SOUTHWEST AREA TRANSPORTATION AND LAND USE STUDY

Evaluation of the Growth Scenarios

Technical Memorandum - #4

EVALUATION OF THE GROWTH SCENARIOS

The growth scenarios developed for use in the Southwest subregion are comprised of varying levels of trends and assumptions to provide an understanding of how land use policies affect growth patterns and, ultimately, transportation conditions. This technical memorandum summarizes the analysis of the Centers and Corridors (CC), Wedge Growth (WG), and Preferred Growth (PG) scenarios, allowing for their comparisons and learned lessons.

The outcome of the analysis of the baseline and two alternative growth scenarios is the development of a more educated preferred growth scenario. The PG scenario is described here in greater detail than the alternative growth scenarios and is the basis for the recommendations of the Williamson County Major Thoroughfare Plan.

1. LAND USE EVALUATION

The outcomes of the land use growth scenarios are best and most completely described by the resulting allocation of population and employment throughout the study area. To further explain the impacts of each scenario's allocations, a set of performance measures was used for comparison. Because Williamson County is the only complete county within the study area, it was the only geography to which the CC and WG scenarios were applied and, consequently, the only geography for which land use evaluation and comparisons can be made.

1.1 Demographic Allocation

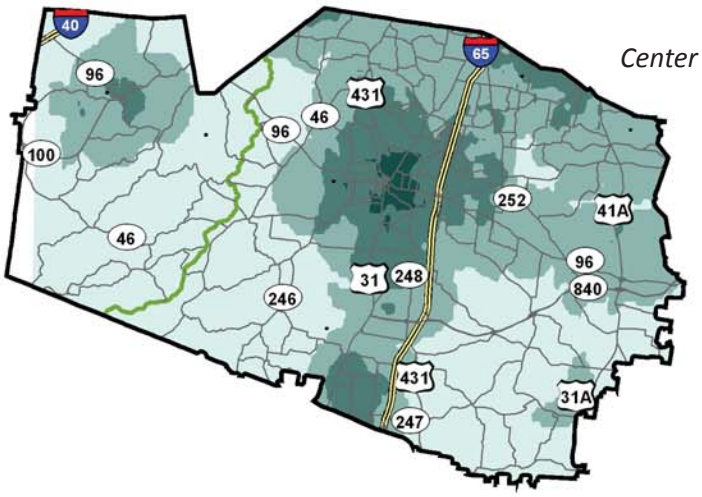
Based on the control totals used in the MPO's 2035 LRTP, by that horizon year, Williamson County is expected to grow by approximately 225,000 residents and 154,000 employees. This would more than double the current number of both residents and jobs in the county and represents an aggressive growth outlook. During the period 2000-2010, Williamson County population grew by 45%.

The demographic allocations resulting from the land use scenarios result in several key findings in both population and employment.

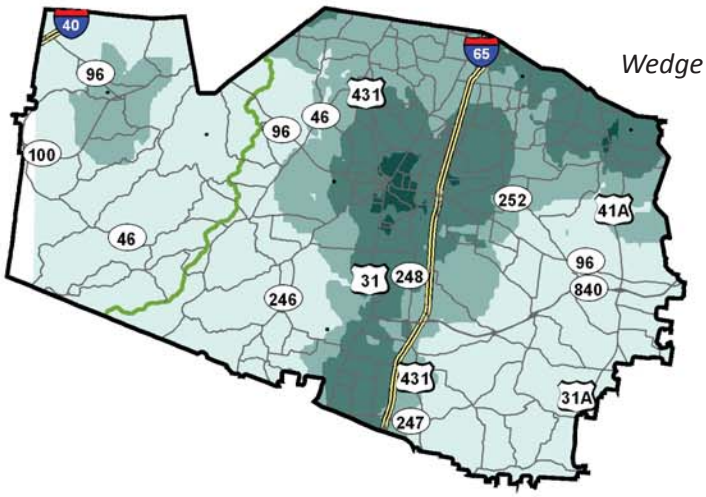
<u>Population Results</u>

- Under all scenarios, Brentwood would slow its growth. Representing a 24% share of all county growth over the past 10 years, Brentwood would see its highest growth share under the WG scenario, but this is less than 8% of the county total.
- Spring Hill would see an even more dramatic slowing in growth, from 25% of the county total over the past 10 years to around 3% over the next 25 years.
- Model scenarios forecast Franklin's population growth to remain fairly consistent from what has been experienced over the past 10 years with respect to the county's total growth. The communities of Fairview, Nolensville, and Thompson's Station would, on average, see modest increases in their share of countywide increases.
- Making up the largest part of the growth share decreases of Brentwood and Spring Hill is the unincorporated portions of Williamson County. Over the past 10 years, unincorporated Williamson County grew by 2,400 residents. The WG scenario predicted the lowest population increase in unincorporated Williamson County at 32,166 over the next 25 years. The BAU predicted the highest gain at over 70,000.
- The effect of the target growth areas of the alternative growth scenarios is made apparent in places like:
  - o Nolensville, where a large portion of its urban growth boundary was targeted in the WG scenario and therefore garnered almost 12,000 more residents than under other scenarios;
  - o Franklin, where the CC and WG scenarios bring growth shares in line with 10 year trends;
  - o Fairview, where the lack of any target growth area under the WG scenario resulted in almost 20,000 fewer residents than under other scenarios; and
  - o Unincorporated Williamson County where, perhaps most notably, the lack of any target growth area under BAU predicted 30,000 more residents than under the CC scenario.

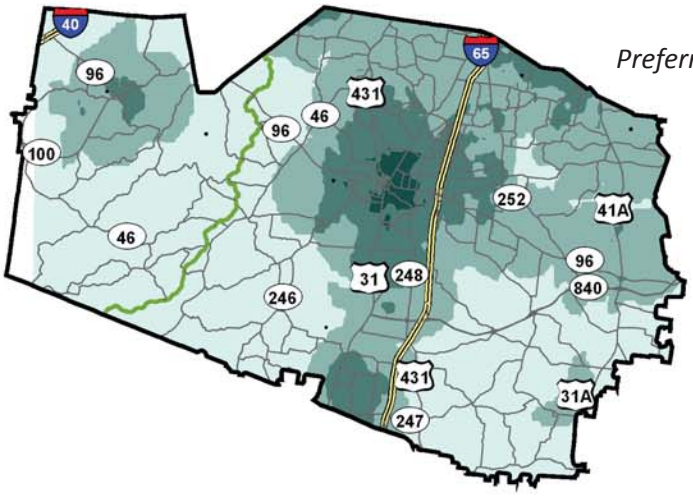
The total population density distribution for the CC, WG, and PG scenarios is shown in Figure 1.1. The population growth allocations by jurisdiction are given in Table 1.1.



