



Florida Department of Transportation

Northwest Florida Regional Planning Model

2015 Model Validation Report

FDOT Office

District Three – Systems Planning

Authors

Daniel Beaty
Andrew Young
Nicholas Reid

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1. Introduction

The Northwest Florida Regional Planning Model (NWFRPM) Validation Report documents the Base Year 2015 model validation of the NWFRPM version 3.1. The validation was performed by re-evaluating and updating the previous version of the NWFRPM (version 2.1) based on the Florida Standard Urban Transportation Model Structure (FSUTMS) using Cube Voyager software.

1.1. Model Background

The NWFRPM is a “traditional” FSUTMS four-step, trip-based model that has been in different stages of development over the past few years. Originally, this model was designed to support Florida Department of Transportation (FDOT) projects in District 3 in areas that were otherwise not included in the existing Metropolitan Planning Organization (MPO) travel demand models. The focus has since expanded to include replacement of the urbanized area models contained within regions covered by the NWFRPM, as well as for use in regional projects that span one or more urban areas, and/or are included in one or more urban area model and/or rural areas adjacent to those models.

Prior to this validation effort, the model underwent extensive changes to the model network and zone structure, which included expanding the model coverage area to include all 16 counties within FDOT District 3. As part of this update, additional enhancements included improving the home-based trip productions component of the trip generation module to a lifestyle model, incorporating mode choice and transit capabilities, and updating model parameters using AirSage and HERE data. More information on the specific enhancements can be found in the *Northwest Florida Regional Planning Model Updates Technical Memo*.

The NWFRPM includes the region governed by the Emerald Coast Regional Council (ECRC) and the Apalachee Regional Planning Council (ARPC). This area is comprised of a 16-county region with four urbanized areas and multiple adjacent rural counties. The urbanized areas and their respective Transportation Planning Organization (TPO) and Transportation Planning Agency (TPA) include the Florida-Alabama Transportation Planning Organization (FATPO), which includes Escambia and Santa Rosa Counties as well as a portion of Baldwin County in Alabama, the Okaloosa-Walton TPO (OWTPO), Bay County TPO, and the Capital Region Transportation Planning Agency (CRTPA), which encompasses the Tallahassee urbanized area and includes Gadsden, Leon, Wakulla, and Jefferson counties.

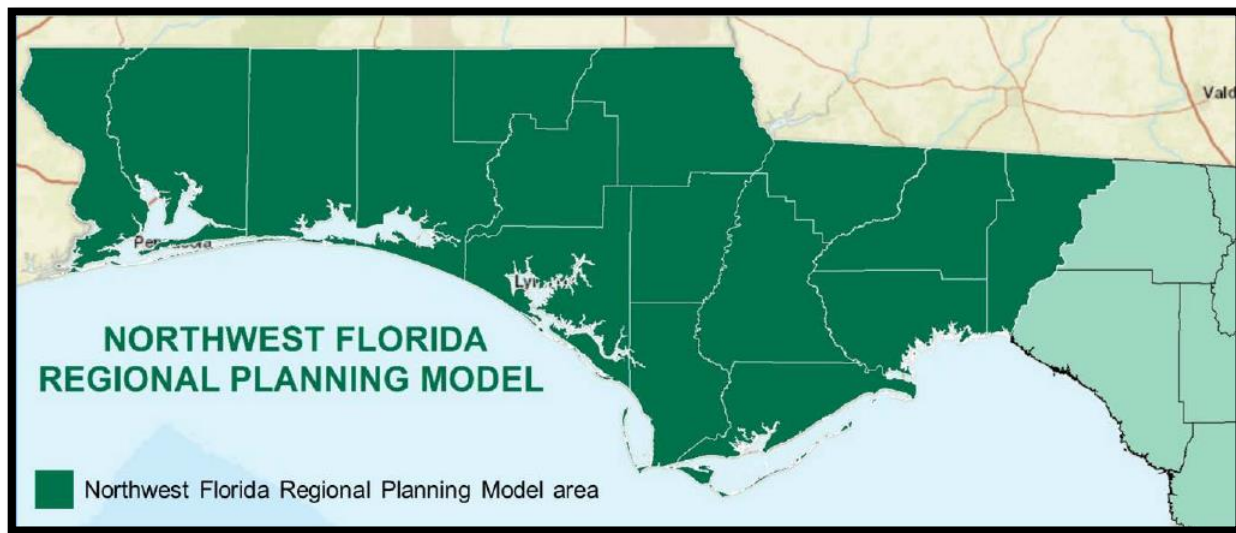
In addition to the Regional Councils and their planning areas, there are other Counties within FDOT District 3 that need to be included in the NWFRPM because they are the subject of transportation planning efforts by the FDOT District 3, counties, local governments, organizations such as Opportunity Florida (a coalition of public-private stakeholders), and the Northwest Florida Corridor Transportation Authority (an organization that includes eight coastal counties from Escambia to Wakulla). Each of these public entities and organizations are working towards transportation improvements in the Florida Panhandle. These additional counties include Jackson, Calhoun, Gulf, and Franklin.

The emphasis for this model validation effort was on minimizing model development costs, which meant the use of existing, readily available data was imperative for this model update. Other than traffic counts routinely collected by FDOT, no other transportation surveys were implemented. The U.S. Census Bureau’s American Community Survey (ACS) data and other readily available FDOT data sources such as InfoGroup employment data and the Florida Statewide Model (provided by FDOT District 3 and the FDOT Central Office Systems Implementation Office), Florida Department of Business and Professional Regulation (FDBPR), Florida Department of Education (FDOE), and colleges and universities were the sources of raw data for this effort.

1.2. Model Updates and Enhancements

In October 2016, the NWFRPM model coverage area was expanded to cover all 16 counties in District 3. Gadsden, Leon, Wakulla, and Jefferson counties were added from the previous CRTPA model, and Liberty County was added, which was previously not included in any regional model. The existing model networks for the NWFRPM and the CRTPA model were merged and updated, and the node numbering system was completely revised and updated to a new coordinate system (NAD 1983 State Plane Florida North – Feet). **Figure 1** depicts the new model study area.

Figure 1. NWFRPM Area



A new combined Traffic Analysis Zone (TAZ) system was created for the expanded model coverage area. There are now 2,682 internal TAZs. **Table 1** shows the numbering scheme used for the new TAZ system. The prior NWFRPM zones remain unchanged. TAZs for Liberty County were inserted into the numbering scheme between the NWFRPM and the CRTPA area. TAZ numbers for the CRTPA area are the previous centroid numbers plus 2000.

Table 1. TAZ Numbering

Area	New Numbering
NWFRPM	1-1710
Liberty County	1800-1813
CRTPA	2001-4095
NWFRPM Externals	4100-4126
CRTPA Externals	4208-4240

The most significant enhancement included incorporation of a lifestyle model to the trip generation module. Lifestyle models attempt to improve trip generation of travel demand models by differentiating socioeconomic aspects of households that have a large bearing on trip making. Variables that consider family lifestyle include number of workers, retirees, school-aged children, and auto availability. For example, retired households make far fewer work trips than households with workers, and households with children generally make more and different types of trips than households without children. Prior to this enhancement, trip rates were based on household characteristics including dwelling type, household size, and vehicle ownership. Studies determined that standard household size-based models overestimated work trips for retired households. As households become more dynamic, travel behavior becomes more difficult to predict using just household characteristics, especially for retired and seasonal populations. Because of the large retired and seasonal population in Northwest Florida, it was determined that adoption of a lifestyle trip generation model would best suit the growing and diverse region.

In Florida, there are currently two lifestyle model structures in application: the Tampa Bay Regional Planning Model (TBRPM) and the Southeast Florida Regional Planning Model (SERPM). Each regional model employs a different set of stratification variables and categorizes households differently for home-based trip productions. Both lifestyle model choices were evaluated for the NWFRPM. The TBRPM approach was chosen because of commonalities in travel characteristics and behavior, and better distribution of home-based work trip productions. More information about the zonal attributes collected and the stratification process is explained in Section 2.3.

1.3. Report Organization

This report documents the socio-economic data, highway and transit networks, and model validation following the traditional four-step model process:

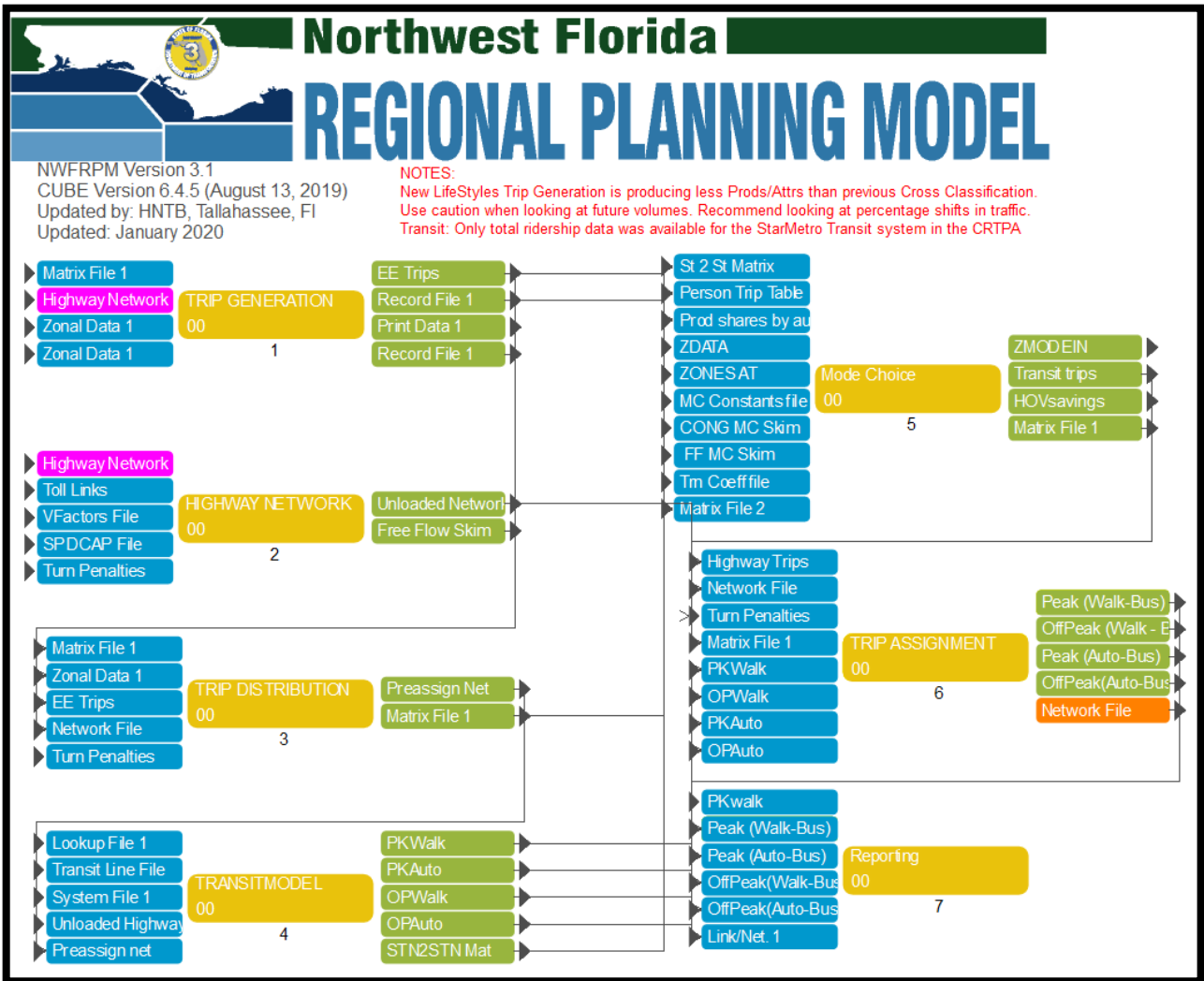
- **Chapter 2, Trip Generation** – converts socio-economic data into person trip ends based on production and attraction rates for the study area; total person trip productions and attractions are balanced for each TAZ for each trip purpose.
- **Chapter 3, Highway Network** – series of links and nodes that represents the roadway system
- **Chapter 4, Trip Distribution** – based on the application of a gravity model with friction factors to determine the trip origins and destinations between all TAZs
- **Chapter 5, Transit Model** – a line file that represents the transit network

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- **Chapter 6, Mode Choice** – determines the portions of total person trips using single occupancy vehicles, ridesharing modes, and public transport for travel between origins and destinations
 - **Chapter 7, Trip Assignment** – determines the highway and transit routes used
 - **Chapter 8, Reporting** – generates statistics for the highway and transit assignments, provides a summary of the validation statistics, including a comparison with each urbanized areas and rural county statistics, as well as recommendations for future model improvements

Each of these chapters has a description of the model step as it was implemented in Cube, including any issues or challenges faced during development, parameter values and their descriptions, and the model results in either table statistics or graphic format. **Figure 2** shows the application manager model main flowchart.

The appendices provide additional information on key input and output files. A list with all roadway link attributes, including a brief description of each, is also included.

Figure 2. Model Main Flowchart



2. Trip Generation

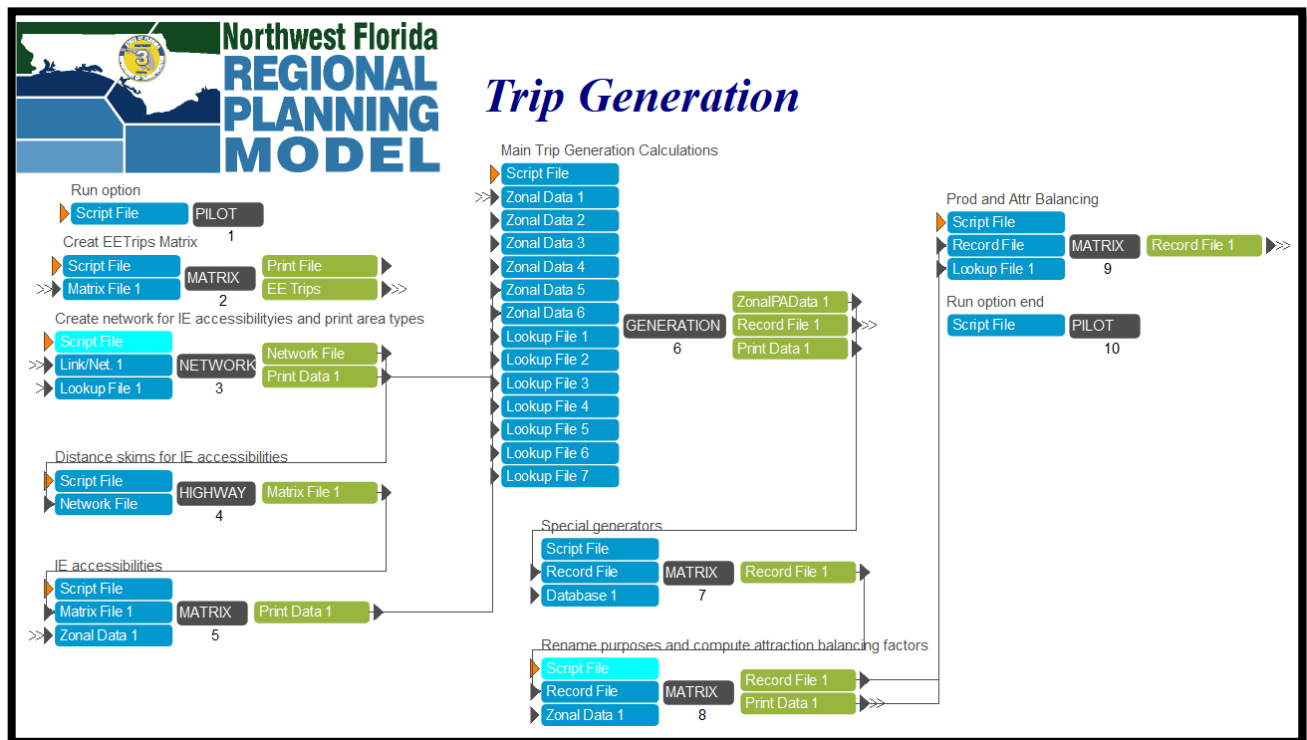
Trip generation is the process that determines the number of trip ends that originate (productions) and terminate (attractions) within each TAZ. Trip productions generally reflect the home end of a trip while trip attractions typically consist of the work, shop, recreational, or school end of the trip.

This chapter of the report describes validation of the trip generation model, including an overview of the model structure, the development of socio-economic data and model parameters, and a summary of model results. Trip generation model performance was assessed based on a review of trip productions by purpose and aggregate trip rates as well as similar statistics from the validated 2010 NWFRPM.

The trip generation process was completely scripted in the model chain. The trip generation flowchart is shown in **Figure 3** below. External trips were manually developed based on existing traffic counts and the distribution of external trips in the 2010 validated NWFRPM.

Data inputs are formatted using the same variable names as traditional FSUTMS ASCII text files to make it easier for first time Cube Voyager users within the study area. The input data is in a single database (dBASE IV, *.dbf) format instead of 2 ASCII text files now.

Figure 3. Trip Generation Model Flowchart



2.1. External Trips

External trips are vehicle trips having at least one trip end (origin or destination) outside of the study area boundary. External trips consist of two components: External-to-External (EE), or “through” trips, and Internal-to-External (IE) trips. EE trips have both trips ends outside of the study area while IE trips have one trip end within the study area and the other trip end outside of the study area.

