

Quarterly Congestion Analysis Report for the Baltimore Region

Top 10 Bottleneck Locations

1st Quarter 2016



Table of Contents

About the region.....2

How bottleneck conditions are tracked4

Bottleneck ranking incident icons6

Top 10 Bottleneck Map7

Top 10 Bottleneck List8

#1-10 Ranked Bottlenecks with Maps, Occurrence Times and Notes9-28

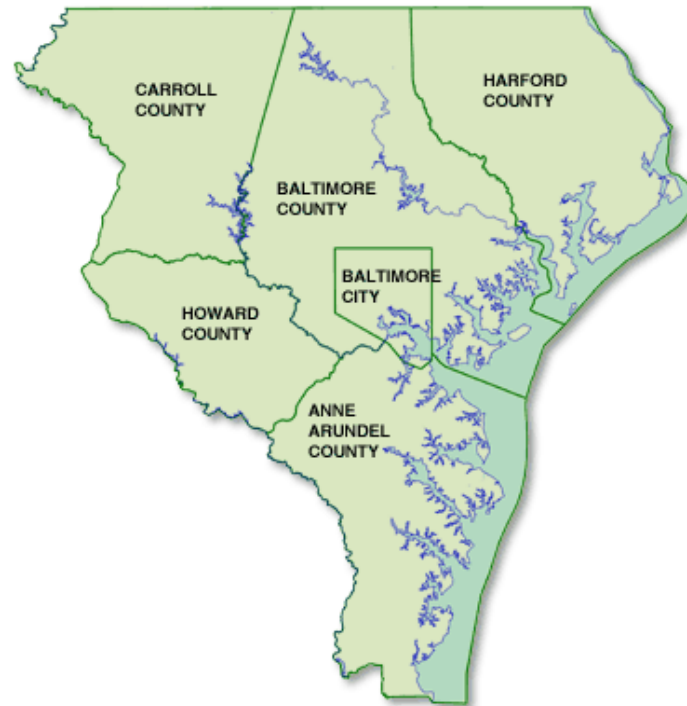
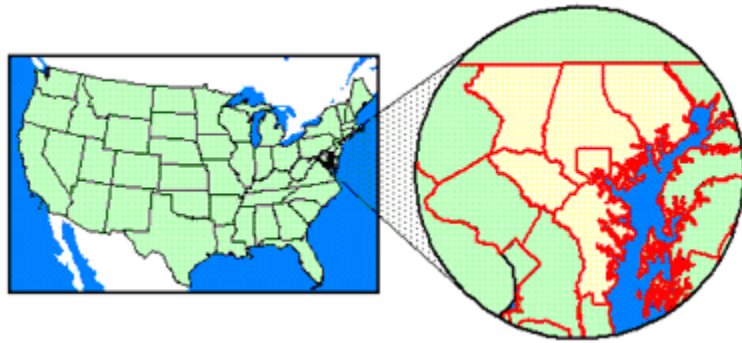
AM Peak Period Speed Map for the Baltimore Region.....29

PM Peak Period Speed Map for the Baltimore Region30

Credits.....31

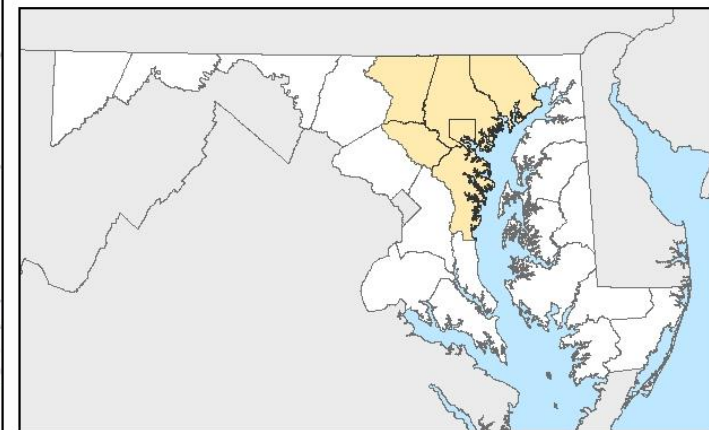
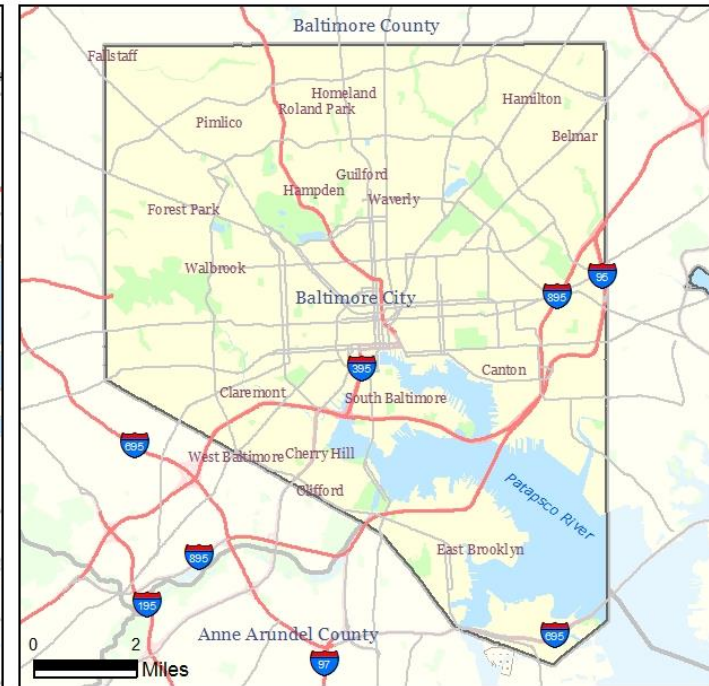
About the Region

Located in the heart of the Mid-Atlantic on the east coast, the Baltimore region includes:



The Baltimore region is the nation's 19th largest market, with over 2.5 million people. The market also ranks among the top 20 in the country in the number of households, total effective buying income and retail sales.

Baltimore Metropolitan Region



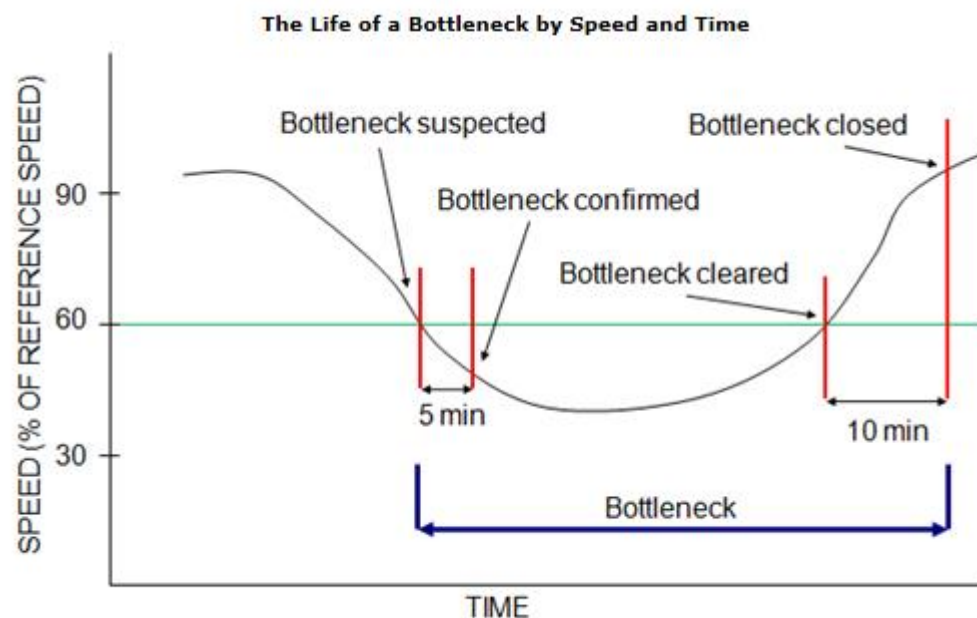
Prepared by
Transportation Planning Division
Projected Coordinate System: NAD 1983 State Plane (ft)
Data Source: BMC, © NAVTEQ 2013, TIGER/Line®, MTA
Printed - July 2013



How are bottleneck conditions tracked?

If the reported speed falls below 60% of the reference, the road segment is flagged as a potential bottleneck

Bottleneck conditions are determined by comparing the current reported speed to the reference speed for each segment of road. Reference speed values are provided by INRIX for each segment, and represent the 85th percentile observed speed for all time periods, with a maximum value of 65 mph. If the reported speed falls below 60% of the reference, the road segment is flagged as a potential bottleneck. If the reported speed stays below 60% for five minutes, the segment is confirmed as a bottleneck location. Adjacent road segments meeting this condition are joined together to form the bottleneck queue. When reported speeds on every segment associated with a bottleneck queue have returned to values greater than 60% of their reference values and remained that way for 10 minutes, the bottleneck is considered cleared. Bottlenecks whose total queue length, determined by adding the length of each road segment associated with the bottleneck is less than 0.3 miles are ignored. Queues may originate outside the Baltimore region but are reported on if any portion extends into the region.



How are bottleneck conditions tracked?

Bottleneck Ranking Table

Rank	Map	Bottleneck head location	Impact	Average max...	Average daily dur...	Total duration	All Events/Inc...
1	<input checked="" type="checkbox"/>	I-495 CW @ CLARA BARTON PKWY/EXIT 41	32,170.11	3.67	5 h 51 m	7 d 07 h 57 m	18
2	<input type="checkbox"/>	I-495 CW @ I-270 SPUR	27,167.59	5.25	2 h 45 m	3 d 10 h 48 m	57
3	<input type="checkbox"/>	I-95 N @ MD-100/EXIT 43	23,117.99	5.08	2 h 50 m	3 d 13 h 01 m	113
4	<input checked="" type="checkbox"/>	I-495 CCW @ MD-97/GEORGIA AVE/EXIT 31	22,657.46	2.72	4 h 35 m	5 d 17 h 30 m	205
5	<input type="checkbox"/>	I-495 CW @ MD-214/CENTRAL AVE/EXIT 15	22,505.20	3.43	3 h 25 m	4 d 06 h 41 m	368
6	<input type="checkbox"/>	I-270 S @ MD-109/EXIT 22	21,832.78	4.45	3 h 09 m	3 d 22 h 48 m	50
7	<input type="checkbox"/>	I-695 CW @ MD-41/PERRING PKWY/EXIT 30	21,655.03	2.91	3 h 17 m	4 d 02 h 48 m	149

The Bottleneck Ranking Table will display a list of locations identified as being bottlenecks along with some additional information for each location, including:

- *Rank* - The ranked position of the location according to the current table ordering (*Impact* by default)
- *Impact* - The aggregation of queue length over time for congestion originating at each location in mile-minutes. For example, if at time t1 an element has congestion covering one mile of the roadway, it has an impact of 1. If the congestion then grows at time t2 to cover 2 miles, the location will now have an impact of 3. If at time t3 congestion shrinks to 1 mile, and at t4 there is no congestion, the element will have a final impact of 4.
- *Average max length* - The average maximum length, in miles, of queues formed by congestion originating at the location
- *Average daily duration* - The average amount of time per day that congestion is identified originating at the location
- *Total duration* - The total amount of time congestion was identified at the location
- *All Events/Incidents* - The number of traffic events and incidents that occurred within the space of the bottleneck at any time during the time period being analyzed

Bottleneck Ranking Incident Icons

When showing event/incident icons on some of the graphs in the Bottleneck Ranking tool a minimalist approach has been taken. In order to reduce clutter and confusion on the graphs, icons have been simplified down to single shape and color. Each represents the following:



Red — Severe events and incidents

- Emergency Roadwork
- Injury
- Medical Emergency



Orange — Roadwork



Yellow — All other events and incidents

More detailed icons may be used at times when a major incident was the cause of a bottleneck.

