

III. CURRENT CONGESTION

Critical Lane Volumes (CLVs) at Signalized Intersections

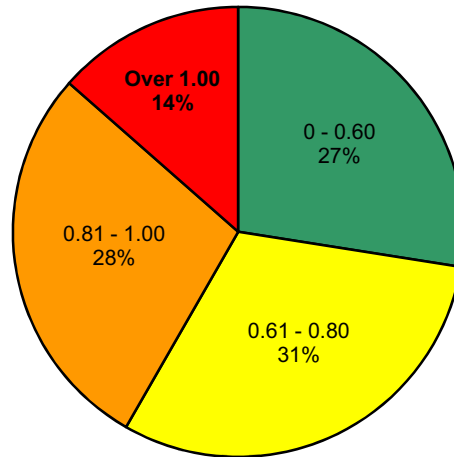
The Department's intersection database currently contains turning movement count samples for 564 of the 772 (existing and planned), signalized intersections in the County, with samples that date back to March 1, 2001. For the purpose of this report, counts dating as far back as three years were analyzed for purposes of discussing current-day congestion. The Department has deemed this an acceptable standard practice, as the percent change in CLVs seen at most intersections tends to be fairly minimal within a three-year period. In addition, the Department routinely utilizes CLV data dating back the same length of time to conduct intersection trend analyses for LATR purposes. Staff elected to remove data prior to January 1, 2005 from the sampling for this year's report. A total of 422 intersections were included in this report (see Appendix 5.1A for the complete list of samples in the database). Although this year's sample size is smaller than that used in the previous report, it should be noted that this sample set contains updated count data for a number of intersections that had CLVs which exceeded their respective LATR standard in the 2006 report. Staff acknowledges that some count samples, which are dated prior to 2005, may hold some degree of relevancy to the current-day traffic conditions. However, it is preferred that more up-to-date samples for these locations be obtained prior to re-reporting on them. It should be noted however that a small set of count data samples, which predate 2005, were used to perform a CLV trend analysis for some intersections.

The findings in this year's study indicate that approximately 14% of the 422 intersections sampled had CLVs that exceeded their LATR standard, or a CLV/LATR ratio of greater than 1.00. Staff estimates that most of the signalized intersections for which data is currently unavailable represent minor intersections operating within their congestion standards. Therefore, the intersections with congestion levels worse than their LATR standards probably represent about 10% of the total number of signalized intersections. In addition, staff found that 28% of the intersections sampled had a CLV/LATR ratio between 0.80 and 1.00, which is indicative of noticeable delay, but not severely congested conditions.

Figure 3.1 provides a graphic display of the PM peak hour CLV/LATR ratios for approximately 160 intersections in the County. Locations with a CLV/LATR ratio of greater than 1.00 are shown as a red dot and locations with a V/C ratio between 0.80 and 1.00 are shown as an orange dot. The size of the dot is proportional to the total number of vehicles traveling through the intersection. The distribution of the highest-volume (large dots) congested intersections tends to be along several heavily traveled State highways, notably Rockville Pike (MD 355), Georgia Avenue (MD 97), and Columbia Pike (US 29). See Figure 3.2 for the complete categorization of CLV/LATR ratios for all of the intersections sampled.

Figure 3.2: CLV/LATR Ratio Categorization

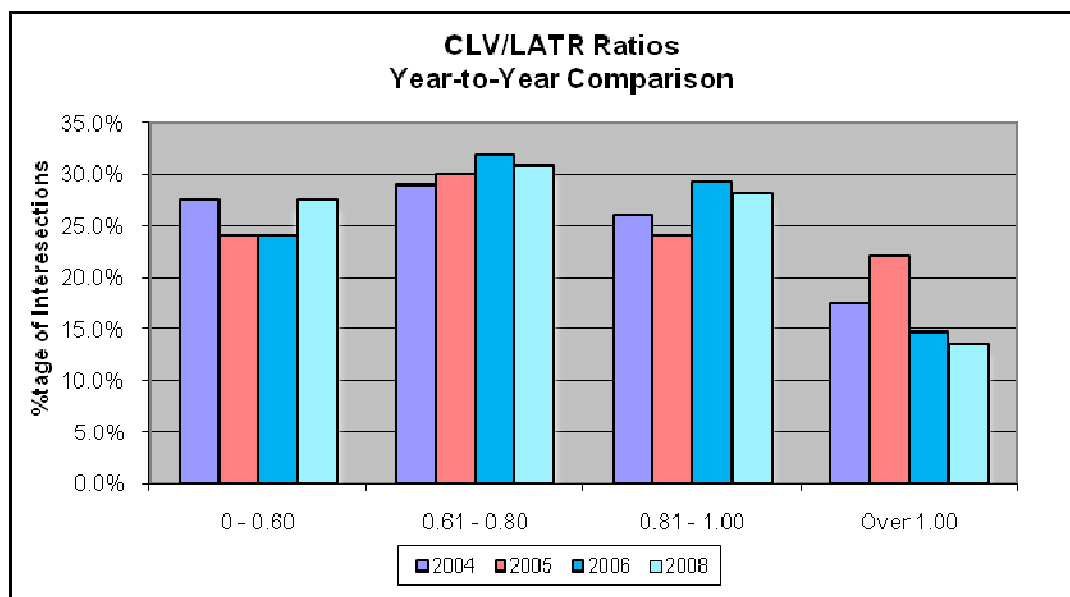
Higher of the AM and PM Peak Hour CLV/LATR Standard Ratio
(sample size = 422)



In general, this categorization mirrors the percentages that were presented in the 2006 HMR. Moreover, 42% of the intersections with a CLV/LATR ratio greater than 1.00 also had CLVs that exceeded their LATR standard in both the 2005 and 2006 reports. This finding indicates that a significant number of the County's intersections are chronically congested, as majority of these intersections are located along the major State roads (i.e. MD 355), which carry the bulk of the County's traffic. In 2006 and 2007, the County witnessed the completion of approximately 6,000 new dwelling units and 4 million square feet of new commercial space. In general, transportation system infrastructure improvements are keeping pace with the growth in new jobs and housing units. Two elements of the 2007-2009 Growth Policy: (1) the establishment of Policy Areas that are deemed "acceptable with partial mitigation", and (2) the requirement to improve failing intersections to somewhat better than background levels, are designed to improve conditions rather than maintain the status quo.

Staff acknowledges that the variability in traffic conditions at some locations over the past three years has slightly influenced the reduction in the number of intersections with CLVs exceeding their standard. Figure 3.3 shows the year-to-year comparison of CLV/LATR ratios for all of the intersections sampled during each reporting year. It should also be noted that 20 of the 81 intersections in the database that have CLVs that exceed their LATR standard, were sampled prior to 2005. While a cursory examination of the proportion of over-capacity intersections in Figure 3.3 might suggest that conditions have improved from 2006 to 2008, staff concludes that the slight improvement is not significant, considering the variability in daily traffic flows. Therefore, staff proposes to acquire more recent count data as budgets permit for these locations prior to re-reporting on their status. Furthermore, the acquisition of the additional fiscal resources will enable staff to audit more intersections on an annual basis for reporting purposes.

Figure 3.3: Year-to-Year Comparison of CLV/LATR ratios



The 2007-2009 Growth Policy was adopted by the County Council on November 13, 2007. As a result, the Local Area Transportation Review (LATR) standards for 16 of the County's 34 policy areas were modified. Table 3.1 shows the revised LATR congestion standards for all 34 policy areas of the County. Nine of the County's policy areas are designated as either Central Business Districts (CBDs) or Metro Station Policy Areas (MSPAs). County policy aims to concentrate the higher levels of growth and development in these areas primarily because they have the transportation infrastructure to accommodate higher levels of congestion, as well as an abundance of transit alternatives.

Table 3.1: LATR Congestion Standards

Congestion (CLV) Standard	Policy Area
1350	Rural Areas* (Poolesville, Goshen, Patuxent, Darnestown / Travilah)
1400	Damascus*
1425	Clarksburg*, Germantown East*, Germantown West*, Montgomery Village/Airpark*
1450	Cloverly*, Gaithersburg City, North Potomac*, Olney*, Potomac*, R&D Village*
1475	Aspen Hill*, Derwood, Fairland/White Oak*
1500	Rockville City
1550	North Bethesda
1600	Bethesda / Chevy Chase, Kensington / Wheaton, Silver Spring / Takoma Park, Germantown Town Center
1800	Bethesda CBD, Friendship Heights CBD, Glenmont, Grosvenor, Shady Grove, Silver Spring CBD, Twinbrook, Wheaton CBD, White Flint

* LATR standard tightened with the approval of the FY07-09 Growth Policy

Table 3.2 lists the 10 most congested intersections in the County. It should be noted that four of this year's 10 most congested intersections appeared on the same list in the 2006 HMR. The intersections are ranked by absolute CLV as opposed to the CLV/LATR standard ratio. Staff has concluded in previous years that absolute CLV tends to be a better determinant of the severity of congestion. That is, a CLV of 1500 typically indicates some degree of congestion, but may not be viewed as severe in some policy areas (e.g. CBDs) when compared to less stringent standards. See Figure 3.4 for a detailed map of these locations.

Table 3.2: 10 Most Congested Intersections

RANKING			INTERSECTION NAME	COUNT DATE	CLV	LATR STANDARD	POLICY AREA
2008	2006	2005					
1	3	11	<i>Great Seneca Hwy at Muddy Branch Rd</i>	3/5/2008	2179	1450	Gaithersburg City
2	*	*	<i>Georgia Ave at Randolph Rd</i>	2/23/2006	2069	1800	Glenmont
3	8	10	Frederick Rd (MD 355) at King Farm Blvd	3/6/2008	2021	1800	Shady Grove
4	7	8	<i>Connecticut Ave at Jones Bridge Rd</i>	6/6/2007	2017	1600	Bethesda/Chevy Chase
5	2	3	<i>Rockville Pike at W Cedar La</i>	5/9/2006	1996	1600	Bethesda/Chevy Chase
6	*	9	Shady Grove Rd at Midcounty Hwy	3/5/2008	1894	1475	Derwood
7	*	46	Norbeck Rd at Bel Pre Rd	5/31/2006	1834	1475	Aspen Hill
8	14	28	<i>Connecticut Ave at East West Hwy</i>	3/29/2006	1831	1600	Bethesda/Chevy Chase
9	16	*	Norbeck Rd (MD 28) at Avery Rd	10/12/2005	1815	1500	Rockville City
10	*	20	Randolph Rd at New Hampshire Ave	3/14/2006	1794	1475	Fairland/White Oak

*Unranked either because data was unavailable or CLV did not exceed standard

Entries in *italics* indicates special notes for this particular location

Notes for Table 3.2 (by rank)

Intersection #1: Capacity improvements completed on Great Seneca Hwy in '06

Intersection #2: Grade-separated interchange has been funded for construction

Intersection #4: Currently under study for BRAC project purposes

Intersection #5: Grade-separated interchange recommended in master plan; currently under study for BRAC project purposes