Center & Corridors



Wedge Growth



Preferred

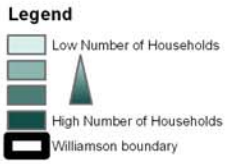


Figure 1.1 Density of New Population Allocation in Williamson County under the Centers & Corridors, Wedge Growth, and Preferred Growth scenarios (2008 - 2035).

Jurisdiction	Scenario							
	BAU		CC		WG		PG	
BNT	14,570	7%	9,451	4%	17,717	8%	9,712	4%
FRK	57,819	26%	86,725	39%	84,807	38%	76,064	34%
FRV	34,426	15%	36,555	16%	14,436	6%	29,993	13%
NOL	27,072	12%	21,308	10%	43,675	20%	17,822	8%
SPH	7,545	3%	7,703	3%	10,875	5%	7,097	3%
TST	13,306	6%	22,439	10%	21,134	9%	9,962	5%
WLM	70,068	31%	40,630	18%	32,166	14%	74,161	33%
TOTAL	**224,806**	**100%**	**224,811**	**100%**	**224,810**	**100%**	**224,811**	**100%**

Table 1.1 New Population Allocation and Percentage of Total County Allocation for All Scenarios (2008 - 2035)

Employment Results

- The overwhelming majority share (70-75%) of new employment in Williamson County is predicted to go to Franklin under all scenarios.
- The two jurisdictions with the next highest share (7-10% each) are Fairview and unincorporated Williamson County.
- The lack of any job growth in the urban growth boundary of Spring Hill was explained by stakeholders by the lack of any remaining commercial land within the urban growth area on the Williamson County side of Spring Hill. However, more new employment would be expected in the Maury County portion of Spring Hill.
- A discrepancy in the model results arises in the consideration of job-housing balance. The most dramatic example of this is found in Thompson's Station where over 20,000 new residents are allocated with the CC and WG scenarios, but only approximately 1,000 new jobs. Given this influx of new population, it is likely that a proportionate number of jobs, if from the service industry alone, would follow.

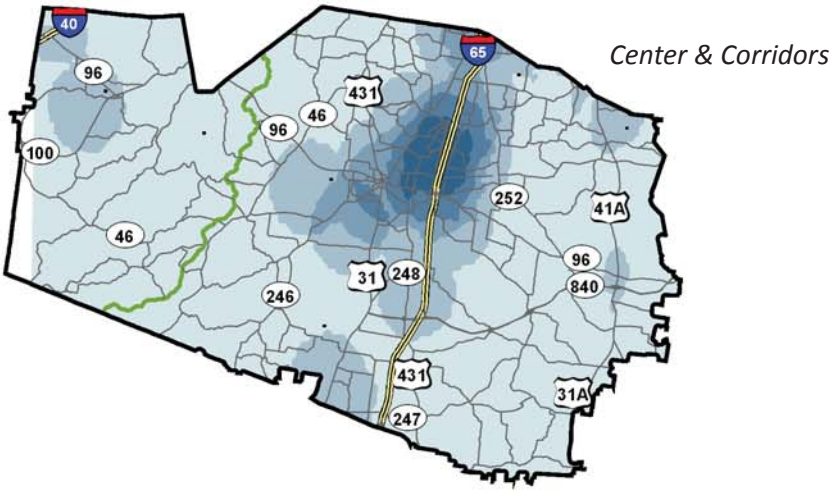
The total employment density distribution for the CC, WG, and PG scenarios is shown in Figure 1.2. The employment growth allocations by jurisdiction are given in Table 1.2.

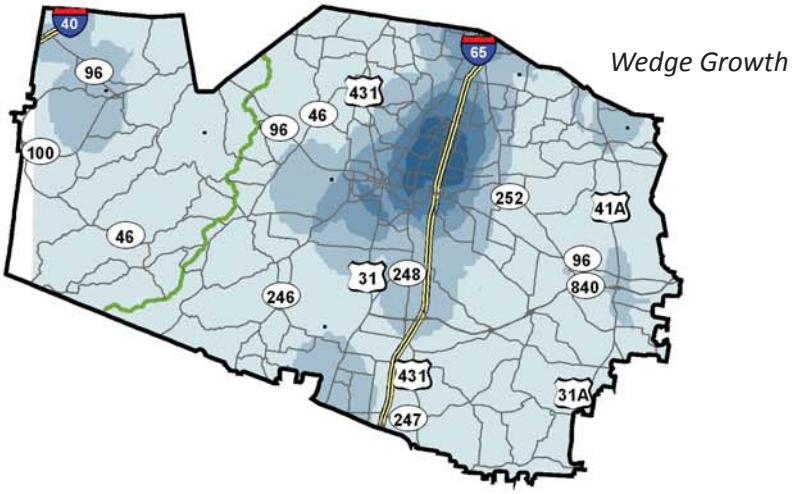
1.2 Measures of Effectiveness

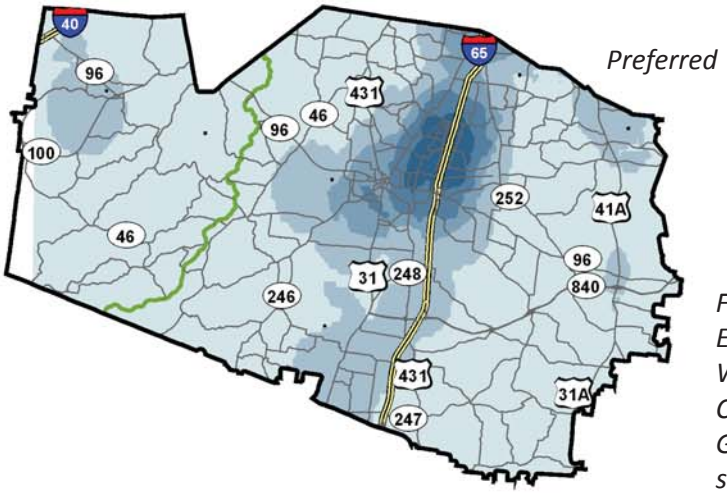
In previous subregional planning efforts, the MPO developed several measures of effectiveness (MOEs) by which to objectively gage the impacts of the various land use scenarios. The MOEs are generally based directly on the parcel allocations derived from the model. The MOEs are simply a way of seeing the large-scale impacts of different future land use conditions. Some examples of these MOEs having notable results are shown in Figures 1.3 - 1.7.