The first step in developing the external module was to estimate total external trips at each external zone, based on available 2015 traffic counts provided by FDOT. Next, total external trips were split into EE and IE components based on the proportion of EE and IE trips in the 2010 validated model, which was based on information from AirSage, the 2010 Florida Statewide Model and US Census Journey to Work data. The EE trips were placed in the EETRIPS_15A.DBF file and the IE trips were entered in the INTEXT_15A.DBF file.

2.1.1. External Model Structure

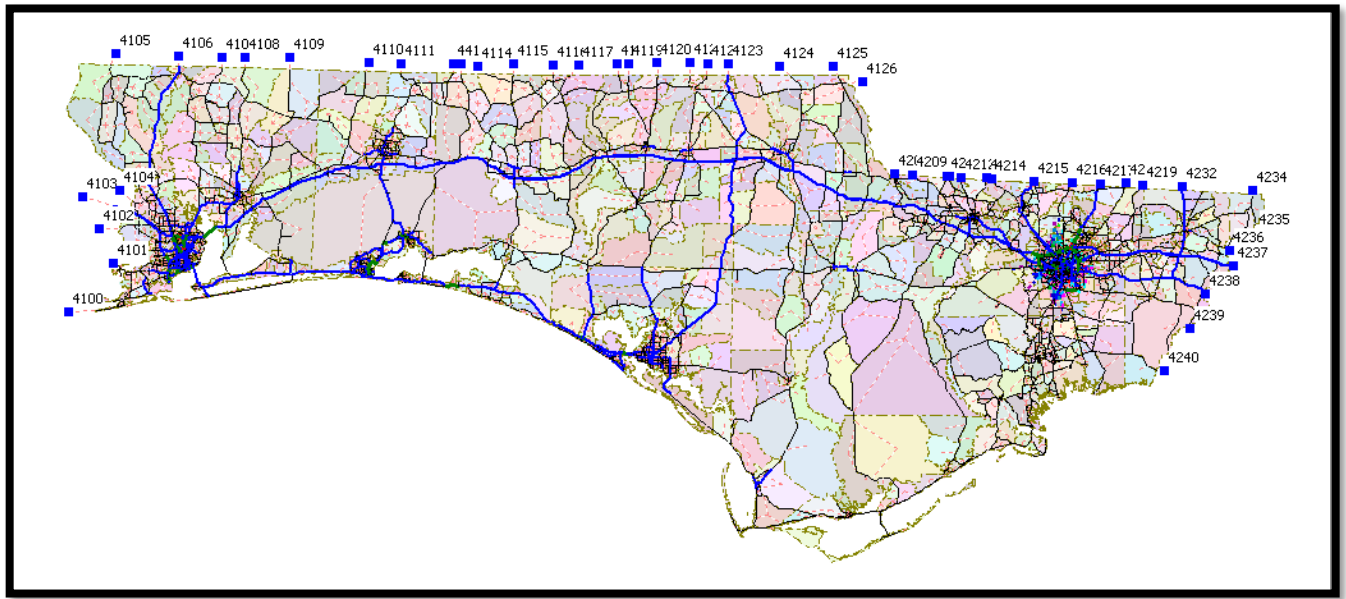
The NWFRPM Cube Voyager Trip Generation module includes internal trip generation and also estimates EE trips. The Trip Generation module is used to build an EE trip matrix through the use of an input file EETRIPS_15A.DBF. The EETRIPS matrix contains a series of origin and destination zones with their respective estimate of through trips. IE trips are generated based on input of the INTEXT_15A.DBF file (**Appendix A**). It should be noted that data contained in the EETRIPS and INTEXT files are usually based on estimates provided from roadside interview origin-destination (O-D) surveys, however O-D surveys were unavailable for this model validation effort. Therefore, a methodology was needed to develop this dataset. The description of the methodology follows in the next paragraphs.

2.1.2. External Model Trip Development and Validation

The external trips used in the NWFRPM were developed using the 2010 NWFRPM and 2015 traffic counts obtained from the 2015 Florida Transportation Information (FTI) DVD. The EE trips were updated for each external zone in the NWFRPM. The proportions in the 2010 EE and IE trip files were applied to the new 2015 stations. For locations that did not have a year 2015 traffic count available, the 2010 annual average daily traffic (AADT) was held constant and used to estimate the year 2015 AADT value for that external zone location.

The NWFRPM includes 47 external stations. **Figure 4** depicts the location of all external zones in relation to the roadway network.

Figure 4. External Stations



2.1.3. Assessment of Data Sources

Since O-D survey data was unavailable for this model validation effort, two primary sources were reviewed in order to develop an estimate of external trips. The first source used was the 2015 FTI DVD.

Table 2 gives a detailed description of each external zone and the corresponding estimates of the year 2015 Peak Season Weekday Average Daily Traffic (PSWADT). The AADT year 2015 counts obtained from the 2015 FTI DVD were adjusted using the appropriate model output conversion factor (MOCF) to determine the peak season weekday average daily traffic (PSWADT).

The second data source used was the EE/IE split percentages obtained from the 2010 NWFRPM validated model, which were based on information from the 2010 Florida Statewide Model, US Census Journey to Work data, and AirSage data. These were the primary sources used to estimate EE/IE percentages for the 2015 NWFRPM because of the lack of O-D survey data. Initially, all the EE and IE trips were entered into the EETRIPS_15A.DBF and INTEXT_15A.DBF files respectively. Upon completing preliminary model runs, adjustments to the files were made based on volume-to-count (V/C) ratios at the external zones. **Table 3** shows a summary of all external trips (EE & IE).

2.1.4. External Model Result

A review of the screenlines close to the model boundaries indicate a reasonable match of external travel movements. A more in-depth discussion of V/C ratios can be found in **Chapter 7** of this report.

Table 2. Traffic Count Information

External Zone	FDOT Count Station #	Station Location	2-Way PSWADT
4100	480461	SR 292, AT THE ALABAMA LINE	12,632
4101	480325	US 98, 1 MILE EAST OF ALABAMA STATE LINE	12,578
4102	480048	US 90, 1 MILE EAST OF PERDIDO RIVER BRIDGE	5,326
4103	482001	I-10, NORTH END OF ELEVEN MILE CREEK BRIDGE	31,318
4104	480501	CR 184, 300 FT SOUTH WEST OF CR 97	3,474
4105	480243	SR 97, 1.3 MILES SOUTH OF STATE LINE	6,042
4106	480003	SR 95/US29, 150' SOUTH OF ALABAMA STATE LINE	12,526
4107	580194	SR 89, 300' SOUTH OF ALABAMA STATE LINE	1,238
4108	580109	SR 87, 500' NORTH OF SR 4	2,784
4109	580097	CR 191, 300' SOUTH OF SR 4	824
4110	570001	SR 189, 300' NORTH OF CR 180	2,968
4111	570051	SR 85, 0.23 MILE NORTH OF CR 602	4,286
4112	600131	SR 85, AT THE FLORIDA/ALABAMA STATE LINE	3,296
4113	600346	SR-187/US-331, AT ALABAMA STATE LINE	4,564
4114	600244	CR 181, 350' WEST OF SR 83	454
4115	600243	SR 83, 300' NORTH OF CR 181	1,648
4116	520001	SR 81, 300' NORTH OF SR 2 AT ROYALS CROSSROADS	1,354
4117	520077	CR 185, 300' SOUTH OF ALABAMA STATE LINE	1,666
4118	520114	CR 177A, 300' NORTH OF SR 2	572
4119	520196	CR 179, 150' NORTH OF SR 2	468
4120	520016	SR 79, 300' NORTH OF SR 2	3,230
4121	520041	CR 171, 300' NORTH OF SR 2	1,562
4122	530247	SR 77, 0.35 MILE SOUTH OF PRIMROSE LANE	3,386
4123	530050	US 231, 2 MILES NORTH OF CAMPBELLTON AT STATE LINE	14,686
4124	530161	SR 71, 1.15 MILES NORTH OF SR 2	2,052
4125	530311	CR 164, 300' NORTH OF SR 2	842
4126	530248	SR 2, 575' WEST OF EDEN ROAD	2,122
4208	505002	CR 0425, 600' NORTH OF US 90	1,158
4209	500238	CR 269A, 300' NORTH OF US 90	1,578
4210	500306	CR 379, 200' NORTH OF US 90	632
4211	N/A	N/A	N/A
4212	500281	SR 267, 0.21 MILE SOUTH OF GEORGIA STATE LINE	1,584
4213	500028	CR 65, 200' SOUTH OF GEORGIA STATE LINE	736
4214	500237	CR 159, 125' SOUTH OF GEORGIA STATE LINE	1,052

4215	500045	SR 63/US 27, AT FLORIDA/GEORGIA STATE LINE	5,684
4216	550215	CR 155, 525' NORTH OF CR 0346	8,980
4217	550392	SR 61/US 319, 250' SOUTH OF GEORGIA STATE LINE	10,714
4218	N/A	N/A	N/A
4219	550018	SR 59, 875' NORTH OF MOCCASIN GAP RD	1,326
4232	540002	SR 57/US 19, 650' NORTH OF CR 149	3,878
4234	540237	SR 55/US 221, 500' NORTH OF CR 146	1,072
4235	540218	SR 55/US 221, 275' SOUTH OF CR 146	1,632
4236	540106	SR 10/US 90, 0.13 MILE EAST OF CR 257	1,786
4237	542005	I-10, 2 MILES EAST OF SR 57	20,918
4238	380028	SR 20, 0.3 MILE SOUTHEAST OF MADISON COUNTY LINE	4,693
4239	540219	CR 257, 450' SOUTH OF SR 20	562
4240	380280	SR 30/US 98, 1.25 MILES EAST OF AUCILLA RIVER	1,986

Source: 2015 FTI DVD

Table 3. External-External and Internal-External Trips

External Zone	FDOT Count Station #	Station Location	Percent EE Trips	Percent IE Trips	EE Trips	IE Trips
4100	480461	SR 292, AT THE ALABAMA LINE	23.7%	76.3%	1,710	5,500
4101	480325	US 98, 1 MILE EAST OF ALABAMA STATE LINE	86.5%	13.5%	4,811	750
4102	480048	US 90, 1 MILE EAST OF PERDIDO RIVER BRIDGE	36.2%	63.8%	1,558	2,744
4103	482001	I-10, NORTH END OF ELEVEN MILE CREEK BRIDGE	53.5%	46.5%	10,370	9,000
4104	480501	CR 184, 300 FT SOUTH WEST OF CR 97	12.4%	87.6%	213	1,503
4105	480243	SR 97, 1.3 MILES SOUTH OF STATE LINE	13.7%	86.3%	758	4,759
4106	480003	SR 95/US29, 150' SOUTH OF ALABAMA STATE LINE	12.6%	87.4%	1,316	9,116
4107	580194	SR 89, 300' SOUTH OF ALABAMA STATE LINE	0.0%	100.0%	0	1,200
4108	580109	SR 87, 500' NORTH OF SR 4	20.8%	79.2%	535	2,038
4109	580097	CR 191, 300' SOUTH OF SR 4	100.0%	0.0%	1,265	0
4110	570001	SR 189, 300' NORTH OF CR 180	90.5%	9.5%	955	100
4111	570051	SR 85, 0.23 MILE NORTH OF CR 602	51.6%	48.4%	1,066	1,000
4112	600131	SR 85, AT THE FLORIDA/ALABAMA STATE LINE	55.5%	44.5%	1,247	1,000
4113	600346	SR-187/US-331, AT ALABAMA STATE LINE	5.3%	94.7%	222	4,000
4114	600244	CR 181, 350' WEST OF SR 83	95.4%	4.6%	739	36
4115	600243	SR 83, 300' NORTH OF CR 181	68.0%	32.0%	887	417
4116	520001	SR 81, 300' NORTH OF SR 2 AT ROYALS CROSSROADS	0.0%	100.0%	0	1,069
4117	520077	CR 185, 300' SOUTH OF ALABAMA STATE LINE	0.0%	100.0%	0	1,316
4118	520114	CR 177A, 300' NORTH OF SR 2	0.0%	100.0%	0	550
4119	520196	CR 179, 150' NORTH OF SR 2	33.3%	66.7%	150	300
4120	520016	SR 79, 300' NORTH OF SR 2	24.0%	76.0%	651	2,063
4121	520041	CR 171, 300' NORTH OF SR 2	22.0%	78.0%	252	892

4122	530247	SR 77, 0.35 MILE SOUTH OF PRIMROSE LANE	40.8%	59.2%	1,459	2,117
4123	530050	US 231, 2 MILES NORTH OF CAMPBELLTON AT STATE LINE	0.0%	100.0%	0	15,000
4124	530161	SR 71, 1.15 MILES NORTH OF SR 2	43.0%	57.0%	794	1,054
4125	530311	CR 164, 300' NORTH OF SR 2	27.3%	72.7%	220	587
4126	530248	SR 2, 575' WEST OF EDEN ROAD	46.6%	53.4%	855	979
4208	505002	CR 0425, 600' NORTH OF US 90	23.3%	76.7%	268	881
4209	500238	CR 269A, 300' NORTH OF US 90	71.6%	28.4%	1,259	500
4210	500306	CR 379, 200' NORTH OF US 90	12.4%	87.6%	75	531
4211	N/A	N/A	0.0%	100.0%	0	535
4212	500281	SR 267, 0.21 MILE SOUTH OF GEORGIA STATE LINE	14.9%	85.1%	217	1,239
4213	500028	CR 65, 200' SOUTH OF GEORGIA STATE LINE	92.8%	7.2%	258	20
4214	500237	CR 159, 125' SOUTH OF GEORGIA STATE LINE	0.0%	100.0%	0	1,000
4215	500045	SR 63/US 27, AT FLORIDA/GEORGIA STATE LINE	26.7%	73.3%	1,329	3,644
4216	550215	CR 155, 525' NORTH OF CR 0346	46.0%	54.0%	530	621
4217	550392	SR 61/US 319, 250' SOUTH OF GEORGIA STATE LINE	12.9%	87.1%	1,211	8,164
4218	N/A	N/A	0.0%	100.0%	0	290
4219	550018	SR 59, 875' NORTH OF MOCCASIN GAP RD	0.0%	100.0%	0	1,140
4232	540002	SR 57/US 19, 650' NORTH OF CR 149	42.9%	57.1%	1,321	1,761
4234	540237	SR 55/US 221, 500' NORTH OF CR 146	69.7%	30.3%	460	200
4235	540218	SR 55/US 221, 275' SOUTH OF CR 146	91.2%	8.8%	476	46
4236	540106	SR 10/US 90, 0.13 MILE EAST OF CR 257	39.5%	60.5%	472	723
4237	542005	I-10, 2 MILES EAST OF SR 57	20.0%	80.0%	3,751	15,000
4238	380028	SR 20, 0.3 MILE SOUTHEAST OF MADISON COUNTY LINE	76.2%	23.8%	2,099	655
4239	540219	CR 257, 450' SOUTH OF SR 20	71.7%	28.3%	147	58
4240	380280	SR 30/US 98, 1.25 MILES EAST OF AUCILLA RIVER	57.6%	42.4%	678	500

Source: HNTB Calculations

2.2. Socio-Economic Data Development

One of the most essential data development tasks during any model validation is the preparation of socio-economic data for input to the travel demand forecasting models. Errors in the socio-economic data can directly influence the accuracy of the four-step modeling process of trip generation, trip distribution, mode choice, and trip assignment. If the socio-economic data are not precise, trips will be generated inaccurately, and these errors will "over-flow" through the other modeling steps.

Socio-economic data for the base year 2015 was developed for this model. The sources utilized for this effort include the following:

- U.S. Census Bureau's 2011 – 2015 ACS Five Year Estimates
- InfoGroup Business USA
- FDBPR
- FDOE
- FDOT

The following section of the report provides a description of the process used to develop the base year 2015 ZONEDATA_15A dataset.

2.2.1. ZONEDATA_15A

The ZONEDATA_15A file contains socio-economic data representing households and characteristics that impact their trip taking. This file includes attributes that represent dwelling units, population, vehicle availability, vacancy rates, hotel-motel data, school enrollment, and employment. The primary source of population and demographic data was the United States (US) Census Bureau's 2011-2015 ACS 5-Year Estimates. Employment data was derived from an Infogroup Business USA dataset obtained from the FDOT Central Office Systems Implementation Office. Hotel and motel data were obtained from the FDBPR, and school enrollment was developed using resources from the FDOE.

The 2011-2015 ACS 5-Year Estimates were available at the Census Block Group summary level for all counties included in the NWFRPM. Once dwelling units and population estimates were calculated for each Census Block Group, the data was applied from the Census Block Group to the NWFRPM TAZs. Census Block Groups are typically larger than the NWFRPM TAZs, so data associated with each Census Block Group must be divided among all the NWFRPM TAZs located within the same Census Block Group. Three ways to divide the single family and multi-family dwelling unit and population data among the NWFRPM TAZs were identified:

- Proportion data equally,
- Proportion data based on TAZ land area, or
- Proportion data based on the single family and multi-family population data in the validated NWFRPM 2010 ZONEDATA.