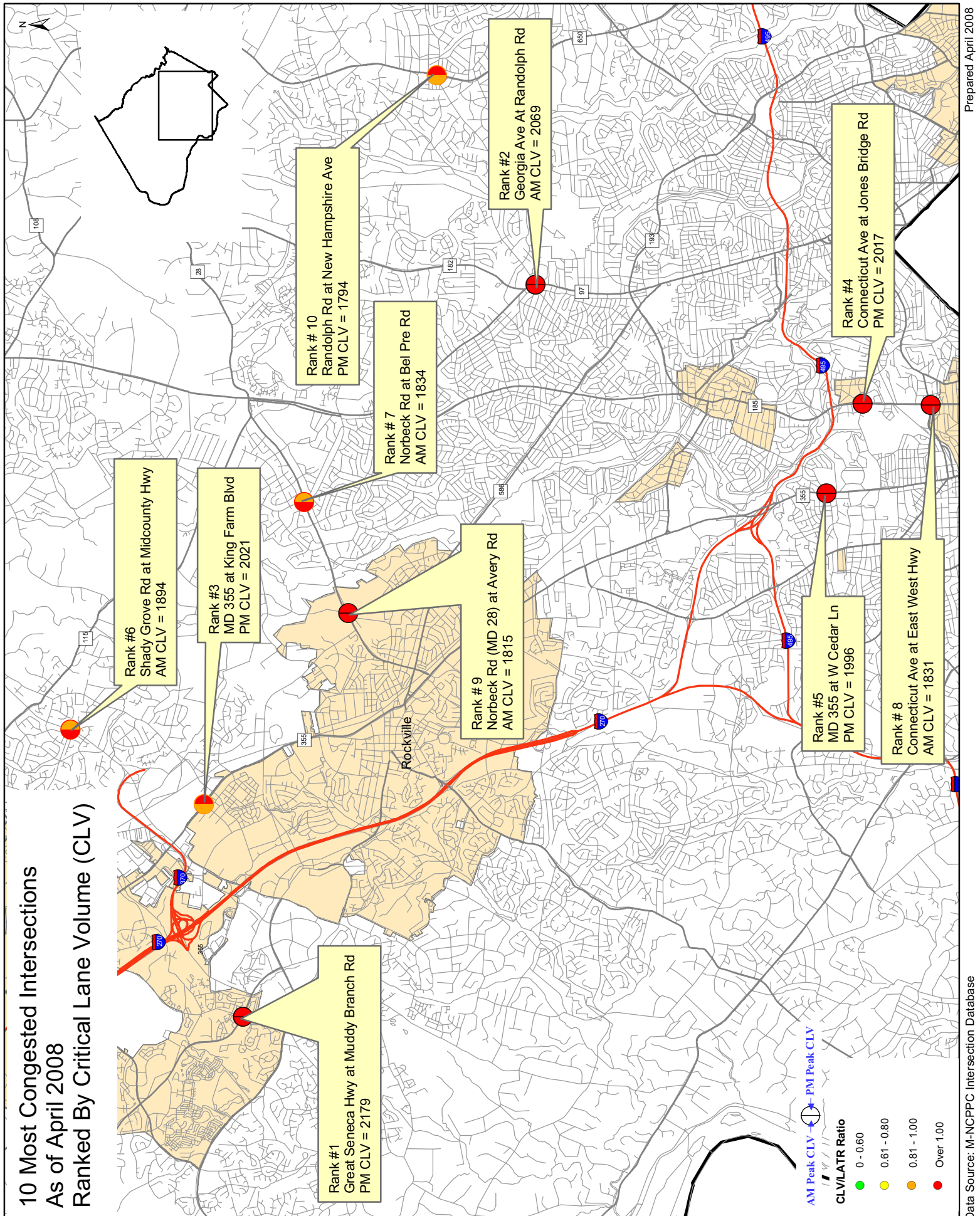
Intersection #8: Intersection capacity improvement completed in '05

This year, five intersections debuted on the 10 most congested intersections list, while another intersection returned to the list after being excluded from the sampling that was reported in 2006.

- Georgia Ave (MD 97) at Randolph Rd** moved into this year's list at #2. Archived data for this intersection indicates that the CLV at this intersection steadily increased from 2003 to 2006. In 2003, this intersection had CLV of 1654, while in 2005 the intersection had a CLV of 1762. The CLV at this intersection increased 17.4% between 2005 and 2006; as a result of increased traffic volumes, in the both AM and PM peak directions, along Georgia Ave (MD 97) as well as Randolph Rd. The level of congestion at this intersection is also reflected in observed travel times as described in the next section of this report.

- **Shady Grove Rd at Midcounty Hwy** appears on this year's list at #7 after being excluded from the sampling in 2006. However, this intersection was ranked as the 9th most congested intersection in the County in the 2005 AGP Chapter on Highway Mobility. When comparing the count sample for this intersection to an archived count sample taken in 2001, a significant decrease in the through-volumes along Shady Grove Rd was observed. This is reflected in the CLV as it decreased 3% within a six-year period. This finding may be indicative of reduced mobility at this intersection during the AM and PM peak periods, and/or a change in commuting patterns (route choice).
- **Norbeck Rd (MD 28)/Bel Pre Rd** and **Norbeck Rd (MD 28)/Avery Rd** both appear on the list for the first time at #8 and #10, respectively. The Norbeck Rd (MD 28)/Avery Rd intersection has not previously been counted for regulatory or monitoring purposes, therefore no historical data is available for this location. However, it should be noted that Norbeck Rd serves as one of the County's major east-west corridors, and therefore the weekday peak period volumes on this roadway are relatively high. The Norbeck Rd (MD 28)/Bel Pre Rd intersection was not identified as a congested location in the 2006 HMR, however it was identified as such in the 2005 AGP Chapter on Highway Mobility.
- **Connecticut Ave (MD 185) at East-West Hwy (MD 410)** has a long history of experiencing severely congested conditions during the AM and PM peak periods. This intersection appears on the list at #9 after being ranked #14 and #28 respectively, in the two previous reports. This intersection must accommodate a significant amount of traffic from all approaches on a daily basis, as it consists of the intersection of two major State roads. Despite the fact that a minor capacity improvement was completed at this intersection prior to the most recent count sample being taken (2006), the CLV (1831) has not decreased from where it was in 2004 (previous count sample). This may be attributed to the observed increase in the northbound throughput volumes at this intersection between 2004 and 2006.
- **New Hampshire Ave (MD 650) at Randolph Rd** debuts on the list at #10 after being excluded from the sampling in 2006. This intersection was ranked #20 in the 2005 AGP Chapter on Highway Mobility with a CLV of 1882. When comparing the most recent count sample to the previous count sample (2002), staff observed slight decreases in the number of vehicles traveling the peak direction along New Hampshire Ave during the peak periods. However, it should be noted that this intersection is located along one of the County's major east-west corridors, as indicated by the relatively high daily peak period volumes reported for Randolph Rd. This intersection will be monitored for future reporting purposes.

Figure 3.4: Map of the 10 Most Congested Intersections



Tables 3.3 and 3.4 rank the remaining intersections that have CLVs, which exceed their respective LATR standard. It is important to note that 14 of the 49 intersections listed in these tables either have master plan recommended improvements, or ongoing/recently completed improvements associated with them, which may impact or have impacted the CLVs at these locations. See Appendix 5.3 in the back of the report for the complete list of planned, active, and recently completed State and County infrastructure improvements.

Table 3.3: Congested Intersections (11-30)

RANKING			INTERSECTION NAME	COUNT DATE	CLV	LATR STANDARD	POLICY AREA
2008	2006	2005					
11	22	38	<i>Veirs Mill Rd at Twinbrook Pkwy</i>	9/8/2005	1783	1550	North Bethesda
12	15	29	<i>Veirs Mill Rd at First St</i>	11/15/2005	1783	1500	Rockville City
13	*	17	Montgomery Village Ave at Russell Ave	3/6/2008	1755	1450	Gaithersburg City
14	*	*	Great Seneca Hwy at Lakeland Blvd	10/3/2007	1754	1450	Gaithersburg City
15	21	48	Old Georgetown Rd at Tuckerman La	5/26/2005	1746	1550	North Bethesda
16	28	27	<i>Norbeck Rd at Bauer Dr</i>	10/20/2005	1710	1475	Aspen Hill
17	29	*	Piney Branch Rd at Philadelphia Ave	4/20/2005	1704	1600	Silver Spring/Takoma Park
18	12	16	<i>Georgia Ave at Norbeck Rd</i>	6/1/2006	1703	1475	Aspen Hill
19	*	85	Darnestown Rd at Muddy Branch Rd	10/23/2007	1697	1475	North Potomac
20	*	*	Norbeck Rd at Muncaster Mill Rd	6/1/2006	1684	1475	Aspen Hill
21	31	47	University Blvd at Piney Branch Rd	5/3/2005	1676	1600	Silver Spring/Takoma Park
22	17	30	Colesville Rd at University Blvd (S)	9/13/2006	1672	1600	Kensington/Wheaton
23	*	88	Frederick Rd at Darnestown-Germantown Rd	3/5/2008	1670	1450	Germantown East
24	34	*	Colesville Rd at Franklin Ave	4/13/2005	1670	1600	Silver Spring/Takoma Park
25	*	*	East-West Hwy at 16th St	12/6/2006	1669	1600	Silver Spring/Takoma Park
26	*	*	Key West Ave at Broschart/Diamondback	10/3/2007	1666	1450	R&D Village
27	*	*	Montrose Rd at Tower Oaks Blvd	11/14/2006	1663	1550	North Bethesda
28	25	*	Key West Ave at Shady Grove Rd	9/25/2007	1640	1500	Rockville City
29	57	77	<i>Columbia Pike at Fairland Rd</i>	9/6/2007	1636	1475	Fairland/White Oak
30	47	58	Woodfield Rd at Fieldcrest/Hadley Farms	3/10/2005	1635	1425	Montgomery Village/Airpark

*Unranked either because data was unavailable or CLV did not exceed standard

Entries in *italics* indicates special notes for this particular location

Notes for Table 3.3 (by rank)

Intersection #11: Intersection capacity improvement currently in project planning

Intersection #12: Intersection capacity improvement currently in design

Intersection #16: Intersection improvement recommended in master plan

Intersection #18: Intersection improvement currently in project planning

Intersection #29: Grade-separated interchange currently in project planning

Table 3.4: Congested Intersections (31-59)

