

Reliability Trends

One of the major reasons for motorists' frustration is the unreliability of the roadway network. A motorist can plan accordingly if they know their trip will take a few extra minutes. However, when their travel times vary greatly it results in motorists' frustration. Motorists have to add a buffer to reach their destination on time and there is a cost associated with the additional travel time. The cost of any trip varies by purpose and nature and the importance to that particular motorist. For example, to catch a flight, have a freight delivery occur on time, or just to be able to make a child's event may have very high costs to that particular person or business. A more reliable freeway system allows for trips to be better planned and meet expectations of the motorists using the network.

The unreliability or variability of travel time on any road is caused by incidents, vehicular breakdowns, crashes, weather, and lane reductions through work zones. This non-recurring congestion impacts automobiles, trucks and on-street transit services. Reliability is critical for transit operations. Variations in travel time make it difficult for transit operators to provide reliable schedules which in turn leads to a decrease in rider confidence and the potential to reduce ridership on the impacted routes.

MDOT/SHA measures trip reliability using the Planning Time Index (PTI). The PTI represents the total time motorists should allow to ensure they arrive at their destination on-time while taking into account potential impacts due to non-recurring congestion. The percentile utilized for the PTI index varies nationwide. In Maryland, the 95th percentile travel time for a section of roadway is utilized as the baseline. Motorists travelling in free flow conditions that take five (5) minutes to traverse

a section of roadway should allow for 15 minutes to ensure arriving on time when the PTI is 3.0. The lower the PTI number, the more reliable the trip. The higher the value, the less reliable and longer a trip might take. For reporting purposes, PTI for freeways/expressways is categorized as:

- Reliable (PTI < 1.5)
- Moderately Unreliable (1.5 < PTI < 2.5)
- Highly to Extremely Unreliable (PTI > 2.5)

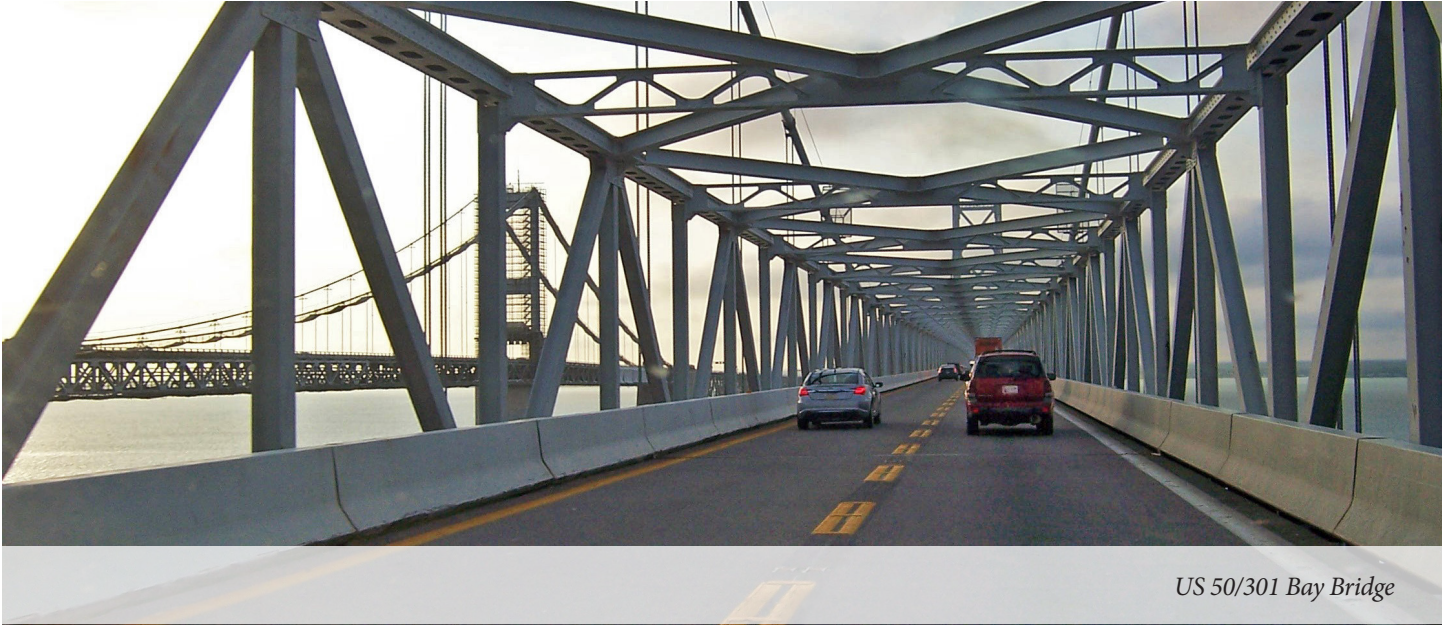
1. Statewide Freeway/Expressway Peak Hour Reliability

The statewide freeway/expressway network was analyzed for the AM (8-9 AM) and PM (5-6 PM) peak hours to determine the PTI. The results of the analysis are shown in Figures 5 and 6.

