

2040 MTP and CTP

Preferred Option – Performance Measures

Purpose of Performance Measures

Performance Measures provide a general indicator from a variety of perspectives such as mobility, travel time, congestion, mode choice, and air quality. The measures are not specific to a particular roadway or travel corridor but instead cover the entire transportation system, and therefore are useful for comparing the overall efficiency and effectiveness of the Preferred Option with the 2010 and no build scenarios. Most of the data used for calculating the Performance Measures comes from the Triangle Regional Model (TRM), which is a travel demand model that forecasts future travel statistics based on a set of assumptions concerning the highway network, transit service and other transportation facilities.

Presentation of Performance Measures

The following table presents all the Performance Measures for the 2010, 2040 E+C (i.e., no build scenario, and the Preferred Option.

Preferred Option
Performance Measures

SE Data Scenario	2010	2040 CommPlan	2040 All-in- Transit	2010 to 2040 E+C	2040 E+C to Preferred Option
Transportation Network	2010	E+C	Preferred Option	% Change	% Change
1 Performance Measures					
1.1 Total Vehicle Miles Traveled (VMT-daily)					
1.1.1 All Facility+Centroid Connectors	13,217,550	21,281,636	21,028,123	61%	-1%
1.1.2 All Facility (no Centroid Connectors)	12,430,435	19,842,072	19,681,404	60%	-1%
1.2 Total Vehicle Hours Traveled (VHT-daily)					
1.2.1 All Facility+C Connectors	312,669	614,488	536,105	97%	-13%
1.2.2 All Facility (no C Connectors)	260,012	517,982	445,846	99%	-14%
1.3 Average Speed by Facility (miles/hour)					
1.3.1 - Freeway	63	55	61	-13%	10%
1.3.2 - Arterial	42	37	39	-10%	5%
1.3.3 - All Facility	53	46	50	-13%	10%
1.4 Peak Average Speed by Facility (miles/hour)					
1.4.1 - Freeway	62	52	58	-16%	12%
1.4.2 - Arterial	41	35	38	-14%	8%
1.4.3 - All Facility	51	43	48	-16%	12%
1.5 Daily Average Travel Length - All Person Trips					
1.5.1 - Travel Time	14.0	15.4	14.3	10%	-7%
1.5.2 - Travel Distance	6.3	5.9	6.0	-6%	2%
1.6 Daily Average Travel Length - Work Trips					
1.6.1 - Travel Time	17.7	19.4	18.0	10%	-8%
1.6.2 - Travel Distance - Work Trips	9.1	8.0	8.4	-11%	5%
1.7 Peak Average Travel Length - All Person Trips					
1.7.1 - Peak Travel Time	14.8	16.7	15.32	13%	-8%
1.7.2 - Peak Travel Distance	6.7	6.1	6.41	-9%	5%
1.8 Daily Average Travel Length - All CV Trips					
1.8.1 - Travel Time	15.0	17.2	15.8	14%	-8%
1.8.2 - Travel Distance	8.3	8.5	8.5	3%	0%

**Preferred Option
Performance Measures**

	SE Data Scenario	2010	2040 CommPlan	2040 All-in- Transit	2010 to 2040 E+C	2040 E+C to Preferred Option
	Transportation Network	2010	E+C	Preferred Option	% Change	% Change
1.9	Daily Average Travel Length - Truck Trips					
1.9.1	- Travel Time	15.3	17.4	16.1	14%	-8%
1.9.2	- Travel Distance	8.5	8.8	8.7	3%	0%
1.1	Hours of Delay (daily)	27,446	139,455	74,329	408%	-47%
1.10.1	Truck Hours of Delay (daily)	1,086	4,742	2,616	337%	-45%
1.11	Percent of VMT experiencing congestion - All Day					
1.11.1	- Freeway	2%	17%	4%	906%	-75%
1.11.2	- Arterial	3%	15%	7%	339%	-54%
1.11.3	- All Facility	2%	14%	5%	585%	-67%
1.12	Percent of VMT experiencing congestion - Peak					
1.12.1	- Freeway	3%	31%	8%	923%	-76%
1.12.2	- Arterial	5%	23%	11%	354%	-52%
1.12.3	- All Facility	3%	23%	8%	632%	-67%
1.12.4	- Designated truck routes	5%	17%	8%	232%	-54%
1.12.5	- Facilities w/bus routes	4%	20%	7%	426%	-63%
2	Mode Share Measures					
2.1	All Trips - Daily					
2.1.1	- Drive alone (single occupant vehicle -SOV)	864,965	1,535,469	1,494,833	78%	-3%
2.1.2	- Carpool (Share ride)	683,083	1,184,575	1,154,202	73%	-3%
2.1.3	- Bus	50,579	71,588	74,454	42%	4%
2.1.4	- Rail	-	-	18,810		
2.1.5	- Non-Motorized (Bike and Walk)	176,554	281,839	315,244	60%	12%
2.2	Work Trips - Daily					
2.2.1	- Drive alone (single occupant vehicle -SOV)	270,716	473,750	461,450	75%	-3%
2.2.2	- Carpool (Share ride)	35,360	61,545	60,725	74%	-1%
2.2.3	- Bus	12,852	19,080	22,298	48%	17%
2.2.4	- Rail	-	-	6,361		

**Preferred Option
Performance Measures**

SE Data Scenario		2010	2040 CommPlan	2040 All-in- Transit	2010 to 2040 E+C	2040 E+C to Preferred Option
Transportation Network		2010	E+C	Preferred Option	% Change	% Change
2.2.5	- Non-Motorized (Bike and Walk)	16,343	25,102	27,657	54%	10%
2.3	All Trips - Peak Hours					
2.3.1	- Drive alone (single occupant vehicle -SOV)	483,159	845,886	831,752	75%	-2%
2.3.2	- Carpool (Share ride)	411,958	704,589	694,529	71%	-1%
2.3.3	- Bus	25,416	34,741	37,076	37%	7%
2.3.4	- Rail	-	-	10,369		
2.3.5	- Non-Motorized (Bike and Walk)	101,821	165,869	178,181	63%	7%
3 Transit Measures						
3.1	Transit Ridership by Prod. Ends	Total	Total	Total		
3.1.1	- TTA (Including Rail)	5,362	8,853	44,418	65%	402%
3.1.2	- CAT	16,639	22,957	43,172	38%	88%
3.1.3	- CHT	26,788	38,460	51,694	44%	34%
3.1.4	- DATA	17,637	25,924	26,123	47%	1%
3.1.5	- NCSU	12,147	21,332	16,433	76%	-23%
3.1.6	- DUKE	14,007	17,358	16,462	24%	-5%
3.1.7	- OPT	N/A	N/A	N/A		
3.1.8	- CARY	1,412	2,136	13,472	51%	531%
3.1.9	Total	93,988	137,015	211,770	46%	55%
3.2	Ridership By Prod. Ends by Routes					
3.2.1	Regional Rail (Durham-Wake)	N/A	N/A	11,555		
3.2.3	Light Rail (Durham-Orange)	N/A	N/A	11,693		
3.2.5	Light Rail (Wake)	N/A	N/A	15,657		
3.3	Total Rail Ridership		N/A	38,905		
4 Demographics Measures						
4.1	Population	403,494	632,102	636,379	57%	1%
4.2	Employment	261,566	427,876	428,195	64%	0%
4.3	Total Daily Person Trips	1,775,182	3,073,472	3,057,544	73%	-1%

**Preferred Option
Performance Measures**

SE Data Scenario		2010	2040 CommPlan	2040 All-in- Transit	2010 to 2040 E+C	2040 E+C to Preferred Option
Transportation Network		2010	E+C	Preferred Option	% Change	% Change
4.3.1	Work Person Trips	335,271	579,478	578,493	73%	0%
4.4	Total Daily CV Trips	137,279	211,324	211,114	54%	0%
4.4.1	Daily Truck Trips	57,715	85,991	85,274	49%	-1%
5	Other Measures					
5.1	Lane Miles	2,472	2,548	2,793	3%	10%

CV = Commercial vehicles (which includes large and small trucks and vans).