Analysis determined the most accurate method to allocate data from the Census Block Group to their corresponding TAZs is to proportion the 2015 data based on the data used in the 2010 NWFRPM. This data allocation process is similar to the method used to develop the ZONEDATA in the validated NWFRPM 2010 model.

ArcGIS was used to assign TAZs to Census Block Groups based on spatial location and to automate proportion calculations. After allocating the data from the Census Block Groups to the TAZs in ArcGIS, the single family and multi-family population was compared to the single family and multi-family population county control totals from the 2011– 2015 ACS Five Year Estimates, to ensure reasonable distribution. 2011-2015 ACS 5-Year Estimates were also used to develop variables representing single family and multi-family vehicle availability, and single family and multi-family percent vacant, non-permanent, and seasonal units. The percentage of single family and multi-family dwelling units with 0 vehicles, 1 vehicle, and 2 or more vehicles was calculated from each Census Block Group, to reflect auto availability. The percentage of vacant and non-permanent and vacant, non-permanent and seasonal dwelling units was calculated for each Census Block Group. Limitations of these datasets is that this data was not available detailing whether the units and their corresponding vacancies and vehicle availabilities were in a single family or multi-family structure. Therefore, the same calculated percentages are used for both dwelling unit types. After determining percentages for each Census Block Group, the data was assigned to the NWFRPM TAZs that best align with the locations of the Census Block Groups.

Hotel-Motel data were obtained from the FDBPR. A 2015 database of hotels and motels for all counties included in the NWFRPM provided information on the name, physical location, and number of rooms for each hotel and motel establishment. The records were geo-coded to the physical location of the business and assigned a NWFRPM TAZ based on this geo-coded location. Following this initial NWFRPM TAZ assignment, the hotel and motel records were verified to ensure proper geo-coding to the appropriate NWFRPM TAZ. Along NWFRPM TAZ boundaries, the geo-coded location and the actual physical location of the business were manually compared. Verification was completed by identifying actual physical location of the business using the following data sources: Google and Bing maps, county property appraisers' databases, the Better Business Bureau, and business websites. If the geocoded location of the actual physical location of the business was found incorrect, it was manually assigned to the correct TAZ. The total number of rooms in each NWFRPM TAZ was calculated by summing the number of rooms for all hotels and motels located within a NWFRPM TAZ.

The NWFRPM ZONEDATA represents employment data that detail the number of employees by industry category (industrial, commercial, or service). Employment data was obtained from the October 2014 Infogroup Dataset, procured from the FDOT Central Office Systems Implementation Office as purchased from Infogroup Business USA. This dataset details the businesses operating in the State of Florida and provides information on the Standard Industrial Classification (SIC) codes, industry category, number of employees, and physical location of the business place. Each employment record in the counties included in the NWFRPM was assigned a NWFRPM TAZ based on the geo-coded location. Following this initial assignment, employment record locations were verified using the same method detailed in the hotel and motel room data assignment and verification process. The number of employees for the three industry categories was then calculated by summing the employees for all businesses operating in a NWFRPM TAZ.

To determine K-12 public and private school enrollment databases of 2016-2017 public school enrollment and 2015-2016 private school enrollment were acquired from the FDOE for all counties located in the NWFRPM. These databases included information on the school name, physical location, and total membership for each school. Because a database detailing 2015-2016 public school enrollment was not available, the 2016-2017 enrollment was adjusted based on the 2015-2016 public school enrollment county control totals, received in a database by the FDOE. The difference between the 2015-2016 and 2016-2017 enrollment totals for each county was calculated, and the percentage adjustment required to get the 2016-2017 totals to match the 2015-2016 totals was determined. The same percentage was applied to each of the school enrollments reported in the 2016-2017 database to ensure consistency with the 2015-2016 data.

To determine the number of students enrolled in higher education for the 2015-2016 school year, a database of all institutions within the Florida College System was obtained from the FDOE. For university enrollment, private institutions, and state colleges with multiple campuses, 2015-2016 school enrollment and school name and physical address was obtained by contacting each institution's admission department. The addresses of the schools were then geocoded and assigned a TAZ based on their geocoded location. Following this initial assignment, school locations were verified using the same method detailed in the hotel and motel room data and employment data assignment and verification process.

Total K-12 school enrollment for each NWFRPM TAZ was calculated by summing the membership for all public and private schools located within a TAZ. Total higher education enrollment for each TAZ was calculated by summing enrollment of all colleges and universities located within a TAZ. Total school enrollment in a TAZ was calculated by summing the enrollment totals for all schools including K-12 public, private, and higher education institutions.

Table 4 shows the sources and methodology used to develop the ZONEDATA variables. **Table 5** provides a summary of the permanent population data from this model. **Table 6** provides a summary of employment totals from this model and Infogroup dataset.

Table 4. 2015 ZDATA1 File Data Sources and Methodology

Variable	Source	Method
Dwelling Units (Single and Multi-Family)	2011 – 2015 ACS 5-Year Estimates, Table B25024 – Units in Structure	Allocated single family and multi-family dwelling units from the Census Block Group level to the NWFRPM TAZs
Population (Single and Multi-Family)	2011 – 2015 ACS 5-Year Estimates, Table B25033 – Total Population in Occupied Housing Units by Tenure by Units in Structure	Allocated single family and multi-family population from the Census Block Group level to the NWFRPM TAZs
Percent Vacant, Non-Permanent, and Seasonal Units (Single and Multi-Family)	2011 – 2015 ACS 5-Year Estimates, Table B25004 – Vacancy Status	Calculated percent vacant, and seasonal single family and multi-family dwelling units for the Census Block Groups and allocated the percentages to the NWFRPM TAZs
Vehicle Availability (Single and Multi-Family)	2011 – 2015 ACS 5-Year Estimates, Table B25044 – Tenure by Vehicle Available	Calculated single family and multi-family percent vehicle availability for each Census Block Group and allocated the percentages to the NWFRPM TAZs
Hotel / Motel	Hotel / Motel database from FDBPR	Geo-coded addresses from the database and aggregated totals to NWFRPM TAZs
Employment	October 2014 InfoGroup dataset	Verified employment record geo-locations and aggregated number of employees by industry category to NWFRPM TAZs
School Enrollment	Public, Private and Higher Education School Databases from Florida Department of Education	Geo-coded addresses from databases and aggregated enrollment totals to NWFRPM TAZs

Source: HNTB

Table 5. Summary of Dwelling Units and Population Data

County	2015 Single Family Units	2015 Multi-Family Units	2015 Total Units
Bay	54,949	45,160	100,109
Calhoun	3,512	2,432	5,944
Escambia	96,350	41,828	138,178
Franklin	5,732	2,850	8,582
Gadsden	12,566	6,886	19,452
Gulf	6,457	2,700	9,157
Holmes	5,778	2,820	8,598
Jackson	13,265	7,615	20,880
Jefferson	4,210	2,392	6,602
Leon	74,582	51,333	125,915
Liberty	1,771	1,638	3,409
Okaloosa	62,902	31,336	94,238
Santa Rosa	52,050	14,736	66,786
Wakulla	8,098	4,743	12,841
Walton	27,149	19,769	46,918
Washington	6,010	4,690	10,700
Total	435,381	242,928	678,309
County	2015 Single Family Population	2015 Multi-Family Population	2015 Total Population
Bay	117,996	54,674	172,670
Calhoun	7,475	5,132	12,607
Escambia	227,129	59,997	287,126
Franklin	6,406	3,329	9,735
Gadsden	27,846	15,094	42,940
Gulf	10,155	3,299	13,454
Holmes	11,703	6,019	17,722
Jackson	26,501	14,621	41,122
Jefferson	7,843	3,899	11,742
Leon	175,183	94,123	269,306
Liberty	3,424	3,308	6,732
Okaloosa	147,561	39,339	186,900
Santa Rosa	130,043	25,419	155,462
Wakulla	17,672	9,829	27,501
Walton	38,511	18,939	57,450
Washington	12,455	9,509	21,964
Total	967,903	366,530	1,334,433

Source: HNTB, 2011 – 2015 ACS 5-Year Estimates

Table 6. Summary of Employment Data

County	2015 Industrial Employment	2015 Commercial Employment	2015 Service Employment	2015 Total Employment
Bay	10,042	54,013	24,867	88,922
Calhoun	554	2,544	957	4,055
Escambia	20,776	102,896	37,227	160,899
Franklin	279	2,694	1,060	4,033
Gadsden	1,721	7,247	3,412	12,380
Gulf	537	3,428	757	4,722
Holmes	428	2,485	706	3,619
Jackson	1,254	10,249	3,440	14,943
Jefferson	336	1,895	652	2,883
Leon	10,816	116,257	31,890	158,963
Liberty	110	796	197	1,103
Okaloosa	8,343	51,531	24,715	84,589
Santa Rosa	3,780	23,951	10,401	38,132
Wakulla	969	3,312	1,561	5,842
Walton	4,429	12,712	8,166	25,307
Washington	529	4,783	1,288	6,600
Total	64,903	400,793	151,296	616,992

Source: HNTB Calculations, October 2014 InfoGroup Business USA

2.3. Model Parameters

As explained in Section 1.2, lifestyle models require additional variables used to further clarify household characteristics and their impact on trip taking. These variables are found in two additional datasets (ZDATA_RETIRED_CHILDREN.DBF and ZDATA_PCTAUTOS.DBF) These files are separate from the ZONEDATA_15A file, and include information on the percentage of retired households, percentage of working households with children, percentage of working households without children, and percentage of households by autos available. Similar to the ZONEDATA, these datasets were developed from the US Census Bureau's 2011-2015 ACS 5-Year Estimates.

Several other parameters are required in the trip generation module. They include trip production rates, trip attraction rates, and special generators (SPECGEN_15A.CSV). This section will describe the methodology used to develop these model parameters and additional lifestyle variables.

2.3.1. ZDATA_Retired_Children.DBF

The ZDATA_RETIRED_CHILDREN.DBF details the percent of households composed of retirees, workers with children, and workers without children. To calculate the households with retirees in

each Census Block Group, an assumption was made that the common age of retirement is 65, so households with a householder in the age cohorts of 65 years or older were considered retired. To calculate households with children, an assumption was made that all households with the presence of related children under the age of 18 were working households with children. **Table 7** shows the sources and methodology used to develop these lifestyle variables.

2.3.2. ZData_PCTAutos. DBF

Auto availability data contained in the standard FSUTMS ZONEDATA is replaced with this dataset. ZDATA_PCTAUTOS.DBF is a separate auto availability percentage file that details the percentage of dwelling units with 0, 1, 2, and 3 or more vehicles available. These percentages were calculated by dividing the number of units with each vehicle availability by the total number of dwelling units in the Census Block Group. Each vehicle availability percentage is reported as a decimal to the thousandths place in the dataset.

2.3.3. Trip Generation Rates

Trip generation rates consist of two components for each trip purpose: production and attraction rates. The 2015 NWFRPM was based on the TBRPM lifestyle approach, which characterizes households as retired, working with children, and working without children. Home-based trip productions are applied to these categories, and trip rates are further stratified by auto ownership levels (0, 1, 2, and 3+). The total number of home-based trips produced for a given zone is determined by applying the appropriate trip production rate. Trip production rates are located in the GENRATES_LIFESYTLE.DBF file. A further breakdown of the stratification of household classifications and their corresponding trip production rates are shown in **Table 7**.

Trip attraction rates were developed from the validated 2010 NWFRPM and CRTPA models and initially used for the expanded model application. After multiple model calibration runs, without modification of trip attraction rates, new rates were estimated using results from an Origin Destination Matrix Estimation (ODME) process. The ODME process generates an O-D matrix that closely replicates traffic counts when assigned to the highway network. This application of the ODME process used the O-D table from previous calibration runs as the seed matrix, and placed bounds on changes to ensure trip ends and trip-length frequencies of the estimated matrix remained reasonably close to desired targets. New trip attraction rates were estimated using linear regression methods with ODME trip attractions, with trip purposes being the dependent variable, and the zonal socio-economic data as the independent variable.

Since the model coverage area was expanded, a revised subarea numbering scheme was established for the 2015 NWFRPM, which aligns with the TPO/TPA jurisdictions, while using counties as the fundamental geography for groupings. **Figure 5** displays the revised subareas. Trip attraction rates coincide with each of the model's planning areas. They are in the following files: ESARATES.DBF (Florida-Alabama TPO), OKWAARATES.DBF (Okaloosa-Walton TPO), BAARATES.DBF (Bay County TPO), TAARATES.DBF (CRTPA), and RUARATES.DBF (Rural Areas). The trip attraction rates for FATPO, OWTP, Bay County TPO, CRTPA, Hotel-Motel, and rural counties are shown in **Tables 8 – 13**, respectively.

Figure 5. Revised NWFRPM Sub-areas



Table 7. Trip Production Rates

CATEGORY	PURPOSE	AUTOS	HHTYPE	PRATE	PURNAME	HHNAME
101	1	0	1	0.07	HBW	Retired
111	1	1	1	0.39	HBW	Retired
121	1	2	1	0.56	HBW	Retired
131	1	3	1	0.89	HBW	Retired
102	1	0	2	1.33	HBW	WNC
112	1	1	2	1.66	HBW	WNC
122	1	2	2	2.76	HBW	WNC
132	1	3	2	3.35	HBW	WNC
103	1	0	3	0.64	HBW	WWC
113	1	1	3	2.25	HBW	WWC
123	1	2	3	2.69	HBW	WWC
133	1	3	3	2.85	HBW	WWC
201	2	0	1	0.29	HBSH	Retired
211	2	1	1	0.88	HBSH	Retired
221	2	2	1	1.23	HBSH	Retired
231	2	3	1	1.36	HBSH	Retired
202	2	0	2	0.09	HBSH	WNC
212	2	1	2	0.36	HBSH	WNC
222	2	2	2	0.67	HBSH	WNC
232	2	3	2	0.85	HBSH	WNC
203	2	0	3	0.11	HBSH	WWC
213	2	1	3	0.51	HBSH	WWC
223	2	2	3	0.86	HBSH	WWC
233	2	3	3	0.99	HBSH	WWC
301	3	0	1	1.39	HBSR	Retired
311	3	1	1	2.19	HBSR	Retired
321	3	2	1	3.39	HBSR	Retired
331	3	3	1	3.67	HBSR	Retired
302	3	0	2	0.44	HBSR	WNC
312	3	1	2	1.09	HBSR	WNC
322	3	2	2	1.83	HBSR	WNC
332	3	3	2	2.35	HBSR	WNC
303	3	0	3	0.78	HBSR	WWC
313	3	1	3	1.71	HBSR	WWC
323	3	2	3	2.89	HBSR	WWC
333	3	3	3	3.15	HBSR	WWC
401	4	0	1	0.61	HBO	Retired
411	4	1	1	1.85	HBO	Retired
421	4	2	1	2.15	HBO	Retired

431	4	3	1	2.36	HBO	Retired
402	4	0	2	0.47	HBO	WNC
412	4	1	2	0.73	HBO	WNC
422	4	2	2	1.47	HBO	WNC
432	4	3	2	1.71	HBO	WNC
403	4	0	3	2.9	HBO	WWC
413	4	1	3	4.94	HBO	WWC
423	4	2	3	6.47	HBO	WWC
433	4	3	3	7.19	HBO	WWC

Note: AUTOS= auto per household. HHTYPE= type of household

HBW= home-based work trip

HBSH= home-based shopping trip

HBSR= home-based social recreational trip

HBO= home-based other trip

Retired= Retired Households

WNC= Working Households with no Children

WWC= Working Households with Children

Table 8. FATPO Trip Attraction Rates

PURPOSE	ARAT_IEMP	ARAT_CEMP	ARAT_SEMP	ARAT_TEMP	ARAT_TOTDU	ARAT_SENR
1	1.44	1.64	0.88	0.00	0.00	0.00
2	0.00	2.06	0.00	0.00	0.00	0.00
3	0.00	1.40	0.84	0.00	0.59	0.00
4	0.00	1.32	1.08	0.00	0.36	1.35
5	0.00	2.72	1.06	0.00	0.44	0.00
6	0.37	0.40	0.36	0.00	0.34	0.00

Table 9. Okaloosa-Walton TPO Trip Attraction Rates

PURPOSE	ARAT_IEMP	ARAT_CEMP	ARAT_SEMP	ARAT_TEMP	ARAT_TOTDU	ARAT_SENR
1	2.11	1.53	1.74	0.00	0.00	0.00
2	0.00	2.02	0.06	0.00	0.00	0.00
3	0.00	1.56	1.40	0.00	0.62	0.00
4	0.00	1.98	1.33	0.00	0.44	1.65
5	0.00	2.35	1.04	0.00	0.25	0.00
6	0.56	0.44	0.40	0.00	0.30	0.00

Table 10. Bay County TPO Trip Attraction Rates

PURPOSE	ARAT_IEMP	ARAT_CEMP	ARAT_SEMP	ARAT_TEMP	ARAT_TOTDU	ARAT_SENR
1	2.67	2.03	1.30	0.00	0.00	0.00
2	0.00	1.84	0.03	0.00	0.00	0.00
3	0.00	1.66	1.16	0.00	0.66	0.00
4	0.00	1.84	1.19	0.00	0.40	1.96
5	0.00	2.63	0.97	0.00	0.50	0.00
6	0.62	0.47	0.33	0.00	0.34	0.00

Table 11. CRTPA Trip Attraction Rates

PURPOSE	ARATEIND	ARATECOM	ARATESVC	ARATETOT	ARATEDUS	ARATESCH
1	1.67	1.40	1.25	0.00	0.00	0.00
2	0.00	2.05	0.00	0.00	0.00	0.00
3	0.00	1.16	1.04	0.00	0.43	0.00
4	0.00	1.90	1.22	0.00	0.09	1.26
5	0.00	3.52	1.12	0.00	0.13	0.00
6	0.50	0.44	0.39	0.00	0.27	0.00

Table 12. Hotel and Motel Population Trip Attraction Rates

PURPOSE	HMPRATE
1	0.49
2	0.34
3	2.72
4	0.13
5	0.00
6	0.03
7	0.00

Table 13. Rural County Trip Attraction Rates

PURPOSE	ARAT_IEMP	ARAT_CEMP	ARAT_SEMP	ARAT_TEMP	ARAT_TOTDU	ARAT_SENR
1	1.27	1.80	1.64	0.00	0.00	0.00
2	0.00	1.70	0.14	0.00	0.00	0.00
3	0.00	1.47	1.46	0.00	0.52	0.00
4	0.00	1.41	1.54	0.00	0.27	1.72
5	0.00	2.28	1.18	0.00	0.24	0.00
6	0.31	0.36	0.38	0.00	0.25	0.00

2.3.4. Special Generators

Special generators are used for activity centers that have a rate of activity significantly different from standard trip generation rates utilized in the trip generation model. Examples of these activity centers in the NWFRPM include recreational areas, colleges/universities, military bases, and shopping malls. Applications of special generator zones deviate from trip generation procedures used in other TAZs and may create complications during future year model applications. Therefore, initial model runs were conducted without special generator adjustments. After running the model from trip generation through trip assignment, it was noticed that the military bases, with the exception of Naval Air Station (NAS) Pensacola and “NAS Mainside”, were attracting a considerably lower number of trips than the 2015 traffic counts indicated. The recreational areas, shopping centers, and colleges were all attracting considerably fewer trips than traffic counts indicated.

