



# MOBILITY ASSESSMENT REPORT

FEBRUARY 2017

Presentation to the Montgomery Planning Board  
February, 9<sup>th</sup>, 2017

▣ MONTGOMERY COUNTY PLANNING DEPARTMENT

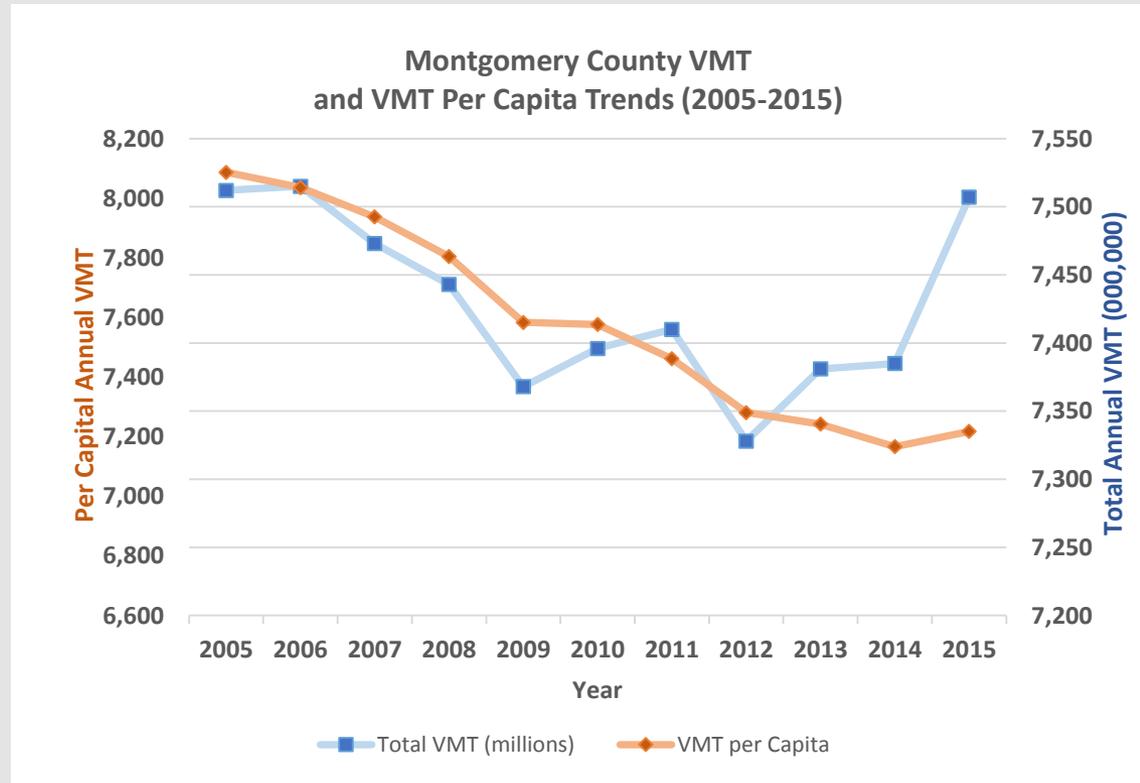
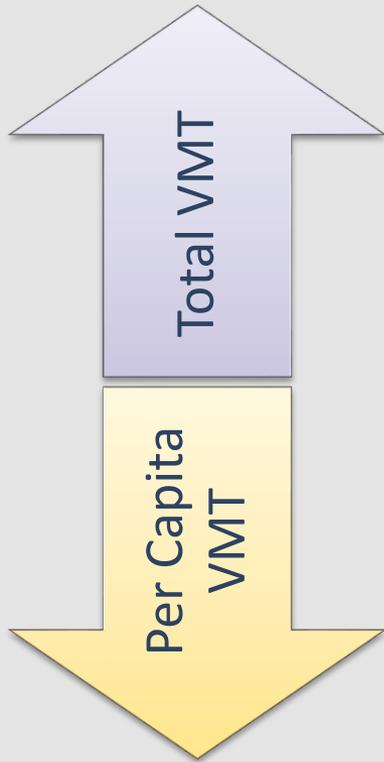
2/14/2017

# Agenda

- Travel Trends
- Vehicular Mobility Analysis (Roads)
- Vehicular Mobility Analysis (Intersections)
- Pedestrian and Bicycle Analysis
- Public Transportation Analysis
- Conclusion and Future Work

# TRANSPORTATION TRENDS

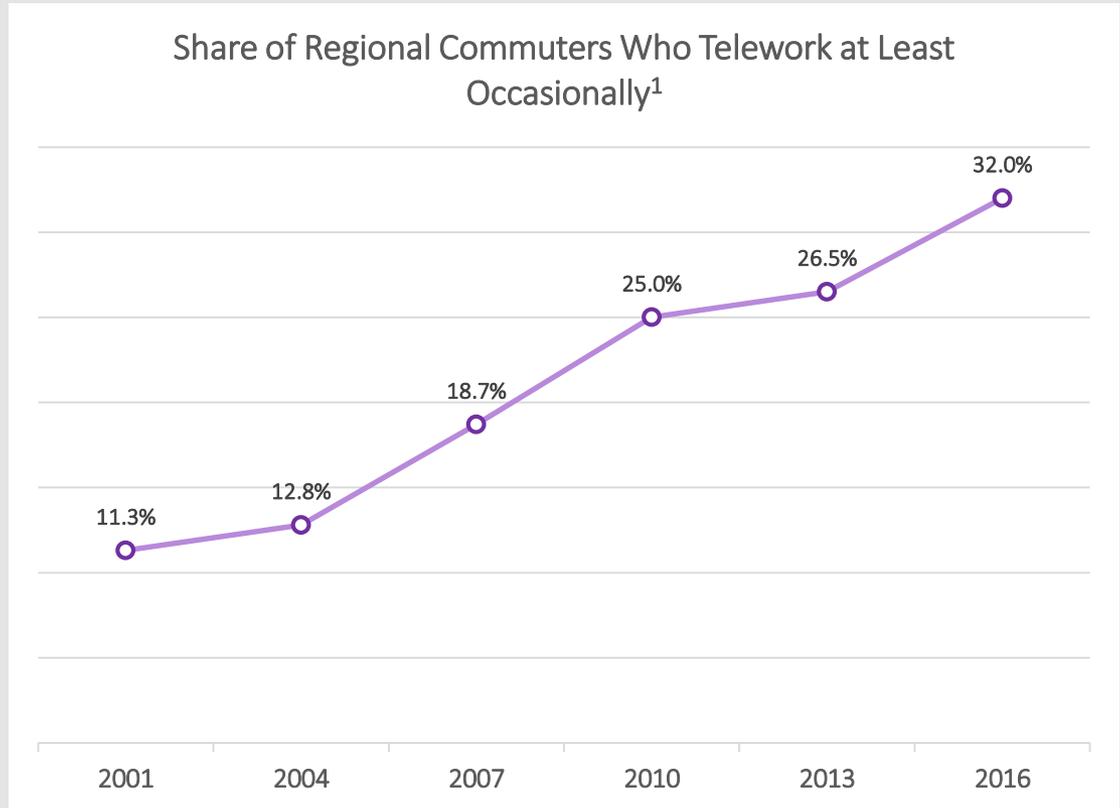
# Travel Trends



1. Maryland State Highway Administration. (2016, 12 13). Annual Vehicle Miles of Travel Report. Retrieved from [http://sha.md.gov/OPPEN/Vehicle Miles of Travel.pdf](http://sha.md.gov/OPPEN/Vehicle_Miles_of_Travel.pdf)
2. U.S. Census Bureau; Community Survey 1-Year Estimates

# Travel Trends

- Additional 500,000 commuters indicate they would telework more regularly if allowed
  - If realized, 50 percent of regional workers would telework



1. National Capital Region Transportation Planning Board. (2016, September 21). National Capital Region State of the Commute 2016 Survey Highlights. Retrieved from [https://www.mwcog.org/assets/1/28/09212016\\_-\\_Item\\_8\\_-\\_Presentation\\_-\\_2016\\_SOC\\_TPBP\\_Presentation.pdf](https://www.mwcog.org/assets/1/28/09212016_-_Item_8_-_Presentation_-_2016_SOC_TPBP_Presentation.pdf)

# Mobility and Accessibility

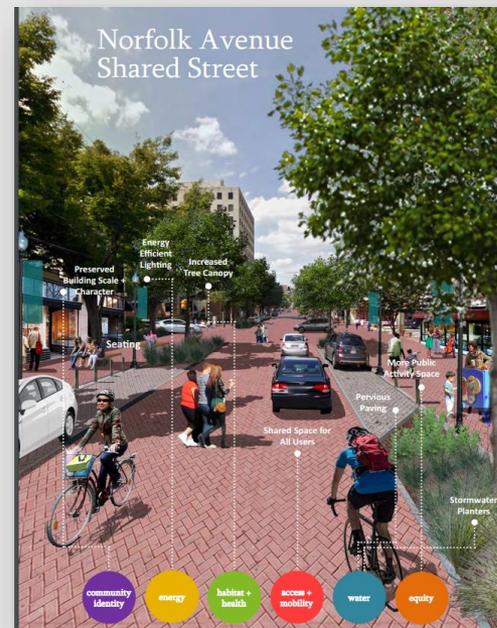
- Mobility: How far can you go in a given time?
- Accessibility: How many opportunities can be reached via all forms of transportation?