Trucks = Subset of CV that includes only large trucks.

Transit ridership is higher than transit trips because transfers are counted multiple times in ridership numbers.

Average Speed (1.3 and 1.4), Percent of Congested VMT (1.11 and 1.12) and Hours of Delay (1.10) calculations do not include local streets or centroid connectors (which often represent local streets in modeling networks)

Travel time is in minutes, and travel distance is in miles.

2040 MTP and CTP Preferred Option – Travel Time

Purpose of Travel Time Measure

This measure calculates and compares the travel time between key activity centers in the Triangle for the afternoon peak period, which occurs from 3:30pm to 7:30pm. These centers attract a significant portion of the travel demand in the region and therefore the most important travel corridors are between these centers. The six activity centers include:

- Downtown Durham;
- Carrboro/Chapel Hill;
- Research Triangle Park; and,
- Downtown Raleigh.

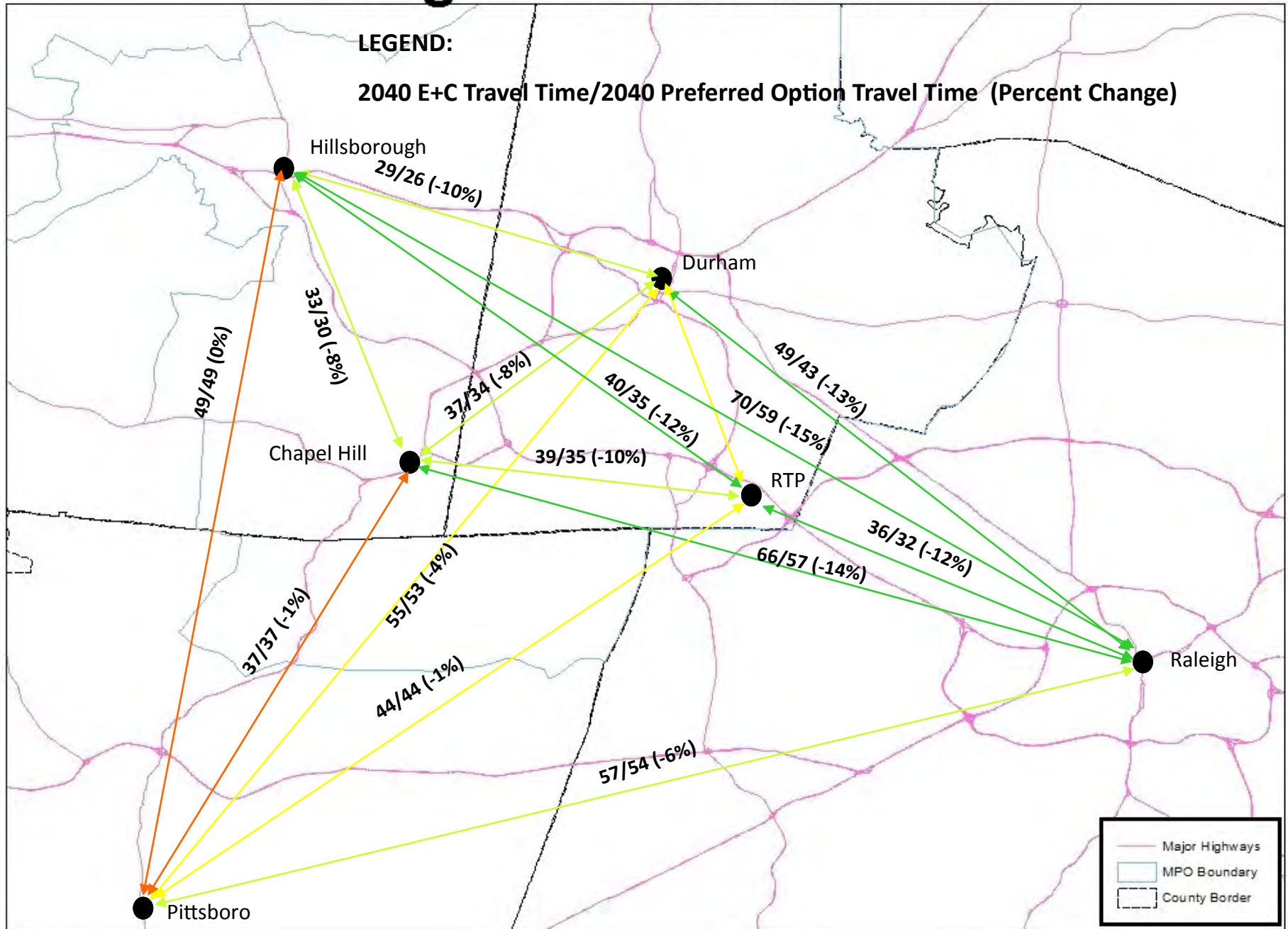
The table on the next page presents the travel time between the activity centers and then compares those values to the Existing plus Committed scenario (E+C), which is the “no build” scenario. A map shows the travel time comparison, as well. The **darker green** color indicates a significant reduction in the corridor travel time when the Preferred Option transportation network is implemented. The **darker red** color indicates smaller travel time impacts.

Preferred Option Travel Time Impacts

E+C		PM Peak Travel time (w/ Terminal Time)							
		To							
		Durham	RTP	Raleigh	RDU	Hillsborough	Chapel Hill	Pittsboro	
From	Durham DT		17	54	30	29	33	58	
	RTP	21		43	20	42	38	49	
	Raleigh DT	44	29		30	65	59	58	
	RDU	29	15	40		51	44	48	
	Hillsborough	28	37	74	50		29	51	
	Chapel Hill	41	41	74	51	37		43	
	Pittsboro	52	39	57	44	47	32		
Preferred		PM Peak Travel time (w/ Terminal Time)							
		To							
		Durham	RTP	Raleigh	RDU	Hillsborough	Chapel Hill	Pittsboro	
From	Durham DT		17	45	29	25	31	56	
	RTP	18		35	19	36	33	48	
	Raleigh DT	40	29		30	57	53	56	
	RDU	25	14	33		42	39	47	
	Hillsborough	26	34	61	45		28	50	
	Chapel Hill	37	37	62	45	32		42	
	Pittsboro	50	40	51	43	48	32		
		Compare E + C and Preferred Option PM Peak Travel Time (percent increase)							
		To							
		Durham	RTP	Raleigh	RDU	Hillsborough	Chapel Hill	Pittsboro	
From	Durham DT		-3%	-17%	-6%	-13%	-6%	-3%	
	RTP	-14%		-19%	-6%	-16%	-12%	-3%	
	Raleigh DT	-8%	-2%		0%	-14%	-9%	-3%	
	RDU	-13%	-1%	-18%		-16%	-11%	-3%	
	Hillsborough	-7%	-7%	-17%	-11%		-4%	-1%	
	Chapel Hill	-9%	-9%	-17%	-10%	-11%		-3%	
	Pittsboro	-5%	1%	-9%	-1%	2%	1%		

Note: travel time values are in minutes.

