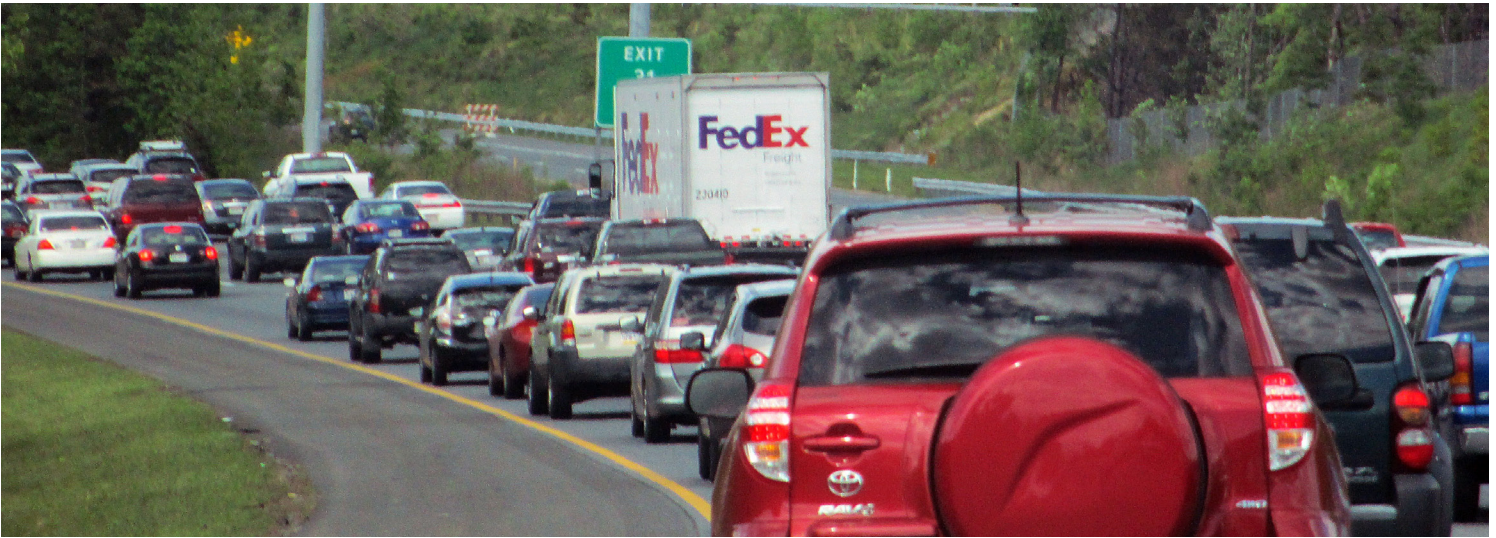




Congestion Trends

There are two types of congestion that impact mobility: recurring and non-recurring congestion. Recurring congestion is related to segments of roadway that are over capacity due to the volume of traffic. This can occur along segments of the freeway, areas where motorists merge or diverge from the roadway or in weave sections where traffic is both trying to ingress or egress from the freeway. Variations that influence these breakdowns include truck volumes, geometrics and lane and shoulder width. Non-recurring congestion relates to events such as crashes and weather that cause highways to experience slowing or stop and go conditions. Long term recurring congestion related issues are typically addressed by major capacity expansion projects or minor congestion relief projects depending upon the level of congestion that is occurring. Non-recurring congestion is addressed through various measures described in Chapter 2 (CHART Transportation System Management and Operations).

Congestion measurements have evolved dramatically over past few years as vehicle probe speed and traffic count data is now available from a variety of public and private sources. This data, together with analyses methodologies that have been developed and tested over time, provides a detailed “picture” of mobility for travelers using the highway system in Maryland. The public data is developed from a statewide program that collects traffic volume data on all of its roadways in a continual cycle. The private data comes from INRIX , a company that provides both real-time and historic traffic speed data collected from an estimated 100 million probe vehicles nationwide including commercial vehicle fleets. The University of Maryland Center for Advanced Transportation Technology (UMD CATT) uses the INRIX speed data, together with detailed traffic volume data from the SHA – Office of Planning and Preliminary Engineering to generate measures of congestion and reliability across the entire freeway system. These congestion and reliability measures have also been closely coordinated with the Washington and Baltimore Metropolitan Planning Organizations (MPOs) to ensure regional consistency in measure definitions and reporting.

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There are various measures of congestion including level of service and volume to capacity ratio. In the past few years, two other measures have become popular as they are easily computed from speed data and are relatively easy to communicate to a range of audiences: the Travel Time Index and the Planning Time Index. In analysis for Maryland's freeways/expressways the Travel Time Index (TTI) compares the 50th percentile travel time of a trip on a section of roadway during the peak hour (when congestion is the worst) to the travel time of a trip during off peak (free-flow or uncongested) conditions. The index depicts how much longer, on average, travel times are during congestion compared to light traffic. The higher the TTI number for a given hour of the day, the longer the travel times. For example, a TTI of 2.0 indicates that a trip that takes 15 minutes in light traffic will take two times longer, or 30 minutes in congested conditions.