The worst operations on the network termed highly to extremely unreliable conditions (PTI > 2.5) occur on a total of 139 road miles (8% of the statewide freeway/expressway network) in the AM peak hour.

In the PM peak hour, 14% of the statewide freeway/expressway network operates under highly to extremely unreliable condition (232 road miles). Almost all the freeway/expressway segments that have a PTI > 2.5 are in the Baltimore - Washington region.

B. CONGESTION AND RELIABILITY TRENDS



US 50/301 Bay Bridge

2. Percent VMT in Unreliable Conditions

MDOT/SHA defines highly to extremely unreliable conditions as segments having a PTI of greater than 2.5. Statewide, an estimated 17% of the morning peak hour VMT and 26% of the afternoon peak hour VMT occur in highly to extremely unreliable travel conditions.

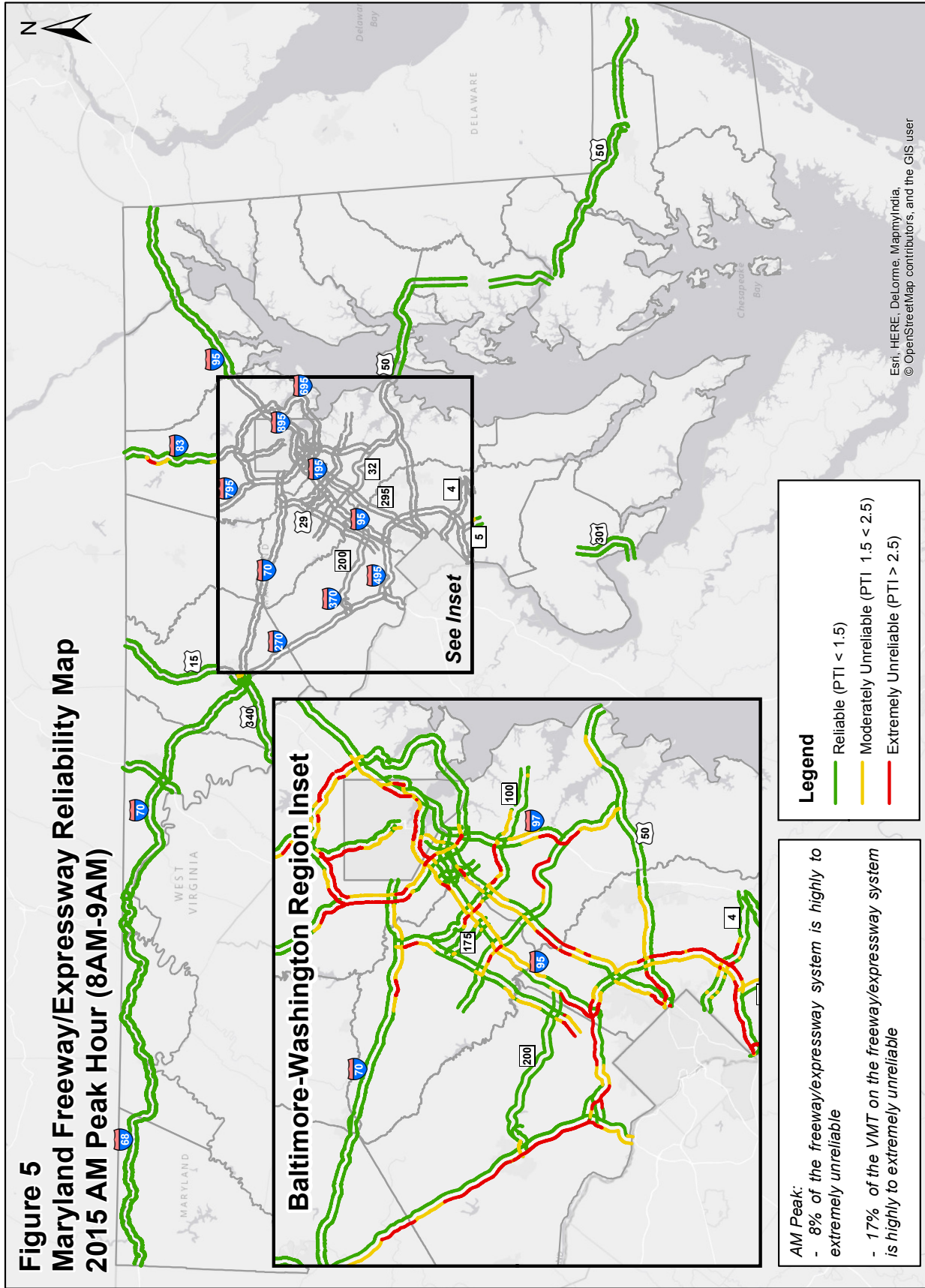
Reliability trends statewide over the past year have mixed results. A slight decrease occurred in the AM peak hour