Regional Travel Time In Minutes



(based on afternoon peak travel time)

2040 MTP and CTP Preferred Option – Isochrones

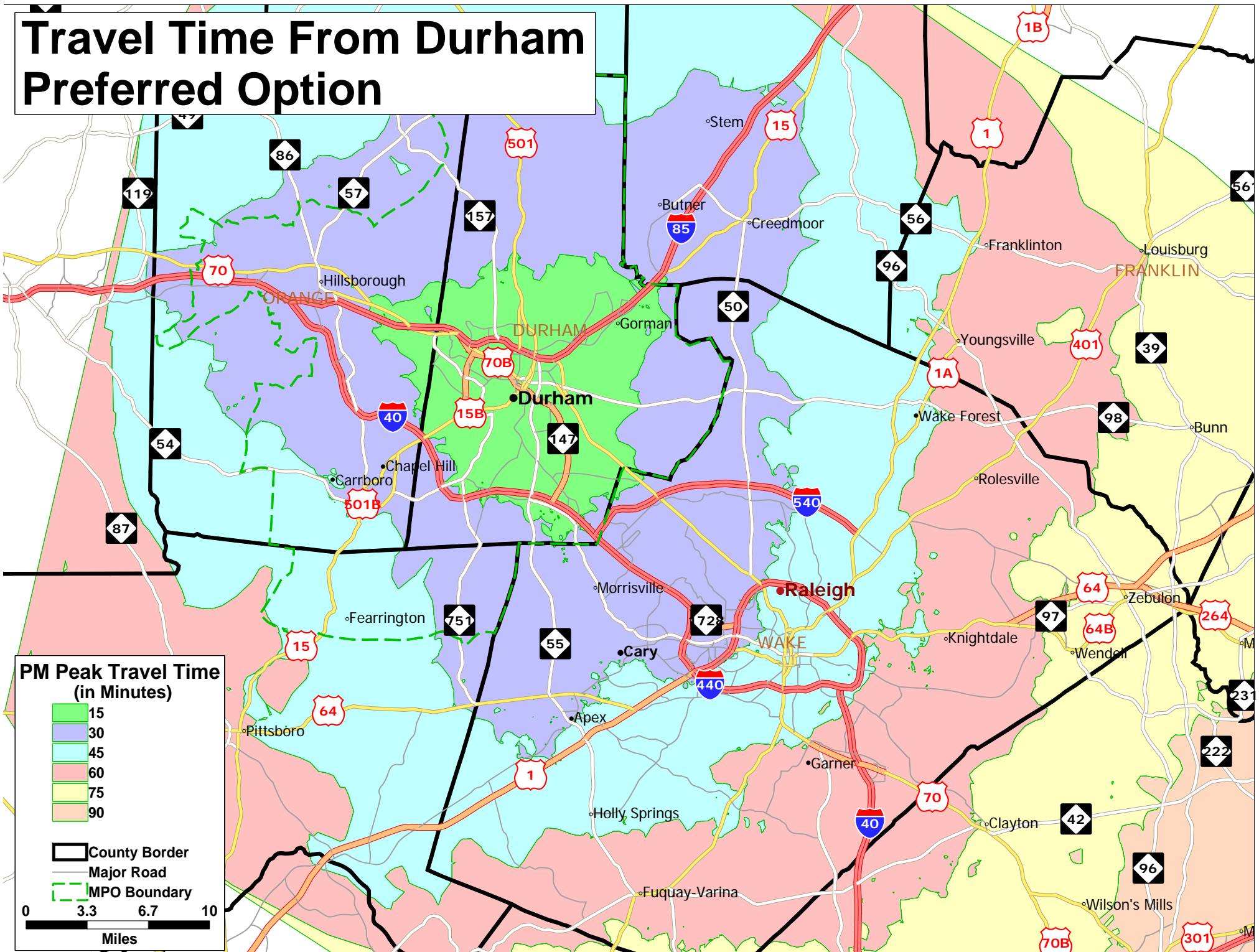
Use Isochrone Maps

Isochrone travel maps connect the points that have the same travel time from a specified center. They resemble contour maps. They are useful for illustrating the mobility from a specified center and for showing the labor, retail, residential and other markets in terms of travel time. These maps are based the average travel time for the afternoon peak period, which occurs from 3:30pm to 7:30pm. The four specified locations and order of display in this document are:

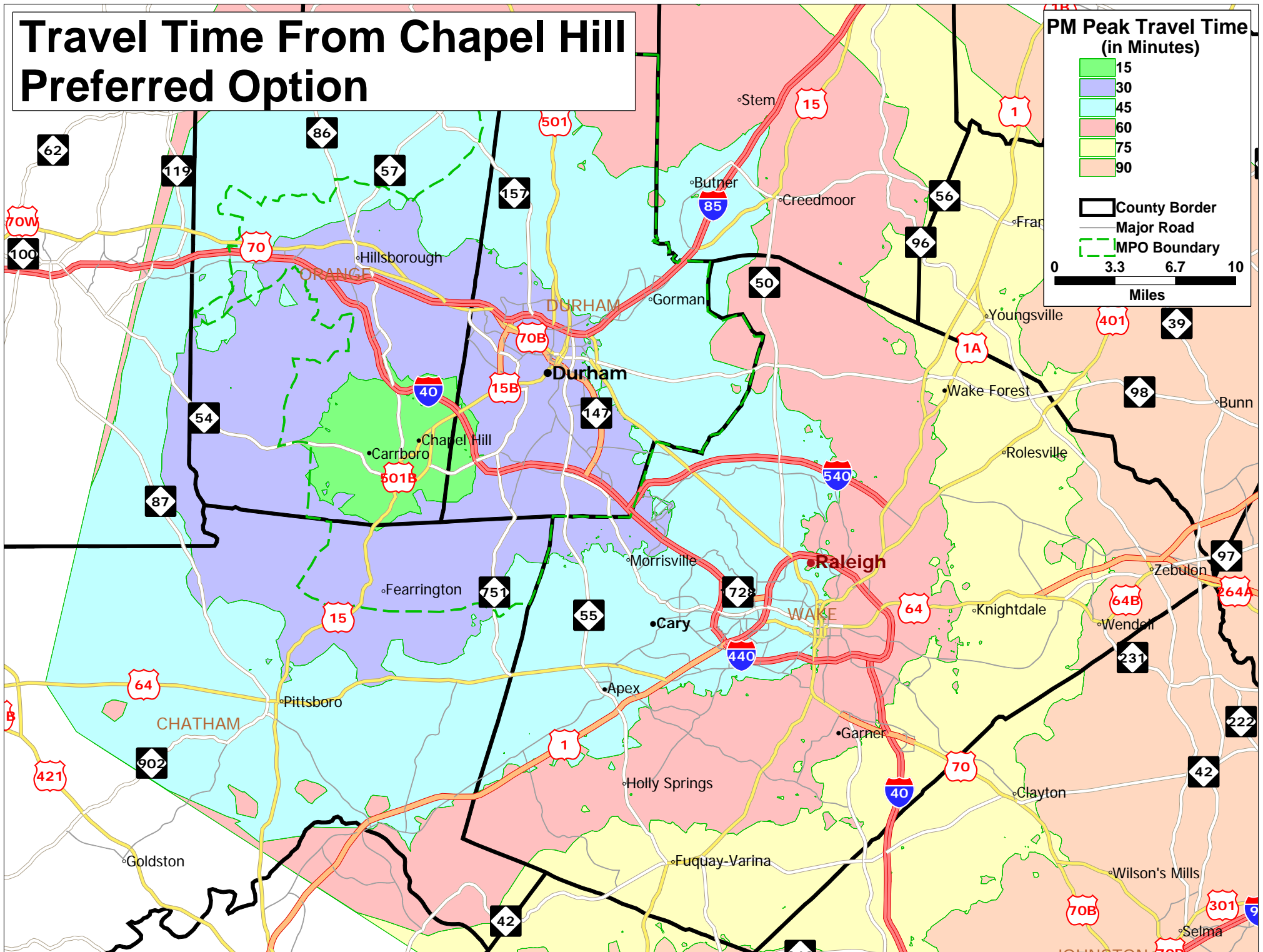
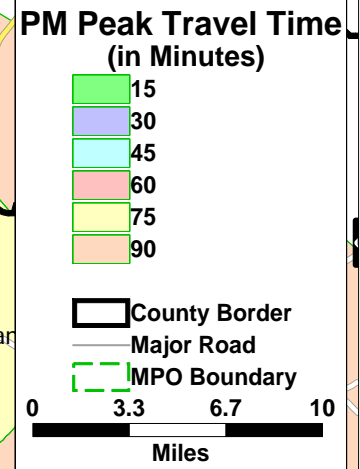
- Downtown Durham
- Carrboro/Chapel Hill
- Research Triangle Park, and
- Downtown Raleigh

These centers attract a significant portion of the travel demand in the region. Therefore, it is important to understand the impact that each Alternative has on the travel markets for these centers.