Mobility



Accessibility



Mobility



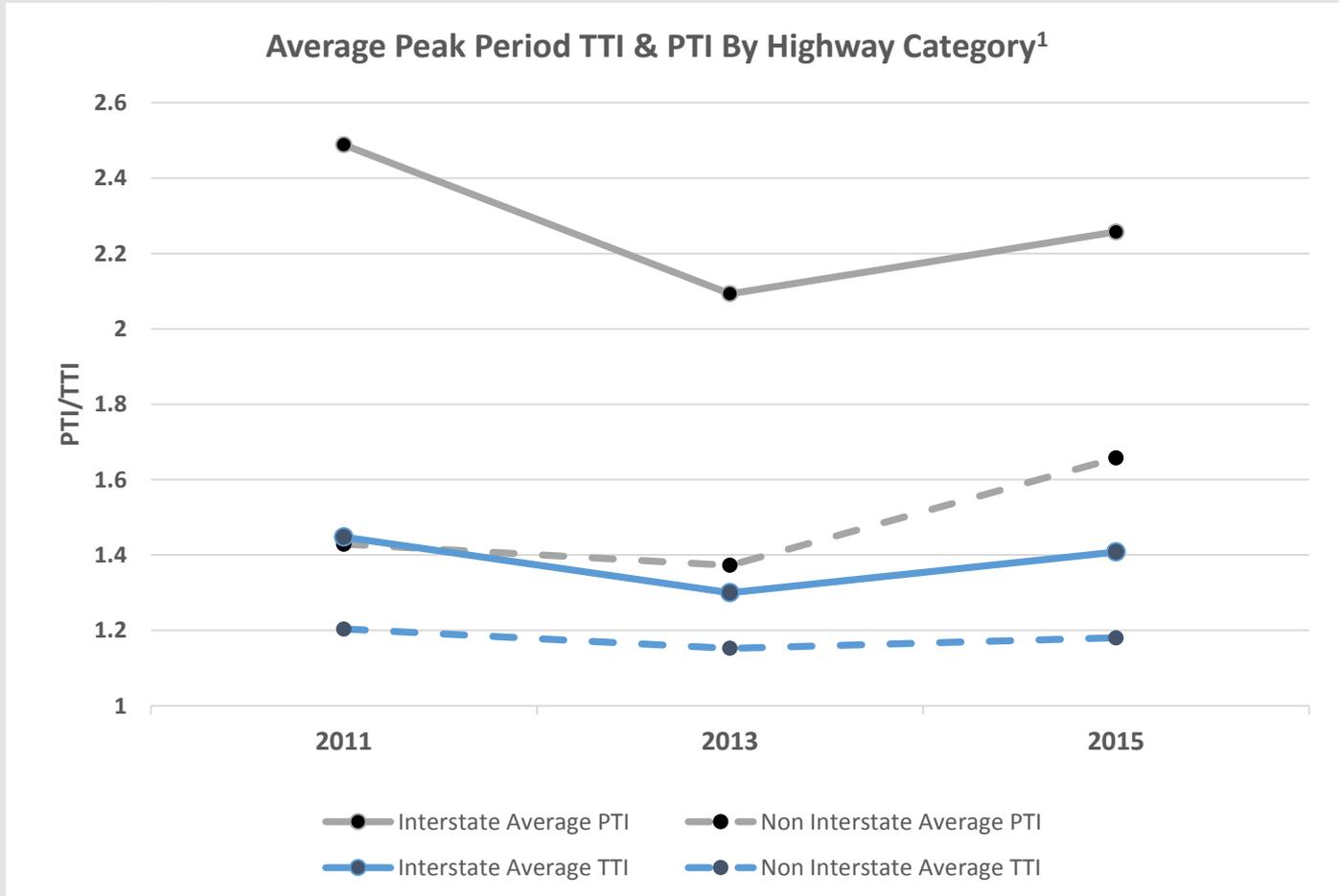
Accessibility

**VEHICULAR  
MOBILITY ANALYSIS  
- ROADS**

# Vehicular Mobility Analysis (Roads)

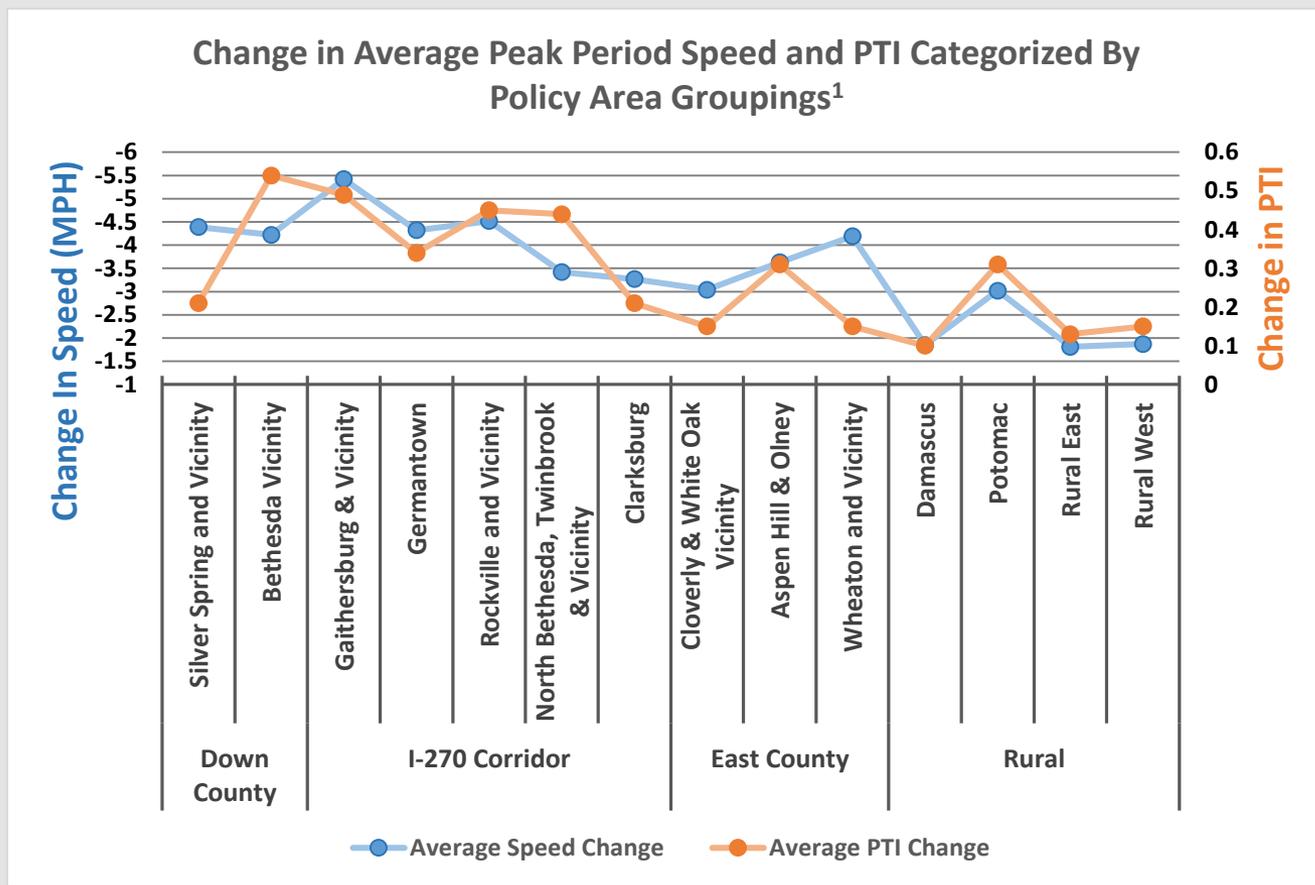
- Metrics
  - **Travel Time Index (TTI):** An indicator of congestion, calculated as the ratio of actual travel time to free flow travel time. A travel time index of 1.00 implies travel without delays, while a travel time index of 1.30 means one must spend 30 percent more time to finish a trip compared to free flow travel time.
  - **Planning Time Index (PTI):** An indicator of travel time reliability, calculated as the ratio (also able to be expressed as a percentage) of 95th percentile travel time over free flow travel time. The PTI expresses the extra time a traveler should budget in addition to free flow travel time to guarantee an on-time arrival. Thus, the planning time index compares near-worst case travel time to a travel time in light or free-flow traffic. For example, a PTI of 1.8 indicates that a 20-minute trip in free-flow conditions requires 36 total minutes ( $1.8 \times 20$  minutes) to guarantee an on-time arrival during congested periods.

# Vehicular Mobility Analysis (Roads)



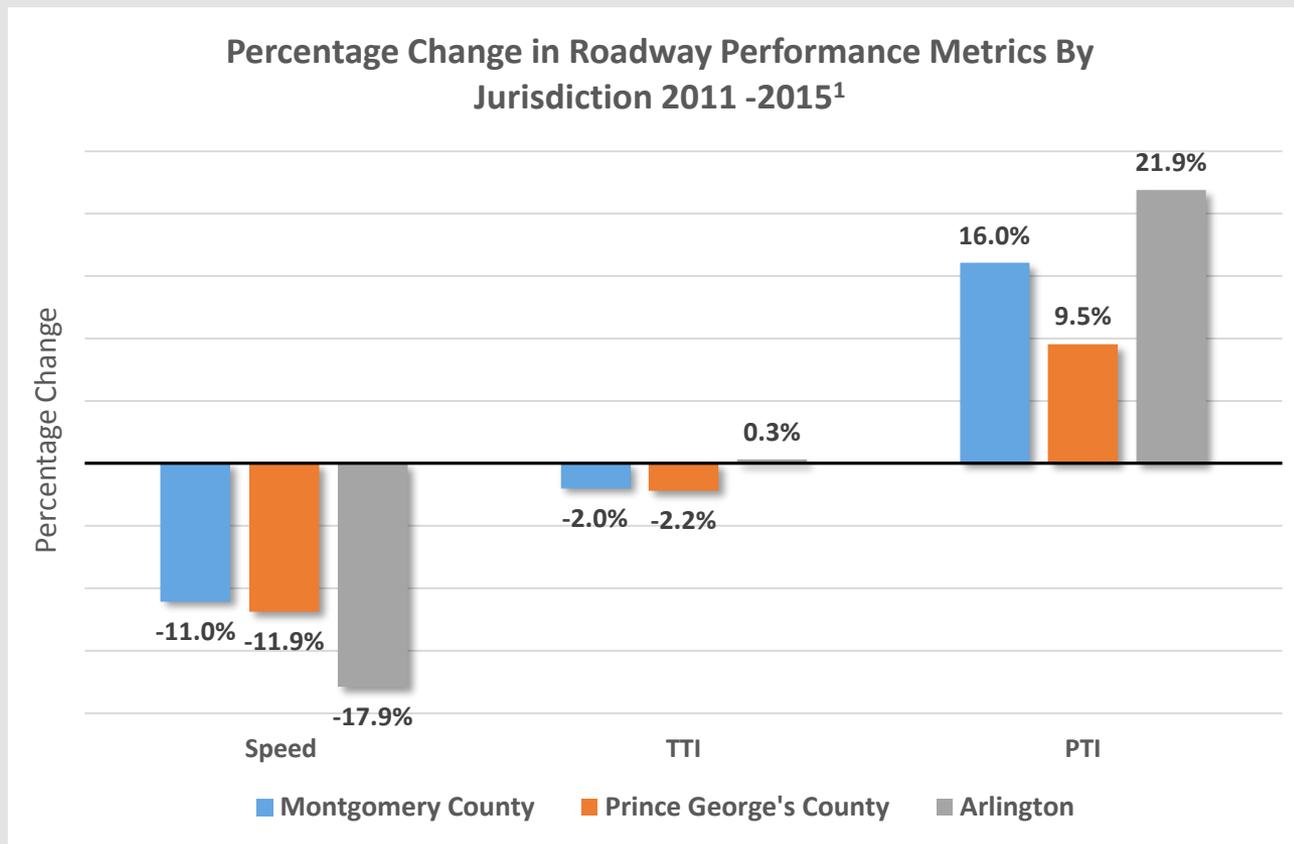
1. Summarized from Inrix Vehicle probe data obtained from the Regional Integrated Transportation Information System's (RITIS) Vehicle Probe Project Suite

# Vehicular Mobility Analysis (Roads)



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# Vehicular Mobility Analysis (Roads)