RANKING			INTERSECTION NAME	COUNT DATE	CLV	LATR STANDARD	POLICY AREA
2008	2006	2005					
31	44	42	Georgia Ave at Columbia Blvd/Seminary La	5/10/2005	1631	1600	Silver Spring/Takoma Park
32	11	41	Colesville Rd at Sligo Crk Pkwy/St Andre	3/6/2008	1624	1600	Silver Spring/Takoma Park
33	27	43	<i>Connecticut Ave at Veirs Mill Rd</i>	<i>6/6/2007</i>	<i>1607</i>	<i>1600</i>	<i>Kensington/Wheaton</i>
34	60	83	<i>Columbia Pike at Greencastle Rd</i>	<i>11/15/2006</i>	<i>1607</i>	<i>1475</i>	<i>Fairland/White Oak</i>
35	52	*	First St at Baltimore Rd	1/13/2005	1602	1500	Rockville City
36	5	6	Columbia Pike at Southwood Ave	3/5/2008	1601	1600	Kensington/Wheaton
37	*	*	Layhill Rd at Ednor Rd/Norwood Rd	10/17/2006	1577	1450	Olney
38	*	*	Muddy Branch Rd at Diamondback Dr	10/9/2007	1563	1450	Gaithersburg City
39	*	*	Norbeck Rd at Norbeck Blvd	5/31/2006	1562	1475	Aspen Hill
40	58	78	Frederick Rd at Montgomery Village Ave	5/5/2005	1560	1450	Gaithersburg City
41	*	*	Parklawn Dr at Boiling Brook Pkwy	9/12/2006	1554	1550	North Bethesda
42	50	*	Georgia Ave at Connecticut Ave	5/31/2006	1539	1475	Aspen Hill
43	*	*	<i>Columbia Pike at Blackburn Rd</i>	<i>12/6/2006</i>	<i>1532</i>	<i>1475</i>	<i>Fairland/White Oak</i>
44	*	*	Briggs Chaney Rd at Old Columbia Pk	11/14/2006	1531	1475	Fairland/White Oak
45	*	*	<i>Georgia Ave at Bel Pre Rd</i>	<i>6/1/2006</i>	<i>1530</i>	<i>1475</i>	<i>Aspen Hill</i>
46	*	18	<i>Columbia Pike at Milestone/Stewart</i>	<i>8/30/2007</i>	<i>1520</i>	<i>1475</i>	<i>Fairland/White Oak</i>
47	61	*	Shady Grove Rd at Epsilon/Tupelo	4/6/2005	1518	1475	Derwood
48	62	*	Muncaster Mill Rd at Needwood Rd	4/12/2005	1510	1350	Rock Creek
49	63	66	Midcounty Hwy at Washington Grove La	3/22/2005	1508	1475	Derwood
50	*	74	Seven Locks Rd at Tuckerman La	11/9/2006	1499	1450	Potomac
51	6	7	<i>Frederick Rd at Ridge Rd</i>	<i>3/29/2007</i>	<i>1496</i>	<i>1425</i>	<i>Germantown East</i>
52	66	36	<i>Georgia Ave at Old Baltimore Rd</i>	<i>3/8/2007</i>	<i>1487</i>	<i>1450</i>	<i>Olney</i>
53	37	93	Frederick Rd at Clarksburg Rd	5/10/2006	1482	1425	Clarksburg
54	*	*	Shady Grove Rd at Corporate Dr	11/30/2005	1467	1450	R&D Village
55	23	39	<i>Georgia Ave at Emory La</i>	<i>6/1/2006</i>	<i>1461</i>	<i>1450</i>	<i>Olney</i>
56	68	*	<i>Georgia Ave at New Hampshire Ave</i>	<i>2/14/2006</i>	<i>1457</i>	<i>1350</i>	<i>Patuxent</i>
57	49	60	Mont. Village Ave at Chris/Lost Knife	5/9/2006	1454	1425	Montgomery Village/Airpark
58	*	*	Ridge Rd at Lewis Dr/Locust Dr	5/16/2006	1437	1400	Damascus
59	*	*	Laytonsville Rd at Brink/Sundown	11/2/2006	1433	1350	Goshen

* Unranked either because data was unavailable or CLV did not exceed standard

Entries in *italics* indicates special notes for this particular location

Notes for Table 3.4 (by rank)

Intersection #33: Intersection capacity improvement completed in '06

Intersection #34: Grade-separated interchange recommended in master plan

Intersection #43: Grade-separated interchange recommended in master plan

Intersection #45: Intersection capacity improvement recommended in master plan

Intersection #46: Grade-separated interchange recommended in master plan

Intersection #51: Intersection capacity improvement completed in '06: grade-separated interchange recommended in master plan

Intersection #52: Intersection capacity improvement recommended in master plan

Intersection #55: Intersection capacity improvement recommended in master plan
Intersection #56: Intersection capacity improvement recommended in master plan

The availability of archived count data enabled staff to conduct a CLV trend analysis for a selected group of intersections. This analysis illustrates the impact of infrastructure improvements on CLVs. Table 3.5 lists locations where CLVs decreased by 15% or more over a 4-year period. In 2006, the Georgia Ave (MD 97)/Forest Glen Rd and Frederick Rd (MD 355)/Ridge Rd (MD 27) intersections were ranked among the 10 most congested intersections in the County. However, intersection capacity improvements have helped to reduce the CLVs at these locations by 26% and 47%, respectively. An analysis of this nature helps to further justify the need for, and effectiveness of, various infrastructure improvements.

Table 3.5: Decrease in CLV of 15% or More between 2003 and 2007

INTERSECTION NAME	CLV	COUNT DATE	ARC CLV	ARC COUNT DATE	PCT CHG	COMMENTS
Great Seneca Hwy (MD 119) at Middlebrook Rd	930	3/28/2006	1274	5/13/2003	-27.0%	Intersection was improved prior to '06 count
Georgia Ave (MD 97) at Forest Glen Rd	1553	6/6/2007	2106	8/28/2003	-26.3%	Intersection capacity improvement was completed in '04
Frederick Rd (MD 355) at Ridge Rd (MD 27)/Father Hurley Blvd	1496	3/29/2007	1981	9/8/2004	-24.5%	Intersection capacity improvement was completed prior to '07 count
Georgia Ave (MD 97) at Olney-Laytonsville/Sandy Spring Rd (MD 108)	1337	3/15/2007	1722	12/14/2005	-22.4%	Intersection capacity improvement was completed prior to '07 count
Montrose Rd at Tildenwood La	1308	3/7/2007	1643	3/9/2005	-20.4%	Montrose Pkwy construction zones/alterd traffic pattern may have affected counts
Crabbs Branch Way at Redland Rd	1682	6/6/2007	2064	4/19/2006	-18.5%	Intersection capacity improvement was completed prior to '07 count
New Hampshire Ave (MD 650) at Lockwood Dr	1353	3/23/2006	1644	11/17/2004	-17.7%	Intersection capacity improvement completed in '06

Archived data was also used to identify locations where CLVs may have increased as a result of changes in travel patterns and/or increases in intersection traffic volumes. It is important to note that despite the increases in CLVs as a result of development, traffic mitigation measures have been implemented at a number of these locations, which will be monitored to determine the margin of effectiveness for future reference. Table 3.6 lists locations where CLVs have increased by at least 15% between 2003 and 2007. The results of this analysis help to illustrate the potential impacts of the opening of a new facility (i.e. roadway or grade-separated interchange) on traffic volumes, and ultimately CLVs at intersections located in the immediate vicinity. This actuality can be seen in the increases in CLV at the Briggs Chaney Rd/Old Columbia Pike and Fernwood Rd/Rock

Spring Dr intersections (23.8% and 30.8%, respectively) as a result of the opening of a new interchange in the area.

Table 3.6: Increase in CLV of 15% or More between 2003 and 2007

INTERSECTION NAME	CLV	COUNT DATE	ARC CLV	ARC COUNT DATE	PCT CHG	COMMENTS
Clopper Rd (MD 117) at Germantown Rd (MD 118)	1361	9/13/2006	899	11/18/2003	51.4%	Traffic generated by new/ongoing developments in Germantown West
Fernwood Rd at Rock Spring Dr / Marriott Drwy	820	3/9/2006	627	6/3/2004	30.8%	Traffic redistributed via new interchange at I-270/Fernwood Rd
East-West Hwy (MD 410) at Blair Mill Rd / Newell St	838	12/14/2005	646	5/29/2003	29.7%	Traffic generated by new/ongoing development in SS CBD
Georgia Ave (MD 97) at Veirs Mill Rd (MD 586) / Prichard Rd	1424	6/7/2007	1115	6/14/2005	27.7%	Traffic generated by new/ongoing development in Wheaton
Darnestown Rd (MD 28) at Quince Orchard Rd (MD 124)	1485	5/12/2005	1190	3/16/2004	24.8%	Down-stream traffic impact resulting from new/ongoing developments in Germantown West
Briggs Chaney Rd at Old Columbia Pike	1531	11/14/2006	1237	2/5/2004	23.8%	Traffic redistributed via new interchange at Columbia Pike (US 29) at Briggs Chaney Rd
Colesville Rd (US 29) at Fenton St	1038	9/19/2006	848	5/24/2005	22.4%	Traffic generated by new/ongoing development in SS CBD
East-West Hwy (MD 410) at 16th St (MD 390)	1669	12/6/2006	1366	6/8/2004	22.2%	Traffic generated by new/ongoing development in SS CBD
Veirs Mill Rd (MD 586) at University Blvd W (MD 193)	1239	4/26/2005	1036	6/5/2003	19.6%	Traffic generated by new/ongoing development in Wheaton
Old Georgetown Rd (MD 187) at Rock Spring Dr	1275	5/26/2006	1099	6/2/2004	16.0%	Rockledge Dr interchange opened in '04

CLV data is useful for identifying levels of congestion at signalized intersections. However, this data does not necessarily describe the issue of congestion at the link or roadway segment level. In some cases, an intersection may have a CLV, which indicates that it is performing at an acceptable level relative to the LATR standard. However, if the intersection approach volumes are being impeded or diminished because of reduced mobility along the approaching links, then the issue of congestion can be attributed to conditions along the link. The next section of this report discusses the results of GPS travel time and speed runs samples that were collected in May and June of 2007 in support of last year's Growth Policy work. This type of traffic monitoring data is needed in order to assess the location, extent, duration, intensity, and relative magnitudes of observable congested conditions along roadways links.