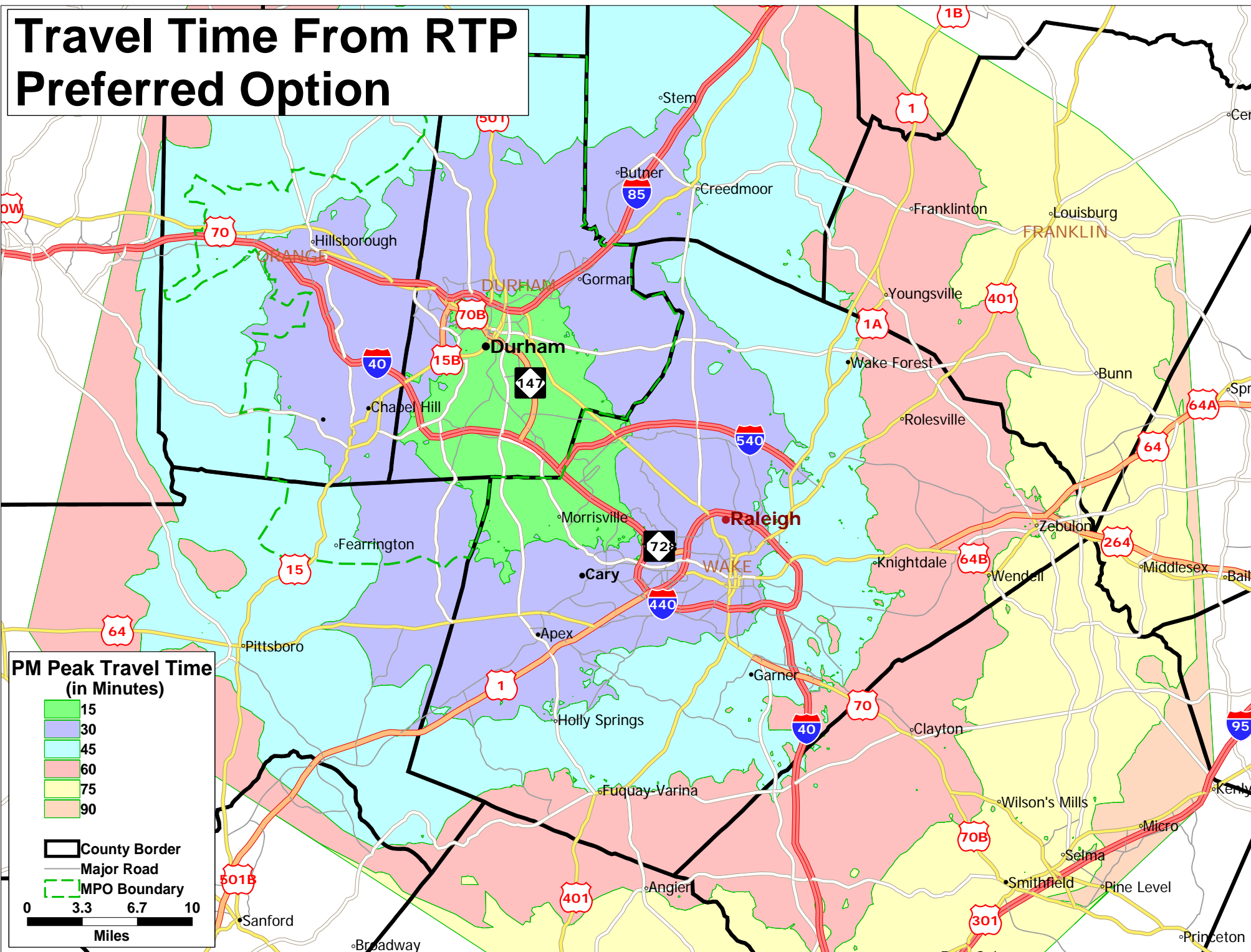
Travel Time From Durham Preferred Option



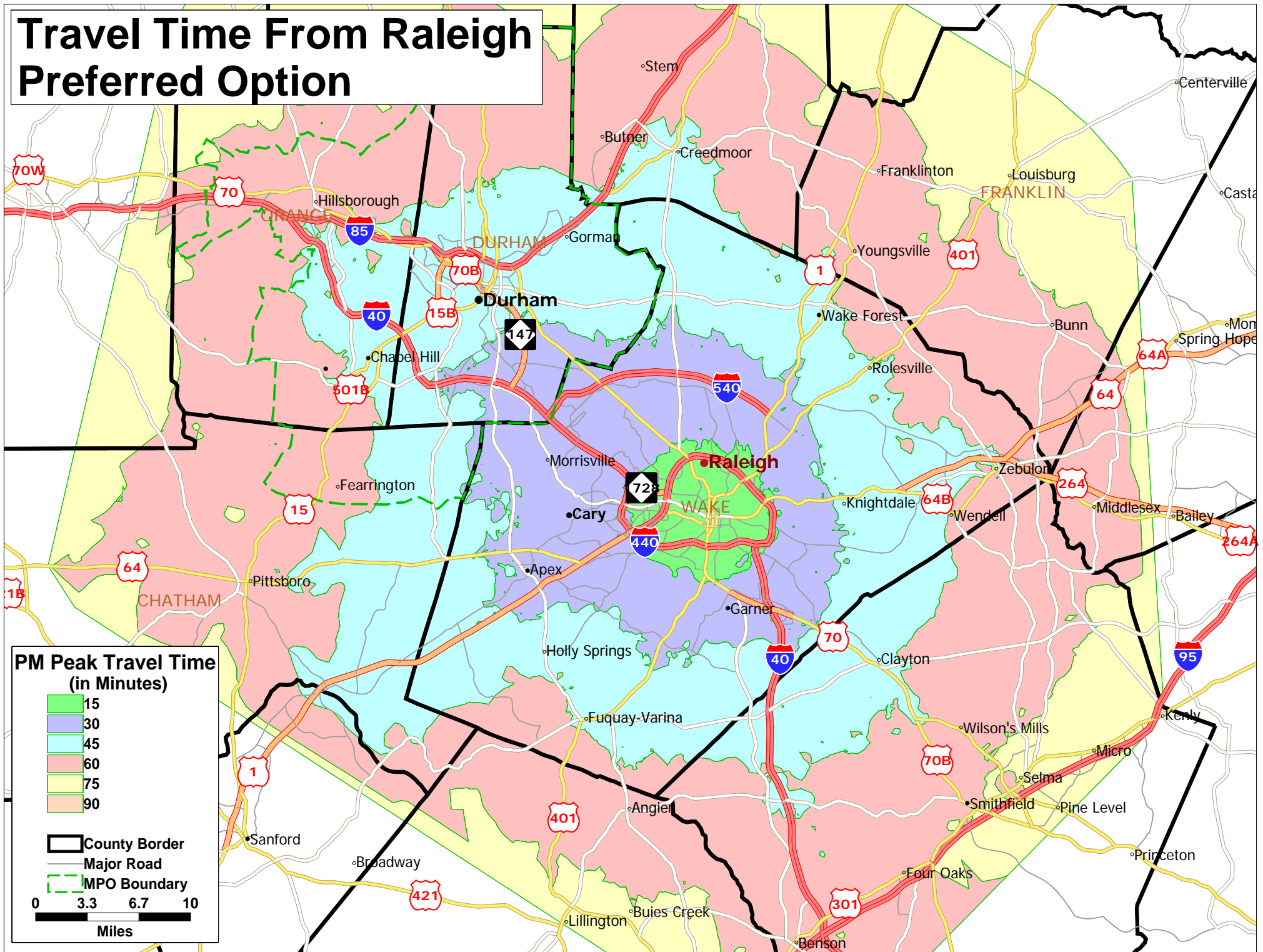
Travel Time From Chapel Hill Preferred Option