For the purposes of the statewide and regional congestion maps presented in this report, the TTI is depicted as follows:

- Uncongested (TTI <1.15)
- Moderate Congestion (1.15 <TTI <1.3)
- Heavy Congestion (1.3 <TTI <2.0)
- Severe Congestion (TTI >2.0)

The detailed analysis of the various mobility measures was performed to provide a comprehensive picture of the statewide Maryland freeway/expressway network. The analysis was conducted statewide, with a focus on the five major geographic regions. The congestion and reliability measures are further analyzed for the combined Baltimore - Washington region, where the majority of weekday congestion occurs.

The vehicle probe speed data analysis for 2013 involves some 1,698 directional miles of freeways/expressways that account for approximately 95% of all these type roadways in Maryland. This includes directional miles of freeways/expressways in the combined Baltimore - Washington region with the remaining directional miles on the Eastern Shore, Southern Maryland and Western Maryland.



CONGESTION MEASURES ON THE MARYLAND STATE FREEWAY/ EXPRESSWAY NETWORK

1. Statewide Peak Hour Congestion (Percent System Congested & Percent VMT in Congested Conditions)

The freeway/expressway system in Maryland was analyzed to compute the TTI on each section of roadway. The analysis was performed for the AM and PM peak hours with the highest levels of congestion occurring from 8-9 AM in the morning peak and from 5-6 PM in the afternoon peak hour. The TTI for those hours are shown in Figure 1 and 2 for the freeway/expressway system.

In the morning peak hour (8-9 AM), heavy to severe congestion (TTI > 1.3) is experienced by motorists on a total of 130 road miles (8% of the statewide freeway/expressway network). Sixteen (16) % of the morning peak hour VMT occurs in congested conditions.

Motorists experience heavy to severe congestion (TTI >1.3) on 209 road miles (12% of the statewide freeway/expressway network) during the afternoon peak hour (5-6 PM). The vehicle miles traveled under congested conditions in the afternoon peak hour is 22% of the afternoon peak hour VMT.

The following table shows the comparison of these metrics for the last three years including an improvement in high to severe congestion in the AM and PM peak hours from 2012 to 2013.

Some of the higher levels on congestion in 2012 could be attributed to system preservation and construction activities on the freeway system. Congestion in 2013 appears to be comparable to 2011 conditions.

STATEWIDE FREEWAY/EXPRESSWAY NETWORK (AVERAGE WEEKDAY AM & PM PEAK HOUR CONGESTION SUMMARY)

Heavy to Severe Congestion	2013		2012		2011	
	AM	PM	AM	PM	AM	PM
Roadway Miles	130	209	219	345	128	218
Percent of Roadway Miles	8	12	13	20	8	13
Percent of VMT	16	22	23	33	16	26

