April 2014

Staff Draft

mobility assessment report

montgomery county planning department
M-NCPPC ▪ MontgomeryPlanning.org

mobility assessment report

Abstract
This report documents how well the County is meeting its goals for mobility of cars, cyclists, pedestrians, and transit, by measuring and analyzing historical, current, and future traffic congestion data and trends.

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Prepared by the Montgomery County Planning Department
April 2014

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Introduction

Travel is a lifestyle decision that influences our investment of time and money. Montgomery County is centrally located in the region's federal and advanced technology marketplace, with 32,300 businesses employing over 361,000 workers in the tech and federal sectors. The County's population has steadily increased from 833,363 in 2000 to just over 1 million in 2012. The County is also home to an active agricultural reserve that contributes to the economy. The continuing rise of population, jobs, and housing contributes to increased travel and makes travel monitoring efforts important to gain a better understanding of travel trends. To stay competitive, the County needs to offer travel choices, making mobility affordable and accessible to all.

The County's extensive road network serves a development pattern reflecting a history of suburban growth. However, recent land use planning efforts have shifted away from auto-oriented development. Beginning with the down-County Central Business Districts (CBDs), plans have focused development around Metrorail and selected planned Purple Line stations. This has created thriving downtowns in Bethesda and Silver Spring and will transform areas such as White Flint and Wheaton.

Transit-oriented development is not only a County initiative, but is a key element of Maryland's Sustainable Growth Plan, which recognizes the potential of high transit served areas to offer residents and employees commuting options. To extend these options beyond Metrorail station areas, WMATA's Metrobus and the County's Ride On systems serve suburban neighborhoods in the County.

The Planning Department continues to promote multi-modal travel options. A series of Purple Line master plans recommend land uses and densities that will make best use of transit while supporting the local communities. The recently adopted *Countywide Transit Corridors Functional Master Plan* recommends a network for bus rapid transit across the County. Continuing to build on its success in the District of Columbia, Capital Bikeshare has debuted as a major step toward safe and sustainable biking in the County.

The performance of all of these modes needs to be measured and monitored in order to achieve maximum return on public investment and understand how best to plan land use and transportation systems to serve Montgomery County.

In this report, staff continues to evaluate and monitor the performance of the County's road system, expanding the use of observed travel time speed data to include MD 27, MD 28, MD 97, MD 117, MD 118, MD 185, MD 193, MD 198, MD 355, MD 390, MD 586, US 29, and US 650. The ongoing analysis of this data set will provide a basis to support a congestion trend comparison, over time, of all major travel corridors throughout the County.

This report continues to monitor all modes of transportation in the County: transit, bike, pedestrian, and roadway travel conditions. These monitoring and planning efforts are consistent with the County's commitment to increasing transportation options. Combined with land use decisions, these transportation options can ensure that Montgomery County is a thriving place that serves all communities and generations.

The Planning Department has used INRIX travel-time tracking as a traffic monitoring resource over the past two years, with the first results incorporated into the 2011 Mobility Assessment Report. At that time, the monitoring effort was limited by available datasets. Since then, data for many more roadways has become available. This report uses an expanded data set with the goal of enabling a year-to-year comparison of all major roads in the County.

The Department's transportation monitoring efforts will improve mobility analyses in the future with the increased availability of non-auto travel data and advanced technology applications.

HIGHLIGHTS

While this report analyzes congestion conditions on many more major roadways than the 2011 Mobility Assessment Report, it finds that the roadway travel conditions findings of the two reports are generally comparable. This report maintains the original ranking system for intersection Critical Lane Volumes (CLVs), as well as the system of ranking intersections by the ratio of CLV relative to the applicable policy area congestion standard. The 2012 Local Area Transportation Review/ Transportation Policy Area Review (LATR/TPAR) Guidelines now require development proposals to include bicycle and pedestrian count data in addition to vehicular counts. As a result, pedestrian and bike volumes collected during the past year have increased considerably.

This report identifies the following key findings.

Total Vehicle Miles Traveled

- Nationwide, travel has been increasing, but local travel has been stabilizing. The Federal Highway Administration's National Vehicle Miles of Travel (VMT) Trend Data indicate an increase from 2011 to 2012 of less than one percent. The stabilization of the overall vehicle miles in the County and the State reflects a slowly recovering economy between 2011 and 2013.

Intersections

- Approximately 11% of the County's signalized intersections represented in the database exceed policy area LATR CLV standards as established in the County's Subdivision Staging Policy. This reflects an overall improvement relative to the findings of the 2011 Mobility Assessment Report which reported that 17 percent of sampled intersections exceeded the applicable policy area congestion standard. Since 2005, this is the lowest percentage of intersections which exceed policy area congestion standards.

Roadways

- Intercounty Connector (MD 200) vehicle traffic volumes continue to grow at a steady rate of 3% per month.
- MD 200 has provided a travel time savings of 25% compared to travelling along parallel local arterials.
- Of the 120 arterial roadway segments analyzed, seven operate under "severe" congestion levels reflecting a Travel Time Index (TTI) ranging from 87 to 119 percent of congested travel speed relative to free flow travel speed. MD 355 Southbound in the Shady Grove Metro Station policy area had the worst level of travel time congestion, with a TTI ranging between 95 to 119 percent during morning and evening peaks as well as during the midday.

Congestion % Color Scale

Uncongested - Light	0%-20%
Light - Moderate	21%-40%
Moderate - Heavy	41%-60%
Heavy - Severe	61%-80%
Severe	80%+

The Travel Time Index is the ratio of the reported speed divided by uncongested free-flow speed. The result is a percentage that can be measured along a range-scale that indicates the severity of congestion. The range of congestion severity begins with an uncongested to light congestion, with 0 to 20 percent, a light to moderate congestion with 21 to 40 percent, a moderate to heavy congestion with 41 to 60 percent, a heavy to severe congestion with 61 to 80 percent, and a severe congestion with a percentage greater than 80 percent. This color classification scheme is modeled after State Highway Adminstration and Metropolitan Washington Council of Governments.

Pedestrians and Bicyclists

- Capital Bikeshare is newly established in the County with docks installed or planned near Metrorail stations in CBD locations: Friendship Heights, Bethesda, and Silver Spring, as well as locations in Takoma Park and the Shady Grove/Life Sciences Center.
- The Planning Department will contract out multi-modal traffic counting at selected locations in the County to build a solid bicycle and pedestrian database. There has been an increase in the collection of observed pedestrian data and bicycle data based as a result of new traffic impact study data collection requirements. However, the sparse coverage of this data limits the ability to perform an analysis of local trends.

Ride On

- In FY13, average weekday ridership on Ride On routes reached 88,370, a slight increase from the 87,990 riders in FY12. Ridership has decreased from the 95,000 average weekday boardings in FY08 due to service reductions of about five percent during the past two years.

Metrobus

- WMATA's average daily bus ridership in the County in FY13 was 57,631, a decrease from 63,254 in FY12.

Metrorail

- Average weekday ridership in the County is highest at the Silver Spring, Shady Grove, Bethesda, and Friendship Heights stations. These Metrorail stations consistently have the highest ridership in the County.

Travel Trends

National, State and Local Vehicle Miles Traveled

Trend data collected by the Federal Highway Administration in 2013 indicated a slight increase nationally in vehicle miles traveled from 2011 to 2013, but an overall stabilization in the County.

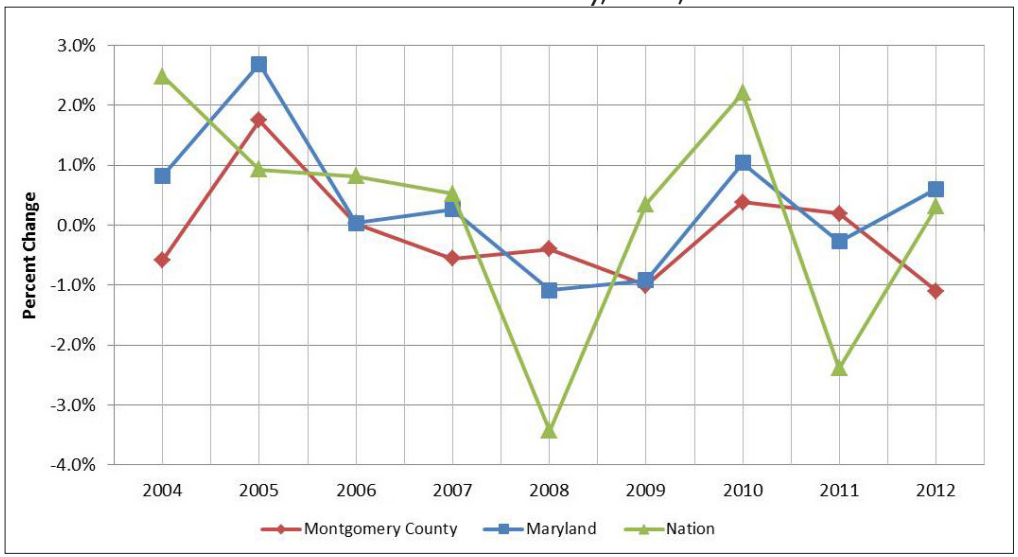
Intercounty Connector (MD 200) Effects on Local Roads

The Intercounty Connector (ICC,MD 200) opened in November 2011 as the first all-electronic toll road in Maryland. This roadway is a major east-west connection between the I-270 and I-95 corridors and improves access to the Baltimore-Washington Thurgood Marshall International Airport. A final phase will extend the ICC from I-95 to US 1.

The 2013 Maryland State Highway Mobility Report found that in 2012, the ICC served up to 30,000 vehicles on an average weekday, during its first year of operation. Traffic on MD 200 continues to grow steadily at a rate of 3 percent per month. Motorists on this route have cut their travel times in half when compared to travel on local commuter routes such as MD 198, MD 28, MD 108, and MD 115. It was also found that motorists who are travelling on east-west arterial routes in the mid-County area are experiencing travel time savings up to 11 percent during the three-year study period.

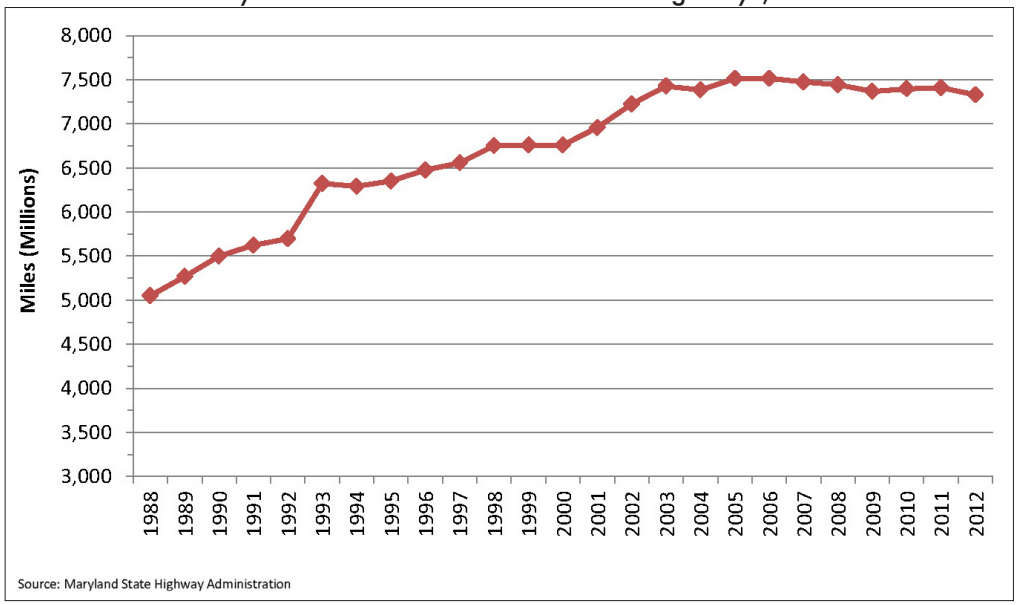
In Spring 2010, The National Capital Region Transportation Planning Board and Metropolitan Washington Council of Governments began a three-year study to examine congestion levels on local roadways before and after the completion of the ICC. The study examined the following routes parallel to the ICC, and found that all experienced improved travel time savings and reduced congestion since the opening of this facility.

Illustration 1: Annual Total Miles Traveled County, State, Nationwide



Since 2013, national VMT has increased by 0.3

Illustration 2 County Vehicle Miles Traveled on State Highways, 1988-2012



VMT in Montgomery County in 2012 was 7.3 million miles, the lowest level since 2002 (7.2 million)

- Corridor 1: Between South Gaithersburg and Laurel: MD 28, to Bel Pre Road, to Bonifant Road, to Good Hope Road, to Briggs Chaney Road, the travel time savings via MD 200 was 23 minutes, which represents a 58 percent decrease in travel time during peak hour conditions in 2012.
- Corridor 2: Between Rockville and Calverton: Montrose Road, to Randolph Road, to Cherry Hill Road, to MD 212 (Beltsville Road), the travel time savings via MD 200 was 25 minutes, which represents a 60 percent decrease in travel time during peak hour conditions in 2012.
- Corridor 3:Between South Rockville and Beltsville: Shady Grove Road at Crabbs Branch Way, to MD 115, to MD 28, to MD 198, to US 1, the travel time savings via MD 200 was 21 minutes, which represents a 55 percent decrease in travel time during peak hour conditions in 2012.

The Maryland Transportation Authority (MDTA) found that a trip between I-370 and I-95 on the ICC saves up to 25 minutes per weekday trip compared to driving on local routes. The MDTA also found that observed average week day traffic volumes on the ICC approached 40,000 vehicles in September 2013. According to MDTA, ICC traffic is slightly lower than projected at the eastern end in the vicinity of the I-95 corridor, and is significantly higher than projected at the western end in the vicinity of the I-270 corridor.

During the study period, there were no decreases in congestion along the Beltway between I-95 and New Hampshire Ave interchange due to on-going construction work. There was a slight decrease in congestion and in travel times between Connecticut Ave and Wisconsin Ave as one traveled away from the construction zone.

The ICC is not meant to alleviate congestion on the Capital Beltway. According to Maryland SHA, MD 200 is intended to: (1) increase community mobility and safety; (2) facilitate the movement of goods and people to and from economic centers; (3) provide cost effective transportation infrastructure to serve existing and future development patterns reflecting local land use planning objectives; (4) help restore the natural, human, and cultural environments from past development impacts in the project area; and (5) advance homeland security.

To assess whether or not local arterial roadway congestion has been alleviated, the Planning Department sampled CLV levels at selected intersections in the vicinity of the ICC before and after the opening of this roadway to traffic operations in November 2011. The intersections sampled were located along New Hampshire Avenue, Norbeck Road, Layhill Road, Georgia Avenue and Bonifant Road. At the nine intersections sampled, critical lane volumes have dropped by 10 percent relative to pre-ICC conditions. The CLVs observed before the opening of the ICC were sampled during the period 2008 to 2011. The CLVs observed after the opening of the ICC were sampled in 2012. The three intersections with the greatest CLV decrease are New Hampshire Avenue at Norbeck Road, Norbeck Road at Layhill Road, and New Hampshire Avenue at Randolph Road — ranging from a 17 to 14 percent drop in CLV between 2008 and 2012.

Table 1: Critical Lane Volumes (Pre ICC) 2008-2011

Selected Intersections	Current Countdate	CLV (Pre-ICC)	CLV (Post-ICC)	% Change
New Hampshire Ave at Norbeck Rd	5/8/2012	1053	875	-16.9%
Norbeck Rd at Layhill Rd	5/1/2012	941	797	-15.3%
New Hampshire Ave at Randolph Rd	5/15/2012	1834	1580	-13.8%
Georgia Ave at Bel Pre Rd	10/1/2012	1530	1326	-13.3%
Norbeck Rd at Wintergate Dr	2/2/2012	1200	1050	-12.5%
Norbeck Rd at Bel Pre Rd	2/14/2012	1464	1330	-9.2%
Georgia Ave at Norbeck Rd	9/11/2012	1816	1656	-8.8%
New Hampshire Ave at Bonifant Rd	2/16/2012	1237	1166	-5.7%
Columbia Pk at Fairland Rd	10/11/2012	1636	1678	2.6%
Average Percent Change				**-10.3**

Table 2: Change in Travel Time Before and After MD 200

Travel Time (Minutes) Via Corridors 1-3

Origin-Destination Pairs	Before	After	Savings	Travel Time Savings Via MD 200 (Min)
Corridor 1 (S. Gaitherburg to Laurel)	45	40	5 (11%)	23 (58%)
Corridor 2 (Rockville to Calverton)	44	42	2 (5%)	25 (60%)
Corridor 3 (S. Rockville to Beltsville)	40	38	2 (5%)	21 (55%)

Congested Intersections

To determine the County's most congested intersections, vehicle traffic count data are gathered at intersections to measure critical lane volumes (CLVs). To determine the County's most congested travel corridors, observed travel time data are collected along these routes and analyzed.

CLVs and observed vehicle traffic count data are included in the Department's intersection database that covers 627 of the County's signalized intersections.

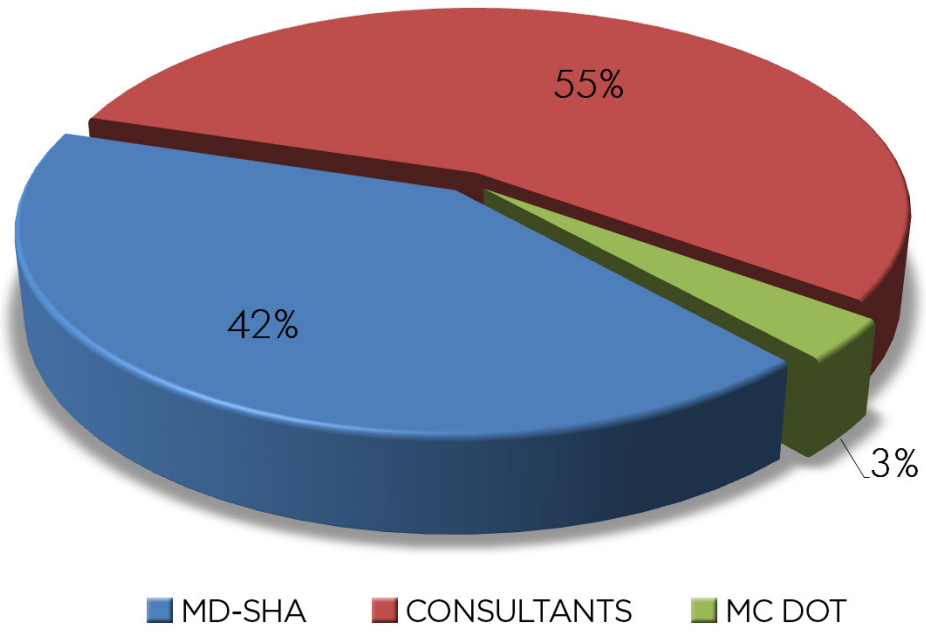
This report ranks the 627 signalized intersections in the database in two ways:

1. Based on the CLV only.
2. Based on the degree to which the observed CLV at these locations exceeds the applicable CLV policy area congestion standard.

CLV provides a snapshot of intersection performance at a particular time and place. This measure, consistent with previous mobility reports, allows comparison with previous years. The discussion of the CLV-based congestion analysis follows immediately below.

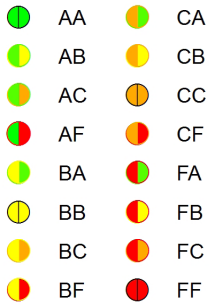
Even though the data sources are relatively constant, each year the ranking changes as new information derived from development and transportation projects becomes available. Most of these data (55 percent) comes from traffic engineering firms submitting studies for development projects. The Maryland State Highway Administration is the other significant source as well (41 percent). In addition, some data come from traffic counts prepared for master plans. See the Appendix for the full list of intersections and their associated critical lane volume information.

Illustration 3: Intersection Counts Breakdown by Source



As in past years, this report measured intersection performance during either the morning or evening peak periods, defined as 6:30-9:30 a.m. and 4:00-7:00 p.m.

Each CLV is divided by the relevant policy area congestion standard resulting in a volume to capacity ratio. Each ratio is given a level of service.



Map 1: Ten Most Congested Intersections

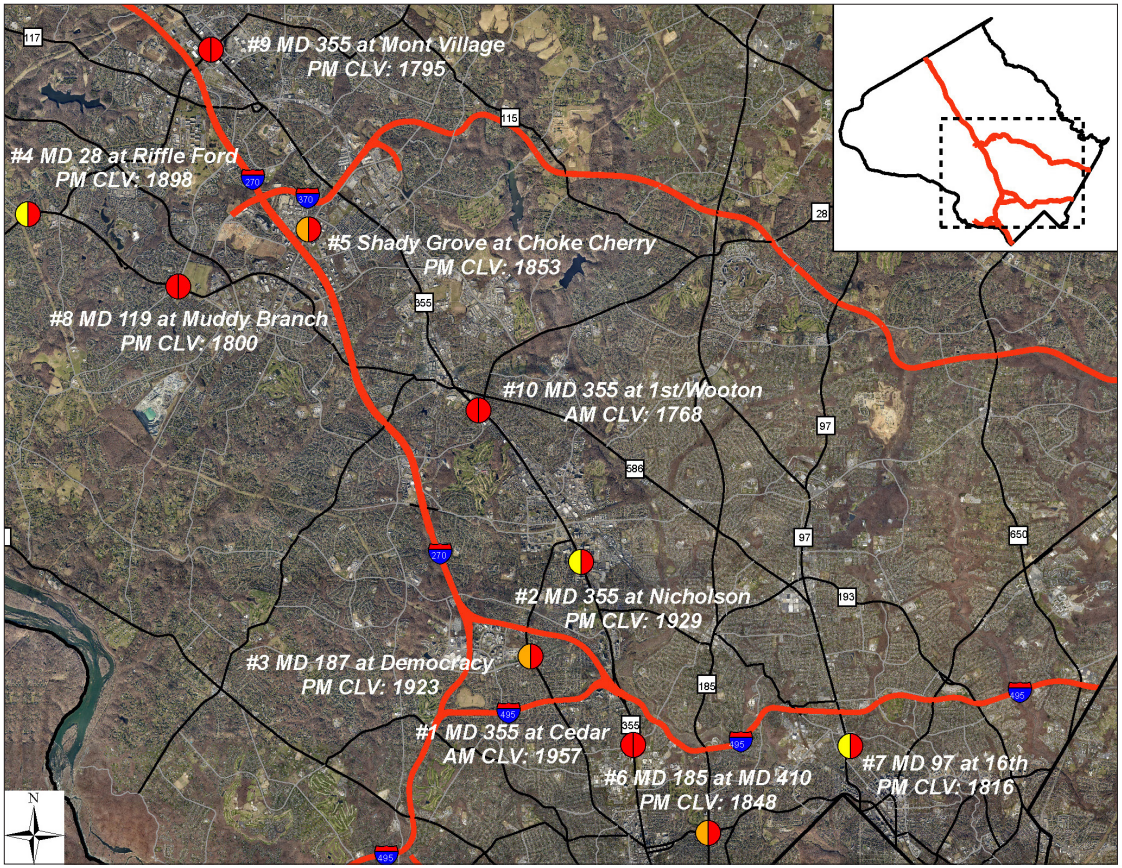


Table 3: Peak Level of Service (AM/PM)

Ranking	Name	Countdate	AM CLV	PM CLV	Policy Area	Congestion Standard	Highest CLV	V/C Ratio	Peak Level of Service
1	Rockville Pike at W Cedar Ln	11/6/2013	1957	1612	Bethesda - Chevy Chase	1600	1957	1.22	FF
2	Rockville Pike at Nicholson Ln	5/19/2011	1234	1929	White Flint	1800	1929	1.07	BF
3	Old Georgetown Rd at Democracy Blvd	6/9/2009	1423	1923	North Bethesda	1550	1923	1.24	BC
4	Darnestown Rd at Riffle Ford Rd	3/12/2009	1061	1898	North Potomac	1450	1898	1.31	BF
5	Shady Grove Rd at Choke Cherry Ln	5/19/2010	1363	1853	Rockville City	1500	1853	1.23	CF
6	Connecticut Ave at East West Hwy	11/6/2013	1684	1848	Bethesda - Chevy Chase	1600	1848	1.03	CF
7	Georgia Ave at 16th St	6/15/2011	1122	1816	Silver Spring - Takoma Park	1600	1816	1.14	BF
8	Great Seneca Hwy at Muddy Branch Rd	1/4/2011	1464	1800	Gaithersburg City	1425	1800	1.26	FF
9	Frederick Rd at Montogomery VIllage Ave	4/25/2012	1536	1795	Gaithersburg City	1425	1795	1.26	FF
10	Rockville Pike at First St/Wooton Pkwy	5/24/2011	1768	1610	Rockville City	1500	1768	1.18	FF

MOST CONGESTED INTERSECTIONS BY CLV (aerial photos do not reflect congested conditions)

The depiction of typical intersection performance is nearly impossible, since traffic conditions vary from day-to-day based on weather, vehicle incidents, economic conditions, and construction that all directly impact traffic flow. Traffic counts at a particular location observed at different points in time may yield higher or lower CLV results than previously reported because of these variable conditions.