Travel Time From RTP Preferred Option



Travel Time From Raleigh Preferred Option



2040 MTP and CTP

Preferred Option – Congestion Maps (V/C maps)

Use of Congestion Maps

Congestion Maps show the forecasted level of service on specific road segments based on the average of the four-hour afternoon peak hour. These maps are sometimes called “V/C” maps (V over C maps) because the level of service, or existence of congestion, is derived by dividing the traffic volume by the traffic capacity of the road segment. A V/C of 1.0 is equal to a Level of Service (LOS) of “E”, which can be described as:

Limit of acceptable delay, unstable flow, poor signal progression, traffic near roadway capacity, frequent cycle failures.

It should be noted that these congestion maps show the average for the afternoon peak. The total volume for the four-hour afternoon peak period is divided by the total capacity for the same period. Thus, the V/C ratio for the afternoon peak is likely to be less than the one-hour peak, or peak-of-the-peak, often experienced by commuters.

Although the term traffic congestion is subjective in that it means different levels of delay to different people, it can be said that any road segment approaching a V/C of 1.0, which is indicated on the maps with an **orange color**, experiences some delays. A V/C greater than 1.0, which is indicated on the maps by the **red color**, means frequent delays for the motorist.

Of particular importance is the comparison of any one Alternative with the **E+C map** (Existing plus Committed), which can be considered a benchmark. The E+C map uses a transportation network with the current roadways and transit services plus any others that have been committed to being implemented, and the Socioeconomic Data (i.e., population and employment) for the year 2040. This map shows the level of service to be experienced if no additional roadways improvements or transit services are implemented.

The **2010** congestion map is provided, as well, to give an additional benchmark. The 2010 basically represents current conditions because it is based on the current transportation network and socioeconomic data.

Presentation of Congestion Maps

The MPO-wide 2010 and E+C congestion maps are presented first, followed by the Preferred Option maps of the counties and Durham and Chapel Hill close-ups.