To account for these discrepancies, special generator adjustments were then made for the areas mentioned above using the 2015 NWFRPM Special Generators file, labeled “SPECGEN_15A.csv”. The number of trip productions and/or attractions to these special generators was either increased or decreased based on the circumstances and professional judgement. The model was run again from trip generation through trip assignment and resulted in V/C ratios that were within acceptable ranges. **Table 14** provides a summary of special generator trips used in the validated 2015 NWFRPM.

Table 14. Special Generator Trips

TAZ	DESCRIPTION	TRIPS			PERCENTAGES BY TRIP PURPOSE				
		P/A		NUMBER OF P/A	HBW	HBSH	HBSR	HBO	NHB
254	UWF Group Quarters	P	+	22000	0	20	20	60	0
698	Eglin AFB	P	+	4000	30	20	20	20	10
699	Eglin AFB	P	+	18000	40	20	20	20	0
713	Eglin AFB	P	+	5000	30	20	20	20	10
1305	Tyndall AFB	P	+	25000	70	0	0	0	30
1628	ST. JOSEPH PENINSULA, GULF CO	P	+	1500	30	30	0	30	10
1671	ST. GEORGE ISLAND, FRANKLIN CO	P	+	4000	30	30	0	30	10
1692	ALLIGATOR POINT, FRANKLIN CO.	P	+	500	30	30	0	30	10
2128	FAMU	P	+	5000	0	0	0	100	0
2226	FAMU	P	+	3000	0	0	10	40	50
2240	FSU	P	+	5000	0	0	0	80	20
2243	FSU	P	+	3000	0	0	0	80	20
2244	FSU	P	+	1000	0	0	20	60	20
2246	FSU	P	+	3500	0	0	0	80	20
2247	FSU	P	+	1000	0	0	20	60	20
2248	FSU	P	+	3800	0	0	0	80	20
2376	TCC Student Housing	P	+	3500	0	0	10	90	0
108	Misc Navy Facilities	A	-	1000	0	0	0	50	50
174	Pensacola Airport	A	+	10000	0	0	0	100	0
209	NAS Pensacola	A	-	15000	40	0	30	0	30
220	Saufley Field	A	+	4000	0	0	0	100	0
234	Johnson Beach	A	+	1000	0	0	50	50	0
268	Fort Pickens	A	+	6000	0	80	0	20	0
487	Santa Rosa Island	A	+	4500	0	80	0	20	0
557	PJC Milton	A	+	12000	0	0	86	14	0
661	Santa Rosa Mall	A	+	5000	0	40	0	0	60

669	Hurlburt Field	A	+	8000	0	0	0	100	0
696	Eglin AFB	A	+	1200	20	5	20	35	20
698	Eglin AFB	A	+	20000	50	0	0	0	50
705	Ft. Walton Beach Park	A	+	15000	0	0	0	0	100
713	Eglin AFB	A	+	5000	50	0	0	25	25
761	Destin-Ft. Walton Beach Airport	A	+	35000	0	0	0	20	80
768	HENDERSON BEACH PARK	A	+	5000	0	0	0	0	100
844	Okaloosa Regional Airport	A	+	15000	0	0	0	0	100
971	Grayton Beach Park - Seaside	A	+	10000	0	0	0	0	100
1186	PANAMA CITY-BAY CO.AIRPORT	A	+	15000	0	0	0	0	100
1310	St. Andrews State Park	A	+	10000	0	0	0	0	100
2127	FAMU	A	+	12000	0	0	0	40	60
2201	Governor's Square Mall	A	+	12000	0	40	0	0	60
2245	FSU	A	+	16000	0	0	0	40	60
2250	FSU	A	+	12000	0	0	0	40	60
2375	TCC	A	+	20000	0	0	0	40	60
2754	Tallahassee Airport	A	+	15000	0	0	0	80	20

Note: P= Productions, A= Attractions

+ = additional, - = subtracted

HBW= home-based work trip

HBSH= home-based shopping trip

HBSR= home-based social recreational trip

HBO= home-based other trip

NHB= Non-home-based trip

2.4. Model Results

Validation of the 2015 NWFRPM was evaluated based on comparisons of aggregate trip rates and trips by purpose against the 2010 NWFRPM. Aggregate trip rates included the total number of study area trips per person, dwelling unit, and employee. Comparisons of trips by purpose included the number of productions, percent of productions, and unbalanced attractions for each purpose. Evaluations of balanced versus unbalanced trip attractions were also used in assessing model performance.

2.4.1. Aggregate Trip Rates

Table 15 shows a summary of the aggregate trip rates. The number of persons per household and total number of trips per dwelling unit (household) for the 2015 NWFRPM was higher than the 2010 NWFRPM. Trips per person and trips per employee, however, decreased when compared with the 2010 NWFRPM.

Table 15. Aggregate Trip Rate Comparison

Unit of Measure	2015 NWFRPM	2010 NWFRPM
Person per Household	2.74	2.44
Internal Trips per Household	10.48	9.46
Internal Trips per Person	3.82	4.60
Internal Trips per Employee	8.77	9.34

2.4.2. Percent of Trips by Purpose

The percent of trips by purpose did differ significantly from the 2010 NWFRPM used in the comparison. Home-based work, home-based other, and truck-taxi represented about the same proportion of trips. Home-based social/recreation doubled when compared with the 2010 NWFRPM. Home-based shop and non-home-based trips were both reduced by 5 percent. The percentage of internal-external trips was roughly the same as the 2010 NWFRPM. **Table 16** shows a summary of trips by purpose.

Table 16. Summary of Trips by Purpose

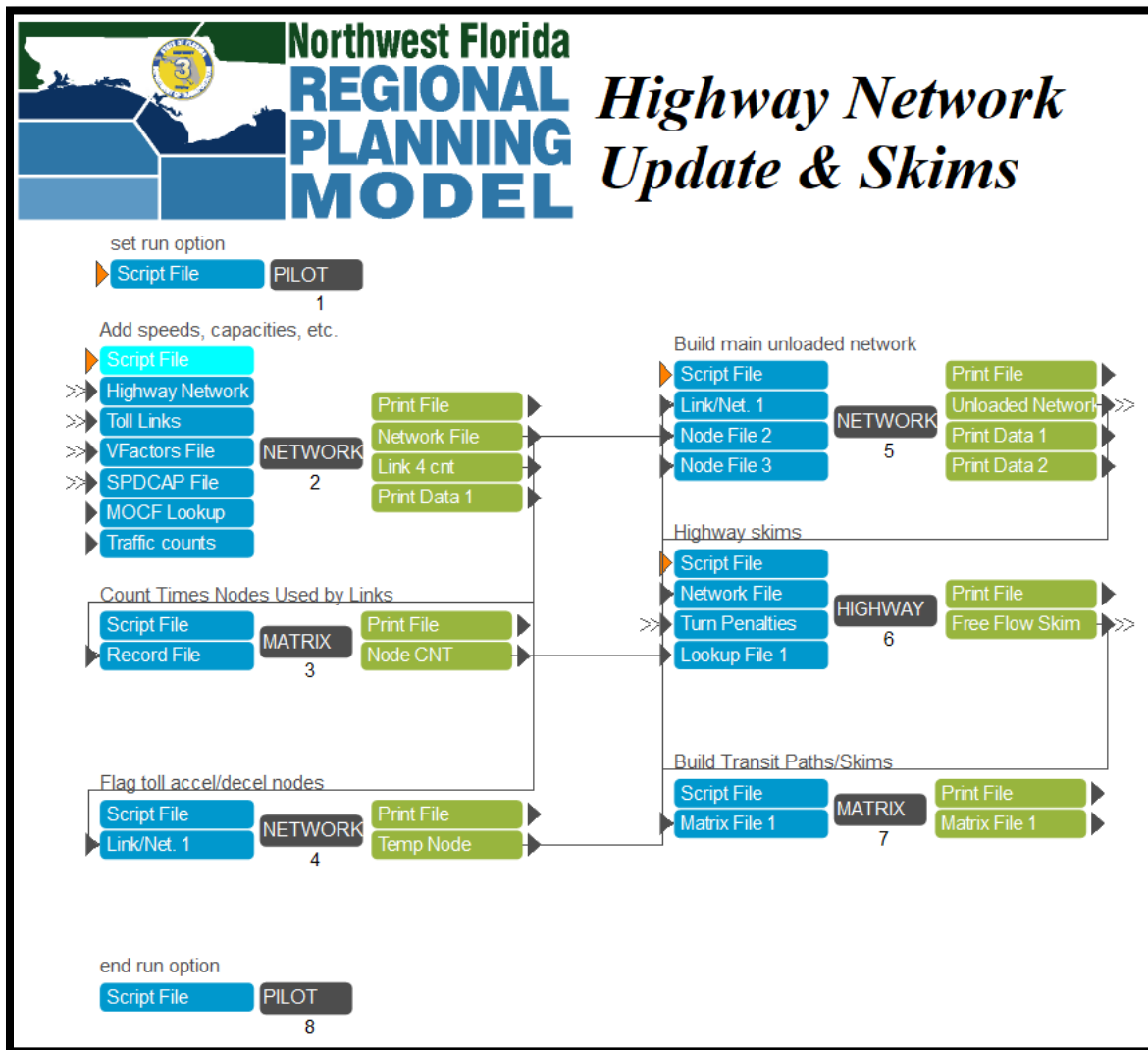
Trip Purpose	2015 NWFRPM	2010 NWFRPM
	% by Productions	% by Productions
Home-Based Work	18%	17%
Home-Based Shop	7%	12%
Home-Based Soc-Rec	24%	12%
Home-Based Other	22%	23%
Non-Home-Based	18%	23%
Truck-Taxi	8%	8%
Internal-External	2%	4%
Total	100%	100%

3. Highway Network

The highway network represents the transportation system in the travel demand model study area. The highway network includes a series of interconnected “links”, each containing a set of attributes relevant to simulating highway conditions. The FSUTMS highway network coding standards including the area type and facility type conventions, VFACTORS, and SPDCAP default values were all included as well as location and district attributes to identify areas within existing travel demand models. Traffic count information and screenlines were also added for validation purposes. In addition to the inclusion of these attributes, highway paths are built in as well as turning movement prohibitors. **Figure 6** displays the highway network step flowchart.

The highway network was prepared for the base year 2015 condition for the 16 counties in the NWFRPM study area. Verification of network characteristics was subsequently completed through use of maps, aerial photography, network plots, and field data inventory.

Figure 6. Highway Network Model Flowchart



3.1. Network Development

The highway network (HWYNET_15A.NET) was developed for the base year of 2015. The 2010 validated network was used as the basis for the 2015 network and was updated to reflect any improvements made to the highway network between 2010 and 2015. These improvements were identified from the various TPO/TPA Transportation Improvement Programs (TIPs) and the FDOT 5-Year Work Program. The expanded network is based upon Census TigerLine files, aerial photography, and local knowledge.

3.2. Network Parameters

Each link in the network has a series of attributes that describe the roadway characteristics. The full list of attributes is included in **Appendix B**.

The speed-capacity lookup table (FDOT.SPEEDCAP.DBF) values were developed as a function of the standard two-digit FSUTMS area types and facility types, which are consistent with the FDOT Generalized Service Volume Tables. Area types are used to define land uses adjacent to each roadway, and facility types are used to classify roadways by function and design characteristics. Speed and capacity values were prepared for every combination of area type groups, facility type groups, and number of lanes (1 lane to 9 lanes). The highway link's uncongested travel speed and capacity are input into the highway network through the speed-capacity lookup table, which is used to calculate travel times. Area type and facility type coding found in the TPO/TPA networks were compared for consistency against the NWFRPM 2015 network prior to the start of the validation process. Additional review and refinement of the highway network's speeds and capacities were adjusted to better replicate traffic flow during the validation process.

Model output volumes represent PSWADT. To convert PSWADT to AADT, the applicable MOCF from the 2015 FTI DVD was added to all network links. Each county code (CO_CODE) is assigned a MOCF used to automatically read from the traffic counts database (Base_Year_FDOT_Counts.DBF) and convert PSWADT to AADT and vice versa. AADT volumes are required when estimating design hour traffic and performing operational analysis. The model also compares the resulting AADT volumes to capacities to attach the associated level of service (LOS) values to output networks.

A toll link (Tolllink_15A.DAT) file is included in the NWFRPM to represent toll plazas in the highway network. This fixed-format text file contains data identifying the locations, capacities, service times, prices, and methods of toll collection at each toll plaza and is used to calculate toll delays in the model. This file contains the existing toll links in the network, which include the Bob Sikes Bridge, Mid-Bay Bridge, and Garcon Point Bridge. The toll link file was updated as part of the 2015 validation to incorporate new toll links in the network. These new toll links include the Orchard Pond Parkway and Mid-Bay Bridge Connector.

3.3. Traffic Count Data

The validation of a travel demand model relies on the existence of extensive base year traffic count data. Volume-to-count ratios generated by the model are used to measure the ability of a travel demand model's highway assignment to simulate known traffic conditions. Traffic counts are needed for a variety of different roadway categories distributed throughout the study area in order to validate highway assignment performance along screenlines, as well as by facility type, area type, and lane configuration. The base year model is validated to traffic count data obtained from the 2015 FTI DVD, the 2015 City of Tallahassee traffic counts, and the 2015 Leon County traffic counts. The traffic data from the 2015 FTI DVD are included as AADT, whereas the 2015 traffic data from the City of Tallahassee and Leon County are included as total daily volumes.

3.4. Highway Paths and Skims

The NWFRPM highway path module uses standard Cube Voyager procedures to build time and distance skim matrices. These paths are defined as the shortest time path through the highway network for each zonal pair. Terminal time and intrazonal times are also added to the intrazonal skims. Intrazonal times represent the travel time assumed for trips that begin and end in the same TAZ. These times are calculated as one-half the travel time from one zone to the nearest adjacent

zone. Terminal times represent the time at either end of a trip to travel from an origin to the network or from the network to a final destination. This accounts for the time necessary to walk to or from the vehicle used for any given trip and to park. The terminal times from the 2010 NWFRPM were used for the validation because the validation results were within an acceptable range.

Skims are updated with terminal times, which are a function of area type and intrazonal times. Turn prohibitors (TURN_15A.PEN) are also added at this stage. Free-flow travel time skims between zone pairs are developed during the highway network module. Highway network characteristics are input into this process.