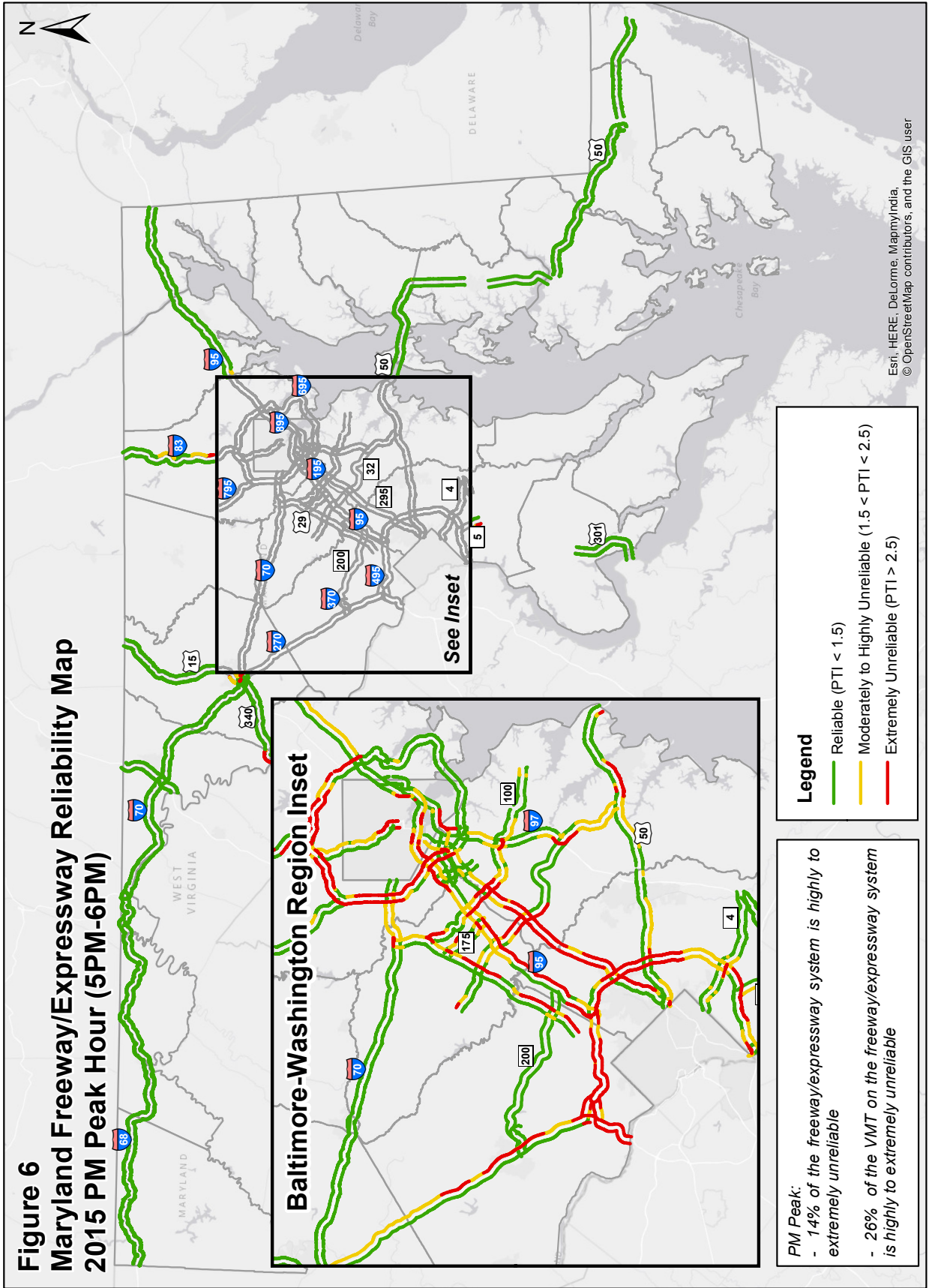
for number of roadway miles that experienced highly to extremely unreliable conditions, but there was a 1% increase in the VMT that occurred in those surroundings. In the PM peak hour, operations were worse with an additional 21 miles experiencing unreliable conditions amounting to the 3% of the VMT. This is depicted in the following chart.

