	9	4,116,469	13.6	11.1	
SEMINOLE	HBSHOP PK	79	15,340,003	17.7	14.1	
<b>Total</b>	<b>HBSHOP PK</b>	<b>259</b>	<b>60,616,306</b>	<b>15.1</b>	<b>13.9</b>	
ORANGE	HBSHOP OFF	285	81,191,639	13.4	12.2	1.14
OSCEOLA	HBSHOP OFF	62	17,099,955	15.0	15.2	
POLK	HBSHOP OFF	57	10,526,622	15.7	11.7	
SEMINOLE	HBSHOP OFF	180	31,186,650	12.1	11.0	
<b>Total</b>	<b>HBSHOP OFF</b>	<b>584</b>	<b>140,004,866</b>	<b>13.4</b>	<b>12.2</b>	
ORANGE	HBSOCREC PK	52	13,453,946	18.3	14.0	
OSCEOLA	HBSOCREC PK	8	1,430,207	14.6	19.0	
POLK	HBSOCREC PK	5	494,302	25.8	36.2	
SEMINOLE	HBSOCREC PK	38	6,441,350	21.3	21.1	
<b>Total</b>	<b>HBSOCREC PK</b>	<b>103</b>	<b>21,819,805</b>	<b>19.5</b>	<b>17.0</b>	
ORANGE	HBSOCREC OFF	128	43,912,632	18.0	14.7	1.02
OSCEOLA	HBSOCREC OFF	22	6,082,617	13.7	20.9	
POLK	HBSOCREC OFF	11	576,934	11.8	10.8	
SEMINOLE	HBSOCREC OFF	74	10,628,642	23.5	22.6	
<b>Total</b>	<b>HBSOCREC OFF</b>	<b>235</b>	<b>61,200,824</b>	<b>19.0</b>	<b>16.6</b>	
ORANGE	HBW PK	213	80,165,277	28.4	29.3	
OSCEOLA	HBW PK	47	19,428,103	30.9	41.9	
POLK	HBW PK	10	2,997,818	45.7	55.2	
SEMINOLE	HBW PK	147	36,277,926	24.1	23.6	
<b>Total</b>	<b>HBW PK</b>	<b>417</b>	<b>138,869,124</b>	<b>27.6</b>	<b>30.1</b>	
ORANGE	HBW OFF	131	73,937,267	23.9	24.6	1.13
OSCEOLA	HBW OFF	41	16,460,614	25.0	33.3	
POLK	HBW OFF	8	1,011,821	35.8	34.6	
SEMINOLE	HBW OFF	82	27,581,603	24.4	28.2	
<b>Total</b>	<b>HBW OFF</b>	<b>262</b>	<b>118,991,305</b>	<b>24.6</b>	<b>26.7</b>	
ORANGE	NHB PK	165	54,862,882	18.1	20.8	
OSCEOLA	NHB PK	45	13,092,341	21.4	22.4	
POLK	NHB PK	14	4,153,476	27.0	18.3	
SEMINOLE	NHB PK	114	24,490,119	18.8	19.9	
<b>Total</b>	<b>NHB PK</b>	<b>338</b>	<b>96,598,818</b>	<b>19.1</b>	<b>20.7</b>	
ORANGE	NHB OFF	343	97,355,019	17.0	16.9	1.29
OSCEOLA	NHB OFF	107	27,903,941	14.9	14.6	
POLK	NHB OFF	62	7,658,253	15.0	13.3	
SEMINOLE	NHB OFF	194	42,648,523	15.7	15.3	
<b>Total</b>	<b>NHB OFF</b>	<b>706</b>	<b>175,565,736</b>	<b>16.2</b>	<b>16.0</b>	
<b>Area Total</b>	<b>PK</b>	<b>1448</b>	<b>427,894,320</b>	<b>20.4</b>	<b>21.2</b>	
<b>Area Total</b>	<b>OFF</b>	<b>2185</b>	<b>606,988,826</b>	<b>17.1</b>	<b>17.5</b>	
<b>AREA TOTAL</b>	<b>ALL</b>	<b>3633</b>	<b>1,034,883,146</b>	<b>18.5</b>	<b>19.1</b>	

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**Reported NHTS Trip Lengths (Cont'd)**

County	Trip Purpose	Trip (Logs)	Trips (Wgtd)	Avg Min (Logs)	Avg Min (Wgtd)	PK/OFF Ratio
SUMTER	HBO PK	7	1,076,549	15.7	17.5	0.65
SUMTER	HBO OFF	18	1,820,635	25.8	27.0	
SUMTER	HBSHOP PK	17	1,851,490	15.4	20.0	1.54
SUMTER	HBSHOP OFF	57	4,898,108	12.9	13.0	
SUMTER	HBSOCREC PK	12	2,195,958	13.8	21.6	0.73
SUMTER	HBSOCREC OFF	32	5,657,419	15.8	29.4	