Incident/Event Icons



- Injury



- Police Activity



- Fire



- Closure



- Sports Event



- Delays



- Signal System



- Tornado



- Wind



- Fallen Tree



- Hazmat



- Debris



- Flood



- Animal Struck



- Special Event



- Congestion



- Incident



- Fog



- Fallen Rocks



- Other



- Vehicle Fire



- Collision



- Disabled Vehicle



- Roadwork



- Emergency Roadwork



- Draw Bridge Opening



- Water Main Work



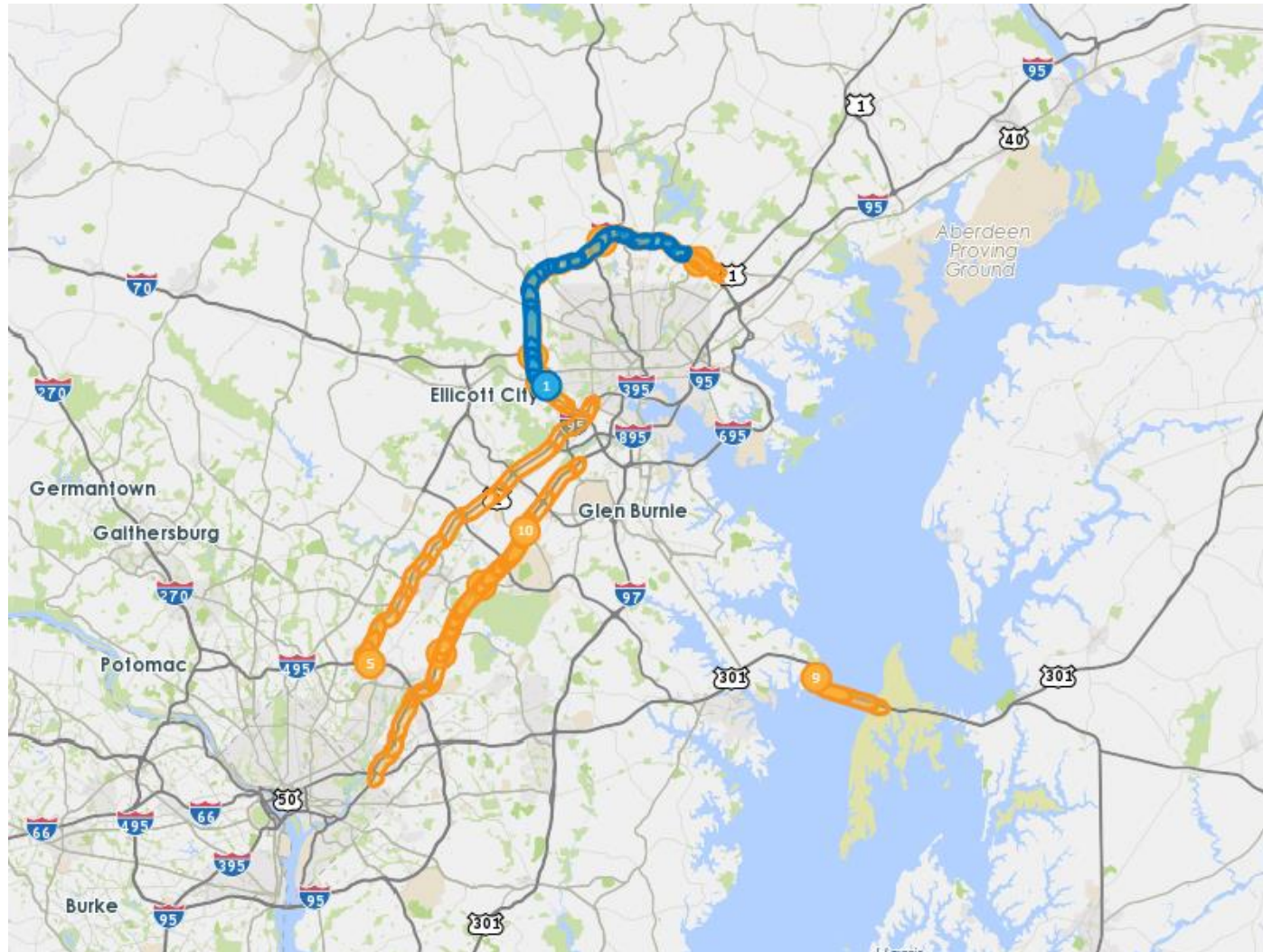
- Medical Emergency



- Overgrown Foliage

Top 10 Bottlenecks in the Baltimore Region 1st Quarter 2016

Overview Map



Top 10 Bottlenecks in the Baltimore Region 1st Quarter 2016

By Impact

The aggregation of queue length over time for congestion originating at each location in mile minutes. This table indicates the top 10 congested corridors in the region.

	Location	Impact	Average max length (miles)	Average Daily Duration	Total Duration	All Events Incidents
1	I-695 OL @ Edmondson Ave/Exit 14	50,456	5.26	1 h 47 m	6 d 18 h 35 m	611
2	I-695 IL @ MD-41/Perring Pkwy/Exit 30	47,463	3.08	2 h 17 m	8 d 16 h 27 m	576
3	I-695 IL @ I-70/Exit 16	34,532	2.24	2 h 42 m	10 d 05 h 47 m	210
4	I-695 IL @ I-83/MD-25/Exit 23	33,080	3.60	2 h 00 m	7 d 14 h 12 m	388
5	I-95 SB @ I-495/Exit 27-25	32,884	2.63	2 h 50 m	10 d 18 h 41 m	590
6	MD-295 SB @ Powder Mill Rd	29,655	4.94	1 h 19 m	5 d 01 h 00 m	212
7	MD-295 SB @ MD-198	27,926	2.58	2 h 05 m	7 d 22 h 37 m	239
8	I-695 OL @ US-40/Exit 15	25,976	3.53	1 h 23 m	5 d 06 h 28 m	730
9	US 50 WB @ Bay Bridge Toll Plaza	23,436	3.73	1 h 07 m	4 d 06 h 35 m	284
10	MD-295 NB @ MD-175	22,887	3.91	1 h 12 m	4 d 14 h 37 m	205

IL = Inner Loop

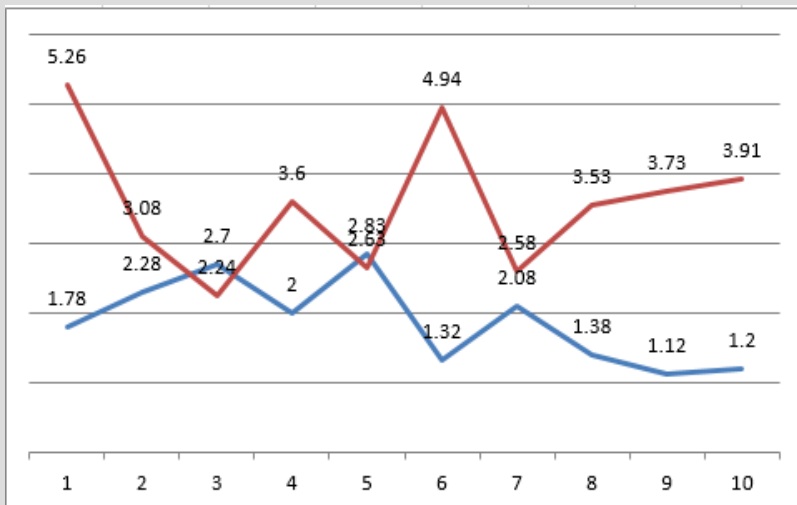
OL = Outer Loop

NB = Northbound

SB = Southbound

EB = Eastbound

WB = Westbound



Top 10 Bottlenecks in the Baltimore Region

By Impact

Aggregation of queue length over time in mile minutes

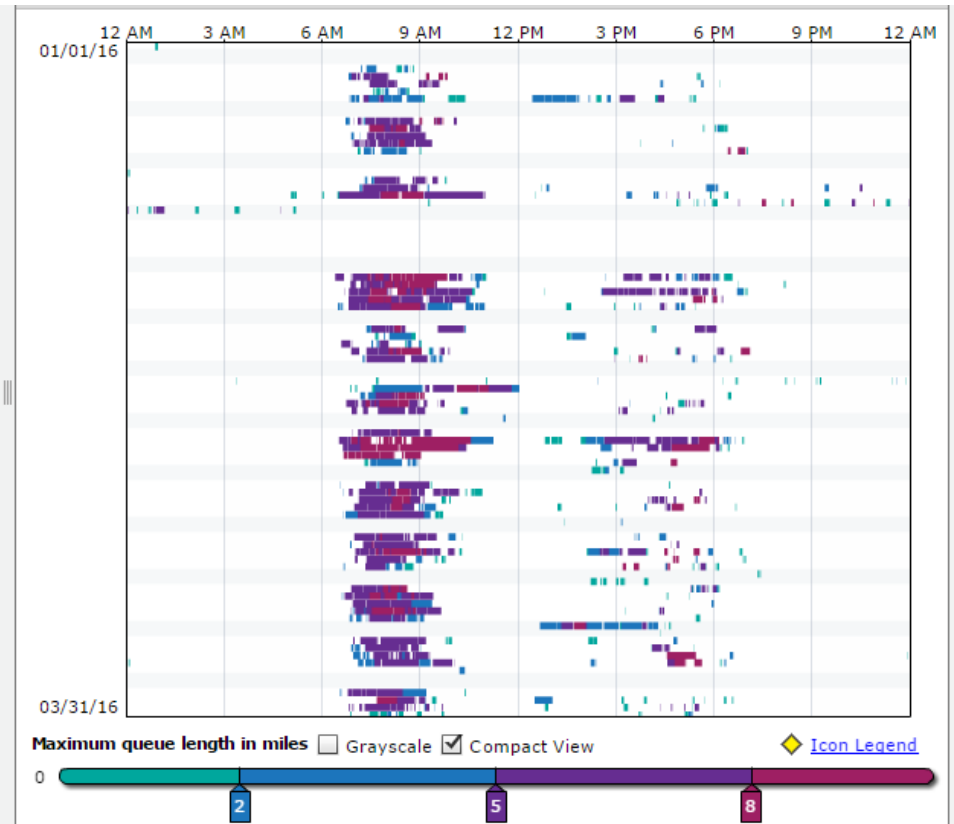
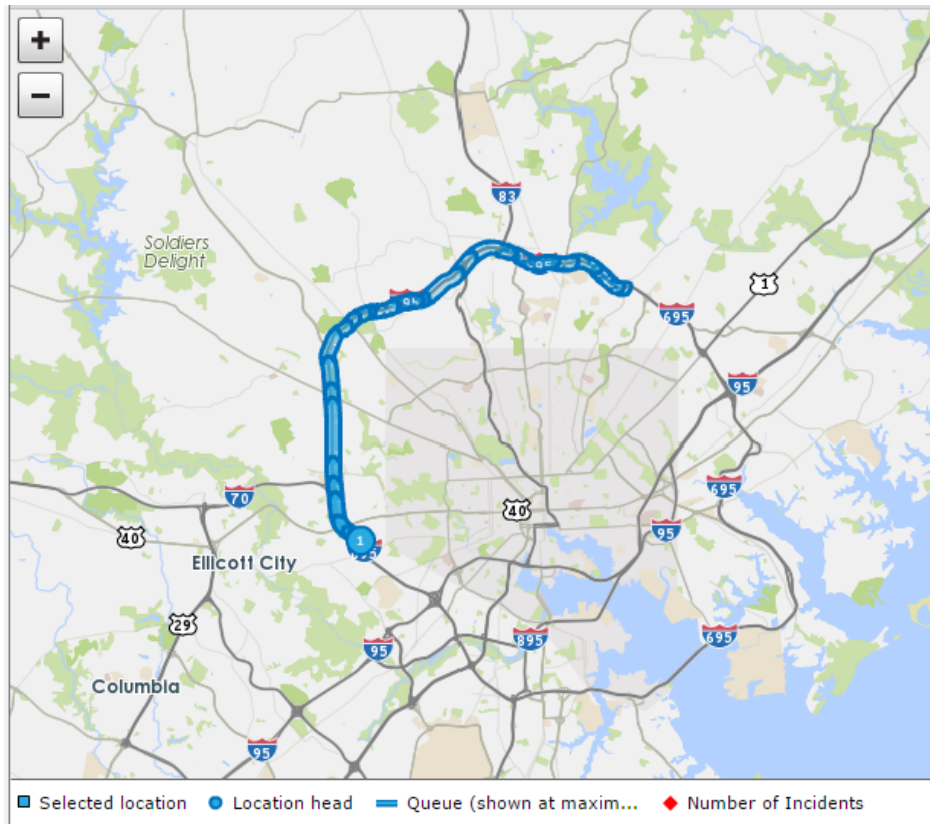
1st Quarter 2016

Average max length (miles)

Average duration (hours)

#1 Ranked Bottleneck in the Baltimore Region – 1st Quarter 2016

Location	Impact	Average max length (miles)	Average Daily Duration	Total Duration	All Events/Incidents
I-695 OL @ Edmondson Ave/Exit 14	50,456	5.26	1 h 47 m	6 d 18 h 35 m	611