STATEWIDE FREEWAY/EXPRESSWAY NETWORK AVERAGE WEEKDAY AM & PM PEAK HOUR RELIABILITY SUMMARY

Highly to Extremely Unreliable Conditions	2013		2014		2015		CHANGE 2014 to 2015	
	AM	PM	AM	PM	AM	PM	AM	PM
Number of Roadway Miles	145	213	141	211	139	232	-2	+21
Percent of Roadway Miles	9	13	9	13	8	14	-1	+1
Percent of Peak Hour VMT Impacted	17	22	16	23	17	26	+1	+3

Figure 5
Maryland Freeway/Expressway Reliability Map
2015 AM Peak Hour (8AM-9AM)





Top 15 Unreliable Sections

The Top 15 unreliable sections were developed based on the summation of the PTI for each individual segment multiplied by the mileage of that segment divided by the total mileage. This weighted PTI value was calculated for the highest levels of unreliability in the AM peak hour (8-9 AM) and PM peak hour (5-6 PM). The Top 15 unreliable sections in the peak hours, in the state on average weekdays are depicted in the following tables. Figures 7 and 8 show the locations of these sections for the AM and PM peak hour respectively.

2015 MOST UNRELIABLE FREEWAY/EXPRESSWAY SECTIONS - AM PEAK HOUR

AM Rank	Route	Location	PTI	County	Mileage
1	I-495 Outer Loop	US 1 to MD 97	6.79	Montgomery	6.4
2	I-695 Outer Loop	East of US 1 to Providence Rd	5.58	Baltimore	5.8
3	I-695 Outer Loop	North of I-795 to South of US 40	5.14	Baltimore	7.5
4	I-495 Inner Loop	North of MD 5 to Virginia State Line	4.88	Montgomery	8.2
5	I-270 Southbound	North of I-370 to South of Montrose Rd	4.49	Montgomery	6.4
6	US 50 Westbound	West of MD 202 to MD 201	4.49	Prince George's	3.7
7	I-895 Southbound	Moravia Rd to Holabird Ave	4.35	Baltimore City	3.2
8	I-270 (Local) Southbound	I-370 to South of Montrose Rd	4.09	Montgomery	6.0
9	MD 295 Southbound ¹	MD 410 to MD 201	3.94	Prince George's	3.1
10	I-270 Southbound	North of Father Hurley Blvd to MD 124	3.71	Montgomery	7.0
11	I-695 Inner Loop	South of MD 140 to East of MD 25	3.42	Baltimore	5.3
12	I-270 Spur Southbound	I-270 to I-495	3.28	Montgomery	2.1
13	MD 295 Southbound ¹	MD 198 to Powder Mill Rd	3.17	Prince George's	5.2
14	MD 32 Westbound	East of MD 170 to MD 198	3.07	Anne Arundel	5.9
15	I-495 Outer Loop	MD 214 to US 50	2.96	Prince George's	4.0