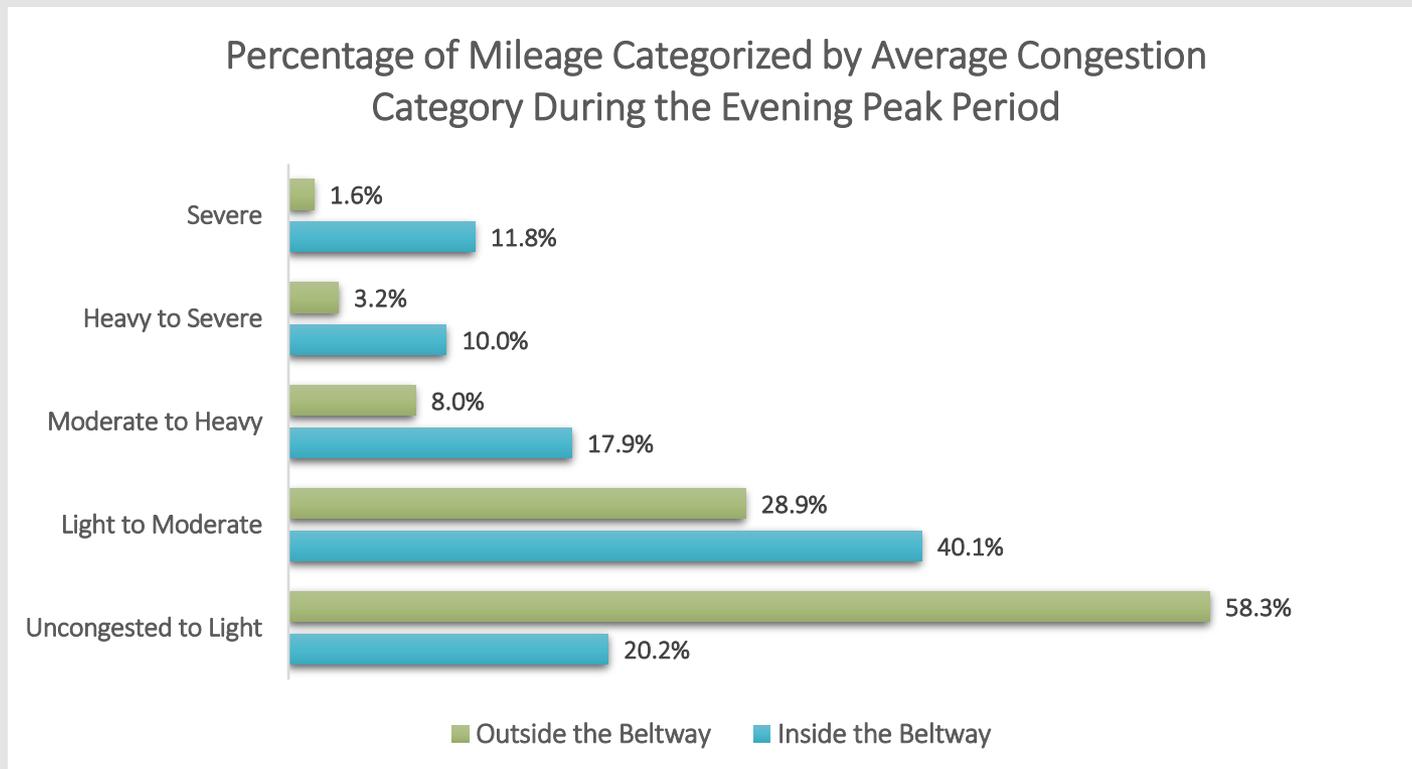


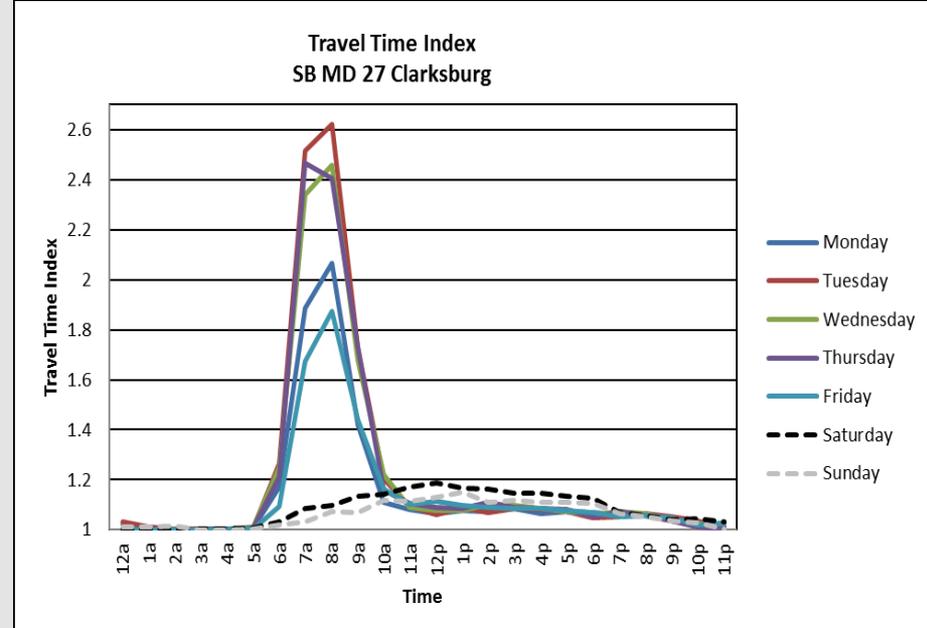
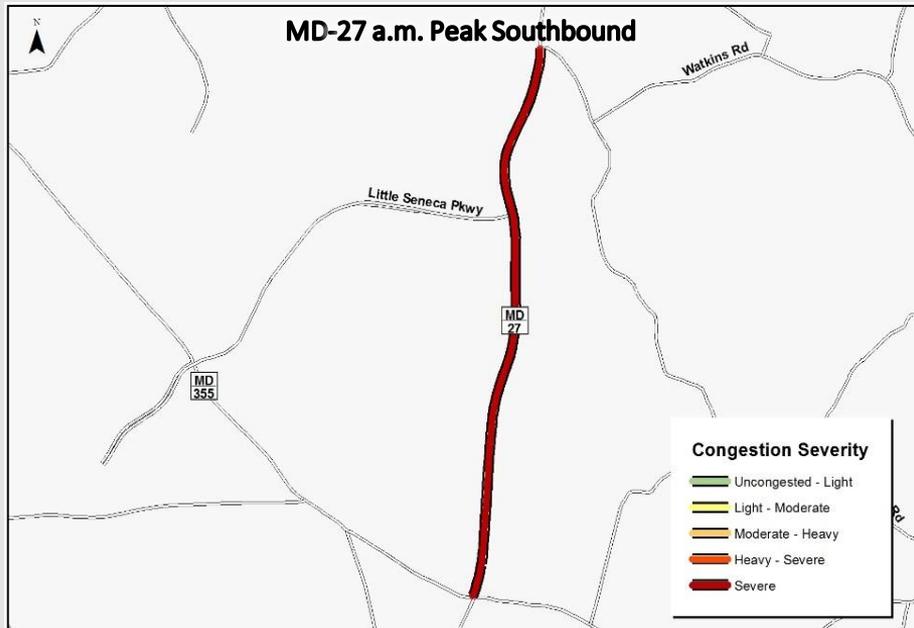
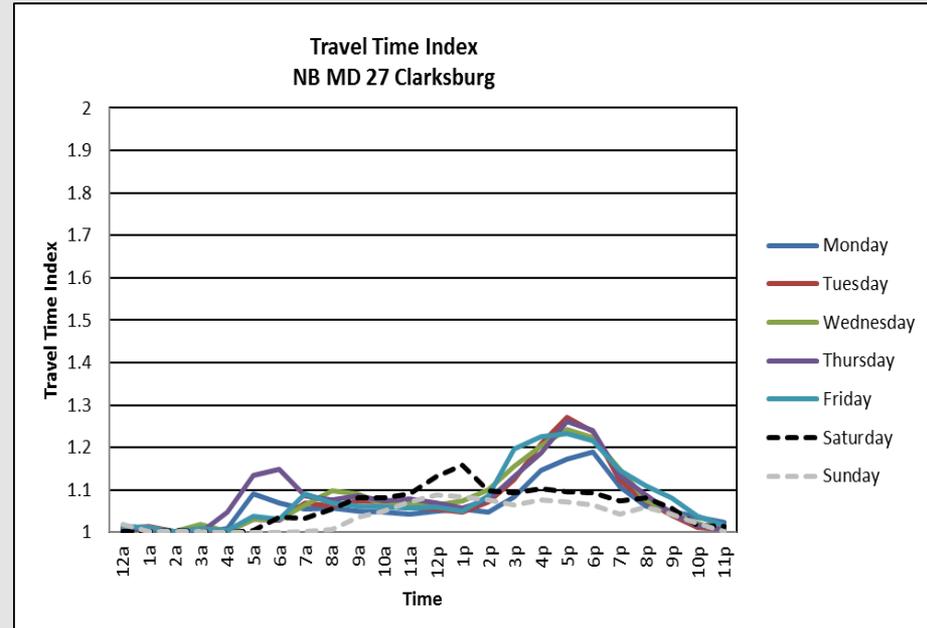
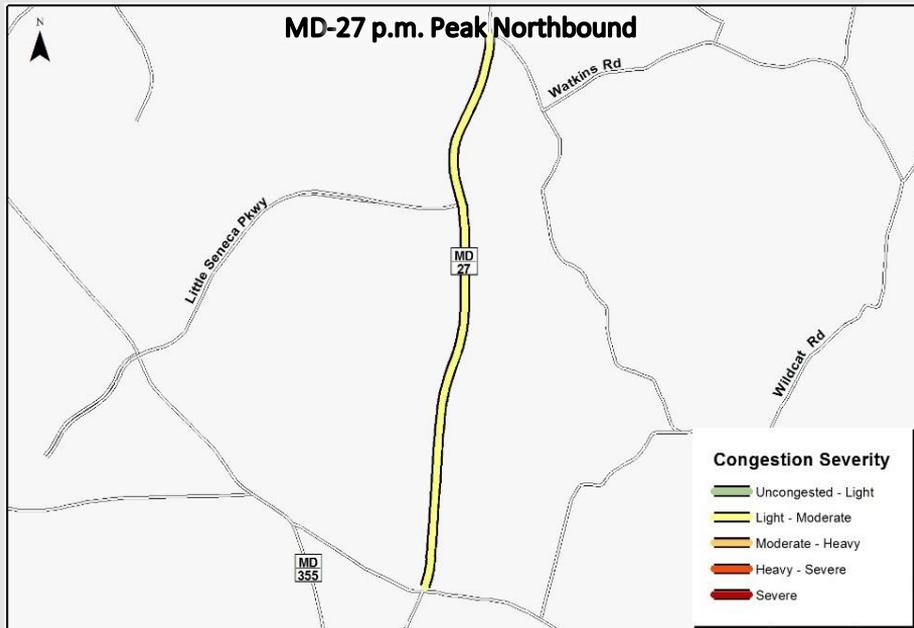
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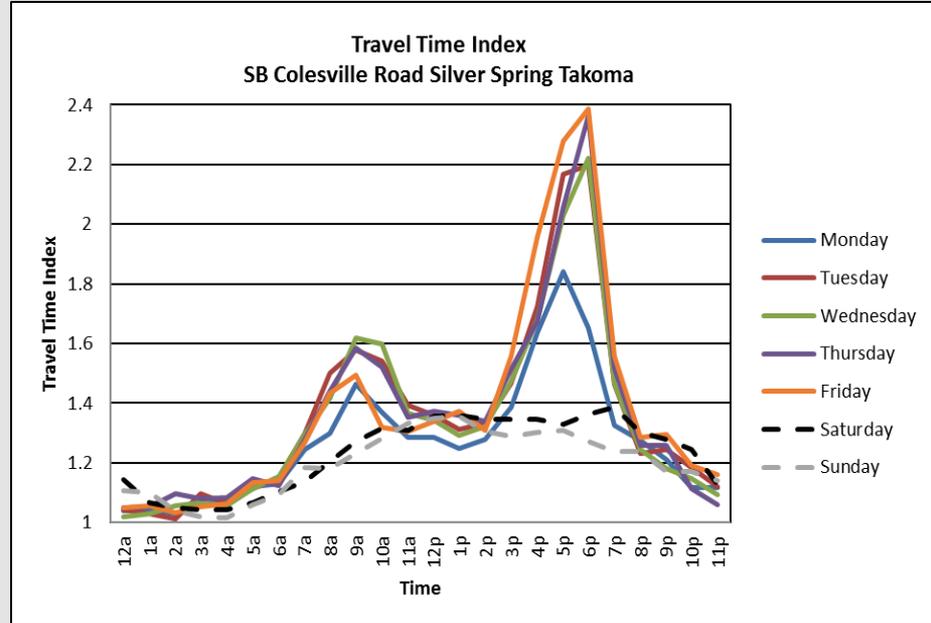
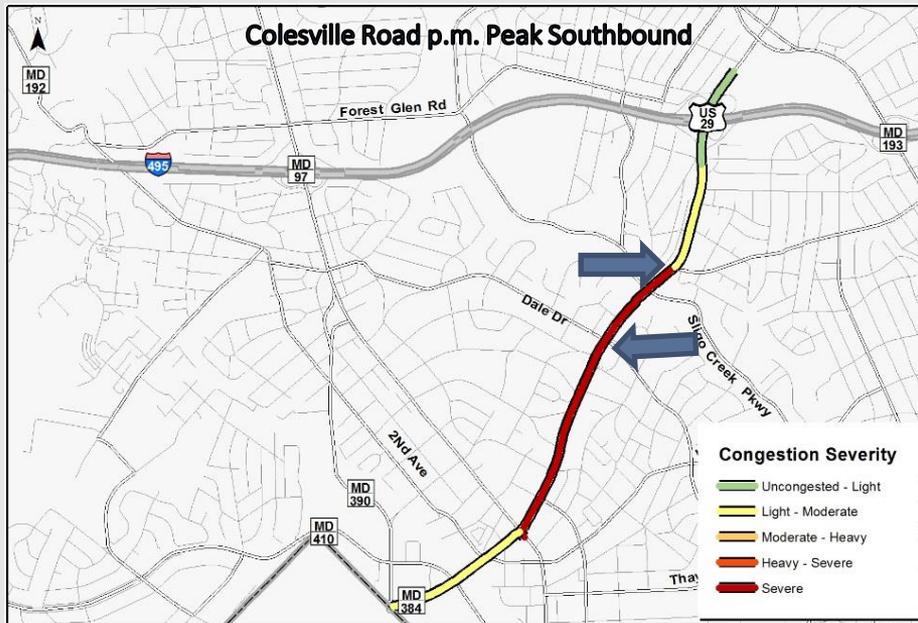
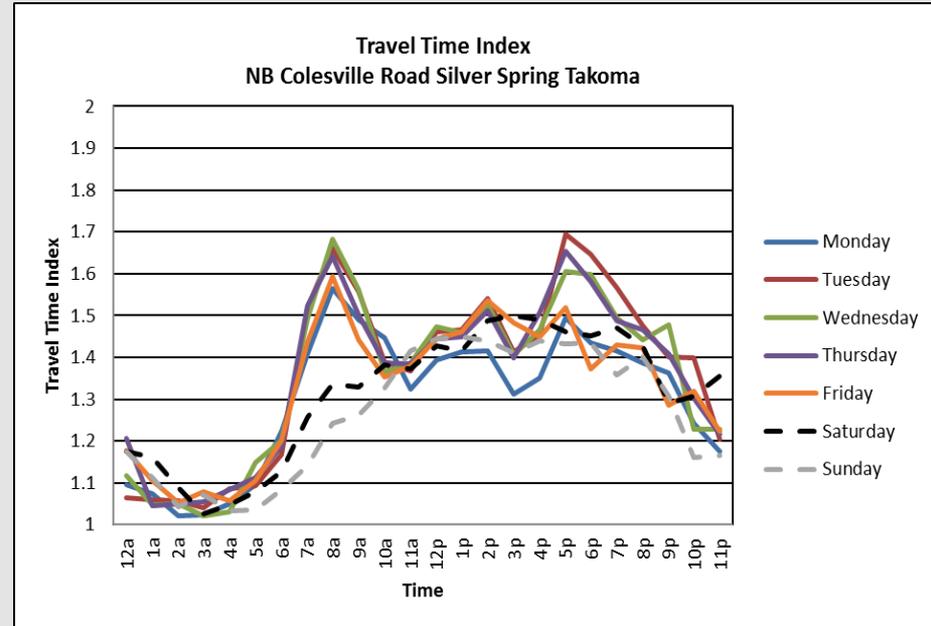
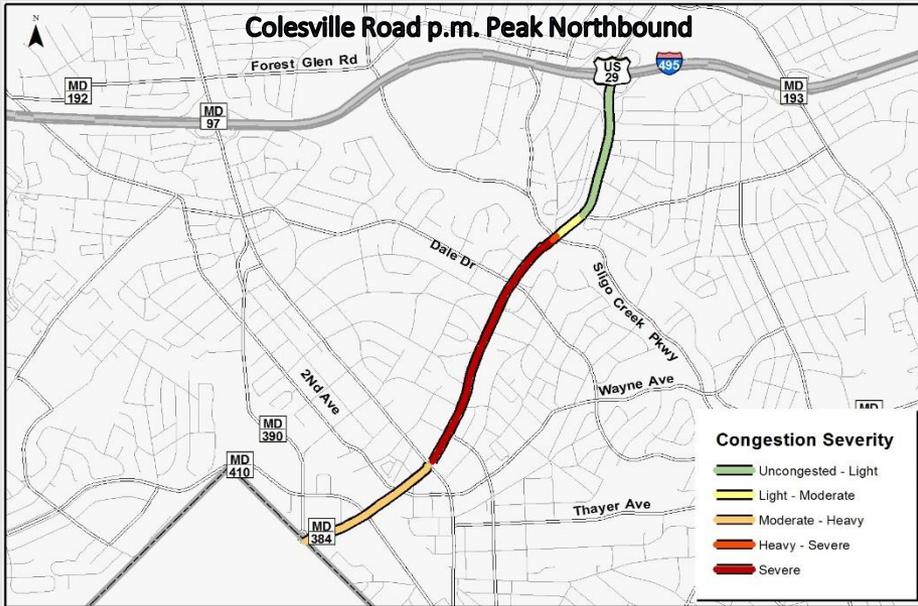