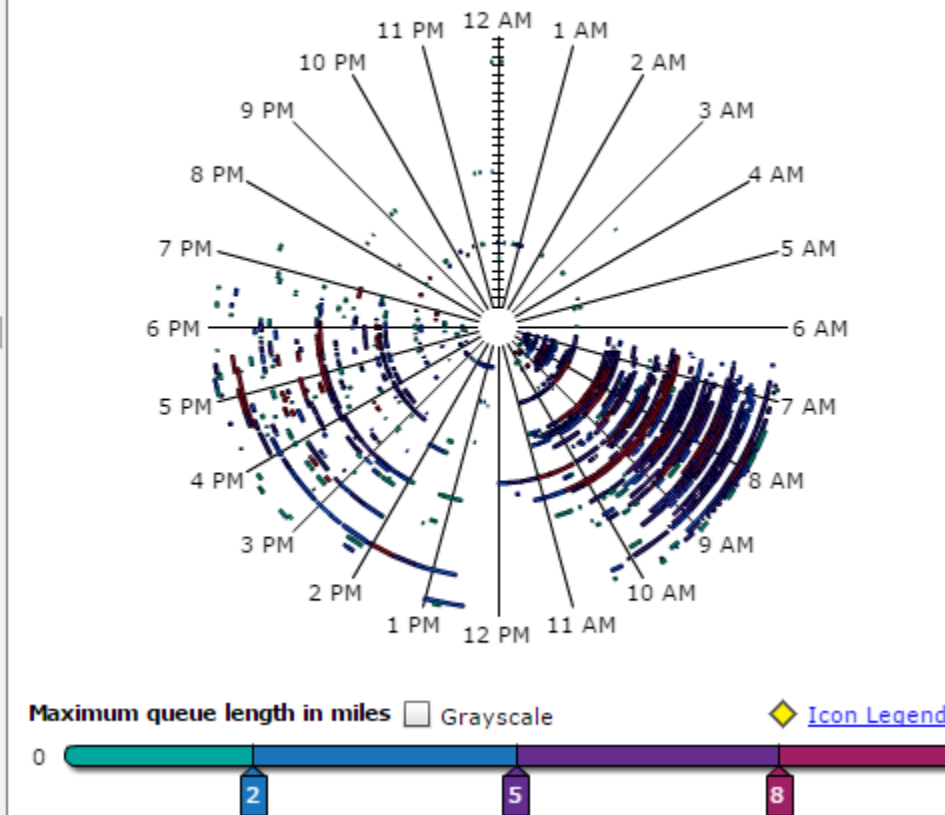


Notes: Longstanding bottleneck on the outer loop of the beltway primarily during the morning rush. High traffic volume area. Delays extend back as far as MD-26/Liberty Rd. Also contributing to congestion in the area is a beltway widening project which began in February. "The plan is for crews to add a fourth lane to the outer loop and widen the median in anticipation of a possible fifth lane. The bridges over Ingleside and Edmondson avenues will be replaced to increase the clearance height." (Source: The Baltimore Sun 2/23/15)

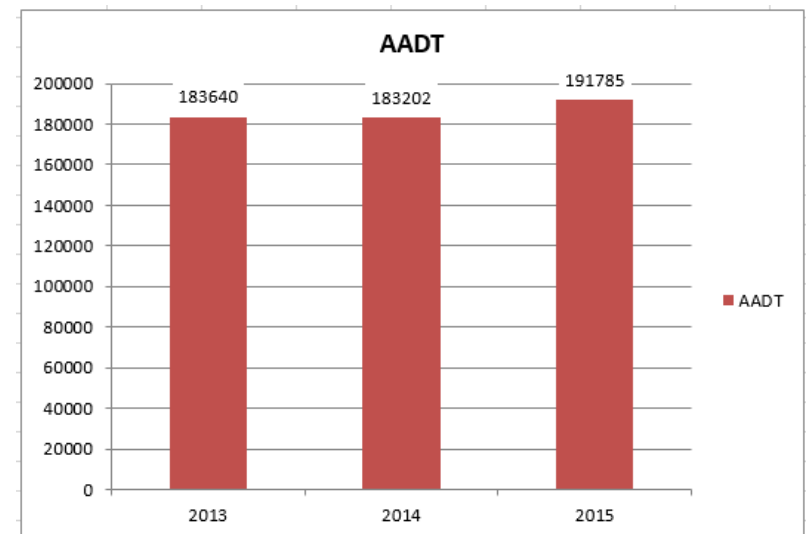
#1 Ranked Bottleneck in the Baltimore Region – 1st Quarter 2016

Location	Impact	Average max length (miles)	Average Daily Duration	Total Duration	All Events/Incidents
I-695 OL @ Edmondson Ave/Exit 14	50,456	5.26	1 h 47 m	6 d 18 h 35 m	611

The center represents January 1, 2016 and the outer edge represents April 1, 2016.

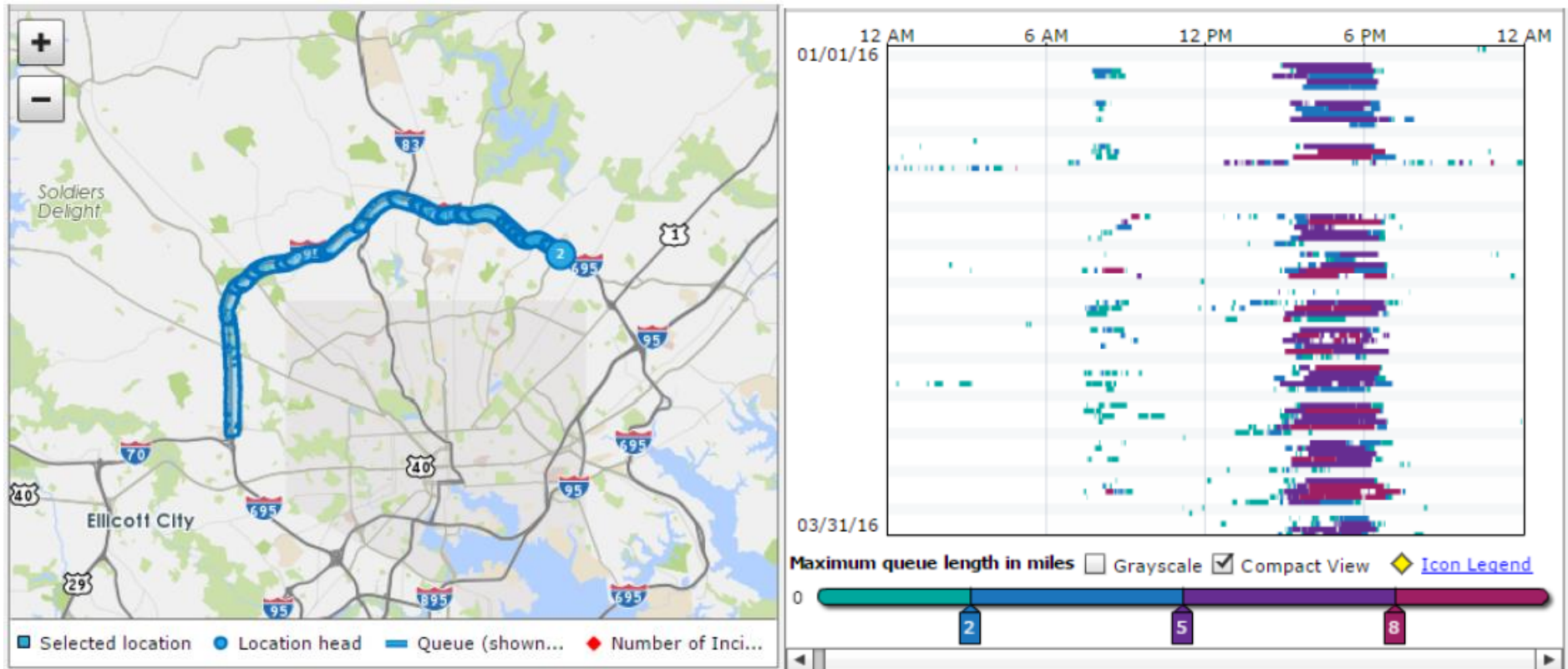


Traffic Volumes – Average Annual Daily Traffic (AADT)
 STATION_DESCRIPTION IS 695 - South of Ingleside Ave
 (ATR#32)



#2 Ranked Bottleneck in the Baltimore Region – 1st Quarter 2016

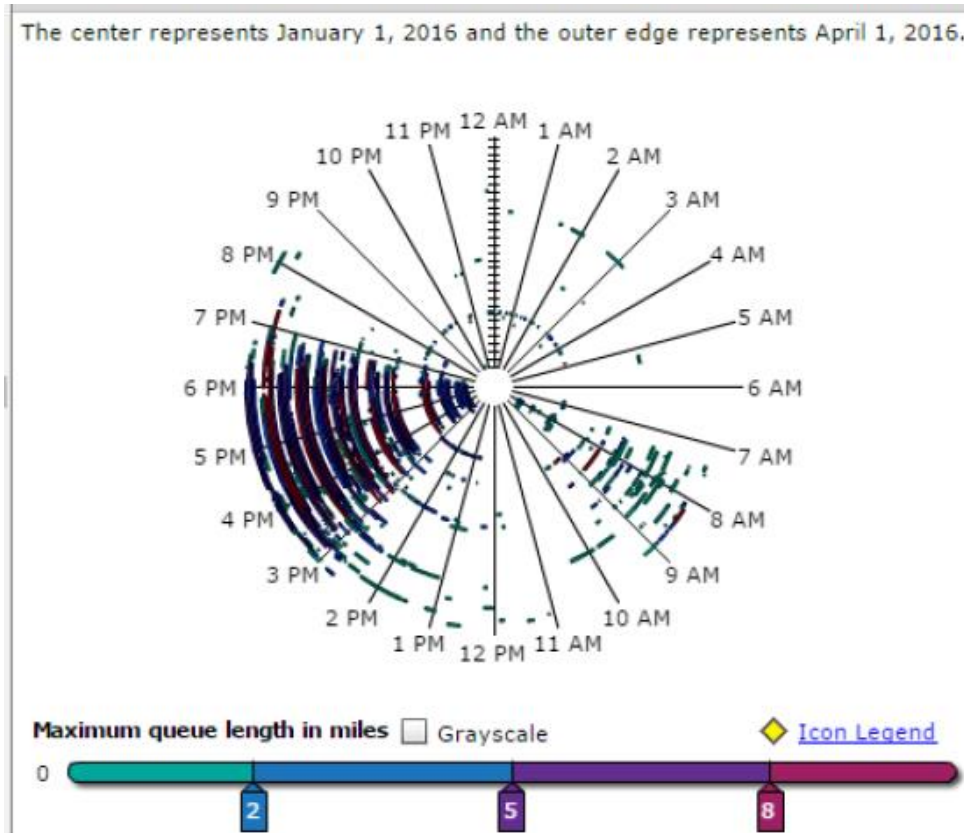
Location	Impact	Average max length (miles)	Average Daily Duration	Total Duration	All Events/Incidents
I-695 IL @ MD-41/Perring Pkwy/Exit 14	47,463	3.08	2 h 47 m	8 d 16 h 27 m	576



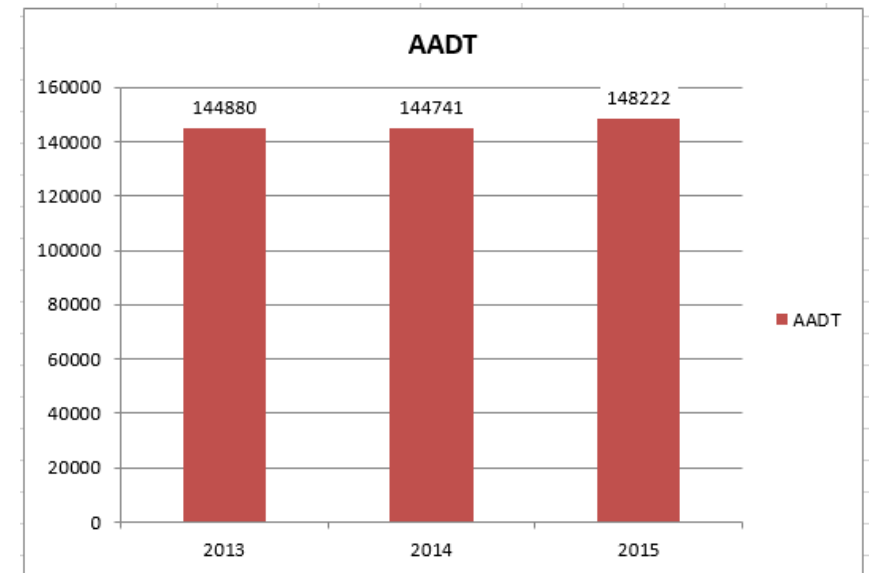
Notes: Congestion was most severe between I-83 and Providence Rd in the afternoon PM peak period. Factors contributing to this long standing and extended congested zone: merging and weaving associated with traffic at each interchange and a lane drop (to 3 lanes) at MD-45/York Rd.

