Metropolitan Transportation Planning Organization
for the Gainesville Urbanized Area
Gainesville Urbanized Area Transportation Study

Year 2045 Long Range Transportation Plan Update

Technical Report 3: Data Review and Verification

Prepared by:
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Metropolitan Transportation Planning Organization

For the Gainesville Urbanized Area

YEAR 2045 LONG RANGE TRANSPORTATION PLAN UPDATE

Technical Report 3

Data Review and Verification

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TASK 3.1 REVIEW ZONAL DATA INPUTS

A comprehensive review of the zonal data was conducted as part of this task. As part of the 2015 effort, the Metropolitan Transportation Planning Organization for the Gainesville Urbanized Area staff and the consultant team updated and refined the Gainesville Urbanized Area Transportation Study Model from 2010 socioeconomic data files to the new base year 2015. Special generator and external trip files were updated by the consultant team (discussed in Task 2.3).

The Gainesville Urbanized Area Transportation Study Year 2015 model study area covers the entirety of Alachua County, including all nine municipalities within the County. The zonal structure of the 2010 model was reviewed by the consultant team and changes were deemed necessary. The zonal changes and data structure are discussed in detail under Task 2.3.

As mentioned earlier, the Metropolitan Transportation Planning Organization for the Gainesville Urbanized Area staff and consultant team developed the 2015 and 2045 socioeconomic datasets which includes information on population disaggregated by single family, multifamily, and hotel/motel units. On the employment side, the dataset contains information disaggregated by service, commercial, manufacturing, and other industrial sectors. It also contains information on school enrollment, university employment, dormitory students, and parking. The automobile availability, property vacancy rates, seasonal use, parking costs and pedestrian environmental variables in the 2015 and 2045 datasets were borrowed from the 2010 and 2040 datasets, respectively, based on discussions with Metropolitan Transportation Planning Organization for the Gainesville Urbanized Area staff.

The data review process involved reviewing aggregate statistics from a Florida Standard Urban Transportation Model Structure standards perspective (the details of which are documented in Technical Report 4 – Model Validation), geographic information systems mapping and spatial analysis of the data at a traffic analysis zone level, and checking reasonableness of the growth reflected in the datasets against other data sources. Iterative adjustments to the datasets were made based on the review findings and coordination with the Metropolitan Transportation Planning Organization for the Gainesville Urbanized Area staff.

Figures 1 through 6 show the comparison of 2015 and 2045 socioeconomic datasets, which reflect the recent changes in population and employment patterns in the County. Table 1 shows aggregate level comparison of the 2015 and 2045 datasets. The 2015 and 2045 datasets will be utilized as input to the model for base year validation and future forecasting purposes, respectively.

Table 1: Comparison and 2015 and 2045 Datasets

Socioeconomic Data Variable	2015	2045
Permanent Population	253,317	309,800
Total Population	258,663	316,403
Total Service Employment	98,379	146,553
Total Commercial Employment	39,876	46,479
Total Manufacturing Employment	4,863	6,828
Total Other Industrial Employment	11,528	16,026
Total Employment	154,646	215,886