Rank	Corridor	Section	Direction	Congestion	Assigned Policy Area Cluster	Peak Period
1	MD- 27	Brink Rd to Davis Mill Rd	Southbound	100%	Clarksburg	AM Peak
2	Colesville Road	Capital Beltway to DC Line	Southbound	100%	Silver Spring CBD, Silver Spring/Takoma	PM Peak
3	MD-185	Capital Beltway to DC Line	Southbound	78%	Bethesda CBD, Bethesda/Chevy Chase, Friendship Heights	AM Peak
4	Georgia Avenue	DC Line to Capital Beltway	Northbound	77%	Silver Spring CBD, Silver Spring/Takoma	PM Peak
5	MD-650	DC Line to Capital Beltway	Northbound	76%	Silver Spring CBD, Silver Spring/Takoma	PM Peak
6	MD-185	DC Line to Capital Beltway	Northbound	74%	Bethesda CBD, Bethesda/Chevy Chase, Friendship Heights	PM Peak
7	MD-355	DC Line to Capital Beltway	Northbound	74%	Bethesda CBD, Bethesda/Chevy Chase, Friendship Heights	PM Peak
8	US-29	MD-198 to University Blvd	Southbound	73%	Fairland/Colesville, White Oak & Cloverly	AM Peak
9	MD-355	Capital Beltway to DC Line	Southbound	72%	Bethesda CBD, Bethesda/Chevy Chase, Friendship Heights	PM Peak
10	MD-187	Rockville Pike to Capital Beltway	Southbound	67%	North Bethesda, White Flint, Twinbrook, Grosvenor	PM Peak
11	MD-185	Aspen Hill Rd to Capital Beltway	Southbound	66%	Wheaton CBD, Wheaton/Kensington, Glenmont	AM Peak
12	MD-410	Jones Mill Rd to Wisconsin Ave	Westbound	66%	Bethesda CBD, Bethesda/Chevy Chase, Friendship Heights	AM Peak
13	MD-185	Aspen Hill Rd to Georgia Ave	Northbound	65%	Aspen Hill & Olney	PM Peak
13	MD-355	DC Line to Capital Beltway	Northbound	66%	Bethesda CBD, Bethesda/Chevy Chase, Friendship Heights	PM Peak
14	MD-547	Beach Drive to MD-185	Eastbound	65%	Wheaton CBD, Wheaton/Kensington, Glenmont	PM Peak
15	US-29	University Blvd to Capital Beltway	Southbound	64%	Wheaton CBD, Wheaton/Kensington, Glenmont	AM Peak
16	US-29	Capital Beltway to University Blvd	Northbound	64%	Wheaton CBD, Wheaton/Kensington, Glenmont	PM Peak
17	MD-390/16TH ST	MD-97 to DC Line	Southbound	61%	Silver Spring CBD, Silver Spring/Takoma	PM Peak
18	Randolph Road	MD-355 to Rocking Horse Rd	Eastbound	61%	North Bethesda, White Flint, Twinbrook, Grosvenor	PM Peak
19	MD-28	MD-97 to Baltimore Rd	Westbound	59%	Aspen Hill & Olney	AM Peak
20	US-29	Sandy Spring Road to the county border	Northbound	59%	Rural East	PM Peak
21	MD-187	MD-355 to the Capital Beltway	Northbound	58%	Bethesda CBD, Bethesda/Chevy Chase, Friendship Heights	PM Peak
22	MD-190	Esworthy Rd to Piney Meetinghouse Rd	Eastbound	57%	Rural West	AM Peak
23	MD-586	MD-97 to MD-185	Eastbound	57%	Wheaton CBD, Wheaton/Kensington, Glenmont	PM Peak
24	MD-190	Capital Beltway to Piney Meetinghouse Rd	Eastbound	57%	Potomac	AM Peak
25	MD-187	Capital Beltway to Rockville Pike	Northbound	56%	North Bethesda, White Flint, Twinbrook, Grosvenor	PM Peak

# Vehicular Mobility Analysis (Roads)



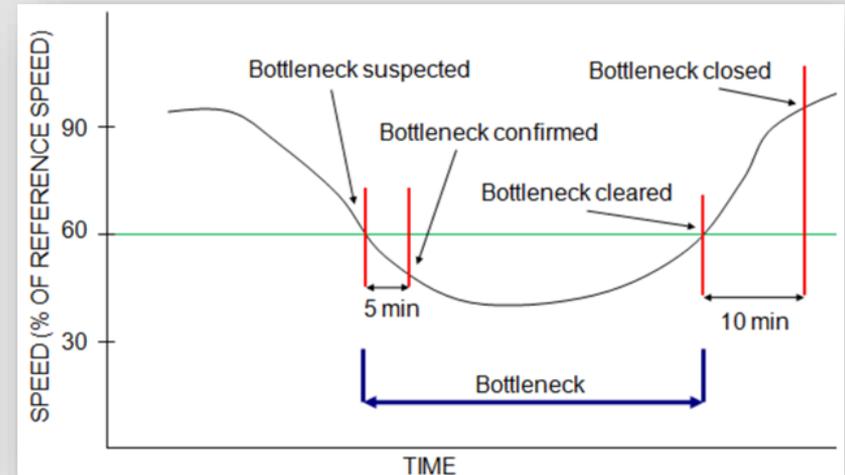




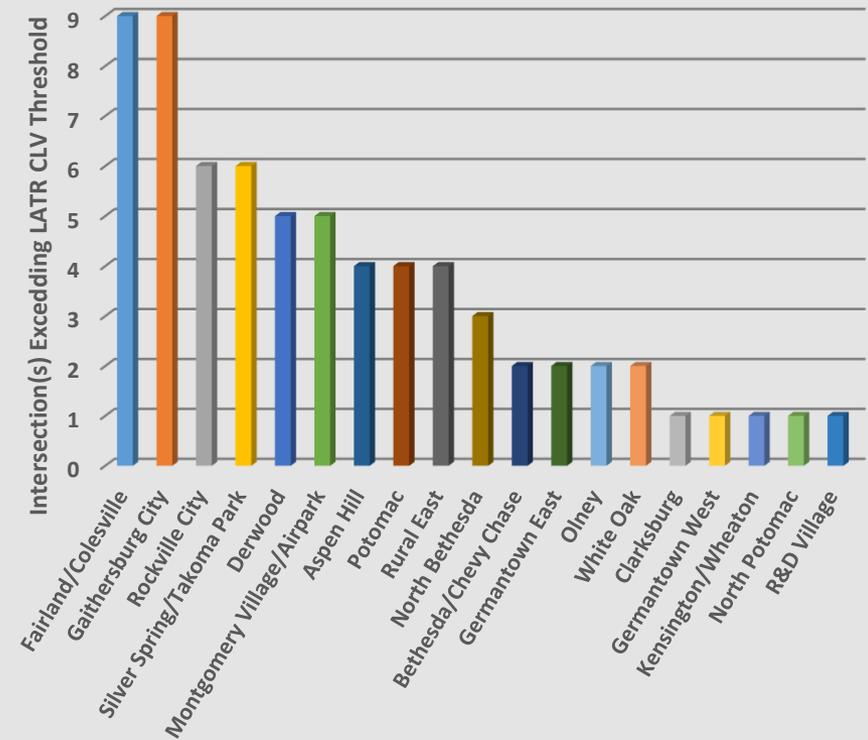
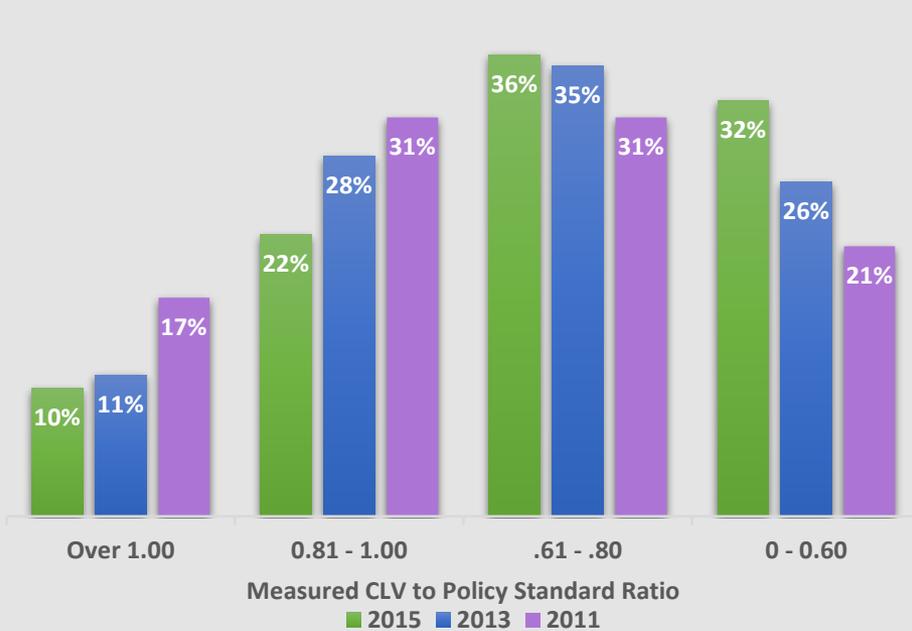
**VEHICULAR  
MOBILITY ANALYSIS  
- INTERSECTIONS**

# Vehicular Mobility Analysis (Intersections)

- Metrics
  - **Critical Lane Volume (CLV):** A level of service (LOS) metric used to assess the performance of an intersection that represents the amount of through and conflicting vehicle movements during a particular period of time.
  - **Bottleneck:** Adopted from the Vehicle Probe Project Suite (VPPS). A bottleneck's intensity is a product of the duration of the bottleneck, average maximum length of the bottleneck, and the number of occurrences within a specified time frame. It is intended to identify chokepoints in the transportation system