Jurisdiction	Scenario							
	BAU		CC		WG		PG	
BNT	4,590	3%	3,490	2%	4,415	3%	11,286	7%
FRK	117,198	76%	114,001	74%	111,154	72%	92,088	60%
FRV	10,591	7%	11,546	8%	13,971	9%	16,057	10%
NOL	4,548	3%	4,957	3%	4,294	3%	7,002	5%
SPH	5,499	3%	6,561	4%	5,122	3%	6,825	4%
TST	914	1%	969	1%	1,086	1%	7,479	5%
WLM	10,685	7%	12,501	8%	13,982	9%	13,286	9%
TOTAL	**154,025**	**100%**	**154,025**	**100%**	**154,024**	**100%**	**154,023**	**100%**

Table 1.2 New Employment Allocation and Percentage of Total County Allocation for All Scenarios (2008 - 2035)







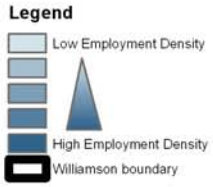


Figure 1.2 Density of New Employment Allocation in Williamson County under the Centers & Corridors, Wedge Growth, and Preferred Growth scenarios (2008 - 2035).

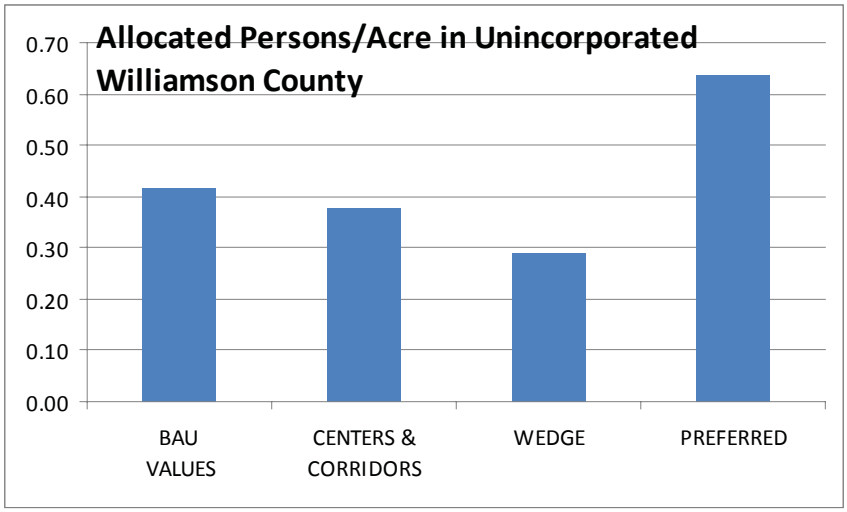


Figure 1.3 Allocated Residential Density in Unincorporated Williamson County

Unincorporated Williamson County showed the most overall residential allocation and, consequently, the highest population density, under the PG scenario. This largely due to the fact that some of the target growth area (which received 80% of the total county allocation) lies outside of any current city limits or urban growth boundary. The sheer acreage of moderately suitable and available land also drives up the total residential allocation in the unincorporated area.

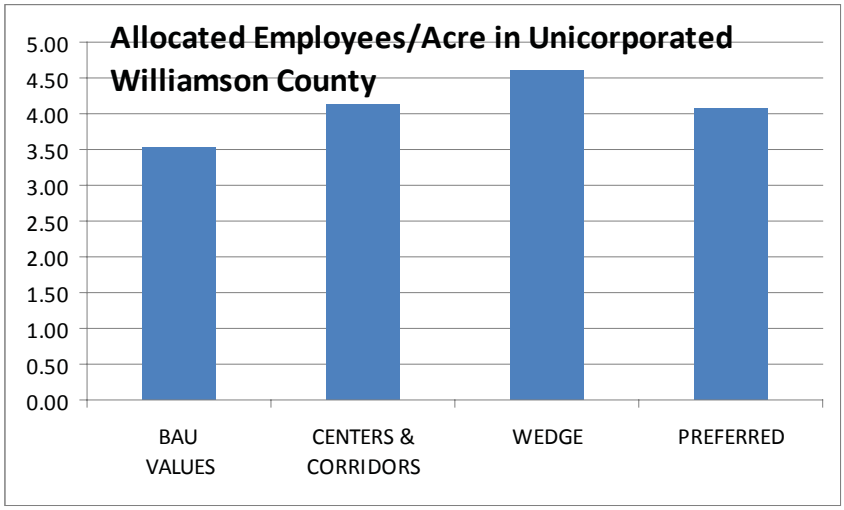


Figure 1.4 Allocated Employment Density in Unincorporated Williamson County

Employment allocation in the unincorporated area remained fairly consistent across all scenarios. Again, the specification of target growth areas along corridors allowed slightly more job growth to be allocated in unincorporated areas. One example is the target growth area along Columbia Pike with resulting job allocation occurring west of Thompson's Station and Spring Hill.