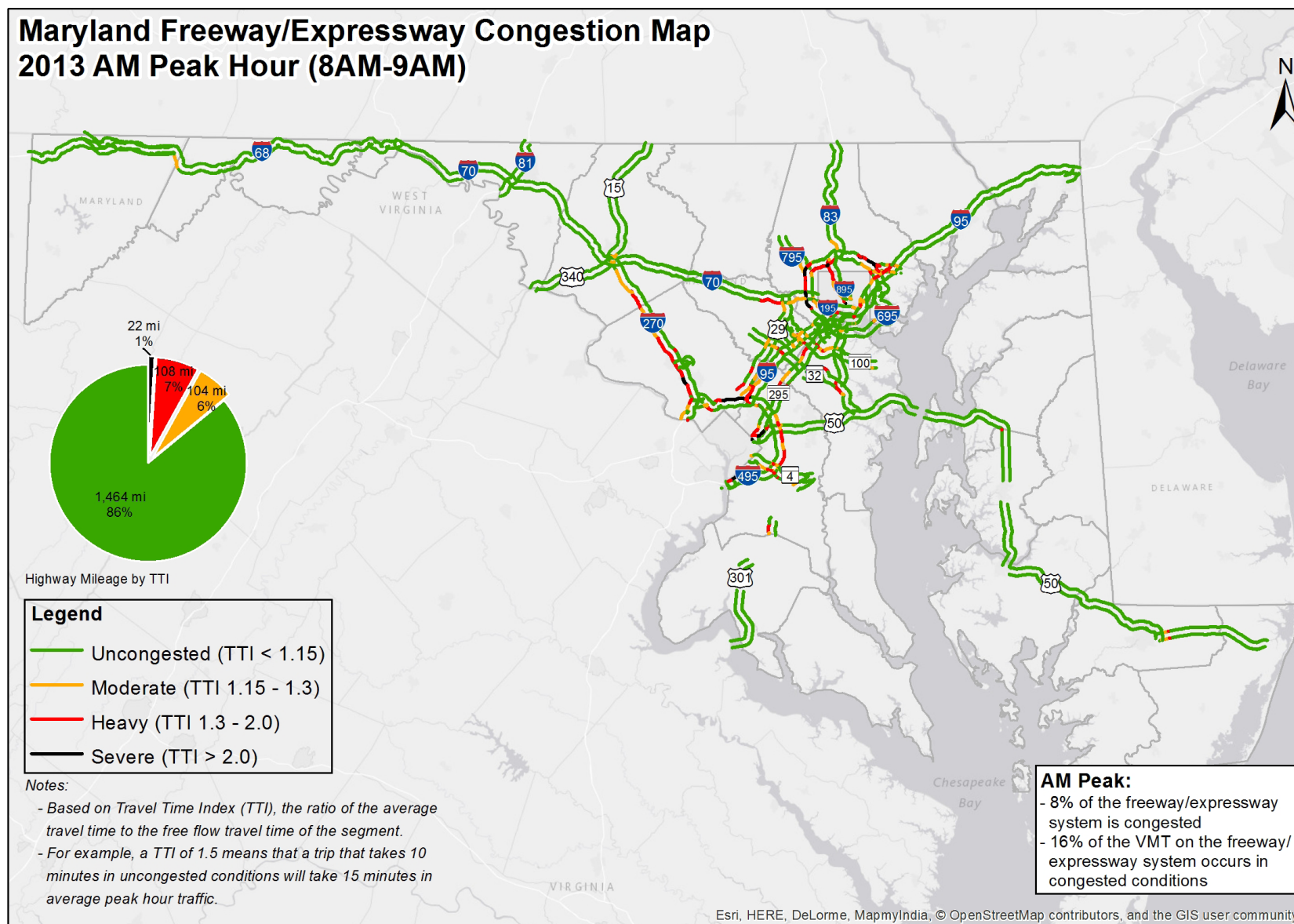
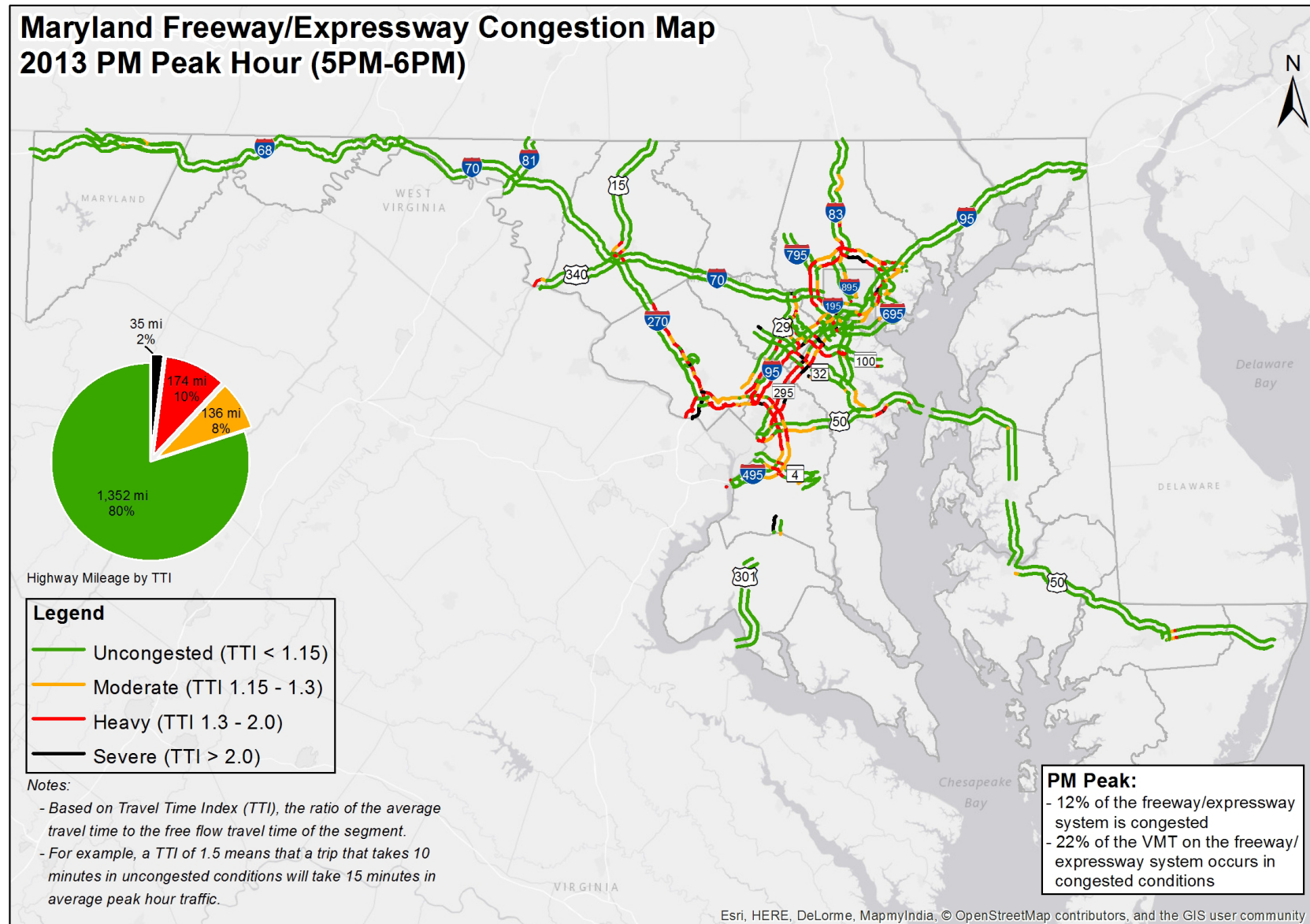