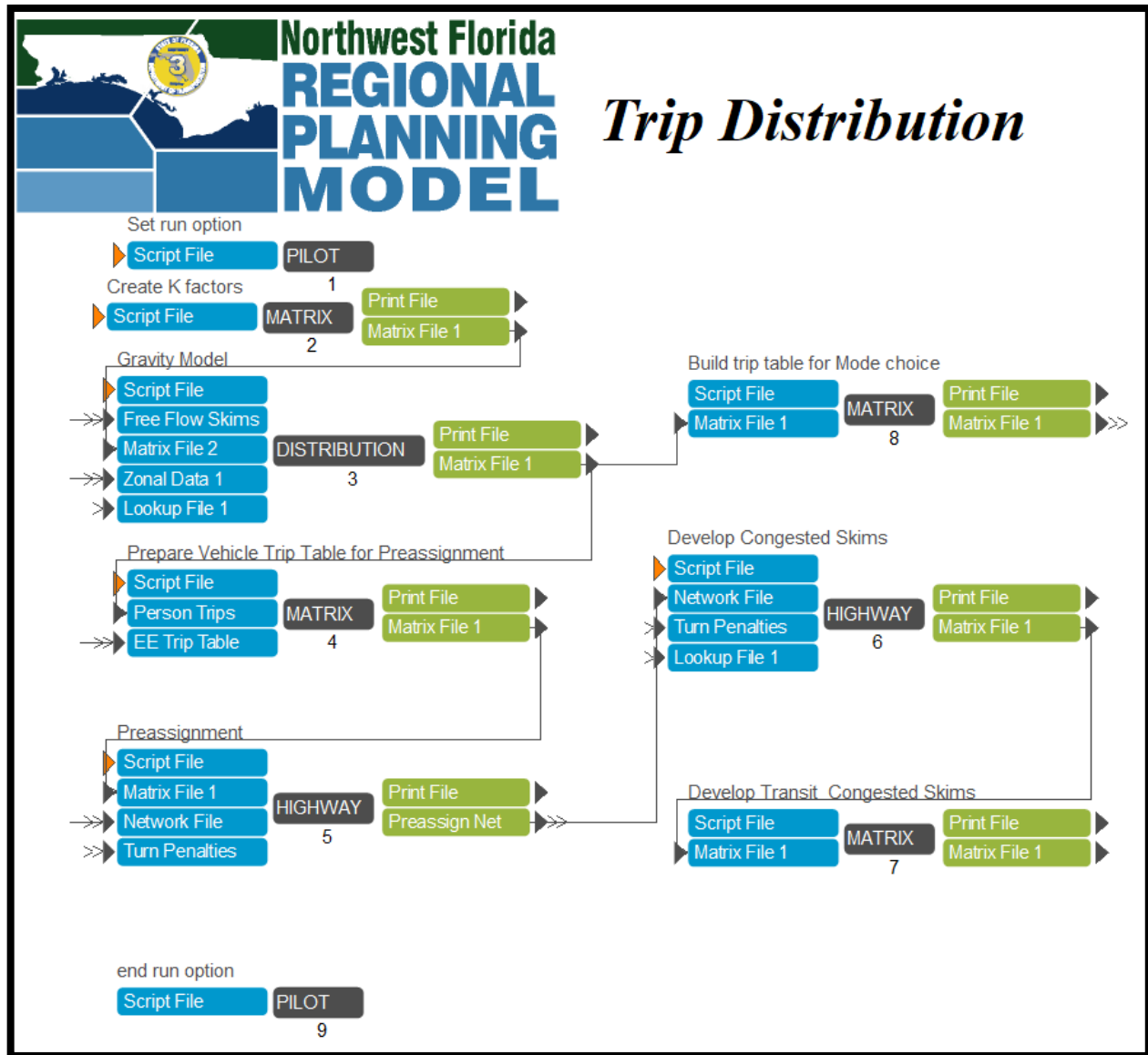
3.5. Model Results

The highway network has 22,340 nodes and 52,931 links, of which 2,455 have traffic counts. More details are presented in **Chapter 7, Trip Assignment**.

4. Trip Distribution

Trip distribution is a critical component of the regional model because it creates the trip tables that are later assigned to the highway network. It is a challenge to validate since the only data sources for its development were parameters and statistics from other geographies in and out of the State of Florida. The sub-programs within the distribution step are depicted in **Figure 7** below.

Figure 7. Trip Distribution Step Flowchart



4.1. Model Development

As standard per FSUTMS procedures, a gravity model is used to estimate the number of trip ends produced at each TAZ, per trip purpose, that is being attracted by all or parts of the other TAZs in

the network. It is also necessary to have some measure of the spatial separation of the TAZs or travel impedances, which is usually measured in time units, distance, or costs.

The trip generation step of the model created zonal records for all trip productions and attractions. The network step produced the travel path skim matrices based on travel time and cost, as well as distances, including terminal times, intra-zonal times, time penalties and turning movement prohibitors. In addition to these inputs, a travel function must be incorporated to replicate drivers' behavior for the different trip purposes, which is known as the friction factor.

Friction factors are derived from travel characteristics surveys and they generally follow well studied curves' shapes; i.e., empirical values taken from surveys can be represented by mathematical functions that replicate the trip length distribution and the average trip lengths by purpose. The trip length distribution curve shows a few motorized trips for short distances, followed by higher number of trips for medium trip durations and then decreasing number of trips as time and/or distance increases. These curves can be different for different trip purposes, as it is the case for home-based work trips which usually have a longer commute time than a trip to the grocery store.

Lacking any kind of travel survey for the whole region under study, one proven way to develop these friction factors is the “gamma function”, which is recommended by the Transportation Research Board publication NCHRP Report 365 – Travel Estimation Techniques for Urban Planning (National Academy Press, Washington D.C., 1998). As a reference, this is the same function that was used in the development of the Florida Statewide Model. The gamma function is represented by the following equation:

$$F_{ij} = a \times t_{ij}^b \times e^{c \times t_{ij}}$$

Where:

F_{ij} = friction factor between origin TAZ “i” and destination TAZ “j”

a = a constant scaling factor coefficient that does not affect the shape of the distribution

b and c = model coefficients, usually a negative value, calibrated for the different trip purposes.

t_{ij} = time or most appropriately, generalized cost of travel between “i” and “j”

t = same as above

e = the base of the natural logarithms

The gamma function is used to generate a lookup table that is then used by the gravity model.

After a few model validation runs, it was apparent that additional restrictions needed to be in place to avoid the gravity model mathematical design to distribute trips based on the internal TAZs attractiveness (measured by, among other things, the total trip attractions). For example, it is not realistic that trips produced in Franklin County external zones would be attracted to the NAS TAZ in Pensacola just because it has a huge employment base. The mathematical model should be additionally restricted by a maximum distance parameter so that it does not encourage travel between zones that are too far apart for specific trip purposes. IE trips showed that behavior so that a skim matrix based on this maximum distance parameter was created and a different friction factor for short

distances IE trips was implemented. The Florida Statewide Model was used as a reference, since it applies similar procedures for path building and trip distribution.

4.2. Model Parameters

As discussed in the previous section, a set of friction factors was created, which are included in the FF.DBF file. There is a maximum time limit of 300 minutes for trip distribution. A summary of the gamma function coefficients, by trip purpose, is shown in **Table 17**. The maximum number of iterations was set to MAXITERS=50 for the gravity model as well as a maximum root mean square error (RMSE) of MAXRMSE=10.

Table 17. Gamma Function Coefficients for Friction Factors

Trip Purpose	a	b	c
HBW	28,507	-0.020	-0.123
HBSH	139,173	-1.285	-.0.094
HBSR	139,173	-1.285	-.0.094
HBO	139,173	-1.285	-.0.094
NHB	219,113	-1.332	-0.100
TT	219,113	-1.332	-0.100
IE	1,000,000	-4.346	0.000

Source: NCHRP Report 365 and Florida Statewide Model scripts

4.3. Model Results

For the validation effort, two basic results are expected from the trip distribution step. First, trip length averages should be reasonable when compared amongst trip purposes within the region and across other urban areas outside the region. Second, the trip length distribution curves should be comparable to other urban area travel demand model outputs. **Table 18** shows that the 2015 NWFRPM average trip lengths (presented in minutes) are reasonable and similar to the 2010 NWFRPM.

Trip length distribution curves are presented in **Appendix C**. Their distribution is similar to the expected shapes from nationally recognized publications such as *NCHRP Report 365* and two United States Department of Transportation (USDOT) Federal Highway Administration (FHWA) publications on the subject entitled *Calibration and Adjustment of System Planning Models, December 1990* and *Model Validation and Reasonableness Checking Manual February 1997*.

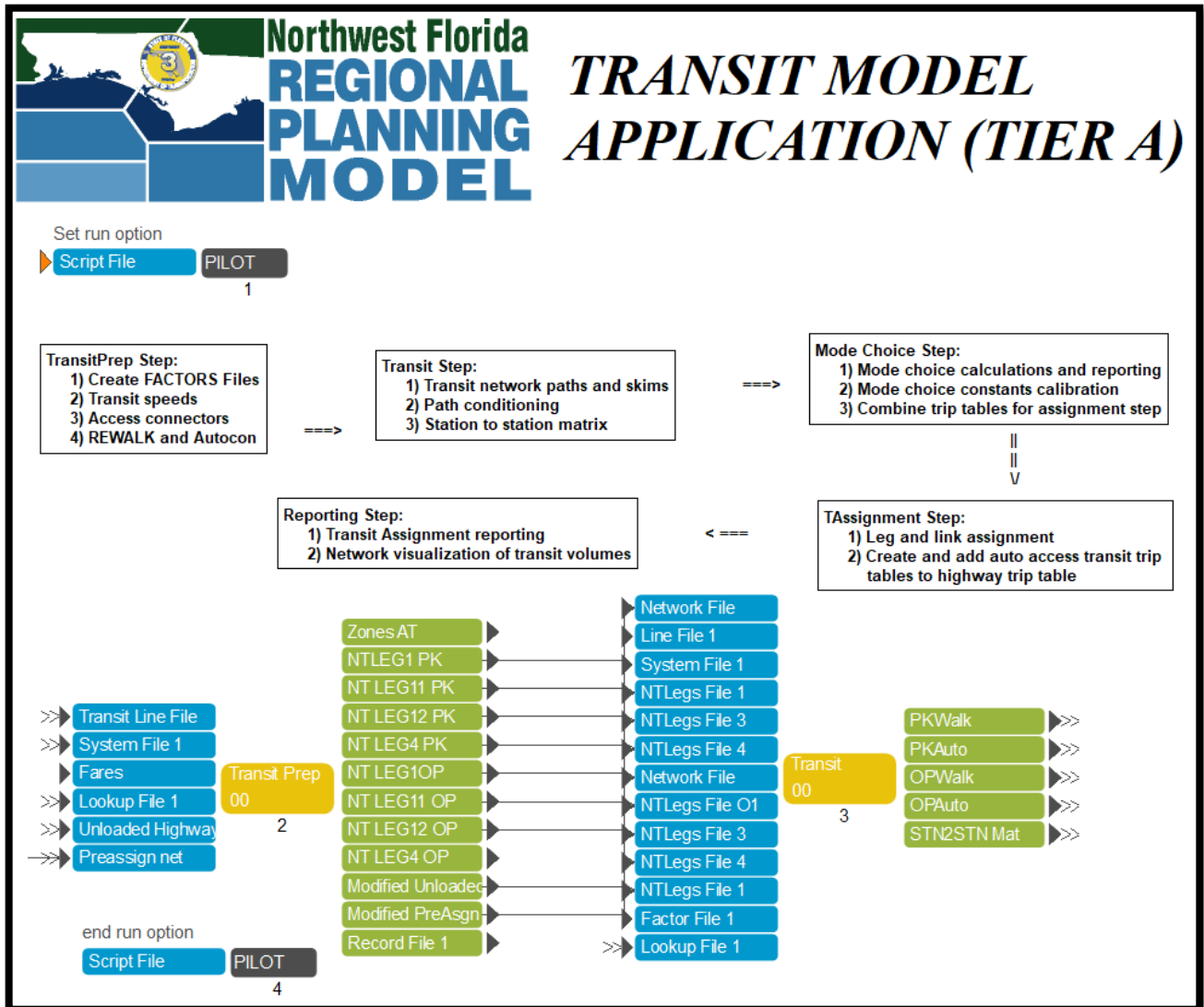
Table 18. Trip Distribution Statistics

Trip Purpose	2015 NWFRPM Model	2010 NWFRPM Model
Home-Based Work	19.38	19.86
Home-Based Shop	18.09	18.32
Home-Based Soc-Rec	17.84	17.65
Home-Based Other	20.11	16.98
Non-Home-Based	17.23	13.76
Truck-Taxi	18.89	14.46
Internal-External	63.84	74.77
Total	25.05	25.11

5. Transit Model

StarMetro provides the transit service for the Tallahassee area. The transit service in the region is a fixed-route bus network. The Cube Voyager Public Transport (PT) program is used to represent the transit network in the NWFRPM. Transit path building involves the generation of zone-to-zone transit paths, transit skims, and transit fares. These files are built for peak and off-peak periods. **Figure 8** shows the corresponding flowchart for this step.

Figure 8. Transit Model Flowchart



5.1. Transit Network

The transit network for the 2015 base year was created for the model validation based on data from StarMetro, which was used to code transit routes and stop locations. The transit network comprises several files, which include a highway network file, transit line file, and line attributes. The line attributes included in the transit network are listed in **Appendix D**.

Transit parameters were created based on information obtained from StarMetro. Each transit route in the transit line file is assigned a mode number. Modal definitions follow FSUTMS transit modeling standards. All StarMetro routes are local bus routes and therefore are coded as Mode 21. Each transit line is also assigned an operator. Operators represent the different types of service offered by the system and they are used to define the boarding and transfer fares. The fare attached to the link is mapped to the operator in the factor files. All StarMetro service uses a flat-fare system. The fare structure in 2015 was used.

The transit network in the NWFRPM has been established to accommodate walk and auto access modes for local bus service. Like other FSUTMS models, the NWFRPM uses the “AM” designation for “peak” transit trips and “MD” for “off-peak” transit trips. There is not a true time of day description. Rather, the “peak” period refers to home-based work trips while the “off-peak” refers to all other internal person trip purposes from trip distribution. The mode definitions that were developed for the 2010 NWFRPM were also used in the 2015 NWFRPM.

5.2. Transit Paths

The PT scripts are used to obtain travel times and costs for transit service based on access mode. The transit path application first identifies the minimum paths between all pairs of zones by all available transit modes. After paths are created and travel time skims are constructed, the transit cost for each preferred path is calculated based on boarding and transfer fares. Multiple paths are built for the AM and MD periods. The nested logit model requires three sets of transit paths for each AM and MD period. The path parameters are defined in the individual path factor files.

Transit skims are the travel cost components obtained from the transit paths. These are required by the mode choice model in calculating the share of the different paths. There is a skim matrix for each path and each of these matrices has 15 tables, which are listed in **Table 19**.

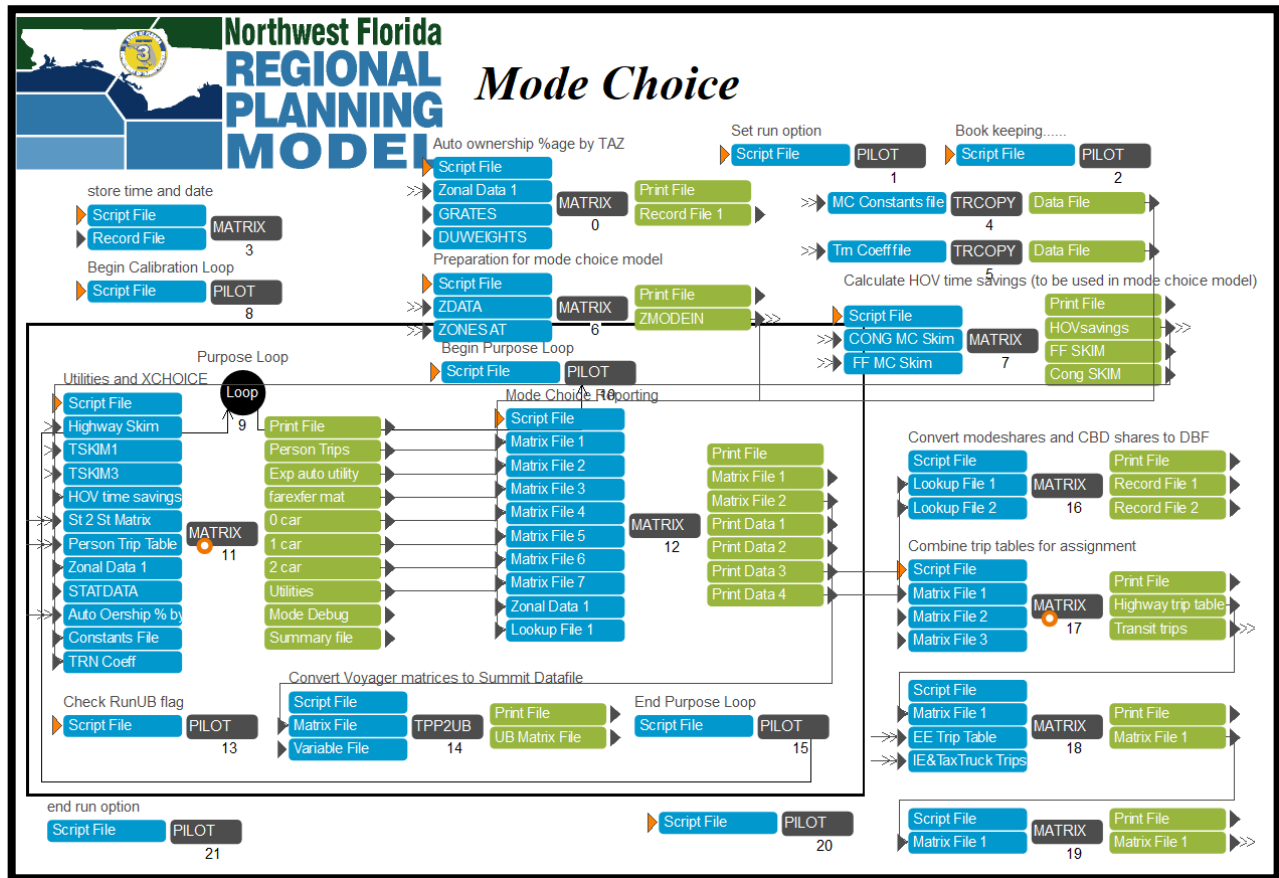
Table 19. Intrazonal Travel

Table Number	Name	Modes Include
1	Walk Access Time	Walk-access, walk-egress, station access
2	Drive Access Time to Bus	Weighted drive-access time plus weighted auto occupancy cost, parking cost & terminal time
3	Sidewalk / Transfer Time	Transfer time
4	Bus In-Vehicle Time	All local, express and BRT bus service
5	Premium Bus In-Vehicle Time	Limited stop service
6	Circulator In-Vehicle Time	Circulators, street cars, trolleys
7	Light / Heavy Rail In-Vehicle Time	Light rail, heavy rail
8	Commuter Rail In-Vehicle Time	Commuter rail
9	Other Mode	Typically mode introduced before project mode
10	Project Mode In-Vehicle Time	New mode that is object of alternatives analysis
11	Boarding	All transit modes
12	Initial Wait Time	All transit modes
13	Transfer Wait Time	All transit modes
14	Fare	All transit modes
15	Total Transit Time	All modes

6. Mode Choice

The NWFRPM mode choice model uses a nested logit formulation. A nested logit model is a behavioral model that estimates the probability of a decision maker's choice of taking an alternative from a set of alternatives. **Figure 9** shows the corresponding flowchart for this step.