# Vehicular Mobility Analysis (Intersections)



# Top Intersections Ranked By CLV

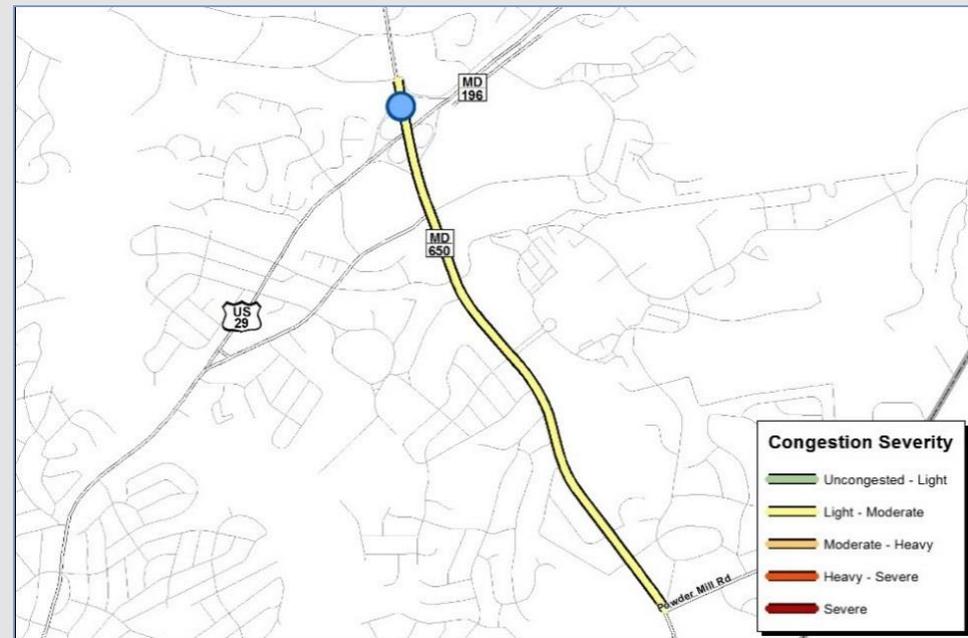
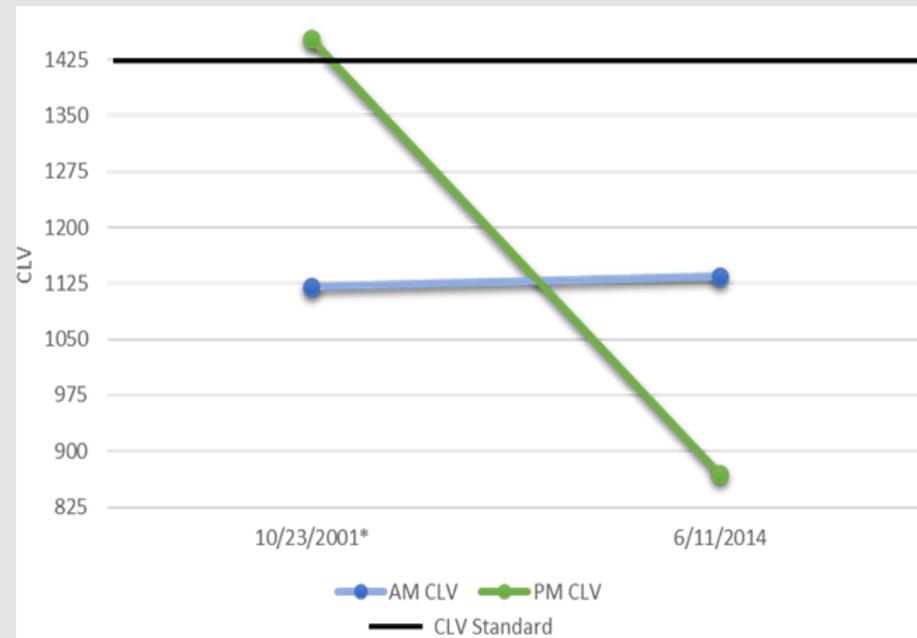
Report Year Ranking				Intersection Name	Previous MAR Count Date	Previous MAR CLV	Current Count Date	Current CLV	CLV Standard	Policy Area
2009	2011	2014	2017							
2	4	1	1	Rockville Pike at W Cedar Lane	11/6/2013	1957	9/16/2015	1868	1600	Bethesda/Chevy Chase
*	3	5	2	Shady Grove Road at Choke Cherry Lane	5/19/2010	1853	5/19/2010	1853	1500	Rockville City
4	17	14	3	Connecticut Avenue at Plyers Mill Road	6/1/2011	1710	4/8/2014	1829	1600	Kensington/Wheaton
9	8	21	4	Connecticut Avenue at Jones Bridge Road/Kensington Parkway	2/29/2012	1672	2/4/2015	1827	1600	Bethesda/Chevy Chase
16	62	9	5	Frederick Avenue at Montgomery Village Avenue	4/25/2012	1795	10/23/2014	1818	1425	Gaithersburg City
169	175	171	6	Snouffer School Road at Centerway Road	4/19/2012	1342	11/5/2014	1816	1425	Montgomery Village/Airpark
191	198	195	7	W Montgomery Avenue at W Gude Drive	9/18/2007	1304	3/13/2014	1799	1500	Rockville City
28	7	8	8	Great Seneca Hwy at Muddy Branch Road	1/4/2011	1800	4/25/2013	1791	1425	Gaithersburg City
167	74	70	9	Great Seneca Hwy (MD-119) at Sam Eig Hwy	2/3/2009	1515	2/25/2014	1779	1450	R&D Village
5	5	25	10	Georgia Avenue at Norbeck Road	9/11/2012	1656	10/29/2015	1778	1475	Aspen Hill

# Top Bottlenecks

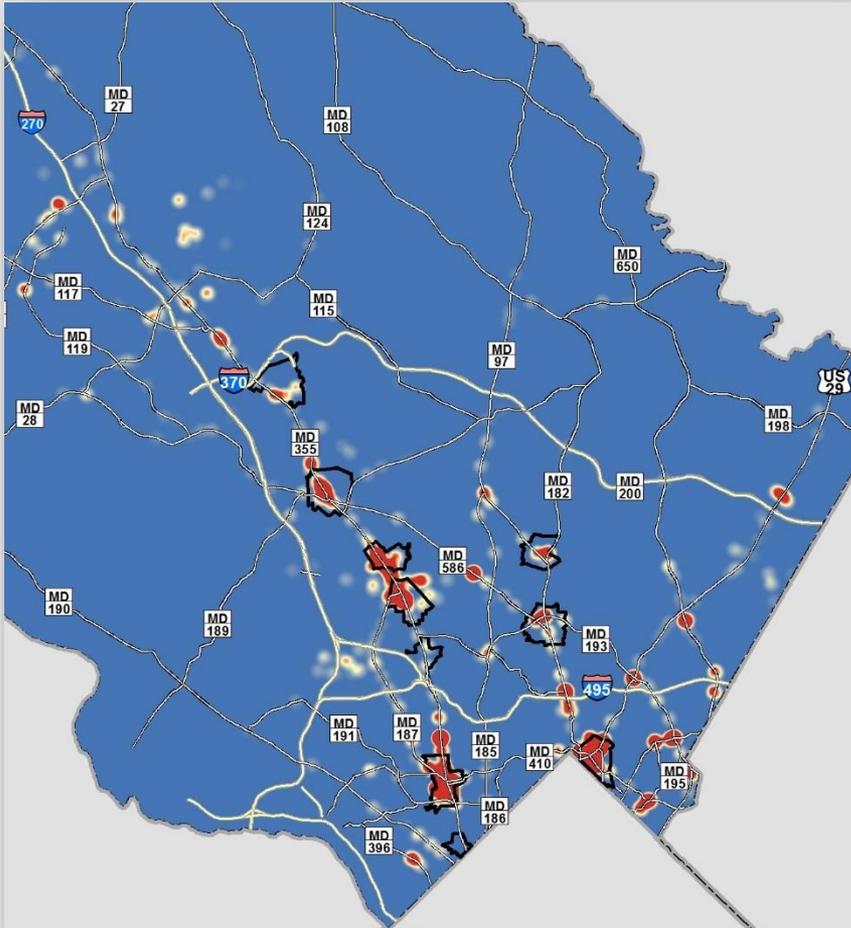
Rank	Location	Direction	Impact factor	Average max length (miles)	Average duration	Occurrences	All Events/Incidents
1	MD-355 @ 1ST ST/WOOTTON PKWY	NORTHBOUND	73,776.29	2.27	51 m	638	23
2	MD-650 @ POWDER MILL RD	NORTHBOUND	72,782.87	0.89	1 h 28 m	932	5
3	MD-190 @ WESTERN AVE	EASTBOUND	58,650.18	1.34	1 h 19 m	552	4
4	MD-650@US-29/COLUMBIA PIKE	NORTHBOUND	58,223.16	1.78	1 h 41 m	323	2
5	MD-185 @ MD-191/BRADLEY LN	SOUTHBOUND	42,582.24	1.77	1 h 20 m	301	9
6	MD-355 @ WESTERN AVE	SOUTHBOUND	40,778.04	0.80	1 h 14 m	687	2
7	US-29 @ MD-516/FRANKLIN AVE	NORTHBOUND	39,047.50	0.81	1 h 27 m	551	0
8	MD-355 @ MD-547/STRATHMORE AVE	SOUTHBOUND	36,715.01	1.56	44 m	535	9
9	MD-185 @ I-495	NORTHBOUND	33,629.59	1.03	1 h 06 m	496	16
10	MD-355 @ MD-28/VEIRS MILL RD/E JEFFERSON ST	SOUTHBOUND	32,503.14	1.01	56 m	576	6
11	MD-355 @ MD-191/BRADLEY LN	SOUTHBOUND	31,057.34	0.88	1 h 09 m	509	26
12	MD-97 @ RANDOLPH RD	NORTHBOUND	30,137.52	0.58	49 m	1062	21
13	MD-355 @ GRAFTON ST	SOUTHBOUND	29,606.43	1.63	2 h 25 m	125	26
14	MD-190 @ DORSET AVE	WESTBOUND	28,184.74	0.93	56 m	541	40
15	US-29 @ OLD COLUMBIA RD	NORTHBOUND	28,172.00	4.24	2 h 03 m	54	7
16	MD-355 @ CHRISTOPHER AVE	NORTHBOUND	28,047.91	0.58	56 m	869	0
17	US-29 @ I-495	SOUTHBOUND	27,799.22	1.18	1 h 00 m	394	8
18	MD-190@ MD-191/BRADLEY BLVD	WESTBOUND	26,181.52	2.25	1 h 05 m	179	2
19	MD-355 @ GROSVENOR LN	SOUTHBOUND	25,811.42	1.44	44 m	408	1
20	MD-97 @ I-495/CAPITAL BELTWAY	NORTHBOUND	25,564.42	0.48	1 h 02 m	858	3

# Vehicular Mobility Analysis (Intersections)

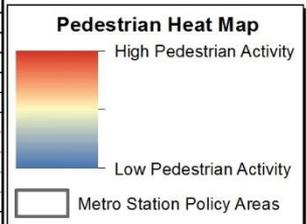
New Charles Pike (MD-655) and Columbia Pike (MD-137)



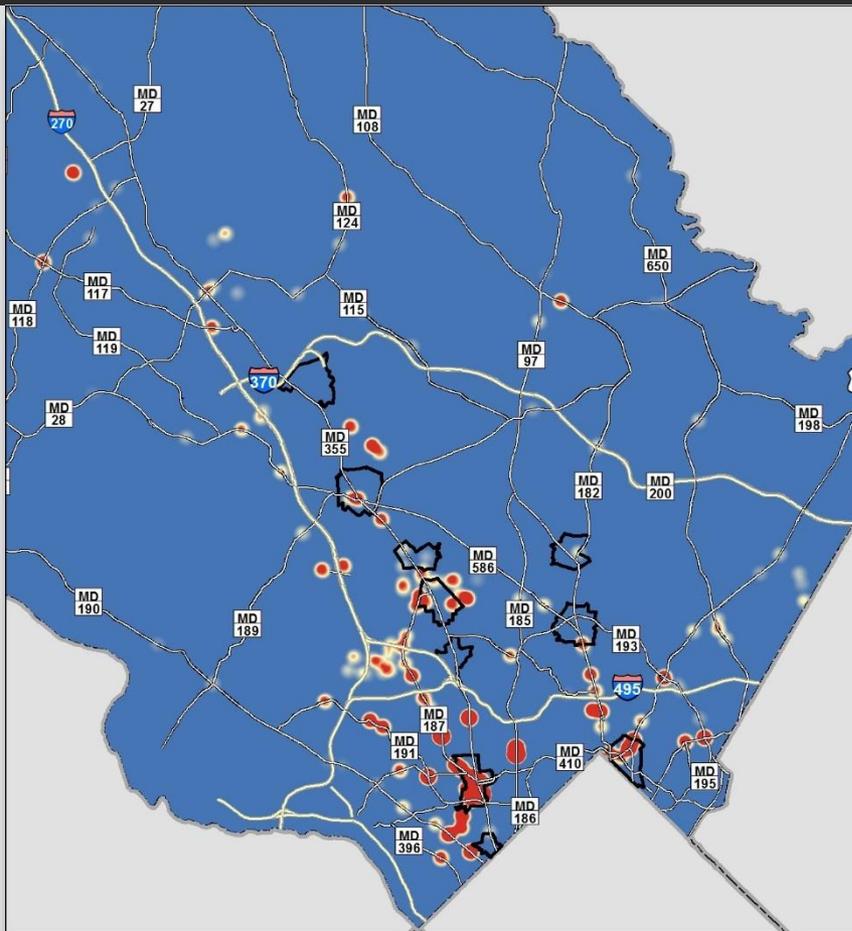
# PEDESTRIAN AND BICYCLE ANALYSIS



Rank	Intersection	Pedestrians	Date
1	Colesville Rd at 2nd Ave/Wayne Ave	6097	9/10/2014
2	Wisconsin Ave at East-West Hwy/Old Georgetown Rd	4124	5/10/2016
3	MD 355 at Elm St/Waverly St	3570	5/10/2016
4	Wisconsin Ave at Montgomery Ln/Montgomery Ave	3570	5/10/2016
5	Colesville Rd at Georgia Ave	3525	9/15/2015
6	Rockville Pike at Marinelli Rd	3147	4/16/2015
7	Old Georgetown Rd at Commerce Ln/Edgemoor Ln	3114	9/10/2015
8	East-West Hwy at Blair Park Plz/NOAA	2916	9/1/2015
9	Woodmont Ave at Hampden Ln	2859	5/10/2016
10	Old Georgetown Rd at Woodmont Ave	2650	9/10/2015
11	Woodmont Ave at Bethesda Ave	2592	5/10/2016
12	Woodmont Ave at Elm St	2506	5/10/2016
13	Rockville Pike at South Dr/Southwood Rd	2307	7/1/2014
14	Colesville Rd at Fenton St	1751	9/1/2015
15	East-West Hwy at Waverly	1679	5/10/2016
16	Hungerford Dr at Middle Ln/Park Rd	1622	9/17/2014
17	Wisconsin Ave at Cheltenham Dr	1495	9/17/2014
18	MD 355 at Halpine Rd	1287	9/30/2014
19	Georgia Ave at Forest Glen Rd	1284	10/20/2015
20	Arlington Rd at Elm St	1259	5/10/2016