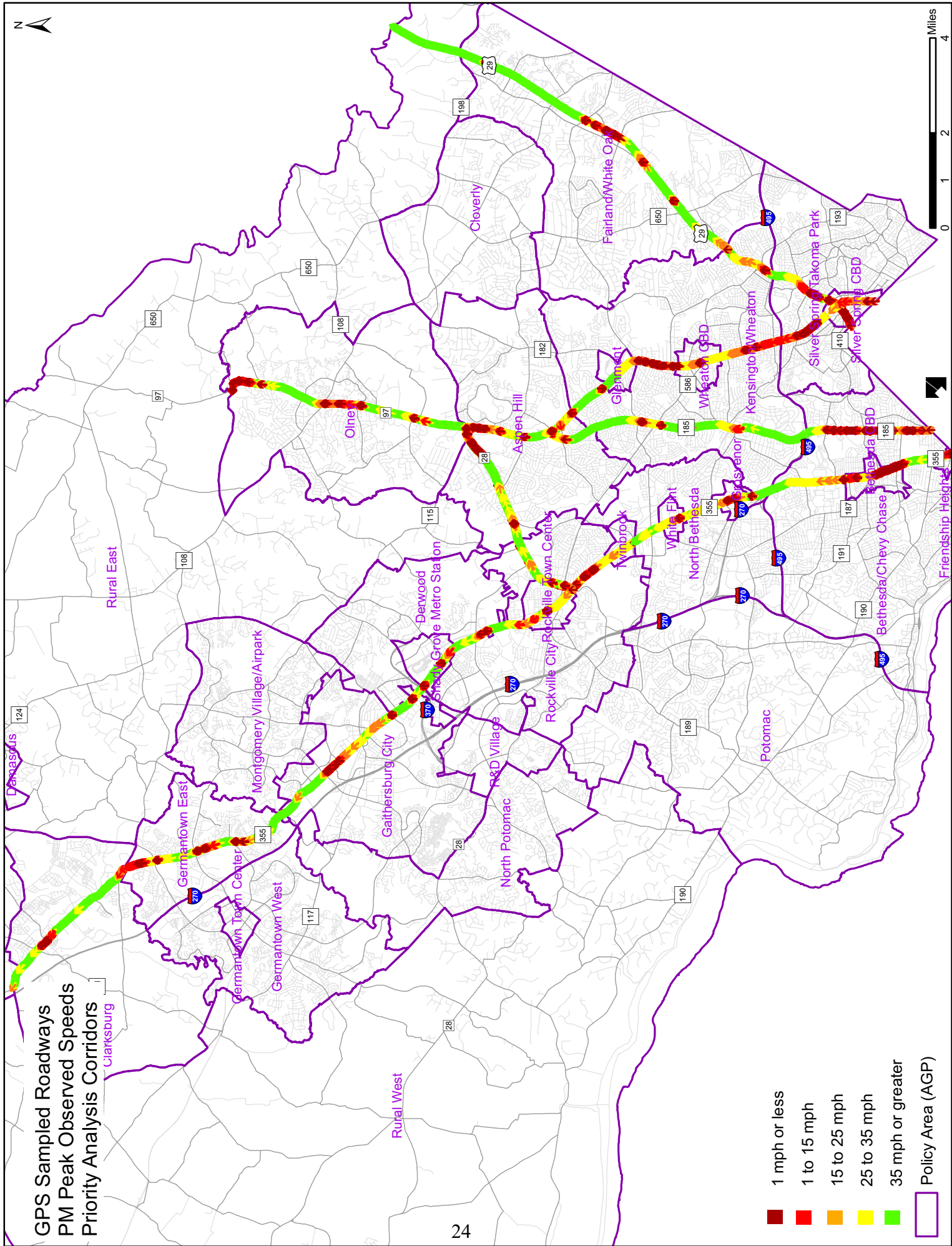
Arterial Travel Times and Speeds

Arterial Travel Times and Speeds of Selected Priority Analysis Corridors: Staff initially summarized results for corridors that were determined to be the “priority analysis corridors”. The priority analysis corridors were selected based on their: (1) degree of interest and visibility to the public and elected officials, (2) location and history of congested conditions, and/or (3) relevance to current or future planning studies. This discussion first focuses on the results for the priority analysis corridors that exhibit well-defined patterns of congestion. A detailed discussion of the sampling approach and methodology used for the purposes of this report can be found in Appendix 5.2A. Additional summaries for the other key sampled roadways, in the form of travel time-distance profiles, can be found in Appendices 5.2B-5.2O.

The results for each corridor (beginning with Figure 3.6) are shown graphically in the form of a “travel time versus distance profile”. The colors of each point along each line indicate the speed range of the probe at that point. Thus each line of the profile depicts the variation in speed along the trajectory. The slope of the line between any two points along the trajectory gives the average speed between those points. Thus stopped traffic is shown by vertical lines that are dark reddish brown in color. The PM peak survey results (in the peak direction) are shown in Figure 3.5 and discussed in the following paragraphs for the five corridors with notable levels of congestion and delay:

- (1) Wisconsin Ave/Frederick Rd (MD 355)
- (2) Georgia Ave (MD 97)
- (3) Norbeck Rd (MD 28)
- (4) Colesville Rd/Columbia Pike (MD 384/US 29)
- (5) Connecticut Ave (MD 185)

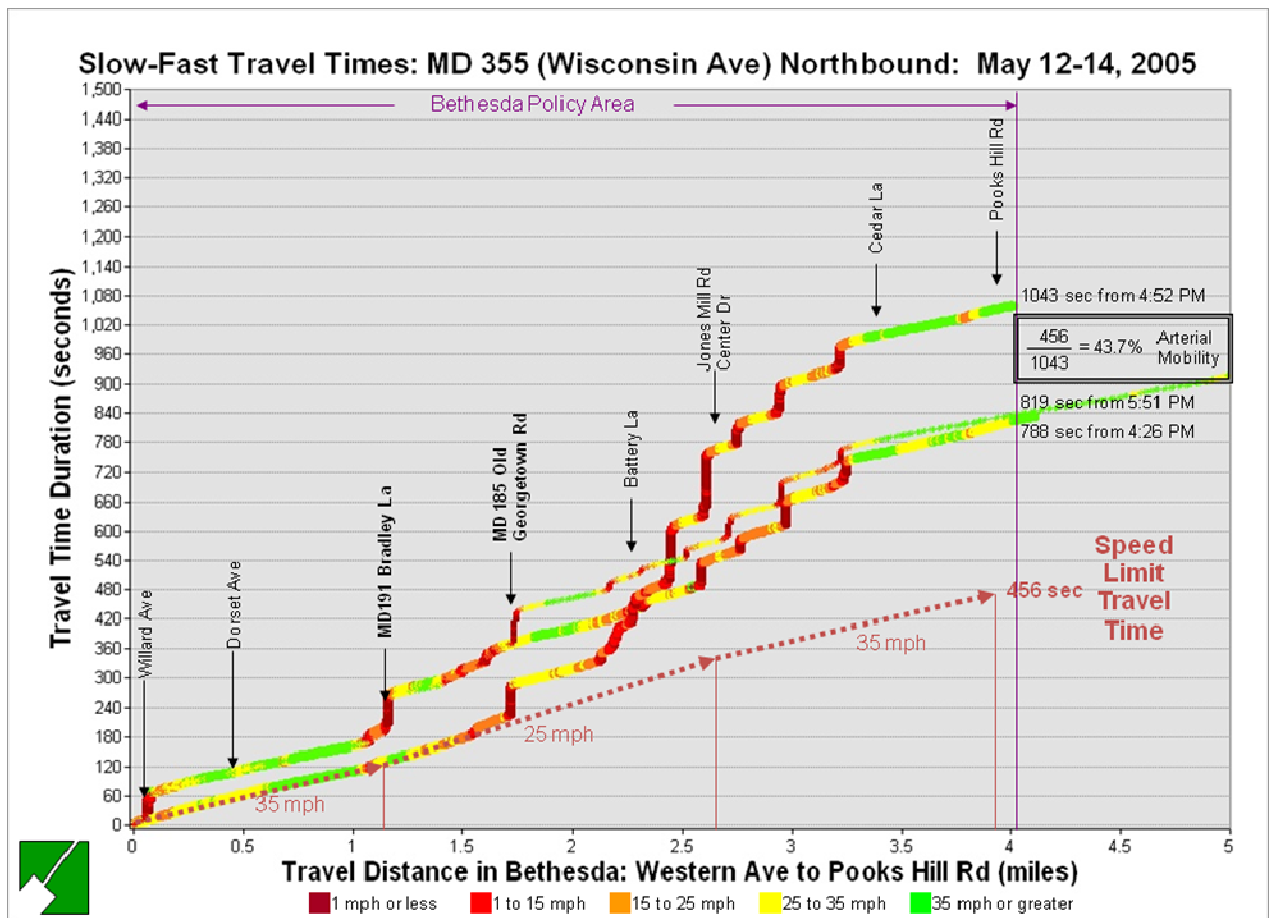
Figure 3.5: Spatial Coverage of Selected Priority Analysis Corridors



Wisconsin Ave (MD 355) from Western Ave (D.C. Line) to Pooks Hill Rd:

These results are based upon samples collected for MDOT/SHA for traffic signal timing in spring 2005. The results shown here are for 3 of 15 northbound samples taken during four days where each of the 15 samples began between 3 and 6 pm. The samples, shown in Figure 3.6, were collected for the section of MD 355 extending from Western Ave to Pooks Hill Rd (roughly 4.6 miles), just south of the Capital Beltway (I-495). The slowest travel time sample began at 4:52 pm and took 1,043 seconds (17.4 minutes) to reach Pooks Hill Rd. The fastest travel time sample during the PM peak began at 4:26 pm, and took 788 seconds (13.1 minutes). Intermediate crossing roadways are also shown in the figure. An extended queue of very slow traffic, which often indicates recurring delays, starts nearly at Cedar La, and extends back to south of Battery Lane in the Bethesda CBD, roughly a distance of one and a quarter miles. That queue lasted about 11.0 minutes, and had an average speed of about 6.8 mph. This resulted in a delay of about 8.0 minutes more than the 3.0 minutes of expected travel time at an average speed limit of about 30 mph along that distance.

Figure 3.6: Travel Time-Distance Profile for Northbound Wisconsin Ave (MD 355)



Seven northbound trajectory samples were collected for this section of Frederick Ave (MD 355), 4 during the PM peak period and 3 during the evening time period. The results for three of those samples are displayed in Figure 3.7, which shows that slowest run started about 6:15 pm. The second fastest run initiated at about 5:47 pm, while the fastest sample was conducted during the off-peak beginning at about 7:37 pm. The slowest run took about 13.0 minutes to travel a distance of roughly 4.1 miles at an average speed of 18.9 mph, compared to the posted speed limits ranging from 35 to 40 mph. The fastest sample took 503 seconds (about 8.4 minutes) at an average speed of about 28.6 mph. The two samples conducted during the peak period recorded significant queues and delays beginning at Montgomery Village Ave (MD 124) that extended south to about Odenhal Ave. The longer of those queues was about 0.67 miles long, and had a travel time duration of about 5.85 minutes. In addition, the traffic queue yielded an average speed of about 7.1 mph, and a delay of about 4.3 minutes more than the 1.3 minutes the probe would have taken to travel that distance at the speed limit of 30 mph.