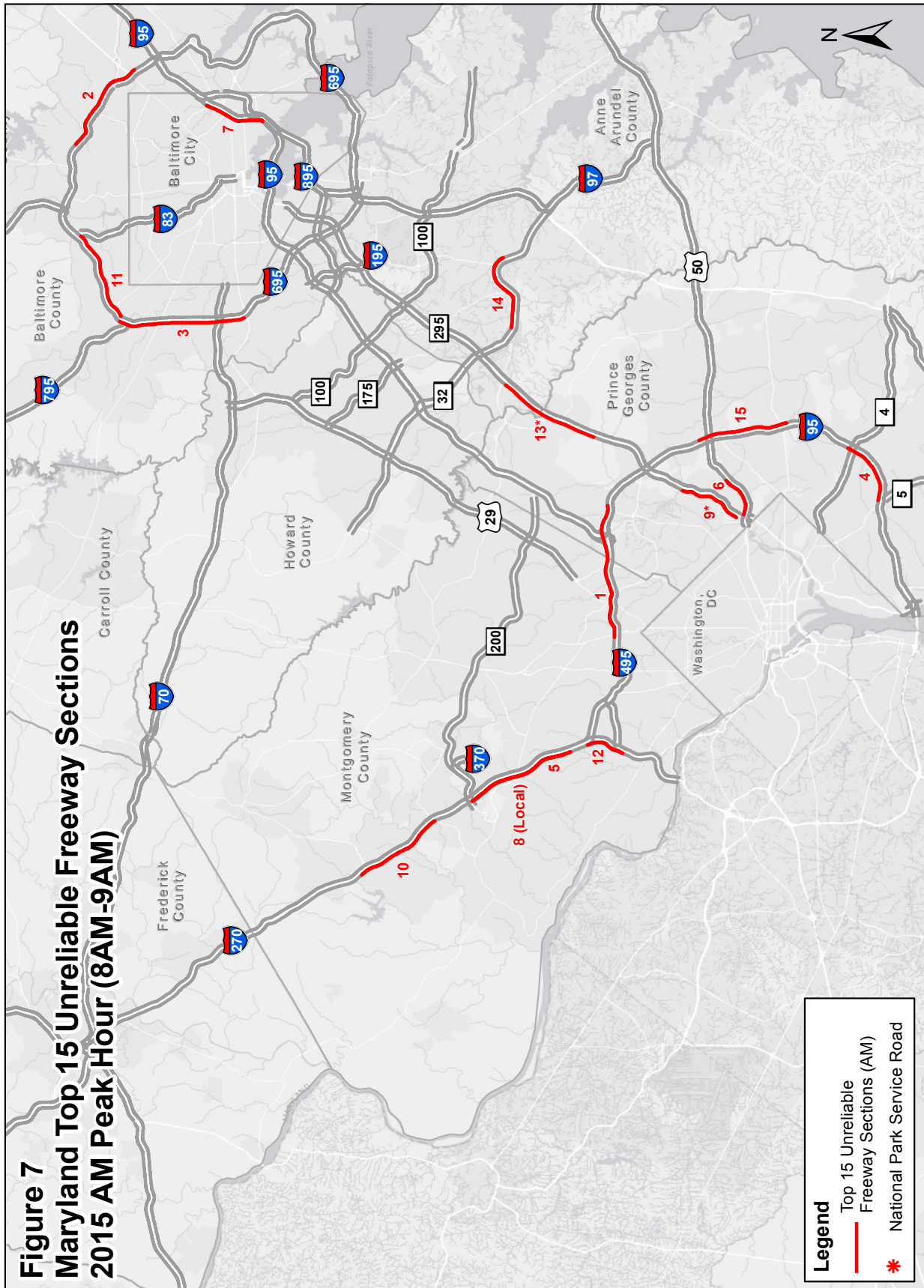
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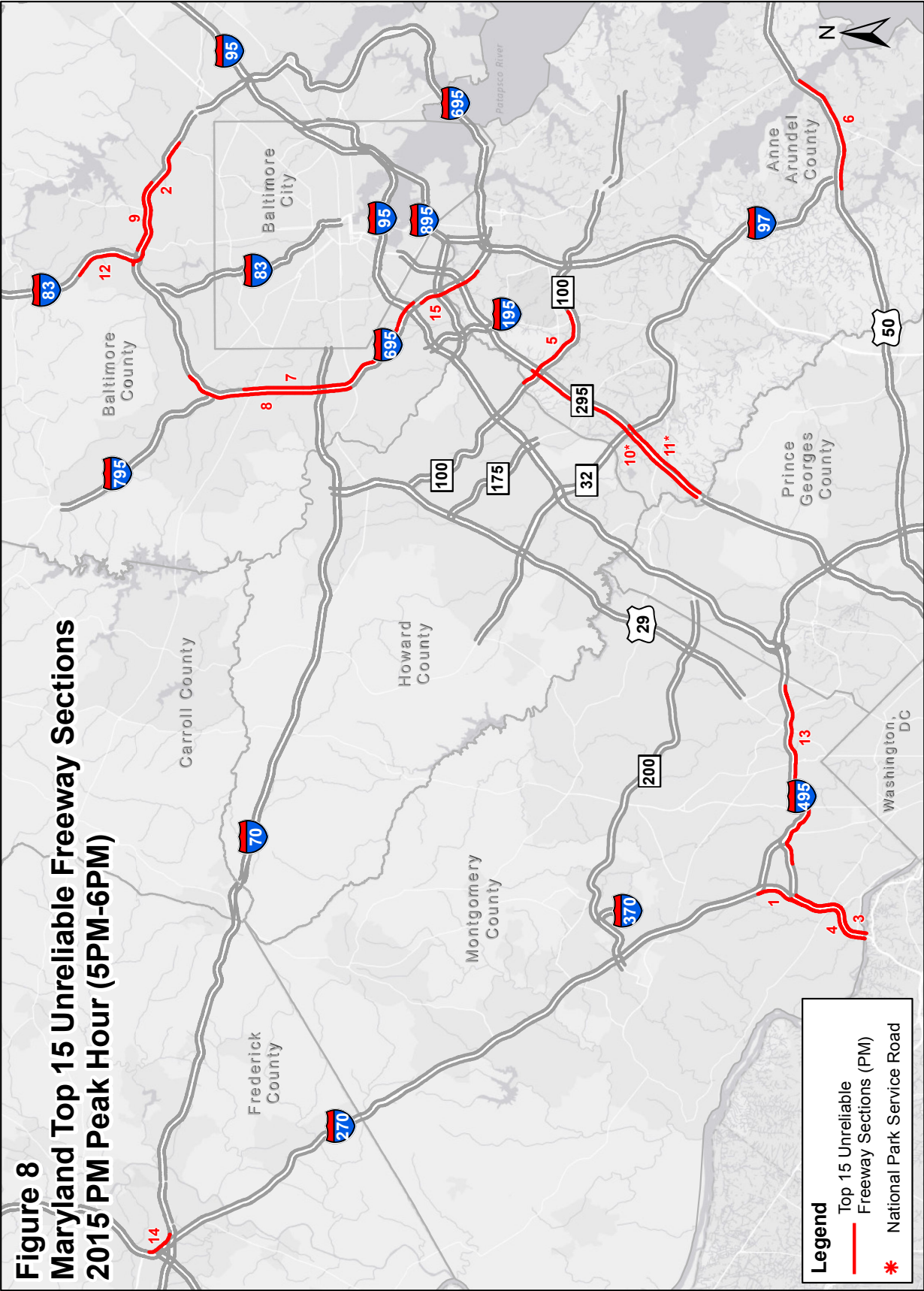
B. CONGESTION AND RELIABILITY TRENDS