One consistent way to show comparative performance at a given intersection is using the CLV measure. One limitation on ranking intersection performance using this measure is that traffic counts at each intersection in the database are not updated every year due to the large number of intersections. As a result, some of intersections with highly ranked CLV's use observed traffic counts collected during previous years. Given this limitation, the following 10 intersections are ranked as the most congested.

Illustration 4

Intersection 1
Rockville Pike at West Cedar Ln

In previous reports in 2011 and 2009, this intersection has been ranked 4th and 2nd, respectively. There are at-grade intersection improvements that are currently under construction to help improve traffic flow at this location.

Morning CLV: 1957

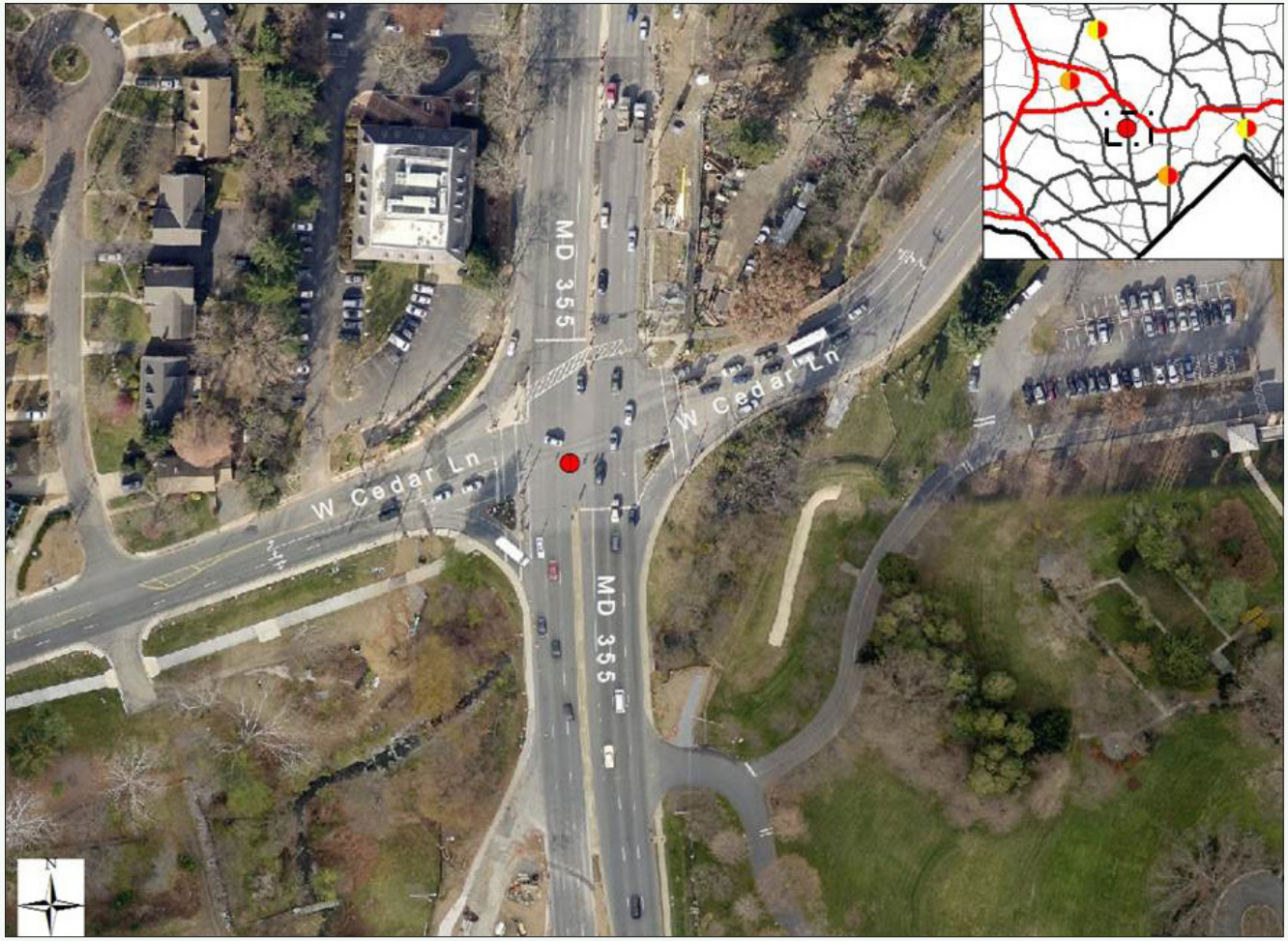


Illustration 5

Intersection 2 Rockville Pike at Nicholson Ln

The White Flint Sector Plan, calls for public transportation additions and improvements to bus, Metrorail, and MARC service to accommodate the area's planned increase in population and commercial development.

Evening CLV: 1929

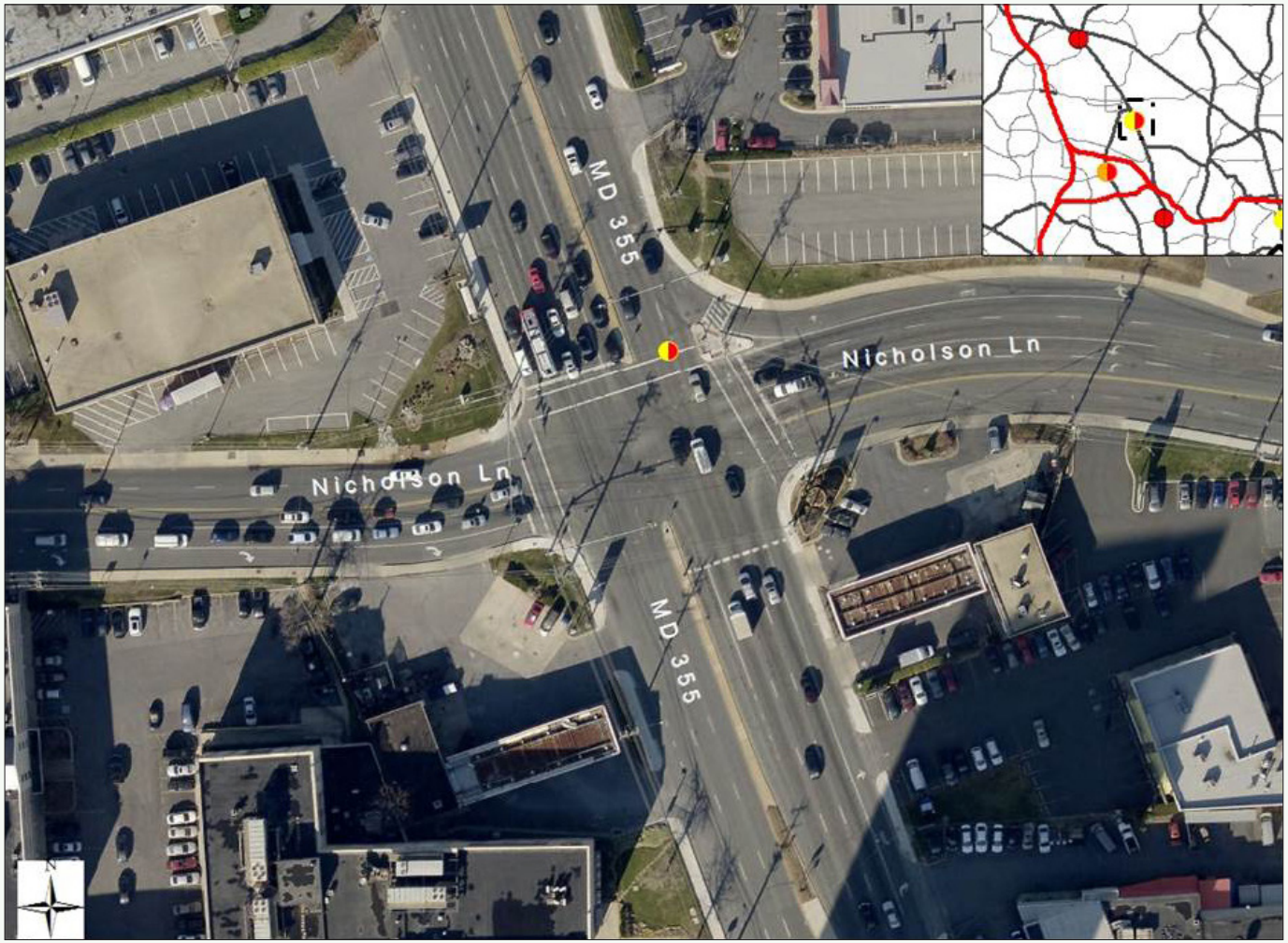


Illustration 6

Intersection 3	Old Georgetown Rd at Democracy Blvd

This intersection drops from number 1 in the 2011 report to number 3 in this report. The Countywide Transit Corridors Functional Master Plan incorporates a transit corridor parallel to Democracy Blvd and along Democracy Blvd.

Evening CLV: 1923

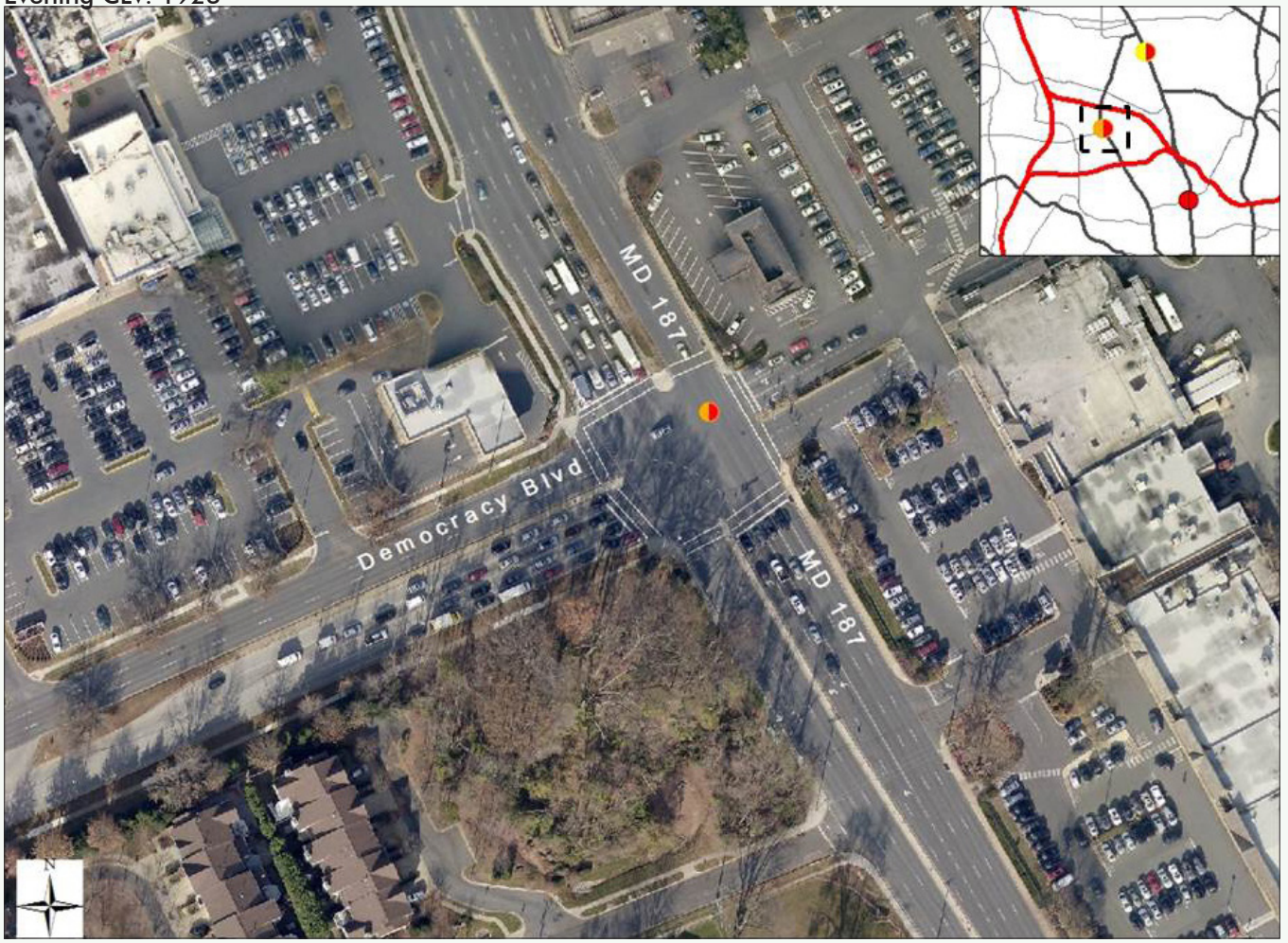


Illustration 7

Intersection 4	Darnestown Rd at Riffle Ford Rd

Based on available 2009 data, this intersection's CLV makes it the third most congested in the County. The westbound through movement on Darnestown Road appears to be the source of the evening congestion. This intersection is also the terminus of SHA's widening of MD 28 that was constructed several years ago. An eastbound lane was added to MD 28 as a part of the project. From Darnestown Road, through movements share a lane with right turns onto Riffle Ford Road and as a result, traffic volume builds up. By comparison, the eastbound leg has a separate through lane and a shared through lane, which support through movements during the morning peak. There are no other planned improvements at this intersection at this time.

Evening CLV: 1898

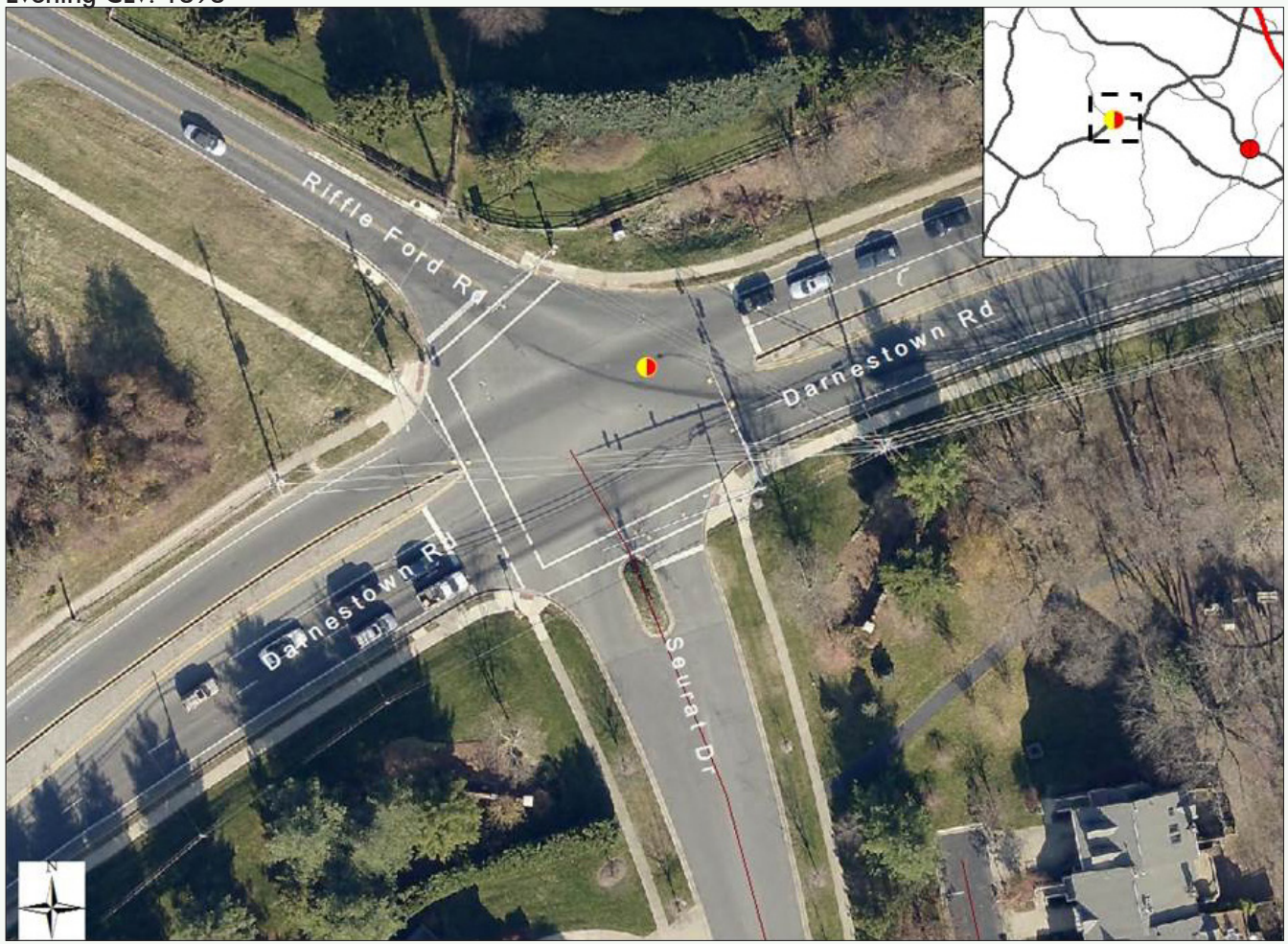


Illustration 8

Intersection 5 Shady Grove Rd at Choke Cherry Ln

This intersection was ranked number 3 in the 2011 report, and drops to number 5 in this report. The existing CLV is based on observed traffic count data from 2011 and has to not been updated to reflect more recent turning movement counts. This intersection is one in a series of congested intersections along Shady Grove Road in the vicinity of Mid-county Highway. There are no other planned improvements at this intersection at this time.

Evening CLV: 1853

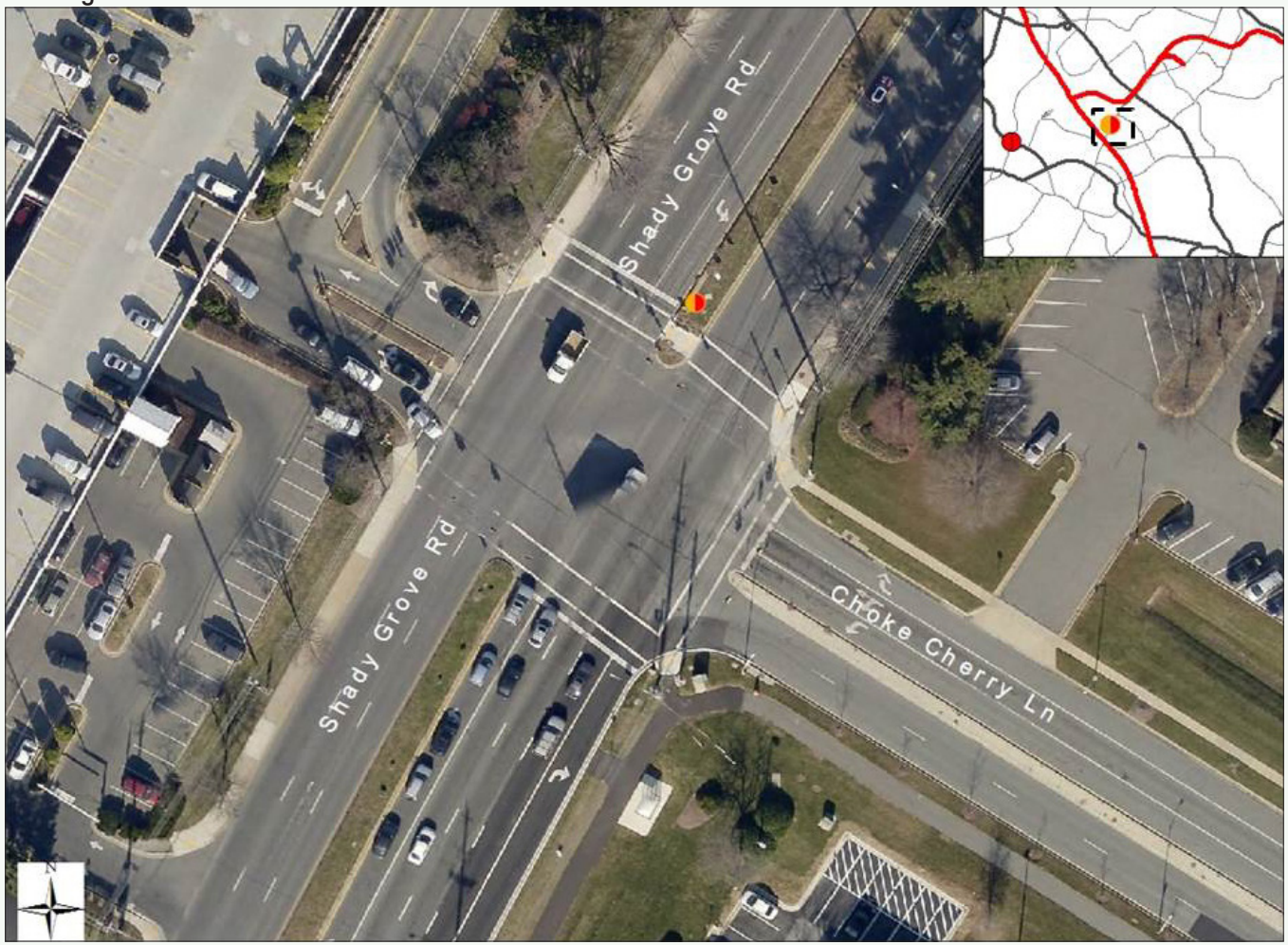


Illustration 9

Intersection 6 Connecticut Ave at East – West Highway

As noted in previous Mobility Assessment Reports, traffic congestion at this intersection is getting worse. In the 2011 report, this location was ranked the 15th most congested; today it is ranked as the sixth most congested. As a down-County area, Connecticut Avenue in the Bethesda-Chevy Chase Policy area consistently has one or more intersections ranked in the top 25 most congested. SHA's improvements here were implemented several years ago. The future Purple Line transitway could alleviate congestion at this intersection.