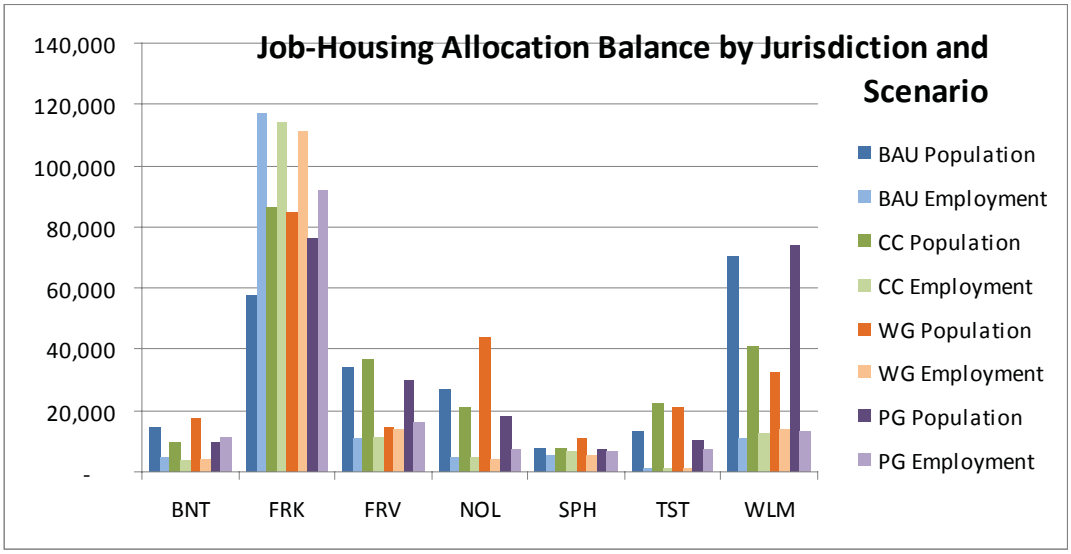


Figure 1.5 Job-Hosing Balance

The scenarios had different effects across the jurisdictions with respect to job-housing balance. Brentwood, Franklin, Nolensville, Spring Hill, and Thompson's Station all showed their best job-housing correlation under the PG scenario. Unincorporated Williamson County is notably unbalanced under all scenarios - an expected characteristic of primarily rural areas with limited retail or office employment.

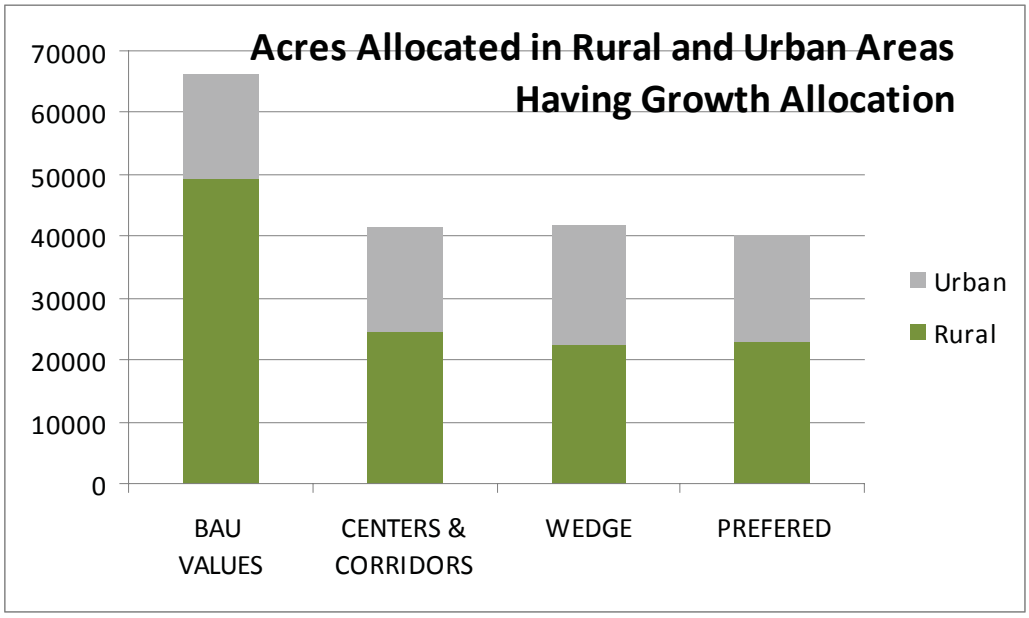


Figure 1.6 Rural and Urban Allocations

A desirable condition of subregional future growth is the allocation of more development in urban areas, where existing services can best accommodate it. All non-BAU scenarios show higher growth densities (and therefore fewer acres being developed) and the PG scenario in particular limits impacts to rural lands. It should be noted that, though developed rural acreage in the PG is comparable with CC and WG, the PG scenario actually allocates residential growth in the unincorporated county at levels 82% higher than the CC and 130% higher than the WG.

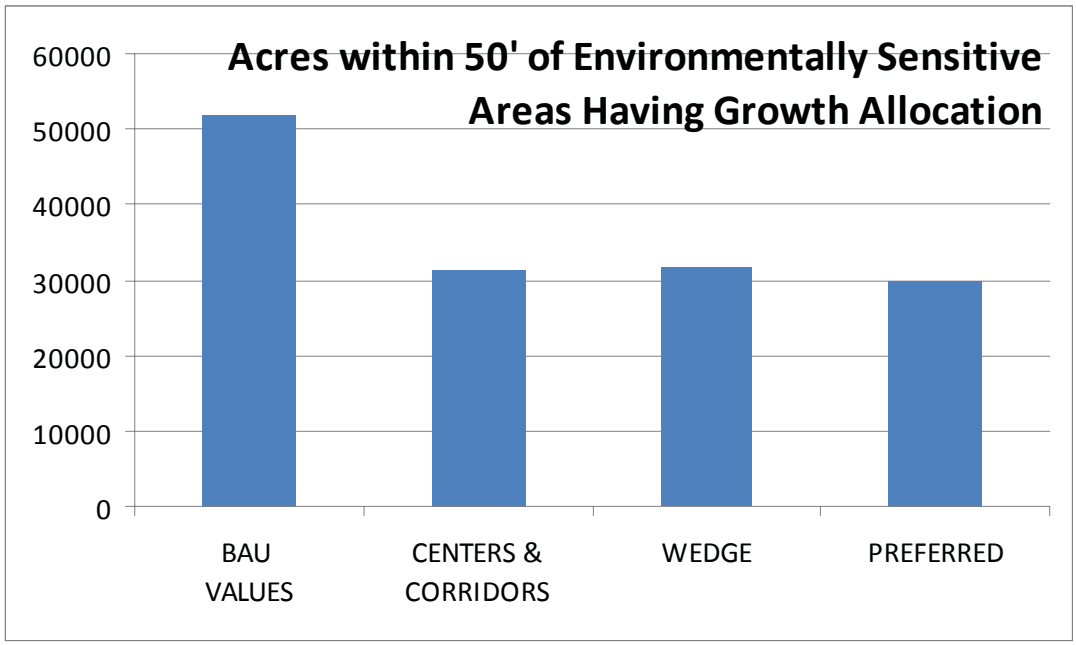


Figure 1.7 Growth Allocation in Environmentally-Sensitive Areas

Environmentally constrained areas are identified as having steep slopes, being floodprone, or having some other notable environmental limitation. The non-BAU scenarios have a more limited impact on such areas because they concentrate growth where existing development has already occurred. Naturally, these are the areas where major environmental obstacles are not as prevalent.