Figure 9. Mode Choice Flowchart



6.1. Mode Choice Structure

A nested logit mode choice model works by computing the utility for each of the bottom level choices. The utility represents the total economic “cost” in terms of travel time, fare, or other cost and other impediments/inducements to travel associated with each mode. It is typically constructed as a linear function of the different components of time and cost. The choices at the top level are auto and transit. The auto nest is divided into drive-alone and shared-ride trips. Shared-ride trips are further divided into 2 passenger and 3+ passenger trips. The transit nest is divided into the access markets, which include walk access and auto access. The access trips are further divided into bus and premium modes.

The total person trips are divided into 0-auto, 1-auto, or 2-auto households for the home-based work and non-home-based work purposes. No market segmentation is done for the non-home-based work purpose. The mode choice module is run separately for these markets.

6.2. Mode Choice Parameters

Auto occupancy rates from existing travel demand models within the region were adopted for use. A review of the auto occupancy rates was made to select the rural values, which generated the following summary of accepted values at the region, state and nation level as presented in **Table 20**. The FHWA National Household Transportation Survey (2001) provides good insight into national averages, but the FDOT Systems Implementation Office recommendation for Florida's rural areas is more appropriate for local conditions.

Table 20. Summary of Auto Occupancy Rates: Region, State, and Nation

Trip Purpose	2015 NWFRPM	Florida Statewide Model	NCHRP 356	Florida Rural	NHTS Rural
HBW	1.10	1.10	1.11	1.08	1.10
HBO	1.60	1.70	1.67	1.70	1.76
NHB	1.43	1.71	1.66	1.34	1.66

Source: NWFRPM and FDOT Systems Implementation Office

6.3. Mode Choice Results

The NWFRPM replicated observed mode shares for each mode and market segment. **Table 21** presents the model estimated trips.

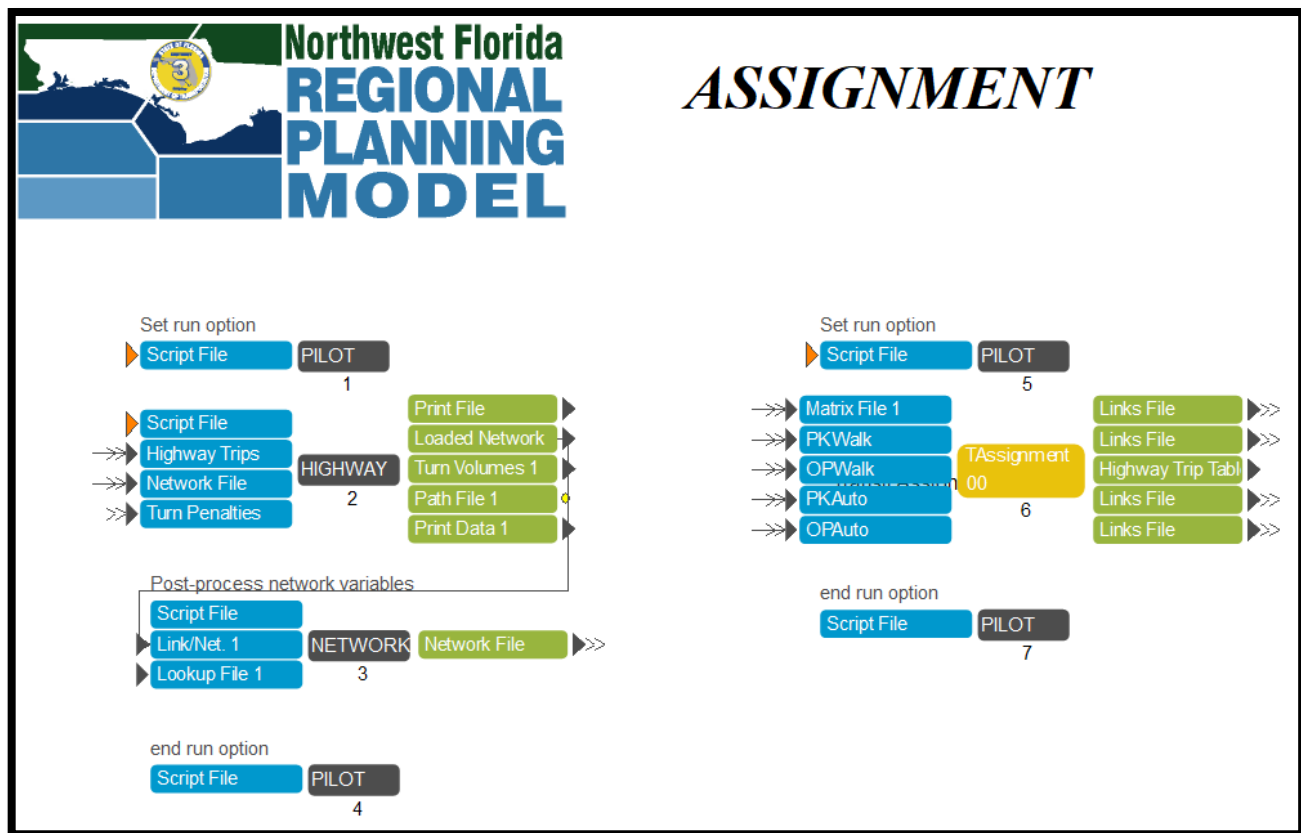
Table 21. Actual Shares

	Home-Based Work			Home-Based Other			Non-Home-Based		
	0 Car HH	1 Car HH	2+ Car HH	0 Car HH	1 Car HH	2+ Car HH	0 Car HH	1 Car HH	2+ Car HH
Drive Alone	0%	79%	87%	0%	38%	37%	48%	0%	0%
Carpool 2	64%	16%	10%	53%	36%	35%	30%	0%	0%
Carpool 3+	28%	4%	3%	39%	26%	27%	21%	0%	0%
Walk-Bus	8%	1%	0%	8%	0%	1%	1%	0%	0%
P-N-R	0%	0%	0%	0%	0%	0%	0%	0%	0%
K-N-R	0%	0%	0%	0%	0%	0%	0%	0%	0%

7. Trip Assignment

Equilibrium assignment using a modified BPR (Bureau of Public Roads) volume delay function and variables from the SPDCAP file are used for trip assignment. BPR curves are a type of volume-delay function used to describe the speed-flow relationships in a travel demand model network based on the available link capacity. The formula indicates that as volume increases or flow increases relative to capacity, the speed decreases and travel time increases. The VFACTORS file includes the parameters used in the BPR function. The SPDCAP file was updated for the 2015 NWFRPM and includes lanes, capacity, and speed for each area type and facility type. These parameters were included in the network's links in the Highway Network step. **Figure 10** shows the Trip Assignment flowchart.

Figure 10. Trip Assignment Flowchart



7.1. Model Development

The generalized cost used for path and assignment calculations is travel time. The cost of tolls is converted to time equivalent units using the variable "CTOLL", which was adopted from the existing models. The CTOLL parameter represents the impedance of a toll, in terms of hour per dollar, as a component of the total impedance of a link. The CTOLL parameter in the 2015 NWFRPM is 0.035. There are five toll facilities in the overall network (see Section 3.2).

There is capability to apply different toll rates and toll payment schemes (conventional tolls or open road tolling, including electronic toll collection systems) for future toll projects in the region. Turning movement prohibitors and a few remaining penalties from existing travel demand models are also included in the path building process during trip assignment.

7.2. Highway Assignment

The highway assignment portion loads auto trips onto the highway network. The NWFRPM uses the standard FSUTMS assignment model, which produces the daily loaded network using an equilibrium assignment algorithm. The highway assignment is a multi-class equilibrium assignment. The BPR equation is used as the volume-delay function using the VFACTORS file. The VFACTORS file contains UROAD factors, CONFAC values, and BPR coefficients for each facility type. To further refine this step, the SPDCAP file is used to reference the lanes, capacity, and speed for each area type and facility type.

7.3. Highway Assignment Model Results

Table 22 details how each facility type and area type are performing based on volume over count vehicle miles traveled (VMT). FDOT assignment validation standards described in *FSUTMS-Cube Framework Phase II: Model Calibration and Validation Standards* include a preferred accuracy level of +/- 15% error for each category for facility type, area type, and number of lanes, however, +/- 25% is acceptable. The validation standards also include a preferred accuracy level of +/- 2% error for areawide, however, +/- 5% is acceptable.

Based on the results, most of the facility types are performing within acceptable standards. Collectors and toll facilities are performing outside acceptable standards of +/- 25%, however, most of these facility types have a relatively low number of network links; data for them are limited. The total areawide performance of 0.79 is outside the acceptable error of +/- 5%.

All area types are performing within acceptable standards. Additionally, most of the area types are within a preferred accuracy level of +/- 15%, except residential.

Table 22. Traffic Assignment Statistics: Volume / Count VMT by Facility Type and Area Type

Facility Type	Volume / Count VMT	% of Links with Counts	Area Type	Volume / Count VMT
Freeways and Expressways	0.77	10.71	CBD	0.97
Divided Arterials	0.84	19.27	Fringe	0.93
Undivided Arterials	0.87	13.44	Residential	0.83
Collectors	0.73	6.84	OBD	0.89
One-Way Facilities	1.07	8.13	Rural	0.89
Toll Facilities	0.47	8.12	Total	0.79
Total	0.79	10.30	<=Total Doesn't include Centroid Connectors	

Another measure of model validation is the V/C ratio at screenlines. An accuracy level of +/- 20% is considered appropriate for low volume screenlines where summed highway count volumes are less than 50,000 vehicles per day (VPD). An accuracy level of +/- 15% is appropriate for screenlines with total highway count volumes between 50,000 and 75,000 VPD. A +/- 10% accuracy level is used for high volume screenlines where highway count volumes exceed 75,000 VPD. A summary of the screenline volume, count, and V/C ratios is presented in **Table 23**.

Table 23. NWFRPM Screenlines Volume to Count Ratios

Screenline Number	Total Volume	Total Count	Volume to Count Ratio
1	222,770	207,043	1.08
2	256,420	253,168	1.01
3	624,310	1,452,069	0.43
4	128,559	156,484	0.82
5	85,852	108,768	0.79
6	178,431	150,706	1.18
7	146,937	143,576	1.02
8	311,627	344,994	0.90
9	93,367	103,788	0.90
10	53,540	55,410	0.97
11	163,898	143,252	1.14
12	189,665	167,794	1.13
13	95,579	82,542	1.16
17	5,507	7,318	0.75
19	4,982	5,110	0.97
21	41,180	50,158	0.82
22	38,149	46,834	0.81
23	22,968	26,540	0.87
24	33,586	44,724	0.75
25	49,075	51,444	0.95
26	36,509	47,836	0.76
27	34,034	43,404	0.78
28	75,599	79,382	0.95
29	71,379	65,042	1.10
30	80,335	76,844	1.05
31	39,939	41,136	0.97
32	123,867	93,404	1.33
33	23,579	17,114	1.38
34	60,381	64,948	0.93
35	83,247	64,892	1.28

36	42,136	34,416	1.22
37	17,032	18,660	0.91
38	19,987	24,500	0.82
39	14,723	7,262	2.03
40	15,677	10,544	1.49
41	8,300	7,392	1.12
42	5,670	5,434	1.04
43	9,835	6,804	1.45
44	27,944	31,712	0.88
51	92,559	80,942	1.14
52	33,036	26,770	1.23
53	127,324	111,812	1.14
54	98,571	91,862	1.07
55	94,087	98,508	0.96
56	62,211	67,604	0.92
57	46,710	43,646	1.07
58	65,509	66,916	0.98
59	39,414	39,612	1.00
60	59,860	57,504	1.04
61	117,845	102,484	1.15
62	58,644	68,218	0.86
63	31,459	34,444	0.91
71	28,462	25,080	1.13
72	33,629	17,212	1.95
75	67,787	56,942	1.19
76	20,518	15,170	1.35
79	56,582	52,820	1.07
80	30,868	41,458	0.74
81	25,047	31,180	0.80
84	20,020	20,980	0.95
87	8,950	13,606	0.66
88	23,188	14,504	1.60
91	35,024	18,812	1.86
92	38,922	10,002	3.89
95	25,060	14,190	1.77
96	23,170	18,372	1.26
98	206,638	187,936	1.10
99	10,681,428	10,525,219	1.01
100	15,789,097	16,296,253	0.97

7.4. Transit Assignment

Transit assignment is the process of assigning the transit trip tables produced by the mode choice model onto the transit path obtained during the path building step. The transit trips are assigned to the minimum time path by an all-or-nothing method for each combination of mode and access.

7.5. Transit Assignment Process

The transit assignment process loads trips onto the transit network. For the 24-hour transit model, home-based work trips are assigned to the peak network and all non-work trips are assigned to the off-peak network. The transit assignment process produces an output file which contains a summary of boarding and alighting by route link. The transit trips are allocated independently of highway trips. The resulting loads are reported by line, mode, and operator.

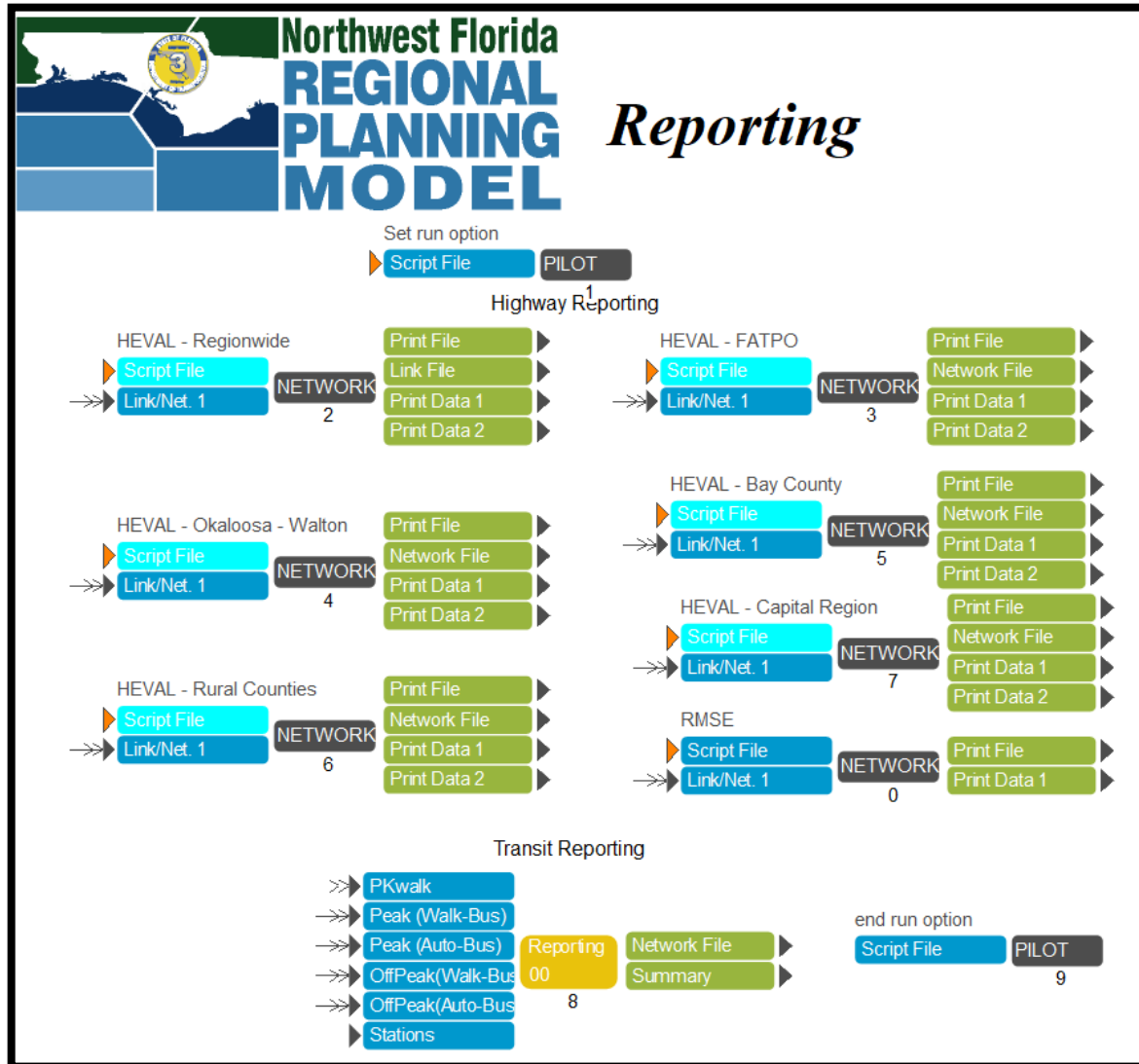
7.6. Transit Assignment Validation

The system-wide modeled number of total daily linked transit trips is 17,550. The passenger counts for StarMetro routes in 2015 were unable to be obtained, however, the number of transit trips assigned is reasonable based on comparison with the 2010 NWFRPM and mode split observed in the Tallahassee region.