Evening CLV: 1848

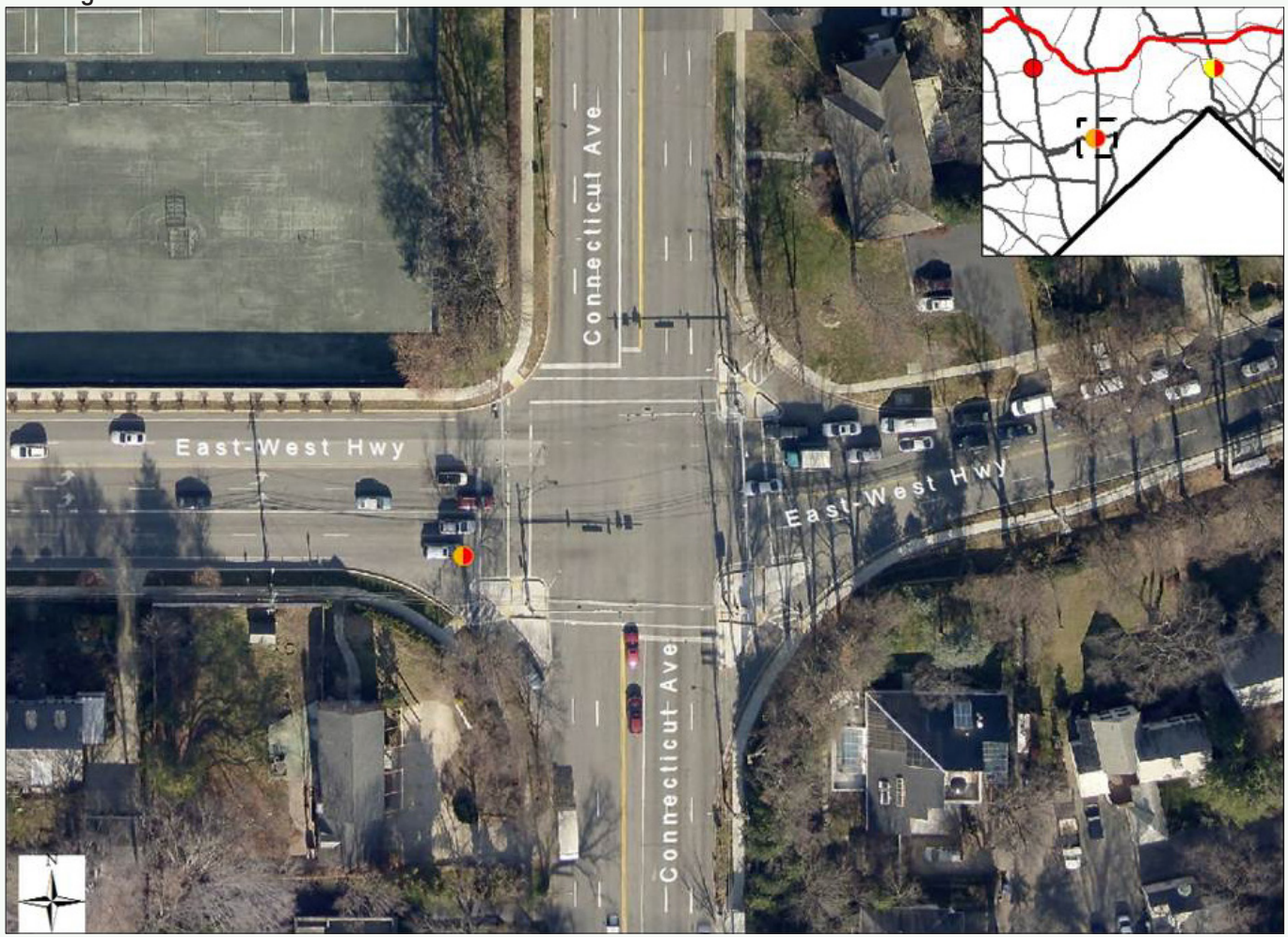


Illustration 10

Intersection 7	Georgia Ave at 16th St

Georgia Avenue at this location continues to be an increasingly congested commuter route for traffic heading in and out of the District of Columbia. This intersection is a point through which vehicle traffic heads to destinations primarily in the north and in the eastern part of the County and beyond during the evening peak period. This section of Georgia Avenue in the vicinity of this intersection shows high congestion levels during morning and evening peak hours. This intersection is included in the Montgomery Hills Project Planning Study and is recommended for reconstruction.

Evening CLV: 1816

Illustration 11

Intersection 8	Great Seneca Hwy at Muddy Branch Rd

Observed congestion conditions at this location have varied during the past several years. In the 2008 Highway Mobility Report, this intersection ranked 1st in congestion with a CLV of 2,179. In the 2009 Highway Mobility Report, the congestion ranking at this location dropped to 29th with a CLV of 1,647 as a result of capacity improvements. In the 2011 Mobility Assessment Report, the congestion ranking at this location moved up to 7th with a CLV of 1,800 – a reflection of increasing congestion in the area.

Evening CLV: 1800

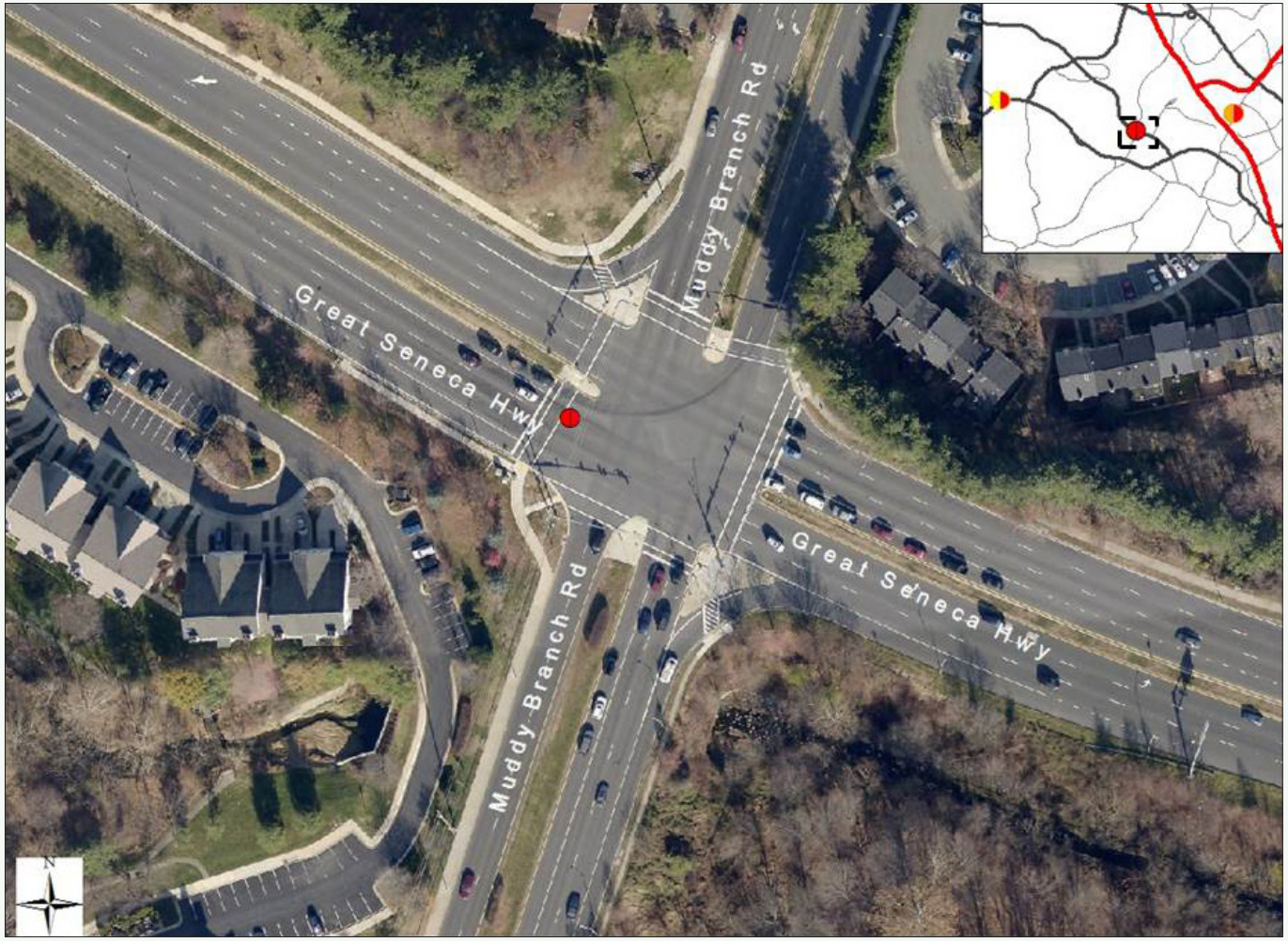


Illustration 12

Intersection 9 Frederick Rd at Montgomery Village Ave

Recently observed CLVs at this location have fluctuated, but appear to show a gradually increasing congestion trend, moving from 1,697 in 2009, to 1,533 in 2011, to 1,795 in 2012. This intersection is characterized by heavy morning and evening peak volumes given its function as a major access point to I-270 in Gaithersburg. There are no planned improvements at this intersection at this time.

Evening CLV: 1795

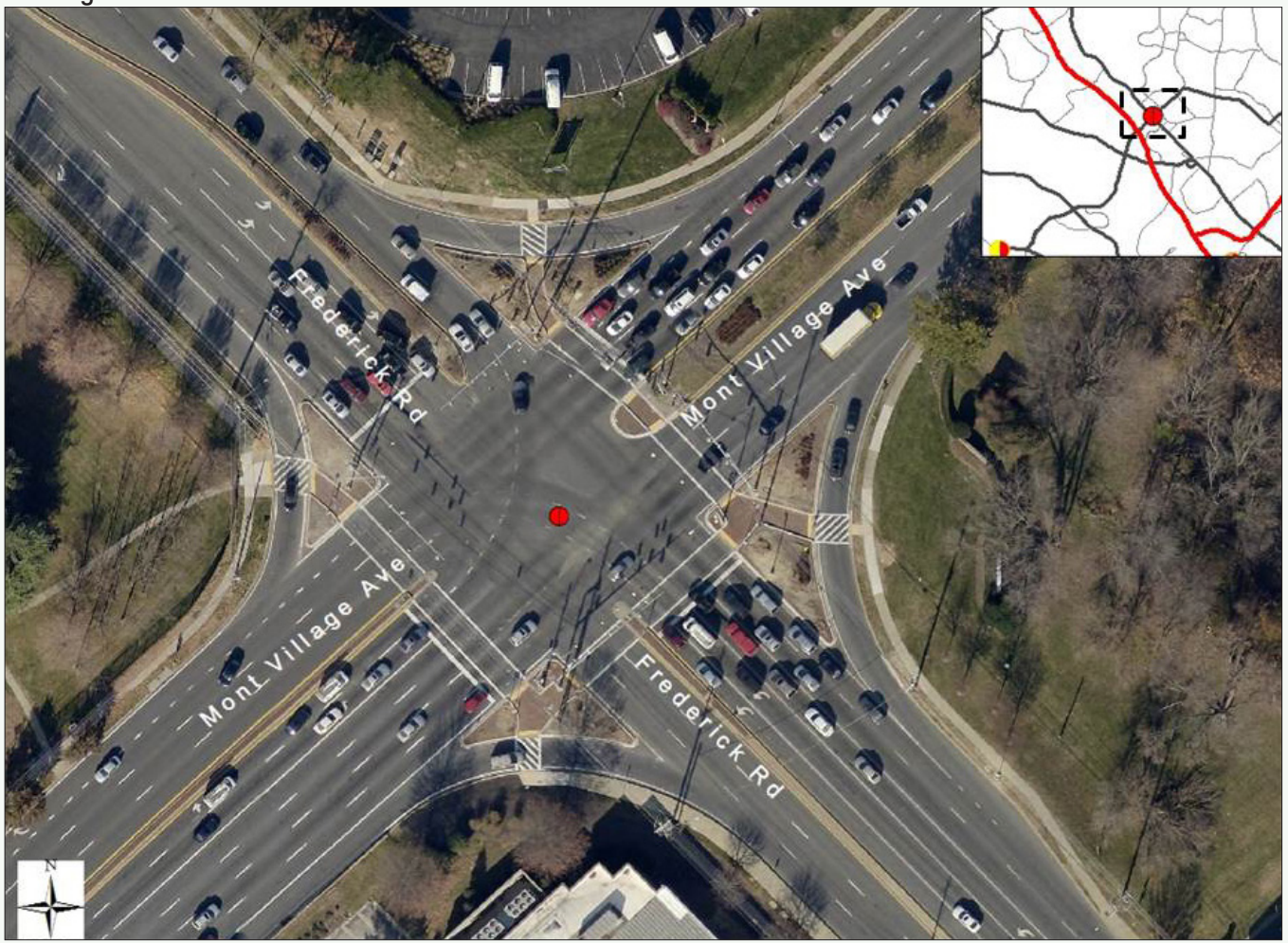


Illustration 13

Intersection 10 Rockville Pike at First St/Wootton Pkwy

The previous count year for this intersection was in 2009 and exhibited a relatively low CLV, where it ranked low in both the 2011 and 2009 reports. The recently updated traffic count indicates a higher CLV value. As a result, the congestion ranking of this location has moved upward to number 10 on the list. There are no planned improvements at this intersection at this time, but it is within the limits of Rockville's planned MD 355 reconstruction as well as the planned addition of BRT transit lanes.

Morning CLV: 1768

Other Congested Intersections

Each year, intersections move in and out of the top ten or top 50 most congested. However, focusing on the top 50 most congested intersections shows locations that are consistently congested. Most of the top 50 congested intersections are along the priority corridors, confirming the Department's need to continue to monitor these corridors. Additional roadways that have intersections with chronically high CLV levels include Piney Branch Road, Shady Grove Road, Randolph Road, New Hampshire Avenue, and Great Seneca Highway. The additional three intersections discussed were intersections of note, that either had a sharp decline in its CLV or a large increase.

Table 4: Top 50 Intersections

Ranking	Intersection Name	Count Date	AM CLV	PM CLV	Policy Area	Congestion Standard	Highest CLV	V/C Ratio	Peak Level of Service
1	Rockville Pike at W Cedar Ln	11/6/2013	1957	1612	Bethesda - Chevy Chase	1600	1957	1.22	FF
2	Rockville Pike at Nicholson Ln	5/19/2011	1234	1929	White Flint	1800	1929	1.07	BF
3	Old Georgetown Rd at Democracy Blvd	6/9/2009	1423	1923	North Bethesda	1550	1923	1.24	BC
4	Darnestown Rd at Riffle Ford Rd	3/12/2009	1061	1898	North Potomac	1450	1898	1.31	BF
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8	Great Seneca Hwy at Muddy Branch Rd	1/4/2011	1464	1800	Gaithersburg City	1425	1800	1.26	FF
9	Frederick Rd at Montgomery Village Ave	4/25/2012	1536	1795	Gaithersburg City	1425	1795	1.26	FF
10	Rockville Pike at First St/Wootton Pkwy	5/24/2011	1768	1610	Rockville City	1500	1768	1.18	FF
11	E Gude Dr at Crabbs Branch/Cecil	3/24/2009	1742	1211	Derwood	1475	1742	1.18	FC
12	Veirs Mill Rd at Twinbrook Pkwy	6/3/2010	1426	1721	North Bethesda	1550	1721	1.11	CF
13	First St at Baltimore Rd	6/6/2012	1422	1718	Rockville City	1500	1718	1.15	CF
14	Connecticut Ave at Plyers Mill Rd	6/1/2011	1349	1710	Kensington - Wheaton	1600	1710	1.07	CF
15	Shady Grove Rd at Epsilon/Tupelo	2/11/2009	1704	1403	Derwood	1475	1704	1.15	FC
16	University Blvd at Piney Branch Rd	1/22/2009	1579	1703	Silver Spring - Takoma Park	1600	1703	1.06	CF
17	E Gude Dr at Southlawn Ln	3/5/2009	1692	1450	Rockville City	1500	1692	1.12	FC
18	Randolph Rd at Veirs Mill Rd	5/3/2012	1683	1679	Kensington - Wheaton	1600	1683	1.05	FC
19	Piney Branch Rd at Philadelphia Ave	1/21/2009	1228	1680	Silver Spring - Takoma Park	1600	1680	1.05	BF
20	Columbia Pike at Fairland Rd	10/11/2012	1416	1678	Fairland - White Oak	1475	1678	1.14	CF
21	Connecticut Ave at Jones Bridge Rd	2/29/2012	1490	1672	Bethesda - Chevy Chase	1600	1672	1.05	CF
22	Montrose Rd at Tower Oaks Blvd	11/14/2006	1663	1232	North Bethesda	1550	1663	1.07	FB

cont Table 4: Top 50 Intersections

Ranking	Intersection Name	Count Date	AM CLV	PM CLV	Policy Area	Congestion Standard	Highest CLV	V/C Ratio	Peak Level of Service
23	Bradley Blvd at Wilson Ln	3/12/2009	1660	1603	Bethesda - Chevy Chase	1600	1660	1.03	FC
24	Falls Rd at Maryland Ave/Pot. Valley	9/16/2008	1384	1658	Rockville City	1500	1658	1.10	CF
25	Georgia Ave at Norbeck Rd	9/11/2012	1656	1592	Aspen Hill	1475	1656	1.22	FF
26	Frederick Rd at Shady Grove Rd	3/15/2011	1647	1486	Shady Grove	1800	1647	1.18	CC
27	Colesville Rd at Dale Dr	2/26/2009	1604	1645	Silver Spring - Takoma Park	1600	1645	1.02	CF
28	Shady Grove Rd at Midcounty Hwy	11/18/2010	1644	1323	Derwood	1475	1644	1.11	FC
29	Clopper Rd at Waring Station Rd	6/2/2011	1636	1589	Germantown West	1425	1636	1.15	FF
30	Montgomery Village Ave at Stedwick	10/4/2007	1633	1170	Montgomery Village - Airpark	1425	1633	1.14	FB
31	Connecticut Ave at Bradley Ln	11/6/2013	1415	1628	Bethesda - Chevy Chase	1600	1628	1.01	CF
32	Georgia Ave at Forest Glen Rd	7/2/2008	1318	1626	Kensington - Wheaton	1600	1626	1.01	CF
33	Colesville Rd at Sligo Crk Pkwy/St Andre	3/6/2008	1508	1624	Silver Spring - Takoma Park	1600	1624	1.01	CF
34	Georgia Ave at Columbia Blvd/Seminary Ln	6/2/2011	1520	1624	Silver Spring - Takoma Park	1600	1624	1.02	CF
35	Veirs Mill Rd at First St	4/25/2012	1610	1475	Rockville City	1500	1610	1.07	FC
36	Aspen Hill Rd at Arctic Ave	11/6/2008	1609	1467	Aspen Hill	1475	1609	1.09	FC
37	Norbeck Rd at Muncaster Mill Rd	1/9/2009	1609	1238	Aspen Hill	1475	1609	1.09	FC
38	Columbia Pike at Greencastle Rd	11/15/2006	1607	1575	Fairland - White Oak	1475	1607	1.08	FF
39	Old Georgetown Rd at Tuckerman Ln	9/13/2011	1604	1261	North Bethesda	1550	1604	1.03	FC
40	Great Seneca Hwy at Quince Orchard Rd	4/25/2012	1602	1547	Gaithersburg City	1425	1602	1.12	FF
41	Randolph Rd at Parklawn Dr (W)	2/11/2009	1601	1165	North Bethesda	1550	1601	1.03	FB
42	Democracy Blvd at Falls Rd/S Glen Rd	4/1/2009	1594	1167	Potomac	1450	1594	1.10	FC
43	River Rd at Royal Dominion/Holton Arms	2/24/2004	1591	1358	Bethesda - Chevy Chase	1600	1591	0.99	CC
44	Norbeck Rd at Bauer Dr	10/18/2011	1586	1329	Aspen Hill	1475	1586	1.03	FC
45	Randolph Rd at New Hampshire Ave	5/15/2012	1440	1580	Fairland - White Oak	1475	1580	1.07	CF
46	Layhill Rd at Ednor Rd/Norwood Rd	4/27/2010	1579	1425	Olney	1450	1579	1.09	FC
47	River Rd at I-495 (E)	3/10/2009	1579	957	Bethesda - Chevy Chase	1600	1579	0.98	CA
48	River Rd at Willard Ln/Greenway	9/21/2011	1579	1530	Bethesda - Chevy Chase	1600	1579	0.99	CC
49	East West Hwy at Jones Mill/Beach	3/5/2009	1087	1574	Bethesda - Chevy Chase	1600	1574	0.98	BC
50	Colesville Rd at Franklin Ave	2/3/2009	1413	1571	Silver Spring - Takoma Park	1600	1571	0.98	CC

Illustration 14

Intersection 18 Randolph Rd at Veirs Mill Rd

This intersection is a major crossroads between Rockville and Wheaton and has experienced increasing congestion related to the changing traffic patterns in the mid-County area. The completion of the ICC has noticeably changed mid-County traffic patterns, mostly decreasing traffic congestion on east-west routes. Nonetheless, some congested locations, like this one, remain.

Morning CLV: 1683

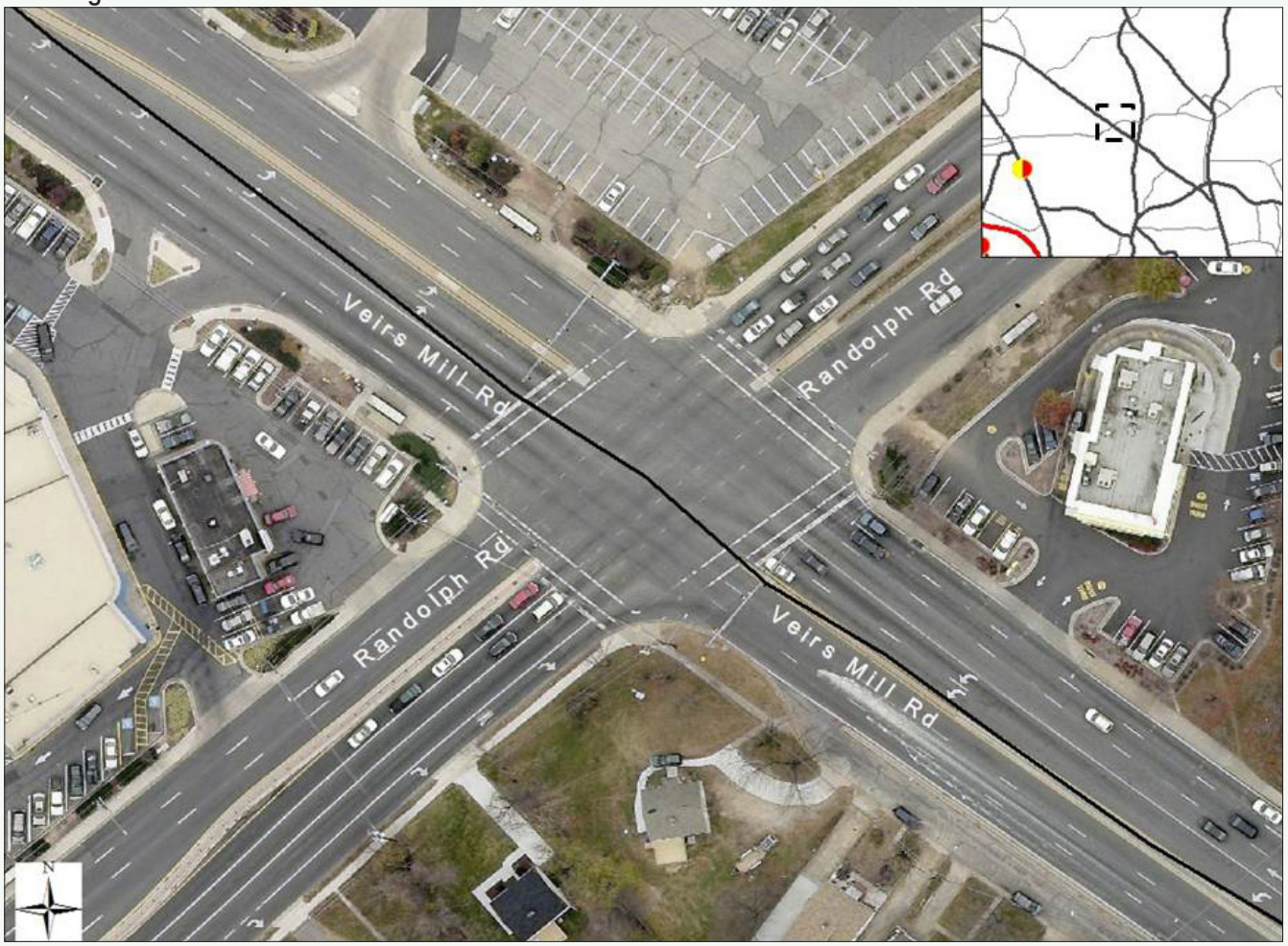


Illustration 15

Intersection 26 Frederick Rd at Shady Grove Rd

In the 2009 MAR, this intersection ranked 27th, and in the 2011 report it dropped out of the worst 100. The current 1,647 CLV at this intersection is below the applicable policy area standard but this location is back as one of the County's most congested intersections. There are no other planned improvements at this intersection at this time.