2. TRANSPORTATION EVALUATION

The MPO's land use model operated through analysis of individual parcels across the planning area. The travel demand model, however, uses a larger geography, the traffic analysis zone (TAZ), for analysis. This required the parcel-based data to be aggregated up to the TAZ; thus, some of the detail of the data is lost once the larger geography is used.

2.1 Williamson County's Contribution to Regional MOEs

Using the MPO's travel demand model, the three alternate land use scenarios were analyzed to determine the effect of each on travel within the subregion and, in particular, Williamson County. As shown in Table 2.1, relatively little difference exists in travel metrics as expressed across the MPO area or Williamson County individually. While the differences are small, the PG scenario does result in the lowest levels of modeled vehicle miles travelled (VMT), vehicle hours travelled (VHT), and total traffic volume in the 2035 horizon year (see Figure 2.1).

Currently, Williamson County contributes proportionately less VMT than population to the region, probably because of heavy traffic commuting volumes in Davidson County. An analysis of Williamson County's future contribution to regional population and travel has shown that as Williamson County's share of regional population grows, so too will its share of VMT. The proportional gap between population and travel, however, will remain constant.

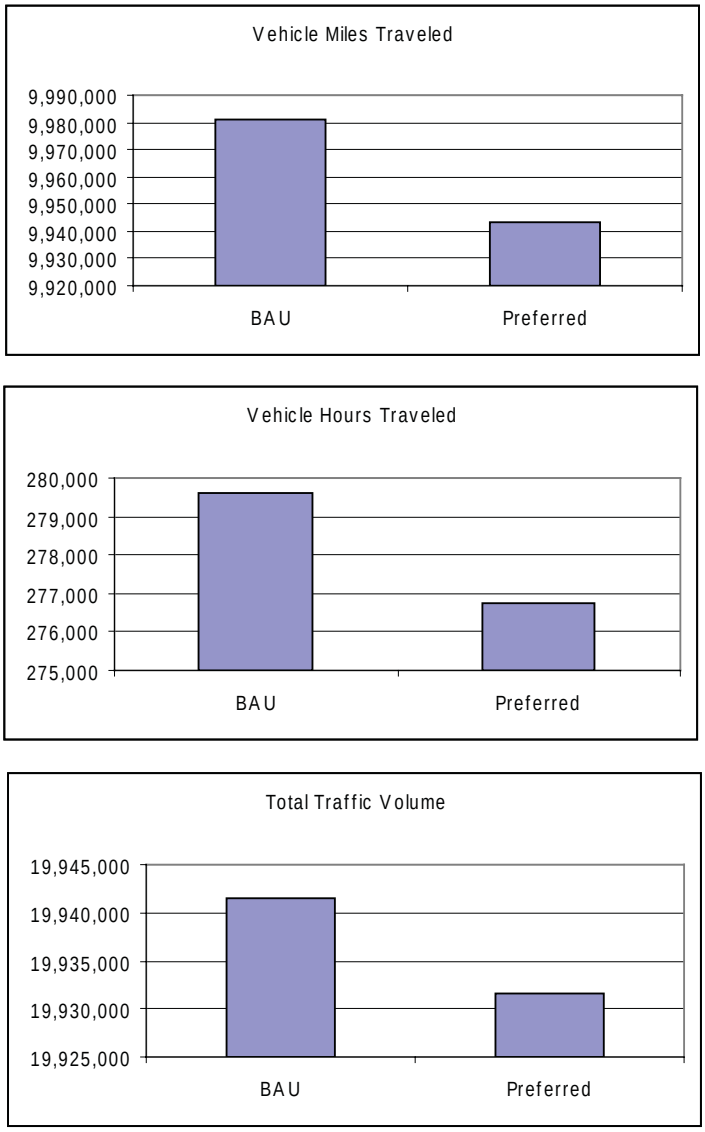


Figure 2.1 Comparison of Travel Characteristics of 2035 BAU and PG Scenarios.

		BAU	CC	WG	PG
Entire Model Network (MPO Area)	VMT	63,761,785	64,079,870	63,751,927	63,668,035
	VHT	1,635,836	1,644,049	1,635,776	1,630,949
	Total Volume	164,625,740	165,118,574	164,599,877	164,447,966
Williamson County	VMT	9,980,746	10,166,384	9,982,564	9,943,550
	VHT	279,636	283,469	279,964	276,742
	Total Volume	19,941,594	20,220,255	19,995,513	19,931,525

Table 2.1 Travel MOEs for Regional and Countywide Geographies by Land Use Scenario (2035)

2.2 Transportation Deficiencies of the 2035 PG Scenario

All evaluations of the alternative growth scenarios (including the PG) were based on the MPO's roadway network including existing plus committed (E+C) roadway projects. This means that future roadway projects which have a committed funding source were included in the model analysis as if these projects had already been constructed. This allows an estimation of what deficiencies still exist throughout the county even after construction of the future committed projects.

Based on the results of the travel demand model, the existing Williamson County roadway network will continue to serve large, predominately rural portions of the county well. Transitional areas of the county, however, will begin to see increasing capacity shortages as growth continues both inside urban areas and in rural parts of the county. Central Williamson County roads in particular will see steady traffic demand increases for north-south travel between Spring Hill, Thompson's Station, Franklin, Brentwood, and Nashville.

A map showing the volume to capacity ratios of sub-regional roads under the 2035 PG scenario is given as Figure 2.2. Figure 2.3 indicates that the bulk of road mileage in the unincorporated areas will continue to operate below capacity. However, approximately 20% of the road mileage will either exceed or approach capacity by the 2035 planning horizon.