Figure 2





Baltimore - Washington Metropolitan Region Peak Hour Congestion

The Baltimore - Washington Region has the highest traffic volumes in the state and accounts for majority of commuting and through travel. Therefore these roadways experience the majority of congestion and impacts on mobility in Maryland. The Travel Time Index Maps are provided for the peak hours (8-9 AM and 5-6 PM) in figures 3 and 4.

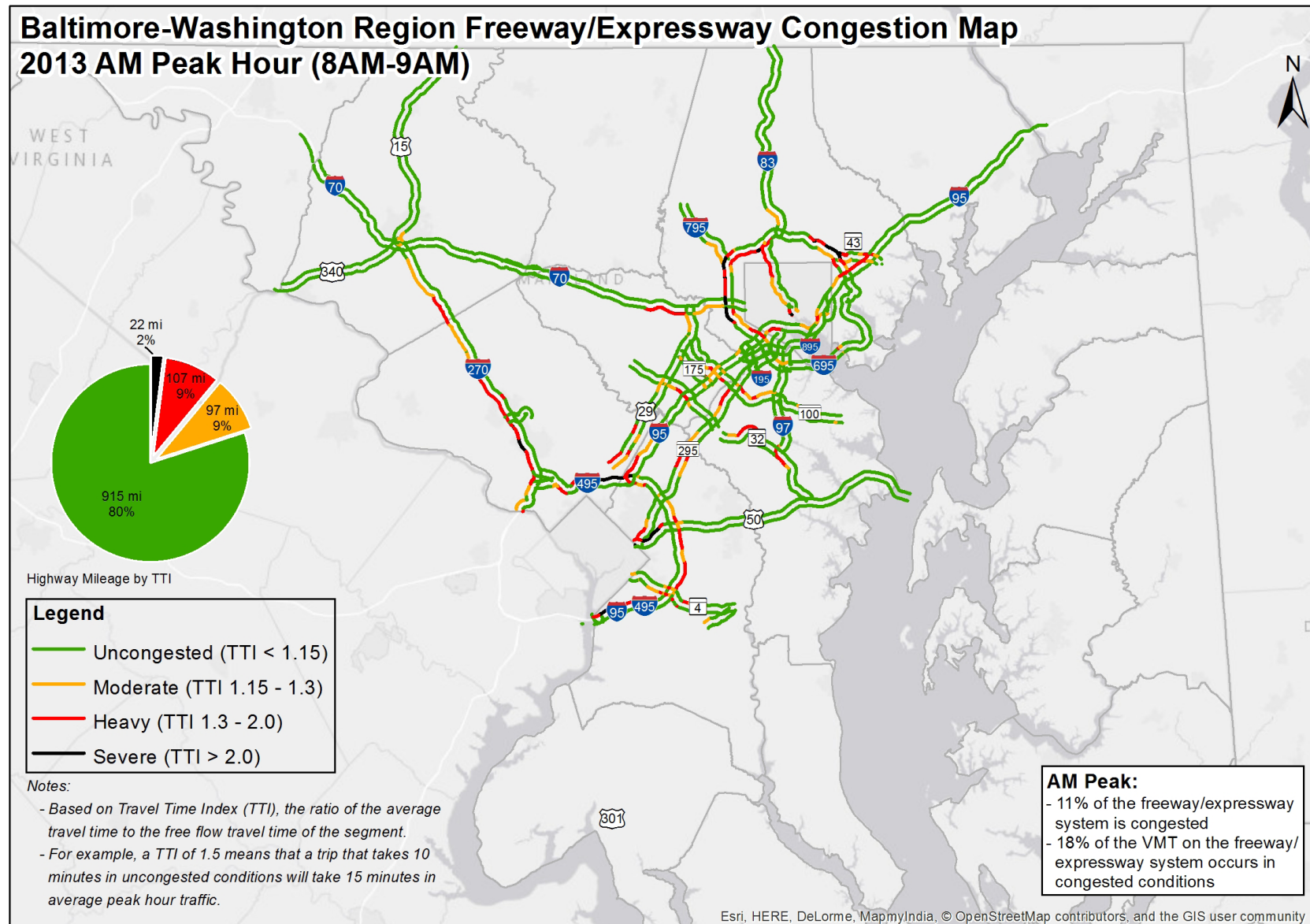
Motorists in the Baltimore - Washington Metropolitan region experience heavy to severe congestion (TTI >1.3) on 11% of the freeways/expressways. This accounts for a total of 129 road miles that operate under these conditions. The vehicle miles traveled under these conditions in the morning peak hour is 18% of the total morning peak hour VMT.