8. Reporting

The final step in the model flow, as designed for the NWFRPM, is the Reporting process, which is an evaluation of the assignment process by area type, facility type, and number of lanes by sub area within the region. The RMSE are also presented in this section. The Reporting flowchart is presented in **Figure 11**.

Figure 11. Reporting Flowchart



8.1. Final Model Validation Results

V/C ratios, as presented in **Chapter 7**, showed a general good fit performance and most criteria are within an accepted range. **Table 24** demonstrates the behavior of the model in terms of another critical statistic, the RMSE.

Table 24. Regionwide Root Mean Square Error

Volume Group	AADT	Percent RMSE	Allowable RMSE	Observations
1	1 - 5,000	77.6%	45 - 55%	2,365
2	5,000 - 10,000	41.7%	35 - 45%	820
3	10,000 - 20,000	29.4%	27 - 35%	674
4	20,000 - 30,000	33.6%	24 - 27%	164
5	30,000 - 40,000	42.6%	22 - 24%	35
6	40,000 - 50,000	12.8%	20 - 22%	2
7	50,000 - 60,000	55.7%	18 - 20%	8
8	60,000 - 70,000	57.1%	17 - 18%	2
10	80,000 - 90,000	60.7%	15 - 16%	2
Total		58.8%	32 - 39%	4,072

Table 25, Table 26, Table 27, and Table 28 summarize the facility type and area type validation statistics for the urbanized areas within the NWFRPM. These tables provide volume over count VMT for the existing facility types and area types. The results are mixed, as there are cases where the NWFRPM performs better than the urbanized area models, and vice versa.

Table 25. Florida Alabama TPO Sub-Area Assignment Statistics

Facility Type	Volume / Count VMT	Area Type	Volume / Count VMT
Freeways and Expressways	0.77	CBD	0.87
Divided Arterials	0.92	Fringe	0.85
Undivided Arterials	1.06	Residential	0.85
Collectors	0.75	OBD	0.86
One-Way Facilities	0.72	Rural	1.05
Toll Facilities	0.42	Total	0.80
Total	0.80		

Table 26. Bay County TPO Sub-Area Assignment Statistics

Facility Type	Volume / Count VMT	Area Type	Volume / Count VMT
Divided Arterials	0.89	CBD	1.59
Undivided Arterials	0.95	Fringe	1.28
Collectors	0.68	Residential	0.79
Total	0.72	OBD	0.83
		Rural	0.45

	Total	0.72
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Table 27. Okaloosa-Walton TPO Sub-Area Assignment Statistics

Facility Type	Volume / Count VMT	Area Type	Volume / Count VMT
Freeways and Expressways	0.63	CBD	0.72
Divided Arterials	0.70	Fringe	0.78
Undivided Arterials	0.85	Residential	1.11
Collectors	0.91	OBD	0.92
Toll Facilities	0.43	Rural	0.83
Total	0.78	Total	0.78

Table 28. Capital Region TPA Sub-Area Assignment Statistics

Facility Type	Volume / Count VMT	Area Type	Volume / Count VMT
Freeways and Expressways	0.88	CBD	0.94
Divided Arterials	0.94	Fringe	0.91
Undivided Arterials	0.88	Residential	0.83
Collectors	0.66	OBD	0.96
One-Way Facilities	1.07	Rural	0.89
Toll Facilities	5.10	Total	0.87
Total	0.87		

8.2. Summary and Conclusions

The NWFRPM, as it was validated, is suited for any planning application at the regional and urbanized area level as a tool. As detailed in the previous section, the validation statistics by sub-area are also good enough to justify the use of the regional model for sub-area planning applications it is recommended that other means of forecasting also be looked at as the overall model performance is underestimating trips.

The lifestyle Trip Generation is producing less productions and attractions than previous cross classification. Use caution when looking at future volumes. It is recommended to look at percentage shifts in traffic rather than future volumes.

Care should be taken when using the model, as the socioeconomic data development relied heavily on factoring and proportioning, and there was a lack of available local traffic counts for the base year. A corridor or sub area validation is highly recommended when using the model.

Future development in rural areas and areas surrounding existing cities and communities might require further detailed geography in terms of TAZs and the highway network. This is suggested to develop good consistency in model geographies across all future years to improve the overall usefulness of the model as a planning tool.

A regional travel characteristics study was not available for this model validation, however, it should be considered as part of future validation efforts to improve the calibration of trip generation parameters and friction factors, as well as provide a better understanding of O-D patterns for short and long trips within and through the region.

Two socioeconomic data sets are a challenge in this region. First, employment data are difficult to assess due to the presence of military bases throughout the region from Pensacola to Panama City, and are not accurate due to understandable national security issues. Second, the occupancy rate of dwelling units is hard to evaluate in resort/beach communities, which in turn creates a seasonal population that is usually mis-represented. These two data issues will likely need additional consideration when updating this model in the future.

Appendices



Appendix A. INTEXT_15A.DBF

ZONE	IE_PROD
4100	5500
4101	750
4102	2744
4103	9000
4104	1503
4105	4759
4106	9116
4107	1200
4108	2038
4109	0
4110	100
4111	1000
4112	1000
4113	4000
4114	36
4115	417
4116	1069
4117	1316
4118	550
4119	300
4120	2063
4121	892
4122	2117
4123	15000
4124	1054
4125	587
4126	979
4208	881
4209	500
4210	531
4211	535
4212	1239
4213	20
4214	1000
4215	3644
4216	621
4217	8164

4218	290
4219	1140
4232	1761
4234	200
4235	46
4236	723
4237	15000
4238	655
4239	58
4240	500
4233	0

Appendix B. Highway Network Variables

Name	Description
AX / BX	X coordinate for A or B node
AY / BY	Y coordinate for A or B node
A	A node number
B	B node number
AADT	Annual average daily traffic
AREA_TYPE	FSUTMS 2-digit area type
CAPACITY	Calculated capacity
CARTOLL	Car toll rate (in dollars), from original tolllinks.yya file
CGSPEED	Congested speed
CGTIME	Congested time
CO_CODE	FDOT traffic database County code number
CO_FIPS	County FIPS code
COSITE	FDOT traffic count station
CS15	FDOT traffic count station
CSOURCE	1 = FDOT count; 2 = local count
DAILYCAPC	Link capacity using spdcap daily equivalent capacity factored by FSUTMS "uroad" factor
DAILYCAPE	Link capacity using spdcap daily equivalent capacity
DISTANCE	Link Distance in miles
FACILITY_TYPE	FSUTMS 2-digit facility type
FFTIME	Free-flow time calculated from speed and distance, plus toll equivalent (on tolled links)
LOCATION	1 = Escambia County; 2 = Santa Rosa County; 3 = Okaloosa County; 4 = Walton County; 5 = Bay County; 6 = All other (rural) counties; 7 = Gadsden County; 8 = Leon County; 9 = Wakulla County; 10 = Jefferson County
LOS	Level of service
MOCF	Model output conversion factor
NUM_LANES	Directional number of lanes
PKSEAS_COUNT	Peak season daily traffic count volume
PLAZADESC	Location of the toll plaza, if TOLL $\neq$ 0
PSWADT	Peak season weekday average daily traffic
SCREENLINE	Screenline number
SFCAT	FDOT traffic database seasonal factor category
SITEID	FDOT traffic count station including county code and site ID number
SPEED	Free flow speed from SPDCAP table
TOLL_ACC	Variable to identify toll acceleration lanes on links
TOLL_DEC	Variable to identify toll deceleration lanes on links
TOLLCOST	Toll amount in dollars, cents

TOLLID	Toll plaza ID number
VHT	Vehicle hours of travel using link traffic volume and time in hours
VMT	Vehicle miles of travel using link traffic volume and distance in miles
VOL_COUNT	Ratio of traffic volume to traffic counts (links w/counts only)
VOL_CAPC	Ratio of traffic volume to DAILYCAPC
VOL_CAPE	Ratio of traffic volume to DAILYCAPE

Appendix C. Distribution Trip Length Outputs

FREQUENCY (Iter=21) HBW TRIP LENGTH FREQUENCY 2015 Validation

BASEMW=20 VALUEMW=1 RANGE=0,300,5

MW[20]		Accum			
>=	<	Obs	Sum	Pct	Pct

5 - 10	22,935	108,241.99	10.5	10.5	=====
10 - 15	140,927	304,744.47	29.7	40.2	=====
15 - 20	171,740	244,198.69	23.8	64.0	=====
20 - 25	145,556	137,417.67	13.4	77.4	=====
25 - 30	149,880	94,400.75	9.2	86.5	=====
30 - 35	183,578	59,190.31	5.8	92.3	=====
35 - 40	191,345	33,932.09	3.3	95.6	=====
40 - 45	151,891	19,781.29	1.9	97.5	=====
45 - 50	122,227	11,327.97	1.1	98.6	=====
50 - 55	116,554	6,925.30	0.7	99.3	=====
55 - 60	127,896	3,617.53	0.4	99.7	=====
60 - 65	137,388	1,847.43	0.2	99.8	=====
65 - 70	141,766	874.72	0.1	99.9	=====
70 - 75	131,952	374.64	0.0	100.0	=====
75 - 80	133,177	179.81	0.0	100.0	=====
80 - 85	130,495	86.43	0.0	100.0	=====
85 - 90	118,802	32.51	0.0	100.0	=====
90 - 95	123,911	13.12	0.0	100.0	=====
95 - 100	126,275	5.68	0.0	100.0	=====
100 - 105	136,716	2.56	0.0	100.0	=====
105 - 110	138,507	0.96	0.0	100.0	=====
110 - 115	119,318	0.37	0.0	100.0	=====
115 - 120	148,454	0.15	0.0	100.0	=====
120 - 125	177,809	0.05	0.0	100.0	=====
125 - 130	165,878	0.02	0.0	100.0	=====
130 - 135	154,619	0.01	0.0	100.0	=====
135 - 140	162,390	0.01	0.0	100.0	=====
140 - 145	35,083	0.00	0.0	100.0	=====
145 - 150	--	--	--	100.0	=====
150 - 155	--	--	--	100.0	=====
155 - 160	--	--	--	100.0	=====
160 - 165	--	--	--	100.0	=====
165 - 170	--	--	--	100.0	=====
170 - 175	--	--	--	100.0	=====
175 - 180	--	--	--	100.0	=====
180 - 185	--	--	--	100.0	=====
185 - 190	--	--	--	100.0	=====
190 - 195	--	--	--	100.0	=====
195 - 200	--	--	--	100.0	=====
200 - 205	--	--	--	100.0	=====
205 - 210	--	--	--	100.0	=====
210 - 215	--	--	--	100.0	=====
215 - 220	--	--	--	100.0	=====
220 - 225	--	--	--	100.0	=====

225 - 230	--	--	--	100.0	
230 - 235	--	--	--	100.0	
235 - 240	--	--	--	100.0	
240 - 245	--	--	--	100.0	
245 - 250	--	--	--	100.0	
250 - 255	--	--	--	100.0	
255 - 260	--	--	--	100.0	
260 - 265	--	--	--	100.0	
265 - 270	--	--	--	100.0	
270 - 275	--	--	--	100.0	
275 - 280	--	--	--	100.0	
280 - 285	--	--	--	100.0	
285 - 290	--	--	--	100.0	
290 - 295	--	--	--	100.0	
295 - 300	--	--	--	100.0	
300+	--	--	--	100.0	

Total Obs = 3,807,069
Total Sum = 1,027,196.55
Mean = 19.38
@I=J = 68,526.37

FREQUENCY (Iter=21) HBSH TRIP LENGTH FREQUENCY 2015 Validation

BASEMW=20 VALUEMW=2 RANGE=0,300,5

MW[20]		Accum			
>=	<	Obs	Sum	Pct	Pct

5 - 10	15,906	66,768.45	16.3	16.3	=====
10 - 15	108,032	136,533.46	33.3	49.6	=====
15 - 20	130,621	84,734.35	20.7	70.2	=====
20 - 25	107,286	44,278.74	10.8	81.0	=====
25 - 30	109,929	28,534.19	7.0	88.0	=====
30 - 35	131,429	19,519.11	4.8	92.7	=====
35 - 40	133,294	11,663.95	2.8	95.6	=====
40 - 45	107,448	6,685.87	1.6	97.2	=====
45 - 50	90,105	4,712.67	1.1	98.4	=====
50 - 55	88,751	3,299.78	0.8	99.2	=====
55 - 60	100,438	1,496.86	0.4	99.5	=====
60 - 65	114,275	920.66	0.2	99.8	=====
65 - 70	122,382	609.88	0.1	99.9	=====
70 - 75	115,459	244.84	0.1	100.0	=====
75 - 80	117,856	135.82	0.0	100.0	=====
80 - 85	--	--	--	100.0	=====
85 - 90	--	--	--	100.0	=====
90 - 95	--	--	--	100.0	=====
95 - 100	--	--	--	100.0	=====
100 - 105	--	--	--	100.0	=====
105 - 110	--	--	--	100.0	=====
110 - 115	--	--	--	100.0	=====
115 - 120	--	--	--	100.0	=====
120 - 125	--	--	--	100.0	=====
125 - 130	--	--	--	100.0	=====
130 - 135	--	--	--	100.0	=====
135 - 140	--	--	--	100.0	=====
140 - 145	--	--	--	100.0	=====
145 - 150	--	--	--	100.0	=====
150 - 155	--	--	--	100.0	=====
155 - 160	--	--	--	100.0	=====
160 - 165	--	--	--	100.0	=====
165 - 170	--	--	--	100.0	=====
170 - 175	--	--	--	100.0	=====
175 - 180	--	--	--	100.0	=====
180 - 185	--	--	--	100.0	=====
185 - 190	--	--	--	100.0	=====
190 - 195	--	--	--	100.0	=====
195 - 200	--	--	--	100.0	=====
200 - 205	--	--	--	100.0	=====
205 - 210	--	--	--	100.0	=====
210 - 215	--	--	--	100.0	=====
215 - 220	--	--	--	100.0	=====
220 - 225	--	--	--	100.0	=====
225 - 230	--	--	--	100.0	=====
230 - 235	--	--	--	100.0	=====
235 - 240	--	--	--	100.0	=====
240 - 245	--	--	--	100.0	=====
245 - 250	--	--	--	100.0	=====

250 - 255	--	--	--	100.0	
255 - 260	--	--	--	100.0	
260 - 265	--	--	--	100.0	
265 - 270	--	--	--	100.0	
270 - 275	--	--	--	100.0	
275 - 280	--	--	--	100.0	
280 - 285	--	--	--	100.0	
285 - 290	--	--	--	100.0	
290 - 295	--	--	--	100.0	
295 - 300	--	--	--	100.0	
300+	--	--	--	100.0	