SUMTER	HBW PK	6	1,139,304	36.8	39.5	1.85
SUMTER	HBW OFF	5	1,213,813	22.4	21.3	
SUMTER	NHB PK	15	1,693,951	10.1	9.7	0.72
SUMTER	NHB OFF	46	3,740,457	13.1	13.4	
<b>Area Total</b>	<b>PK</b>	<b>57</b>	<b>7,957,252</b>	<b>16.0</b>	<b>20.7</b>	
<b>Area Total</b>	<b>OFF</b>	<b>158</b>	<b>17,330,432</b>	<b>15.3</b>	<b>20.5</b>	
<b>AREA TOTAL</b>	<b>ALL</b>	<b>215</b>	<b>25,287,684</b>	<b>15.5</b>	<b>20.6</b>	
FLAGLER	HBO PK	32	5,977,648	12.5	11.8	0.97
VOLUSIA	HBO PK	94	22,297,256	18.1	19.1	
<b>Total</b>	<b>HBO PK</b>	<b>126</b>	<b>28,274,905</b>	<b>13.6</b>	<b>17.6</b>	
FLAGLER	HBO OFF	38	8,638,562	16.6	12.2	
VOLUSIA	HBO OFF	135	29,111,341	19.7	19.8	1.10
<b>Total</b>	<b>HBO OFF</b>	<b>173</b>	<b>37,749,903</b>	<b>15.5</b>	<b>18.1</b>	
FLAGLER	HBSHOP PK	31	3,480,623	16.6	12.8	1.32
VOLUSIA	HBSHOP PK	122	19,980,873	16.6	16.1	
<b>Total</b>	<b>HBSHOP PK</b>	<b>153</b>	<b>23,461,496</b>	<b>13.3</b>	<b>15.6</b>	
FLAGLER	HBSHOP OFF	72	4,417,402	14.3	14.2	
VOLUSIA	HBSHOP OFF	338	69,861,665	14.7	14.2	1.03
<b>Total</b>	<b>HBSHOP OFF</b>	<b>410</b>	<b>74,279,066</b>	<b>12.1</b>	<b>14.2</b>	
FLAGLER	HBSOCREC PK	16	757,300	10.4	8.8	1.33
VOLUSIA	HBSOCREC PK	31	6,542,206	21.5	25.9	
<b>Total</b>	<b>HBSOCREC PK</b>	<b>47</b>	<b>7,299,506</b>	<b>14.4</b>	<b>24.1</b>	
FLAGLER	HBSOCREC OFF	33	1,681,878	17.5	18.2	
VOLUSIA	HBSOCREC OFF	93	18,485,742	17.1	18.2	1.03
<b>Total</b>	<b>HBSOCREC OFF</b>	<b>126</b>	<b>20,167,620</b>	<b>12.8</b>	<b>18.2</b>	
FLAGLER	HBW PK	35	5,589,741	22.3	26.8	1.33
VOLUSIA	HBW PK	127	36,643,002	25.8	23.2	
<b>Total</b>	<b>HBW PK</b>	<b>162</b>	<b>42,232,743</b>	<b>20.3</b>	<b>23.7</b>	
FLAGLER	HBW OFF	22	3,506,637	17.4	22.3	
VOLUSIA	HBW OFF	52	14,526,220	25.0	23.1	1.03
<b>Total</b>	<b>HBW OFF</b>	<b>74</b>	<b>18,032,857</b>	<b>17.8</b>	<b>22.9</b>	
FLAGLER	NHB PK	29	2,404,177	13.9	13.6	1.33
VOLUSIA	NHB PK	94	21,578,596	18.0	20.4	
<b>Total</b>	<b>NHB PK</b>	<b>123</b>	<b>23,982,773</b>	<b>13.9</b>	<b>19.7</b>	
FLAGLER	NHB OFF	108	18,523,934	18.7	13.4	
VOLUSIA	NHB OFF	339	61,268,043	14.0	15.3	1.03
<b>Total</b>	<b>NHB OFF</b>	<b>447</b>	<b>79,791,978</b>	<b>10.7</b>	<b>14.8</b>	
<b>Area Total</b>	<b>PK</b>	<b>611</b>	<b>125,251,423</b>	<b>15.4</b>	<b>20.1</b>	
<b>Area Total</b>	<b>OFF</b>	<b>1230</b>	<b>230,021,424</b>	<b>12.5</b>	<b>16.1</b>	
<b>AREA TOTAL</b>	<b>ALL</b>	<b>1841</b>	<b>355,272,847</b>	<b>13.5</b>	<b>17.5</b>	
<b>CFRPM TOTAL</b>	<b>PK</b>	<b>3276</b>	<b>823,733,979</b>	<b>18.1</b>	<b>19.7</b>	
<b>CFRPM TOTAL</b>	<b>OFF</b>	<b>5742</b>	<b>1,231,951,393</b>	<b>15.6</b>	<b>16.9</b>	
<b>CFRPM TOTAL</b>	<b>ALL</b>	<b>9018</b>	<b>2,055,685,372</b>	<b>16.5</b>	<b>18.0</b>	