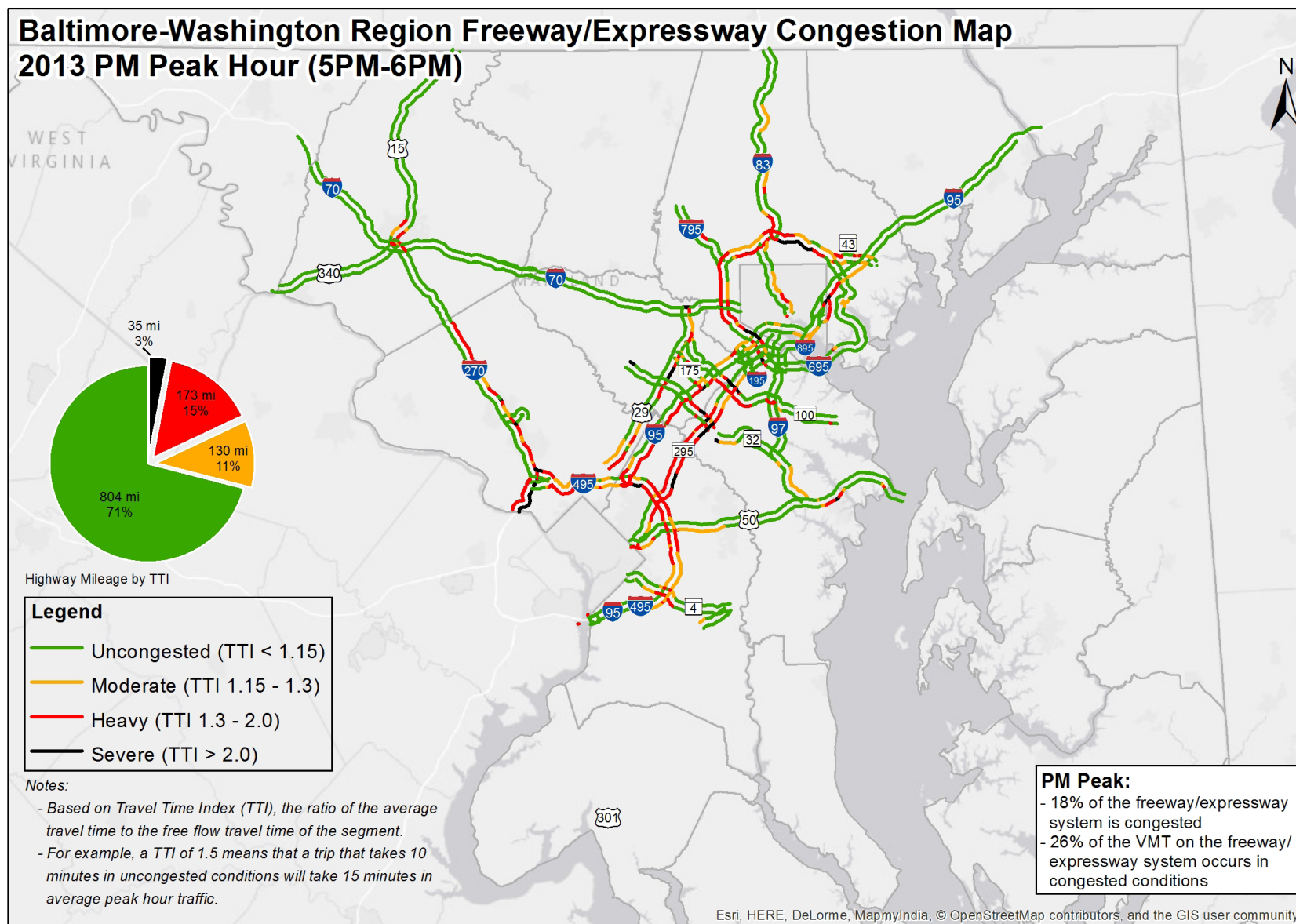
The Baltimore - Washington Metropolitan region in the afternoon peak hour, has a total of 208 (18%) road miles that motorists experience heavy to severe congestion (TTI >1.3). This amounts to 26% of the total VMT that occurs in the afternoon peak hour that motorists experience this level of congestion.