Morning CLV: 1647

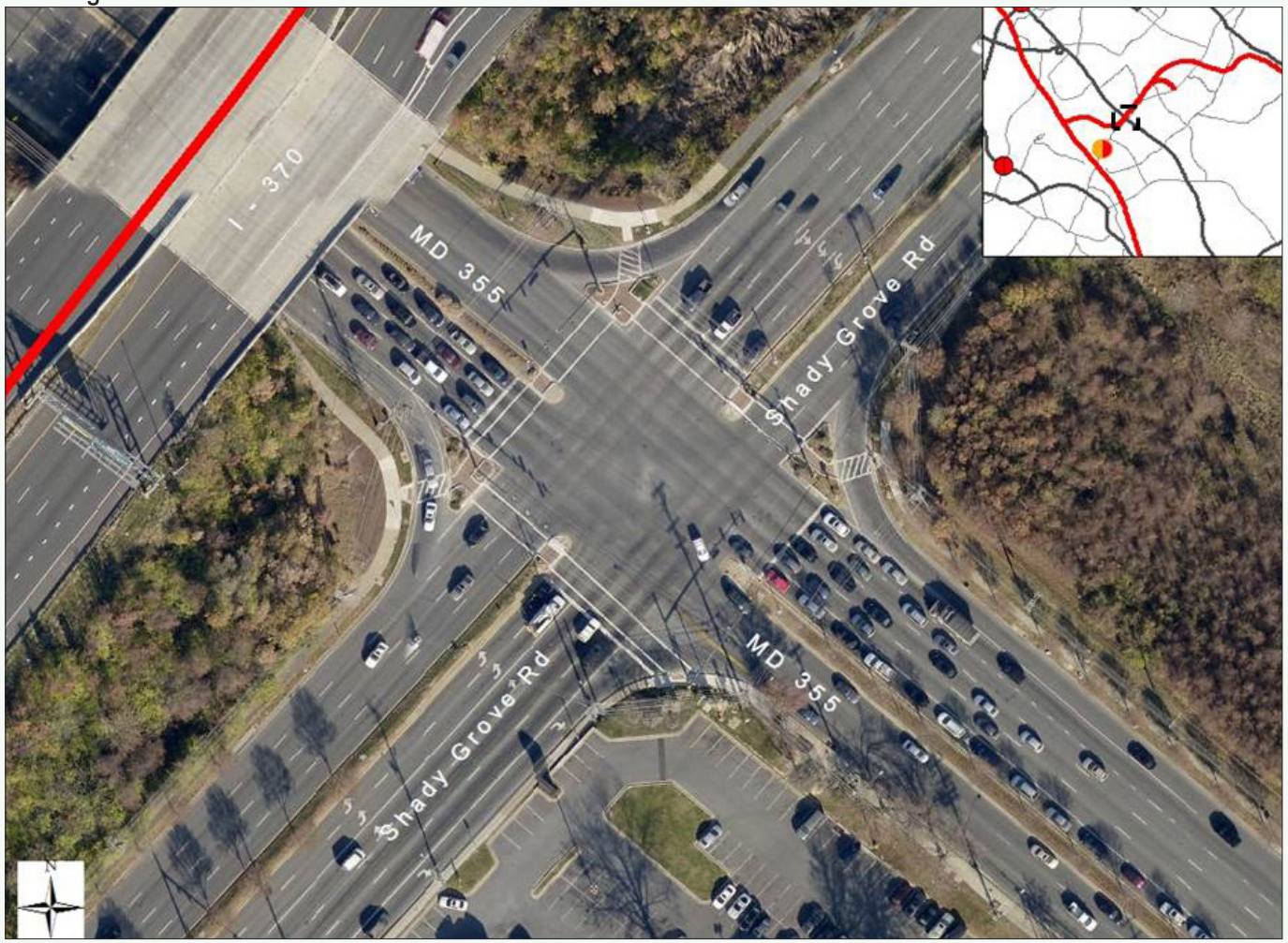
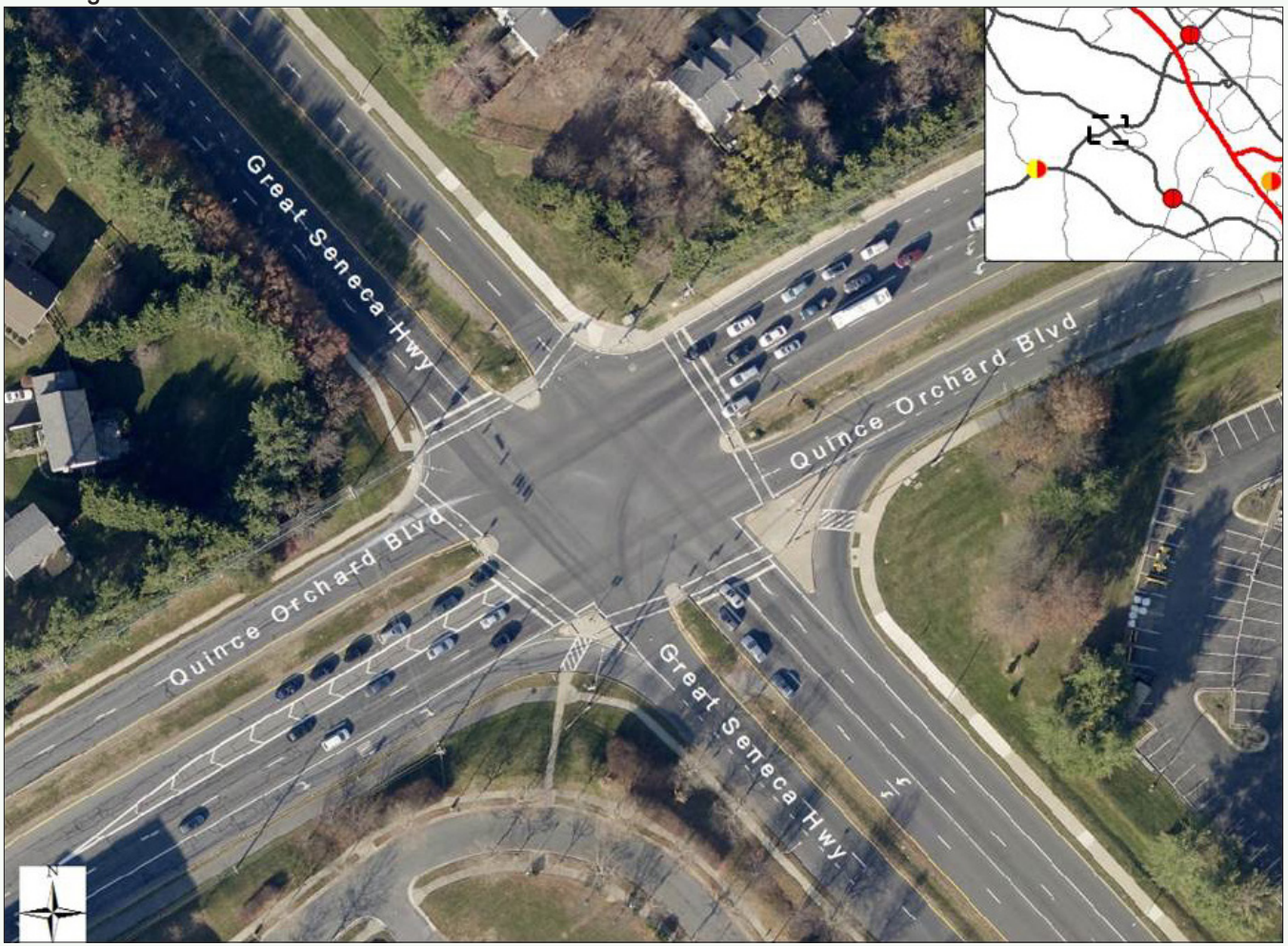


Illustration 16

Intersection 40 Great Seneca Hwy at Quince Orchard Rd

The 2012 traffic count propelled this intersection's ranking from below 100 to 40th. It is located in the Gaithersburg policy area and three other intersections along Great Seneca Highway in the immediate vicinity of this intersection are similarly congested. Great Seneca Highway in the vicinity of this location is a potential problem area that should be monitored. There are no other planned improvements at this intersection at this time.

Morning CLV: 1602



Intersections Exceeding Policy Area CLV Congestion Standards

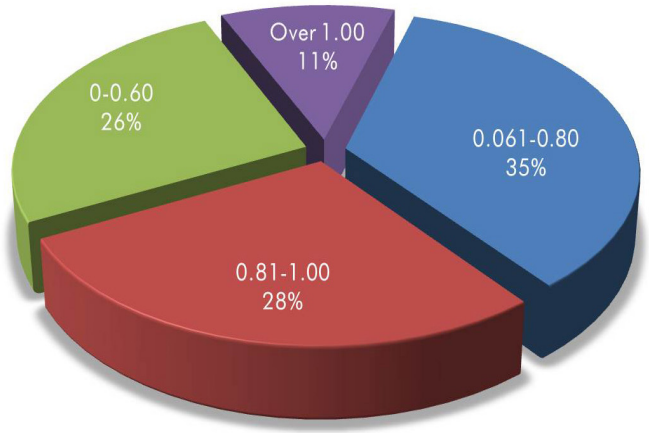
Another way of evaluating intersection performance using the CLV measure is to compare the highest observed CLV (during the morning or evening peak period) relative to the relevant Local Area Transportation Review policy area congestion standard. This relationship is expressed in the form of a ratio between the observed CLV and the relevant congestion standard. This measure can also be characterized as a volume- to-capacity ratio (V/C ratio), where the "V" is the observed CLV and the "C" is the congestion standard. If the V/C ratio is above one, then volume exceeds the capacity based on the congestion standard for the policy area.

From a planning perspective, it is important to know which intersections exceed policy area CLV congestion standards, and by how much. This information can help identify congestion problems relative to standards and allows traffic mitigation measures to be prioritized in master plans. Table 2 in the appendix lists the intersections by policy area that exceed the applicable CLV congestion standard.

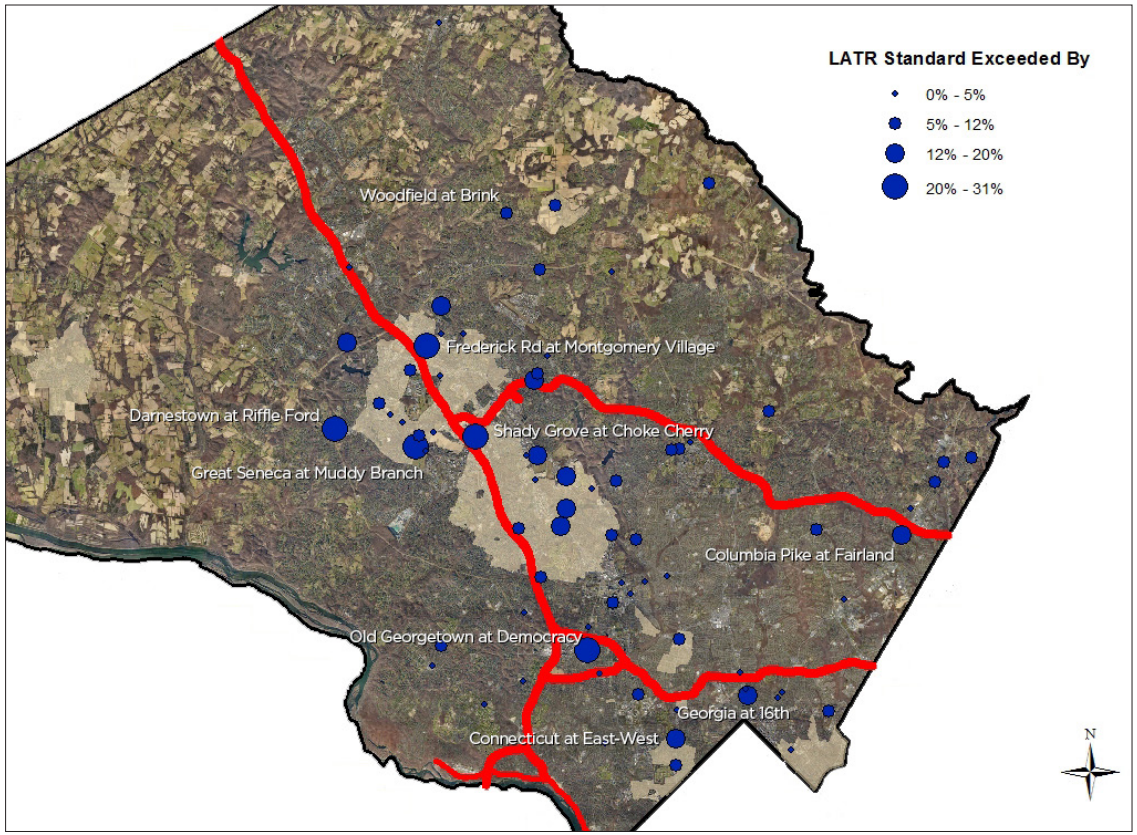
In the 2011 MAR, 17 percent of the intersections in the database exceeded the applicable policy area standard. As of 2013, only 11 percent of intersections exceed policy area standards, an overall improvement. This is the lowest percentage of intersections which exceeded the applicable policy area congestion standards since 2005. Most County intersections, roughly 35 percent, fall within the 0.61 to 0.80 V/C ratio range. This reflects an increase from 31 percent in the previous MAR. Refer to Table 2 in the Appendix to see this information reported for all intersections in detail.

The Rockville, Gaithersburg City, and North Bethesda policy areas have the most intersections that exceed the applicable policy area congestion standard. Gaithersburg City, in particular, has four locations along Great Seneca Highway that exhibit inadequate intersection performance: at Quince Orchard Road, Muddy Branch Road, Kentlands Boulevard, and Lakeland Boulevard.

Illustration 17: V/C Ratios



Map 2: Intersections Exceeding LATR Standard



Congested Roadways

Travel time corridor data is provided by the Regional Integrated Transportation Information System (RITIS), which is an automated data sharing, dissemination, and archiving system that includes many travel time performance measures and analytics tools. Our purpose in collecting, analyzing, and presenting travel time data is to inform the broader audience such as the County Planning Board and County Council to aid in future planning decision-making.

Although each corridor is unique, travel conditions among roadways can be compared by measuring the travel time index (TTI), determined from observed travel speed data.

New travel time data collected in support of this report expands the previous analysis by including more roadways—MD 27, MD 28, MD 97, MD 117, MD 118, MD 119, MD 185, MD 193, MD 198, MD 355, MD 390, MD 586, US 29, and US 650. Travel time data was collected in all but one policy area for the roadways sampled. In Potomac, travel time samples were unavailable during our data collection process. Priority corridors, which include MD 355, MD 97, MD 586, MD 198, and US 29, were evaluated in this report. These are most traveled arterials in the County. In addition, other selected roadways, located primarily in the northern portion of the County, were evaluated as well.

The TTI is a comparison between the travel conditions during the peak period relative to free-flow conditions. The index depicts how much longer, on average, travel times are during congested periods relative to uncongested time periods.

In the 2011 MAR, TTI was calculated for each roadway sampled by direction, spanning long distances through the County. One of the drawbacks of this method of analysis was that the index represented areas of varying densities and traffic variability, without reflecting those variations.

To be more informative, the analysis should be performed based on the limits of each policy area. A TTI analysis for major arterials by policy area provides a more localized view of traffic congestion in a specific planning area. In this report, the TTI line graph reports travel time performance for arterial segments by policy area.

This report also provides a congestion percentage chart, measuring the difference between uncongested traffic conditions (identified with numerical value of 1.0) and the amount of congestion increase over 1.0. That percentage increase over 1.0 is a time lost due to congestion. Table 4 highlights the percentage of congestion based on an average weekday, weekend morning peak periods and evening peak periods. This table reports the average congestion percentage for overnight and midday time periods, as well.

Average Congestion % Color Scale

Uncongested - Light	0%-20%
Light - Moderate	21%-40%
Moderate - Heavy	41%-60%
Heavy - Severe	61%-80%
Severe	80%+

Colors indicate the severity of congestion ranging from 0%-20% (uncongested to light), 21%-40% (light to moderate), 41%-60% (moderate to heavy), 61%-80% (heavy to severe), and 81% + (severe).

The roadways sampled were segmented by policy areas for corridor travel time analysis on a local level. This report ranks and analyzes travel time data for 120 corridor roadway segments according to severity of congestion by policy area and direction of travel.

Of the 120 corridor roadway segments analyzed, seven operate under "severe" congestion levels ranging from a TTI of 87 to 119 percent. MD 355 southbound in the Shady Grove policy area had the highest congestion level, above 95 percent and peaking at 119 percent, during morning and evening peaks as well as during midday. Under these conditions, a driver will experience travel times that are more than double the amount of time it takes to travel during free flow conditions.

Six of the top ten most congested corridor roadway segments are located within the Silver Spring-Takoma Park and Bethesda-Chevy Chase policy areas. These six corridor roadway segments are northbound and southbound MD 355, southbound MD 185, northbound and southbound MD 97, northbound and southbound US 29, northbound US 650, and southbound MD 390.

Clarksburg is the only outlying area with a travel corridor roadway segment that ranks within the top 25 most congested corridors in the County. That corridor is MD 355 southbound which is observed to have a TTI congestion level of 59 percent during the morning peak. Clarksburg has grown rapidly during the past decade and the corresponding increase in commuter traffic contributes to increasing congestion in the area.

Map 3: Roadway Analysis Coverage with Policy Areas

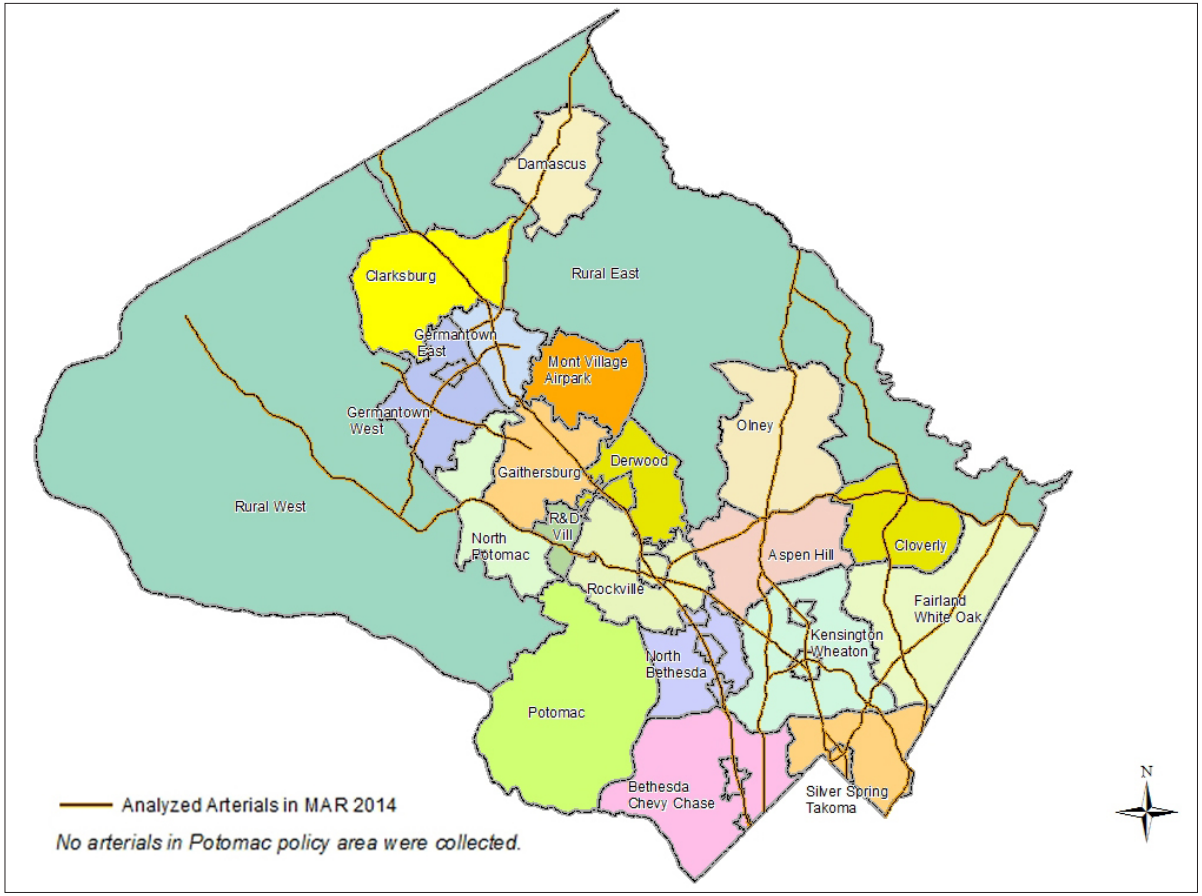
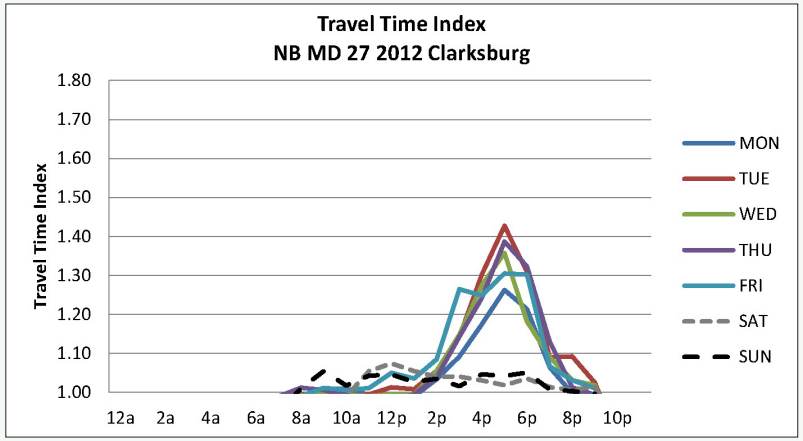


Table 5: Top 25 Congested Roadways by Policy Area

Ranking	Roadname	Bound	Policy Area	Congestion	Type	"Worst" Time of Day
1	MD 355	SB	Shady Grove	119%	Severe	Both Peaks & Midday
2	MD 185	SB	Bethesda	112%	Severe	Morning Peak
3	MD 97	SB	Kensington Wheaton	99%	Severe	Morning Peak
4	US 29	SB	Fairland White Oak	96%	Severe	Morning Peak
5	US 650	NB	Silver Spring Takoma Park	94%	Severe	Evening Peak
6	MD 97	NB	Silver Spring Takoma Park	93%	Severe	Evening Peak
7	US 29	SB	Kensington Wheaton	87%	Severe	Morning Peak
8	MD 355	SB	Bethesda	80%	Heavy-Severe	Morning Peak
9	MD 390	SB	Silver Spring Takoma Park	70%	Heavy-Severe	Morning Peak
10	MD 355	NB	Bethesda	69%	Heavy-Severe	Midday & Evening Peak
11	MD 355	SB	Derwood	69%	Heavy-Severe	Morning Peak
12	MD 193	WB	Silver Spring Takoma Park	68%	Heavy-Severe	Morning & Evening Peak
13	US 29	NB	Kensington Wheaton	68%	Heavy-Severe	Evening Peak
14	MD 97	SB	Silver Spring Takoma Park	65%	Heavy-Severe	Morning Peak
15	MD 586	EB	Kensington Wheaton	64%	Heavy-Severe	Morning Peak
16	MD 355	SB	Rockville	63%	Heavy-Severe	Morning Peak
17	MD 355	NB	Shady Grove	60%	Moderate-Heavy	Morning Peak & Midday
18	MD 355	SB	Clarksburg	59%	Moderate-Heavy	Morning Peak
19	US 650	SB	Fairland White Oak	59%	Moderate-Heavy	Morning Peak
20	MD 28	WB	Aspen Hill	58%	Moderate-Heavy	Morning Peak
21	MD 28	SB	Rural East	57%	Moderate-Heavy	Morning Peak
22	US 29	NB	Fairland White Oak	57%	Moderate-Heavy	Evening Peak
23	MD 28	EB	Aspen Hill	53%	Moderate-Heavy	Evening Peak
24	MD 119	NB	R&D Village	53%	Moderate-Heavy	Morning Peak
25	MD 119	NB	Gaithersburg	52%	Moderate-Heavy	Morning Peak & Midday

Ridge Road (MD 27)

The most congested direction on MD 27 is northbound in Clarksburg Policy Area during the evening peak. The evening peak exhibits the highest levels of TTI congestion ranging from 25-35 percent, which is considered moderate. The travel time index shows that all weekdays exhibit higher congestion during the evening peak when compared to other times of the day.