#2 Ranked Bottleneck in the Baltimore Region – 1st Quarter 2016

Location	Impact	Average max length (miles)	Average Daily Duration	Total Duration	All Events/Incidents
I-695 IL @ MD-41/Perring Pkwy/Exit 30	47,463	3.08	2 h 17 m	8 d 16 h 27 m	576

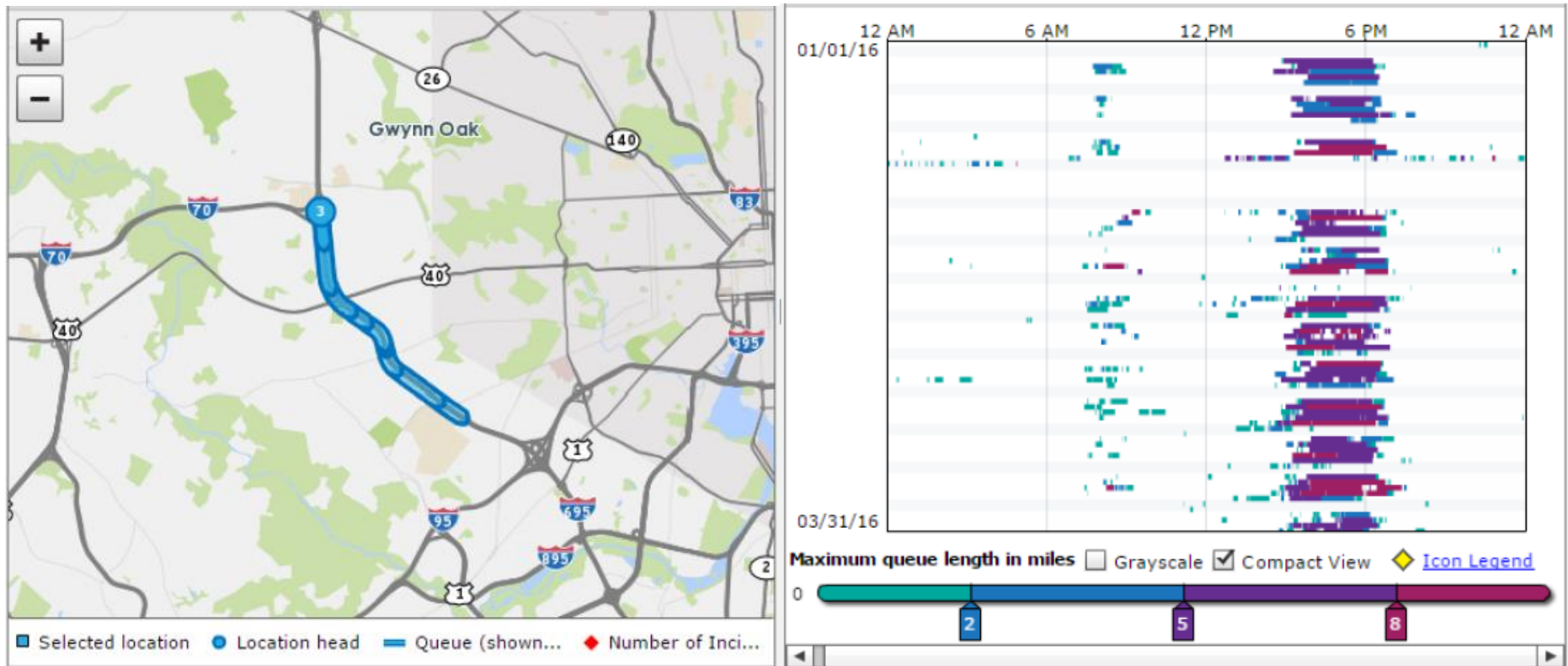


Traffic Volumes – Average Annual Daily Traffic (AADT)
STATION_DESCRIPTION IS695-.20 MI E OF MD542



#3 Ranked Bottleneck in the Baltimore Region – 1st Quarter 2016

Location	Impact	Average max length (miles)	Average Daily Duration	Total Duration	All Events/Incidents
I-695 IL @ I-70/Exit 16	34,532	2.24	2 h 42 m	10 d 05 h 47 m	210

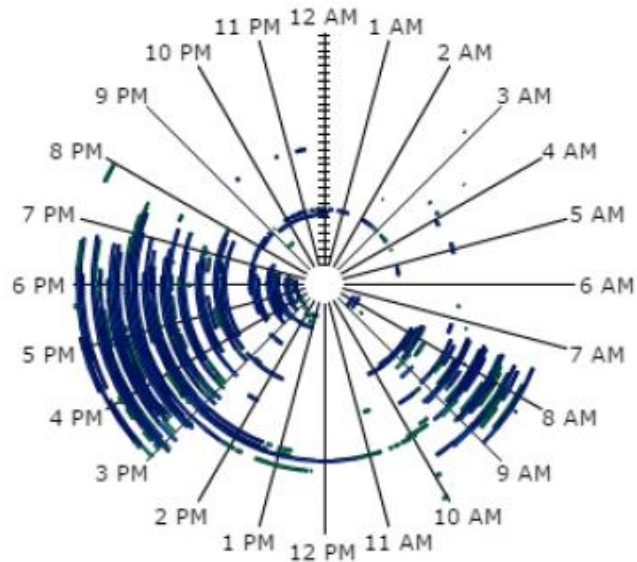


Notes: Normal inner-loop congestion with the greatest delays between MD 144 and the lane drop at I-70. High-volume ramps from Security Blvd, I-70 and US 40 contributed to the congestion.

#3 Ranked Bottleneck in the Baltimore Region – 1st Quarter 2016

Location	Impact	Average max length (miles)	Average Daily Duration	Total Duration	All Events/Incidents
I-695 IL @ I-70/Exit 16	34,532	2.24	2 h 42 m	10 d 05 h 47 m	210

The center represents January 1, 2016 and the outer edge represents April 1, 2016.



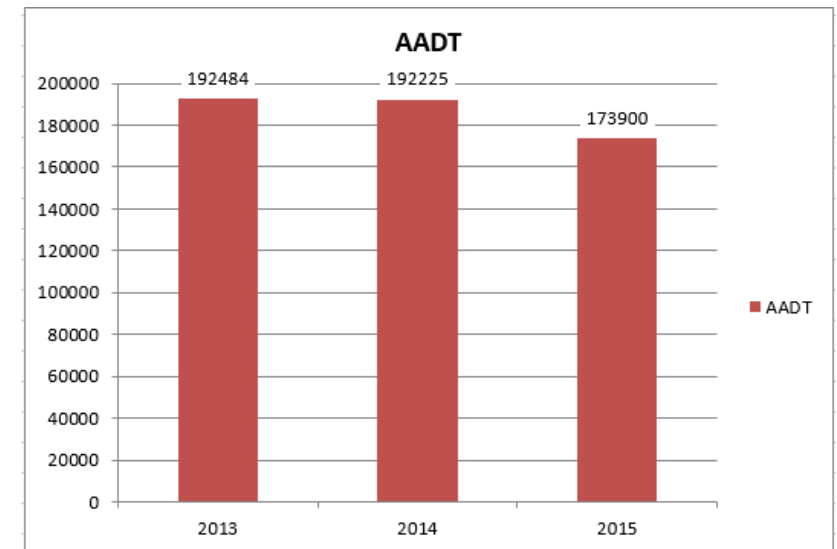
Maximum queue length in miles

Grayscale

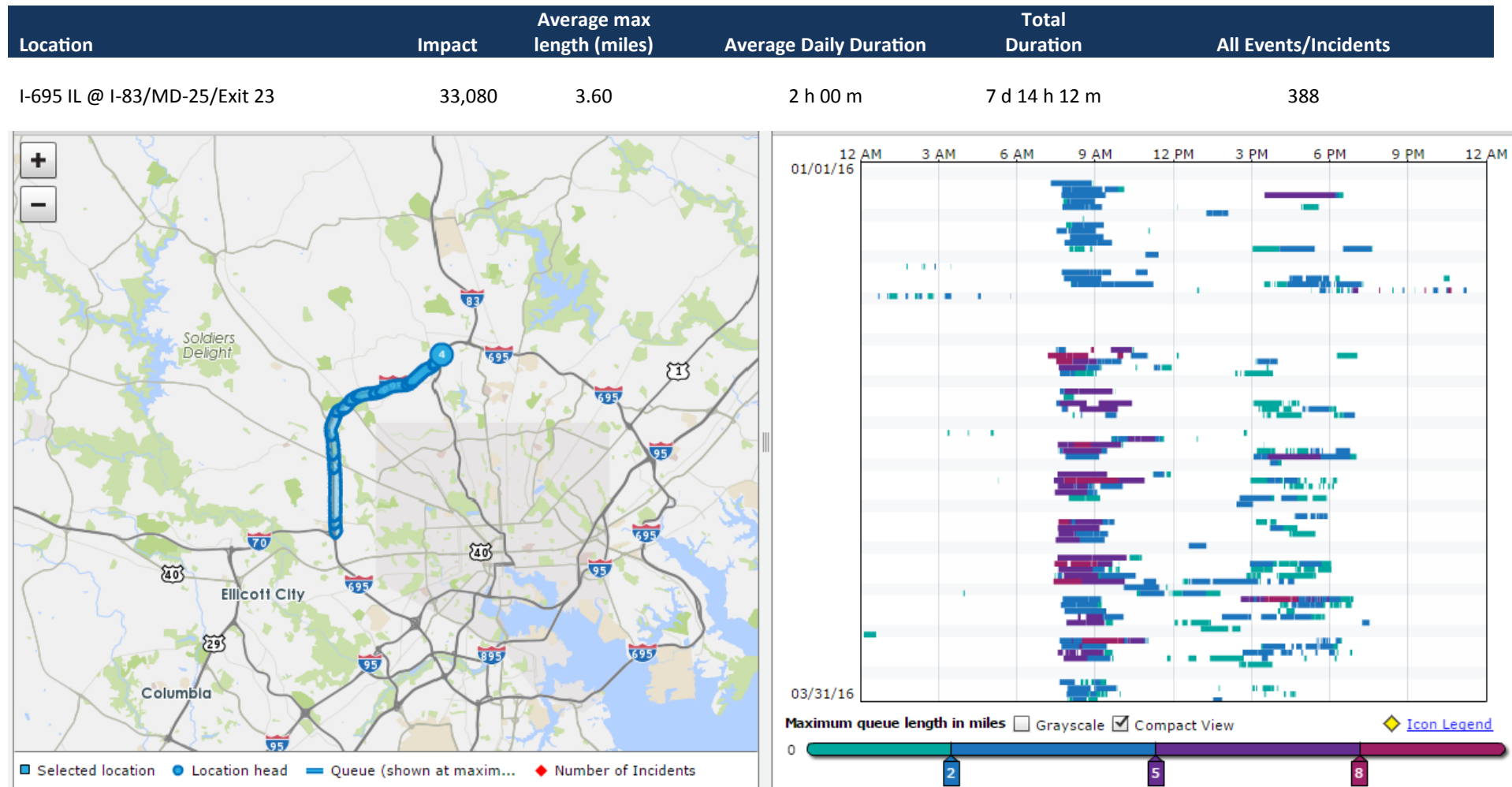
Icon Legend



Traffic Volumes – Average Annual Daily Traffic (AADT)
STATION_DESCRIPTION IS695-.50 MI S OF IS70