Eastern Shore, Southern & Western Maryland Congestion

The Eastern Shore, Southern Maryland and Western Maryland experience pockets of congestion throughout the year. This ranges from the Hagerstown area, (the hub of two major interstate routes), to Salisbury, (the "Crossroads of Delmarva") to the fast growing areas of Waldorf, La Plata, Prince Frederick, and Lexington Park where motorists encounter increased travel times and congestion. The Eastern Shore, Southern Maryland and Western Maryland have locations that are affected by congestion issues as shown in Figures 1-2 during the AM and PM peak hours. Some of the congestion in these regions are related to weekend travel and affected by seasonality.

Figure 3







2. Statewide Cost of Congestion

The total statewide and regionwide estimated cost of congestion due to auto delay, truck delay and wasted fuel and emissions on the freeway/expressway network in 2013 was estimated to be \$775 million. The total statewide costs can be broken down as follows:

- Auto Delay Cost: \$664.0 Million
- Truck Delay Cost: \$58.5 Million
- Wasted Fuel Cost: \$31.2 Million
- Air Emissions Cost: \$21.5 Million

The majority of these costs (\$751 million) occur in the Baltimore Washington region. The cost associated with congestion for the Eastern Shore, Southern and Western Maryland regions is estimated to be \$24 million. The congestion costs state and region wide are shown in the following chart.

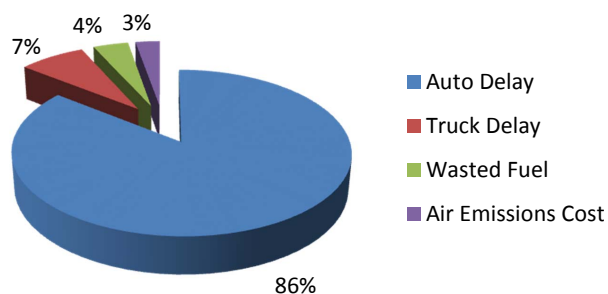
TOTAL COST OF CONGESTION (MILLIONS)	
Region	2013
Statewide	775
Baltimore Region	329
Washington Region	422
Eastern Shore Region	16
Southern Region	2
Western Region	6

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The percent breakdown of the congestion costs by source and by different regions is depicted in the following graphs.

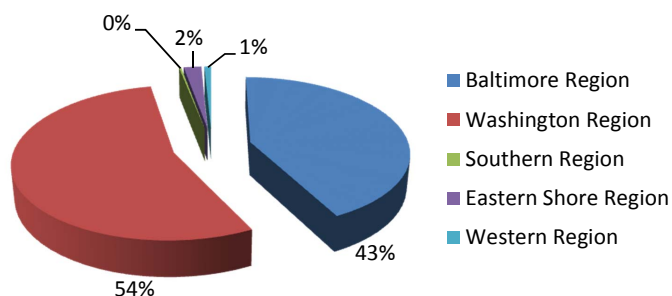
PERCENT OF STATEWIDE CONGESTION COST BY SOURCE

(TOTAL CONGESTION COST = \$775 M)



PERCENT OF STATEWIDE CONGESTION COST BY REGION

(TOTAL CONGESTION COST = \$775 M)