Total Obs = 1,593,211
Total Sum = 410,138.62
Mean = 18.09
@I=J = 43,636.29

FREQUENCY (Iter=21) HBSR TRIP LENGTH FREQUENCY 2015 Validation

BASEMW=20 VALUEMW=3 RANGE=0,300,5

MW[20]		Accum					
>=	<	Obs	Sum	Pct	Pct		

5 - 10	28,443	179,693.63	13.7	13.7	=====		
10 - 15	147,850	413,522.71	31.5	45.2	=====		
15 - 20	181,402	326,254.21	24.8	70.0	=====		
20 - 25	162,970	172,362.33	13.1	83.1	=====		
25 - 30	166,530	98,129.35	7.5	90.6	=====		
30 - 35	207,483	57,471.05	4.4	95.0	=====		
35 - 40	217,408	31,711.64	2.4	97.4	=====		
40 - 45	171,208	16,372.10	1.2	98.6	=====		
45 - 50	137,187	8,629.04	0.7	99.3	=====		
50 - 55	130,543	4,653.60	0.4	99.6	=====		
55 - 60	142,011	2,400.59	0.2	99.8	=====		
60 - 65	150,744	1,213.66	0.1	99.9	=====		
65 - 70	153,255	589.33	0.0	100.0	=====		
70 - 75	141,982	267.25	0.0	100.0	=====		
75 - 80	144,356	124.11	0.0	100.0	=====		
80 - 85	141,920	60.88	0.0	100.0	=====		
85 - 90	129,320	26.39	0.0	100.0	=====		
90 - 95	135,107	11.26	0.0	100.0	=====		
95 - 100	136,792	5.06	0.0	100.0	=====		
100 - 105	149,287	2.29	0.0	100.0	=====		
105 - 110	151,950	0.97	0.0	100.0	=====		
110 - 115	129,669	0.41	0.0	100.0	=====		
115 - 120	162,984	0.17	0.0	100.0	=====		
120 - 125	191,125	0.07	0.0	100.0	=====		
125 - 130	178,108	0.03	0.0	100.0	=====		
130 - 135	165,324	0.01	0.0	100.0	=====		
135 - 140	173,597	0.01	0.0	100.0	=====		
140 - 145	186,035	0.00	0.0	100.0	=====		
145 - 150	--	--	--	100.0	=====		
150 - 155	--	--	--	100.0	=====		
155 - 160	--	--	--	100.0	=====		
160 - 165	--	--	--	100.0	=====		
165 - 170	--	--	--	100.0	=====		
170 - 175	--	--	--	100.0	=====		
175 - 180	--	--	--	100.0	=====		
180 - 185	--	--	--	100.0	=====		
185 - 190	--	--	--	100.0	=====		
190 - 195	--	--	--	100.0	=====		
195 - 200	--	--	--	100.0	=====		
200 - 205	--	--	--	100.0	=====		
205 - 210	--	--	--	100.0	=====		
210 - 215	--	--	--	100.0	=====		
215 - 220	--	--	--	100.0	=====		
220 - 225	--	--	--	100.0	=====		
225 - 230	--	--	--	100.0	=====		
230 - 235	--	--	--	100.0	=====		
235 - 240	--	--	--	100.0	=====		

240 - 245	--	--	--	100.0	
245 - 250	--	--	--	100.0	
250 - 255	--	--	--	100.0	
255 - 260	--	--	--	100.0	
260 - 265	--	--	--	100.0	
265 - 270	--	--	--	100.0	
270 - 275	--	--	--	100.0	
275 - 280	--	--	--	100.0	
280 - 285	--	--	--	100.0	
285 - 290	--	--	--	100.0	
290 - 295	--	--	--	100.0	
295 - 300	--	--	--	100.0	
300+	--	--	--	100.0	

Total Obs = 4,314,590
Total Sum = 1,313,502.15
Mean = 17.84
@I=J = 128,120.32

FREQUENCY (Iter=21) HBO TRIP LENGTH FREQUENCY 2015 Validation

BASEMW=20 VALUEMW=4 RANGE=0,300,5

MW[20]		Accum			
>=	<	Obs	Sum	Pct	Pct

5 - 10	28,470	124,778.77	10.0	10.0	=====
10 - 15	148,841	339,452.08	27.1	37.0	=====
15 - 20	182,355	298,692.12	23.8	60.9	=====
20 - 25	163,427	181,813.26	14.5	75.4	=====
25 - 30	166,941	117,859.08	9.4	84.8	=====
30 - 35	208,134	77,532.97	6.2	91.0	=====
35 - 40	218,248	47,399.99	3.8	94.8	=====
40 - 45	171,592	27,208.34	2.2	96.9	=====
45 - 50	137,384	16,113.09	1.3	98.2	=====
50 - 55	130,731	9,836.25	0.8	99.0	=====
55 - 60	142,100	5,727.78	0.5	99.5	=====
60 - 65	150,842	3,219.88	0.3	99.7	=====
65 - 70	153,403	1,719.83	0.1	99.9	=====
70 - 75	142,140	827.82	0.1	99.9	=====
75 - 80	144,560	414.25	0.0	100.0	=====
80 - 85	142,093	212.64	0.0	100.0	=====
85 - 90	129,436	96.97	0.0	100.0	=====
90 - 95	135,294	49.11	0.0	100.0	=====
95 - 100	136,953	24.84	0.0	100.0	=====
100 - 105	149,430	11.40	0.0	100.0	=====
105 - 110	152,064	5.06	0.0	100.0	=====
110 - 115	129,773	2.36	0.0	100.0	=====
115 - 120	163,125	1.11	0.0	100.0	=====
120 - 125	191,643	0.45	0.0	100.0	=====
125 - 130	178,366	0.22	0.0	100.0	=====
130 - 135	165,525	0.12	0.0	100.0	=====
135 - 140	173,938	0.05	0.0	100.0	=====
140 - 145	186,318	0.02	0.0	100.0	=====
145 - 150	163,256	0.01	0.0	100.0	=====
150 - 155	151,541	0.00	0.0	100.0	=====
155 - 160	187,450	0.00	0.0	100.0	=====
160 - 165	106,656	0.00	0.0	100.0	=====
165 - 170	--	--	--	100.0	=====
170 - 175	--	--	--	100.0	=====
175 - 180	--	--	--	100.0	=====
180 - 185	--	--	--	100.0	=====
185 - 190	--	--	--	100.0	=====
190 - 195	--	--	--	100.0	=====
195 - 200	--	--	--	100.0	=====
200 - 205	--	--	--	100.0	=====
205 - 210	--	--	--	100.0	=====
210 - 215	--	--	--	100.0	=====
215 - 220	--	--	--	100.0	=====
220 - 225	--	--	--	100.0	=====
225 - 230	--	--	--	100.0	=====

230 - 235	--	-- -- 100.0
235 - 240	--	-- -- 100.0
240 - 245	--	-- -- 100.0
245 - 250	--	-- -- 100.0
250 - 255	--	-- -- 100.0
255 - 260	--	-- -- 100.0
260 - 265	--	-- -- 100.0
265 - 270	--	-- -- 100.0
270 - 275	--	-- -- 100.0
275 - 280	--	-- -- 100.0
280 - 285	--	-- -- 100.0
285 - 290	--	-- -- 100.0
290 - 295	--	-- -- 100.0
295 - 300	--	-- -- 100.0
300+	--	-- -- 100.0

 Total Obs = 4,932,029
 Total Sum = 1,252,999.85
 Mean = 20.11
 @I=J = 84,262.25

FREQUENCY (Iter=21) NHB TRIP LENGTH FREQUENCY 2015 Validation

BASEMW=20 VALUEMW=5 RANGE=0,300,5

MW[20]	Accum				
>=	-	<	Obs	Sum	Pct Pct
5 - 10	30,071	124,959.91	12.6	12.6	=====
10 - 15	174,428	351,756.21	35.5	48.1	=====
15 - 20	213,565	260,213.94	26.2	74.3	=====
20 - 25	181,106	114,554.28	11.6	85.9	=====
25 - 30	180,194	63,268.81	6.4	92.2	=====
30 - 35	228,353	37,464.65	3.8	96.0	=====
35 - 40	245,698	18,965.34	1.9	97.9	=====
40 - 45	187,269	9,310.19	0.9	98.9	=====
45 - 50	146,295	4,757.53	0.5	99.3	=====
50 - 55	137,591	3,020.05	0.3	99.6	=====
55 - 60	149,444	1,722.50	0.2	99.8	=====
60 - 65	159,375	903.23	0.1	99.9	=====
65 - 70	161,715	468.99	0.0	100.0	=====
70 - 75	149,324	232.22	0.0	100.0	=====
75 - 80	151,419	105.15	0.0	100.0	=====
80 - 85	148,651	51.60	0.0	100.0	=====
85 - 90	135,403	22.47	0.0	100.0	=====
90 - 95	141,194	10.38	0.0	100.0	=====
95 - 100	144,155	4.54	0.0	100.0	=====
100 - 105	157,024	2.20	0.0	100.0	=====
105 - 110	161,231	1.06	0.0	100.0	=====
110 - 115	135,980	0.47	0.0	100.0	=====
115 - 120	171,573	0.19	0.0	100.0	=====
120 - 125	205,989	0.09	0.0	100.0	=====
125 - 130	193,527	0.04	0.0	100.0	=====
130 - 135	176,752	0.02	0.0	100.0	=====
135 - 140	186,369	0.01	0.0	100.0	=====
140 - 145	200,369	0.00	0.0	100.0	=====
145 - 150	175,812	0.00	0.0	100.0	=====
150 - 155	160,554	0.00	0.0	100.0	=====
155 - 160	37,260	0.00	0.0	100.0	=====
160 - 165	--	--	--	100.0	=====
165 - 170	--	--	--	100.0	=====
170 - 175	--	--	--	100.0	=====
175 - 180	--	--	--	100.0	=====
180 - 185	--	--	--	100.0	=====
185 - 190	--	--	--	100.0	=====
190 - 195	--	--	--	100.0	=====
195 - 200	--	--	--	100.0	=====
200 - 205	--	--	--	100.0	=====
205 - 210	--	--	--	100.0	=====
210 - 215	--	--	--	100.0	=====
215 - 220	--	--	--	100.0	=====

220 - 225	--	--	--	100.0	
225 - 230	--	--	--	100.0	
230 - 235	--	--	--	100.0	
235 - 240	--	--	--	100.0	
240 - 245	--	--	--	100.0	
245 - 250	--	--	--	100.0	
250 - 255	--	--	--	100.0	
255 - 260	--	--	--	100.0	
260 - 265	--	--	--	100.0	
265 - 270	--	--	--	100.0	
270 - 275	--	--	--	100.0	
275 - 280	--	--	--	100.0	
280 - 285	--	--	--	100.0	
285 - 290	--	--	--	100.0	
290 - 295	--	--	--	100.0	
295 - 300	--	--	--	100.0	
300+	--	--	--	100.0	

Total Obs = 5,027,690
Total Sum = 991,796.07
Mean = 17.23
@I=J = 86,095.96

FREQUENCY (Iter=21) TT TRIP LENGTH FREQUENCY 2015 Validation
 BASEMW=20 VALUEMW=6 RANGE=0,300,5

MW[20]		Accum			
>=	<	Obs	Sum	Pct	Pct

5 - 10	30,072	46,315.75	11.1	11.1	=====
10 - 15	174,409	124,540.48	29.9	41.0	=====
15 - 20	213,576	106,243.07	25.5	66.5	=====
20 - 25	181,112	56,229.45	13.5	80.0	=====
25 - 30	180,266	33,846.08	8.1	88.1	=====
30 - 35	228,399	21,426.89	5.1	93.2	=====
35 - 40	245,687	12,659.82	3.0	96.3	=====
40 - 45	187,275	6,797.99	1.6	97.9	=====
45 - 50	146,309	3,766.88	0.9	98.8	=====
50 - 55	137,594	2,140.84	0.5	99.3	=====
55 - 60	149,405	1,229.50	0.3	99.6	=====
60 - 65	159,355	736.42	0.2	99.8	=====
65 - 70	161,687	422.99	0.1	99.9	=====
70 - 75	149,238	221.69	0.1	99.9	=====
75 - 80	151,370	114.51	0.0	100.0	=====
80 - 85	148,572	62.90	0.0	100.0	=====
85 - 90	135,291	31.91	0.0	100.0	=====
90 - 95	141,172	16.74	0.0	100.0	=====
95 - 100	144,135	8.57	0.0	100.0	=====
100 - 105	157,006	4.59	0.0	100.0	=====
105 - 110	161,217	2.34	0.0	100.0	=====
110 - 115	135,974	1.16	0.0	100.0	=====
115 - 120	171,554	0.62	0.0	100.0	=====
120 - 125	205,998	0.34	0.0	100.0	=====
125 - 130	193,513	0.17	0.0	100.0	=====
130 - 135	176,749	0.09	0.0	100.0	=====
135 - 140	186,388	0.05	0.0	100.0	=====
140 - 145	200,372	0.02	0.0	100.0	=====
145 - 150	175,716	0.01	0.0	100.0	=====
150 - 155	160,516	0.01	0.0	100.0	=====
155 - 160	201,554	0.00	0.0	100.0	=====
160 - 165	187,695	0.00	0.0	100.0	=====
165 - 170	152,879	0.00	0.0	100.0	=====
170 - 175	173,895	0.00	0.0	100.0	=====
175 - 180	198,379	0.00	0.0	100.0	=====
180 - 185	137,266	0.00	0.0	100.0	=====
185 - 190	--	--	--	100.0	=====
190 - 195	--	--	--	100.0	=====
195 - 200	--	--	--	100.0	=====
200 - 205	--	--	--	100.0	=====
205 - 210	--	--	--	100.0	=====

210 - 215	--	--	--	100.0	
215 - 220	--	--	--	100.0	
220 - 225	--	--	--	100.0	
225 - 230	--	--	--	100.0	
230 - 235	--	--	--	100.0	
235 - 240	--	--	--	100.0	
240 - 245	--	--	--	100.0	
245 - 250	--	--	--	100.0	
250 - 255	--	--	--	100.0	
255 - 260	--	--	--	100.0	
260 - 265	--	--	--	100.0	
265 - 270	--	--	--	100.0	
270 - 275	--	--	--	100.0	
275 - 280	--	--	--	100.0	
280 - 285	--	--	--	100.0	
285 - 290	--	--	--	100.0	
290 - 295	--	--	--	100.0	
295 - 300	--	--	--	100.0	
300+	--	--	--	100.0	

Total Obs = 6,041,595
Total Sum = 416,821.91
Mean = 18.89
@I=J = 32,791.75

FREQUENCY (Iter=21) IE TRIP LENGTH FREQUENCY 2015 Validation

BASEMW=20 VALUEMW=7 RANGE=0,300,5

MW[20]		Accum			
>=	<	Obs	Sum	Pct	Pct

5 - 10	8		14.74	0.0	0.0
10 - 15	81		134.66	0.1	0.1
15 - 20	455		639.72	0.6	0.7
20 - 25	765		1,853.29	1.7	2.5 =
25 - 30	1,352		2,967.12	2.8	5.3 ==
30 - 35	2,131		6,812.80	6.4	11.7 =====
35 - 40	2,666		10,450.21	9.8	21.5 =====
40 - 45	3,686		15,396.78	14.4	35.9 =====
45 - 50	4,146		10,156.91	9.5	45.4 =====
50 - 55	3,613		5,712.90	5.4	50.8 =====
55 - 60	2,832		4,680.19	4.4	55.2 =====
60 - 65	3,148		6,441.08	6.0	61.2 =====
65 - 70	3,213		4,124.47	3.9	65.1 =====
70 - 75	3,049		2,877.99	2.7	67.8 =====
75 - 80	2,749		2,618.58	2.5	70.2 =====
80 - 85	2,774		3,015.88	2.8	73.1 =====
85 - 90	3,721		4,844.32	4.5	77.6 =====
90 - 95	4,089		5,919.08	5.6	83.2 =====
95 - 100	3,677		3,734.78	3.5	86.7 =====
100 - 105	3,282		3,685.06	3.5	90.1 =====
105 - 110	3,610		2,297.80	2.2	92.3 =====
110 - 115	4,052		1,713.70	1.6	93.9 =====
115 - 120	3,840		1,818.51	1.7	95.6 =====
120 - 125	3,492		1,367.86	1.3	96.9 =====
125 - 130	3,386		675.94	0.6	97.5 =====
130 - 135	3,080		504.76	0.5	98.0 =====
135 - 140	3,352		507.72	0.5	98.5 =====
140 - 145	2,974		321.89	0.3	98.8 =====
145 - 150	2,957		336.25	0.3	99.1 =====
150 - 155	2,982		228.99	0.2	99.3 =====
155 - 160	2,624		162.10	0.2	99.5 =====
160 - 165	2,796		166.11	0.2	99.6 =====
165 - 170	2,841		121.81	0.1	99.7 =====
170 - 175	2,340		77.41	0.1	99.8 =====
175 - 180	2,313		63.62	0.1	99.9 =====
180 - 185	2,045		51.85	0.0	99.9 =====
185 - 190	2,444		42.33	0.0	99.9 =====
190 - 195	2,364		22.20	0.0	100.0 =====
195 - 200	2,312		12.24	0.0	100.0 =====

200 - 205	2,175	9.18	0.0	100.0	
205 - 210	1,809	5.44	0.0	100.0	
210 - 215	1,433	3.60	0.0	100.0	
215 - 220	1,448	1.84	0.0	100.0	
220 - 225	1,213	1.72	0.0	100.0	
225 - 230	795	0.55	0.0	100.0	
230 - 235	468	0.66	0.0	100.0	
235 - 240	406	0.49	0.0	100.0	
240 - 245	269	0.20	0.0	100.0	
245 - 250	187	0.24	0.0	100.0	
250 - 255	108	0.09	0.0	100.0	
255 - 260	72	0.17	0.0	100.0	
260 - 265	56	0.06	0.0	100.0	
265 - 270	19	0.04	0.0	100.0	
270 - 275	12	0.01	0.0	100.0	
275 - 280	2	0.01	0.0	100.0	
280 - 285	1	0.01	0.0	100.0	
285 - 290	--	--	--	100.0	
290 - 295	--	--	--	100.0	
295 - 300	--	--	--	100.0	
300+	--	--	--	100.0	

Total Obs = 117,714
Total Sum = 106,598
Mean = 63.84
@I=J = 0

Appendix D. Transit Line Variables

Name	Description
NAME	Transit line name & route number
MODE	Transit network mode number
OPERATOR	Transit system operator number
ONEWAY	T (true) or F (false)
HEADWAY[1]	Bus headway in minutes for peak period
HEADWAY[2]	Bus headway in minutes for off-peak period
LONGNAME	Second unique identifier
N	Node number (stops with hyphen)