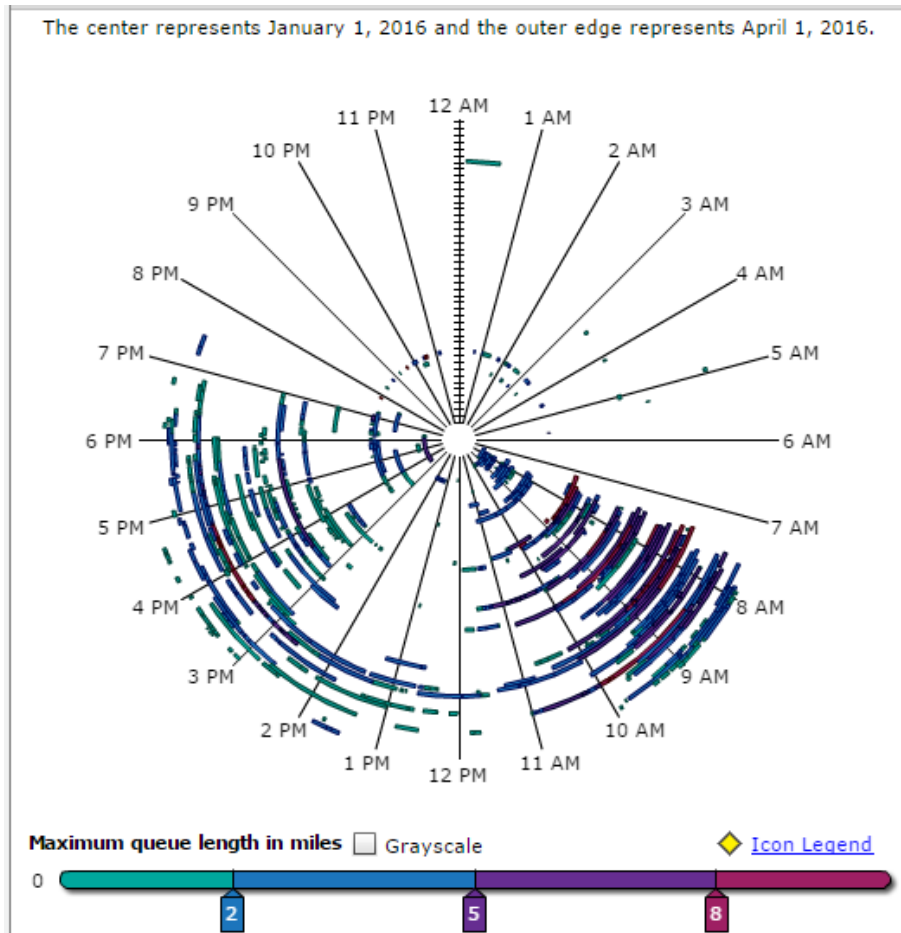
#4 Ranked Bottleneck in the Baltimore Region – 1st Quarter 2016



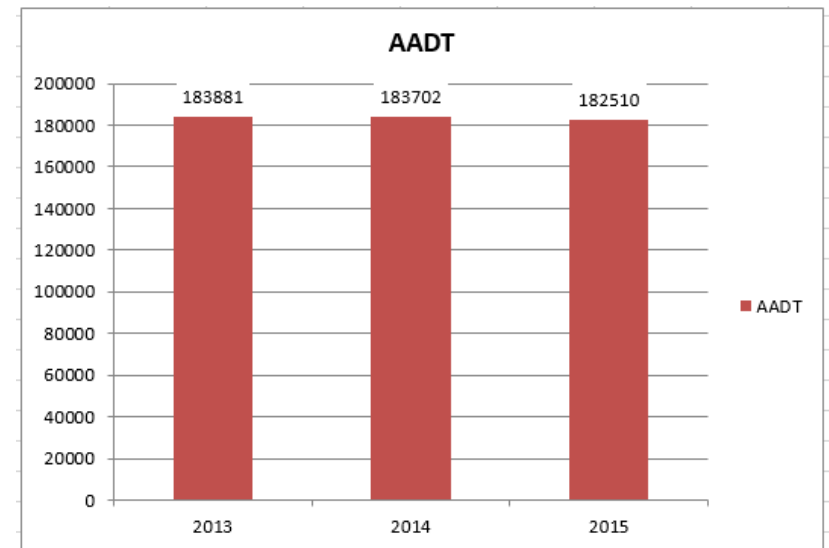
Notes: Morning rush hour congestion. The lane drop approaching the ramp to southbound I-83 is a contributing factor, as are merging and weaving at the interchanges in this segment.

#4 Ranked Bottleneck in the Baltimore Region – 1st Quarter 2016

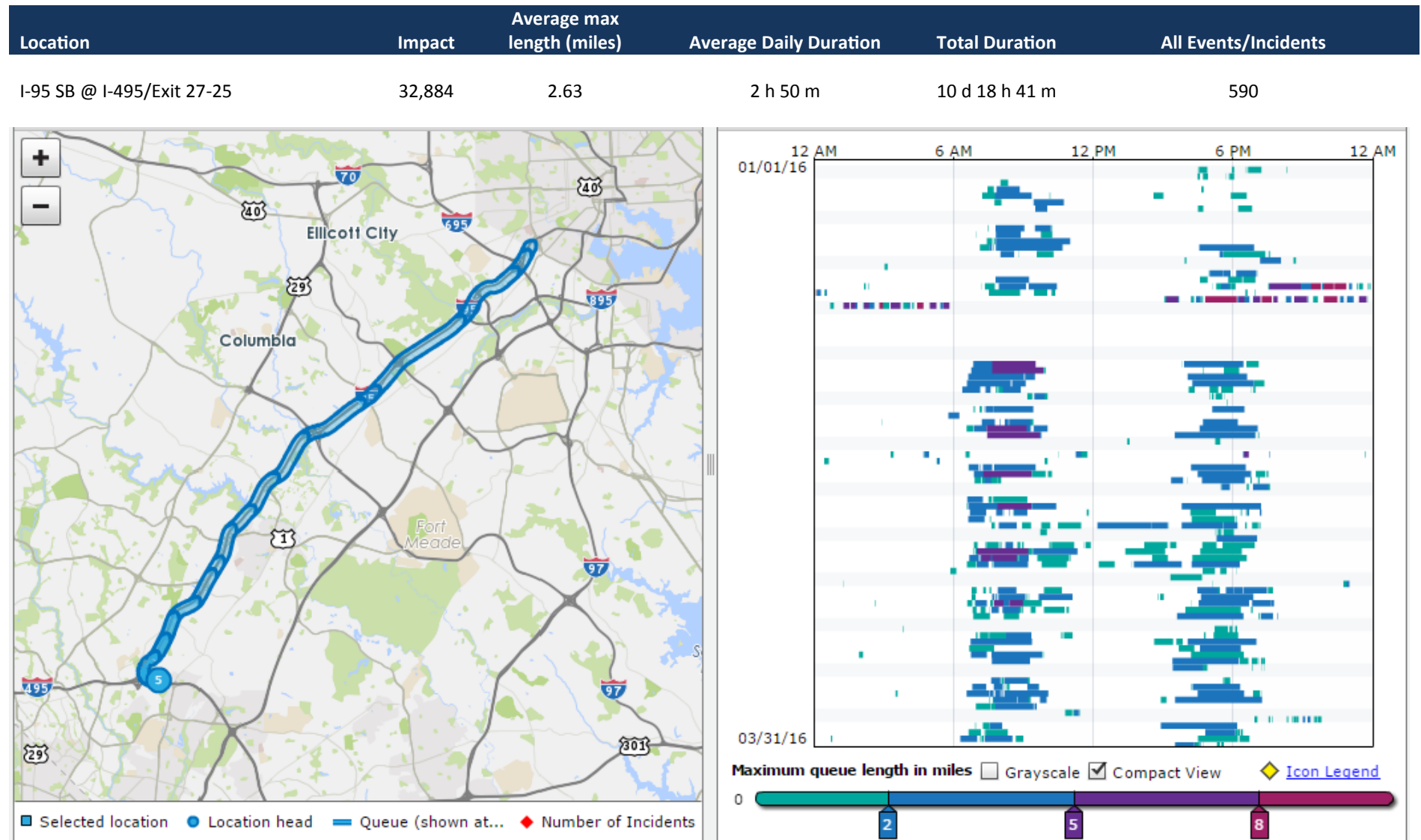
Location	Impact	Average max length (miles)	Average Daily Duration	Total Duration	All Events/Incidents
I-695 IL @ I-83/MD-25/Exit 23	33,080	3.60	2 h 00 m	7 d 14 h 12 m	388



Traffic Volumes – Average Annual Daily Traffic (AADT)
 STATION_DESCRIPTION IS695-.50 MI N OF GREENSPRING
 AVE



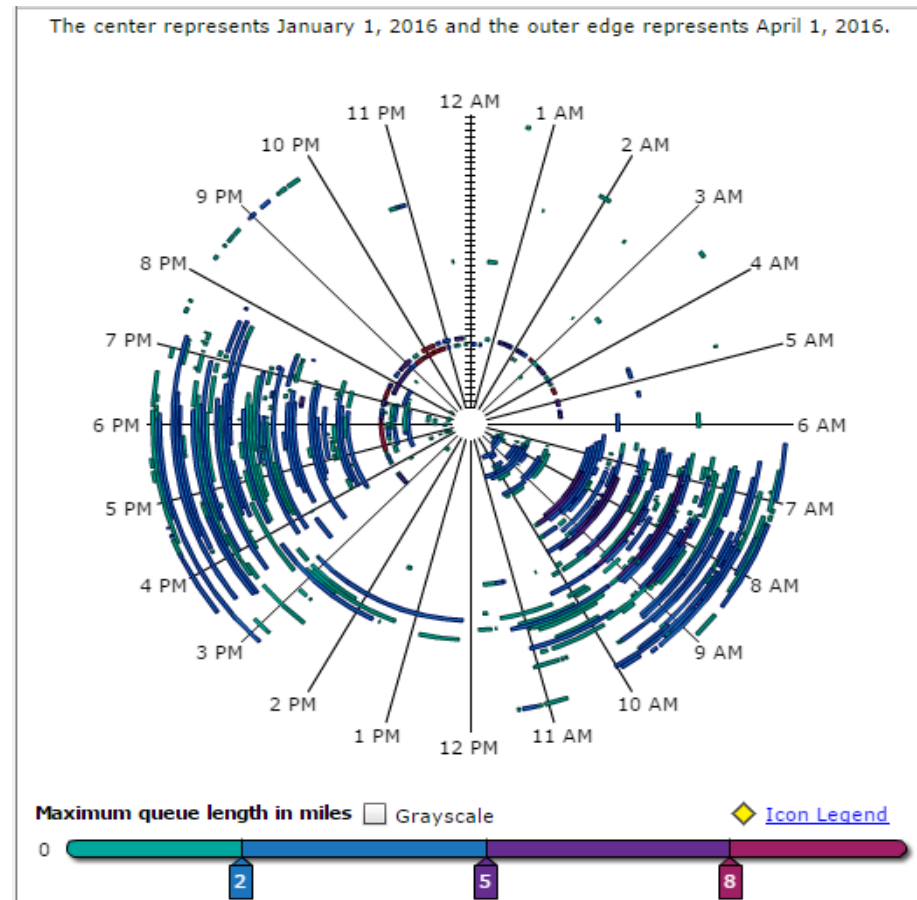
#5 Ranked Bottleneck in the Baltimore Region – 1st Quarter 2016



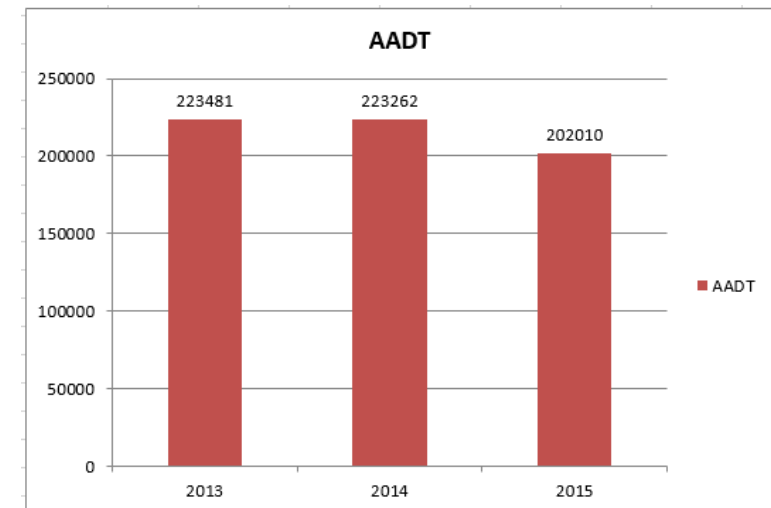
Notes: I-95 merge with the Capital Beltway I-495. Volume related delays. Congestion seen in the morning and afternoon rush hour sometimes extending into the southern portion of the Baltimore region.