Figure 1: Year 2015 Population By Traffic Analysis Zone

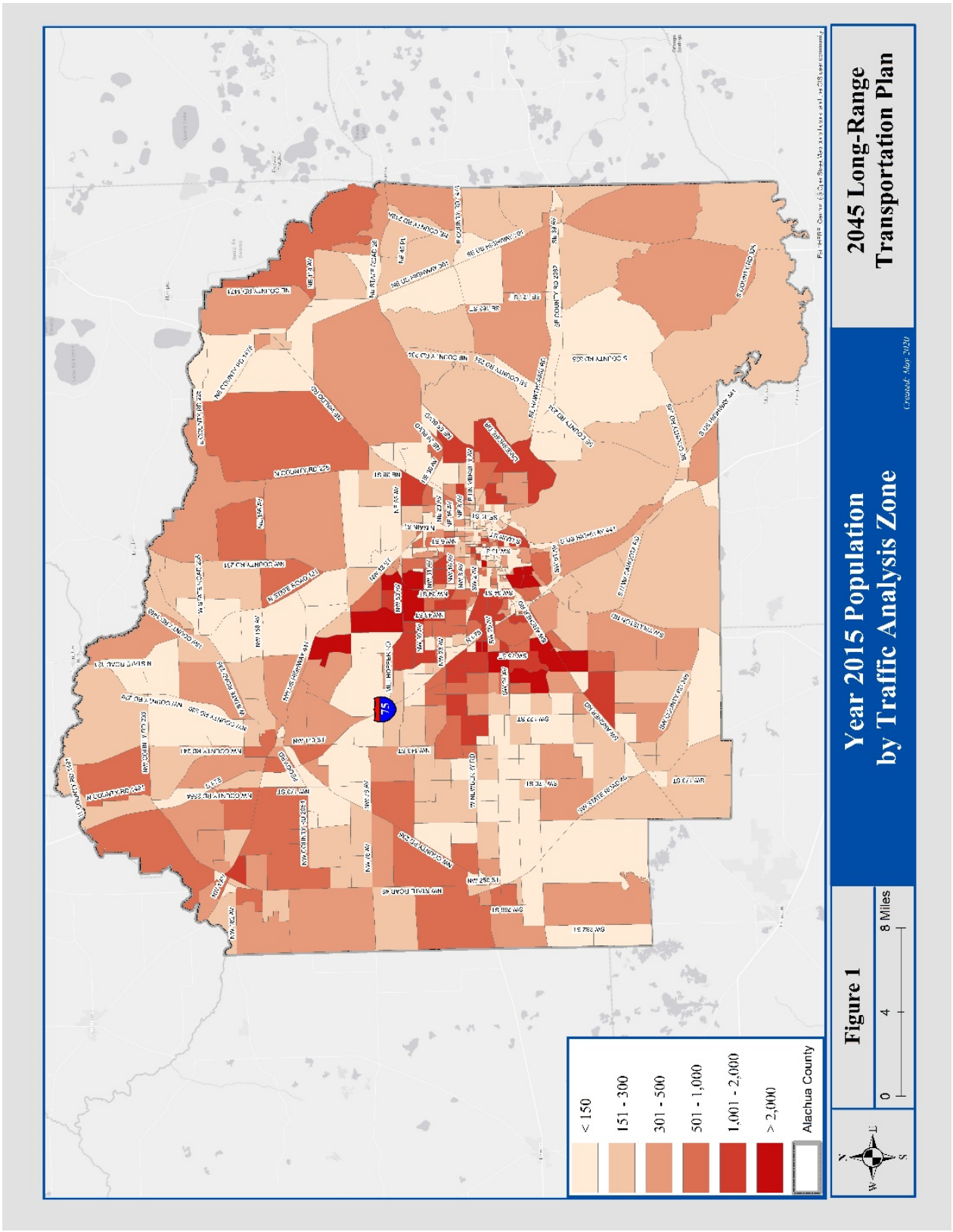


Figure 2: Year 2045 Population by Traffic Analysis Zone

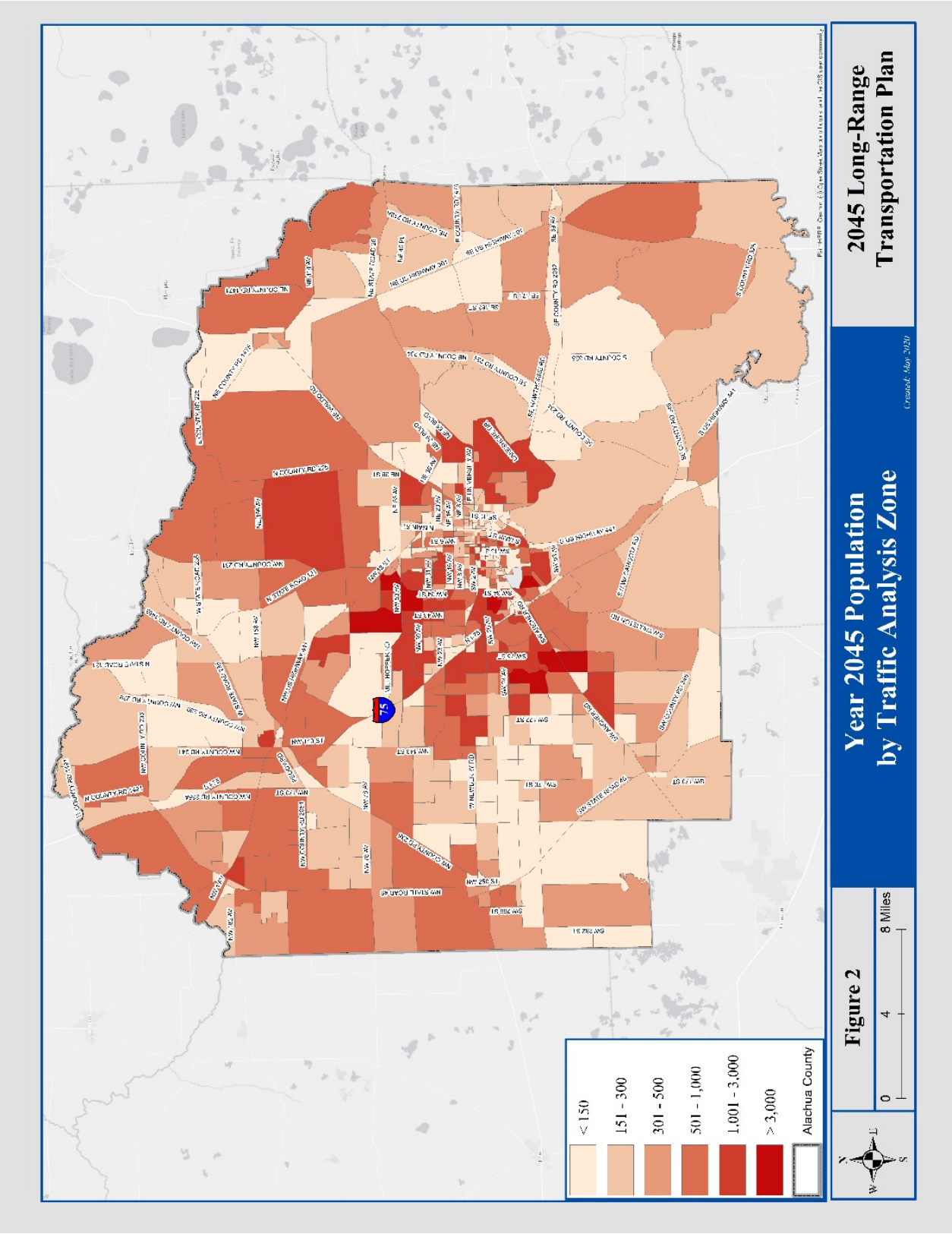


Figure 3: Population Growth 2015 – 2045 by Traffic Analysis Zone

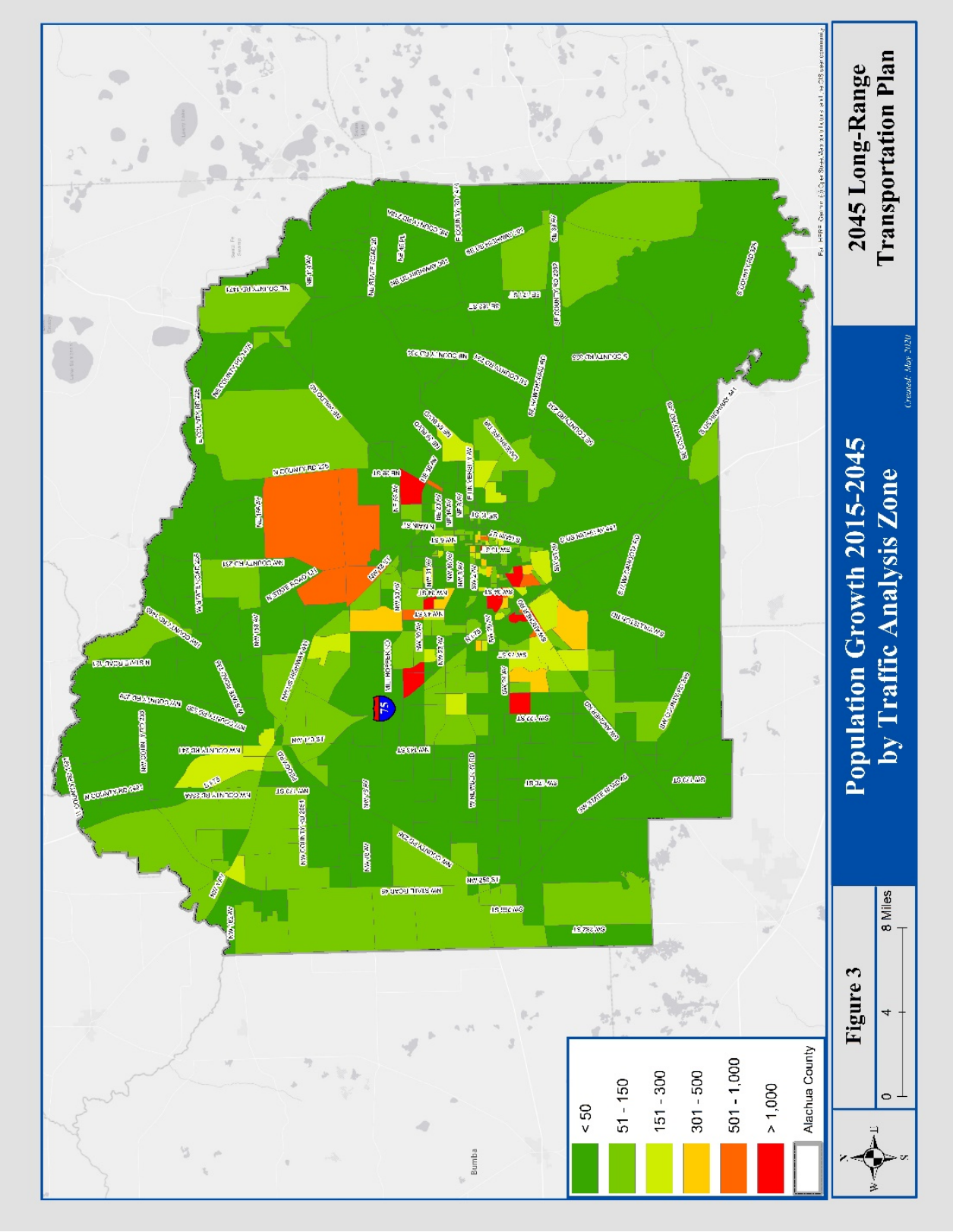


Figure 4: Year 2015 Employment by Traffic Analysis Zone

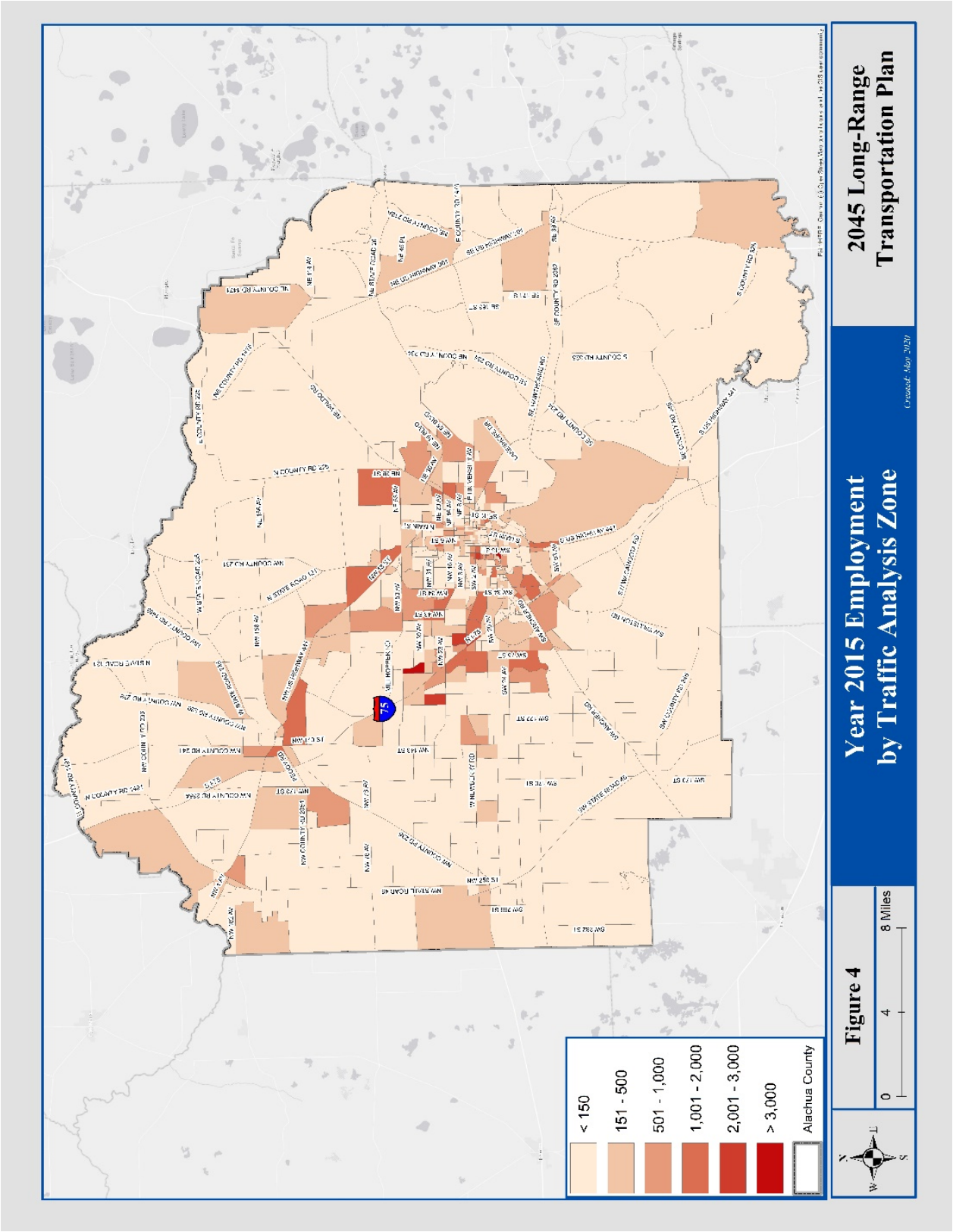


Figure 5: Year 2045 Employment by Traffic Analysis Zone

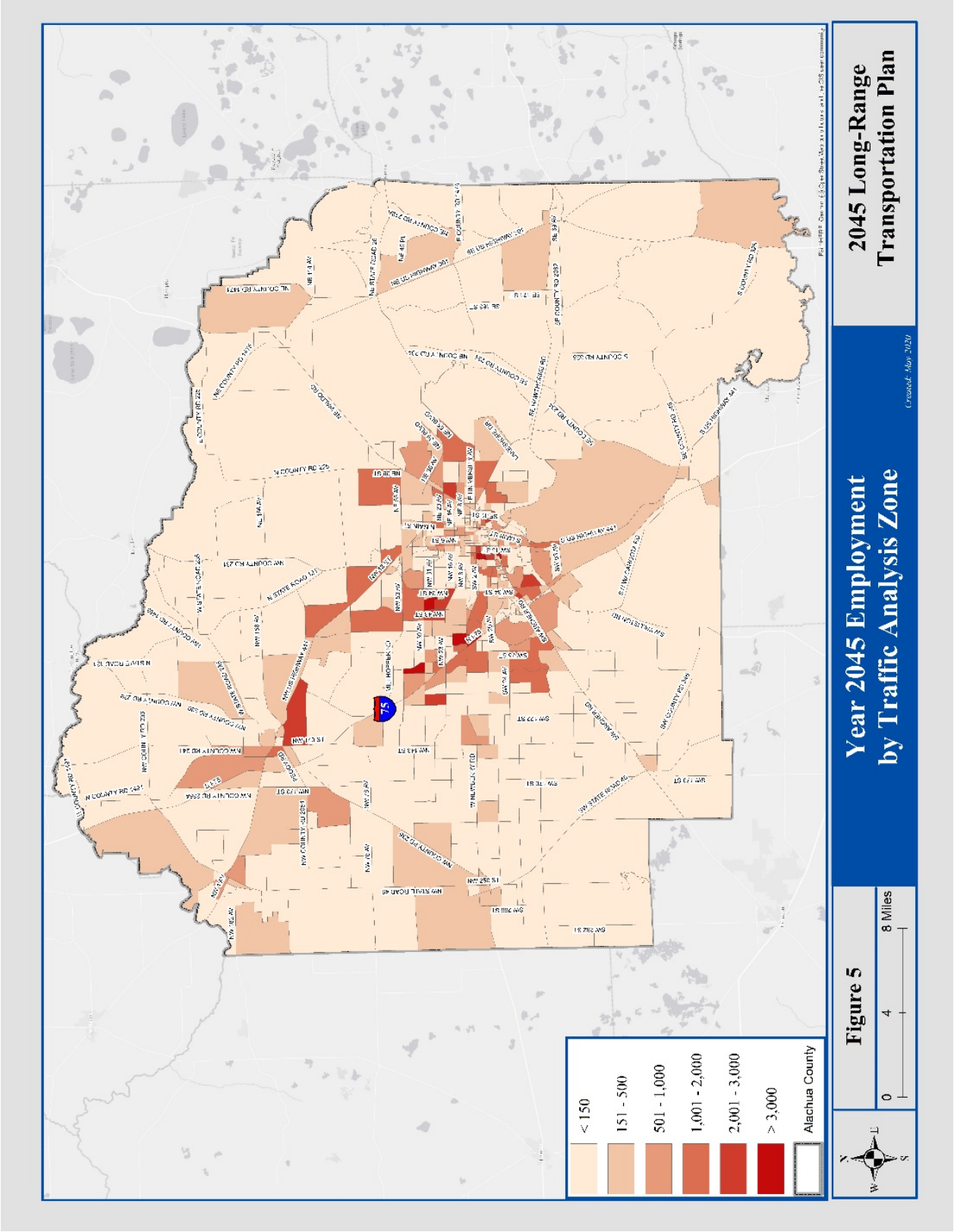
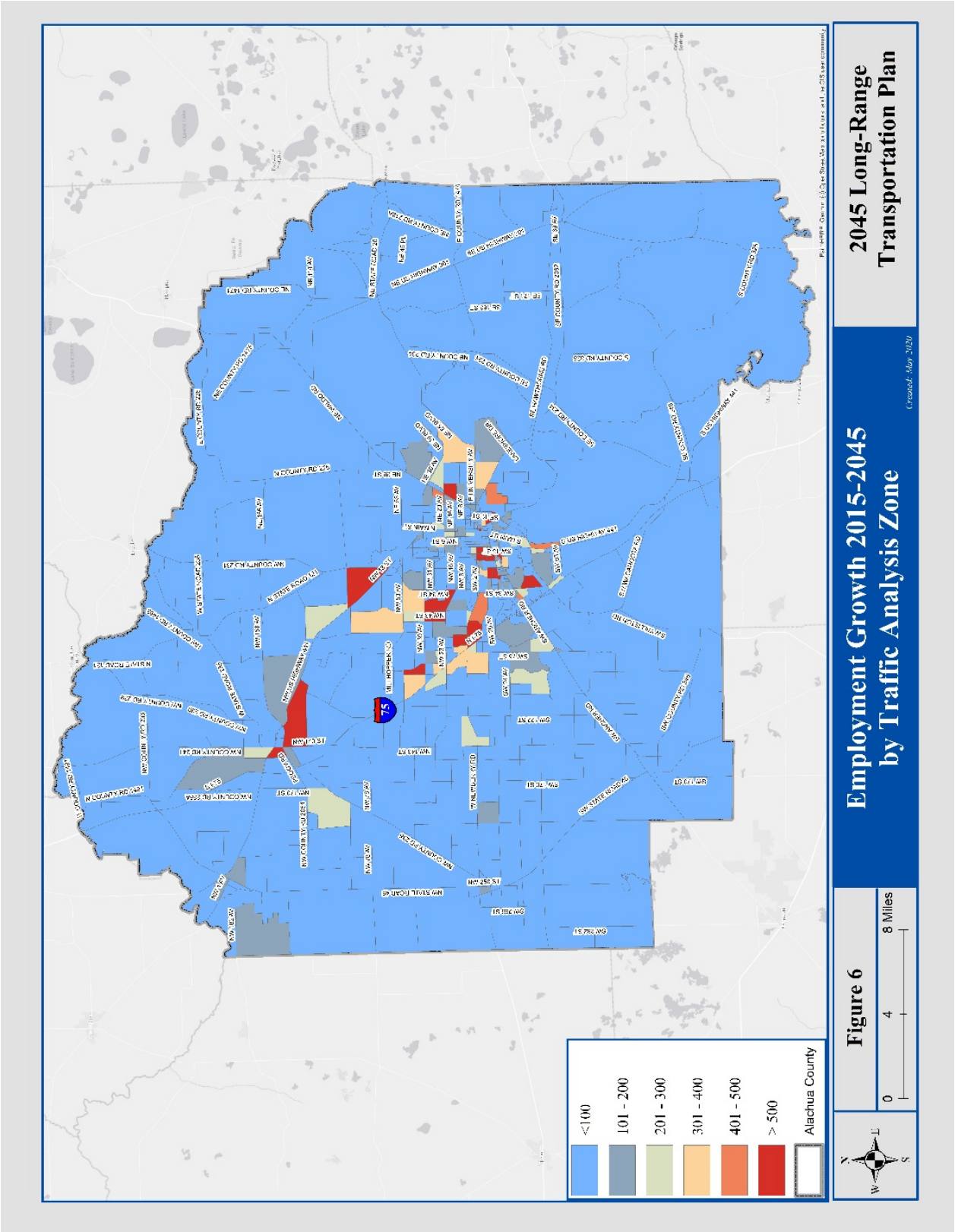


Figure 6: Employment Growth 2015 – 2045 by Traffic Analysis Zone



TASK 3.2 REVIEW 2015 HIGHWAY AND TRANSIT NETWORKS

As part of the 2015 model validation effort, the base year highway and transit networks were updated using 2010 base year networks. Data needed for the validation process were gathered from the Florida Department of Transportation, the Metropolitan Transportation Planning Organization for the Gainesville Urbanized Area, the City of Gainesville Regional Transit System, and University of Florida staff. The gathered data was used to update the highway network edits that includes number of lanes, posted speed, traffic signals and traffic counts. In addition, transit edits related to routes, stop locations, fares, headways, and other service variables were reviewed and updated. The following section provides details on data collection and modifications made to the highway and transit networks.

3.2.1 Updating Highway Network Data

The 2015 highway network development was primarily made by editing the 2010 base year network to represent 2015 conditions. The number of lanes and traffic counts were updated to 2015 conditions. In addition, new network attributes posted speed and traffic signals were coded for future use. The Florida Department of Transportation's Roadway Characteristics Inventory data was utilized as the primary data source to update highway network. Local knowledge and 2015 Google historical imagery were also utilized for updating the non-state facilities. The 2015 Base Year Network incorporates changes since the last plan update, to reflect the current facility configurations. Figures 7 and 8 depict the directional number of lanes of the highway network. The 2015 traffic counts coded in the network were obtained from the Metropolitan Transportation Planning Organization for the Gainesville Urbanized Area, the Florida Department of Transportation, and the City of Gainesville.

Other network attributes such as area types, facility types, were reviewed and no changes were necessary. Tables 2 and 3 show the area type and facility type codes for the highway network. Figures 9 through 12 show the area type and facility type codes of the 2015 network, respectively.

Figures 13 through 15 show the new network attributes posted speed and traffic signals added to the 2015 network, respectively.

Table 2: Area Type Codes

AT 1	Central Business District Areas
AT 11	Urbanized Area (over 500,000) Primary City Central Business District
AT 12	Urbanized Area (under 500,000) Primary City Central Business District
AT 13	Other Urbanized Area Central Business District and Small City Downtown
AT 14	Non-Urbanized Area Small City Downtown
AT 2	Central Business District Fringe Areas
AT 21	All Central Business District Fringe Areas
AT 3	Residential Area
AT 31	Residential Area of Urbanized Areas
AT 32	Undeveloped Portions of Urbanized Areas
AT 33	Transitioning Areas/Urban Areas over 5,000 Population
AT 34	Beach Residential (not used)
AT 35	Residential Divided Arterial with a speed limit of 35 miles per hour
AT 4	Outlying Business District Areas
AT 41	High Density Outlying Business District
AT 42	Other Outlying Business District
AT 43	Beach Outlying Business District (not used)
AT 44	Low Density Industrial Area
AT 45	Outlying Business District Divided Arterial with a speed limit of 35 miles per hour
AT 5	Rural Areas
AT 51	Developed Rural Areas/Small Cities under 5,000 Population
AT 52	Undeveloped Rural Areas

AT=Area Type

Table 3: Facility Type Codes

FT 1	Freeways and Expressways
FT 11	Freeway Group 1 (City of 500,000+)
FT 12	Other Freeway (Group 2)
FT 15	Collector/Distributor Lanes
FT 16	Controlled-Access Expressway
FT 17	Controlled-Access Parkway
FT 2	**Divided Arterials**
FT 21	Divided Arterial 55 miles per hour
FT 22	Divided Arterial 45 miles per hour
FT 23	Divided Arterial Class Ia
FT 24	Divided Arterial Class Ib
FT 25	Divided Arterial Class II/III
FT 26	Low Speed Divided Arterial
FT 3	**Undivided Arterials**
FT 31	Undivided Arterial 45 miles per hour (with Turn Bays)
FT 32	Undivided Arterial Class Ia (with Turn Bays)
FT 33	Undivided Arterial Class Ib (with Turn Bays)
FT 34	Undivided Arterial Class II/III (with Turn Bays)
FT 35	Undivided Arterial 45 miles per hour (without Turn Bays)
FT 36	Undivided Arterial Class Ia (without Turn Bays)
FT 37	Undivided Arterial Class Ib (without Turn Bays)
FT 38	Undivided Arterial Class II/III (without Turn Bays)
FT 4	**Collectors**
FT 41	Major Divided Collector
FT 42	Major Undivided Collector (with Turn Bays)
FT 43	Major Undivided Collector (without Turn Bays)
FT 44	Other Divided Collector
FT 45	Other Undivided Collector (with Turn Bays)
FT 46	Other Undivided Collector (without Turn Bays)
FT 47	Low Speed Collector
FT 48	Very Low Speed Collector
FT 5	**Centroid Connectors**
FT 51	Centroid Connector
FT 52	External Centroid Connector
FT 53	Used as DUMMIES
FT 6	**One Way**
FT 61	One-Way Street 45 miles per hour
FT 62	One-Way Street Class Ia
FT 63	One-Way Street Class Ib
FT 64	One-Way Street Class II/III
FT 65	Frontage Roads 45 miles per hour
FT 66	Frontage Roads Class Ia
FT 67	Frontage Roads Class Ib
FT 68	Frontage Roads Class II/III

FT 7	Ramps
FT 71	Freeway On-Ramp
FT 72	Freeway Loop On-Ramp
FT 73	Other On-Ramp
FT 74	Other Loop On-Ramp
FT 75	Freeway Off-Ramp
FT 76	Freeway Loop Off-Ramp
FT 77	Other Off-Ramp
FT 78	Other Loop Off-Ramp
FT 79	Freeway-Freeway Ramp
FT 8	**Exclusive HOV**
FT 81	High Occupancy Vehicle Lane Group 1 (Separated)
FT 82	High Occupancy Vehicle Lane Group 2 (Separated)
FT 83	High Occupancy Vehicle Lane Group 1 (Non-Separated)
FT 84	High Occupancy Vehicle Lane Group 2 (Non-Separated)
FT 85	Non-Freeway High Occupancy Vehicle Lane
FT 86	AM and PM Peak High Occupancy Vehicle Ramp
FT 87	AM Peak Only High Occupancy Vehicle Ramp
FT 88	PM Peak Only High Occupancy Vehicle Ramp
FT 89	All Day High Occupancy Vehicle Ramp
FT 9	**Toll Facilities**
FT 91	Toll Freeway Group
FT 92	Other Toll Freeway
FT 93	Toll Expressway/Parkway
FT 94	Toll Divided Arterial
FT 95	Toll Undivided Arterial
FT 97	Toll On-Ramp
FT 98	Toll Off-Ramp
FT 99	Toll Plaza

FT=Facility Type

Figure 7: 2015 Highway Network – Number of Lanes

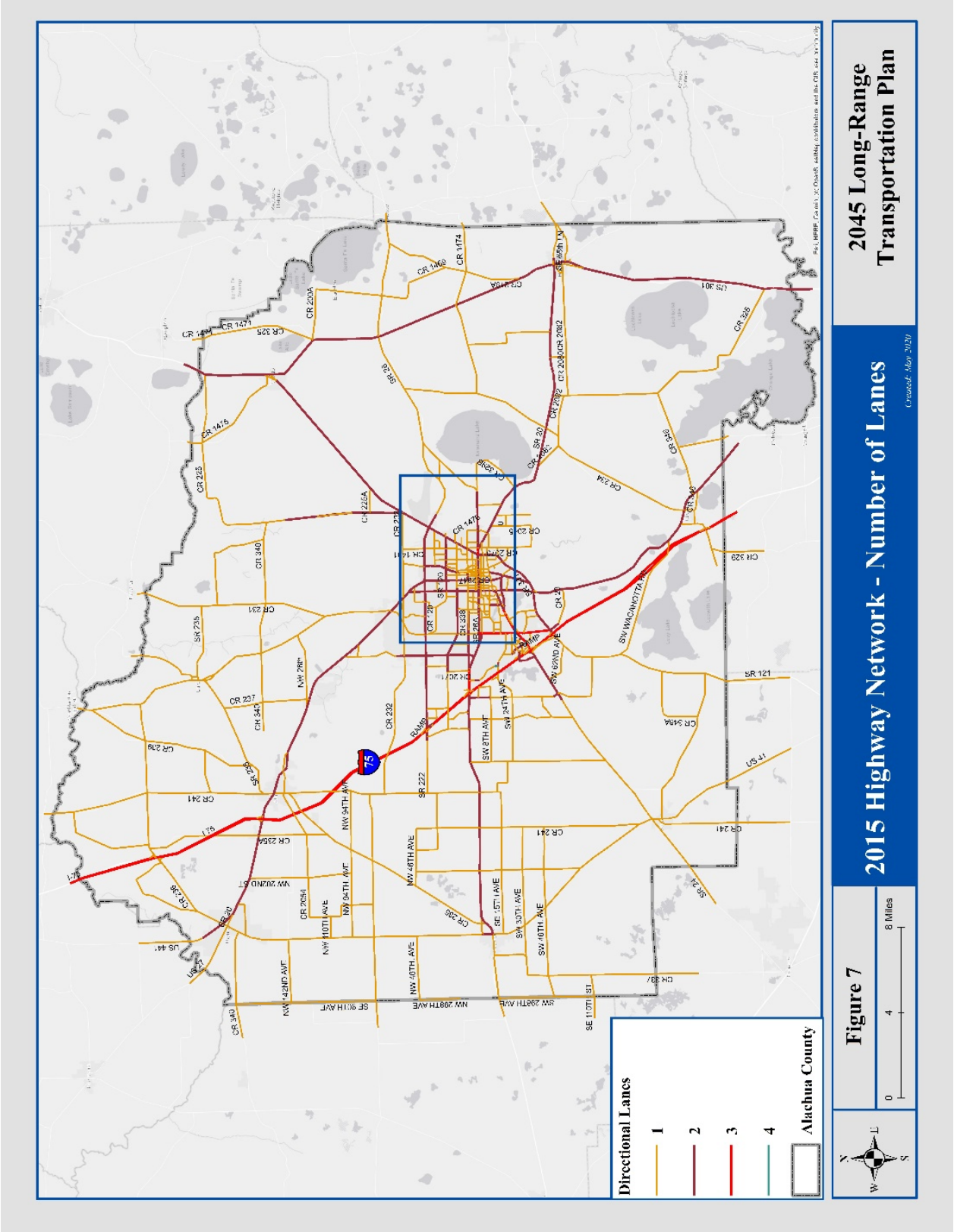


Figure 8: 2015 Highway Network – Number of Lanes (Inset)