Top 30 Congested Segments

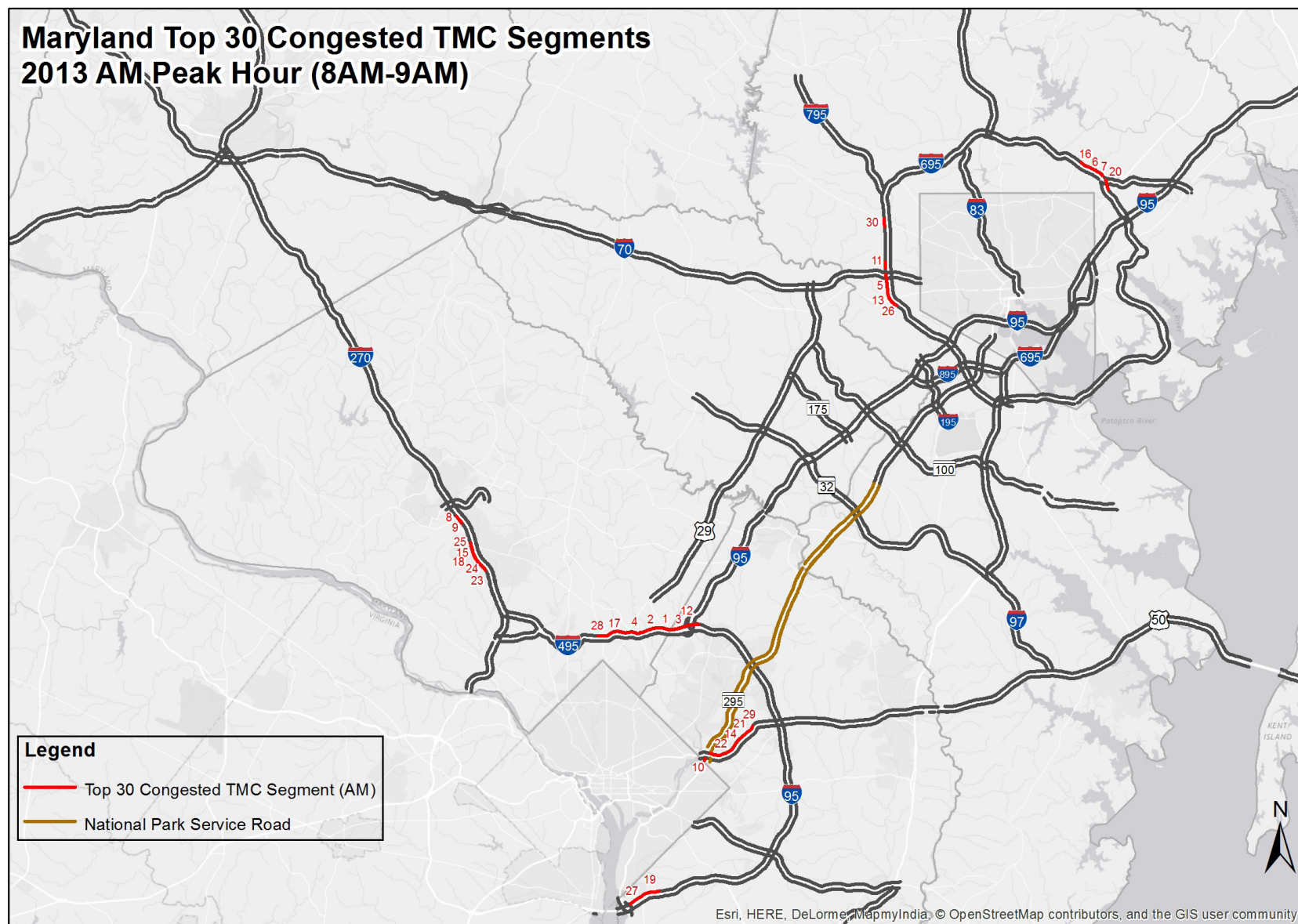
An analysis of all freeway/expressway segments statewide was conducted to determine the roadway segments that experience the highest levels of congestion in the AM peak hour (8-9 AM) and PM peak hour (5-6 PM). Based on the TTI the following tables and figures 5 and 6 depict the Top 30 locations for congestion in the State.