#5 Ranked Bottleneck in the Baltimore Region – 1st Quarter 2016

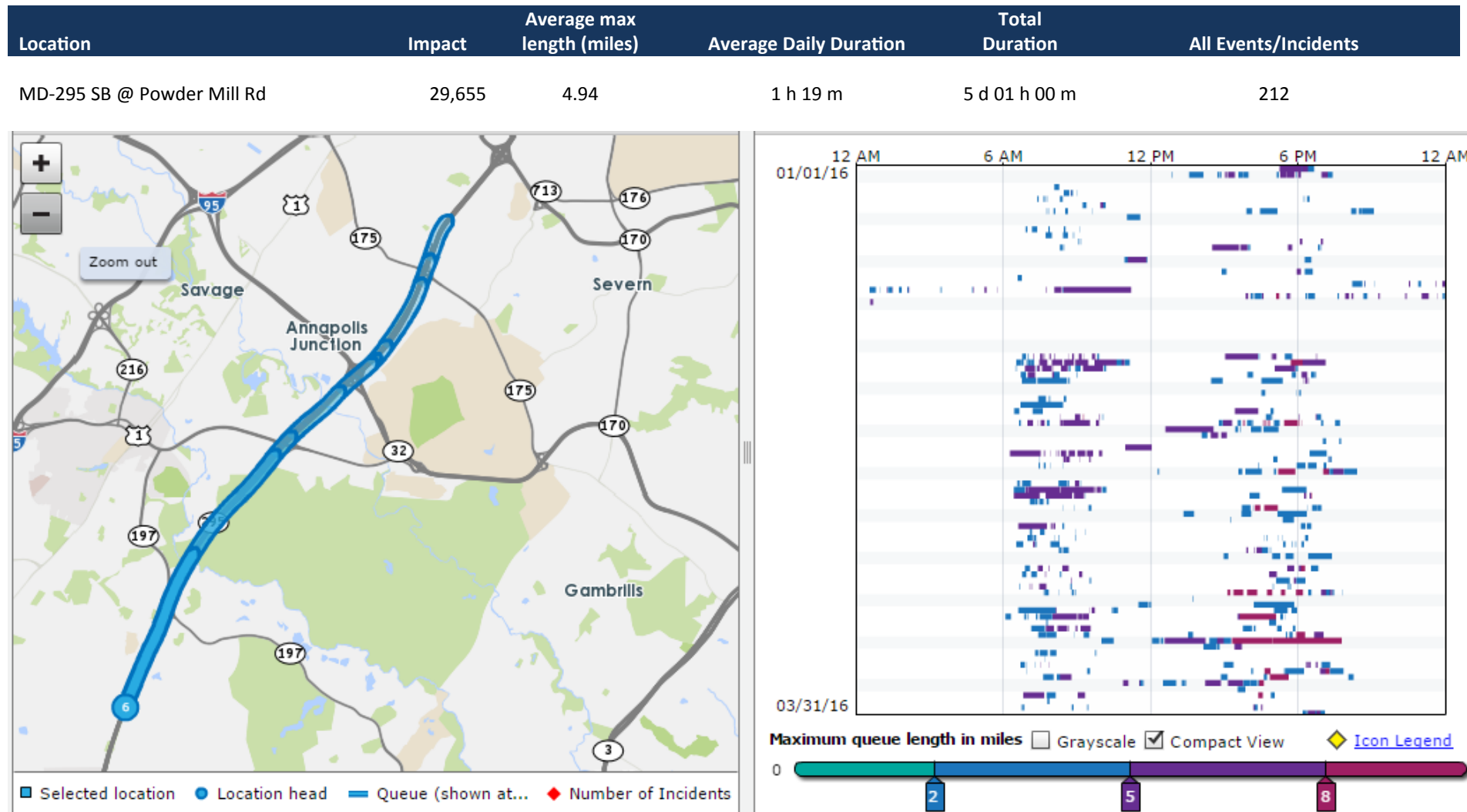
Location	Impact	Average max length (miles)	Average Daily Duration	Total Duration	All Events/Incidents
I-95 SB @ I-495/Exit 27-25	32,884	2.63	2 h 50 m	10 d 18 h 41 m	590



Traffic Volumes – Average Annual Daily Traffic (AADT)
STATION_DESCRIPTION IS95-1.0 MI S OF MD212



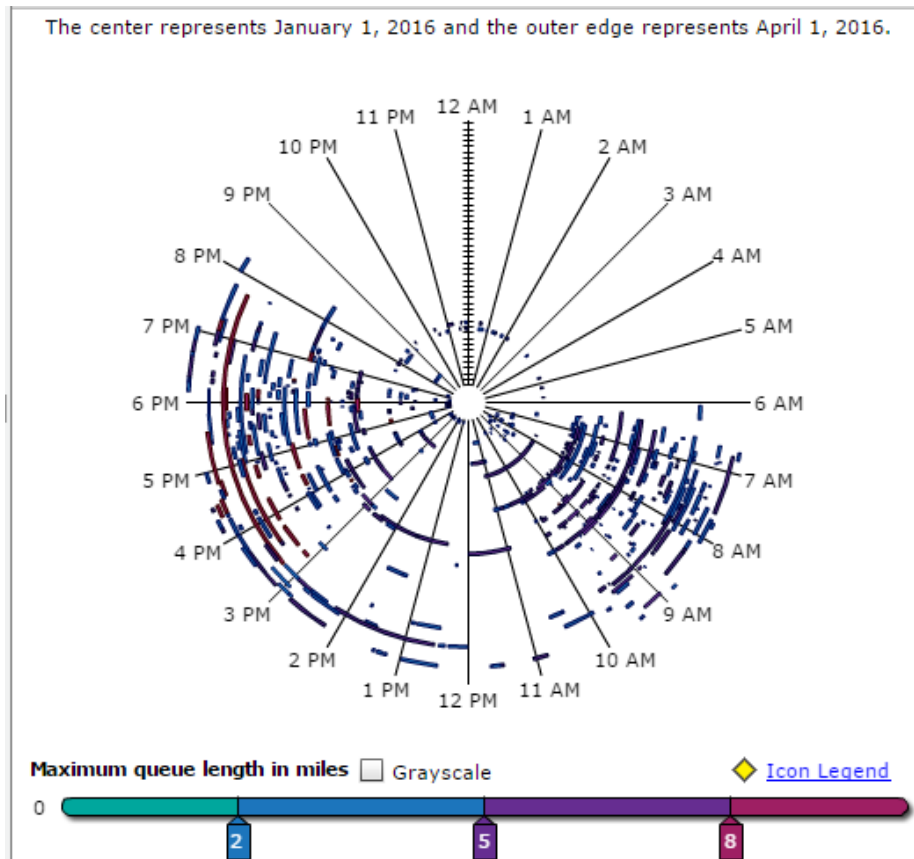
#6 Ranked Bottleneck in the Baltimore Region – 1st Quarter 2016



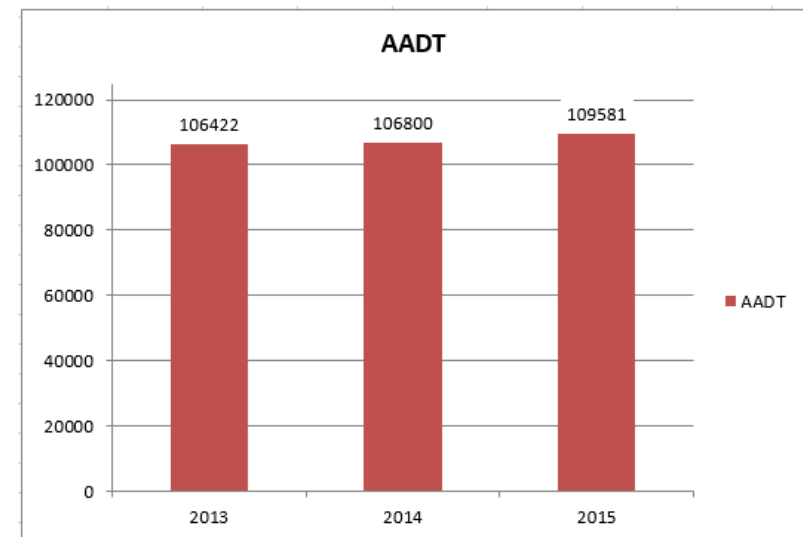
Notes: Southbound AM and PM congestion extending from Powder Mill Rd just barely extending into the southern portion of the Baltimore region near Fort Meade occurring during both the morning and afternoon peak periods. Bottleneck is potentially combined with the #7 ranked location at MD-295 at MD-198 which would have made this the #1 congested corridor for the 1st Quarter of 2016.

#6 Ranked Bottleneck in the Baltimore Region – 1st Quarter 2015

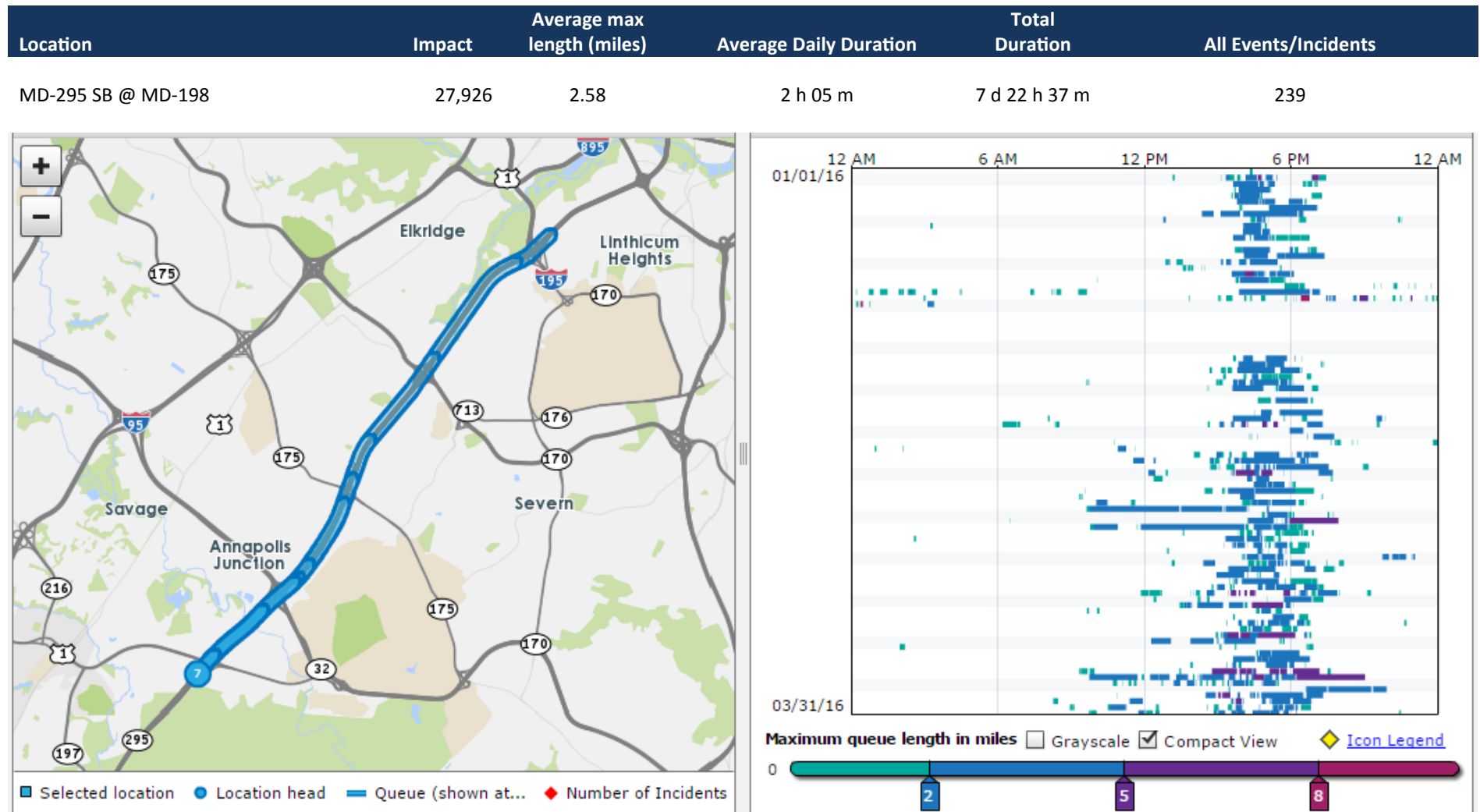
Location	Impact	Average max length (miles)	Average Daily Duration	Total Duration	All Events/Incidents
MD-295 SB @ Powder Mill Rd	29,655	4.94	1 h 19 m	5 d 01 h 00 m	212



Traffic Volumes – Average Annual Daily Traffic (AADT)
STATION_DESCRIPTION MD295-.60 MI S OF MD197