2015 MOST UNRELIABLE FREEWAY/EXPRESSWAY SECTIONS - PM PEAK HOUR

PM Rank	Route	Location	PTI	County	Mileage
1	I-270 Spur Southbound	I-270 to I-495	10.90	Montgomery	2.1
2	I-695 Inner Loop	MD 139 to MD 41	6.66	Baltimore	5.6
3	I-495 Inner Loop	Virginia State Line/American Legion Bridge to I-270	5.37	Montgomery	3.9
4	I-495 Outer Loop	MD 187 to Virginia State Line/ American Legion Bridge	5.26	Montgomery	5.3
5	MD 100 Westbound	MD 170 to Howard County Line	4.99	Anne Arundel	3.6
6	US 50 Eastbound	I-97 to Severn River Bridge	4.53	Anne Arundel	5.4
7	I-695 Inner Loop	US 1 Alt to MD 26	4.10	Baltimore	9.9
8	I-695 Outer Loop	MD 140 to US 40	3.86	Baltimore	7.0
9	I-695 Outer Loop	Providence Rd to MD 139	3.81	Baltimore	2.7
10	MD 295 Southbound ¹	MD 175 to Prince George's County Line	3.77	Anne Arundel	6.8
11	MD 295 Northbound ¹	Prince George's County Line to MD 175	3.69	Anne Arundel	6.8
12	I-83 Southbound	Padonia Rd to I-695	3.69	Baltimore	3.2
13	I-495 Inner Loop	MD 187 to MD 650	3.67	Montgomery	8.6
14	US 40 Westbound	I-70 to US 15	3.53	Frederick	1.5
15	I-695 Outer Loop	US 1 Alt to MD 170	3.49	Anne Arundel	2.6

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2016 MARYLAND STATE HIGHWAY MOBILITY REPORT

Congestion and Reliability Correlation Trends

Motorists traveling along roadways that experience high levels of recurring congestion are more likely to be impacted by minor incidents. These incidents can produce severe back-ups and system level unreliable conditions for hours. Therefore, there is a strong correlation between the average congestion (TTI based maps shown in Figures 1 - 2) and the reliability (PTI

based maps in Figures 3-4). Roadways with lower TTI have some reserve capacity to absorb the disruption caused by non-recurring congestion and show higher reliability. The following tables represent the Top 30 congested segments (segments are part of a section) and their unreliability values for 2015 and 2014.