Average Congestion % Color Scale

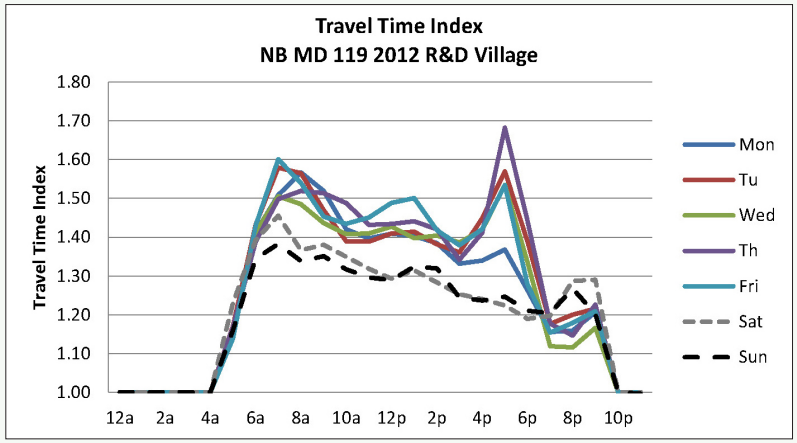
Uncongested - Light	0%-20%
Light - Moderate	21%-40%
Moderate - Heavy	41%-60%
Heavy - Severe	61%-80%
Severe	80%+

Percentage of Average Congestion
NB MD 27 2012 Clarksburg

	12a-5a	6a	7a	8a	9a	10a-3p	4p	5p	6p	7p	8p-11p
Weekday (M-F)	0%	0%	0%	0%	1%	3%	25%	35%	27%	9%	1%
Weekend	0%	0%	0%	0%	3%	4%	4%	3%	4%	1%	0%

Great Seneca Highway (MD 119)

MD 119 runs through Gaithersburg City, North Potomac, Germantown West, and R&D Village policy areas. The heaviest congestion is found northbound in the R&D Village policy area. From 6:00 a.m. to 3:00 p.m. there is a steady moderate congestion during weekdays. Weekends experience moderate congestion during the morning hours. In the Gaithersburg City policy area, congestion is light to moderate. Fridays have the highest levels of congestion. The weekday average of congestion lasts most of the day from the morning peak with a TTI of 45 percent into the evening peak with a TTI of 51 percent. The moderate congestion levels along this stretch of road between R&D Village and Gaithersburg City policy areas reflect the high CLV at the MD 119 and Muddy Branch intersection.



Average Congestion % Color Scale

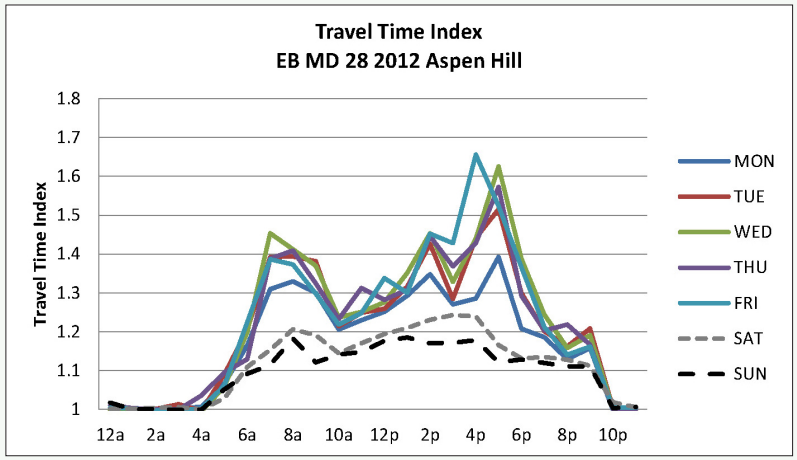
Uncongested - Light	0%-20%
Light - Moderate	21%-40%
Moderate - Heavy	41%-60%
Heavy - Severe	61%-80%
Severe	80%+

Percentage of Average Congestion
NB MD 119 2012 R&D Village

	12a-5a	6a	7a	8a	9a	10a-3p	4p	5p	6p	7p	8p-11p
Weekday (M-F)	3%	41%	53%	50%	45%	42%	39%	51%	33%	16%	10%
Weekend	3%	34%	34%	34%	35%	30%	24%	25%	21%	20%	12%

Norbeck Road (MD 28)

The heaviest congestion was found eastbound and westbound along this road in Aspen Hill. Eastbound movements exhibited light congestion during the morning peak at a TTI of 33 to 39 percent, while the early evening peak hours exhibited moderate levels of congestion at a TTI of 45 to 53 percent. Westbound movements exhibited moderate congestion levels, at a TTI of 32 to 58 percent.

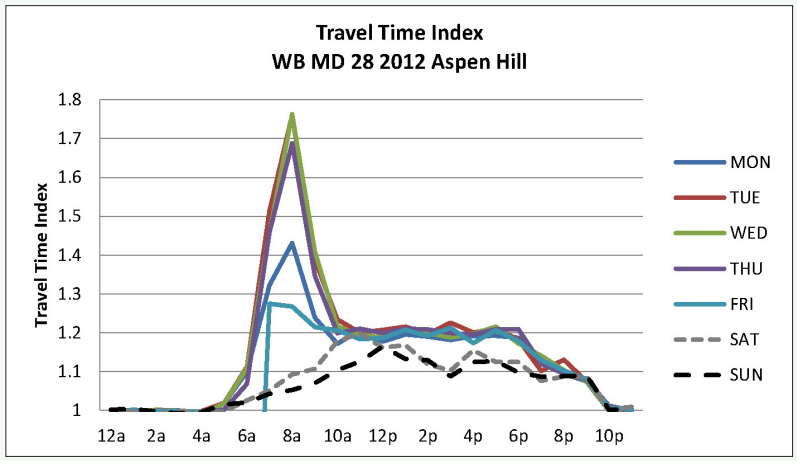


Average Congestion % Color Scale

Uncongested - Light	0%-20%
Light - Moderate	21%-40%
Moderate - Heavy	41%-60%
Heavy - Severe	61%-80%
Severe	80%+

Percentage of Average Congestion
EB MD 28 2012 Aspen Hill

	12a-5a	6a	7a	8a	9a	10a-3p	4p	5p	6p	7p	8p-11p
Weekday (M-F)	1%	18%	39%	38%	33%	30%	45%	53%	31%	21%	9%
Weekend	1%	10%	19%	19%	16%	18%	21%	14%	13%	13%	6%



Average Congestion % Color Scale

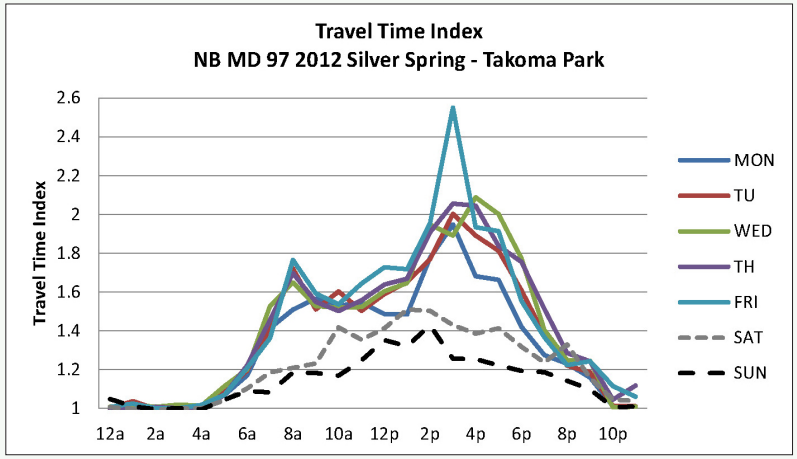
Uncongested - Light	0%-20%
Light - Moderate	21%-40%
Moderate - Heavy	41%-60%
Heavy - Severe	61%-80%
Severe	80%+

Percentage of Average Congestion
WB MD 28 2012 Aspen Hill

	12a-5a	6a	7a	8a	9a	10a-3p	4p	5p	6p	7p	8p-11p
Weekday (M-F)	0%	8%	40%	58%	32%	20%	19%	21%	19%	12%	5%
Weekend	0%	2%	5%	7%	9%	14%	14%	13%	11%	8%	5%

Georgia Avenue (MD 97)

MD 97 Southbound is the third most congested corridor in the sample set. Congestion levels hit a peak TTI of 99%, which is considered severe conditions during the morning peak. Northbound and southbound traffic moving through Silver Spring-Takoma Park also has one of the highest congestion levels of the roadways sampled in the policy area. In the morning, northbound traffic experiences a TTI of 43 to 67 percent congestion (moderate to heavy). During the evening, congestion increases to a TTI between 62 and 93 percent (heavy to severe). Congestion also increases starting midday and into the evening peak hours. Southbound travel exhibits moderate to heavy levels of congestion at a TTI of 49 to 65 percent in the morning.

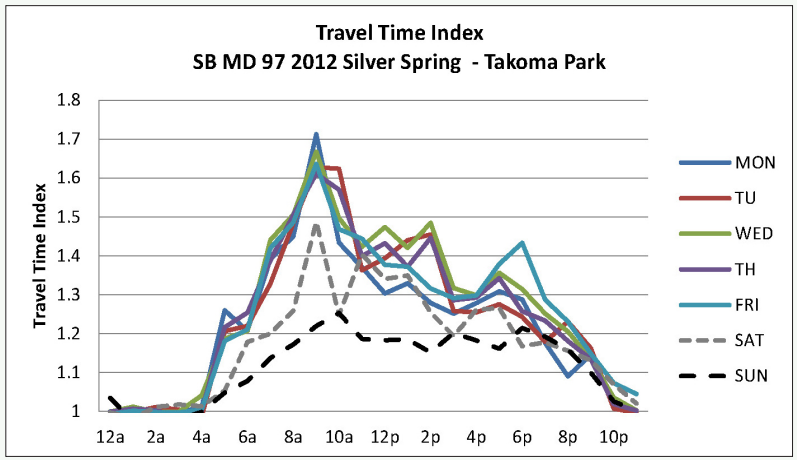


Average Congestion % Color Scale

Uncongested - Light	0%-20%
Light - Moderate	21%-40%
Moderate - Heavy	41%-60%
Heavy - Severe	61%-80%
Severe	80%+

Percentage of Average Congestion
NB MD 97 2012 Silver Spring - Takoma Park

	12a-5a	6a	7a	8a	9a	10a-3p	4p	5p	6p	7p	8p-11p
Weekday (M-F)	2%	20%	43%	67%	55%	68%	45%	93%	62%	39%	13%
Weekend	1%	10%	20%	20%	21%	37%	21%	32%	25%	21%	10%



Average Congestion % Color Scale

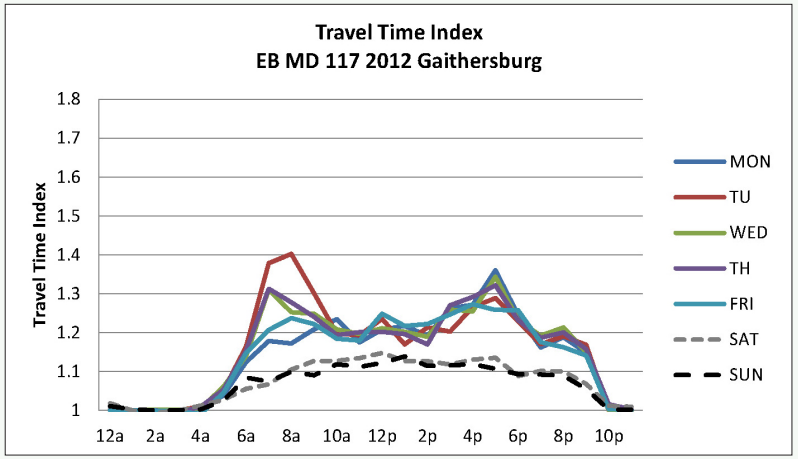
Uncongested - Light	0%-20%
Light - Moderate	21%-40%
Moderate - Heavy	41%-60%
Heavy - Severe	61%-80%
Severe	80%+

Percentage of Average Congestion
SB MD 97 2012 Silver Spring - Takoma Park

	12a-5a	6a	7a	8a	9a	10a-3p	4p	5p	6p	7p	8p-11p
Weekday (M-F)	4%	22%	39%	49%	65%	40%	28%	33%	31%	23%	9%
Weekend	1%	13%	22%	22%	35%	25%	22%	21%	19%	18%	8%

Clopper Road (MD 117)

Generally, MD 117 exhibits light to uncongested conditions throughout most of the day with the exception of eastbound movements out of the Gaithersburg and Germantown West policy areas. Both exhibit levels of light to moderate congestion throughout the day (from 7:00 a.m. to 6:00 p.m.) at a TTI of 21 to 31 percent. Westbound congestion levels are light throughout the day with a peak on Wednesday and Friday.

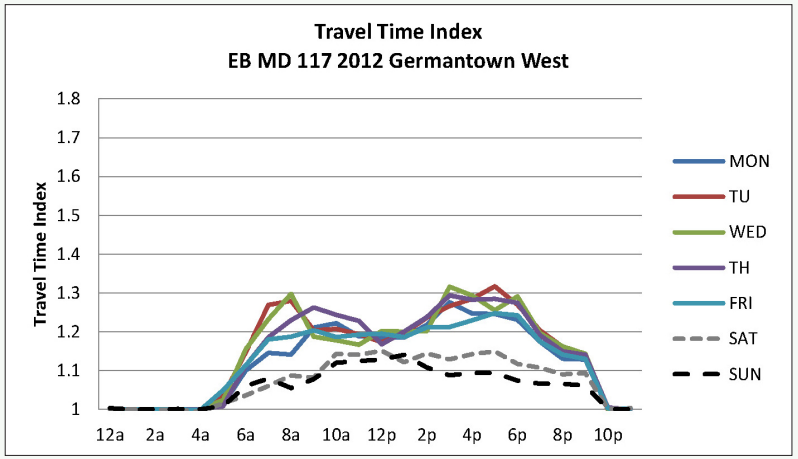


Average Congestion % Color Scale

Uncongested - Light	0%-20%
Light - Moderate	21%-40%
Moderate - Heavy	41%-60%
Heavy - Severe	61%-80%
Severe	80%+

Percentage of Average Congestion
EB MD 117 2012 Gaithersburg

	12a-5a	6a	7a	8a	9a	10a-3p	4p	5p	6p	7p	8p-11p
Weekday (M-F)	1%	15%	28%	27%	24%	21%	27%	31%	24%	18%	9%
Weekend	1%	7%	10%	10%	11%	13%	12%	12%	9%	10%	4%



Average Congestion % Color Scale

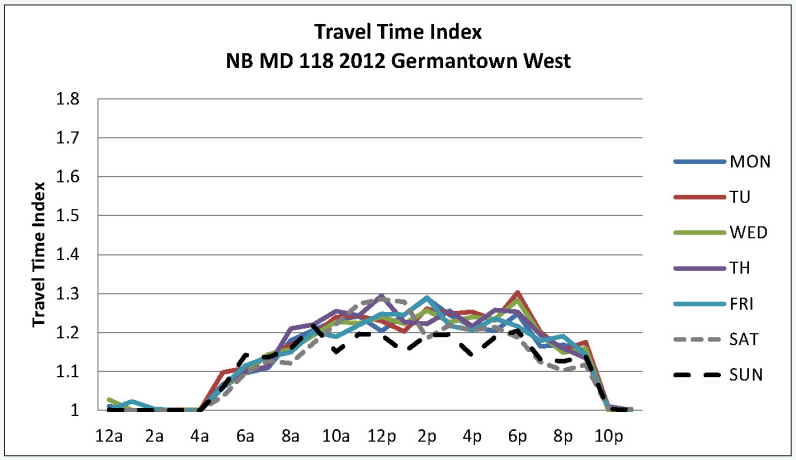
Uncongested - Light	0%-20%
Light - Moderate	21%-40%
Moderate - Heavy	41%-60%
Heavy - Severe	61%-80%
Severe	80%+

Percentage of Average Congestion
EB MD 117 2012 Germantown West

	12a-5a	6a	7a	8a	9a	10a-3p	4p	5p	6p	7p	8p-11p
Weekday (M-F)	0%	13%	20%	23%	21%	22%	27%	27%	26%	19%	7%
Weekend	0%	5%	7%	7%	8%	13%	12%	12%	10%	9%	4%

Germantown Road (MD 118)

Of the three policy areas that MD 118 traverses, Germantown West exhibited the most congestion, at light to moderate levels. Southbound from 6:00 a.m. to 7:00 p.m., the travel congestion ranges from a TTI of 21 to 39 percent. Northbound traffic experiences a TTI of 23 to 26 percent from 10:00 a.m. to 6:00 p.m. All of the congestion increases and maintains its level of congestion until the end of the evening peaks for both directions.

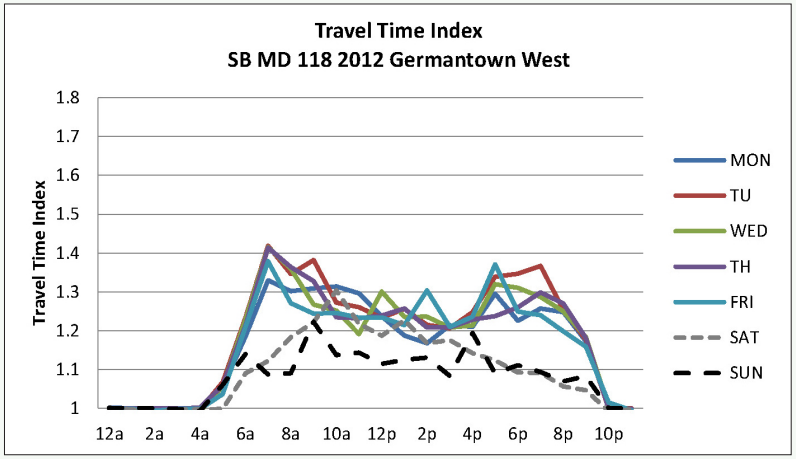


Average Congestion % Color Scale

Uncongested - Light	0%-20%
Light - Moderate	21%-40%
Moderate - Heavy	41%-60%
Heavy - Severe	61%-80%
Severe	80%+

Percentage of Average Congestion
NB MD 118 2012 Germantown West

	12a-5a	6a	7a	8a	9a	10a-3p	4p	5p	6p	7p	8p-11p
Weekday (M-F)	1%	10%	13%	17%	20%	24%	23%	23%	26%	19%	8%
Weekend	1%	12%	14%	14%	19%	21%	17%	20%	20%	13%	6%



Average Congestion % Color Scale

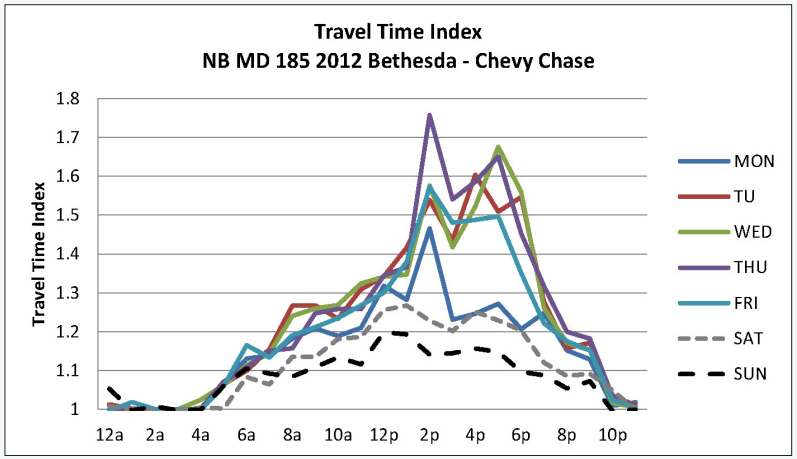
Uncongested - Light	0%-20%
Light - Moderate	21%-40%
Moderate - Heavy	41%-60%
Heavy - Severe	61%-80%
Severe	80%+

Percentage of Average Congestion
SB MD 118 2012 Germantown West

	12a-5a	6a	7a	8a	9a	10a-3p	4p	5p	6p	7p	8p-11p
Weekday (M-F)	4%	22%	39%	49%	65%	40%	28%	33%	31%	23%	9%
Weekend	1%	13%	22%	22%	35%	25%	22%	21%	19%	18%	8%

Connecticut Avenue (MD 185)

MD 185 is a heavily traveled corridor that experiences high traffic counts and heavy volumes in its down-County segments. This roadway is a major route into the County and, unlike MD 97 and MD 355, is not near major transit service which could ease congestion. In the Bethesda-Chevy Chase policy area, there is moderate to heavy and heavy to severe congestion depending on direction. In the morning, southbound movements experience severe congestion levels with a TTI of 80 to 112 percent, and moderate congestion from 10:00 a.m. to 3:00 p.m. at 40 percent. Northbound evening peak period traffic within Bethesda Chevy Chase experiences moderate to heavy congestion at a TTI of 42 to 52 percent.