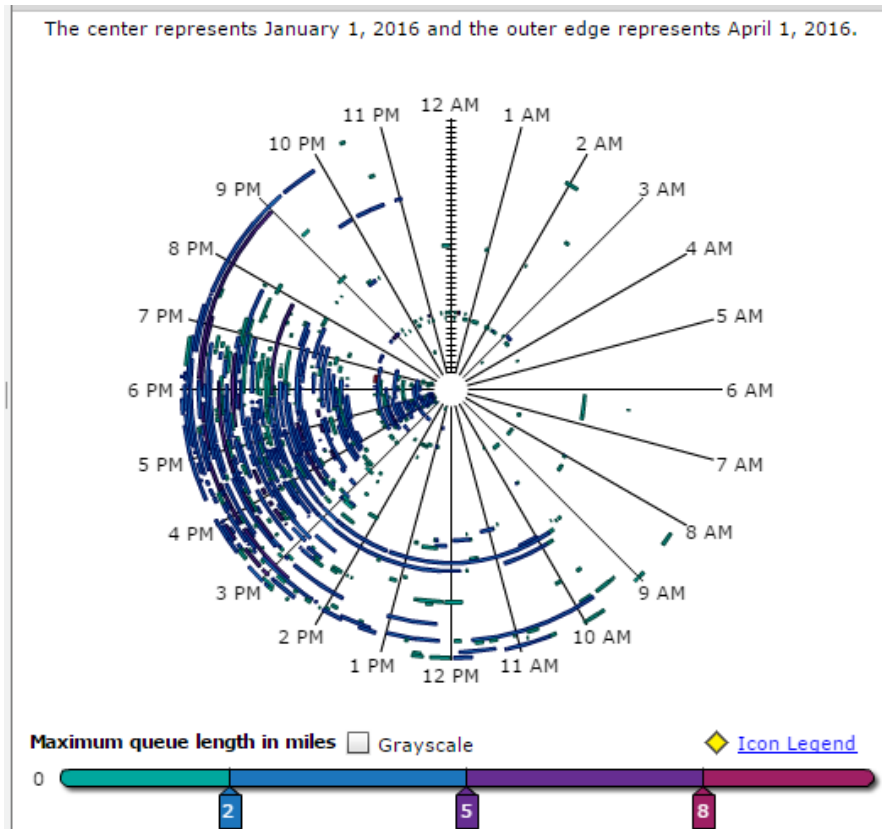
#7 Ranked Bottleneck in the Baltimore Region – 1st Quarter 2016



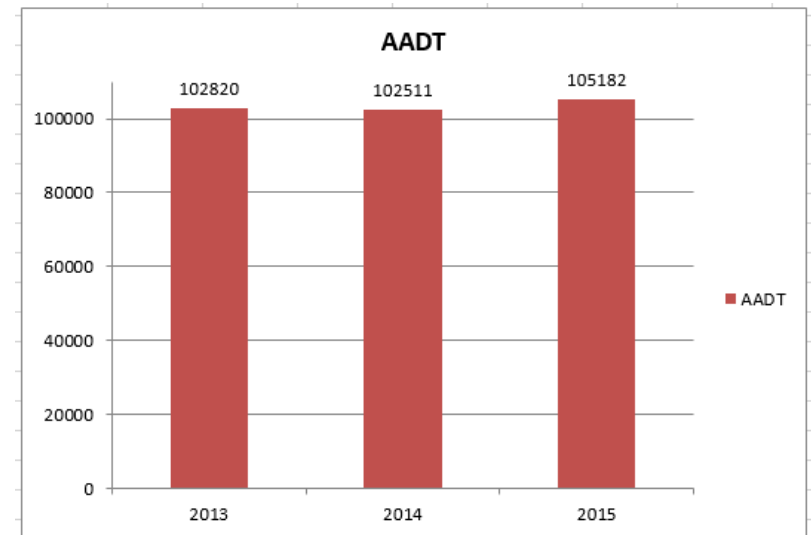
Notes: Southbound PM congestion extending from Powder Mill Rd just barely extending into the southern portion of the Baltimore region near Fort Meade occurring during both the morning and afternoon peak periods. Bottleneck is potentially combined with the #6 ranked location at MD-295 at Powder Mill Rd which would have made this the #1 congested corridor for the 1st Quarter of 2016.

#7 Ranked Bottleneck in the Baltimore Region – 1st Quarter 2016

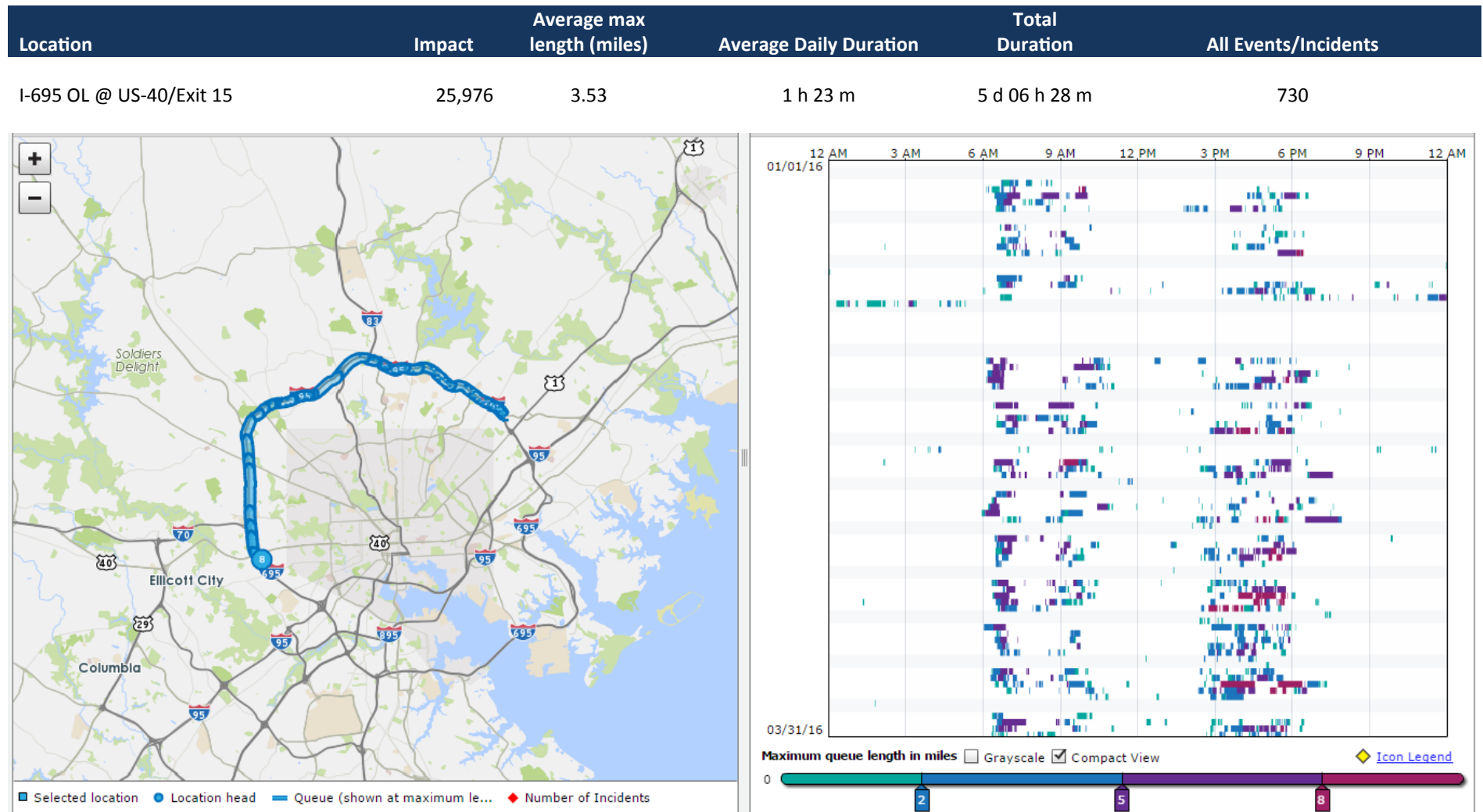
Location	Impact	Average max length (miles)	Average Daily Duration	Total Duration	All Events/Incidents
MD-295 SB @ MD-198	27,926	2.58	2 h 05 m	7 d 22 h 37 m	239



Traffic Volumes – Average Annual Daily Traffic (AADT)
STATION_DESCRIPTION MD295-.50 MI S OF MD32



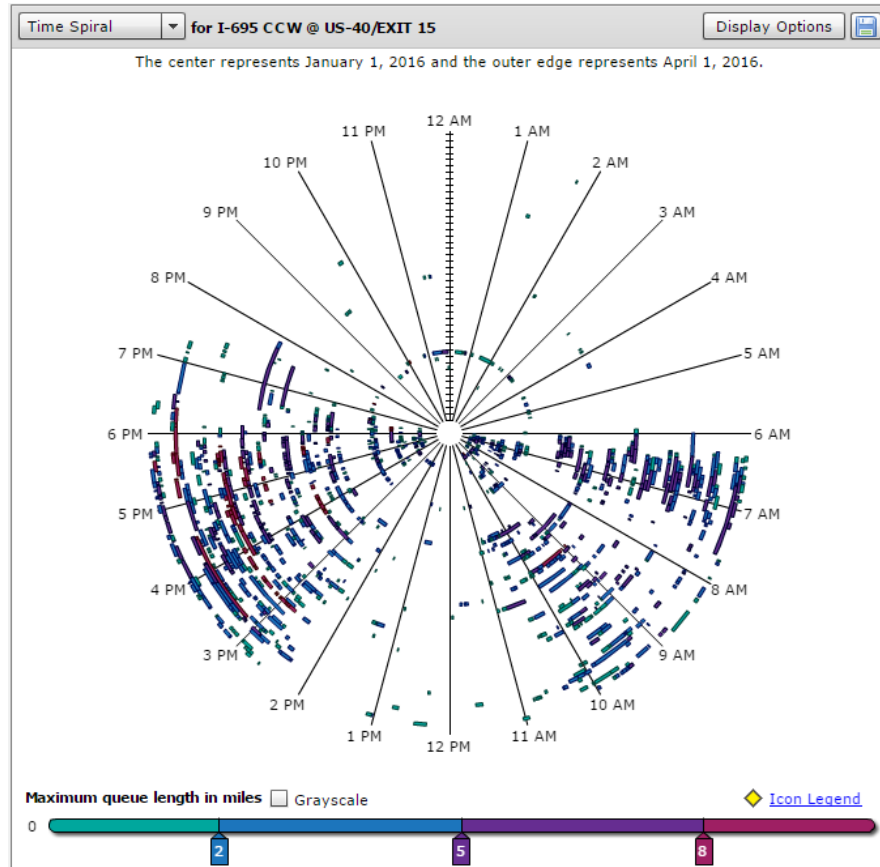
#8 Ranked Bottleneck in the Baltimore Region – 1st Quarter 2016



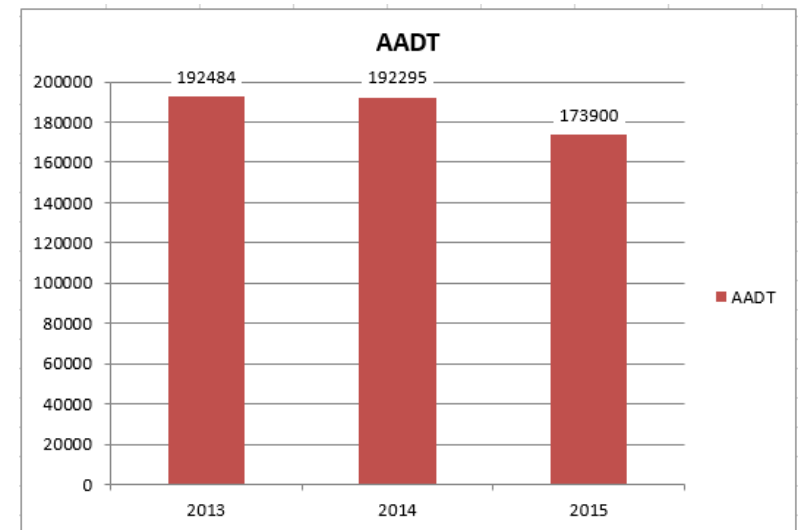
Notes: Delays found in both the morning and afternoon. Longstanding bottleneck on the outer loop of the beltway primarily during the morning rush. High traffic volume area. Also contributing to congestion in the area is a beltway widening project.