2010 Regional V/C Maps

Map layers

- County Boundary
- MPO Boundary

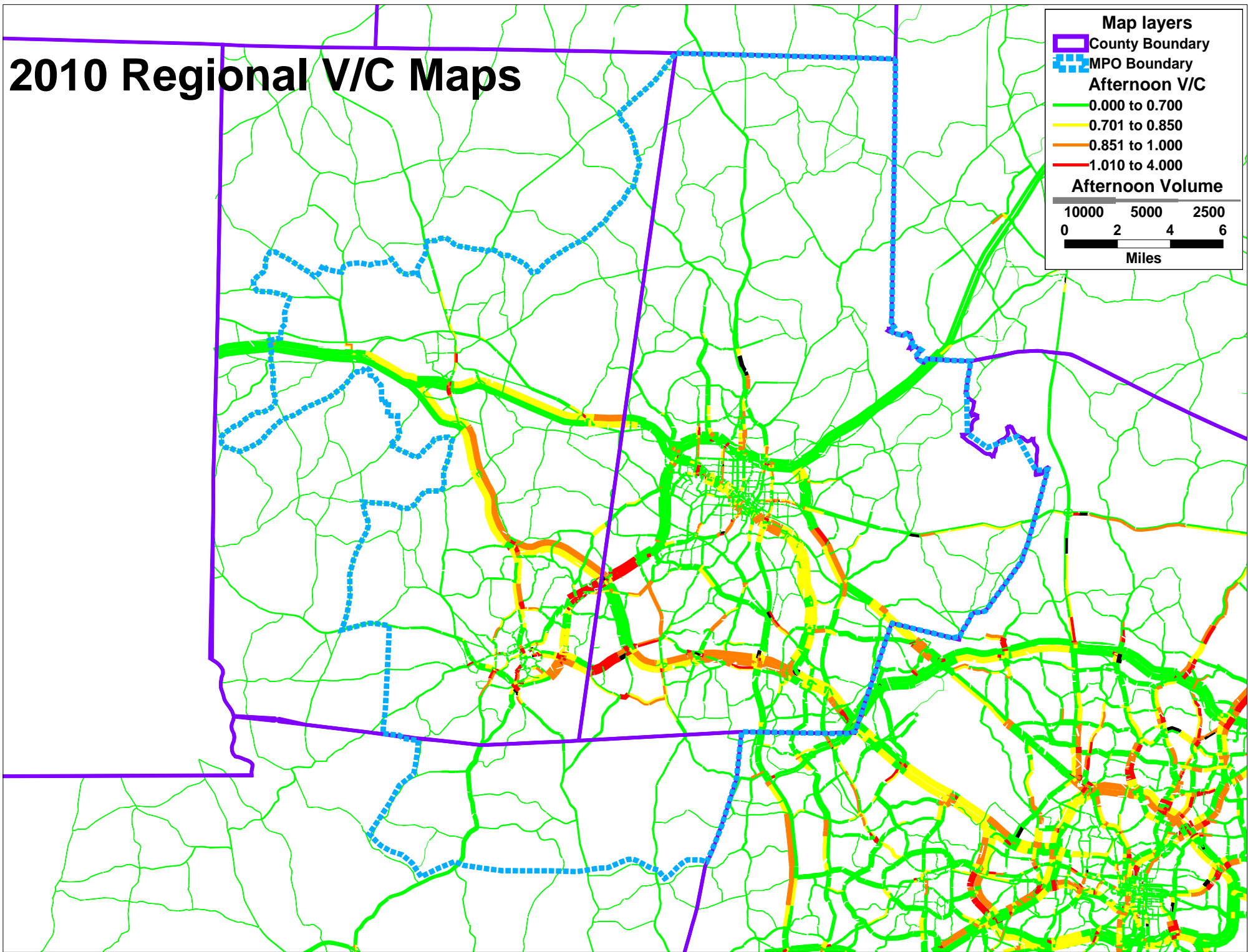
Afternoon V/C

- 0.000 to 0.700
- 0.701 to 0.850
- 0.851 to 1.000
- 1.010 to 4.000

Afternoon Volume

10000	5000	2500	
0	2	4	6

Miles



2040 DCHC MPO Regional V/C Map

E plus C

Map layers

- County Boundary
- MPO Boundary

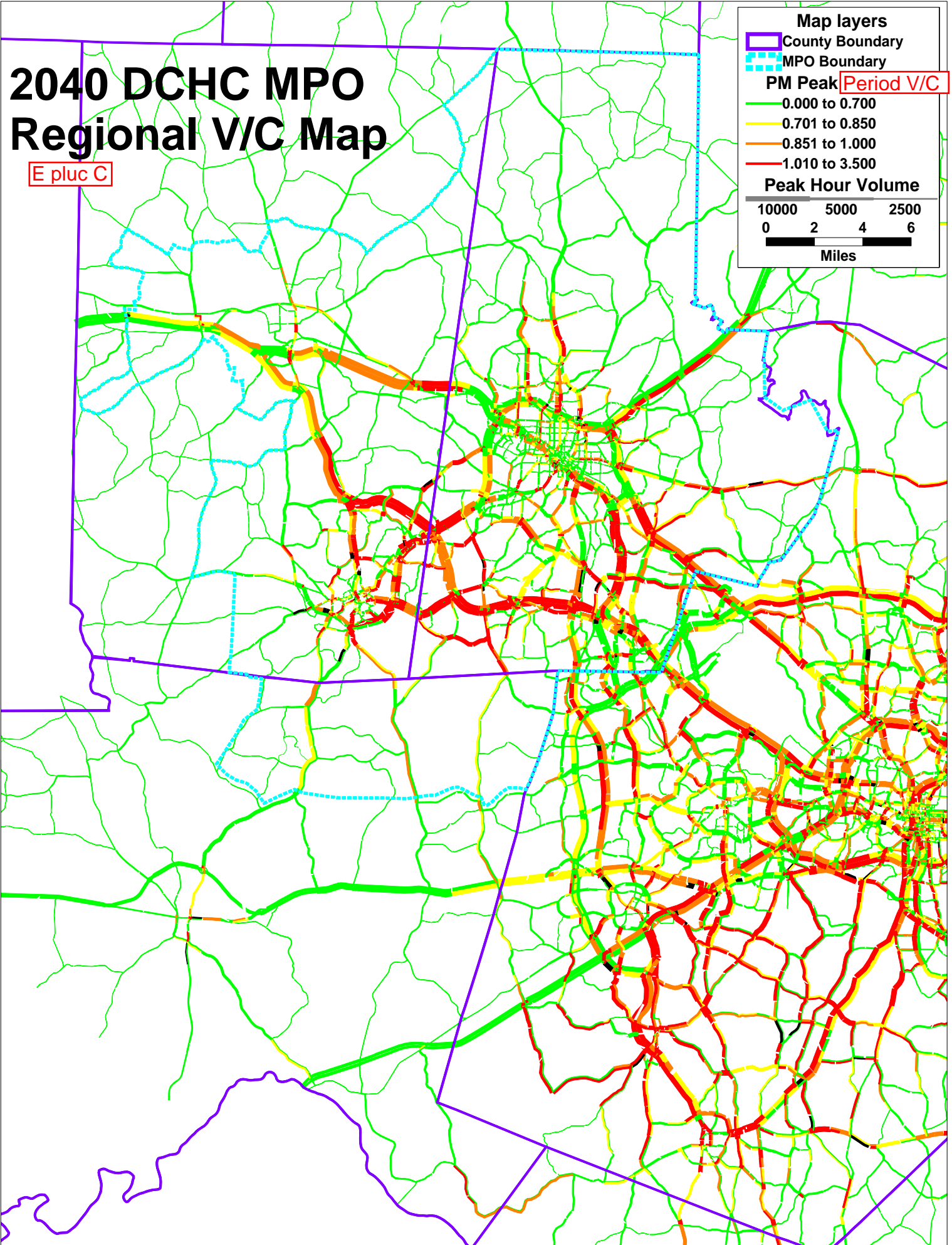
PM Peak Period V/C

- 0.000 to 0.700
- 0.701 to 0.850
- 0.851 to 1.000
- 1.010 to 3.500

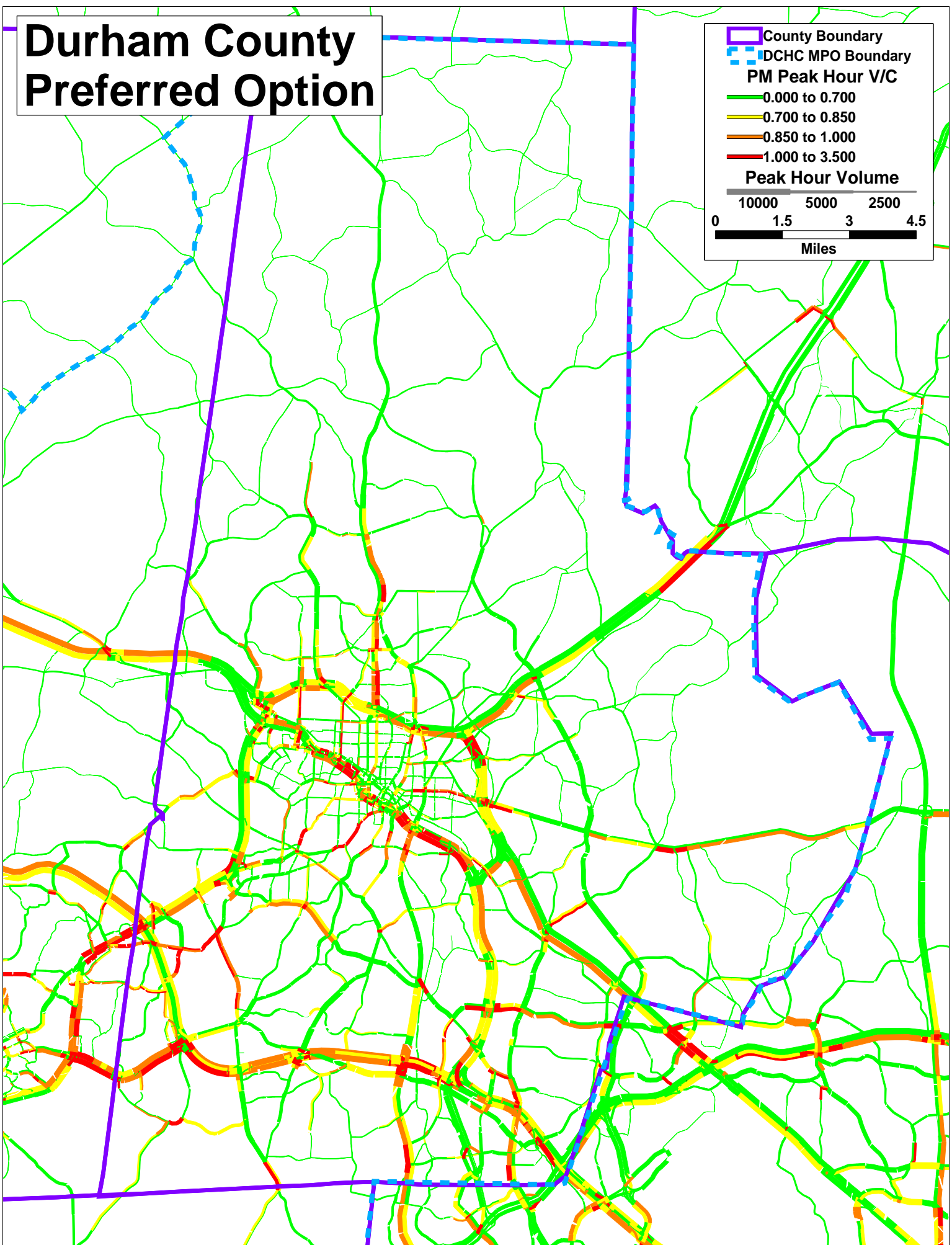
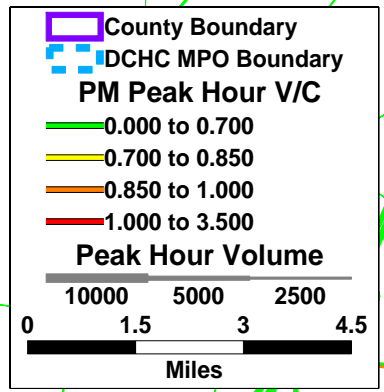
Peak Hour Volume