Slow-Fast Travel Times: MD 355 (Frederick Rd) Tue, 5-15-07 Northbound

Travel Time Duration (seconds)

900
840
780
720
660
600
540
480
420
360
300
240
180
120
60
0

0 0.5 1 1.5 2 2.5 3 3.5 4 4.5 5

Travel Distance in Gaithersburg City: Shady Grove Rd to Great Seneca Creek (miles)

Westland Dr
Deer Park Rd
Summit Ave
Brookside Ave
Chestnut Ave / Walker Ave
Odendhal Ave
Perry Pkwy / Lake Forest Blvd
MD 124 Montgomery Village Ave
Watkins Mill Rd
Great Seneca Creek

Gaithersburg City Policy Area

782 sec from 6:15 PM
677 sec from 5:47 PM
503 sec from 7:37 PM

Speed Limit Travel Time
420 sec
40 mph
30 mph
35 mph

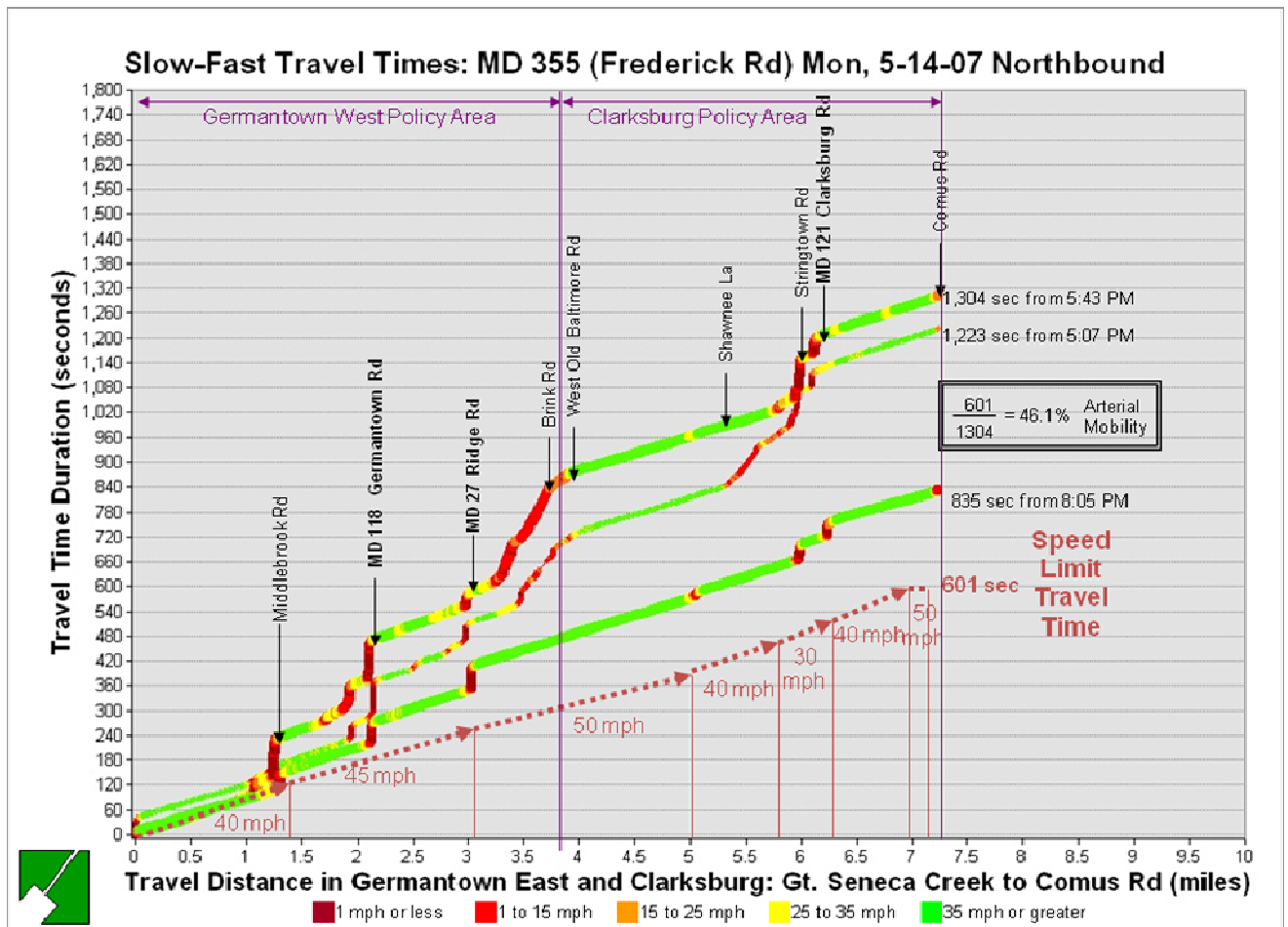
$\frac{420}{782} = 53.7\%$ Arterial Mobility

1 mph or less
1 to 15 mph
15 to 25 mph
25 to 35 mph
35 mph or greater

Frederick Rd (MD 355) from Great Seneca Creek to Comus Rd:

Four full-length northbound trajectory samples were collected for this section of Frederick Rd (MD 355), 2 during the PM peak period and 2 during the off-peak period. This section totals a distance of about 7.1 miles. The two peak period samples initiated at 5:07 pm and 5:43 pm, respectively. The third sample was conducted during the off-peak beginning at 8:05 pm. The results of the sampling are displayed graphically in Figure 3.8. The slowest run began at 5:43 pm, and took 1,304 seconds (about 21.7 minutes) at an average speed of about 19.6 mph, compared to the posted speed limits ranging from 40 to 50 mph. The fastest run was conducted during the off-peak beginning at about 8:05 pm, and took 835 seconds (about 13.9 minutes) at an average speed of about 30.7 mph. The two samples conducted during the peak period recorded three separate notable traffic queues beginning at the: Clarksburg Rd (MD 121), West Old Baltimore / Brink Rd intersections, and the Germantown Rd (MD 118) intersections, which were consistent among the samples. The most severe traffic queue was reflected in the sample that initiated at 5:07 pm, during which it took the probe driver about 5 minutes to travel from Shawnee La to Clarksburg Rd (about .90 miles) at an average speed of 10.8 mph.

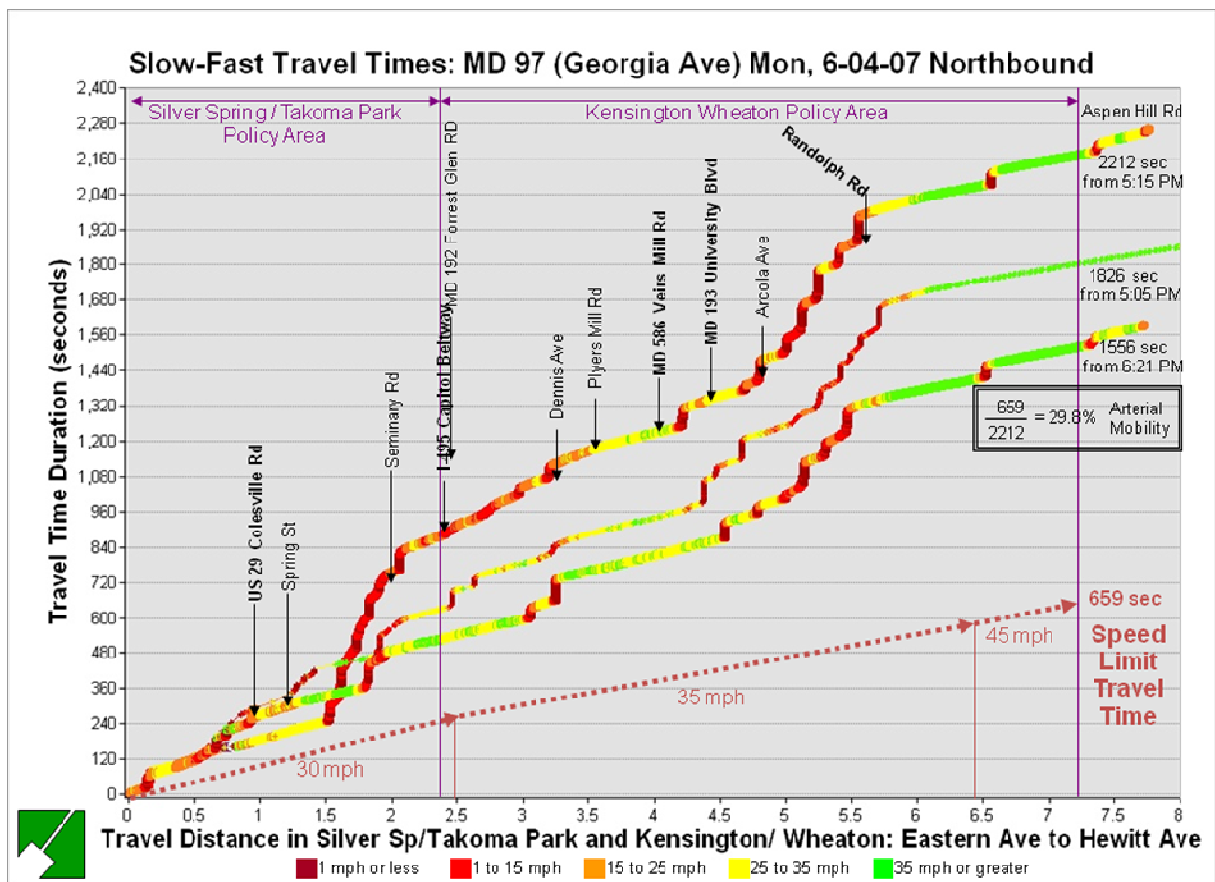
Figure 3.8: Travel Time-Distance Profile for Northbound Frederick Rd (MD 355)



Georgia Ave (MD 97) from Eastern Ave (D.C. Line) to Hewitt Ave:

Four northbound samples were collected for this section of Georgia Ave (MD 97) during the peak period. A graphic display of the observed congested conditions for three of the four samples is provided in Figure 3.9. The samples began at about 5:05 pm, 5:15 pm, and 6:21 pm, respectively. The slowest sample began at about 5:15 pm, and took 2,212 seconds (about 36.9 minutes) to travel a distance of about 7.2 miles, at an average speed of about 11.7 mph, compared to the posted speed limits ranging from 30 to 45 mph. The fastest run began about 6:21 pm and took 1,556 seconds (about 25.9 minutes), at an average speed of 16.7 mph. The first two samples recorded significant traffic queues beginning at Seminary Rd and extending as far south as Noyes Dr (just north of Spring St). During the slowest run, it took the probe vehicle roughly 8.3 minutes to travel this stretch of Georgia Ave (0.46 miles) at an average speed of 3.3 mph. In addition, all three samples recorded significant delays beginning at Randolph Rd, which extended as far south as University Blvd (roughly a distance of 1.2 miles). During the slowest run, it took the probe vehicle approximately 8.0 minutes to travel from Arcola Ave to Randolph Rd (roughly .69 miles), at an average speed of 5.2 mph, and a delay of about 6.8 minutes more than the approximate 1.2 minutes that it would have taken to travel that distance at the speed limit of 35 mph.