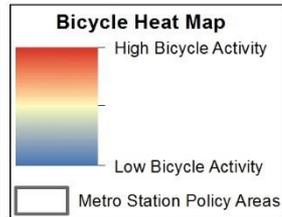


- Bethesda CBD
  - Eleven of the top 20 intersections with the highest pedestrian use.
  - 2012 Metorail Passenger Survey, 73 percent of riders accessed the Bethesda Metro by foot or bike.
  - The most pedestrian observations occurred adjacent to the Bethesda Metro Station at Wisconsin Avenue at East-West Highway/Old Georgetown Road with 4,124 observations.
- Silver Spring Metro Station
  - In total, 4 of the top 20 intersections with the highest pedestrian observations occurred within the Silver Spring CBD
  - 61 percent non-motorized Metro station access rate
  - Intersection of Colesville Road at 2nd Ave/Wayne Ave most pedestrian active intersection in the database with 6,097 pedestrians observed

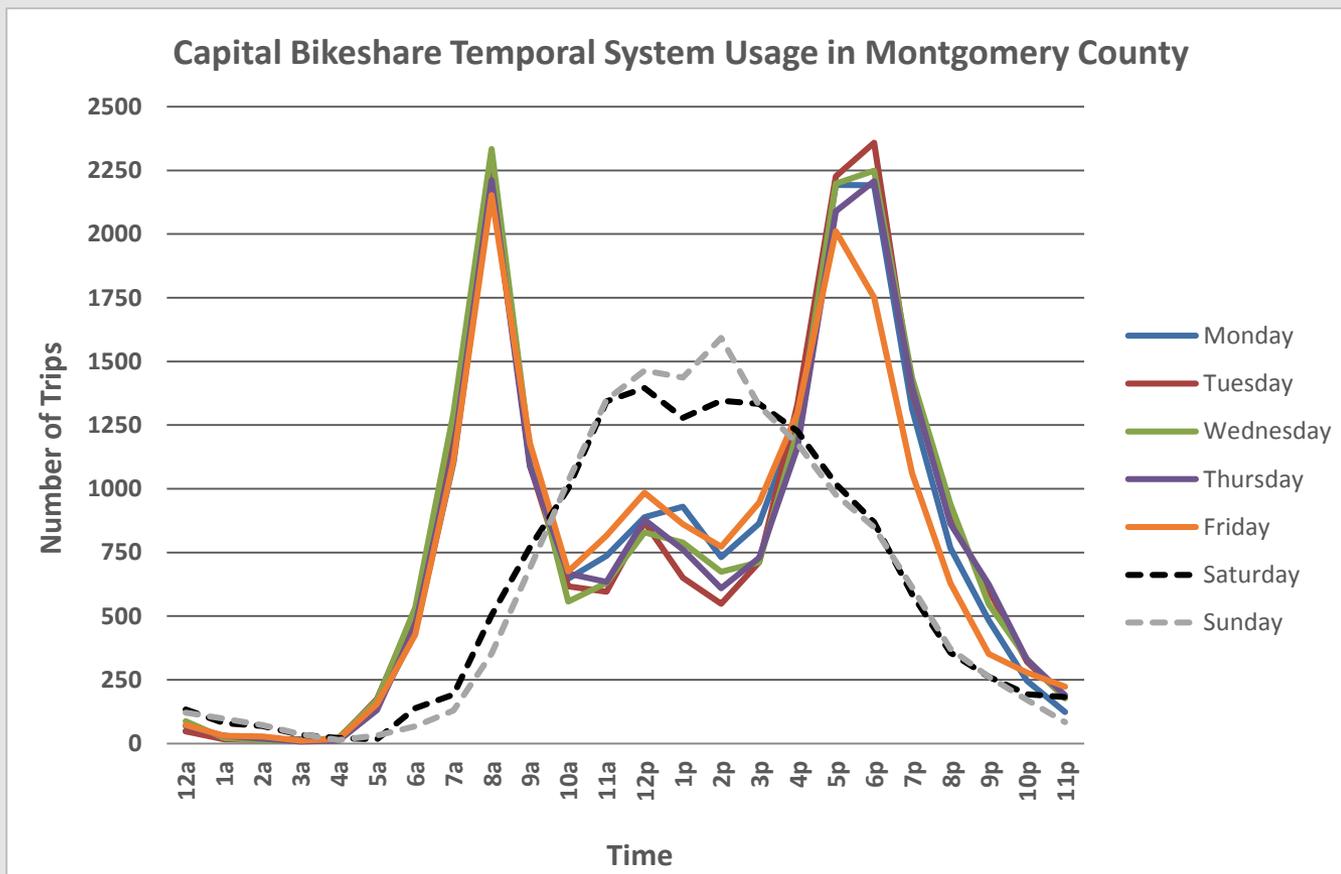


- Bethesda CBD
  - The highest concentration of bicycle activity
  - Capital Crescent Trail (CCT) transitions into the Georgetown Branch section at Woodmont Avenue and Bethesda Avenue. 375 bicyclists were observed during the morning and evening hours. Overall, 12 of the top 20 bicycle observations occurred in the Bethesda Metro Station Policy Area.
- The third highest observation of bicyclists occurred at the intersection of Connecticut Avenue and Chevy Chase Lake Drive - CCT.
- Significant bike activity is also observed along Georgia Avenue from Silver Spring to Wheaton and again along Old Georgetown Road from Bethesda to Rockville Pike.

Rank	Intersection	Bicyclists	Date
1	Woodmont Ave at Bethesda Ave	375	5/10/2016
2	Wisconsin Ave at Leland St/Woodmont Ave	355	5/10/2016
3	Connecticut Ave at Chevy Chase Lake Dr	239	10/6/2015
4	Woodmont Ave at Elm St	178	5/10/2016
5	Old Georgetown Rd at South/Greentree	141	7/21/2015
6	Woodmont Ave at Hampden Ln	133	5/10/2016
7	MD 355 at Elm St/Waverly St	93	5/10/2016
8	Connecticut Ave at Manor Rd	85	10/7/2015
9	Wisconsin Ave at Montgomery Ln/Montgomery Ave	83	5/10/2016
10	Wisconsin Ave at East-West Hwy/Old Georgetown Rd	78	5/10/2016
11	Rockville Pike at W Cedar Ln	77	9/16/2015
12	Bradley Blvd at Wilson Ln	64	3/9/2016
13	Colesville Rd at Georgia Ave	54	9/15/2015
14	Old Georgetown Rd at Auburn St	53	9/10/2015
15	Wisconsin Ave at Bethesda/Willow	51	5/10/2016
16	Old Georgetown Rd at Commerce Ln/Edgemoor Ln	51	9/10/2015
17	University Blvd at Piney Branch Rd	47	10/7/2015
18	Old Georgetown Rd at Battery Ln	45	9/10/2015
19	Old Georgetown Rd at Woodmont Ave	44	9/10/2015
20	River Rd at Willard Ln/Greenway	42	10/28/2014