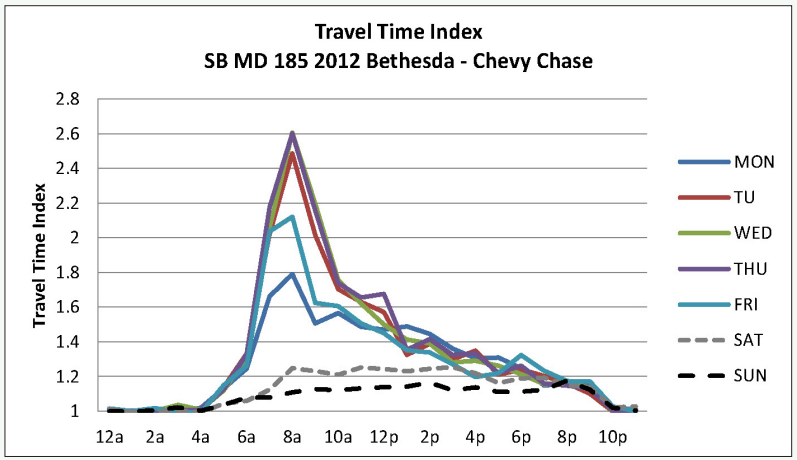


Average Congestion % Color Scale

Uncongested - Light	0%-20%
Light - Moderate	21%-40%
Moderate - Heavy	41%-60%
Heavy - Severe	61%-80%
Severe	80%+

Percentage of Average Congestion
NB MD 185 2012 Bethesda - Chevy Chase

	12a-5a	6a	7a	8a	9a	10a-3p	4p	5p	6p	7p	8p-11p
Weekday (M-F)	1%	12%	14%	21%	24%	37%	49%	52%	42%	26%	9%
Weekend	1%	9%	11%	11%	12%	19%	20%	19%	15%	10%	4%



Average Congestion % Color Scale

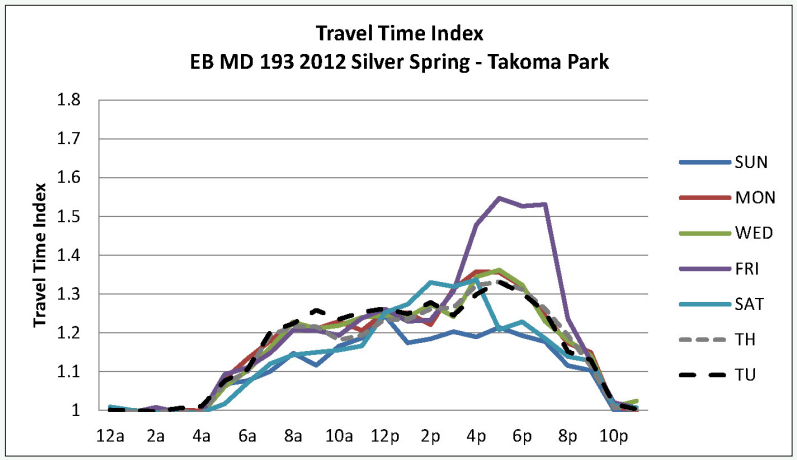
Uncongested - Light	0%-20%
Light - Moderate	21%-40%
Moderate - Heavy	41%-60%
Heavy - Severe	61%-80%
Severe	80%+

Percentage of Average Congestion
SB MD 185 2012 Bethesda - Chevy Chase

	12a-5a	6a	7a	8a	9a	10a-3p	4p	5p	6p	7p	8p-11p
Weekday (M-F)	2%	26%	80%	112%	80%	40%	28%	22%	22%	16%	8%
Weekend	2%	16%	68%	68%	43%	33%	21%	19%	26%	21%	9%

University Boulevard (MD 193)

On this route, the difference between eastbound and westbound traffic congestion continues to be small with the road being heavily traveled in both directions at any given point of the day. MD 193 is heavily used as an east-west route to other major corridors such as MD 355 and MD 185. Eastbound movements in the Silver Spring-Takoma Park experience light to moderate congestion levels at a TTI of 22 to 39 percent. Westbound MD 193 exhibits heavy congestion during the morning peak and the evening peak, while maintaining a steady moderate congestion level during the weekends.

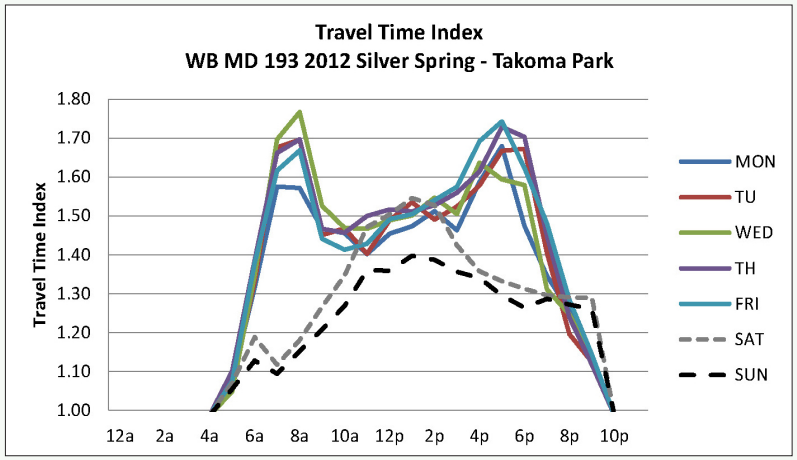


Average Congestion % Color Scale

Uncongested - Light	0%-20%
Light - Moderate	21%-40%
Moderate - Heavy	41%-60%
Heavy - Severe	61%-80%
Severe	80%+

Percentage of Average Congestion
EB MD 193 2012 Silver Spring-Takoma Park

	12a-5a	6a	7a	8a	9a	10a-3p	4p	5p	6p	7p	8p-11p
Weekday (M-F)	1%	11%	18%	22%	22%	24%	36%	39%	36%	30%	8%
Weekend	1%	7%	14%	14%	13%	22%	26%	21%	21%	18%	6%



Average Congestion % Color Scale

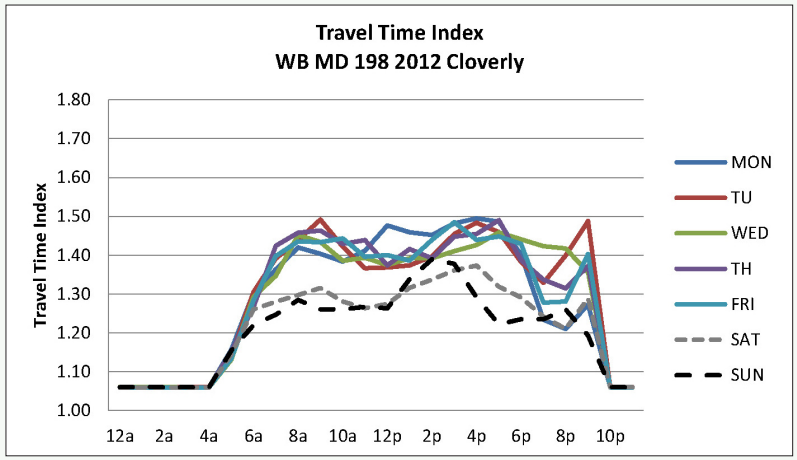
Uncongested - Light	0%-20%
Light - Moderate	21%-40%
Moderate - Heavy	41%-60%
Heavy - Severe	61%-80%
Severe	80%+

Percentage of Average Congestion
WB MD 193 2012 Silver Spring-Takoma Park

	12a-5a	6a	7a	8a	9a	10a-3p	4p	5p	6p	7p	8p-11p
Weekday (M-F)	1%	35%	64%	68%	47%	49%	62%	68%	61%	40%	9%
Weekend	1%	16%	17%	17%	24%	41%	35%	31%	29%	29%	14%

Spencerville Road (MD 198)

MD 198 is another major east-west route that ranges from uncongested to light congestion levels. Eastbound traffic in the Rural East policy area experienced light to moderate congestion at a TTI of 41 percent in the evening peak hour. Westbound traffic exhibits moderate congestion from 8:00 a.m. to 6:00 p.m. on weekdays. Morning and evening peaks, as well as the midday, have moderate congestion, indicating a steady flow of vehicles in this direction.



Average Congestion % Color Scale

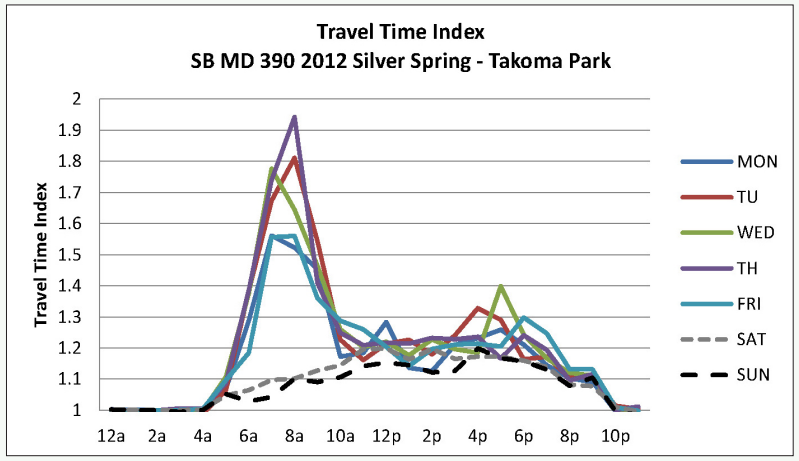
Uncongested - Light	0%-20%
Light - Moderate	21%-40%
Moderate - Heavy	41%-60%
Heavy - Severe	61%-80%
Severe	80%+

Percentage of Average Congestion
WB MD 198 2012 Cloverly

	12a-5a	6a	7a	8a	9a	10a-3p	4p	5p	6p	7p	8p-11p
Weekday (M-F)	7%	29%	38%	44%	45%	41%	46%	47%	41%	32%	21%
Weekend	7%	24%	26%	29%	29%	31%	33%	27%	26%	24%	15%

Sixteenth Street (MD 390)

Considered a relatively short length arterial, MD 390 takes vehicles north and southbound from MD 97 in downtown Silver Spring and into Washington, D.C. and experiences moderate to heavy congestion levels at a TTI of 45 to 70 percent southbound during the morning peak period.



Average Congestion % Color Scale

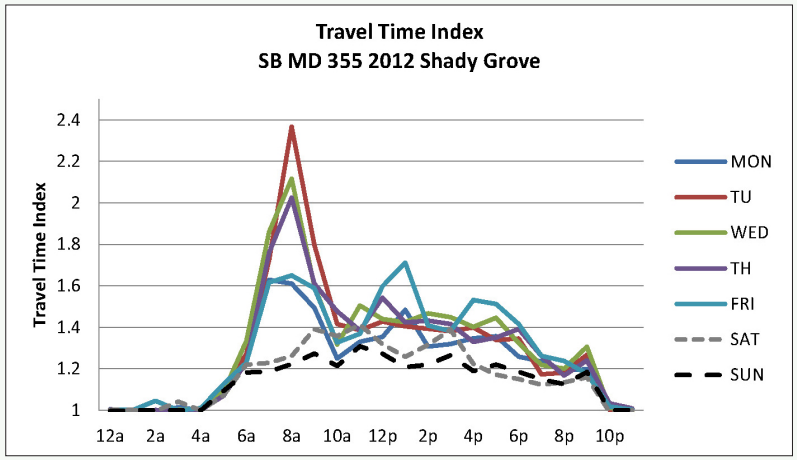
Uncongested - Light	0%-20%
Light - Moderate	21%-40%
Moderate - Heavy	41%-60%
Heavy - Severe	61%-80%
Severe	80%+

Percentage of Average Congestion
SB MD 390 2012 Silver Spring-Takoma Park

	12a-5a	6a	7a	8a	9a	10a-3p	4p	5p	6p	7p	8p-11p
Weekday (M-F)	1%	32%	66%	70%	45%	21%	24%	26%	23%	18%	6%
Weekend	1%	5%	10%	10%	11%	16%	19%	17%	16%	13%	4%

Wisconsin Avenue/Rockville Pike/Hungerford Road (MD 355)

The highest congestion level in the entire roadway sample is in the morning peak hour from 7:00 to 9:00 along MD 355 southbound in the Shady Grove policy area. Congestion along this corridor shifts from moderate to heavy from one populated center to the next. The Bethesda-Chevy Chase, North Bethesda, Rockville City, Shady Grove, and Derwood policy areas along MD 355 exhibit moderate to heavy congestion. Clarksburg exhibits moderate levels of congestion during the morning peak hours at a TTI of 32 to 59 percent, heading southbound. In Bethesda-Chevy Chase, both directions exhibit heavy congestion levels with southbound heavy from 8:00 a.m. to 10:00 a.m. at a TTI of 71 to 80 percent and moderate levels from 6:00 a.m. to 8:00 a.m. and through the rest of the day. MD 355 northbound from 10:00 a.m. to 6:00 p.m. has a heavy level of congestion ranging from 61 to 69 percent. Despite the congestion along these sections of MD 355, the Metrorail serves to mitigate these populated corridors. In Clarksburg, southbound MD 355 exhibits moderate congestion during the morning peak, at a TTI of 59 percent.

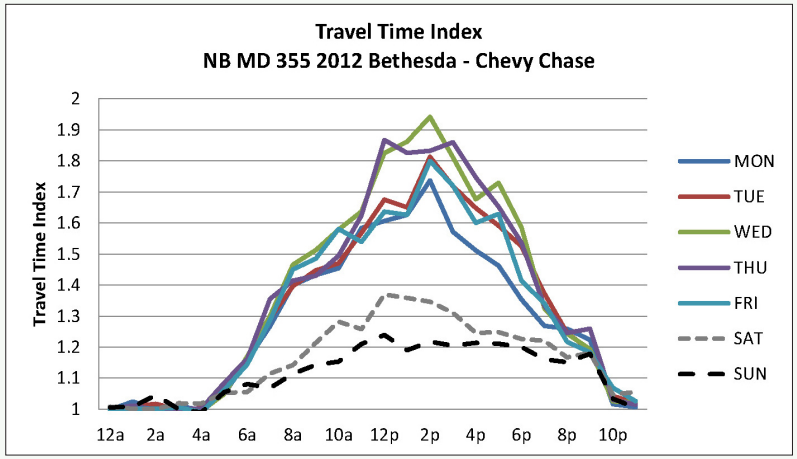


Average Congestion % Color Scale

Uncongested - Light	0%-20%
Light - Moderate	21%-40%
Moderate - Heavy	41%-60%
Heavy - Severe	61%-80%
Severe	80%+

Percentage of Average Congestion
SB MD 355 2012 Shady Grove

	12a-5a	6a	7a	8a	9a	10a-3p	4p	5p	6p	7p	8p-11p
Weekday (M-F)	48%	18%	74%	114%	119%	65%	61%	81%	87%	73%	60%
Weekend	51%	54%	61%	61%	61%	66%	63%	69%	44%	57%	56%



Average Congestion % Color Scale

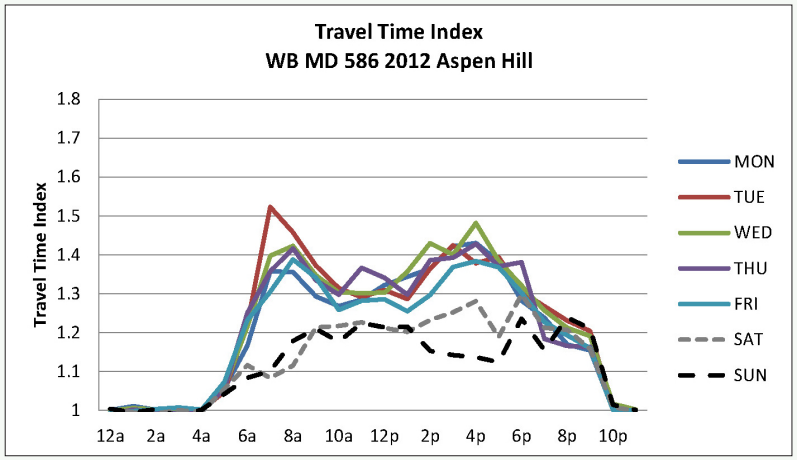
Uncongested - Light	0%-20%
Light - Moderate	21%-40%
Moderate - Heavy	41%-60%
Heavy - Severe	61%-80%
Severe	80%+

Percentage of Average Congestion
NB MD 355 2012 Bethesda - Chevy Chase

	12a-5a	6a	7a	8a	9a	10a-3p	4p	5p	6p	7p	8p-11p
Weekday (M-F)	1%	16%	30%	43%	46%	69%	64%	61%	48%	33%	13%
Weekend	2%	7%	13%	13%	18%	26%	23%	23%	21%	19%	10%

Veirs Mill Road (MD 586)

Considered a major cross-county route through the mid-county, MD 586 experiences moderate to heavy levels of congestion particularly during the morning peak hours in both Aspen Hill and Kensington- Wheaton, ranging from a TTI of 45 to 64 percent. Westbound in the R&D Village exhibits light to moderate congestion levels throughout the weekdays with light congestion in Rockville.

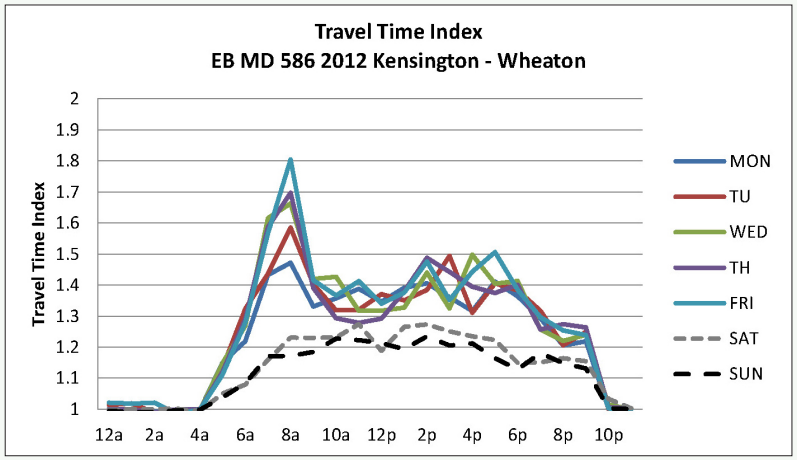


Average Congestion % Color Scale

Uncongested - Light	0%-20%
Light - Moderate	21%-40%
Moderate - Heavy	41%-60%
Heavy - Severe	61%-80%
Severe	80%+

Percentage of Average Congestion
WB MD 586 2012 Aspen Hill

	12a-5a	6a	7a	8a	9a	10a-3p	4p	5p	6p	7p	8p-11p
Weekday (M-F)	1%	22%	39%	41%	34%	33%	42%	38%	32%	23%	9%
Weekend	1%	10%	9%	15%	21%	21%	21%	16%	27%	18%	10%



Average Congestion % Color Scale

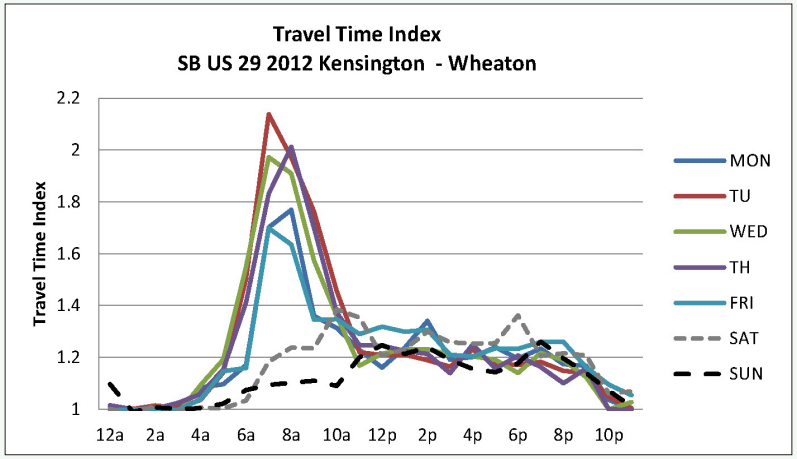
Uncongested - Light	0%-20%
Light - Moderate	21%-40%
Moderate - Heavy	41%-60%
Heavy - Severe	61%-80%
Severe	80%+

Percentage of Average Congestion
EB MD 586 2012 Kensington-Wheaton

	12a-5a	6a	7a	8a	9a	10a-3p	4p	5p	6p	7p	8p-11p
Weekday (M-F)	2%	28%	53%	64%	39%	37%	39%	42%	39%	28%	12%
Weekend	1%	8%	20%	20%	21%	23%	22%	19%	14%	17%	8%

Colesville Road /Columbia Pike (US 29)

This route experiences moderate to severe congestion levels in the Kensington-Wheaton, Fairland-White Oak, and Silver Spring-Takoma Park policy areas. Southbound travel in Kensington-Wheaton (in the vicinity of Four Corners) exhibits the highest levels of congestion at a TTI of 87 percent between 7:00 – 8:00 am.



Average Congestion % Color Scale

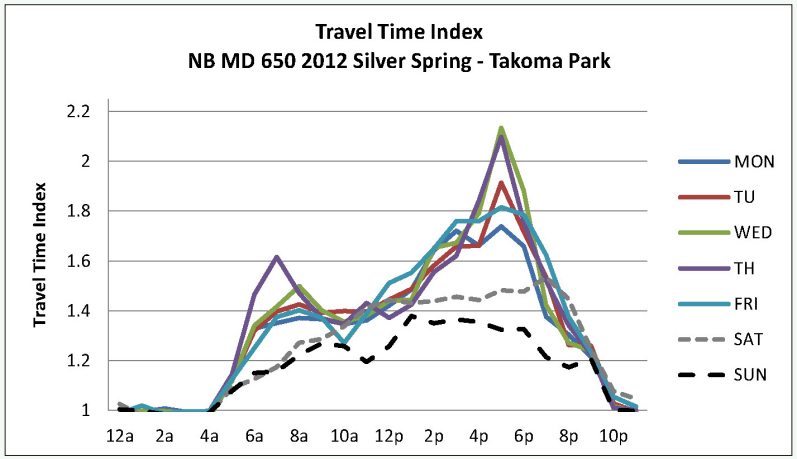
Uncongested - Light	0%-20%
Light - Moderate	21%-40%
Moderate - Heavy	41%-60%
Heavy - Severe	61%-80%
Severe	80%+

Percentage of Average Congestion
SB US 29 2012 Kensington-Wheaton

	12a-5a	6a	7a	8a	9a	10a-3p	4p	5p	6p	7p	8p-11p
Weekday (M-F)	4%	36%	87%	86%	55%	24%	22%	20%	19%	21%	9%
Weekend	1%	5%	17%	17%	17%	24%	20%	20%	27%	23%	12%

New Hampshire Avenue (US 650)

Northbound movements along US 650 in the Silver Spring-Takoma Park policy area exhibit moderate to severe levels of congestion at a TTI of 34 to 43 percent during the morning peak hours and a TTI of 50 to 94 percent during the evening peak hours.



Average Congestion % Color Scale

Uncongested - Light	0%-20%
Light - Moderate	21%-40%
Moderate - Heavy	41%-60%
Heavy - Severe	61%-80%
Severe	80%+

Percentage of Average Congestion
NB MD 650 2012 Silver Spring-Takoma Park

	12a-5a	6a	7a	8a	9a	10a-3p	4p	5p	6p	7p	8p-11p
Weekday (M-F)	2%	34%	43%	43%	38%	48%	74%	94%	76%	50%	14%
Weekend	2%	14%	25%	25%	28%	36%	40%	40%	40%	37%	15%

Non-Auto Travel Trends

The County's transportation system users are not only auto drivers, but also include pedestrians, bicyclists, and transit riders. To that end, the Planning Department recognizes the importance of assessing non-auto travel modes. Since 2012, new development applications are required to include a Pedestrian and Bicycle Impact Statement that includes pedestrian and bike counts as a requirement of Local Area Transportation Review.

Pedestrian and bicycling activity can be measured in many different ways. Past reports calculated pedestrian-to-vehicle ratios to estimate the impact of vehicles on people walking in a given area. Although this ratio is a good measure, this report shifts the focus to more details about pedestrian movements along each road segment. The new database totals observed pedestrian and bike movements at all intersection legs separately and collectively to support performance analysis and the application of these data in future master plans.

Staff continues to collect and load pedestrian and bike counts into the database as this information is received from MDSHA and development application sources. New pedestrian and bicycling data will be integrated into the new database and expanded to provide coverage consistent with the intersection and roadway database. This information will allow planners to make more informed decisions regarding non-motorized travel based on specific community needs.

report. Outside the Urban Areas, there are 171 pedestrian counts that have been collected. The amount of pedestrian counts is steadily increasing with each Mobility Assessment Report, and consultant services will be utilized to collect pedestrian and bike counts, when appropriate, in support of master plan and sector plan updates. This effort will substantially increase the amount of available non-motorized travel data.

Bike and pedestrian volume data are measured as an indication of the level of non-motorized travel through an intersection. Bike turning movements inform the discussion of where and how cyclists are travelling. Pedestrian flows are measured by the total volume traversing through an intersection at any given time of the day.

Pedestrian and Bicycling Analysis

Both pedestrian and bike data are provided by traffic engineering consultants in support of traffic impact study submittals from MDSHA and MCDOT.