TOP 30 CONGESTED SEGMENTS AND ASSOCIATED UNRELIABILITY VALUES AM PEAK						
ROAD	LOCATION	DIRECTION	2015 RANK & (TTI)	2014 RANK & (TTI)	2015 RANK & (PTI)	2014 RANK & (PTI)
I-495	MD 650 to MD 193	Outer Loop	1 (4.4)	2 (3.9)	6 (8.5)	6 (7.5)
I-495	@ MD 650	Outer Loop	2 (4.4)	1 (4.0)	1 (9.2)	1 (9.0)
I-495	Prince George's County Line to MD 650	Outer Loop	3 (3.7)	3 (3.6)	2 (9.1)	2 (8.7)
I-495	MD 193 to US 29	Outer Loop	4 (3.6)	4 (3.2)	15 (6.3)	15 (5.8)
I-695	@ MD 147*	Outer Loop	5 (3.5)	5 (3.2)	9 (7.5)	9 (6.9)
I-695	MD 43 to MD 147*	Outer Loop	6 (3.4)	6 (2.8)	7 (8.3)	8 (7.2)
I-695	US 1 to MD 43	Outer Loop	7 (3.0)	13 (2.4)	3 (9.1)	5 (7.7)
I-495	US 29 to MD 97	Outer Loop	8 (2.8)	7 (2.5)	48 (4.4)	47 (4.0)
MD-295	US 50 to Washington DC Line ¹	Southbound	9 (2.8)	12 (2.5)	24 (5.3)	13 (5.8)
US-50	MD 202 to MD 459	Westbound	10 (2.6)	14 (2.4)	37 (4.8)	37 (4.4)
I-695	@ I-70	Outer Loop	11 (2.6)	11 (2.5)	12 (6.5)	12 (6.3)
I-695	MD 147 to MD 41	Outer Loop	12 (2.5)	9 (2.5)	42 (4.7)	4.0 (4.3)
I-270	@ MD 189	Southbound	13 (2.5)	17 (2.2)	36 (4.9)	43 (4.2)
I-270	Shady Grove Rd to MD 28	Southbound	14 (2.4)	10 (2.5)	20 (5.6)	17 (5.6)
I-495	I-95 to Montgomery Co Line	Outer Loop	15 (2.4)	8 (2.5)	4 (9.0)	3 (8.6)
I-270	Shady Grove Rd to MD 28 CD Lanes	Southbound	16 (2.4)	24 (2.1)	25 (5.3)	32 (4.6)
I-495	@ MD 97	Outer Loop	17 (2.4)	16 (2.3)	68 (3.7)	86 (3.3)
MD-295	@ MD 197 ¹	Southbound	18 (2.4)	28 (2.0)	64 (3.9)	69 (3.6)
I-270	MD 189 to Montrose Rd	Southbound	19 (2.4)	21 (2.1)	50 (4.3)	63 (3.7)
US-50	MD 459 to MD 201	Westbound	20 (2.3)	15 (2.3)	88 (3.4)	85 (3.3)
I-495	MD 414 to MD 210	Inner Loop	21 (2.3)	20 (2.1)	8 (8.1)	11 (6.8)
US-50	@ MD 202	Westbound	22 (2.3)	22 (2.1)	30 (5.1)	24 (4.9)
MD-295	Prince George's County Line to MD 198 ¹	Southbound	23 (2.2)	44 (1.8)	59 (4.0)	87 (3.3)
I-695	I-70 to US 40*	Outer Loop	24 (2.2)	18 (2.2)	56 (4.1)	49 (3.9)
I-270	I-370 to Shady Grove Rd	Southbound	25 (2.2)	29 (2.0)	13 (6.5)	22 (5.1)
I-695	@ US 1	Outer Loop	26 (2.2)	50 (1.8)	5 (8.6)	10 (6.8)
I-95	MD 210 to I-295 CD Lanes	Inner Loop	27 (2.2)	19 (2.1)	28 (5.2)	28 (4.6)
I-695	MD 26 to MD 122*	Outer Loop	28 (2.2)	25 (2.1)	26 (5.3)	20 (5.2)
I-895	MD 150 to O'Donnell St ²	Southbound	29 (2.2)	131 (1.3)	40 (4.8)	79 (3.4)
I-270	@ MD 118	Southbound	30 (2.1)	33 (1.9)	51 (4.3)	45 (4.0)

¹ Owned by the National Park Service

² Owned and Maintained by the Maryland Transportation Authority*Under or Nearby Construction