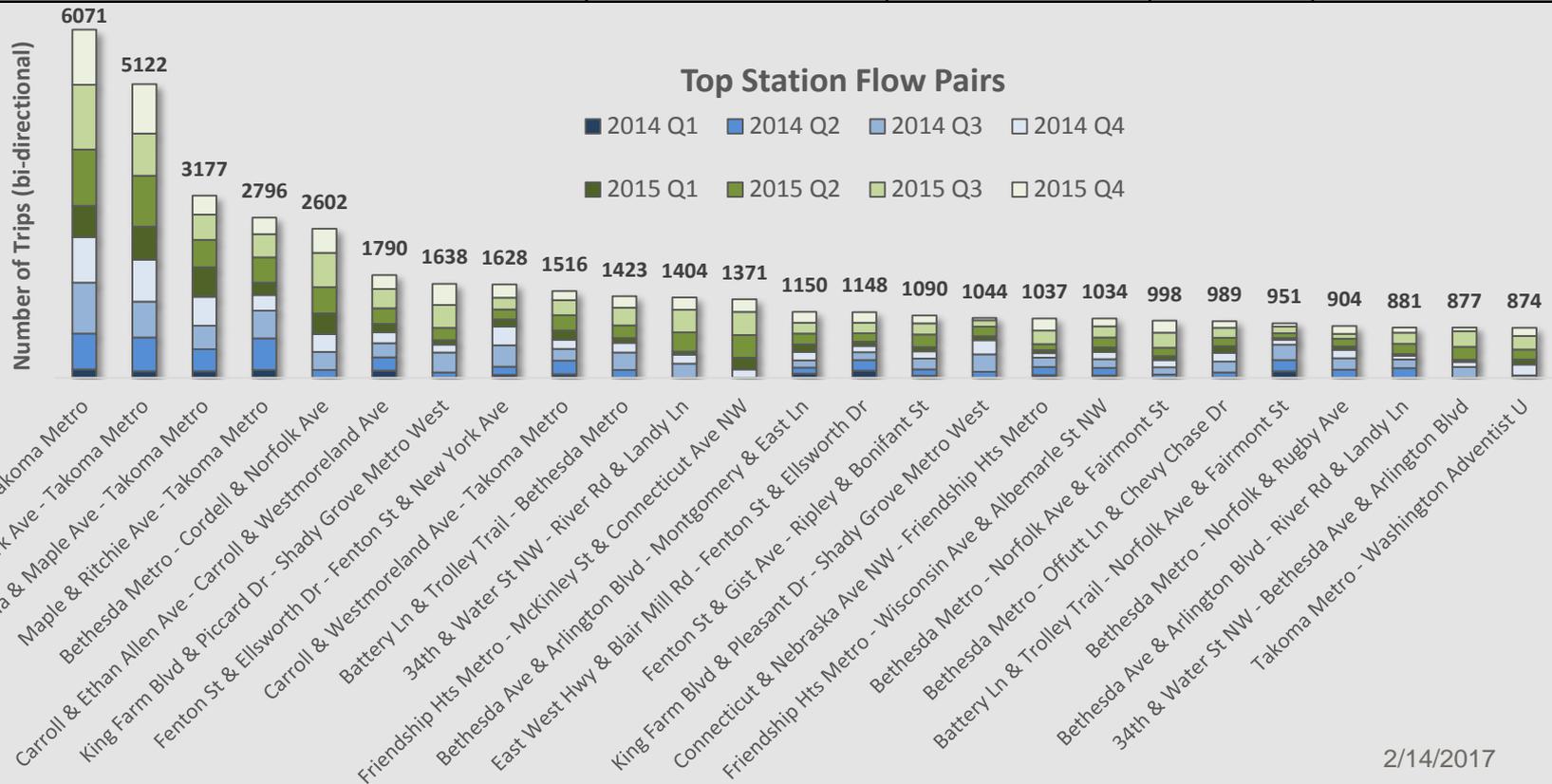


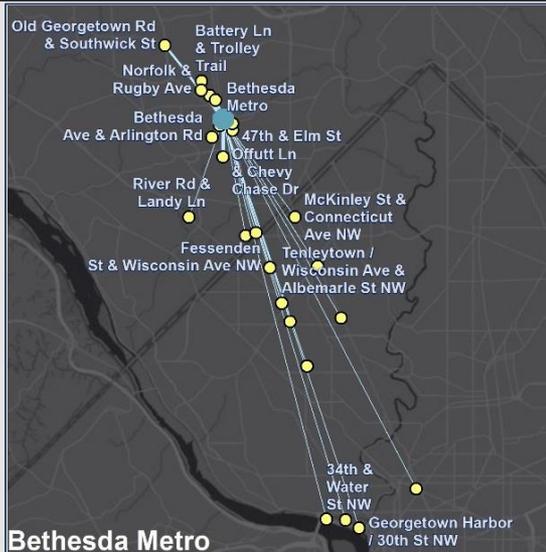
# Capital Bikeshare



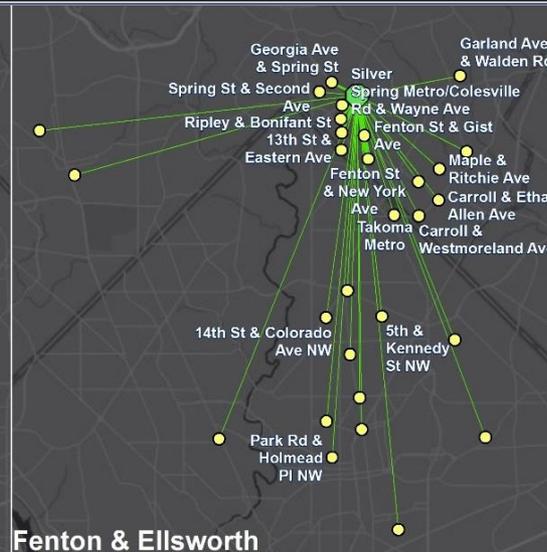
# Capital Bikeshare

Station	Origins	Destinations	Total	Percent of total trips
Takoma Metro (Washington, D.C.)	11182	10486	21668	17.9%
Friendship Heights Metro/Wisconsin Ave & Wisconsin Cir	6005	5672	11677	9.6%
Fenton St & New York Ave	6536	5012	11548	9.5%
Bethesda Metro	6902	4554	11456	9.5%
Bethesda Ave & Arlington Rd	4823	5584	10407	8.6%
Fenton St & Ellsworth Dr	4936	5442	10378	8.6%
Carroll & Ethan Allen Ave	4863	4478	9341	7.7%
River Rd & Landy Ln	3607	3571	7178	5.9%
Cordell & Norfolk Ave	3356	3550	6906	5.7%
Montgomery Ave & Waverly St	3636	2620	6256	5.2%