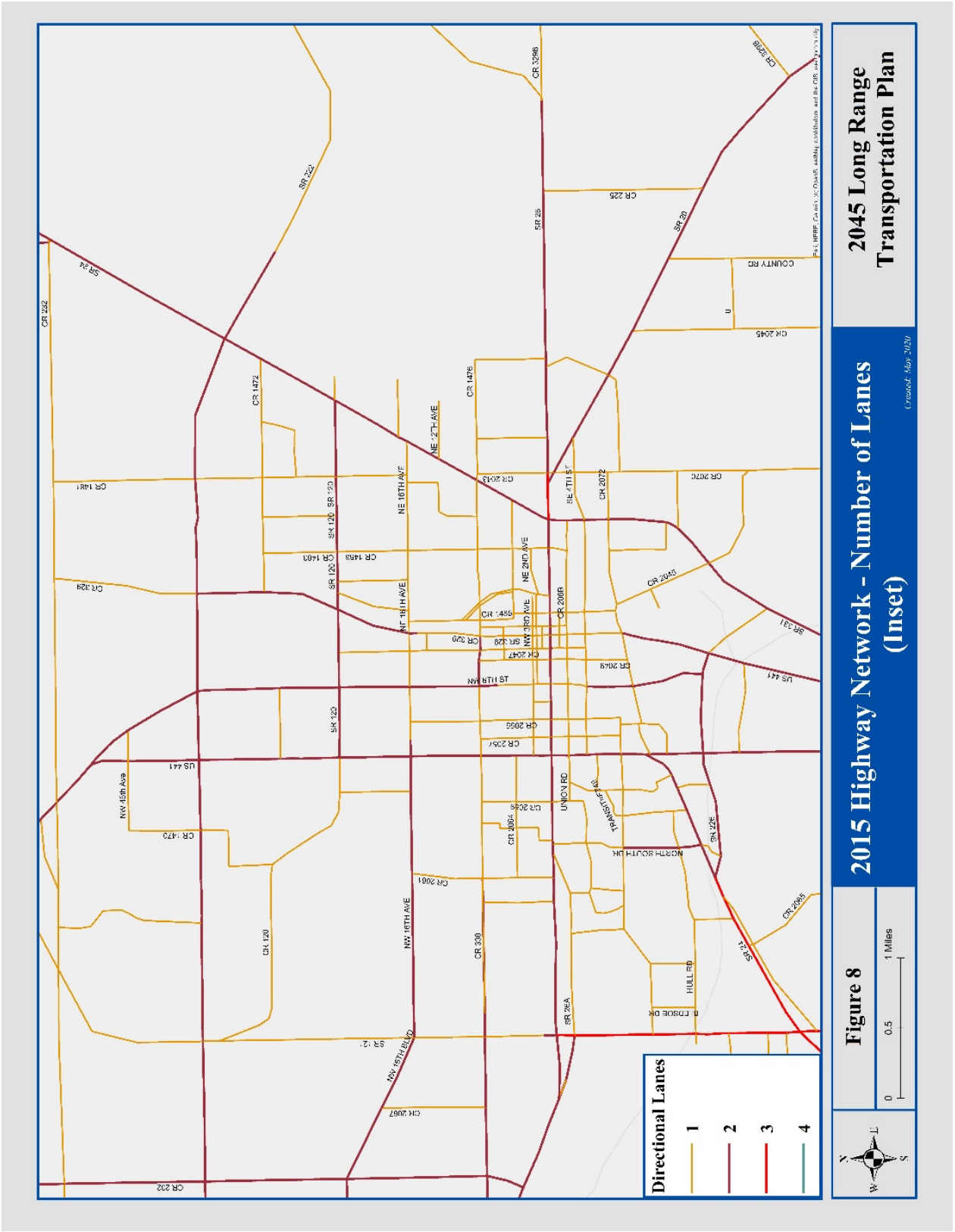


Figure 9: 2015 Highway Network - Area Type

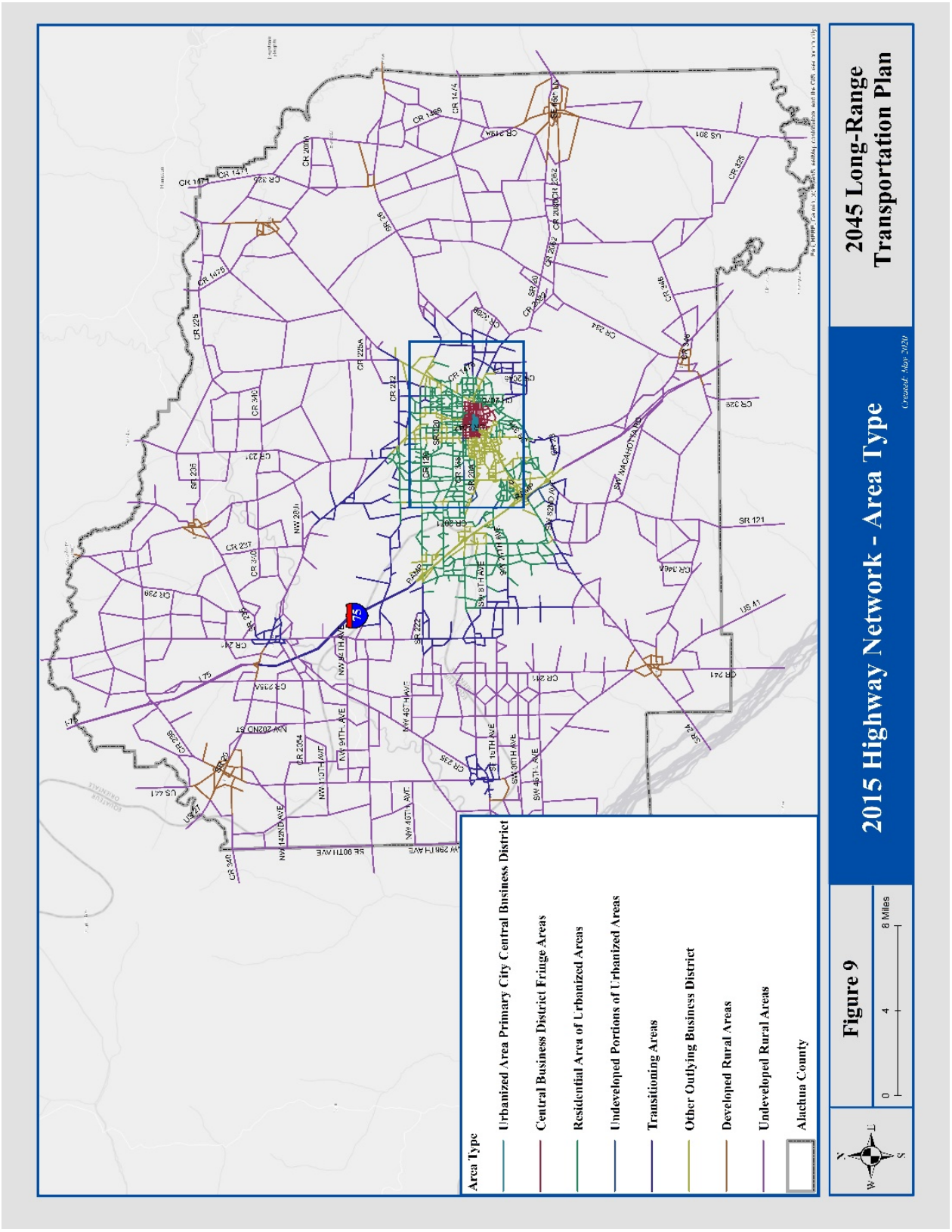


Figure 10: 2015 Highway Network – Area Type (Inset)

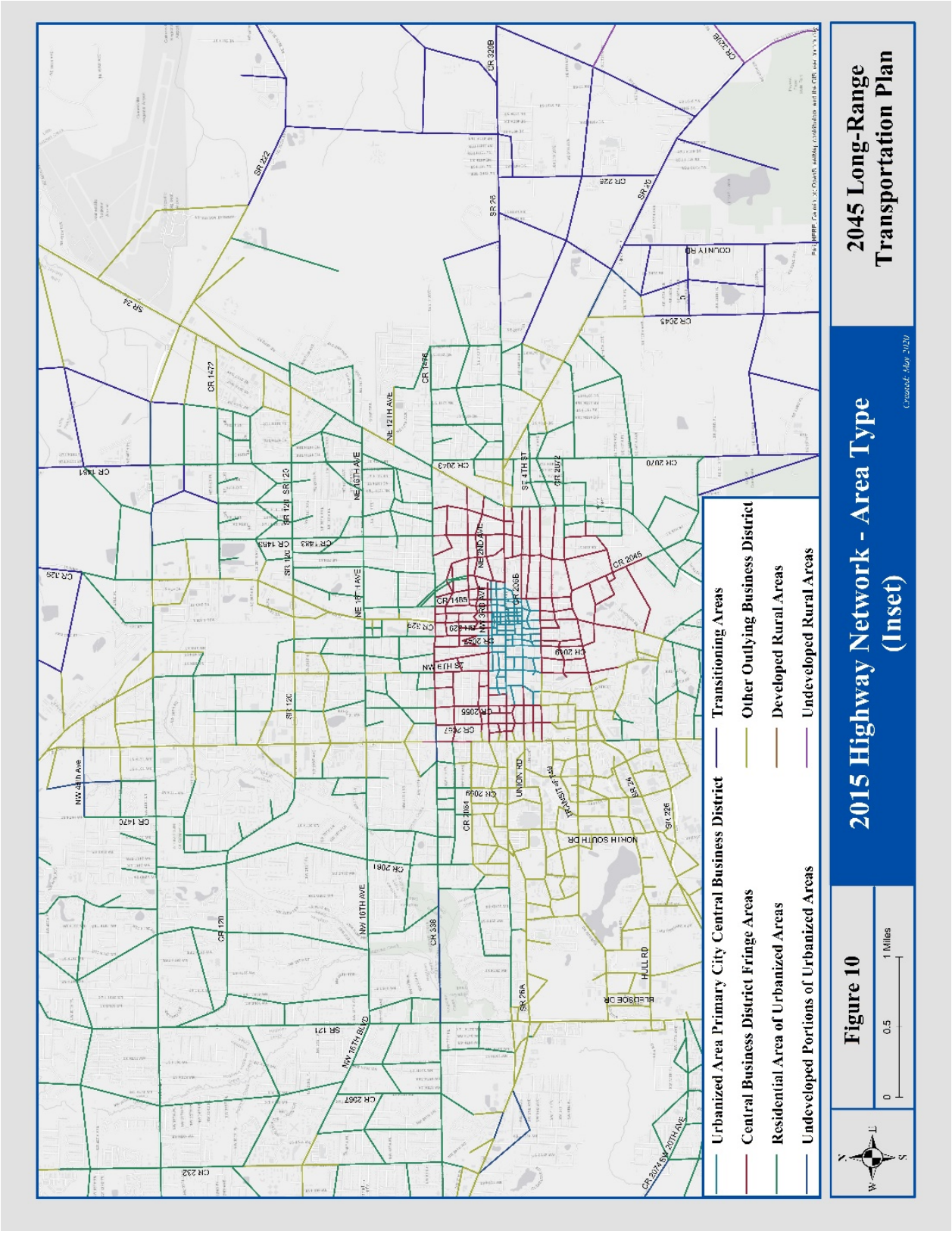


Figure 11: Highway Network - Facility Type

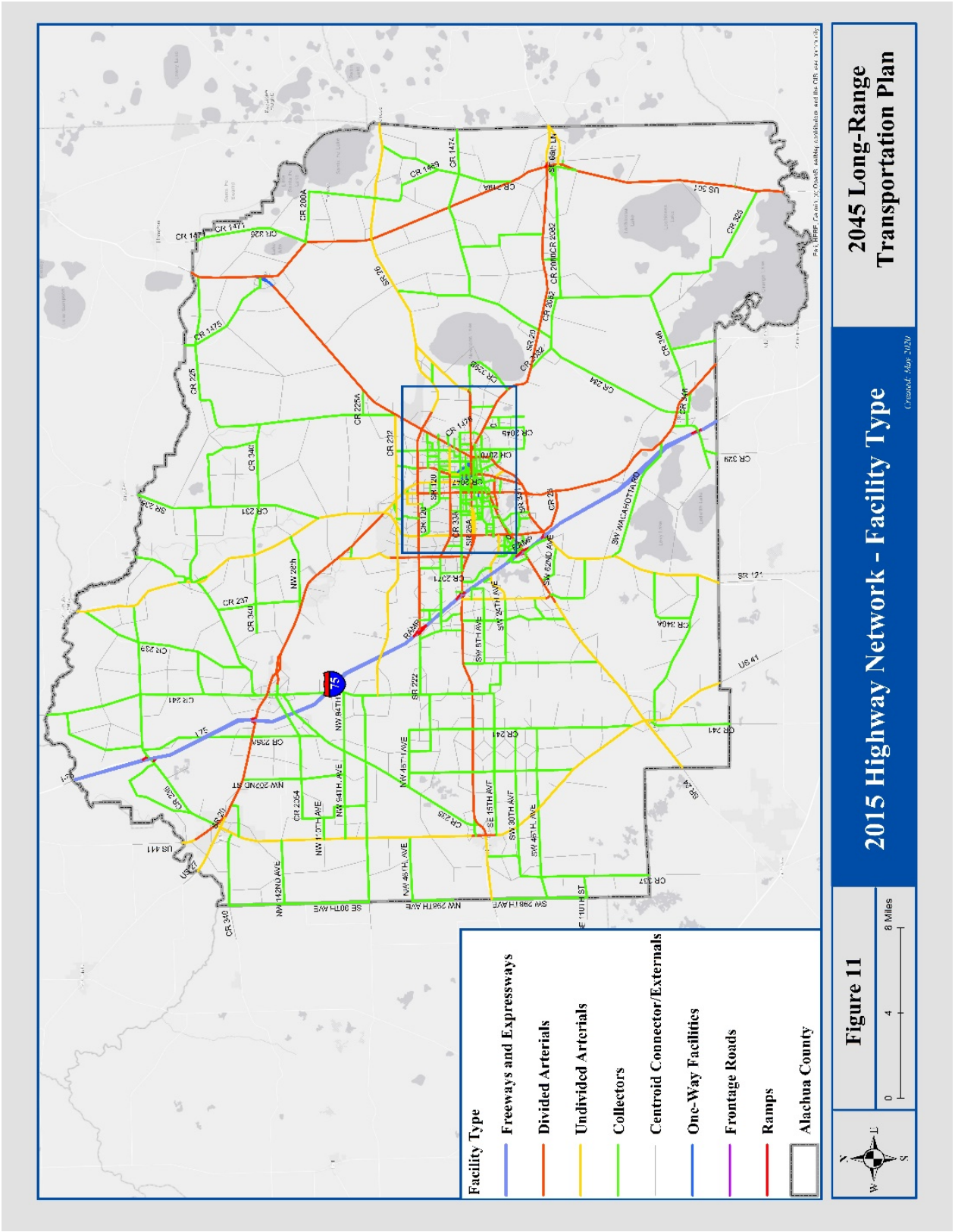


Figure 12: Highway Network - Facility Type (Inset)