B. CONGESTION AND RELIABILITY TRENDS

TOP 30 CONGESTED SEGMENTS AND ASSOCIATED UNRELIABILITY VALUES PM PEAK

ROAD	LOCATION	DIRECTION	2015 RANK & (TTI)	2014 RANK & (TTI)	2015 RANK & (PTI)	2014 RANK & (PTI)
I-695	MD 45 to MD 146	Inner Loop	1 (4.1)	2 (3.7)	4 (9.1)	8 (7.6)
I-695	@ MD 146	Inner Loop	2 (4.0)	4 (3.4)	6 (8.3)	10 (6.5)
I-695	MD 139 to MD 45	Inner Loop	3 (3.9)	1 (4.0)	3 (10.4)	4 (9.5)
I-495	Cabin John Pkwy to MD 190	Inner Loop	4 (3.7)	3 (3.6)	9 (7.4)	9 (7.1)
I-270 Spur	@ I-495	Southbound	5 (3.6)	50 (2.0)	2 (12.0)	3 (9.6)
I-695	MD 146 to Providence Rd	Inner Loop	6 (3.6)	10 (3.0)	13 (6.7)	23 (5.3)
MD 32	Great Star Dr to MD 108	Westbound	7 (3.4)	6 (3.2)	14 (6.6)	18 (5.8)
I-495	Clara Barton Pkwy to Cabin John Pkwy	Inner Loop	8 (3.2)	7 (3.1)	17 (6.3)	20 (5.6)
I-495	MD 190 to I-270 Spur (West)	Inner Loop	9 (3.1)	8 (3.1)	38 (5.1)	26 (5.3)
I-270	MD 124 to Middlebrook Rd CD Lanes	Northbound	10 (3.0)	9 (3.0)	45 (4.9)	19 (5.7)
I-495	@ Clara Barton Pkwy (.295 Miles)	Inner Loop	11 (3.0)	11 (2.9)	27 (5.5)	25 (5.3)
I-270 Spur	@ Democracy Blvd	Southbound	12 (3.0)	74 (1.8)	1 (15.0)	1 (11.7)
I-495	MD 191 to MD 190	Outer Loop	13 (2.9)	62 (1.9)	19 (6.2)	40 (4.7)
I-495	US 1 to Greenbelt Metro	Inner Loop	14 (2.9)	16 (2.5)	40 (5.0)	48 (4.6)
MD-100	@ MD 295	Westbound	15 (2.8)	17 (2.5)	16 (6.3)	27 (5.3)
I-495	MD 190 to Cabin John Pkwy	Outer Loop	16 (2.8)	53 (2.0)	42 (5.0)	71 (4.0)
I-270	@ MD 124 CD Lanes	Northbound	17 (2.8)	21 (2.4)	39 (5.0)	36 (5.0)
MD-100	@ Coca Cola Dr	Westbound	18 (2.7)	13 (2.6)	63 (4.2)	79 (3.8)
I-695	@ MD 139	Inner Loop	19 (2.6)	5 (3.2)	5 (8.7)	2 (10.0)
I-270	@ Shady Grove Rd CD Lanes	Northbound	20 (2.6)	15 (2.6)	46 (4.8)	51 (4.4)
MD 295	MD 32 to MD 198 ¹	Southbound	21 (2.6)	29 (2.2)	33 (5.2)	33 (5.0)
US 29	MD 32 to Broken Land Pkwy*	Northbound	22 (2.6)	18 (2.5)	89 (3.9)	93 (3.8)
MD 295	Powder Mill Rd to MD 197 ¹	Northbound	23 (2.5)	19 (2.5)	67 (4.2)	77 (3.9)
MD 32	MD 295 to MD 198/Fort Meade Rd	Eastbound	24 (2.5)	N/A	61 (4.2)	N/A
I-495	MD 355 to MD 185	Inner Loop	25 (2.5)	38 (2.1)	32 (5.2)	16 (6.0)
I-495	@ MD 185	Inner Loop	26 (2.5)	35 (2.2)	36 (5.1)	15 (6.0)
I-70	@ US 29	Westbound	27 (2.4)	43 (2.1)	31 (5.2)	44 (4.6)
I-695	@ MD 122	Inner Loop	28 (2.4)	20 (2.4)	51 (4.5)	45 (4.6)
MD-295	@ MD 32 ¹	Northbound	29 (2.4)	12 (2.7)	52 (4.5)	41 (4.7)
I-695	@ Hammonds Ferry Rd/Nursery Rd	Outer Loop	30 (2.4)	24 (2.3)	94 (3.9)	105 (3.6)

¹ Owned by the National Park Service

*Under or Nearby Construction

There is also a close correlation between the statewide ranking of the TTI value and the PTI value. There are exceptions to this which mostly occur in segments that border on the worst congested segments. The top 5 locations for PTI values that are not part of the Top 30 congested segments:

HIGHEST PTI LOCATIONS WITH LOWER TTI VALUES

2015 AM Peak Hour

Location	PTI Value	Statewide Rank
I-695 @ I-795 Outer Loop	7.29	10
I-695 - MD 140 to I-795 Outer Loop	6.57	11
I-495 @ MD 414 Inner Loop	6.14	16
MD 295 - MD 202 to US 50 Southbound	6.07	17
US 50 - MD 410 to MD 202 Westbound	5.93	18

2015 PM Peak Hour

Location	PTI Value	Statewide Rank
MD 100 - MD 713 to MD 295 Westbound	8.30	7
MD 100 - MD 170 to MD 713 Westbound	7.97	8
I-495 - MD 187 to MD 355 Inner Loop	6.93	11
I-495 @ MD 355 Inner Loop	6.77	12
I-695 @ I-95 Inner Loop	6.40	15