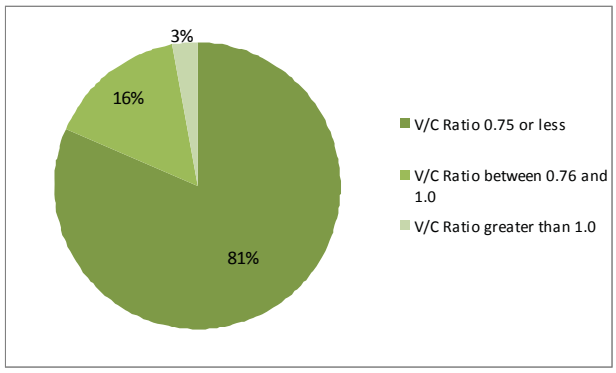


Figure 2.3 Proportional Volume to Capacity Ratios of Unincorporated Williamson County Roads (PG 2035)

In addition to roadway capacities, speed can also be an indication of roadway operation. The 2035 model estimates that, like capacity, prevailing speeds on most county roadways will remain relatively unconstrained due to traffic. As shown in Figure 2.4, over 70% of the roadway mileage will generally operate with peak period speeds that are at least 90% of the free flow speed.

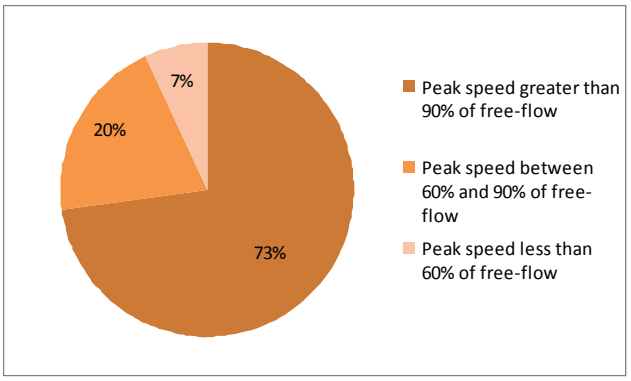


Figure 2.4 Proportional Speed Ratios (Peak Period to Free-Flow) of Unincorporated Williamson County Roads (PG 2035)

2.3 Special Modal Considerations

An analysis of truck traffic has shown that a significant number of county roads are expected to see increasing truck traffic through 2035. Generally along principal arterials and roads with access to SR 840 and I-65, truck percentages for the most part will remain below 10%. Figure 2.5 is a map illustrating projected future truck traffic percentages.

Analyzing 2035 household growth patterns, it can be seen that the existing transit routes in Franklin are well positioned to capture the potential growing ridership. Any transit route modifications that may be beneficial are within established City Limits and the introduction of transit service into unincorporated areas of the county is projected to have limited impact. A central Williamson County housing growth and transit map is given as Figure 2.6.