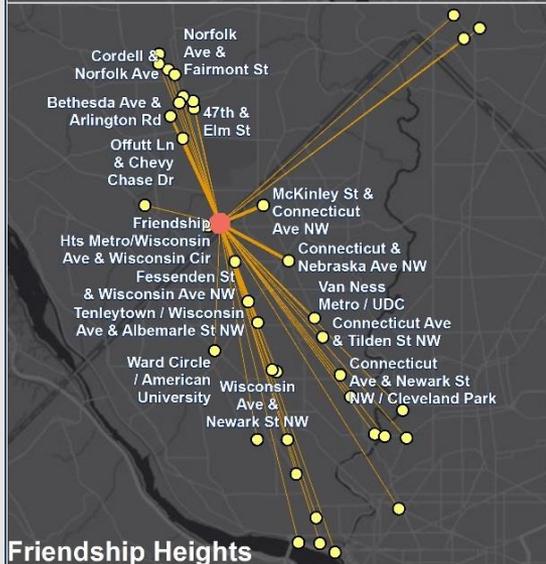




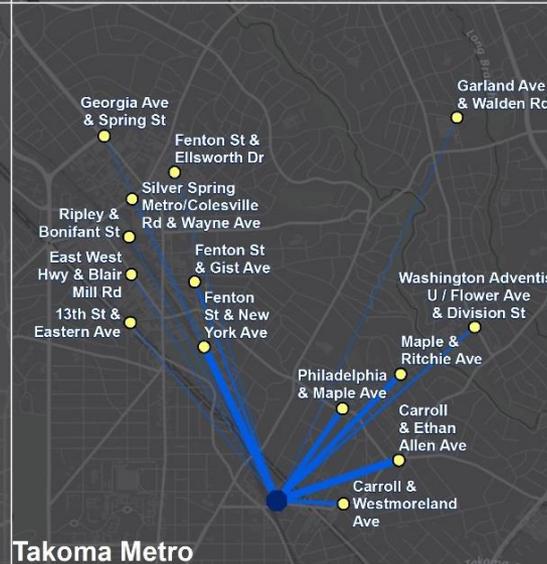
Bethesda Metro



Fenton & Ellsworth



Friendship Heights

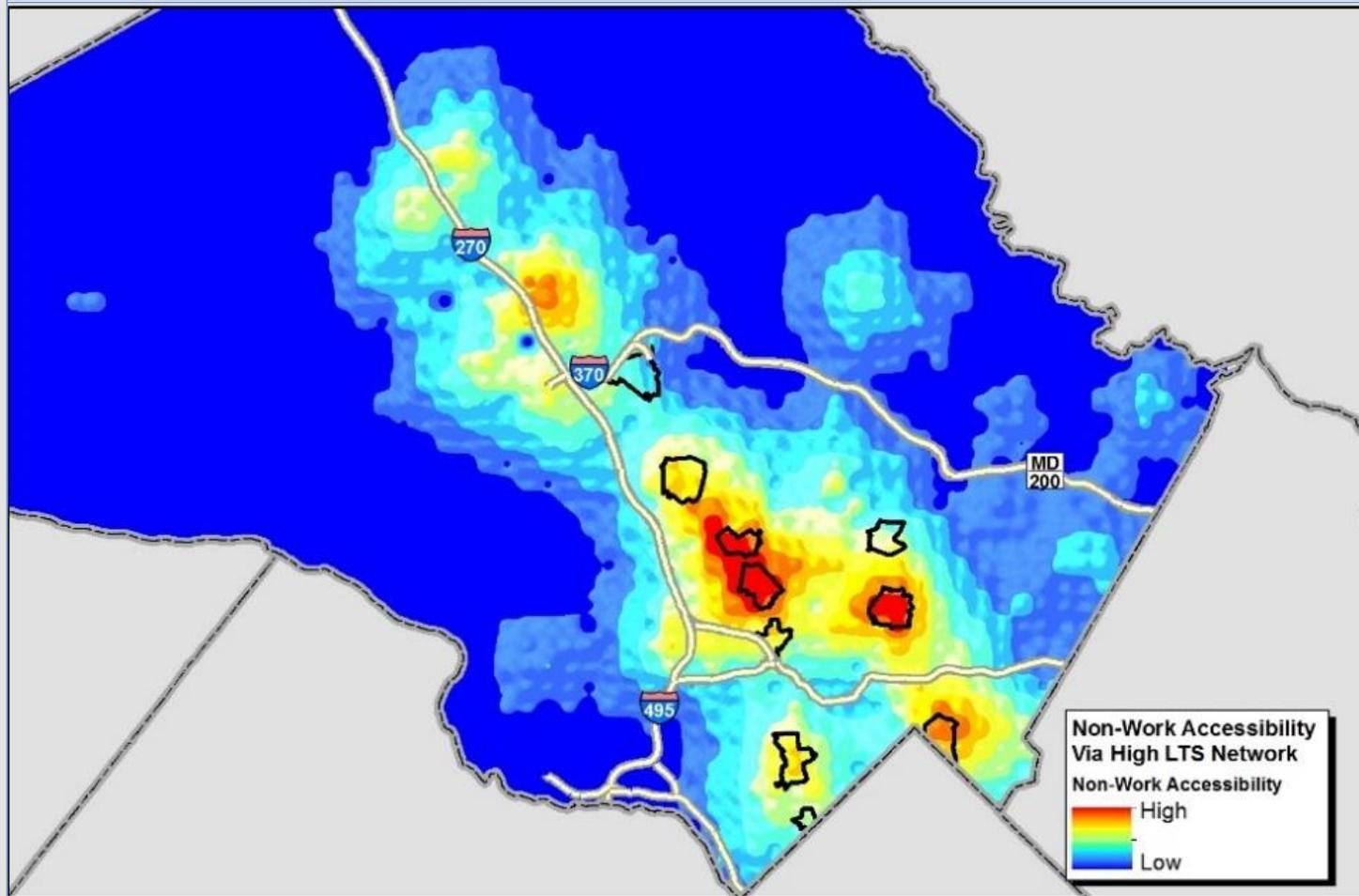


Takoma Metro

Top Utilized Capital Bikeshare Stations 2014-2015

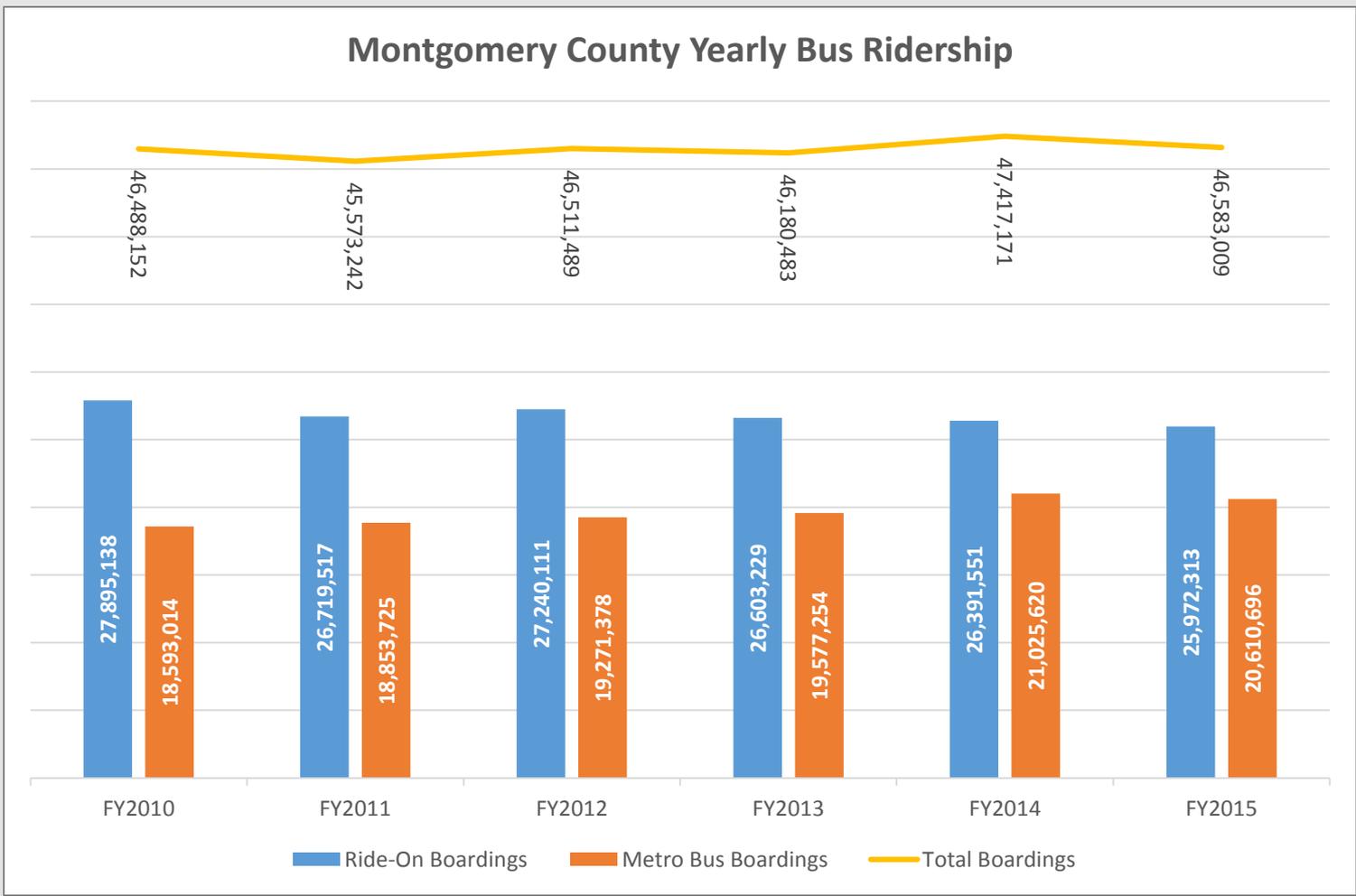


# Accessibility Via Bicycle



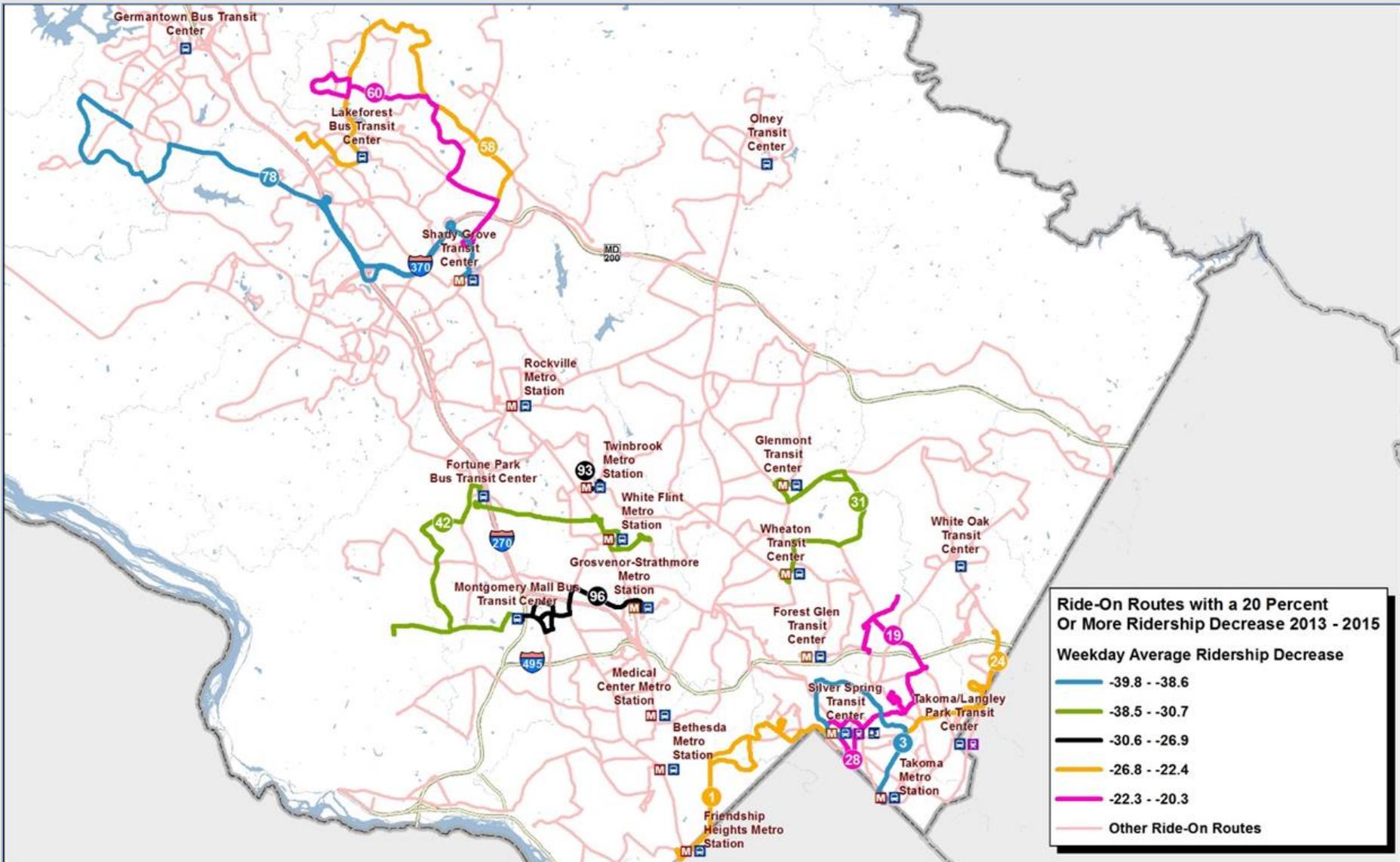
# **PUBLIC TRANSPORTATION**

# Bus Ridership

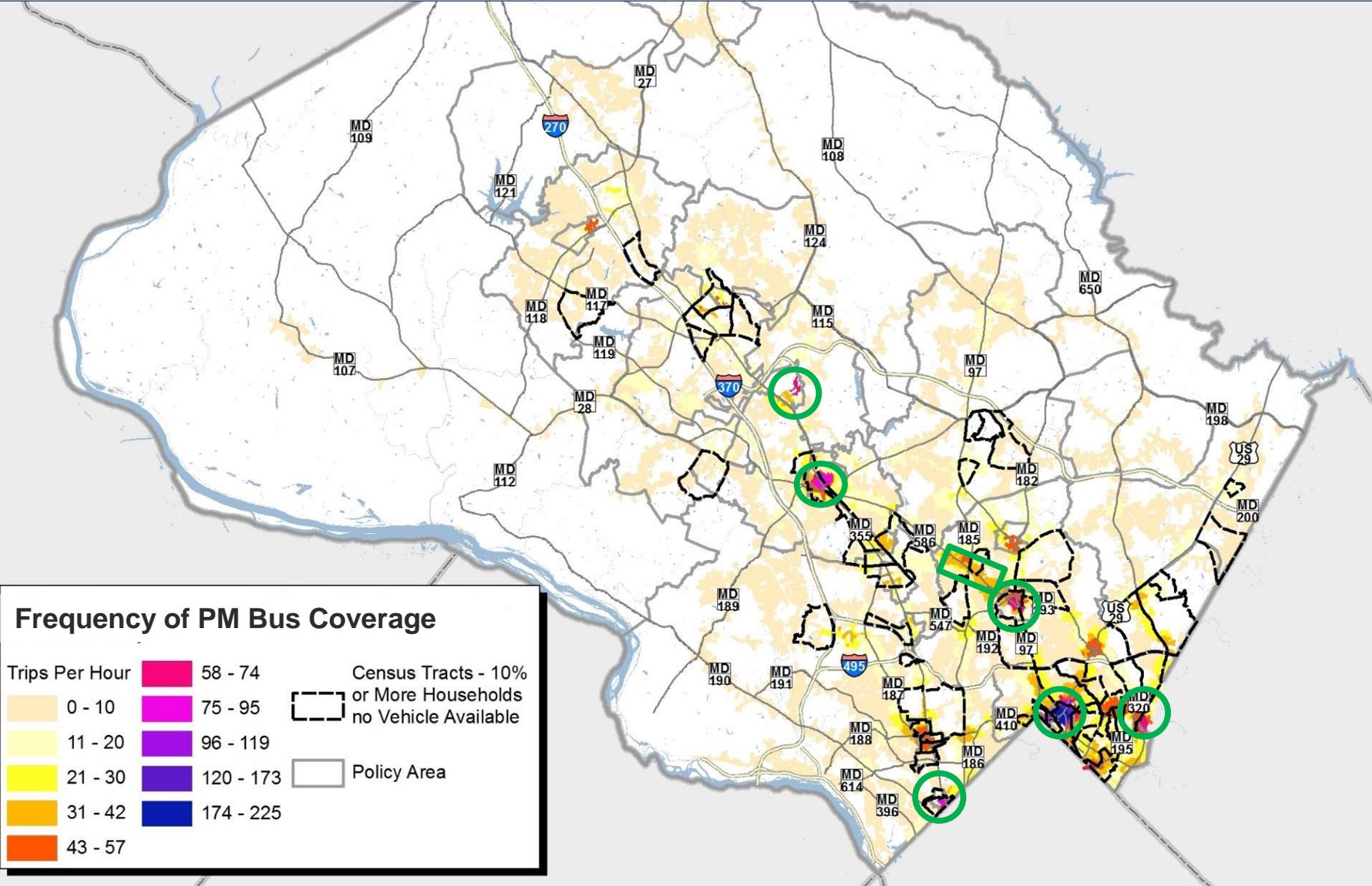


Due to a gap in data collection, Figure does not reflect Metro Bus weekend ridership for April, May, and June of 2013

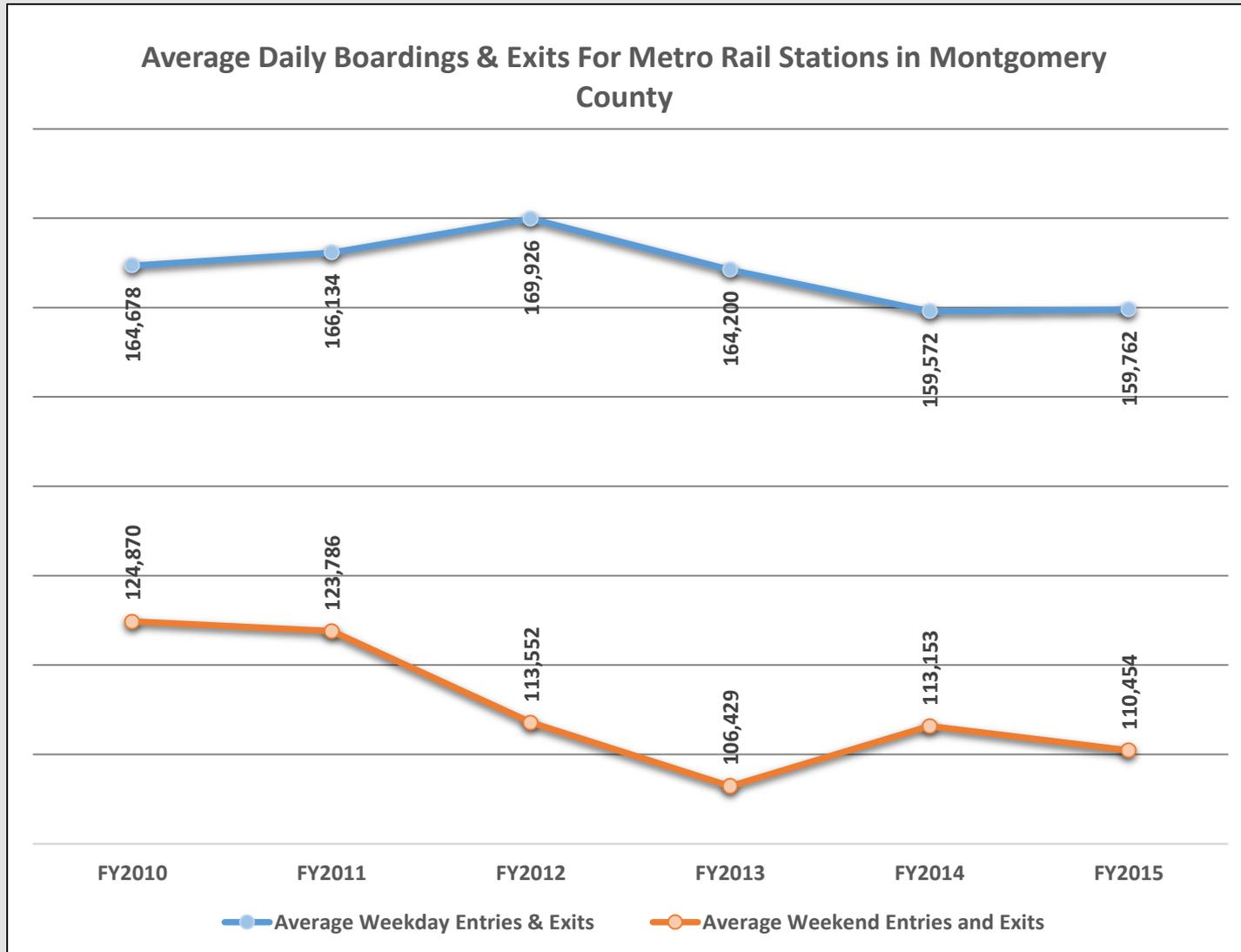
# Ride-On



# Combined Bus Coverage



# Metrorail Ridership



# Metrorail Ridership

Montgomery County Average Weekday Ridership

- FY2010
- FY2011
- FY2012
- FY2013



# CONCLUSION AND FUTURE WORK

# Conclusion and Future Work

- Mobility is only one aspect to a sustainable and equitable transportation system<sup>1</sup>
  - Affordability – Whether transport options have financial costs within the targeted users' budget.
  - Availability – Whether transport options exist at the location and time users require.
  - Access – Whether transport options accommodate users' abilities, including people with disabilities and special needs, taking into account the total journey (i.e., door-to-door), i.e. integration of modes.
  - Accessibility – Whether transport options available provide access to destinations people need/want to go to.
  - Acceptability – Whether transport options are considered suitable to users.
- Future work will focus on creating a multi-modal GIS network that will integrate many of the datasets used in this report
- Changes in Parking rates?

1. Zuidgeest, M. (2016, December 15). United Nations Environment Programme - Share The Road. Retrieved from From Mobility to Accessibility: [http://www.unep.org/Transport/sharetheroad//PDF/courseware\\_nmt/Lecture2\\_mobility\\_accessibility\\_Zuidgeest.pdf](http://www.unep.org/Transport/sharetheroad//PDF/courseware_nmt/Lecture2_mobility_accessibility_Zuidgeest.pdf)