10000	5000	2500
0	2	4
6		

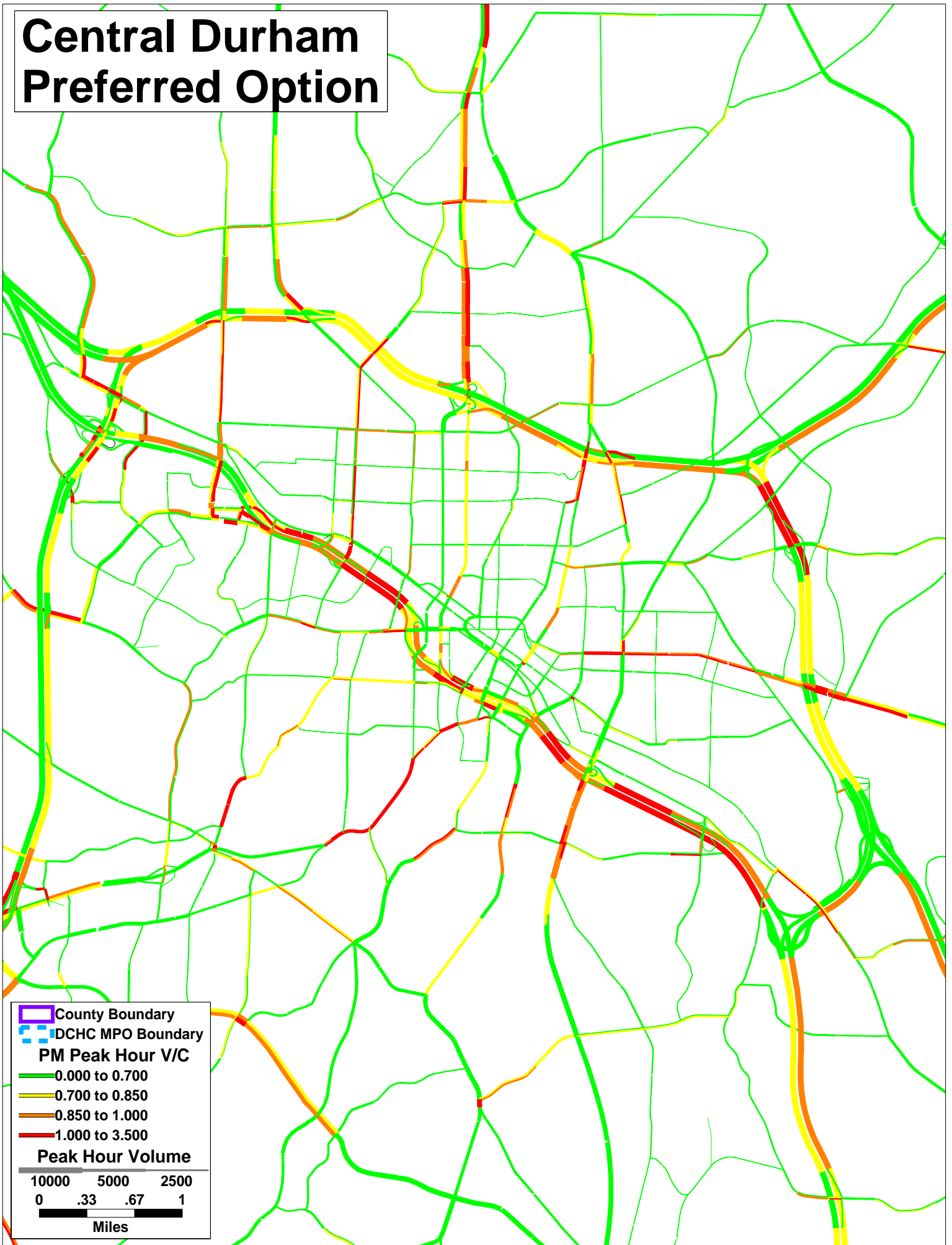
Miles



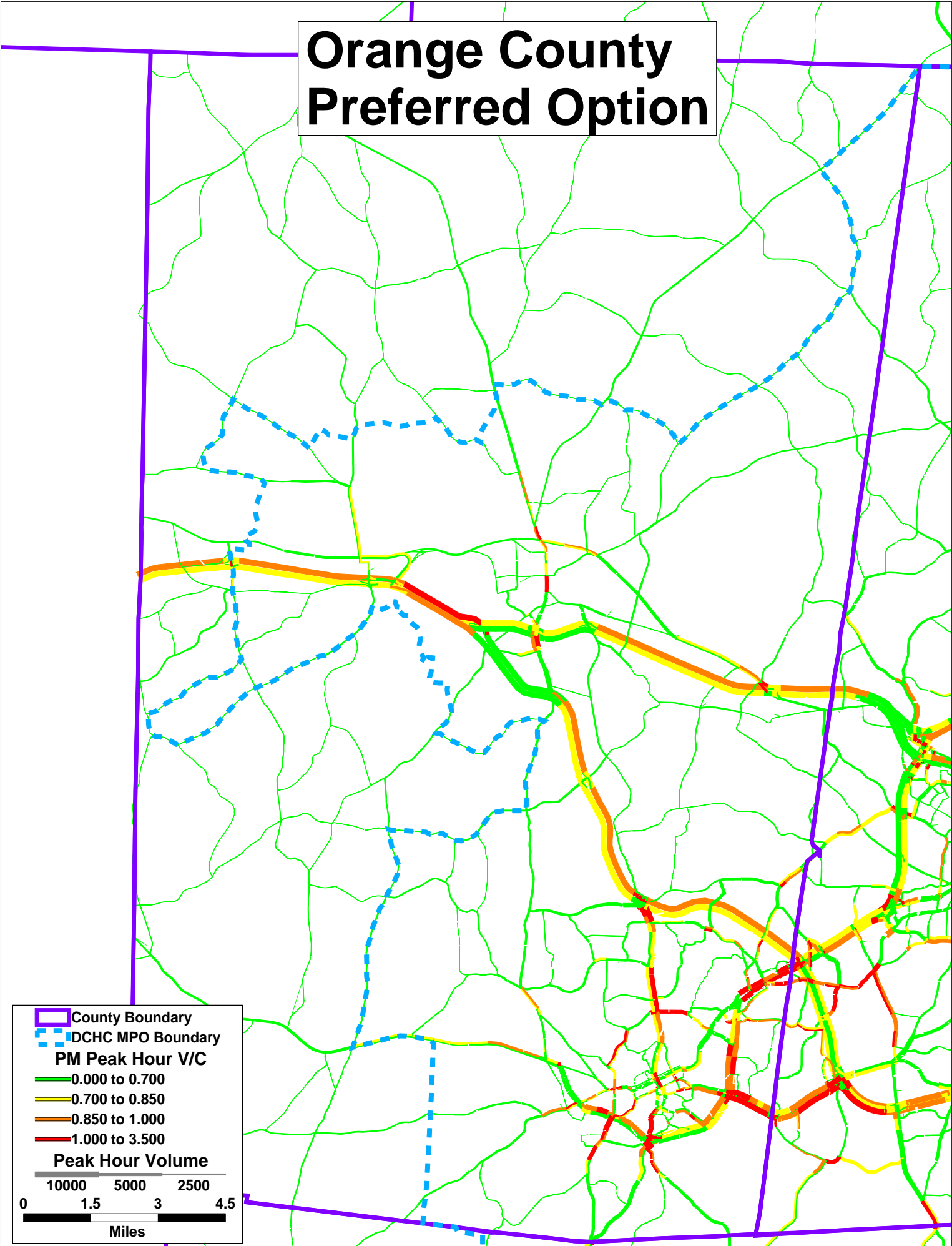
Durham County Preferred Option



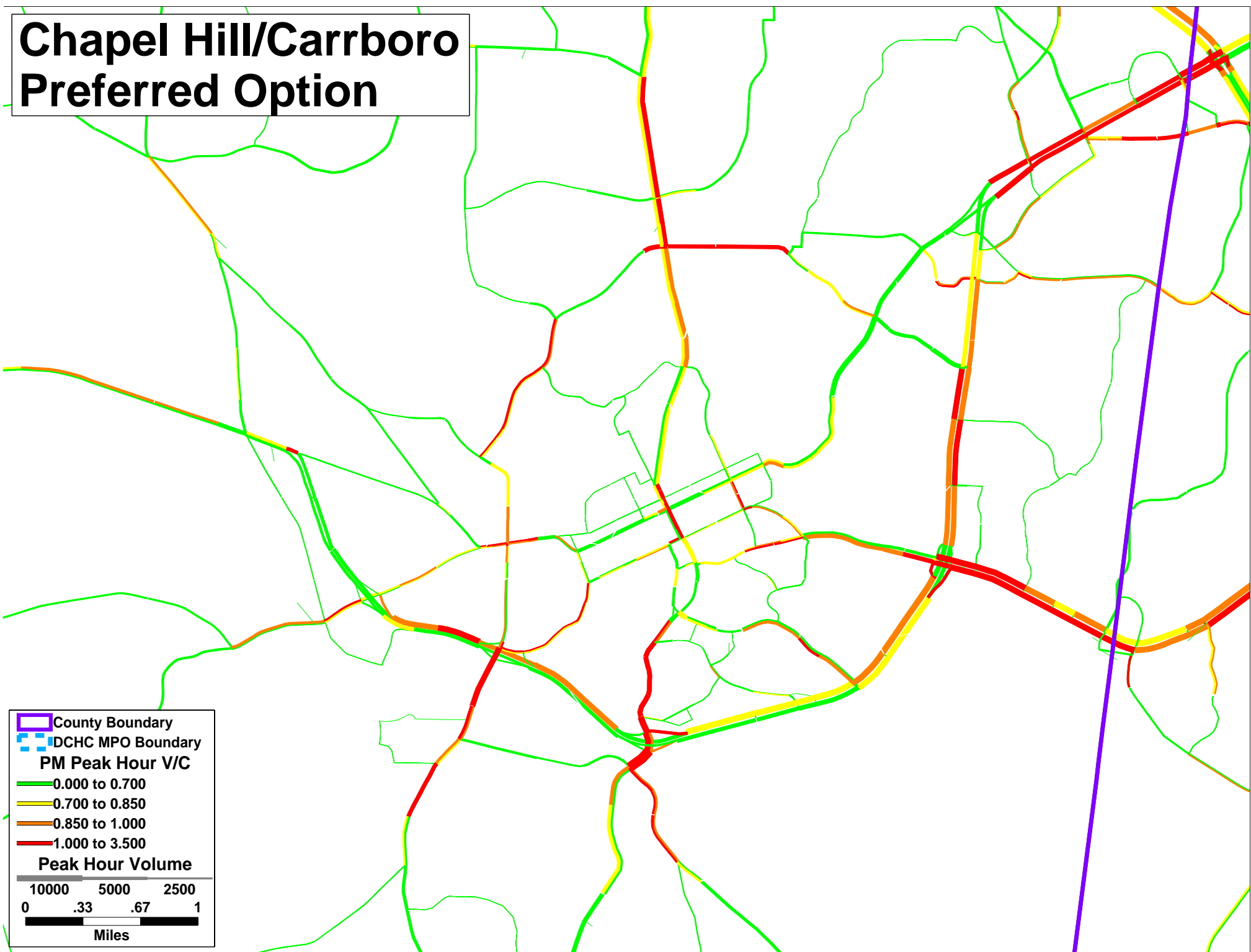
Central Durham Preferred Option



Orange County Preferred Option



Chapel Hill/Carrboro Preferred Option