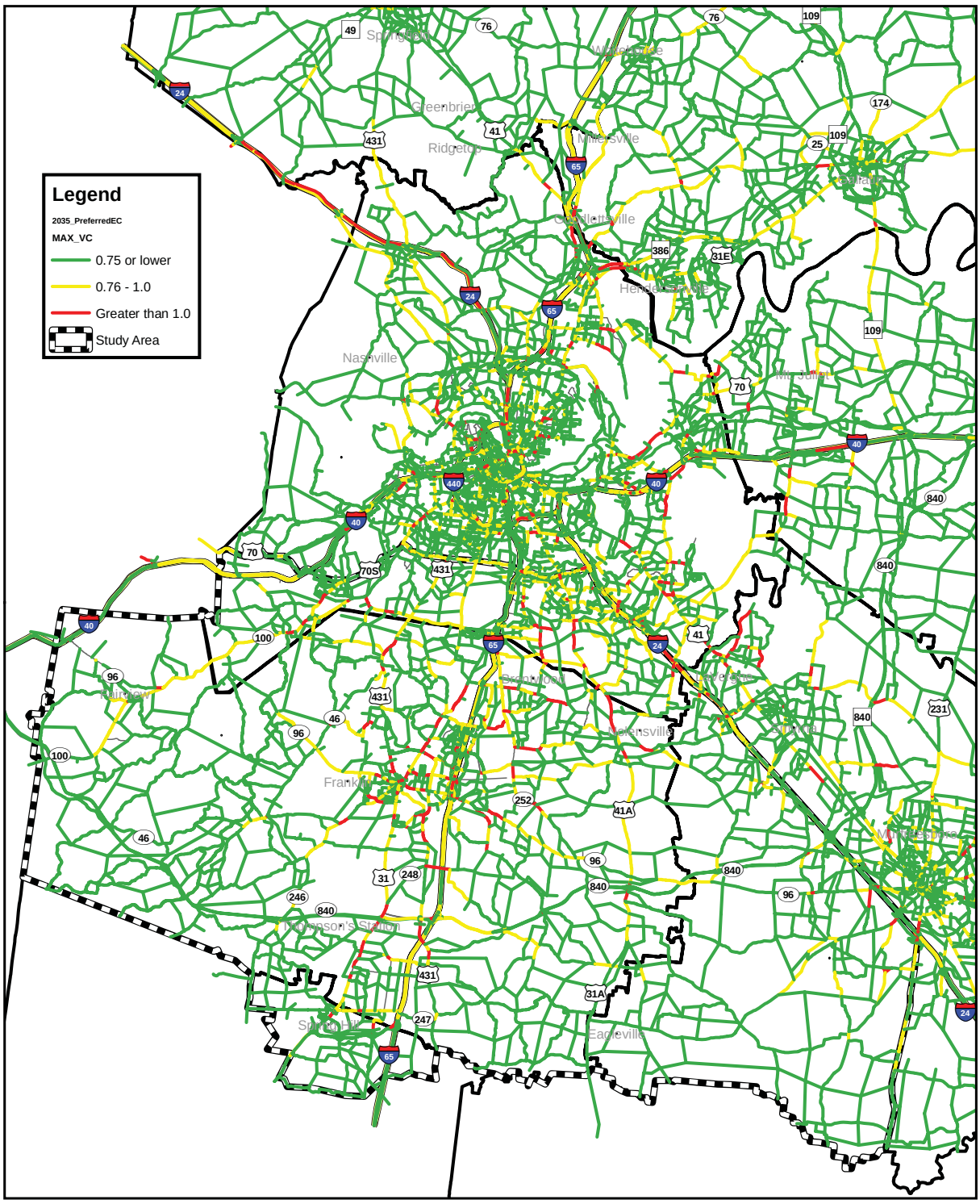


Figure 2.2 Volume to Capacity Ratios, Preferred Growth Scenario

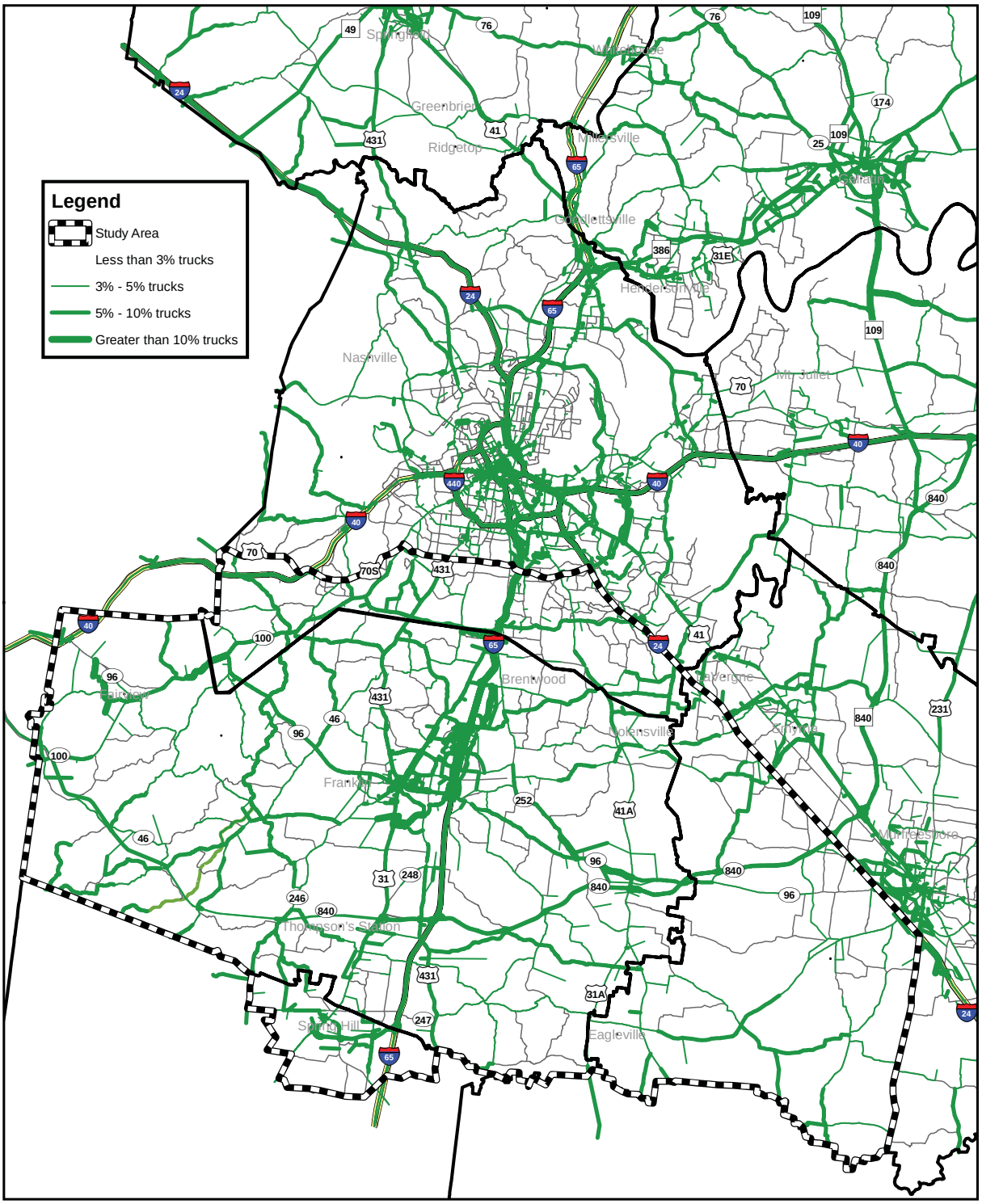


Figure 2.5 Truck Percentages, Preferred Growth Scenario

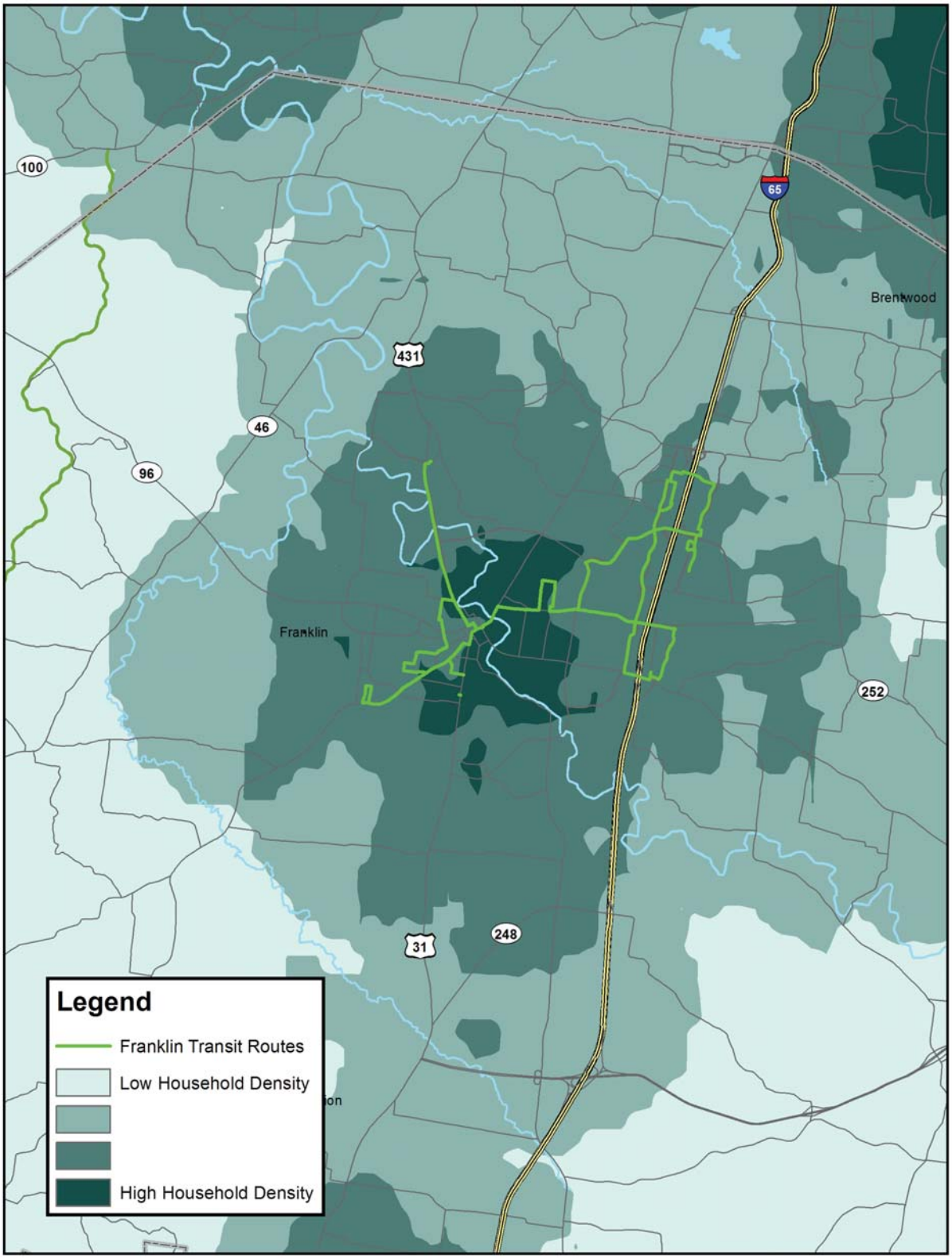


Figure 2.6 Relationship of Existing Transit Service to Household Growth (PG 2035)

As provided by the MPO's Regional Bicycle and Pedestrian Study, Williamson County's roads have varying degrees of suitability for transportation by bicycle. The cross-section of its rural