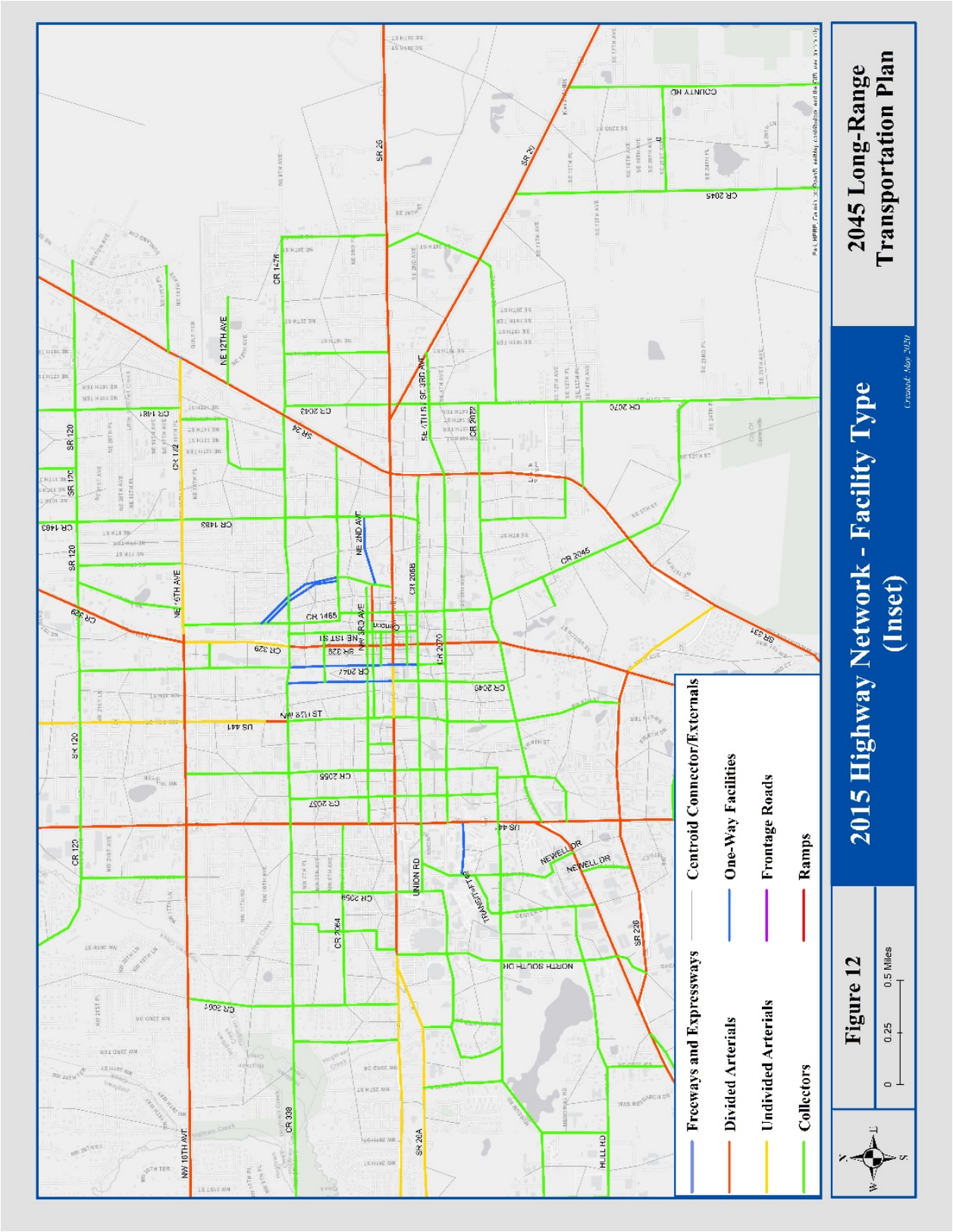


Figure 13: 2015 Highway Network - Posted Speed

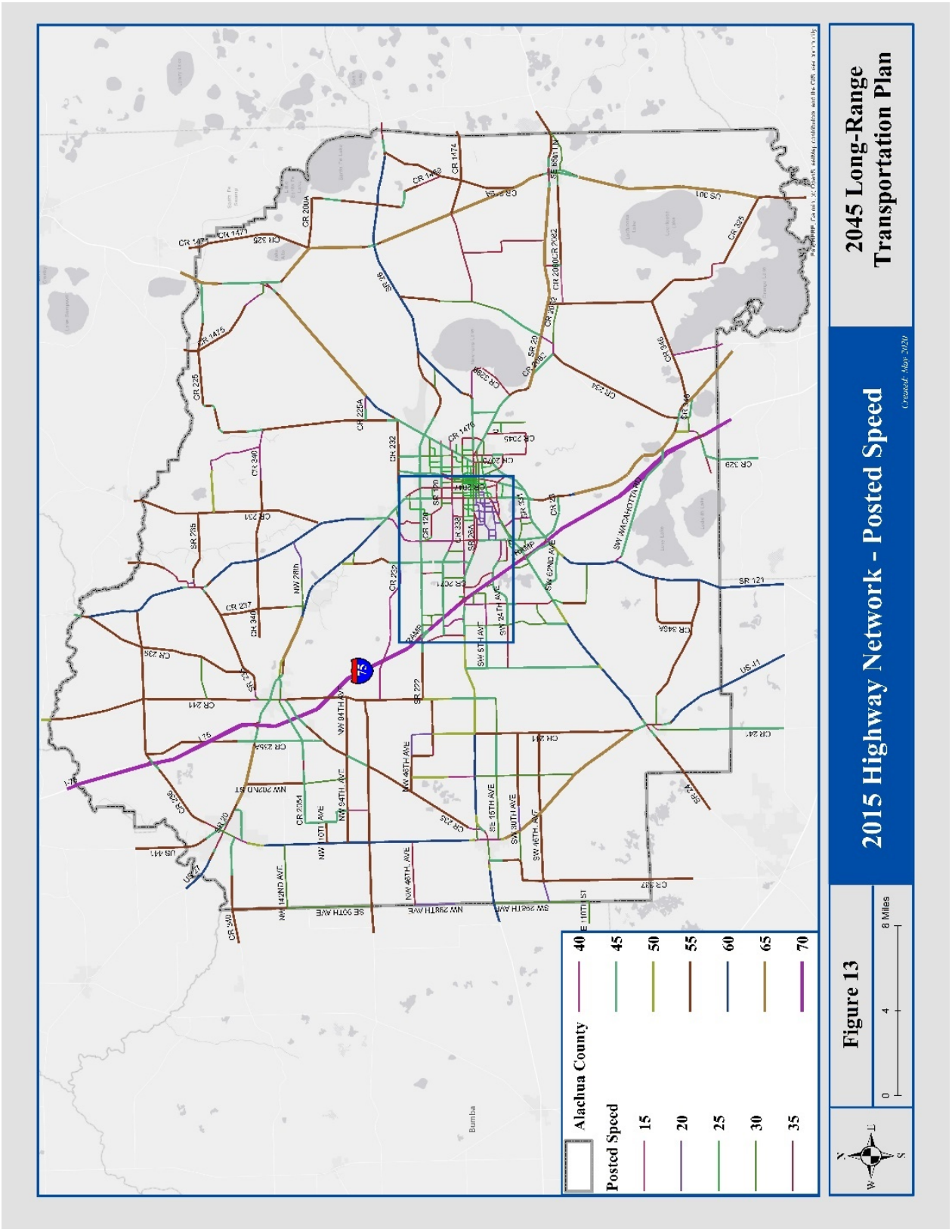


Figure 14: Highway Network - Posted Speed (Inset)

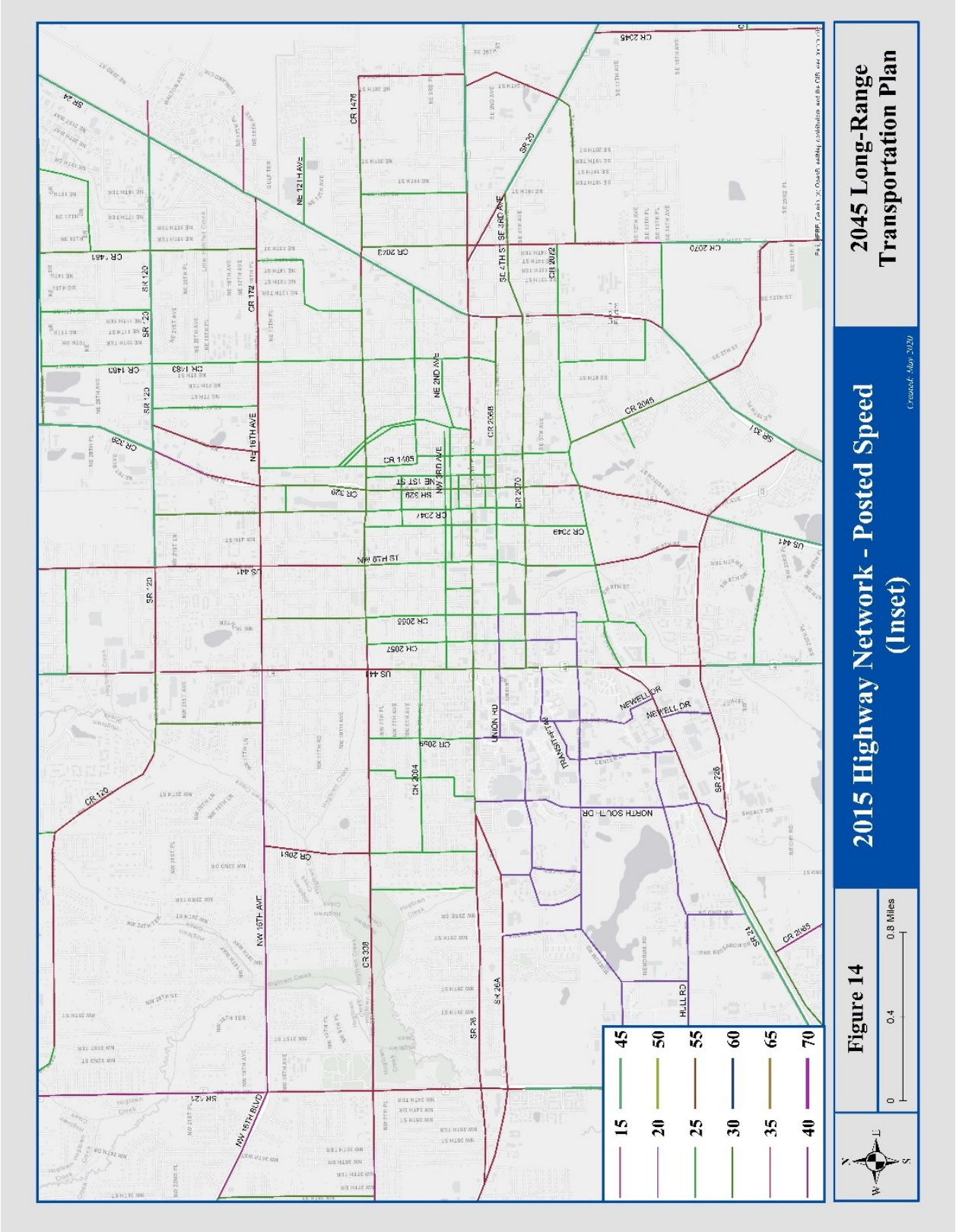
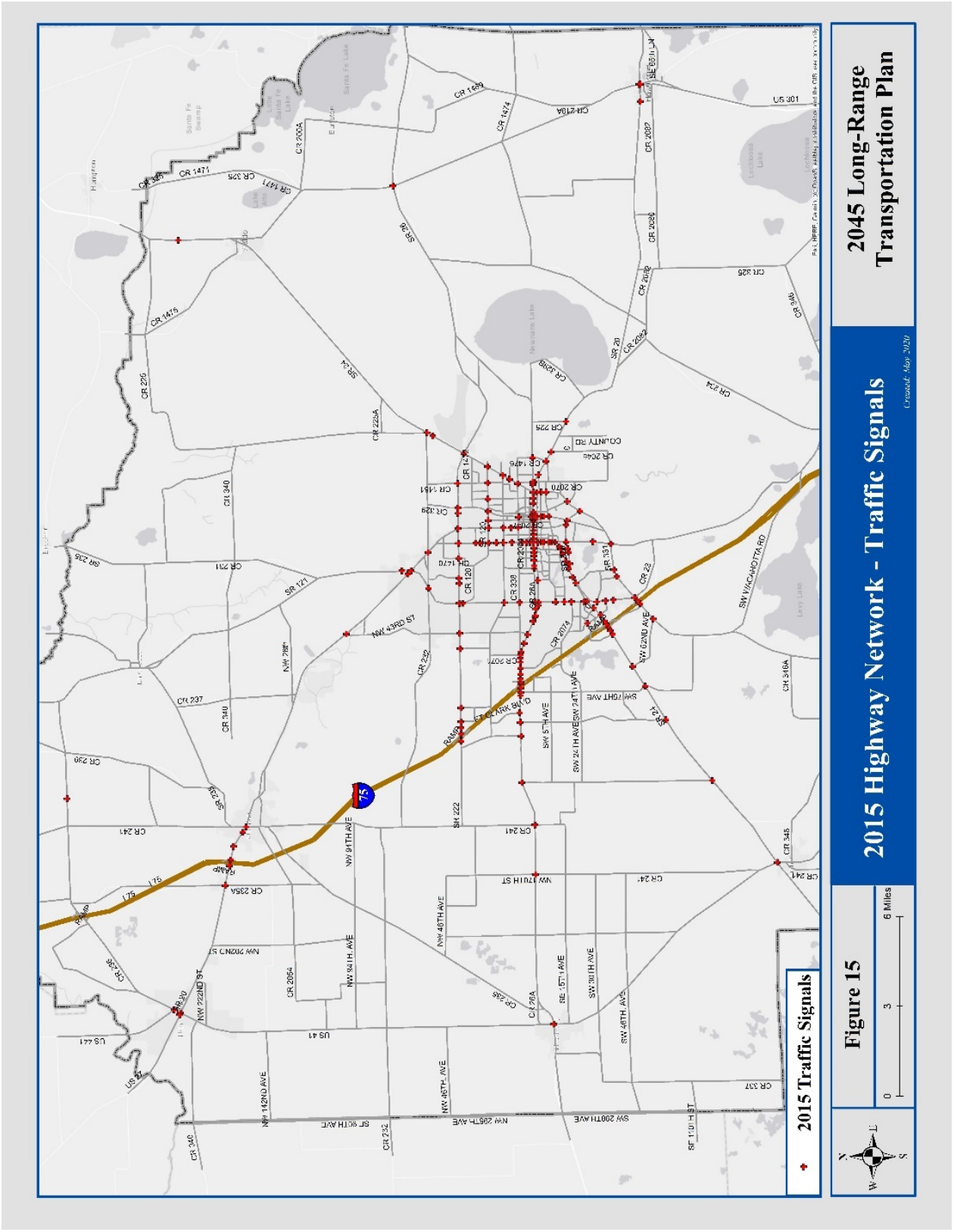


Figure 15: 2015 Highway Network - Traffic Signals



3.2.2 Updating Transit Network Data

Data for each transit route in the 2015 model were coded in the transit line (troute15.lin) file. Each route was coded into the previous 2010 transit line file, including mode, operator, and peak and off-peak headway attributes. To ensure that each of the routes was updated properly to 2015 conditions, transit data in General Transit Feed Specification format was obtained from the City of Gainesville Regional Transit System. The General Transit Feed Specification files provide information on routes, stop locations, and service characteristics (fare, frequency, run times, and span of service) of the system. This data was used to update the existing routes and stops, modify headways, and add 11 new routes (2B,24A, 27, 28, 38T, 39, 41, 46, 62, 76, and 77) that did not exist in the 2010 model. In addition, the routes 22 and 29 were deleted. These routes are no longer operated by the City of Gainesville Regional Transit System. Table 4 contains a listing of all the transit routes that are coded into the transit system and Figure 16 shows the 2015 transit routes.

The transit route file had to be overlaid with the highway network when new bus stop locations were added due to the necessity of splitting highway links where a bus stop exists. The highway network was updated at the same time as the transit route file was updated. Later Gator bus routes that were not included as these are evening bus services specifically for University of Florida students and operate for only limited hours while the model is designed to estimate daily peak and off-peak transit ridership.

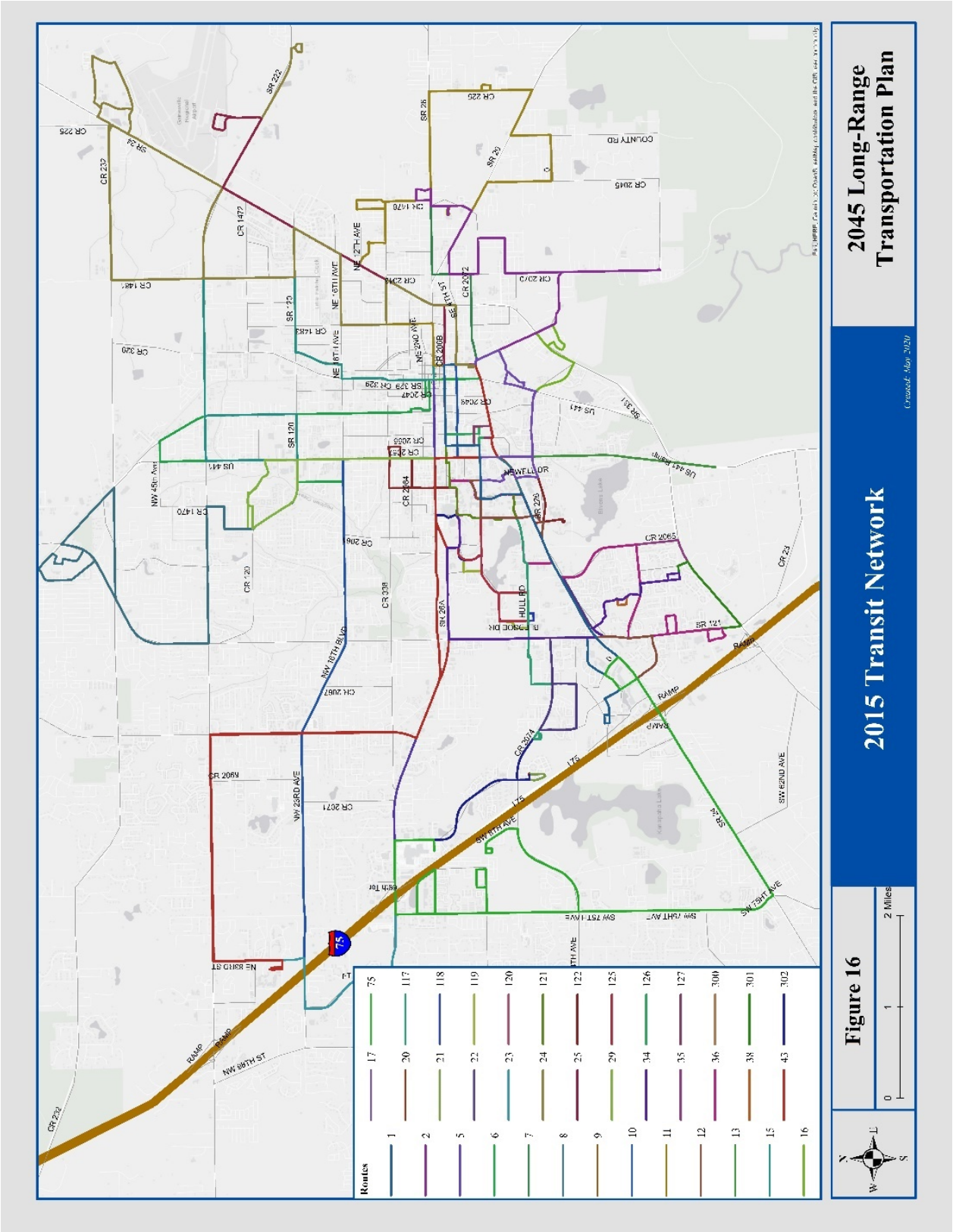
Transit fare data can be found within the Cube Voyager script file ALACHUA.FAR. According to the bus fare data provided by the City of Gainesville Regional Transit System, the year 2015 bus fare was $1.50. While the full 2015 bus fare amount was applied to transit trips for the homebased other trip purposes, discounted bus fare amounts were assumed for the home-based work and home-based university/dormitory trip purposes. Based on employee pass program information provided by the City of Gainesville Regional Transit System, 25 percent of the full fare was assumed for the home-based work trip purpose. University students are charged with bus fare as part of class registration fees which generally increases bus ridership for students (i.e., it is prepaid whether used or not and does not require students to pay upon boarding the bus). Therefore, ten percent of full fare was assumed for home-based university/dormitory trip purposes, consistent with the 2010 model. Extensive network testing will be conducted as part of the model validation effort, which may result in additional changes to the networks.