2013 TOP 30 CONGESTED SEGMENTS AM PEAK

2013 Rank	Road	Location	Direction	2013 TTI	2012 Rank	Rank Change 2012 to 2013
1	I-495	@ MD 650	OUTER LOOP	4.14	3	-2
2	I-495	MD 650 TO MD 193*	OUTER LOOP	3.83	4	-2
3	I-495	Prince George's CO/L TO MD 650	OUTER LOOP	3.56	2	1
4	I-495	MD 193 TO US 29*	OUTER LOOP	3.15	12	-8
5	I-695	@ IS 70	OUTER LOOP	3.12	13	-8
6	I-695	MD 147 TO MD 41	OUTER LOOP	2.98	8	-2
7	I-695	MD 43 TO MD 147	OUTER LOOP	2.69	7	0
8	I-270	SHADY GROVE RD TO MD 28 CD LANES	SOUTHBOUND	2.66	5	3
9	I-270	SHADY GROVE RD TO MD 28	SOUTHBOUND	2.66	6	3
10	MD 295	US 50 TO WASHINGTON DC/L ¹	SOUTHBOUND	2.63	173	-163
11	I-695	MD 26 TO MD 122	OUTER LOOP	2.58	59	-48
12	I-495	I-95 TO MONTGOMERY CO/L	OUTER LOOP	2.52	1	11
13	I-695	IS 70 TO US 40	OUTER LOOP	2.51	38	-25
14	US-50	MD 202 TO MD 459	WESTBOUND	2.49	34	-20
15	I-270	@ MD 189	SOUTHBOUND	2.44	22	-7
16	I-695	@ MD 41	OUTER LOOP	2.42	15	1
17	I-495	US 29 TO MD 97	OUTER LOOP	2.42	35	-18
18	I-270	MD 28 TO MD 189	SOUTHBOUND	2.39	23	-5
19	I-95	MD 414 TO MD 210	INNER LOOP	2.29	315	-296
20	I-695	US 1 TO MD 43	OUTER LOOP	2.27	10	10
21	US-50	@ MD 202	WESTBOUND	2.26	33	-12
22	US-50	MD 459 TO MD 201	WESTBOUND	2.24	54	-32
23	I-270	MD 189 TO MONTROSE RD CD LANES	SOUTHBOUND	2.23	25	-2
24	I-270	MD 189 TO MONTROSE RD	SOUTHBOUND	2.23	24	0
25	I-270	@ MD 28 to N of MD 189	SOUTHBOUND	2.18	31	-6
26	I-695	US 40 TO EDMONDSON AVE*	OUTER LOOP	2.17	81	-55
27	I-95	MD 210 TO IS 295	INNER LOOP	2.13	256	-229
28	I-495	@ MD 97	OUTER LOOP	2.13	52	-24
29	US-50	MD 410 TO MD 202	WESTBOUND	2.12	28	1
30	I-695	@ MD 26	OUTER LOOP	2.04	16	14

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*Under Construction



2013 TOP 30 CONGESTED SEGMENTS PM PEAK

2013 Rank	Road	Location	Direction	2013 TTI	2012 Rank	Rank Change 2012 to 2013
1	I-495	CABIN JOHN PKWY TO MD 190	INNER LOOP	3.81	8	-7
2	I-695	MD 139 TO MD 45	INNER LOOP	3.68	11	-9
3	MD-32	GREAT STAR DR TO MD 108	WESTBOUND	3.35	2	1
4	I-695	MD 45 TO MD 146	INNER LOOP	3.28	27	-23
5	I-695	@ MD 139	INNER LOOP	3.18	29	-24
6	I-495	CLARA BARTON PKWY TO CABIN JOHN PKWY	INNER LOOP	3.06	28	-22
7	I-695	@ MD 146	INNER LOOP	3.00	35	-28
8	I-495	@ MD 190 TO IS 270Y (WEST) & @ IS 270Y (WEST)	INNER LOOP	2.99	12	-4
9	I-270	MD 124 TO MIDDLEBROOK RD	NORTHBOUND	2.95	13	-4
10	I-495	@ CLARA BARTON PKWY	INNER LOOP	2.84	32	-22
11	I-695	@ IS 95	INNER LOOP	2.71	163	-152
12	MD-295	@ MD 32 ¹	NORTHBOUND	2.66	76	-64
13	MD-295	POWDER MILL RD TO MD 197 ¹	NORTHBOUND	2.65	17	-4
14	MD-295	MD 198 TO MD 32 ¹	NORTHBOUND	2.62	67	-53
15	I-695	MD 146 TO PROVIDENCE RD	INNER LOOP	2.59	68	-53
16	I-270	@ SHADY GROVE RD	NORTHBOUND	2.52	44	-28
17	I-270	@ SHADY GROVE RD CD LANES	NORTHBOUND	2.52	43	-26
18	I-895	MORAVIA RD TO BALTIMORE CO/L ^{2*}	NORTHBOUND	2.47	51	-33
19	US-29	MD 32 TO BROKEN LAND PKWY	NORTHBOUND	2.46	46	-27
20	I-270	@ MD 124	NORTHBOUND	2.44	39	-19
21	MD-100	@ MD 295	WESTBOUND	2.42	177	-156
22	MD-100	@ COCA COLA DRIVE	WESTBOUND	2.37	73	-51
23	I-270	MD 117 TO MD 124	NORTHBOUND	2.37	38	-15
24	I-270 Spur	@ DEMOCRACY BLVD	NORTHBOUND	2.31	33	-9
25	MD-295	MD 32 TO MD 198 ¹	SOUTHBOUND	2.27	62	-37
26	I-70	US 29 TO MARRIOTTSTVILLE RD	WESTBOUND	2.27	84	-58
27	I-95	US 1 TO GREENBELT METRO*	INNER LOOP	2.26	110	-83
28	I-95	MD 32 TO MD 175	NORTHBOUND	2.25	100	-72
29	I-95	IS 895 TO BALTIMORE CITY LINE (NORTH) ^{2*}	NORTHBOUND	2.22	59	-30
30	MD-100	MD 713 TO MD 295	WESTBOUND	2.21	232	-202

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