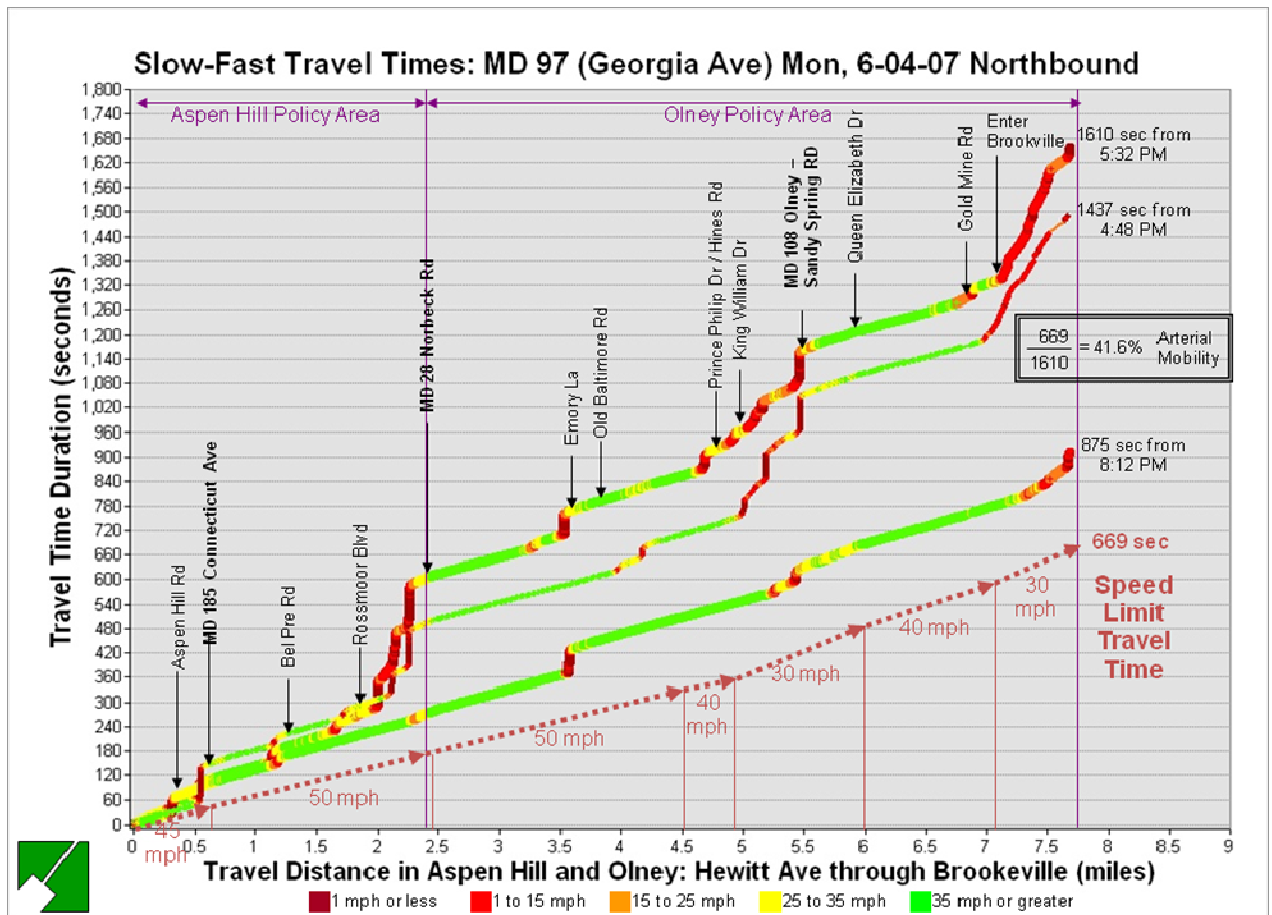
Figure 3.9: Travel Time-Distance Profile for Northbound Georgia Ave (MD 97)



Georgia Ave (MD 97) from Hewitt Ave through Brookeville:

Five northbound trajectory samples were collected in 2007 for this section of Georgia Ave (MD 97), three during the PM peak period and two during the evening time period. This section totals a distance of about 7.7 miles. The results of the three of the sampling trajectories are displayed graphically in Figure 3.10, which shows that the two peak samples began at about 4:48 pm and 5:32 pm respectively, while the off-peak sample began at about 8:12 pm. The slowest sample began at about 5:32 pm, which took 1,610 seconds (about 26.8 minutes) to travel the entire corridor at an average speed of about 17.2 mph, compared to the posted speed limits ranging from 30 to 50 mph. The fastest sample trajectory, which was recorded during the off-peak, took 875 seconds (about 14.6 minutes), at an average speed of about 31.6 mph. Both peak period samples, which were taken about 45 minutes apart, showed significant queues and delays that began at Norbeck Rd (MD 28) and extended back south of Rossmoor Blvd. In addition, both samples recorded traffic queues beginning at Olney-Sandy Spring Rd (MD 108), which extended as far south as Prince Phillip Dr/Hines Rd. Figure 3.10 also shows that significant queues and delays were recorded after Gold Mine Rd approaching the Town of Brookeville and extending through Brookeville.

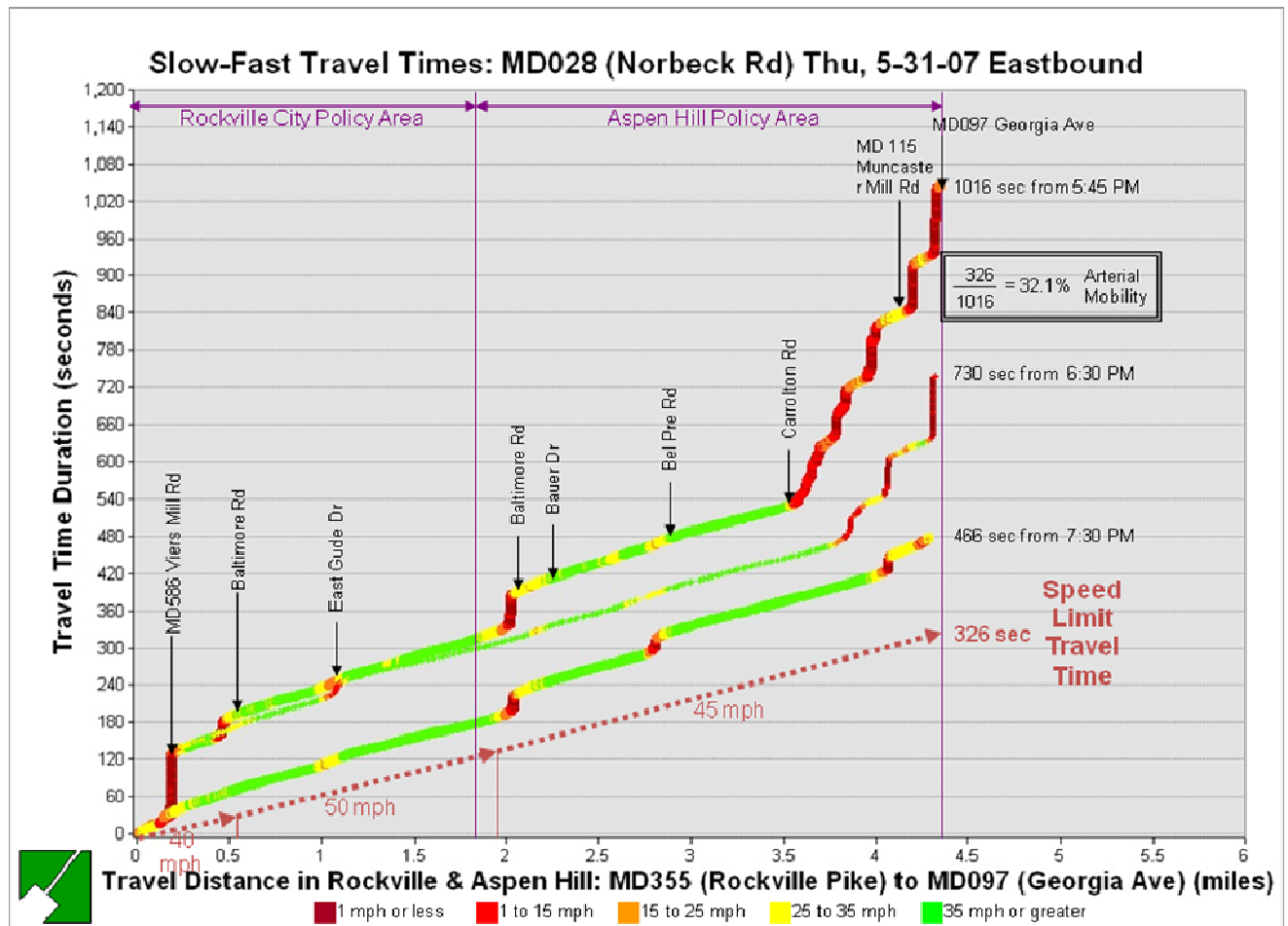
Figure 3.10: Travel Time-Distance Profile for Northbound Georgia Ave (MD 97)



Norbeck Rd (MD 28) from Rockville Pike (MD 355) to Georgia Ave (MD 97):

Three eastbound samples were collected for this section of Norbeck Rd (MD 28). A graphical display of the sampling results is provided in Figure 3.11. Two of the samples were collected during the peak period, which began at 5:45 pm and 6:30 pm, respectively. The third sample was collected during the off-peak beginning at 7:30 pm. The slowest of the three runs began at 5:45 pm and took 1,016 seconds (about 16.9 minutes) to travel the approximate 4.4-mile length of this roadway section, at an average speed of about 15.5 mph. The fastest run was conducted during the off-peak, which took 466 seconds (about 7.8 minutes) at an average speed of about 33.9 mph. Both of the runs conducted during the peak period recorded significant traffic queues, in which the slower one began at Georgia Ave extended as far west as Carrollton Rd (roughly a distance of about 0.81 miles). During the slowest run, it took the probe vehicle about 8.6 minutes to travel this congested segment at an average speed of about 5.7 mph, compared to the posted speed limit of 45 mph. That resulted in a delay of about 7.3 minutes more than the approximate 1.2 minutes of expected travel time it would have taken to travel that distance at the posted speed limit of 45 mph.