Table 4: Transit Routes

Route	Original-Destination Stops
1	Downtown Station - Butler Plaza
2A	Downtown Station - Northeast Walmart Supercenter
2B	Downtown Station – North Main Street Post Office
5	Downtown Station - Oaks Mall
6	Downtown Station - Plaza Verde
7	Downtown Station - Eastwood Meadows
8	Shands - North Walmart Supercenter
9	Reitz Union - Hunters Run
10	Downtown Station - Santa Fe

Route	Original-Destination Stops
11	Downtown Station - Eastwood Meadows
12	Reitz Union - Butler Plaza
13	Beaty Towers - CareerSource
15	Downtown Station - Northwest 13th Street (@ Northwest 23rd Avenue)
16	Beaty Towers - Sugar Hill
17	Beaty Towers - Downtown Station
20	Reitz Union - Oaks Mall
21	Reitz Union - Cabana Beach
23	Oaks Mall - Santa Fe
24A	Downtown Station - Airport
24B	Downtown Station - Job Corps
25	University of Florida Commuter Lot - Airport
27	Downtown Station - Northeast Walmart Supercenter
28	The Hub - Forest Park
34	The Hub - Lexington Crossing
35	Reitz Union - Southwest 35th Place
36	Reitz Union - Southwest 23rd Terrace @ Southwest 35th Place
38	The Hub - Gainesville Place
38T	The Hub - Old Archer Road
39	Santa Fe College- Airport
41	Beaty Towers - North Walmart Supercenter
43	Shands - Santa Fe
46	Reitz Union - Downtown Station
62	Oaks Mall - Lexington Crossing
75	Oaks Mall - Butler Plaza
76	Santa Fe College - Haile Square Market
77	Santa Fe College - Cabana Beach Apartments
117	Park-N-Ride 2 (Southwest 34th Street)
118	Park-N-Ride 1 (Cultural Plaza)
119	Family Housing
120	West Circulator (Fraternity Row)
121	Commuter Lot
122	University of Florida North/South Circulator
125	Lakeside
126	University of Florida East/West Circulator
127	East Circulator (Sorority Row)

Figure 16: Transit Network



TASK 3.3 REVIEW 2015 TRAFFIC COUNT AND TRANSIT RIDERSHIP DATA

3.3.1 Traffic Count

Validation of any travel demand model relies on the existence of a comprehensive set of base year traffic count data. Volume-over-count ratios generated by the model are used to measure the ability of a travel demand highway assignment model to simulate observed 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, and by each facility type, area type, and lane category.

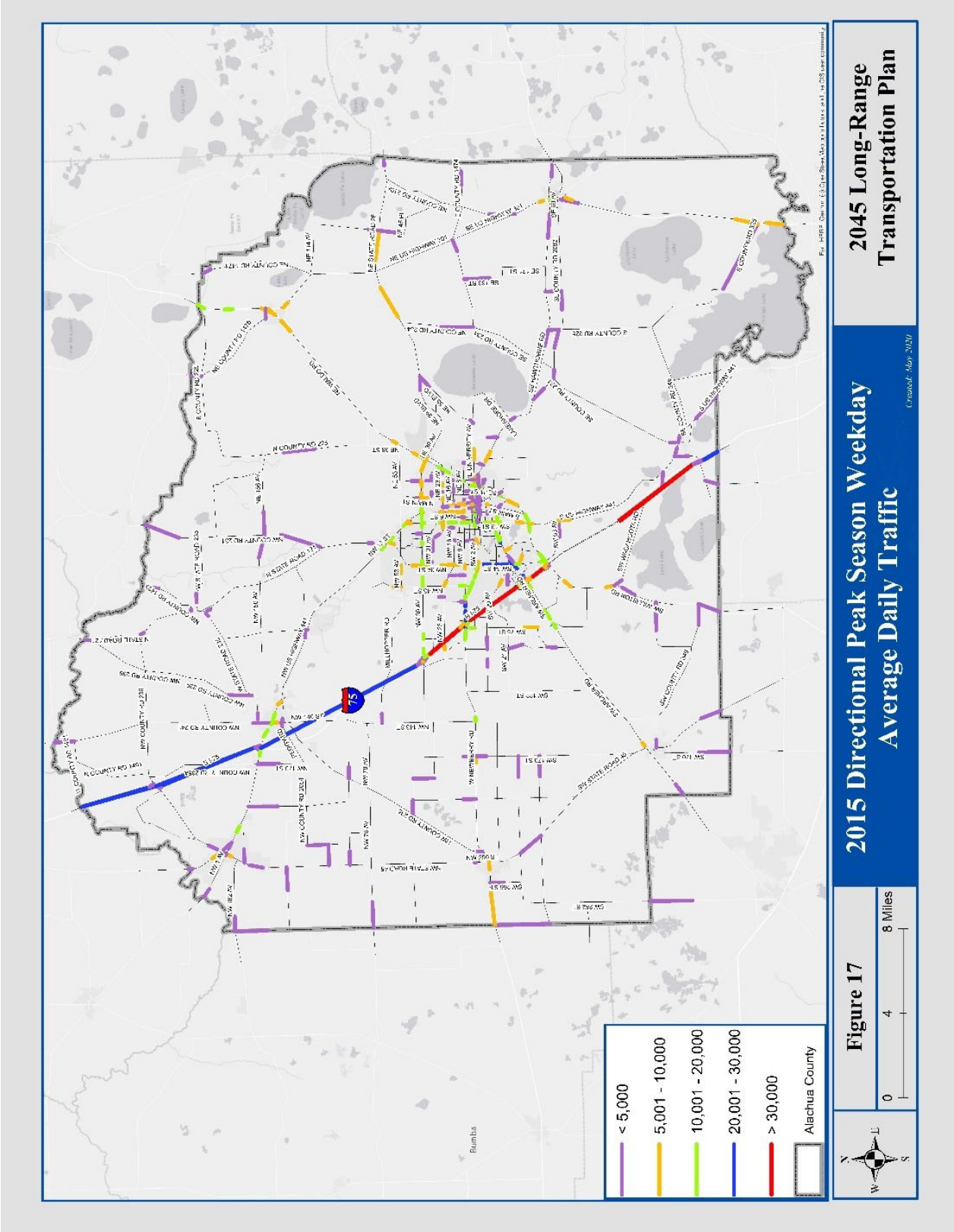
The 2015 traffic counts coded in the network were obtained from the Metropolitan Transportation Planning Organization for the Gainesville Urbanized Area, the Florida Department of Transportation, and the City of Gainesville. The Metropolitan Transportation Planning Organization for the Gainesville Urbanized Area's Year 2015 Multimodal Level of Service Report included counts on state roads, Alachua County arterials, and City of Gainesville/ University of Florida arterials. The Florida Department of Transportation's Roadway Characteristics Inventory provided 2015 counts on the State Highway System. In addition, 2015 traffic counts were also obtained from the City of Gainesville. No field data collection was undertaken as part of this modeling effort given the county-wide nature of this study.

Like most Florida Standard Urban Transportation Model Structure models, the Year 2015 Gainesville Urbanized Area Transportation Study travel demand model assigns trips to the highway network in terms of Peak Season Weekday Average Daily Traffic. Traffic count data from various sources are reported as Average Annual Daily Traffic. Annual Average Daily Traffic values are converted to Peak Season Weekday Average Daily Traffic using the inverse of the model output conversion factor from the Florida Traffic Information Digital Versatile Disc. Finally the Peak Season Weekday Average Daily Traffic values were coded in the highway network using the COUNT15 attribute, which is shown in Figure 17. Extensive data checks were conducted during this process in order to ensure that the counts coded in the model are reliable. Counts were cross referenced between different sources for consistency and compared with the 2010 model as part of the reasonableness checking. Table 5 provides a system-wide summary of the 2010 and 2015 traffic counts coded in the model network. As seen from the summary, several new counts were coded in the model network to enhance the model validation. However, it should be noted that 2015 counts (Count15) were less than 2010 counts (Count10). As a reasonableness check, at these locations 2018 Average Annual Daily Traffic (AADT18) and location 2010 Average Annual Daily Traffic (AADT10) were compared. It was noted that the AADT10 value were higher than AADT18. Since it is a peak season weekday model and to account for uncertainty in data collection, the 2015 counts were capped using 2010, if count15 is less than count10.

Table 5: System-wide Statistical Summary of Traffic Courts

	2010 Annual Average Daily Traffic	2015 Annual Average Daily Traffic
Observations	691	724
Average	13,953	12,618
Sum	9,641,210	9,136,087

Figure 17: 2015 Directional Peak Season Weekday Average Daily Traffic



3.3.2 Transit Ridership

The 2010 transit network was updated using the 2015 transit data provided by the City of Gainesville Regional Transit System in General Transit Feed Specification format. Ridership of the City of Gainesville Regional Transit System has increased steadily over the years. The system continues to set new ridership records through its partnerships and enhanced services. In Fiscal Year 2015, the City of Gainesville Regional Transit System provided over 10.23 million trips systemwide.

Over the last three years, the system has moved over ten million passengers per year which has kept the transit agency ranked as the top agency in the state of Florida when comparing ridership to population. Table 6 shows the 2015 route level ridership by month. The seasonal fluctuations in ridership are heavily influenced by the University of Florida schedule and holiday season. As the model represents peak season travel conditions, the model will be validated to represent peak season ridership.

Table 6: Transit Ridership by Route (in thousands of rides)

Route ID	Route Name	October	November	December	January	February	March	April	May	June	July	August	September
1	Butler Plaza to Downtown via Archer Road	71,088	54,247	50,591	56,665	54,706	54,791	55,278	43,171	44,563	46,600	54,253	71,542
2	Downtown to Robinson Heights via Southeast 15th Street	12,307	9,022	10,538	10,101	9,522	9,331	9,592	5,684	6,206	5,334	5,908	6,801
3	Downtown to N Main Street Post Office								1,822	1,973	1,997	2,473	2,565
5	Oaks Mall to Downtown via University Avenue	51,677	37,603	37,251	38,470	40,587	40,377	41,512	32,104	31,012	31,119	36,018	45,635
6	Downtown to Gainesville Mall via 6th Avenue	10,214	7,134	8,423	8,367	8,182	8,210	8,106	6,422	6,445	6,129	6,640	7,077
7	Downtown to Eastwood Meadows	9,201	6,123	7,012	6,662	6,337	6,412	6,654	6,341	6,564	6,675	6,385	7,229
8	Pine Ridge to Shands via Northwest 13th Street	32,386	23,515	23,714	25,975	27,198	26,982	27,196	22,646	22,875	23,148	25,008	30,450
9	Lexington Crossing to McCarty Hall	84,313	59,077	40,853	66,669	68,956	60,088	63,112	21,227	22,518	26,154	34,603	73,976
10	Santa Fe College to Downtown via Northwest 16th Avenue/University Avenue	16,691	11,570	8,355	11,709	12,787	11,196	11,757	7,166	7,546	8,048	8,275	13,756
11	Eastwood Meadows to Downtown via University Avenue	17,305	13,012	14,133	13,483	13,058	13,141	13,618	9,916	9,549	9,252	9,453	10,990
12	Campus Club to McCarty Hall	95,322	68,883	51,795	72,342	70,655	65,252	68,787	35,714	36,275	42,617	57,763	86,623
13	Job Services to Newell Drive/Museum Road via 13th Street	44,539	31,078	24,994	33,812	34,393	31,810	33,010	17,807	19,106	22,373	24,082	38,464
15	Downtown to Northwest 23rd Street/Northwest 6th Street (includes Saturday service)	29,644	22,587	26,142	22,158	23,039	24,221	23,940	23,414	23,613	23,374	23,262	23,222
16	Newell Drive/Museum Road. to Sugar Hill via 16th Avenue	17,315	12,961	11,362	14,479	13,671	13,364	13,843	8,436	8,541	8,565	8,896	11,302
17	Shands to Downtown (Began August 2007)	18,451	12,953	11,691	11,977	13,630	13,679	14,960	10,043	10,922	10,404	10,094	12,591
20	Oaks Mall to McCarty Hall via Southwest 20th Avenue	127,443	91,143	69,451	98,819	101,149	91,120	95,705	59,403	65,284	80,170	25,308	1,664
21	Southwest 43rd Street to McCarty Hall	54,817	36,586	24,965	44,751	46,347	37,692	40,295	719	0	0	0	0
22	McCarty to Southwest 43rd Street @ Southwest 24th Avenue	0	0	0	0		0	0	0	0	0	3,149	1,425
23	Oaks Mall to Santa Fe College	19,476	13,563	9,060	14,198	14,126	12,618	13,972	8,130	8,522	8,060	8,722	20,888

Route ID	Route Name	October	November	December	January	February	March	April	May	June	July	August	September
24	Downtown to Job Corps via State Road 24 (Waldo Road.)	12,451	9,017	9,808	10,755	10,202	10,682	10,385	2,333	2,235	1,851	3,612	2,324
25	McCarty Hall to Airport	8,191	6,882	6,395	7,319	7,439	7,290	7,125	5,404	5,347	5,554	6,698	8,310
26	Downtown to Airport								6,706	7,096	7,395	4,046	7,326
27	City Eastside Circulator	1,953	1,418	825	1,715	1,544	1,191	1,758	95	0	0	786	1,615
28	The Hub to Southwest 20th Avenue	18,146	12,667	6,974	15,738	16,291	13,552	13,997	103	0	0	8,743	28,225
29	Beaty Towers to Cobblestone	0	0	0	0	0	0	0	0	0	0	5,853	4,990
34	The Hub to Lexington Crossing	35,046	23,566	15,553	27,107	29,509	24,111	24,817	11,631	13,282	16,549	28,385	34,794
35	McCarty to Homestead Apartments	73,505	52,919	37,348	58,926	62,399	54,304	56,599	36,279	40,621	46,829	35,682	86,484
36	McCarty Hall to Williston Plaza	12,973	9,409	5,290	11,213	11,477	10,260	9,482	209	0	0	6,348	6,862
37	Reitz Union to Butler Plaza (via Southwest 35th Place)											5,346	
38	The Hub to Gainesville Place	70,383	47,812	31,076	59,425	63,565	53,720	55,601	14,608	15,786	21,443	24,671	
38	Reitz Union to Butler Plaza (via Southwest 35th Place)												12,264
39	The Hub to Gainesville Place												74,945
39	Santa Fe College to Airport	2,419	1,778	996	2,116	2,028	1,740	2,149	65	0	0	6,870	
40	The Hub to Hunters Crossing											2,410	
40	Santa Fe College to Airport												3,119
41	Beaty Towers to Pine Ridge/Walmart	7,932	5,567	3,088	5,897	6,621	5,223	6,008	235	0	0	0	
41	The Hub to Hunters Crossing												0
43	Beaty Towers to Pine Ridge/ Walmart												21,701
43	Downtown to Santa Fe via 43rd Street	24,585	17,062	13,995	19,598	19,921	19,053	19,881	13,434	14,867	15,707	18,843	
46	Downtown to Santa Fe via 43rd Street												17,801
46	University of Florida Downtown Circulator	15,734	11,820	7,125	13,349	14,640	11,562	13,220	3,163	3,557	5,061	6,045	
62	Oaks Mall to Lexington Crossing.	2,724	1,952	1,131	1,776	1,884	1,338	1,563	102	0	0	919	2,148
75	Oaks Mall to Butler Plaza via 75th Street	30,319	21,498	24,167	20,328	20,933	21,339	20,358	20,846	20,414	20,686	12,501	22,296
76	Santa Fe College to Haile Square Market	5,653	4,176	2,029	4,692	4,779	3,592	4,269	59	0	0	1,232	3,854
77	Santa Fe College to Cabana Beach Apartments	2,785	2,086	935	2,279	2,043	1,645	2,177	24	0	0	709	2,215
128	Lake Wauburg	0	0	0	86	86	203	281	102	100	0	0	0
129	West/East Circulator											1,526	3,350
300	Later Gator A (Downtown to Reitz Union)	8,493	4,906	2,804	8,864	6,843	5,450	7,294	446	0	3,247	2,455	5,555
301	Later Gator B (Downtown to Lexington Circle)	5,275	2,669	1,751	3,727	2,855	2,682	3,838	744	0	2,704	2,208	3,553
302	Later Gator C (Downtown to Oaks Mall)	7,952	5,058	2,718	7,283	5,973	5,808	7,211	672	0	4,800	2,682	5,826
303	Later Gator D (Downtown to Southwest 13th Street)	531	401	182	660	371	406	370	55	0		206,860	301
305	Later Gator F (Downtown to Butler Plaza)	827	689	364	859	571	696	643	153	0		349	804
711	Downtown to Eastwood Meadows								1,892	2,133	2,346	1,281	2,302
City Total		**1,060,066**	**754,409**	**604,884**	**834,349**	**850,317**	**776,131**	**810,363**	**437,633**	**454,819**	**511,845**	**746,071**	**826,862**