County Boundary
DCHC MPO Boundary

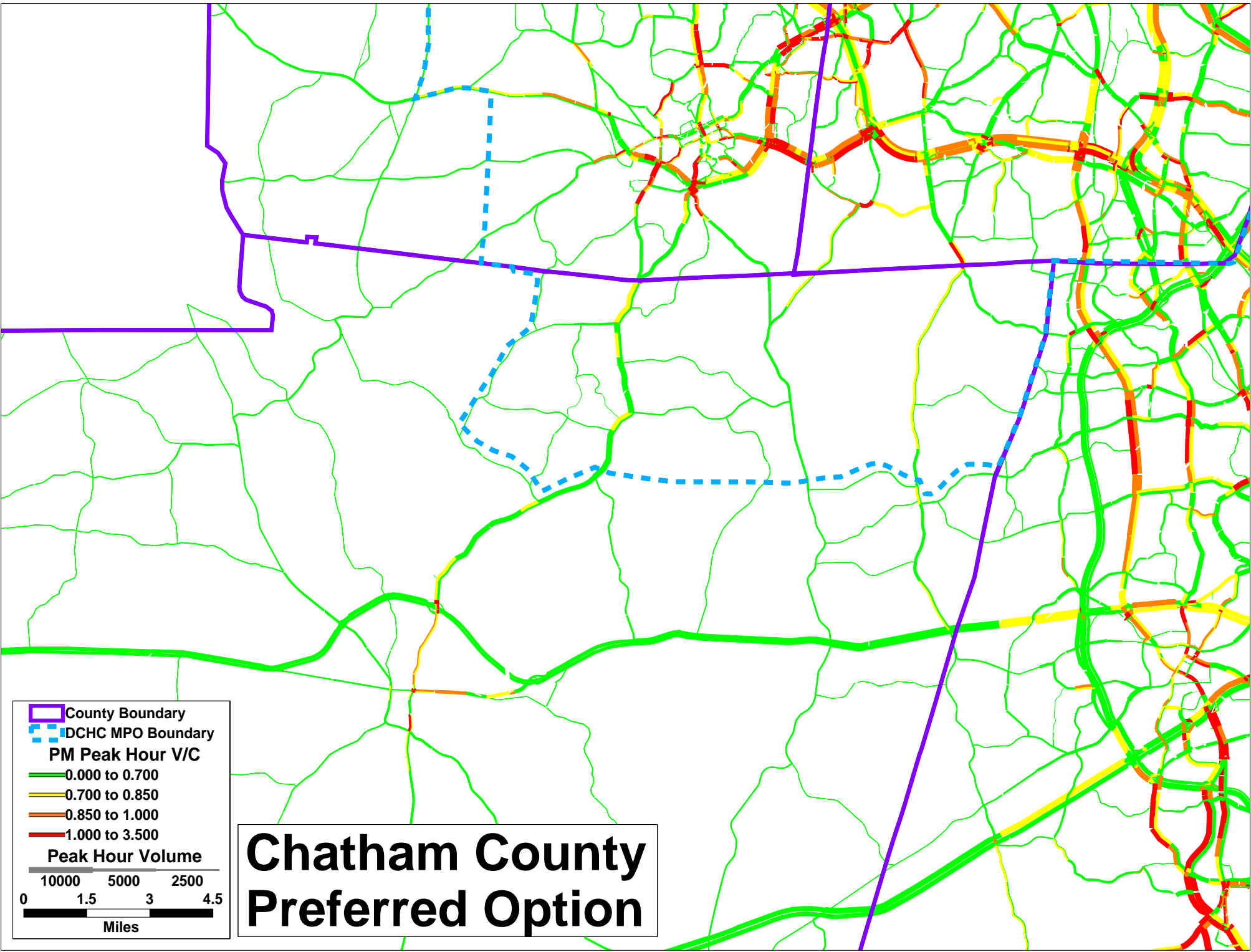
PM Peak Hour V/C

- 0.000 to 0.700
- 0.700 to 0.850
- 0.850 to 1.000
- 1.000 to 3.500

Peak Hour Volume

Volume	Scale
10000	0
5000	.33
2500	.67
0	1

Miles



Chatham County Preferred Option