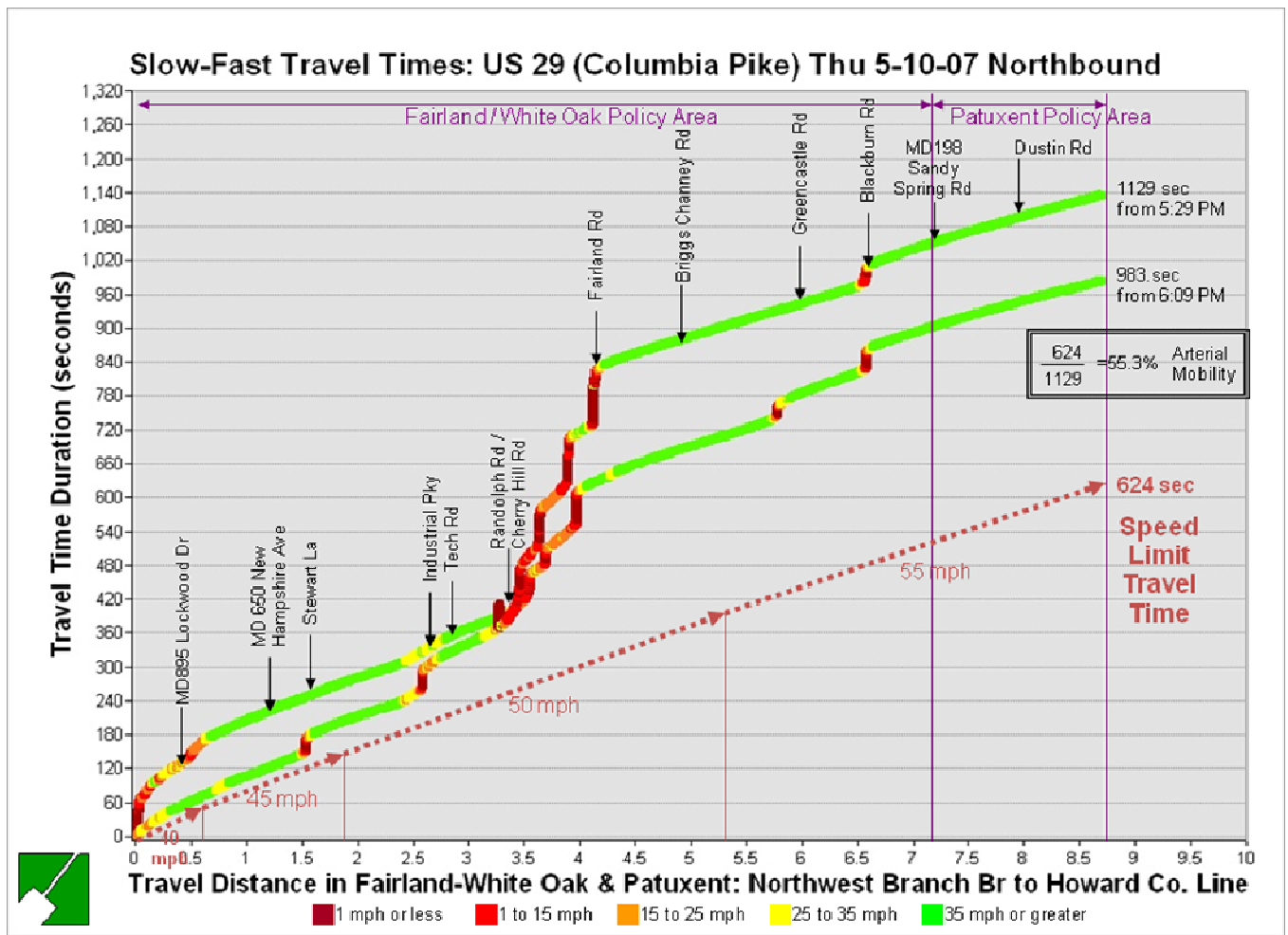
Figure 3.11: Travel Time-Distance Profile for Eastbound Norbeck Rd (MD 28)



Columbia Pike (US 29) from Northwest Branch to the Howard County Line:

Three northbound samples were conducted for this section of Columbia Pike (US 29) during the PM peak period. Results for two of the sampling trajectories are displayed graphically in Figure 3.12. The two samples shown started at about 5:29 pm and 6:09 pm, respectively. The slower of the two samples, which began at about 5:29 pm, took 1,129 seconds (about 18.8 minutes) to travel a distance of roughly 8.7 miles, at an average speed of about 27.8 mph, compared to the posted speed limits ranging from 40 to 55 mph. Both samples recorded significant queues and delays beginning at about Fairland Rd, which extended back south of Randolph Rd/Cherry Hill Rd, roughly a distance of about 1.05 miles. During the slower sample, it took the probe vehicle about 7.95 minutes to travel this congested segment at an average speed of about 7.9 mph. That resulted in a delay of about 6.7 minutes more than the approximate 1.25 minutes of expected travel time it would have taken to travel that distance at the posted speed limit of 50 mph.

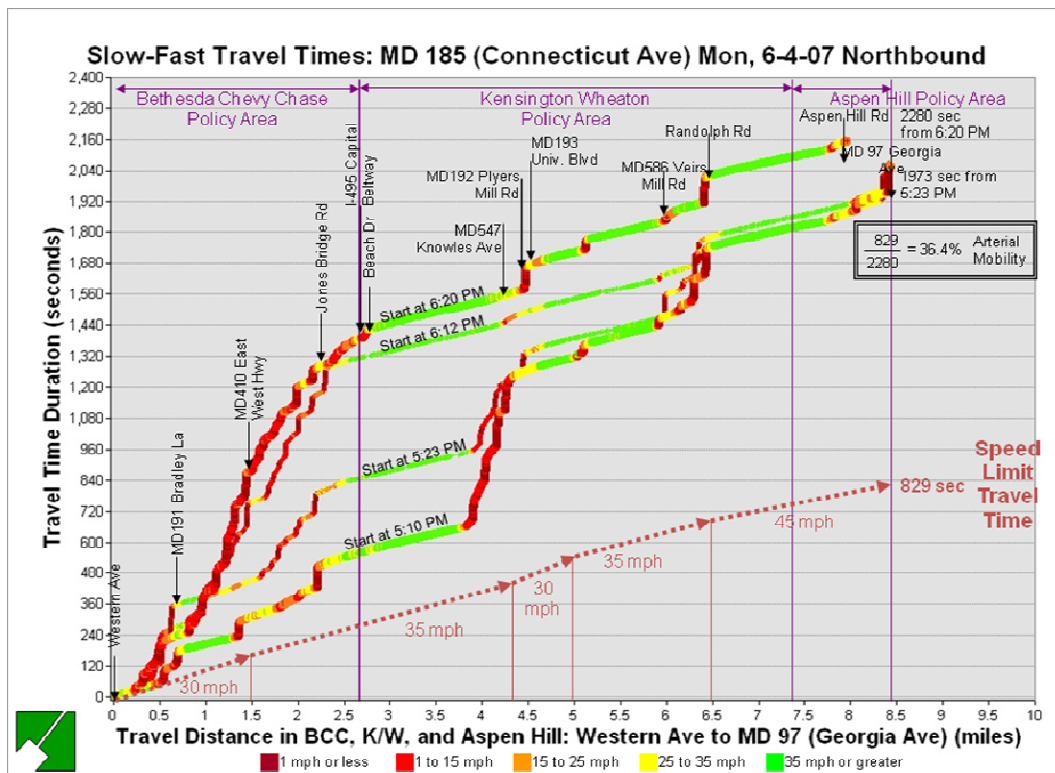
Figure 3.12: Travel Time-Distance Profile for Northbound Columbia Pike (US 29)



Connecticut Ave (MD 185) from Western Ave (D.C. Line) to Georgia Ave (MD 97):

Four samples were collected during the peak period for this 8.4-mile stretch of Connecticut Ave (MD 185). The samples began at about 5:10 pm, 5:23 pm, 6:12 pm, and 6:20 pm, respectively. The slowest of the four samples began at about 6:20 pm and took 2,280 seconds (about 38.0 minutes) to travel the corridor at an average speed of about 13.3 mph, compared to the posted speed limits ranging from 30 to 45 mph. The fastest of the four peak period samples that began at about 5:23 pm, took 1,973 seconds (about 32.9 minutes) at an average speed of about 15.3 mph. The last two samples observed significant traffic queues and delays, which began at the Capital Beltway and extended back almost as far as south as Bradley La (MD 191), roughly a distance of about 2.0 miles. During the slowest run, it took the probe vehicle about 19.6 minutes to travel this congested segment at an average speed of about 6.1 mph and a delay of about 16.0 minutes more than the expected 3.6 min expected travel time. The slower of the two earlier runs recorded a traffic queue of about 0.67 miles (average speed of 4.0 mph) beginning at University Blvd W (MD 193) and extending through Kensington to near Dresden St. Another significant queue, which began at Randolph Rd and extended back about 0.62 miles through Veirs Mill Rd, had a 5.2-minute duration and average speed of about 7.2 mph. Thus the location of the significant congestion tends to consistently vary by location and time within the peak period. With the earlier samples being more congested in Kensington and at Randolph Rd, while the later samples are more congested south of the Capital Beltway.

Figure 3.13: Travel Time-Distance Profile for Northbound Connecticut Ave (MD 185)



Current Arterial Mobility for Selected Policy Areas of the Annual Growth Policy:

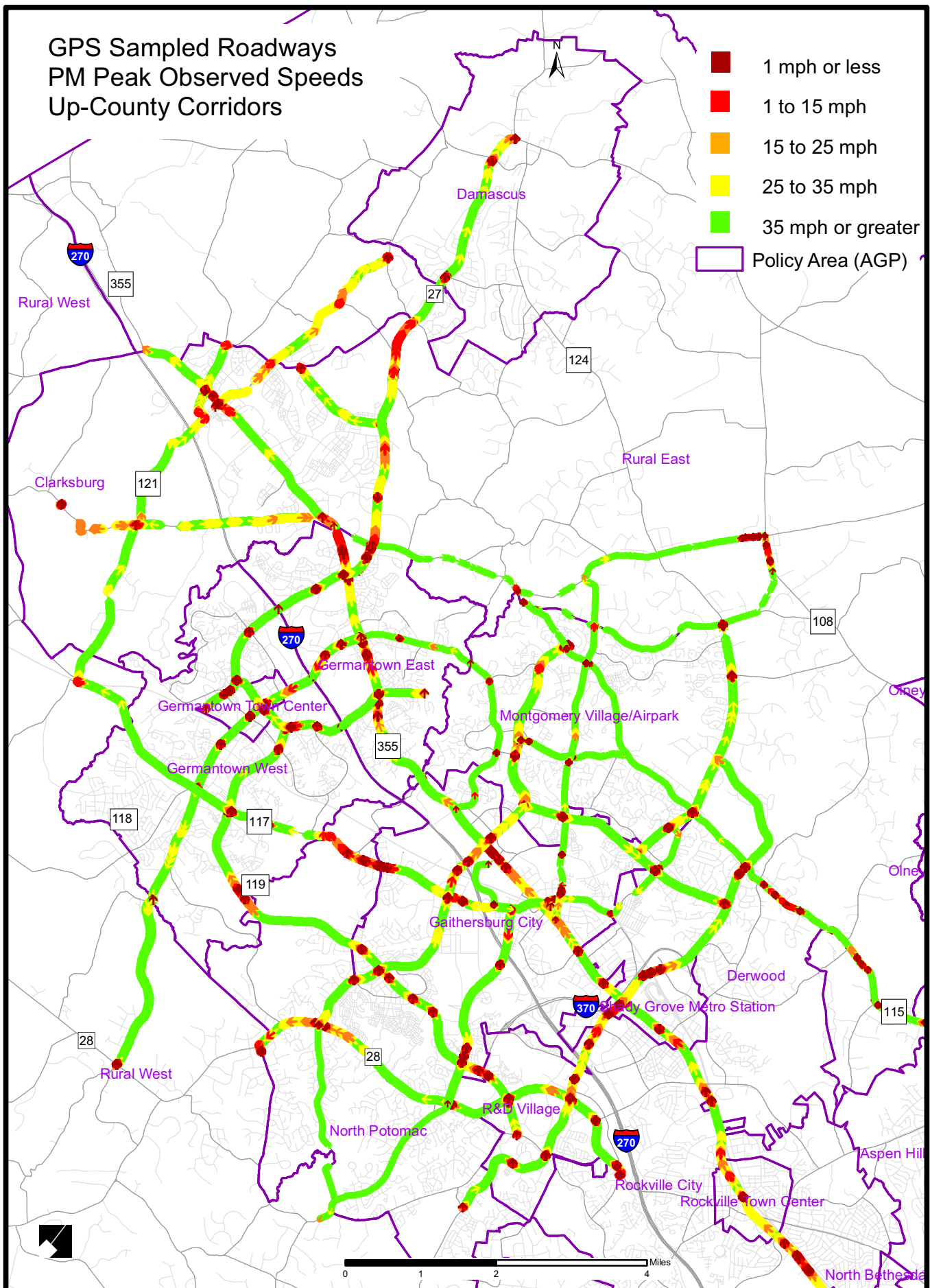
Each of the travel time versus distance profiles shown in the preceding section of this report contained some additional information. First, each of the roadway sections shown is located in one or more Policy Areas, as indicated by the Policy Area boundary labels in each of the figures. While most of the sampled sections are in one or two Policy Areas, the roadway section of Connecticut Ave (MD 185) shown in Figure 3.13 is located in three Policy Areas. Some other key corridors such as Great Seneca Highway (MD 119) are located in four Policy Areas. Secondly, each figure shows a value for the Speed Limit Travel Time, which is the theoretical amount of time the probe would take to travel that section if it traveled no slower or any faster than the speed limit, absent any stoppages at traffic signals. Thirdly, the calculations for a measure termed as “arterial mobility” is shown in each figure as being the percentage that the Speed Limit Travel Time is of the slowest of the observed travel times in the sampling.