Route ID	Route Name	October	November	December	January	February	March	April	May	June	July	August	September
117	Park-N-Ride 2 (Southwest 34th Street)	23,965	15,986	9,578	21,394	22,926	19,294	20,746	6,327	7,032	10,446	15,724	35,328
118	Park-N-Ride 1 (Harn Museum)	49,886	36,059	20,781	40,672	44,755	38,220	39,422	231	0	0	13,401	46,170
119	Family Housing	11,208	6,167	4,170	5,708	6,249	4,867	5,356	1,327	1,993	4,578	2,737	6,806
120	West Circulator (Fraternity Row)	33,323	22,978	13,937	28,218	28,120	23,709	25,267	4,689	6,871	19,979	14,511	33,029
121	Commuter Lot	9,418	4,704	3,064	7,129	8,357	6,374	7,482	99	0	0	3,923	9,695
122	University of Florida North/South Circulator	5,586	3,993	2,523	4,949	5,410	3,684	4,110	880	1,340	1,931	2,070	4,335
125	Lakeside	35,810	24,917	15,412	29,808	31,592	24,728	24,920	4,649	6,487	20,321	13,255	36,740
126	University of Florida East/West Circulator (Evening)	17,750	11,851	6,521	13,663	15,748	12,953	13,303	938	1,051	2,152	6,275	13,122
127	East Circulator (Sorority Row)	29,454	19,441	11,758	22,713	23,700	17,293	18,156	3,613	3,523	5,577	7,832	25,826
Campus Total		**216,400**	**146,096**	**87,744**	**174,254**	**186,857**	**151,122**	**158,762**	**22,753**	**28,297**	**64,984**	**79,728**	**211,051**
Other Services Totals		**10,594**	**0**	**0**		**0**		**0**	**0**	**0**	**0**	**4,438**	**23,714**
System-wide Total		**1,287,060**	**900,505**	**692,628**	**1,008,603**	**1,037,174**	**927,253**	**969,125**	**460,386**	**483,116**	**576,829**	**830,237**	**1,061,627**

Source: City of Gainesville Regional Transit System

TASK 3.4 REVIEW TRIP GENERATION RATE

Like most Florida Standard Urban Transportation Model Structure models, the Year 2015 Gainesville Urbanized Area Transportation Study travel demand model uses cross classification trip production rates stratified by automobile availability (0, 1, 2, and 3+ automobile households), dwelling unit type (single family, multifamily, and hotel/motel units), and household size (1, 2, 3, 4, and 5+ persons per household). Trip production rates for home-based work, home-based shopping, home-based social/recreational, and home-based other purposes are shown in Table 7. The production rates were developed using the North Florida Household Travel Survey and were also utilized by the 2015 model.

Trip attraction rates were originally derived from the 2005 Northeast Florida Regional Planning Model and are shown in Table 8. Both model regions share a few similar socioeconomic characteristics such as less of a reliance on tourism and seasonal residents than other parts of Florida. The rates were reviewed as part of the 2015 update and deemed reasonable. The dwelling unit weights have been utilized from the 2010 model and are shown in Table 9.

Table 7: Trip Production Rates

Home-Based Work						
Dwelling Unit Type	**Number of Automobiles Available**	**1**	**2**	**3**	**4**	**5+**
Single Family	0	0.35	0.64	1.01	1.5	2.08
	1	0.69	0.98	1.35	1.84	2.42
	2	1.35	1.64	2.01	2.5	3.08
	3+	1.76	2.05	2.42	2.9	3.49
Multifamily	0	0.41	0.7	1.01	1.31	1.62
	1	0.95	1.49	2.02	2.56	3.1
	2	1.65	2.3	2.95	3.6	4.25
	3+	2.21	2.89	3.59	4.27	4.96
Hotel/Motel		1.04	0.72	0.5	0.39	0.39

Home-Based Shopping						
Dwelling Unit Type	**Number of Automobiles Available**	**1**	**2**	**3**	**4**	**5+**
Single Family	0	0.3	0.53	0.95	1.55	2.34
	1	0.59	1.02	1.55	2.18	2.89
	2	0.65	1.08	1.61	2.23	2.95
	3+	0.77	1.22	1.76	2.39	3.1
Multifamily	0	0.22	0.57	1.02	1.54	2.11
	1	0.5	0.95	1.4	1.83	2.27
	2	0.72	1.22	1.66	2.08	2.46
	3+	0.84	1.35	1.79	2.2	2.56
Hotel/Motel		0.33	1.43	2.2	2.75	3.19

Home-Based Social/Recreational						
Dwelling Unit Type	**Number of Automobiles Available**	**1**	**2**	**3**	**4**	**5+**
Single Family	0	0.21	0.28	1.28	1.47	2.2
	1	0.48	0.85	1.43	1.31	2.37
	2	0.53	0.89	1.85	2.07	2.77
	3+	0.7	1.07	2.04	2.24	2.97
Multifamily	0	0.18	0.63	1.08	1.53	1.98
	1	0.22	0.67	1.12	1.57	2.02
	2	0.64	1.09	1.54	1.99	2.44
	3+	0.84	1.29	1.74	2.19	2.64
Hotel/Motel		0.66	1.81	2.97	4.29	6.49

Home-Based Other						
Dwelling Unit Type	Number of Automobiles Available	1	2	3	4	5+
Single Family	0	0.29	0.64	1.67	3.38	5.78
	1	0.48	1.29	2.59	4.38	6.67
	2	0.62	1.79	3.34	5.2	7.33
	3+	0.68	1.94	3.58	5.59	7.99
Multifamily	0	0.35	0.78	2.28	4	6.23
	1	0.74	1.36	3.16	4.92	6.91
	2	1.12	1.87	3.71	5.59	7.34
	3+	1.17	2.09	4.05	5.75	7.56
Hotel/Motel		0.55	1.32	2.31	3.63	4.84

Table 8: Attraction Rates

Purpose	Manufacturing	Other Industrial	Commercial	Service	Total	Dwelling Units	School Enrollment
Home-Based Work	0	0	0	0	1.8	0.5	0
Home-Based Shopping	0	0	6.1	0	0	0	0
Home-Based Social/ Recreational	0	0	0.5	0.5	0	1.61	0
Home-Based Other	0	0	1.5	1.5	0	0.3	1.5
Non Home-Based	0	0	3.54	1.71	0	0.3	0
Four-Tire Truck	0.47	0.55	0.45	0.22	0	0.13	0
Single-Unit Truck	0.12	0.15	0.13	0.04	0	0.05	0
Tractor-Trailer	0.05	0.09	0.04	0.01	0	0.02	0

Table 9: Dwelling Unit Weights

Average Persons Per Dwelling Unit	One-Person Households	Two-Person Households	Three-Person Households	Four-Person Households	Five-Person Households
0.00-1.12	0.89	0.11	0	0	0
1.13-1.37	0.76	0.22	0.02	0	0
1.38-1.62	0.59	0.34	0.05	0.01	0.01
1.63-1.87	0.46	0.34	0.11	0.06	0.03
1.88-2.12	0.32	0.36	0.16	0.11	0.05
2.13-2.37	0.24	0.36	0.18	0.14	0.08
2.38-2.62	0.21	0.33	0.19	0.16	0.12
2.63-2.87	0.12	0.35	0.19	0.23	0.11
2.88-3.12	0.13	0.34	0.18	0.16	0.19
3.13-3.37	0.12	0.29	0.18	0.17	0.24
3.38-3.62	0.08	0.24	0.2	0.2	0.28

Average Persons Per Dwelling Unit	One-Person Households	Two-Person Households	Three-Person Households	Four-Person Households	Five-Person Households
3.63-3.87	0.05	0.2	0.19	0.23	0.33
3.88-4.12	0.04	0.16	0.17	0.24	0.39
4.13-4.37	0.02	0.15	0.14	0.21	0.48
4.38-4.62	0.01	0.15	0.13	0.17	0.54
4.63-5.99	0	0.05	0.07	0.14	0.74
6.00+	0	0	0.02	0.05	0.93

The Home-Based University and University of Florida Campus/Dormitory trip purposes are unique to the Year 2010 and 2015 Gainesville Urbanized Area Transportation Study travel demand model. These additional purposes were also used in the Year 2000 and Year 2007 Gainesville Urbanized Area Transportation Study travel demand models, as it was found that this was necessary to properly model a county with a university town, such as the City of Gainesville, as a major trip attractor. The Home-Based University purpose is for trips traveling from off-campus housing to parking spaces within the University of Florida campus. On the other hand, the University of Florida Campus/Dormitory trip purpose is for trips from the University of Florida on-campus dormitories to classrooms that are specified in the ZONEDATA file. It should be noted that the model has limited capabilities in simulating parking capacity beyond the number of parking spaces being stored in the ZONEDATA file and used in the attraction equations.

Home-based University and University of Florida Campus/Dormitory trip production and attraction equations for those trip purposes are listed below, as extracted from model scripts. During validation, these trip rates were relocated to the Cube catalog keys (names depicted in {brackets}) to enhance model transparency.

Home-Based University Productions:
RO.HBUP = {RATE_HBUP}*ZI.1.UF_OC_ST;
UF_OC_ST is off-campus (students);
Default value of {RATE_HBUP} is 2.996
Home-Based University Attractions:
RO.HBUA = {RATE_HBUA}*ZI.1.UF_PARKING;
PARKING is University of Florida Parking Spaces;
Default value of {RATE_HBUA} is 1.375
University of Florida Campus/Dormitory Productions:
RO.HDORMUP = {RATE_HDORMUP} *ZI.1.UF_DORM_ST
UF_DORM_ST is Campus housing/Dormitory students
Default value of {RATE_HDORMUP} is 2.262
University of Florida Campus/Dormitory Attractions:
RO.HDORMUA = {RATE_HDORMUA} *ZI.1.SEATS
SEATS is University of Florida Classroom Seats
Default value of {RATE_HDORMUA} is 0.7513

The impacts of these rates will be comprehensively assessed during the trip generation validation of the Year 2015 Gainesville Urbanized Area Transportation Study travel demand model.

TASK 3.5 REVIEW TRIP LENGTH DISTRIBUTION

Trip length frequency distribution is an important component of the trip distribution model that pairs the productions and attractions estimated by the trip generation model. Gravity models are implemented as mathematical procedures designed to preserve the observed frequency distribution of trip lengths for each modeled trip purpose. The travel time matrix from highway skimming and production-attraction matrices from the trip distribution process are used to determine the average trip length and the trip length frequency distribution for each trip purpose.

3.5.1 Friction Factors

Friction factors are used in the gravity model to represent the effects of travel impedance. These factors define the measure of separation based on travel impedances between traffic analysis zones. The friction factors from the 2010 model were reviewed and no updates were necessary for the 2015 model validation (refer to Table 10). Average trip lengths seemed reasonable, intrazonal percentages made sense, and aggregate trip distribution patterns looked logical. In addition, there were no updated household travel diary survey data for Alachua County to allow for calibration of new friction factors.

3.5.2 Travel Time Skims

Trip travel time contains three parts. First is in-vehicle travel time on the road, second is intrazonal time which represents travel time within traffic analysis zones, and the last one is terminal time which approximately estimates the travel time from/to vehicle at trip ends. In-vehicle travel time skims between zone pairs are developed as the last substep in the Highway Network step, including the updating of travel time skims with intrazonal and terminal times.

Highway network characteristics are input to this process. In addition to the highway network characteristics, the TCARDS file is used as input to the process. The TCARDS file contains a record of all prohibited movements in the network. The TCARDS file also can include time penalties; however, time penalties were not recommended in the model area as the highway assignment validated reasonably well without supplemental travel time factors.

Intrazonal times represent the travel time it takes to travel within or across a zone. These times are calculated as one-half the travel time from one zone to the nearest adjacent zone. Terminal times represent the time required at either end of a trip to travel from an origin to a vehicle or from the vehicle to a final destination. More specifically, this accounts for the time necessary to walk to or from the vehicle used for any given trip. Terminal times are typically greatest in central business districts and lowest in residential areas. Table 11 lists the terminal times by area type used in the Alachua County 2015 model.

Table 10: Friction Factors

TIME	HBWFF	HBSHFF	HBSRFF	HBOFF	NHBFF	TK4FF	TKSGLFF	TKTRLRFF	SOVIEFF	HOVIEFF	TKLTIEFF	TKHTIEFF	HBUFF	HDORMUFF
1	25,208	126,687	126,687	126,687	198,262	9,231	9,048	9,704	222	222	222	222	126,687	126,687
2	21,983	47,324	47,324	47,324	71,259	8,521	8,187	9,418	333	333	333	333	47,324	47,324
3	19,282	25,585	25,585	25,585	37,571	7,866	7,408	9,139	444	444	444	444	25,585	25,585
4	16,953	16,092	16,092	16,092	23,174	7,261	6,703	8,869	555	555	555	555	16,092	16,092
5	14,924	10,997	10,997	10,997	15,577	6,703	6,065	8,607	666	666	666	666	10,997	10,997
6	13,149	7,919	7,919	7,919	11,056	6,188	5,488	8,353	777	777	777	777	7,919	7,919
7	11,591	5,913	5,913	5,913	8,147	5,712	4,966	8,106	888	888	888	888	5,913	5,913
8	10,222	4,534	4,534	4,534	6,170	5,273	4,493	7,866	1,333	1,333	1,333	1,333	4,534	4,534
9	9,018	3,548	3,548	3,548	4,773	4,868	4,066	7,634	1,666	1,666	1,666	1,666	3,548	3,548
10	7,957	2,820	2,820	2,820	3,753	4,493	3,679	7,408	3,333	3,333	3,333	3,333	2,820	2,820
11	7,023	2,271	2,271	2,271	2,991	4,148	3,329	7,189	6,666	6,666	6,666	6,666	2,271	2,271
12	6,199	1,849	1,849	1,849	2,410	3,829	3,012	6,977	7,777	7,777	7,777	7,777	1,849	1,849
13	5,473	1,519	1,519	1,519	1,960	3,535	2,725	6,771	8,888	8,888	8,888	8,888	1,519	1,519
14	4,833	1,257	1,257	1,257	1,607	3,263	2,466	6,570	9,999	9,999	9,999	9,999	1,257	1,257
15	4,267	1,047	1,047	1,047	1,326	3,012	2,231	6,376	9,999	9,999	9,999	9,999	1,047	1,047
16	3,769	877	877	877	1,101	2,780	2,019	6,188	9,999	9,999	9,999	9,999	877	877
17	3,328	739	739	739	919	2,567	1,827	6,005	9,999	9,999	9,999	9,999	739	739
18	2,940	625	625	625	771	2,369	1,653	5,827	9,999	9,999	9,999	9,999	625	625
19	2,597	531	531	531	649	2,187	1,496	5,655	9,999	9,999	9,999	9,999	531	531
20	2,294	452	452	452	548	2,019	1,353	5,488	6,666	6,666	6,666	6,666	452	452
21	2,026	387	387	387	465	1,864	1,225	5,326	3,333	3,333	3,333	3,333	387	387
22	1,790	331	331	331	395	1,720	1,108	5,169	1,111	1,111	1,111	1,111	331	331
23	1,582	285	285	285	337	1,588	1,003	5,016	444	444	444	444	285	285
24	1,397	246	246	246	288	1,466	907	4,868	222	222	222	222	246	246
25	1,235	212	212	212	247	1,353	821	4,724	111	111	111	111	212	212
26	1,091	184	184	184	212	1,249	743	4,584	66	66	66	66	184	184
27	964	159	159	159	183	1,153	672	4,449	22	22	22	22	159	159
28	852	138	138	138	157	1,065	608	4,317	16	16	16	16	138	138
29	753	120	120	120	136	983	550	4,190	13	13	13	13	120	120
30	665	105	105	105	118	907	498	4,066	11	11	11	11	105	105
31	588	92	92	92	102	837	450	3,946	16	16	16	16	92	92
32	519	80	80	80	88	773	408	3,829	3	3	3	3	80	80
33	459	70	70	70	77	714	369	3,716	1	1	1	1	70	70
34	406	61	61	61	67	659	334	3,606	1	1	1	1	61	61
35	358	54	54	54	58	608	302	3,499	1	1	1	1	54	54
36	317	47	47	47	51	561	273	3,396	1	1	1	1	47	47
37	280	41	41	41	44	518	247	3,296	1	1	1	1	41	41
38	247	36	36	36	39	478	224	3,198	1	1	1	1	36	36
39	219	32	32	32	34	442	202	3,104	1	1	1	1	32	32
40	193	28	28	28	29	408	183	3,012	1	1	1	1	28	28
41	171	25	25	25	26	376	166	2,923	1	1	1	1	25	25
42	151	22	22	22	23	347	150	2,837	1	1	1	1	22	22
43	133	19	19	19	20	321	136	2,753	1	1	1	1	19	19
44	118	17	17	17	17	296	123	2,671	1	1	1	1	17	17
45	104	15	15	15	15	273	111	2,592	1	1	1	1	15	15
46	92	13	13	13	13	252	101	2,516	1	1	1	1	13	13
47	81	12	12	12	12	233	91	2,441	1	1	1	1	12	12