Currently, most pedestrian counts in the database are in the Urban Areas, and along priority corridors and other major arterials. In the Urban Areas, 91 of the 172 signalized intersections have pedestrian counts, which doubles the number of pedestrian data locations relative to the previous

For the majority of the data set, pedestrian counts have been submitted in a 13 hour format. Some peak hour numbers, which are in a 6 hour format, have also been submitted into the database which covers the peak but excludes non-peak. For the purposes of this report, the focus is on peak periods only until there is a substantial amount of data that includes both non-peak hours and peak hours.

Based on available pedestrian data, Downtown Bethesda has the most pedestrian activity. Downtown Silver Spring and Downtown Wheaton also exhibit high pedestrian volumes. The County's highest daily pedestrian

volume is at US 29/MD 384/MD 97 intersection located in downtown Silver Spring with nearly 9,500 pedestrians.

Not surprisingly, the Bethesda CBD has the highest level of pedestrian activity during its peak hours, with the Silver Spring and White Flint CBDs close behind. The lowest levels of pedestrian activity are in more auto-oriented locales such as Up-County policy areas along I-270 and Olney and Damascus.

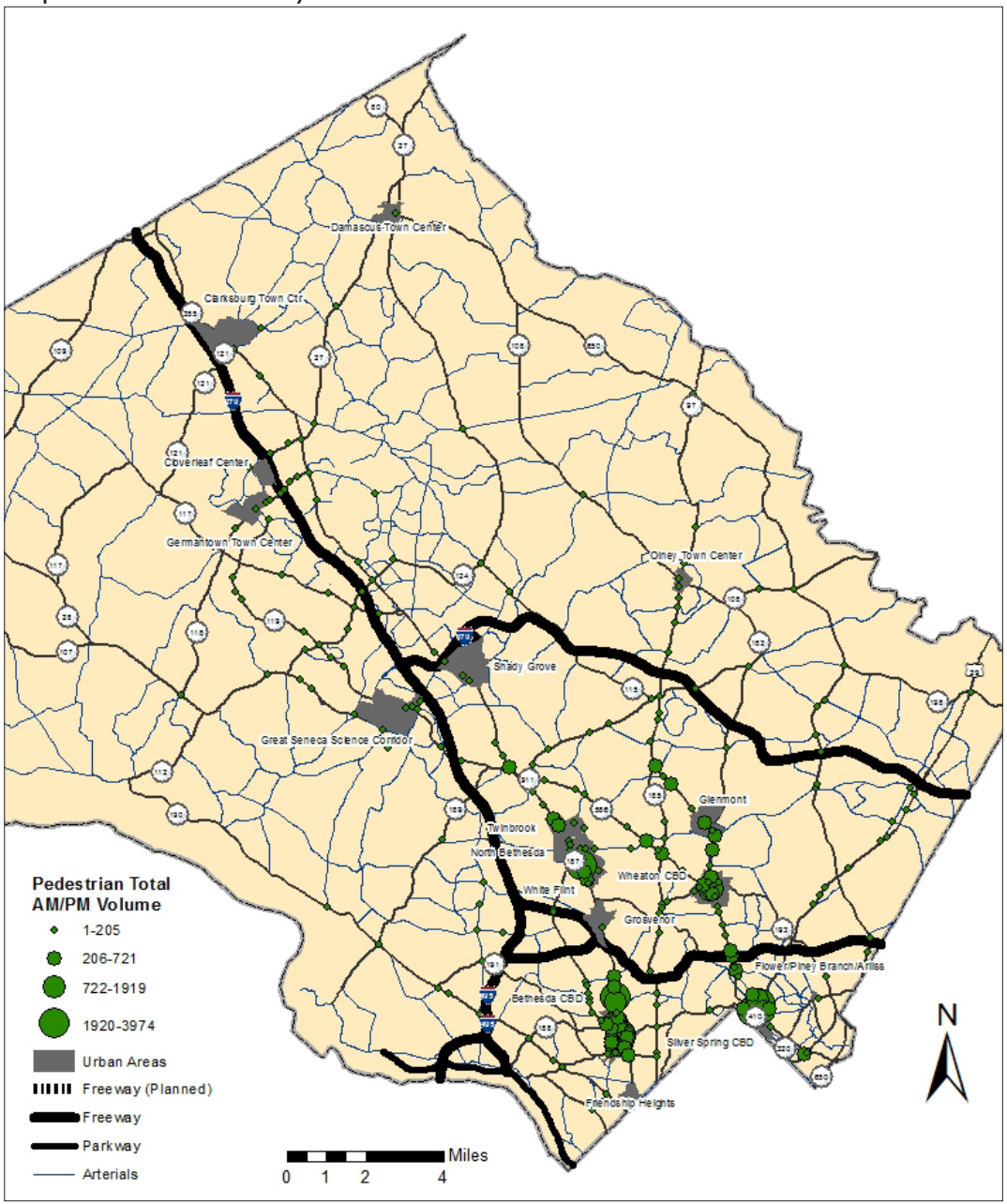
Planning staff have developed a database platform to support the storage and analysis of bicycle count data. However, relative to observed travel data collected for other modes of travel, bicycle counts represent the least amount of data available for analysis.

MDSHA provides bicycle and pedestrian data to address potential conflicts with cars at state-controlled intersections. Bicycle data is also available from MWCOG's 2007/2008 *Household Travel Survey*. The findings from this source, presented in the 2009 Highway Mobility Report*, show a regional increase in bicycling since 1994, including in Montgomery County. While most reported bicycle trips are commuting and social/recreational, people also use their bikes for school, shopping, and other personal trips. As with pedestrian data, consultant services will be used to increase observed bicycling data.

Based on data collected by MDSHA and consultants, 25 bicycle counts were recorded at urban intersections. The highest level of bicycle activity can be found in the Bethesda CBD. Some cyclist activity was recorded in the Wheaton CBD and the Great Seneca Science Corridor. While bicycling for commuting or recreation is not as prevalent in the County as pedestrian or automobile travel, Montgomery County is continuing to build its bicycling database, including data for existing and proposed shared use paths, bike lanes, and signed shared roadways. Future reports will include data on Bikeshare usage as this program expands in Montgomery County.

* www.mwcog.org/uploads/committee-documents/YV5cV1ZX20090520110217.pdf

Map 4: Pedestrian Activity

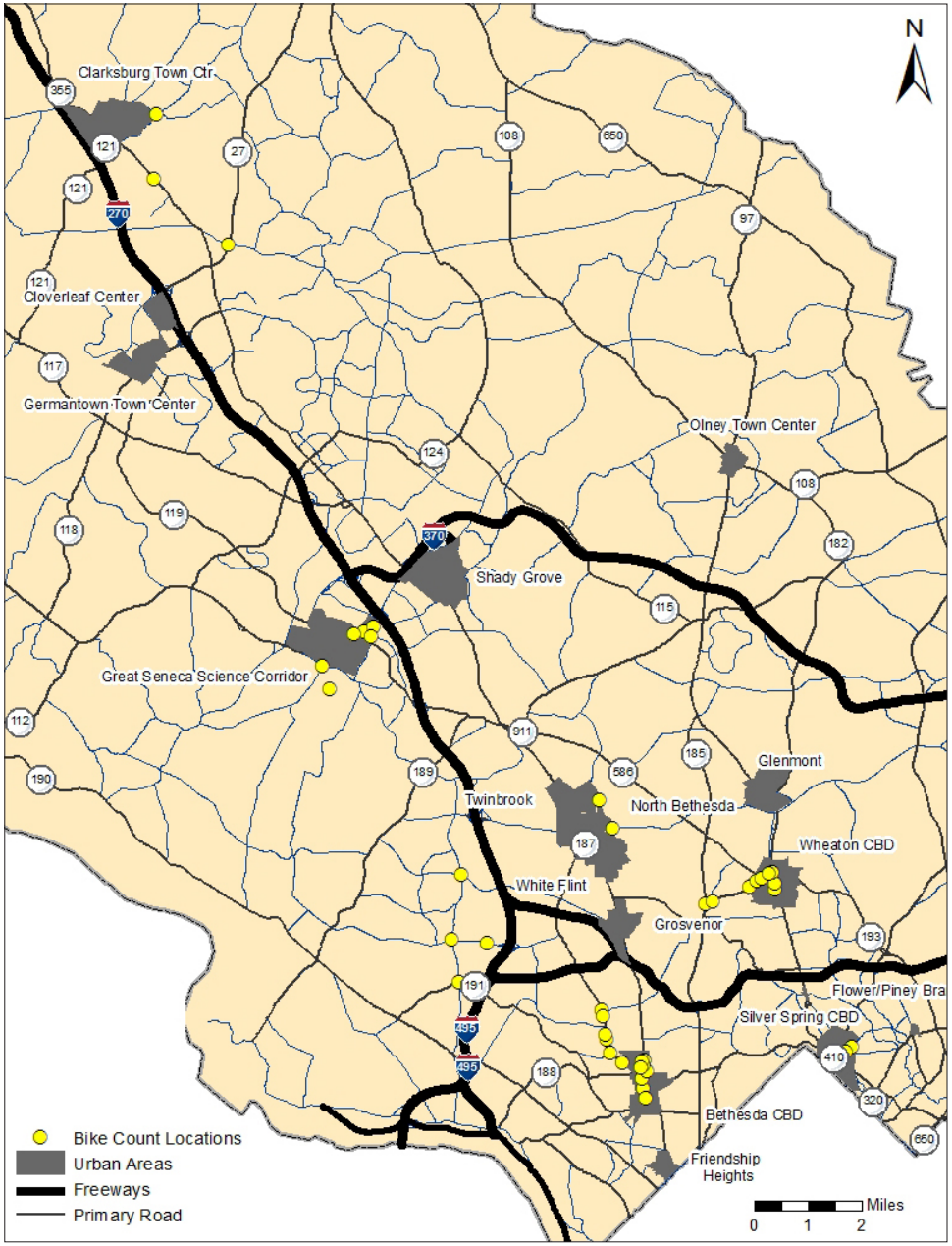


The following map illustrates the breakdown of bike movements through intersections by each leg in an intersection. Each leg is represented by a color in pie chart format on Map 6 to give an indication of the amount of bikers in comparison to the other legs. Investigating bike movements this way can further support an analysis for understanding the flow of bicycles within an intersection. When looking closely, the data will show which legs of an intersection are crossed or not crossed, thus highlighting any specific need to improve bike accommodation based on volume or lack thereof. This type of analysis can be expanded and will be more useful when additional counts become available. North and South leg movements are dominant along MD 355 in downtown Bethesda explaining that the main share of cyclists are using MD 355 to ride through. In a master plan setting, it would be very useful to get an idea of the bike activity at its intersections.

The counts that are currently available in the database are at select locations in Bethesda-Chevy Chase, Clarksburg, Great Seneca Science Corridor, White Flint, Wheaton CBD, and Silver Spring CBD. Currently, the top ten highest bike counts are located in downtown Bethesda. At Woodmont Avenue at Montgomery Lane, 163 bikes were counted, with 84 during the morning peak and 79 during the evening peak. There are 124 cyclists at MD 187 and NIH driveway, which represents the third highest bike count in the list. Counts outside of peak hours are sometimes as much or greater than peak counts, indicating a steady flow of bikers through an intersection. More information will be needed in the database to study the movements further.

Relative to the Bethesda CBD, the Wheaton CBD currently shows a low number of bikers. As Wheaton redevelops, bicycling may increase in the immediate area, but Georgia Avenue, the CBD's main artery, continues to be a heavy-volume road and acts as a deterrent for both pedestrians and bicyclists.

Map 5: Bike Count Locations



Maryland Department of Transportation (MDOT) released a Bicycle and Pedestrian Master Plan in November of 2013. This document recommended goals that can help with monitoring efforts for Montgomery County. "Complete Streets" is the state of Maryland's approach to achieving an interconnected, multi-modal transportation network throughout Maryland that supports access and travel for all users (MDOT, 2013). During the past decade, the State of Maryland has made progress in implementing policies to provide pedestrian and bicycle accommodation as a routine element of road improvements. The reality is that not every need will be met due to constraints in the rights-of-way and in the budget. To remedy this situation, MDOT is striving to improve the evaluation of bicycle and pedestrian needs in order to support balanced decisions and trade-offs. The State will continue to work on improving its evaluation criteria and methodology for assessing bicycle and pedestrian needs to support fully informed "Complete-Streets" decision making. A potential analysis tool that the Planning Department can use is the development of a Bicycle Level of Comfort (BLOC) model to help determine which roads have the greatest need for bicycle-focused improvements. For the pedestrian, the Pedestrian Comfort Factor (PCF) measures, such as crossing distance, intersection spacing, and buffer from traffic, will form an additional metric to better understand the pedestrian network.

Map 6: Total Bike Split Movement Analysis

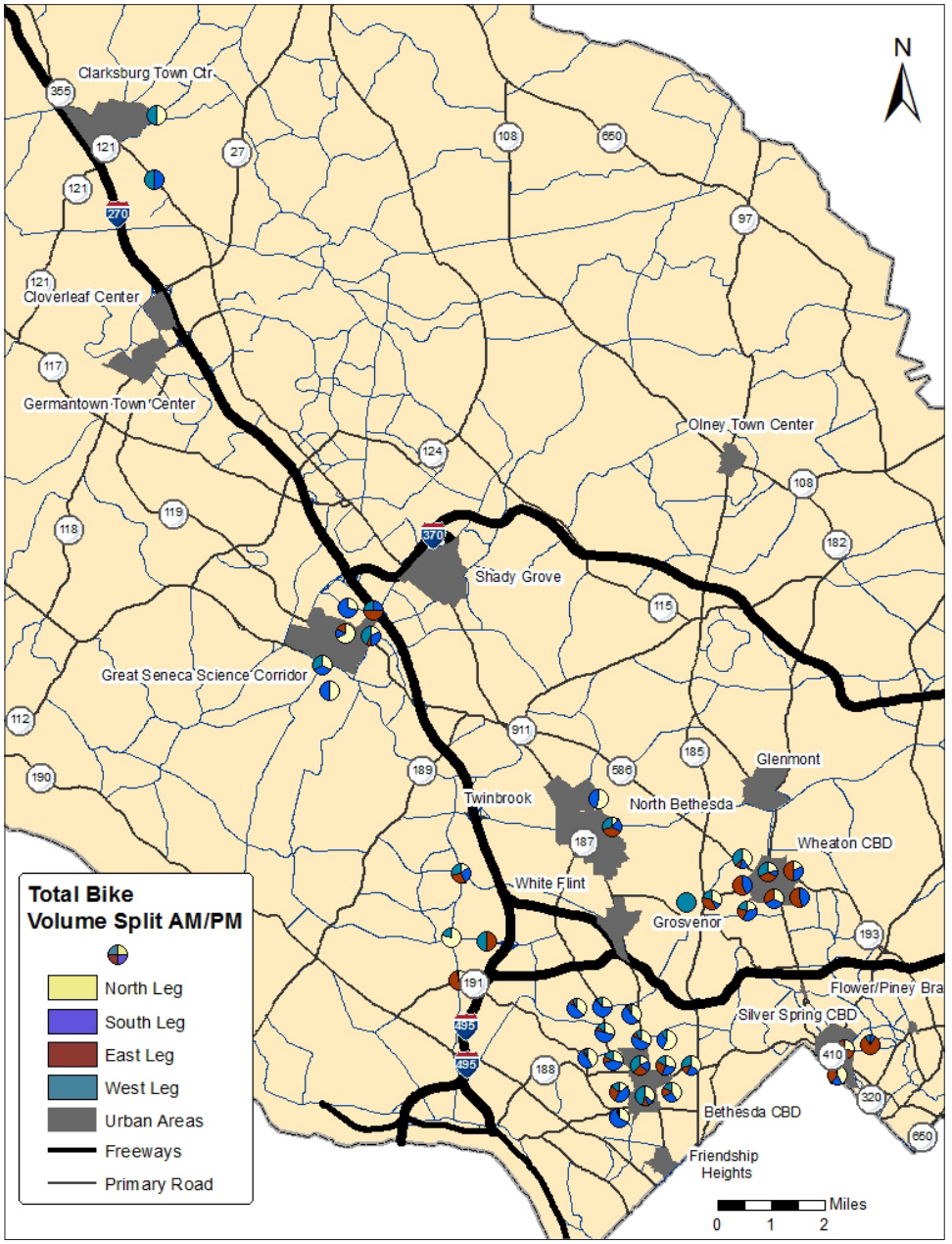


Table 6: Bike Count Ranking

Bike Ranking	Date	North Leg	South Leg	East Leg	West Leg	Total
1	4/25/2012	Woodmont Ave	Woodmont Ave	Montgomery Ln	Montgomery Ln	163
2	12/12/2012	Bradley Blvd	Bradley Blvd	Seven Locks Rd	Seven Locks Rd	150
3	4/6/2011	MD 187	MD 187	NIH Driveway	Lincoln St	124
4	4/6/2011	MD 187	MD 187	Mckinley St	Mckinley St	110
5	12/14/2010	Woodmont Ave	Woodmont Ave	Bethesda Ave	Bethesda Ave	109
6	4/6/2011	MD 187	MD 187	Battery Ln	Battery Ln	100
7	4/6/2011	MD 187	MD 187	West Cedar Ln	Oakmont Ave	76
8	11/17/2011	Woodmont Ave	Woodmont Ave	Norfolk Ave	Norfolk Ave	69
9	4/6/2011	MD 187	MD 187	West Cedar Ln	Oakmont Ave	68
10	1/18/2012	Woodmont Ave	Woodmont Ave	Norfolk Ave	Norfolk Ave	56
11	4/6/2011	MD 187	MD 187	School Driveway	Huntington Pkwy	55
12	11/17/2011	Woodmont Ave	Woodmont Ave	Cordell Ave	Cordell Ave	49
13	11/17/2011	MD 355	MD 355	Chelthenham Dr	Norfolk Ave	48
14	1/18/2012	St Elmo Ave	St Elmo Ave	Norfolk Ave	Norfolk Ave	41
15	1/18/2012	Woodmont Ave	Woodmont Ave	MD 187	MD 187	38
16	5/9/2012	MD 410	Newell St	Newell St	Blair Mill Rd	32
17	11/17/2011	MD 355	MD 355	Cordell Ave	n/a	31
18	1/29/2013	Parklawn Dr	Parklawn Dr	Randloph Dr	Randloph Dr	23
19	12/12/2012	Tuckerman Ln	Tuckerman Ln	Seven Locks Rd	Seven Locks Rd	21
20	9/14/2011	MD 586	MD 586	MD 193	MD 193	13
21	12/18/2012	Fenton St	Fenton St	Bonifant St	Bonifant St	12
22	5/3/2011	Shady Grove Rd	Shady Grove Rd	Research Blvd	Research Blvd	12
23	9/15/2011	MD 97	MD 97	MD 193	MD 193	12
24	5/11/2011	Omega Dr	Medical Ctr Dr	MD 28	MD 28	12
25	1/29/2013	Parklawn Dr	Parklawn Dr	Wilkins Ave	Wilkins Ave	11
26	9/15/2011	MD 97	MD 97	Reedie Dr	Reedie Dr	11
27	5/16/2012	Democracy Blvd	Democracy Blvd	Seven Locks Rd	Seven Locks Rd	10
28	9/5/2011	Newport Mill Rd	Newport Mill Rd	MD 193	MD 193	9
29	9/15/2011	Grandview Ave	Grandview Ave	MD 193	MD 193	9
30	12/18/2012	US 29	US 29	Bonifant St	Bonifant St	7
31	9/14/2011	Valley View Ave	Mall Access	MD 193	MD 193	7
32	5/11/2011	Site Access	n/a	Research Blvd	Research Blvd	7
33	9/14/2011	East ave	Mall Access	MD 193	MD 193	5
34	5/11/2011	Shady Grove Rd	Shady Grove Rd	Corporate Blvd	Corporate Blvd	4
35	4/8/2012	Verizon Bldg Access	Travilah Rd	MD 28	MD 28	3
36	9/13/2011	MD 586	MD 586	Metrobus Access	Shopping Ctr Access	3
37	3/8/2012	Traville Gateway Dr	Traville Gateway Dr	Shady Grove Rd	Shady Grove Rd	2
38	2/6/2013	Democracy Blvd	Democracy Blvd	Westlake Dr	Westlake Dr	2
39	1/31/2012	MD 355	MD 355	Foreman Blvd	Clarksburg HS Access	2
40	1/31/2012	Snowden Farm Pkwy	Snowden Farm Pkwy	Foreman Blvd	Stringtown Rd	2
41	9/23/2010	MD 185	MD 185	Perry Ave	Perry Ave	1
42	5/23/2012	MD 27	MD 27	Brink Rd	Brink Rd	0

Transit Analysis

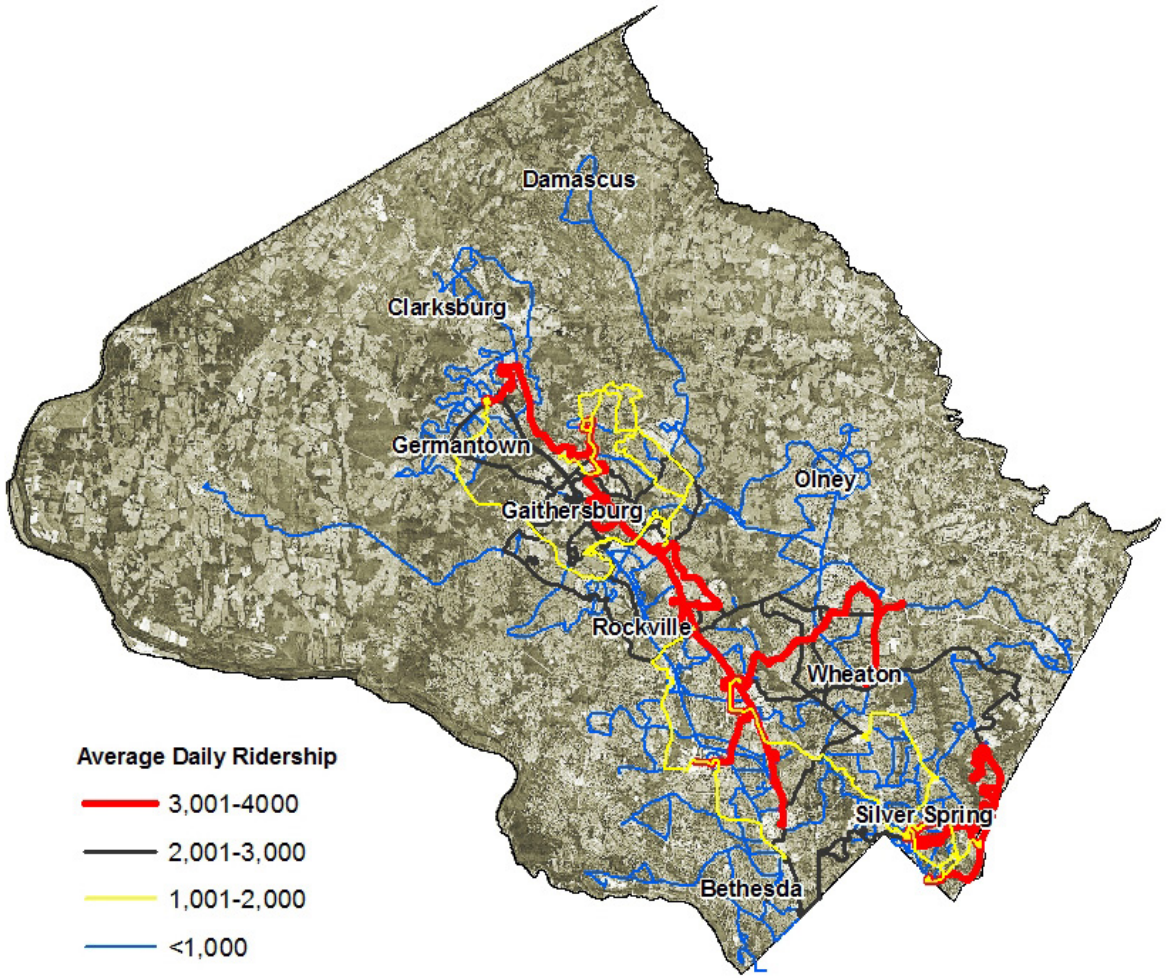
Transit performance measurements look at headways and average ridership and are provided by the Washington Metropolitan Area Transportation Authority (WMATA), and the Montgomery County Department of Transportation (MCDOT).