Figure 3.14, shows the spatial coverage and spatial resolution of the 2007 samples associated with non-freeway roadways in the “Up-County” Policy Areas of: Clarksburg, Germantown East, Germantown West, Gaithersburg City, Montgomery Village/Airpark, and North Potomac. While the discussion of congested travel times and speeds in the preceding section focused on that observed along a selected set of roadways, in Figure 3.14 one can begin to discern area-wide patterns of congested traffic conditions associated with one or more Policy Areas based upon the location and general magnitudes of queue length and delay. For example, for arterial roadways that traverse the boundary between Gaithersburg City and Germantown West and East, such as Great Seneca Highway (MD 119), Clopper Road MD 117) and Frederick Rd (MD 355), each appear to have long queues that from a traffic flow standpoint are effectively near or are at that boundary. In essence, it appears that these arterial roadways collectively function as constricted gateways for the high traffic flow volumes that pass to and from adjacent Policy Areas. This observation is similar in concept to the gateway capacity constraints long associated in the AGP with setting of growth amounts within several down-county Metro Station Policy Areas, such as the Silver Spring CBD.

It is believed that further exploration of these ideas based upon additional information to be obtained from the already collected arterial travel time and speed data will better assist the Board, Council, and other interested parties in their understanding of how to set the particular Policy Area Mobility Review (PAMR) categories and/or amounts as part of the 2008 AGP work.

The next section of this report examines the general degree of consistency in findings between information about congestion based upon travel times and speed with that based upon the turning movements and traffic volumes as expressed in terms of CLVs.

Figure 3.14: Spatial Coverage of Sampled Roadways in the Up-County Policy Areas



Congested Corridors

By analyzing this year's CLV data samples against the GPS arterial travel time and speed survey results, staff has identified a group of congested corridors. A number of these locations have exhibited well-defined patterns of recurring congestion, some of which were identified in the 2006 Highway Mobility Report (HMR). However, it should be noted that some locations have recently become more congested, as indicated in some of the arterial travel time and speed data results. In most cases, a significant number of the intersections located along these corridors have CLVs that either exceed, or are close to exceeding their LATR standard. These intersections tend to be located along the major thoroughfares (e.g. State routes), which provide linkages to the various activity centers (including CBDs) of the County. In addition, these corridors tend to exhibit instances of spotty congestion and/or extremely elongated patterns of congestion, as indicated by lengthy travel times and reduced travel speeds and mobility. There are a number of projects that are either master-planned, or already in project planning, which should help to improve mobility in these areas. Based on this year's analysis, the following routes and corridors are experiencing significant levels of congestion:

- **Rockville Pike (MD 355)** from the Bethesda CBD to West Cedar La, where the Cedar La / W Cedar La intersection has a CLV that exceeds its LATR standard. The Rockville Pike/West Cedar La intersection is the 5th most congested intersection in the County with a CLV of 1996. In addition, the GPS travel samples indicated that it takes up to 8.5 minutes to travel from Battery La to W Cedar La (roughly one mile), at an average speed of 7.1 mph (compared to the posted speed limits ranging from 25 to 35 mph). The West Cedar La intersection ranks among the 10 most congested intersections in the County for the fourth consecutive reporting year. The master-planned grade-separated interchange for this location was recommended by the County Executive and County Council, for addition to the State's Development & Evaluation (D&E) program in the fall of 2005. In addition, a number of the intersections located along this corridor are currently being analyzed under the Base Realignment and Closures (BRAC) Study.
- **Frederick Rd (MD 355)** from Chestnut St / Walker Ave to Montgomery Village Ave (MD 124) in Gaithersburg, and from Middlebrook Rd to Brink Rd in Germantown East where four intersections (Montgomery Village Ave (MD 124), Christopher St, Darnestown-Germantown Rd (MD 118), Ridge Rd (MD 27)/Father Hurley Blvd) all have CLVs that exceed their respective LATR standard. The GPS travel samples indicated that it takes up to 6 minutes to travel from Walker Ave to Montgomery Village Ave (roughly one mile), at a speed of an average speed of 8 mph (compared to the posted speed of 30 mph). In addition, the samples indicated that it takes up to 10 minutes to travel from Middlebrook Rd to Brink Rd (roughly 2.3 miles), at a speed of an average speed of 13.8 mph (compared to the posted speeds ranging from 45 to 50 mph). A grade-separated interchange for the Ridge Rd (MD 27)/Father Hurley Blvd

intersection has been recommended in the area master plan. This corridor may be a candidate for Bus Rapid Transit (BRT) treatments.

- **Frederick Rd (MD 355)** in the vicinity of the Clarksburg Town Center where the Clarksburg Rd (MD 121) currently has a CLV, which exceeds its LATR standard. In addition, the GPS travel samples indicated that it takes drivers up to 5 minutes to travel from Shawnee La to Clarksburg Rd (a distance of about .90 miles), at an average speed of 10.8 mph. This area should continue to be monitored with a high level of scrutiny, as there is a significant amount of new development has been approved for this area that has yet to be built. There is also a significant amount of planned transportation infrastructure for this area, both developer-funded (such as the extension of Snowden Farm Parkway to Ridge Road) and through public funding sources (such as the extension of Observation Drive). However, travel conditions will most likely worsen until those facilities are actually constructed. In addition, the Midcounty Corridor Study, which focuses on improving mobility for the corridor east of I-270, is currently in phase I facility planning.
- **Colesville Road / Columbia Pike (US 29)** from Stewart La/Milestone Dr to Fairland Rd where two intersections (Stewart La/Milestone Dr, Fairland Rd) have CLVs that exceed their respective LATR standards. In addition, the GPS travel samples indicated that it takes up to 10 minutes to travel from Industrial Pkwy to Fairland Rd (a distance of about 1.5 miles), at an average speed of about 9 mph (compared to the posted speed limit of 50 mph). Construction of the new grade-separated interchange at Briggs Chaney Rd was completed in late 2007. Four additional grade-separated interchanges (Blackburn Rd, Fairland Rd / Musgrove Rd, Greencastle Rd, Stewart La, Tech Rd) are either master-planned or in project planning. However, in accordance with the Council Master Plan guidance, SHA is conducting a monitoring program in the vicinity of and downstream from the new interchanges before additional interchanges are funded for construction. The development of planned interchanges along US 29 has reserved the opportunity for future Bus Rapid Transit (BRT) priority treatments.
- **Georgia Avenue (MD 97)** from the Silver Spring CBD to the Capital Beltway (I-495) and from Veirs Mill Rd (MD 586) to Randolph Rd, where two intersections (Columbia Blvd / Seminary La, Randolph Rd) have CLVs exceeding their LATR standard. The Randolph Rd intersection is ranked the 2nd most congested intersection in the County with a CLV of 2069. The GPS travel samples indicated that it takes up to 11 minutes to travel from Spring St to I-495 (roughly 1.1 miles), at an average speed of 6.0 mph (compared to the posted speed of 30 mph). In addition, the samples indicated that it takes up to 13 minutes to travel from Veirs Mill Rd to Randolph Rd (roughly 1.6 miles), at an average speed of 7.4 mph (compared to the posted speed of 35 mph). A new grade-separated interchange for the Randolph Rd intersection is currently funded for construction.

- **Georgia Avenue (MD 97)** from Connecticut Ave (MD 185) to Olney-Sandy Spring Rd (MD 108), where four intersections (Connecticut Ave, Bel Pre Rd, Norbeck Rd (MD 28), Old Baltimore Rd) each have CLVs that exceed their LATR standard. In addition, the GPS travel samples indicated that it takes up to about 17 minutes to travel from Connecticut Ave to Olney-Sandy Spring Rd (roughly 4.9 miles), at an average speed of 17.3 mph (compared to the posted speeds ranging from 30 to 50 mph). An intersection capacity improvement is currently in project planning for the Norbeck Rd intersection. In addition, a grade-separated interchange has been recommended for this intersection in the master plan. Capacity improvements have also been recommended in the master plan for the Bel Pre Rd and Emory La intersections. The County Executive and County Council have indicated that the Georgia Avenue Busway is a priority for future study in the state's CTP.
- **Norbeck Rd/First St (MD 28)** from Veirs Mill Rd (MD 586) to Georgia Ave (MD 97), where seven intersections (Veirs Mill Rd, Baltimore Rd (at First St), Avery Rd, Baltimore Rd, Bel Pre Rd, Muncaster Mill Rd, Georgia Ave) each have CLVs that exceed their LATR standard. The Bel Pre Rd and Avery Rd intersections are ranked the 8th and 10th most congested intersections in the County with CLVs of 1834 and 1815, respectively. The GPS travel samples indicated that it takes up to 18 minutes to travel from MD 355 (in the City of Rockville) to Georgia Ave (roughly 4.9 miles), at an average speed of 16.3 mph (compared to the posted speeds ranging from 40 to 50 mph). An intersection capacity improvement is currently in project planning for the Georgia Ave intersection. In addition, intersection capacity improvement options for the Norbeck Rd/First St / Veirs Mill Rd intersection are currently in the design phase. This corridor is expected to see some reduction in its PM peak traffic volumes with the completion of the ICC, as indicated by the year 2012 PAMR analysis results.
- **Connecticut Ave (MD 185)** from Western Ave (DC Line) to the Capital Beltway (I-495) where two intersections (East-West Hwy (MD 410) and Jones Bridge Rd) have CLVs exceeding their LATR standard. The East-West Hwy intersection is ranked the 9th most congested intersection in the County with a CLV of 1831. In addition, the GPS travel samples indicated that it takes up to 20 minutes to travel from Bradley La (MD 191) to the Capital Beltway (a distance of 2 miles), at an average speed of 6.1 mph. The Jones Bridge Rd intersection is currently being analyzed under the Base Realignment and Closures (BRAC) Study.