TIME	HBWFF	HBSHFF	HBSRFF	HBOFF	NHBFF	TK4FF	TKSGLFF	TKTRLRFF	SOVIEFF	HOVIEFF	TKLTIEFF	TKHTIEFF	HBUFF	HDORMUFF
48	72	11	11	11	10	215	82	2,369	1	1	1	1	11	11
49	64	9	9	9	9	198	74	2,299	1	1	1	1	9	9
50	56	8	8	8	8	183	67	2,231	1	1	1	1	8	8
51	50	7	7	7	7	169	61	2,165	1	1	1	1	7	7
52	44	7	7	7	6	156	55	2,101	1	1	1	1	7	7
53	39	6	6	6	6	144	50	2,039	1	1	1	1	6	6
54	34	5	5	5	5	133	45	1,979	1	1	1	1	5	5
55	30	5	5	5	4	123	41	1,920	1	1	1	1	5	5
56	27	4	4	4	4	113	37	1,864	1	1	1	1	4	4
57	24	4	4	4	3	105	33	1,809	1	1	1	1	4	4
58	21	3	3	3	3	97	30	1,755	1	1	1	1	3	3
59	19	3	3	3	3	89	27	1,703	1	1	1	1	3	3
60	16	3	3	3	2	82	25	1,653	1	1	1	1	3	3
120	0	0	0	0	0	0	0	0	0	0	0	0	0	0

HBOFF=Home Based Other Friction Factor
HBSHFF=Home Based Work Friction Factor
HBSR= Home Based Social Recreation Friction Factor
HBUFF=Home Based University Friction Factor
HBWFF=Home Based Work Friction
HDORMFF=Dormitory Based Friction Factor
HOVIEFF=High-Occupancy Vehicle Friction Factor
NHBFF=None Home Based Friction Factor
SOVIEFF=Single Occupant Vehicle Internal-External Friction Factor
TKHTIEFF=Heavy Truck Friction Factor
TKLTIEFF=Light Truck Friction Factor
TKSGLFF=Single Unit Truck Friction Factor
TKTRLRFF=Truck Trailer Friction Factor
TK4FF=4-Tire Truck Friction Factor

Table 11: Terminal Time

Terminal Times	Area Type	Area Type Descriptions
5	12	Urbanized Area (under 500,000) Primary City Central Business District
5	13	Other Urbanized Area Central Business District and Small City Downtown
5	14	Non-urbanized Area Small City Downtown
3	21	Central Business District Fringe Areas
3	22	Industrial
1	31	Residential Area of Urbanized Areas
1	32	Undeveloped Portions of Urbanized Areas
1	33	Transitioning Areas/Urban Areas over 5,000 Population
2	42	Other Outlying Business District
1	51	Developed Rural Areas/Small Cities under 5,000 Population
1	52	Undeveloped Rural Areas

3.5.3 Trip Length Frequency Distribution and Average Trip Length by Purpose

Table 12 shows a comparison of average trip length statistics generated by the Year 2015 and Year 2010 Gainesville Urbanized Area Transportation Study travel demand models and applicable Florida Standard Urban Transportation Model Structure standards. The comparison between the Gainesville Urbanized Area Transportation Study Year 2015 model and the Year 2010 model show no significant changes in average trip length in minutes. The model results are also within the standard ranges for the most part (note that the long-range transportation plan model validation standards utilized are more stringent compared to the general standards noted on Table 12). Figures 18 through 21 depict the trip length distribution by purpose, which

will be further refined as part of the model validation process as needed. The 2010 and 2015 trip length frequency distributions are found to be similar.

Table 12: Average Trip Length Comparison (in Minutes)

Purpose	2015 Gainesville Urbanized Area Transportation Study Model	2010 Gainesville Urbanized Area Transportation Study Model	Florida Standard Urban Model Transportation Structure Standard*
Home-Based Work	15.03	14.67	15-28
Home-Based Shop	13.67	13.09	10-18
Home-Based Social/Recreation	12.76	12.49	11-19
Home-Based Other	13.52	13.24	10-20
Nonhome-Based	10.68	10.51	10-18
Home-Based University	9.2	9.31	9-16
University of Florida Campus/Dormitory	6.21	6.2	NA
Truck-Taxi	15.77	15.4	12-20
Internal-External	26.45	25.77	27-45

Figure 18: Trip Length Frequency Distribution for Home Based Work

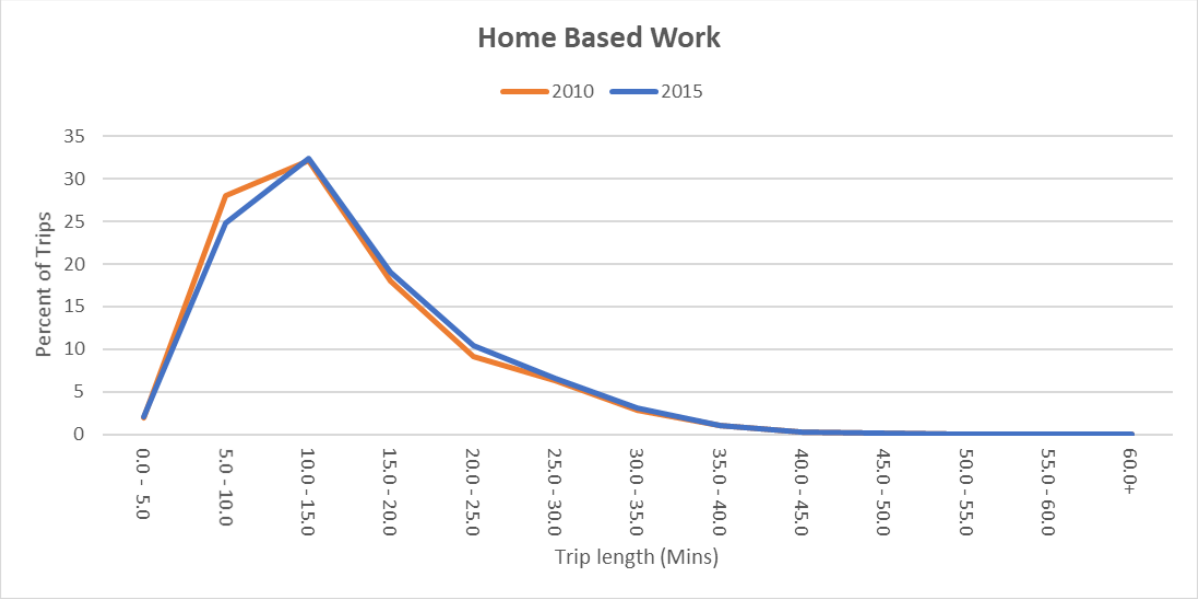


Figure 19: Trip Length Frequency Distribution for Home Based Shopping

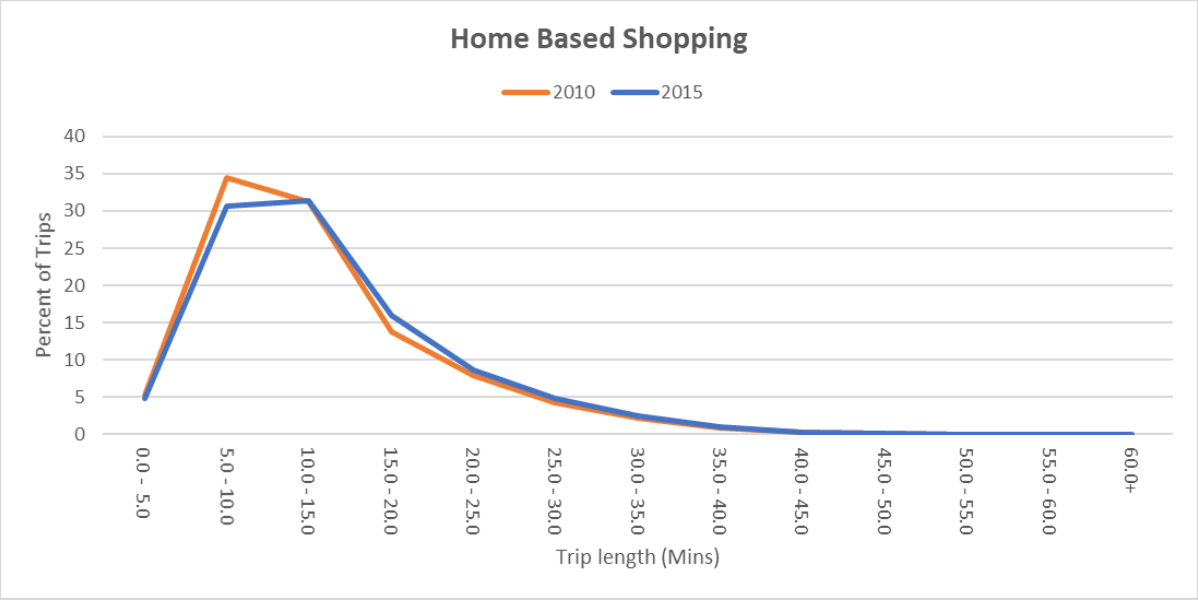


Figure 20: Trip Length Frequency Distribution for Home Based Social/ Recreational

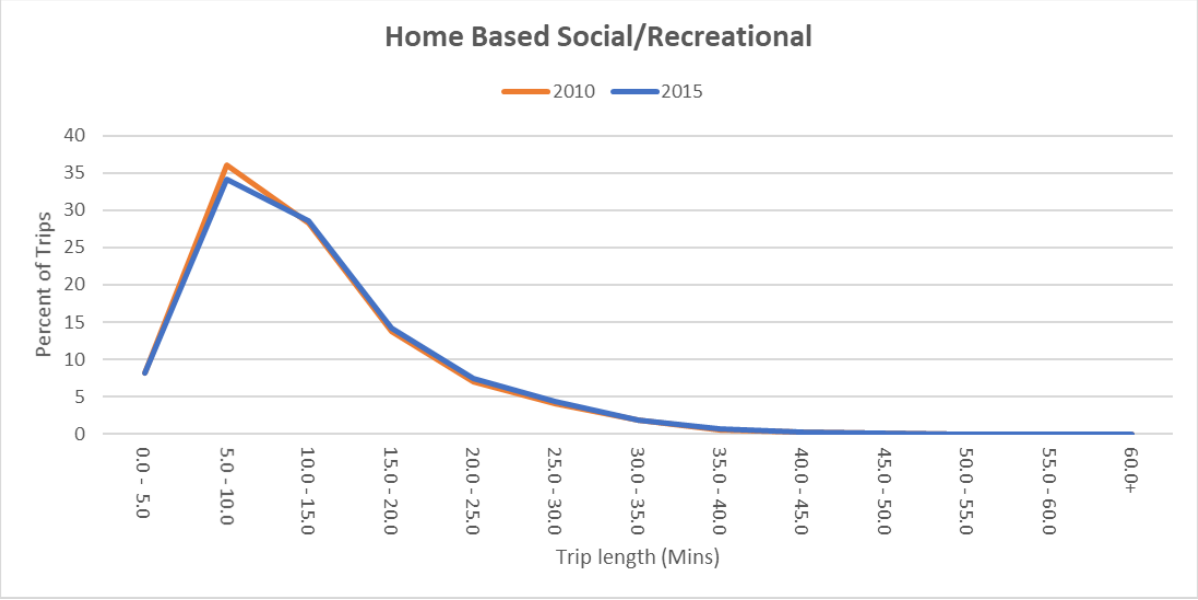
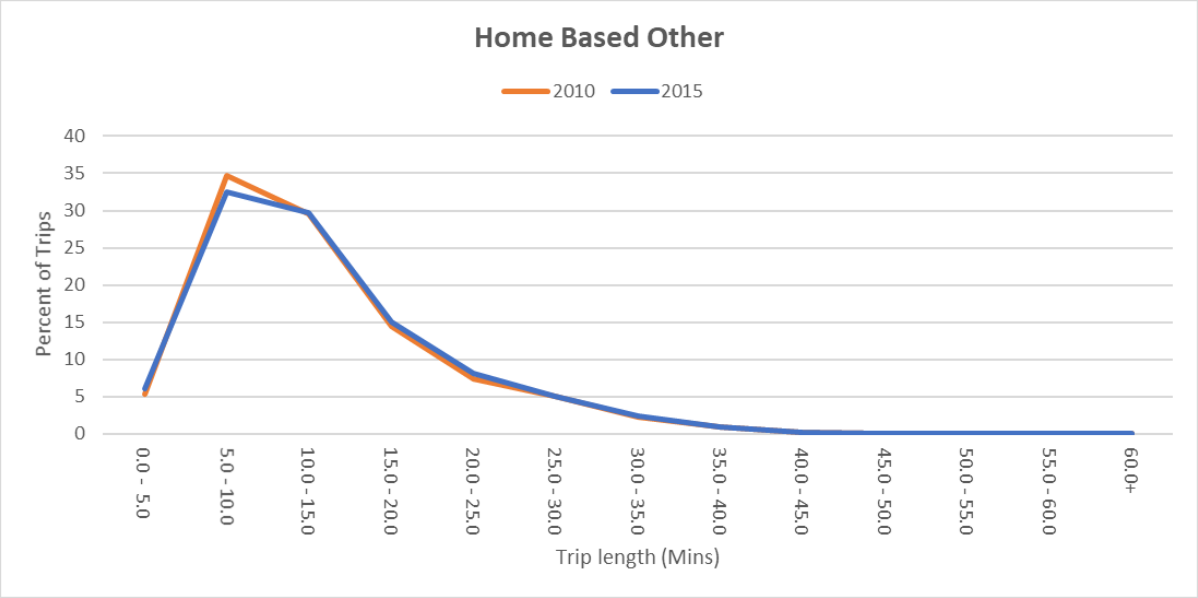


Figure 21: Trip Length Frequency Distribution for Home Based Other



TASK 3.6 REVIEW AUTO OCCUPANCY RATES

Automobilie occupancy rate is the average number of persons per vehicle. In the model chain, the trips are treated as person trips from generation through mode choice and subsequently converted into vehicle trips before assignment. The following script has been used in the model to accomplish this task by trip purpose.

```
MW(1)=(MI.1.1+MI.1.1.T)*0.5*{AOFAC1}+ ; HBW
(MI.1.2+MI.1.2.T)*0.5*{AOFAC2}+ ; HBSH
(MI.1.3+MI.1.3.T)*0.5*{AOFAC3}+ ; HBSR
(MI.1.4+MI.1.4.T)*0.5*{AOFAC4}+ ; HBO
(MI.1.5+MI.1.5.T)*0.5*{AOFAC1}+ ; NHB
(MI.1.6+MI.1.6.T)*0.5+
(MI.1.7+MI.1.7.T)*0.5+
(MI.1.8+MI.1.8.T)*0.5+
(MI.1.9+MI.1.9.T)*0.5+
(MI.1.10+MI.1.10.T)*0.5+
(MI.1.11+MI.1.11.T)*0.5+
(MI.1.12+MI.1.12.T)*0.5+
mi.2.EETRIPS+
(MI.1.13+MI.1.13.T)*0.5*{AOFACU} ; HBU
```

DORM=Dormitory
HBO=Home Based Other
HBSH=Home Based Work
HBSR=Home Based Social Recreation
HBU=Home Based University
HBW=Home Based Work
NHB=None Home Based

Table 13 shows the automobile occupancy factors utilized in the model to convert person trips to vehicle trips. The factors are shown in the Cube catalog key to enhance model transparency. The rates remain unchanged from the 2010 model validation.

Table 13: Auto Occupancy Rates

Vehicle Occupancy Factors	Vehicle Occupancy Rate	For Purpose
AOFAC1	0.917	Home Based Work
AOFAC2	0.667	Home Based Shopping
AOFAC3	0.613	Home Based Social Recreation
AOFAC4	0.667	Home Based Other
AOFAC5	0.699	None Home Based
AOFACU	0.917	Home Based University

AOFACU=Auto Occupancy Factor

Truck trips and external-external trips are forecasted as vehicle trips. Thus, this conversion is not necessary for such trips.