roads remains fairly consistent, but increased volumes of traffic decrease the bicycle suitability in more developed portions of the county. This trend will continue, making unimproved roads on the fringe of growth areas in central Williamson County less suitable for cycling than roads in the southeast and southwest quadrant of the county, for example. Figure 2.7 shows the existing bicycle level of service (BLOS) for Williamson County.

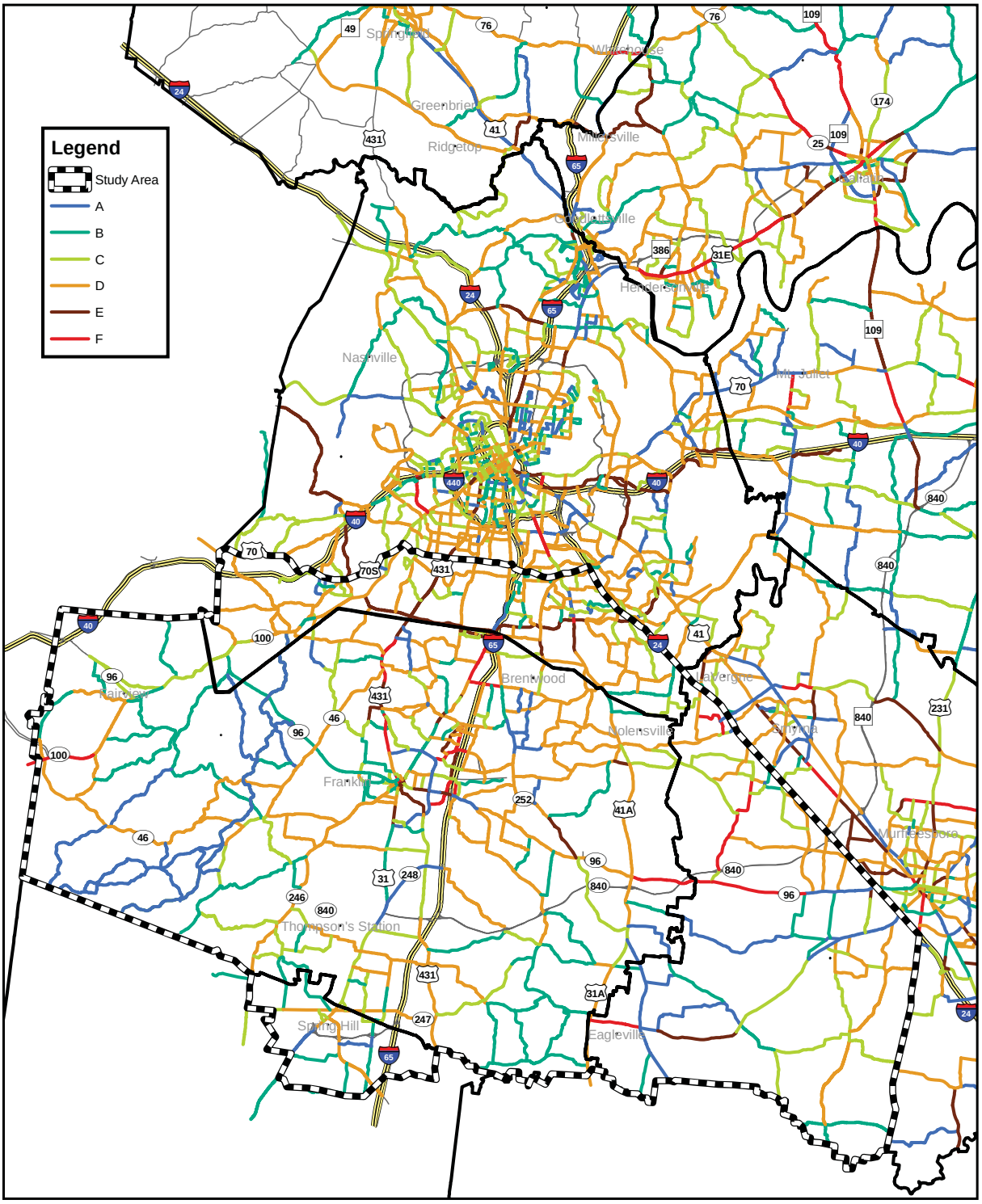


Figure 2.7 Bicycle Level of Service