Ride On Bus

Montgomery County's Ride On bus service is an extensive network of local, feeder, circulator, and express routes that complement the regional bus and rail service provided by the Washington Metropolitan Area Transit Authority (WMATA). Total Ride On boardings on a typical weekday are similar to the total number of passengers boarding Metrorail at Metrorail stations.

In FY13, average weekday ridership on Ride On routes reached 88,370, a slight increase from the 87,990 riders in FY12. Ridership has decreased from the 95,000 average weekday boardings in FY08 due to service reductions of about five percent during the past two years. In addition, fare increases may have contributed to the decline. The only bus line that has been discontinued in 2013 is Route 94 between Kingsview and the Germantown MARC station.

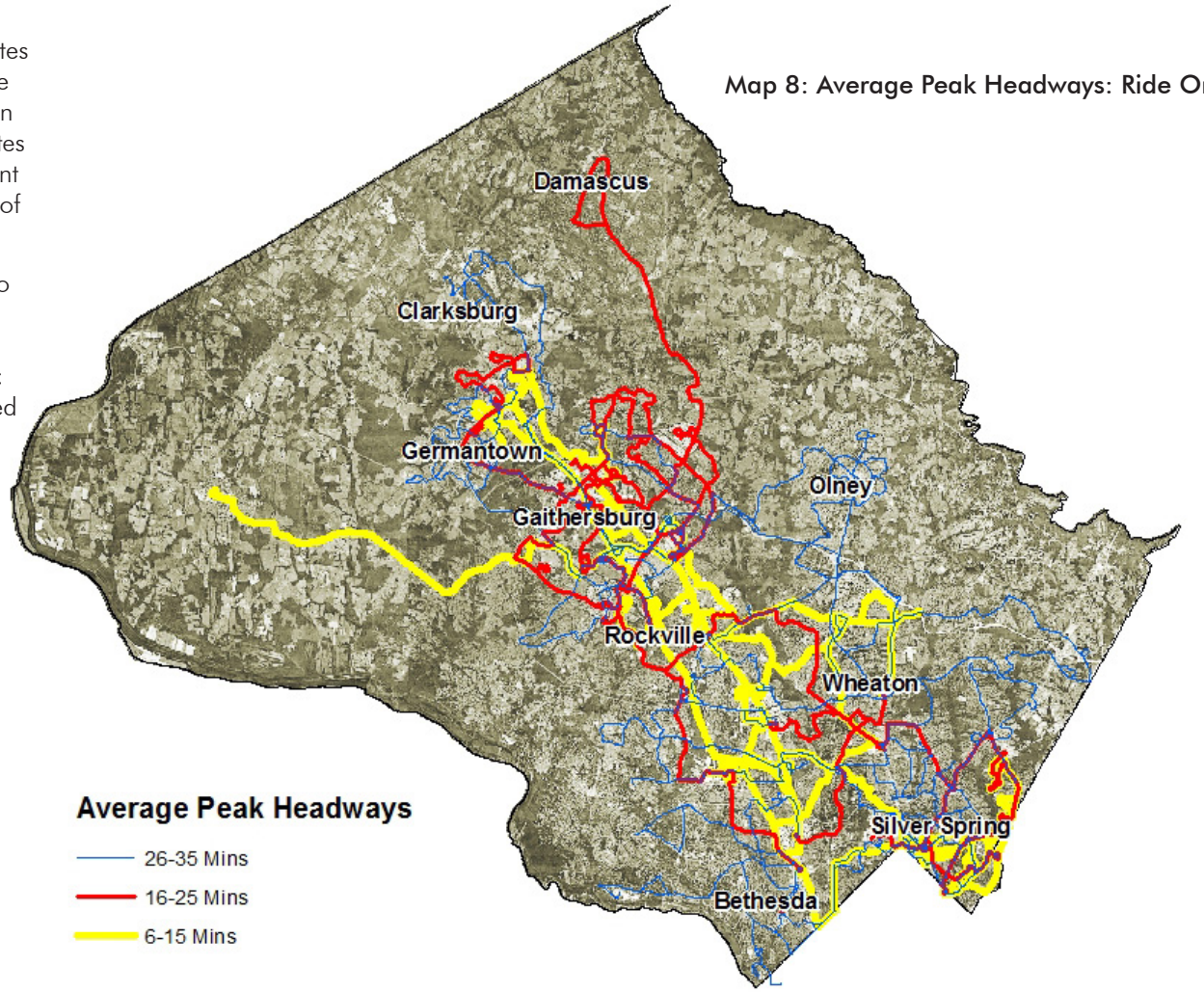
Map 7: Average Daily Ridership: Ride On Bus



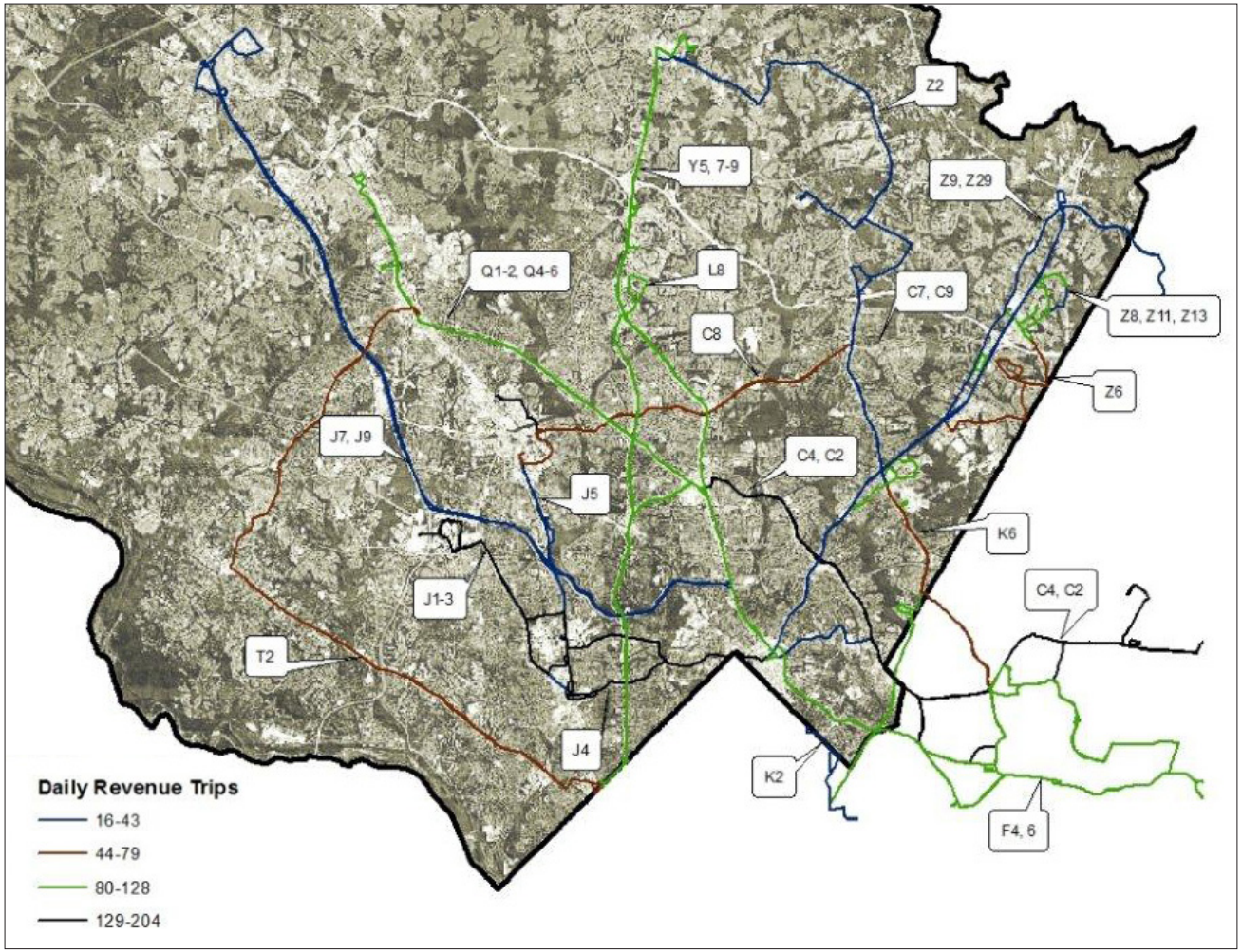
The heaviest Ride On ridership occurs along Routes 55 and 59, which respectively serve the Rockville-Gaithersburg- Germantown area and the Rockville-Lake Forest-Montgomery Village area. While over 70 percent of routes have peak hour headways (the waiting time for a passenger at a transit station) between 20 and 30 minutes, more widely-used routes (such as the 55 and 59) have more frequent service, operating at peak hour headways of 15 minutes or less.

Planning Department analysis has begun to establish the link between high pedestrian volumes and heavily used bus lines to help focus attention on the needs of public transit riders as the County's transit-oriented development areas grow.

Map 8: Average Peak Headways: Ride On Bus



Map 9: Metrobus Daily Revenue Trips



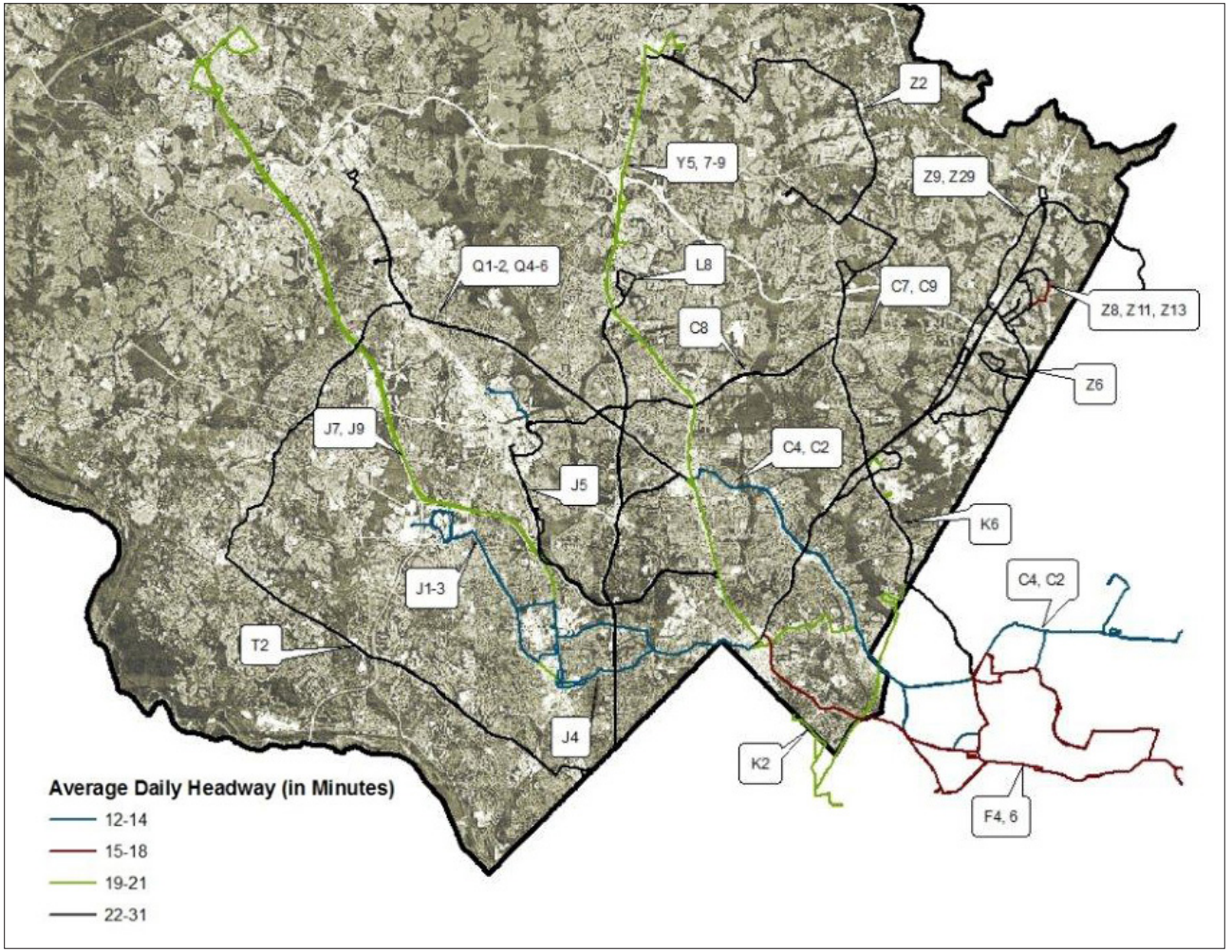
WMATA Metrobus

WMATA daily revenue trips and headways are part of the bus data set that allows comparison to previous years and will allow future comparisons. WMATA Metrobus countywide average weekday ridership increased from 62,062 in FY 12 to 65,794 in FY 13.

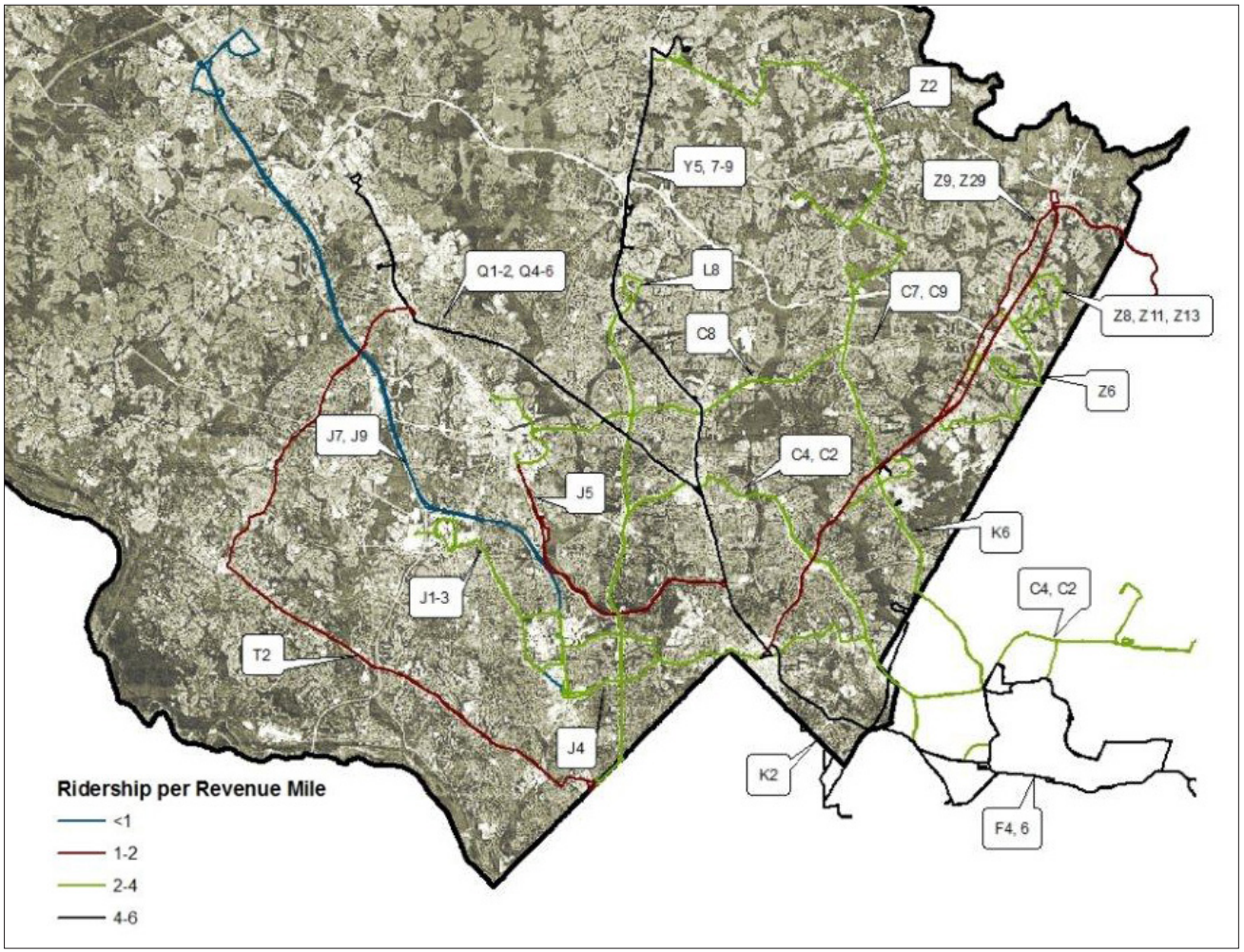
Daily Revenue Trips are the total daily scheduled one-way trips on a given route from its origin to its terminus. Average headway is the average waiting time for a passenger at a transit station.

The Ride On network offers more routes and broader coverage than Metrobus, so the ridership numbers are higher than Metrobus. Additionally, Metrobus tends to serve predominantly major travel corridors, while Ride On offers service to many Up-County, multifamily, transit-dependent neighborhoods.

Map 10: Metrobus Daily Headways



Map 11: Metrobus Ridership per Revenue Mile



The most heavily-traveled Metrobus routes include the C2-C4 and J1-J2-J-3, which travel respectively from Greenbelt to Twinbrook and from Montgomery Mall to Silver Spring. The bus lines that have the highest average daily revenue trips are the J1-J4, and the C2 & C4. The lines with the least amount of headways are the same routes as daily revenue trips J1-4, and the C2 and the C2. These lines serve the down-county area.

WMATA Metrorail

Metrorail ridership by volume and time is measured at each of Montgomery County's Red Line stations.

In the County, Metrorail ridership volume decreased between February 2006 and February 2009. Average Weekday Ridership decreased between FY 11 (173,307) and FY 13 (170,255). The county has seen a slight decreasing trend of weekday ridership of metrorail between FY 10 and FY 13. Between FY 11 and FY 13 there were roughly 3,000 less riders on an average weekday. There was a 2.4% decrease in between FY 11 and FY 13 of average weekday ridership. Since the recession, the ridership recovery of rail ridership has been behind Metrobus. Some causal explanations behind the slower recovery is the expansion of Telework and Alternative Work Schedules (AWS) for federal government and contract employees. 40% of all metrorail riders are federal employees.

Average weekday ridership is heaviest at the Silver Spring, Shady Grove, Bethesda, and Friendship Heights stations. In July 2010, Shady Grove peaked at an average weekday ridership of 30,952. Ridership at those stations has decreased since FY09. Summer months are often the heaviest traveled, with ridership declining during the winter. Weather and political events like the federal shutdown affect ridership volumes.

In Montgomery County, ridership patterns through the day reflect the predominantly residential nature of areas surrounding many Metrorail stations. Monitoring of exits and entries indicates that Metrorail stations in communities with a mix of jobs and housing tend to have an even pattern of entries and exits throughout the day. For example, ridership at the Friendship Heights station is relatively steady through the morning, midday, afternoon, and evening. By contrast, nearly three quarters of all entries at the Shady Grove station, which serves a high commuter population, occur in the morning hours and two thirds of exits are in the evening hours.

Illustration 19: Metrorail Average Weekday Ridership

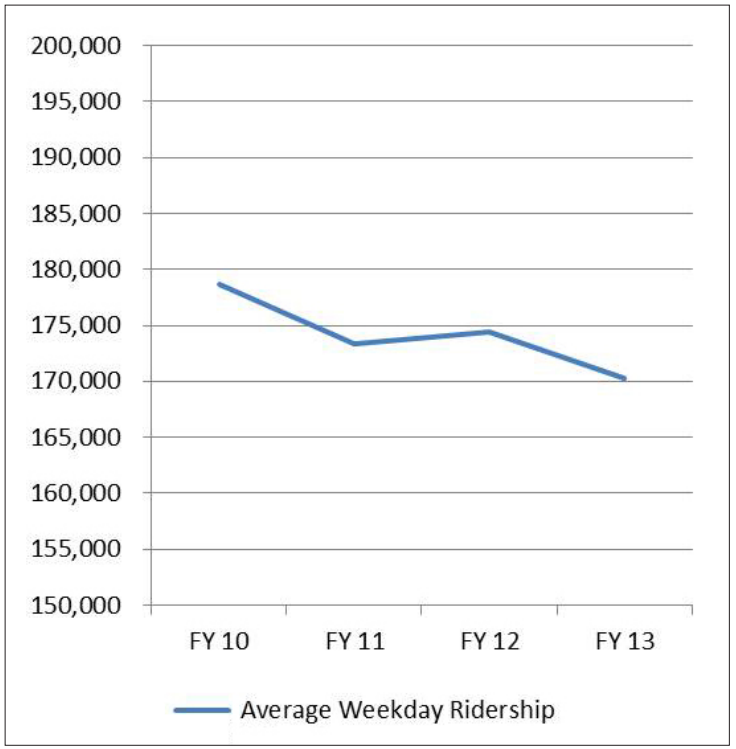
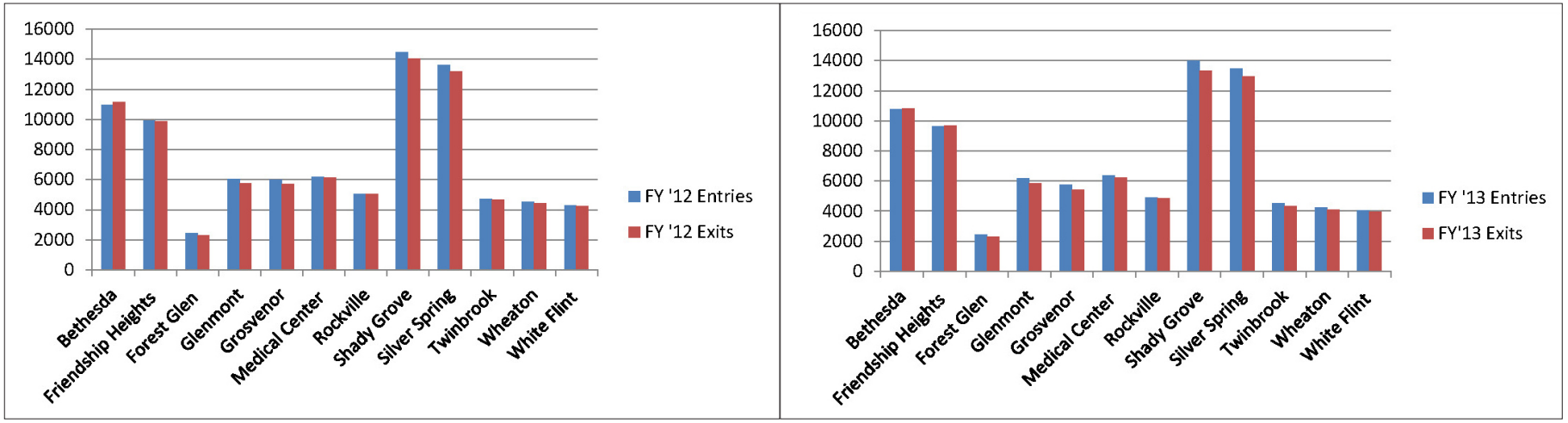


Illustration 18: Metrorail Entries and Exits



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Appendices

Staff Draft

mobility assessment report

April 2014

Montgomery County Planning Department

M-NCPPC

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