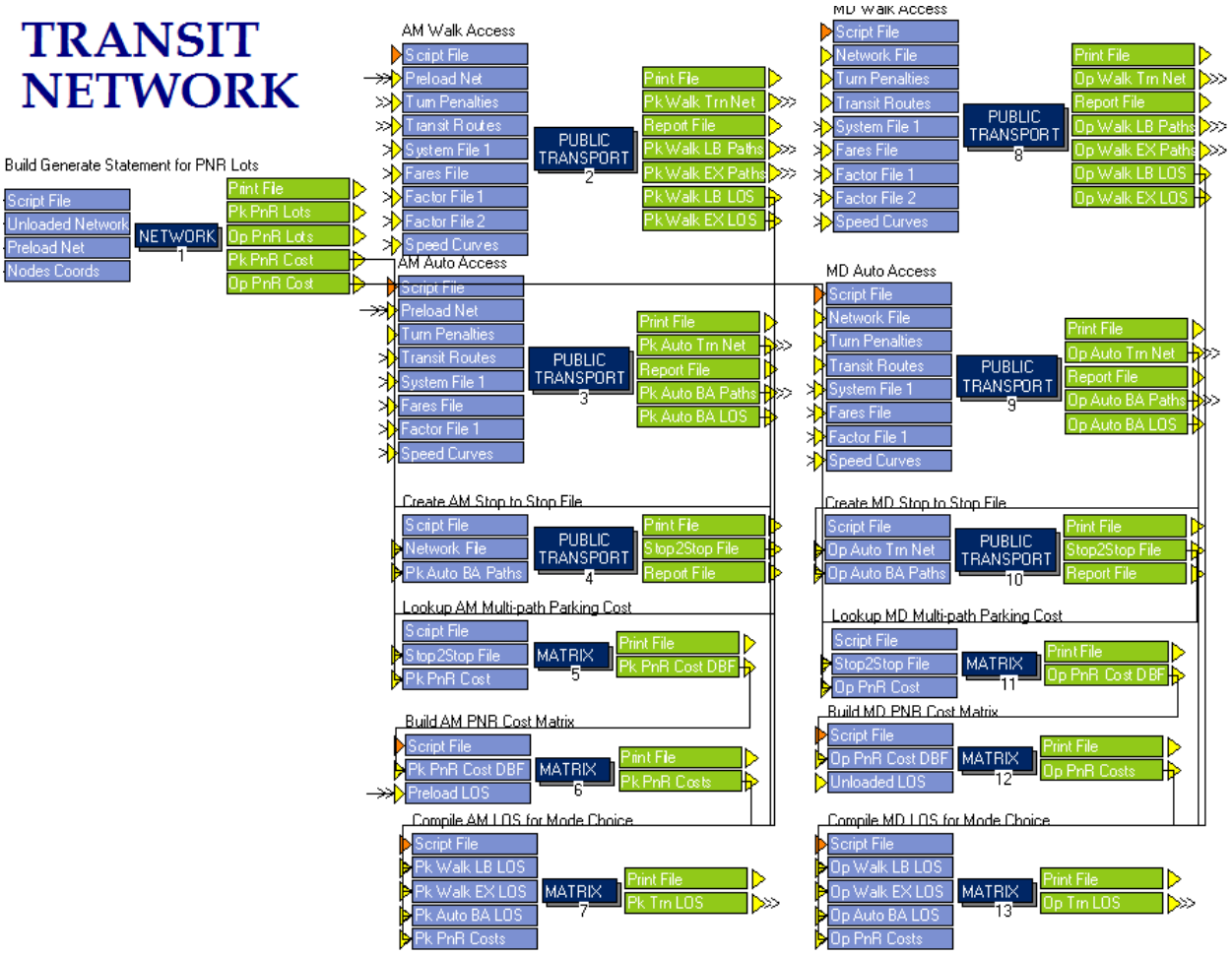
TASK 3.7 - REVIEW TRANSIT PARAMETERS

3.7.1 Transit Skimming and Path Building

Transit level of service is computed separately for peak hours and off-peak hours. During the process of distribution, the highway network is loaded with pre-mode choice trips to create an initial congested time network. During the process of transit path creation, this preloaded network is used to calculate the time skim for transit during peak hours. The unloaded free-flow network is used to compute the time skim for off-peak transit.

Figure 22 shows the process flow for calculating the two sets of transit time skims. During this path building process, transit route path files are saved for later use in transit assignment. The following sections describe the inputs and parameters used in transit path building and skimming.

Figure 22: Transit Network Level of Service Flow Chart



3.7.2 Transit Travel Speed (Speed Curves)

Transit vehicle speed (link travel time) is determined as a function of the automobile speed on each link. There are three types of relationship between automobile speed and transit speed, which are shown in Table 14. Type 1 is used when the automobile and transit speed are quite similar, such as limited stops. Type 2 shows a slight slowdown in transit speed. Type 3 represents the common local bus with a large number of stops.

Table 14: Auto/Transit Speed Relationships

Auto Travel Speed	Type 1 Transit Speed	Type 2 Transit Speed	Type 3 Transit Speed
5	5	4	3
10	10	8	5
15	15	12	7
20	20	15	9
25	25	17	12
30	30	19	15
35	30	23	16
40	38	25	18
45	42	32	20
50	48	35	27
55	52	36	35
60	62	42	45
70	65	50	45
80	70	50	45
90	70	50	45

These automobile/transit speed relationships are used in a lookup function. The type of relationship used for each transit service type is identified based on area type and facility type of the link. The scripts assign the relationship type as shown in Table 15.

Table 15: Automobile/Transit Speed Relationship Assignment

Facility Type	Area Type	Local Bus Curve Type	Express Bus Curve Type	Rail Curve Type	Comment
10-19, 80-99	All	1	1	1	Free Flow
20-79	10-19	2	2	1	Buses hitting resistance
20-79	20-29	3	2	1	Buses hitting resistance
20-79	30-39	3	2	1	Buses hitting resistance
20-79	40-49	2	2	1	Buses hitting resistance
20-79	50-59	2	1	1	Buses hitting resistance

3.7.3 Transit Fare

The transit fare was $1.50 during 2010, as used for the Alachua County base year 2010 model validation. In 2015, there are no fare changes, according to the City of Gainesville Regional Transit System General Transit Feed Specification data. The fare control file (ALACHUA.FAR) reflect the base fare. A scenario key named BUSFAREFAC represents a multiplier on the base dollar amount of transit fare, which the subsequent mode choice script uses to apply any fare

change for future year scenarios. BUSFAREFAC is set to 1.0 for base year 2015 and future years to represent a $1.50 transit fare. BUSFAREFAC can be changed to model fare increase scenarios.

3.7.4 Headway Time and Transit Stop Location

As validation efforts moved towards reasonable transit assignments, headway data also was provided from the City of Gainesville Regional Transit System and the transit route file (troute15.lin) was updated. Headway 1 represents peak headway and is calculated from AM peak trips (6 AM to 9 AM). Headway 2 represents off-peak headway and calculated from midday trips (10 AM to 1 PM). The transit route file was overlaid with the highway network when new bus locations were added due to the necessity of splitting highway links where a bus stop exists. Table 16 shows the headways that were computed for each route.

Table 16: Computed Headway by Route

Route	Headway 1 (Minutes)	Headway 2 (Minutes)
1	16	15
2	60	60
2B	60	60
5	20	20
6	60	60
7	60	60
8	30	30
9	9	8.5
10	35	26
11	60	60
12	10	10
13	10	10
15	32.5	30
16	24	24
17	24	24
20	10	10
21	10	10
23	23	20
24	60	60
24B	60	60
25	65	65
27	60	60
28	16	16
34	20	20
35	10	10
36	30	30

Route	Headway 1 (Minutes)	Headway 2 (Minutes)
38	13	13
38T	0	32
39	60	60
41	32	32
43	30	30
46	15	15
62	60	60
75	52	35
76	60	60
77	45	45
117	15	15
118	7	7
119	30	30
120	9	9
121	15	15
122	45	45
125	10	10
126	23	0
127	11	11

3.7.5 Transit Accessibility

Transit accessibility is represented by each zone's Pedestrian Environmental Variables that are stored in the ZONEDATA file. The Pedestrian Environment Variables define several factors that are essential to have sufficient accessibility to bus stops, such as sidewalk availability, ease of street crossing, non-motorized connections, and building setbacks. Each variable is given a score between 0 and 3, and the accumulated scores of the four Pedestrian Environment Variables are saved as SUM, which ranges from 0 to 12, in the ZONEDATA file. Future changes to the zonal transit accessibility will require modification of the Pedestrian Environment Variable scores as well as updating SUM values to get the total Pedestrian Environment Variable scores for each traffic analysis zone. Table 17 indicates what each Pedestrian Environment Variable value represents. These variables and categories remain unchanged from the Gainesville Urbanized Area Transportation Study Year 2010 model.

Table 17: Pedestrian Environment Variable Values

Variables	PEV = 0	PEV = 1	PEV = 2	PEV = 3
Sidewalk Availability	No sidewalks	<10 percent have sidewalks	10 to 90 percent have sidewalks	>90 percent have sidewalks
Ease of Street Crossing	Crossing difficult	<10 percent have easy crossing	10 to 90 percent with easy crossing	>90 percent with easy crossing
Nonmotorized Connections	No connections	<10 percent have connections	10 to 90 percent have connections	>90 percent have connections
Building Setbacks	All large setbacks	<10 percent have minimum setbacks	10 to 90 percent have minimum setbacks	>90 percent have minimum setbacks

PEV=Pedestrian Environmental Variable

3.7.6 Waiting Times

The waiting times for initial boardings and transfer boardings are computed from the headway of the route to be boarded. If there are multiple bus routes that serve the desired trip boarding and alighting locations, then Cube combines these headways in the waiting time calculation. These times are computed using the curves shown in Table 18. The initial waiting curve follows a standard convention of one-half the headway up to 30 minutes headway, decreasing to one-quarter the headway at 160 minutes headway. The transfer waiting curve gives a waiting time that is a few minutes less than the transfer headway. This is higher than the normal convention of one-half the headway, but not unreasonable given that the transit assignment validates well.

Table 18: Waiting Time Curves

Initial Route(s) Headway (Minutes)	Initial Waiting Time (Minutes)	Transfer Route(s) Headway (Minutes)	Transfer Waiting Time (Minutes)
1	0.5	1	0.5
6	3	4	3
15	7.5	6	5
30	15	10	8
160	40	12	10
-	-	15	13
-	-	20	18
-	-	40	35
-	-	60	55
-	-	160	100

3.7.7 Transit Path Building Parameters

Table 19 shows the parameters and factors used during the path building processes. In general, these factors should be consistent between path building and mode choice. All of these parameters are reasonable, with the high transfer constant (XFERCONST) causing the path builder to greatly prefer the path with fewest transfers.

3.7.8 Transit Mode Choice

The Year 2015 Gainesville Urbanized Area Transportation Study travel demand model uses a nested logit approach for mode choice. Home Based Work trips are assigned to the peak period network while Home Based Other, Non-Home Based, Home Based University, and Home-Based Dorm/University trips are assigned to the off-peak network. Within each period there are three transit mode choices available: walk to local transit, walk to premium transit, and drive to best available transit.

Table 19: Transit Path Building Parameters and Factors

Parameter / Factor	Value for Walk to Local Bus	Value for Walk to Premium Bus/Rail	Value for Drive to Transit
MAXFERS – Maximum Transfers	4	4	4
RUNFACTOR(1) – multiplicative factor of weighted walk access time	2.5	2.5	2.5
RUNFACTOR(101) – multiplicative factor of weighted walk egress time	2.5	2.5	2.5
RUNFACTOR(2) – multiplicative factor of weighted drive access time	1.0	1.0	1.0
RUNFACTOR(3) – multiplicative factor of weighted transfer walk time	2.5	2.5	2.5
RUNFACTOR(4) – multiplicative factor of weighted transit in-vehicle time	1.0	1.0	1.0
WAITFACTOR – multiplicative factor of weighted waiting time	1.4	1.4	2.5
VALUEOFTIME – used to relate times and fares	15.0	15.0	15.0
XFERCONST – Constant added to the weighted transfer penalty	999.0	3,999.0	0.0

For Home Based Work trips, the local bus fare is discounted to 25 percent since there is an employee pass program. Since the transit fare is covered by the tuition of University of Florida students, the local bus fare for Home Based University and Home-Based Dorm/University walk to local transit is discounted to ten percent. For Home Based University walk and drive to premium transit the bus fare is free.

The BUSFAREFAC is a factor used in the mode choice model to adjust the transit fares for future changes. However, only ten percent of the change in the BUSFAREFAC factor is used in the mode choice calculations. For example, if the BUSFAREFAC factor is set to 1.5, mode choice calculations use a factor of 1.05. This represents an inelastic response to fare increases. Table 20 shows the coefficients used in the mode choice utility calculations. The computed utilities are used in a nested logit model to compute the mode shares for each mode. Table 21 shows the ratio of the path coefficients to the in-vehicle travel time coefficient. These ratios are consistent with the factors used in transit path building with a few exceptions. First, the time driving to transit is counted as out-of-vehicle travel time and has a coefficient ratio between 1.96 and 2.92 in mode choice. However, during path building, drive access time has a factor of 1.0. Second, transfer waiting time is also counted as out-of-vehicle travel time in mode choice but has a factor of 1.4 during walk access path building.

Consistency between path building factors and mode choice coefficients is highly desired by the Federal Transit Administration when models are used for New Starts purposes. However, from the perspective of using this model for county-wide purposes, such as long-range planning, these inconsistencies may not have a significant impact. The path building parameters will be adjusted for consistency and the results checked during the model validation process. If it is determined that these parameters have an impact on model results that will require significant effort in model recalibration then this will be discussed with the Gainesville Metropolitan Transportation Planning Organization staff.

Table 20: Mode Choice Utility Coefficients

Coefficient	Home Based Work	Home Based Other	Non-Home Based	University of Florida
civt - In-Vehicle Travel Time Coefficient	-0.025	-0.02	-0.024	-0.024
covt – Out-of-Vehicle Travel Time Coefficient	-0.049	-0.048	-0.07	-0.048
ccst - Cost Coefficient	-0.005	-0.011	-0.009	-0.011
cwt - Walk only Coefficient	-0.042	-0.083	-0.052	-0.083
cbt - Bike Coefficient	-0.109	-0.117	-0.096	-0.117
pti - Walk to Transit Pedestrian Environment Variable Coefficient	1.15	0.6	0.45	0.25
pwi - Walk Pedestrian Environment Variable Coefficient Origin	0.35	0.175	0.22	0.4
pwj - Walk Pedestrian Environment Variable Coefficient Destination	0.3	0.164	0.164	0.35
pbi - Bike Pedestrian Environment Variable Coefficient Origin	0.47	0.07	0.066	0.3
pbj - Bike Pedestrian Environment Variable Coefficient Destination	0.006	0	0.006	0.006

ccst=Cost Coefficient
civt=In-Vehicle Travel Time Coefficient
covt=Out-of-Vehicle Travel Time Coefficient
cwt=Walk Only Coefficient
pbi=Bike Pedestrian Environment Variable Coefficient Origin
pbj=Bike Pedestrian Environment Variable Coefficient Destination
pti=Walk to Transit Pedestrian Environment Variable Coefficient
pwi=Walk Pedestrian Environment Variable Coefficient Origin
pwj=Walk Pedestrian Environment Variable Coefficient Destination

Table 21: Mode Choice Utility Coefficient Ratios

Coefficient	Home Based Work	Home Based Other	Non-Home Based	Home Based University
civt - In-Vehicle Travel Time Coefficient	1	1	1	1
covt – Out-of-Vehicle Travel Time Coefficient	1.96	2.4	2.916667	2
ccst - Cost Coefficient	0.2	0.55	0.375	0.458333

ccst=Cost Coefficient
civt=In-Vehicle Travel Time Coefficient
covt=Out-of-Vehicle Travel Time Coefficient

Table 22 shows the cost conversion factors used for each mode and purpose. Most factors are 100, representing 100 cents per dollar of cost. This factor is needed because the mode choice equations require all cost to be in cents for consistency. The factors that are not 100 are consistent with the special fare categories detailed above.

Table 22: Mode Choice Cost Conversion Factors

Mode	Home Based Work No Car	Home Based Work With Car	Home Based Work Student	Home Based Other No Car	Home Based Other With Car	Home Based Other Student	Non-home Based	Home Based University	University/ Dormitory
Drive Alone	N/A	100	100	N/A	100	100	100	100	N/A
Carpool 2	100	100	100	100	100	100	100	100	N/A
Carpool 3+	100	100	100	100	100	100	100	100	N/A
Walk to Bus	25	25	25	100	100	100	100	10	10
Walk to Premium	100	100	100	1	1	1	1	0	N/A
Drive to Transit	100	100	100	0	0	0	1	0	N/A

N/A= Not Applicable

Table 23 contains the mode choice calibration constants. These values are added to each of the utility calculations to calibrate the base year mode choice results to observed values. Overall, these constants look reasonable and generally in line with other comparable mode choice models.

Table 23: Mode Choice Utility Calibration Constants

Mode	HBW No Car	HBW With Car	HBW Student	HBO No Car	HBO With Car	HBO Student	NHB	HBU	DORM
Drive Alone	0	0	0	0	0	0	0	0	0
Carpool 2	0	-1.601	-1.19	0	-0.488	-0.233	-0.718	-0.878	0
Carpool 3+	-0.41	-1.992	-1.59	-0.58	-1.142	-0.839	-1.515	-1.284	0
Walk to Bus	-0.596	-0.919	-2.092	-0.271	-1.3	-1.854	-2.975	0.713	0
Walk to Premium	-0.596	-0.919	-2.092	-0.271	-1.3	-1.854	-2.975	0.713	0
Drive to Transit	0	-2.248	-2.188	0	-3.588	-3.336	-5.142	-2.272	0
Walk only	-0.747	-1.404	-2.13	0.475	-0.319	-0.989	-4.493	1.956	1.512
Bike only	-1.413	-2.174	-2.533	-2.661	-3.478	-3.516	-4.714	0.49	0.571

DORM= Dormitory
HBO= Home Based Other
HBW= Home Based Work
HBU= Home Based University
NHB= None Home Based

3.7.9 Transit Assignment

The transit assignment flow shown in Figure 23 is very simple in this model. It loads the transit trips from mode choice onto the transit paths computed during path building. There are no parameters used in this procedure.

Figure 23: Transit Assignment Flow Chart