#8 Ranked Bottleneck in the Baltimore Region – 1st Quarter 2016

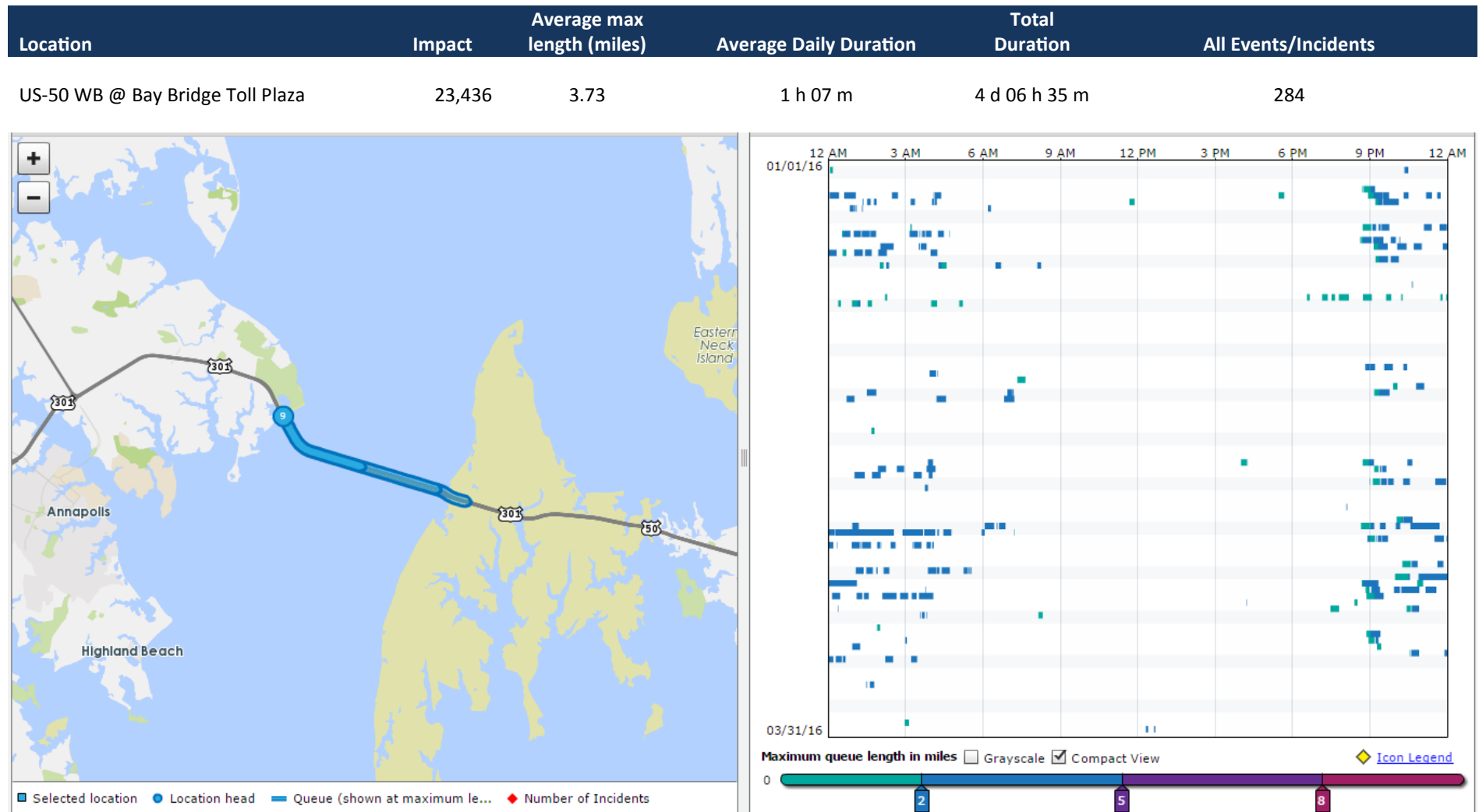
Location	Impact	Average max length (miles)	Average Daily Duration	Total Duration	All Events/Incidents
I-695 OL @ US-40/Exit 15	25,976	3.53	1 h 23 m	5 d 06 h 28 m	730



Traffic Volumes – Average Annual Daily Traffic (AADT)
STATION_DESCRIPTION IS695-.50 MI S OF IS70



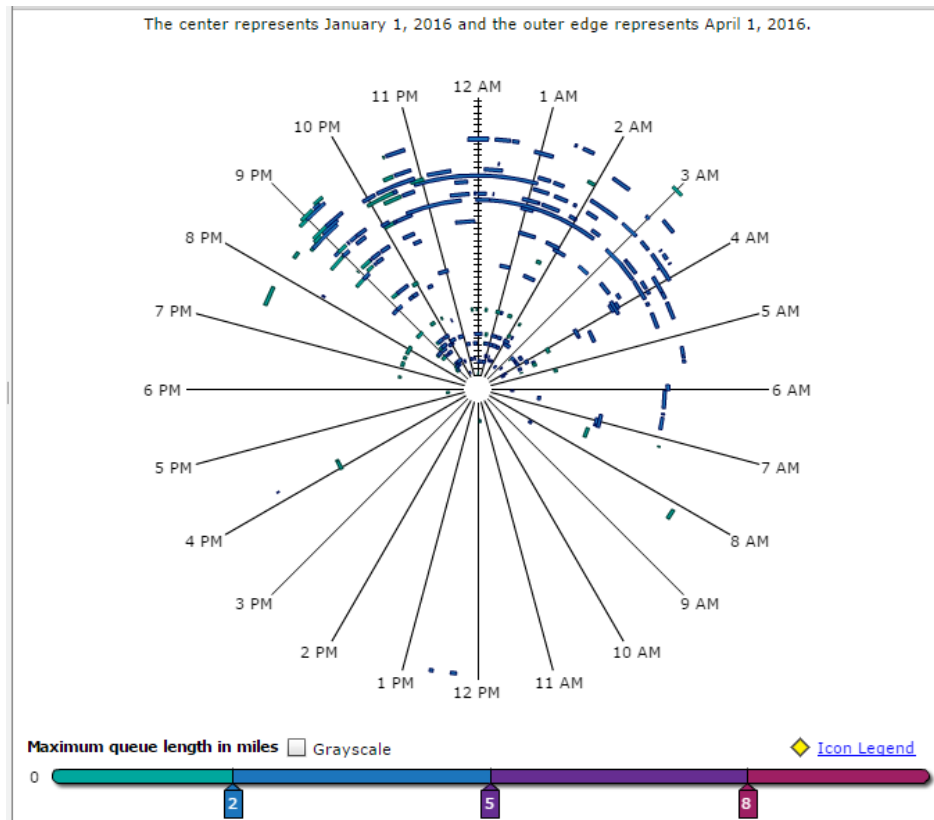
#9 Ranked Bottleneck in the Baltimore Region – 1st Quarter 2016



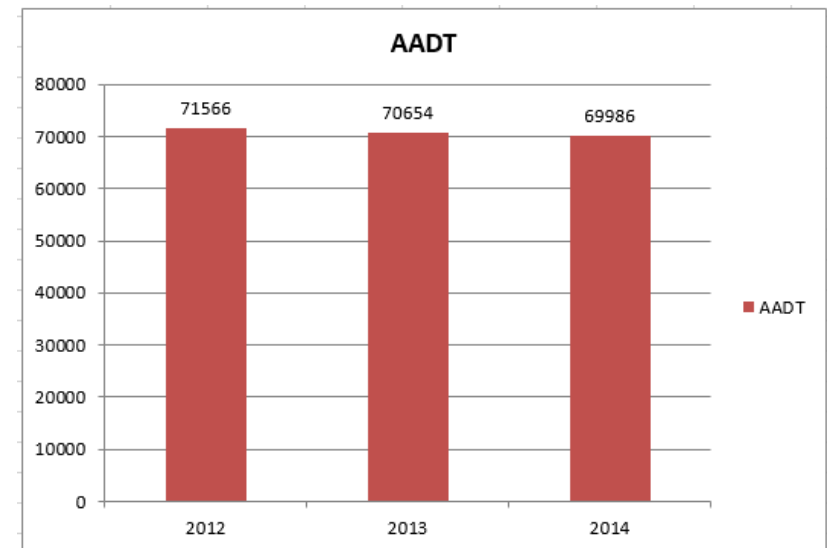
Notes: Bridge Maintenance project scheduled for completion in the fall of 2016. Lane closures and changing traffic patterns. The eastbound span may be closed Sunday from 10 p.m. to 5 a.m. the following morning for preservation/maintenance work or routine annual inspections. Two-way traffic will operate on the westbound span during the full eastbound span closure. The westbound span may be closed Monday through Thursday from 8 p.m. to 5 a.m. the following morning for preservation/maintenance work or routine annual inspections. Two-way traffic will operate on the eastbound span during the full westbound span closures. (Source MdTA)

#9 Ranked Bottleneck in the Baltimore Region – 1st Quarter 2016

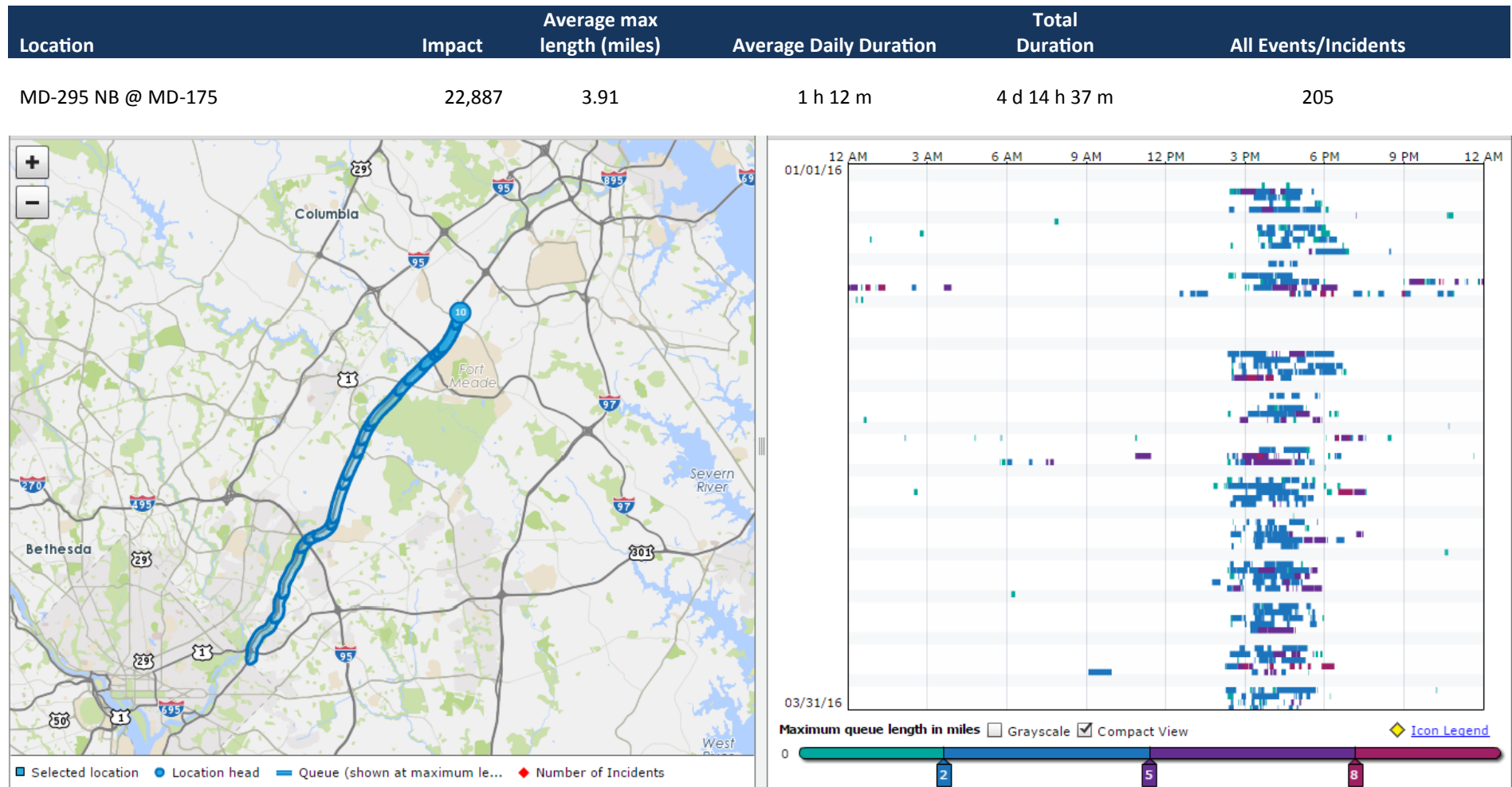
Location	Impact	Average max length (miles)	Average Daily Duration	Total Duration	All Events/Incidents
US-50 WB @ Bay Bridge Toll Plaza	23,436	3.73	1 h 07 m	4 d 06 h 35 m	284



Traffic Volumes – Average Annual Daily Traffic (AADT)
 STATION_DESCRIPTION US 50 at William Preston Lane Jr.
 Memorial Bridge



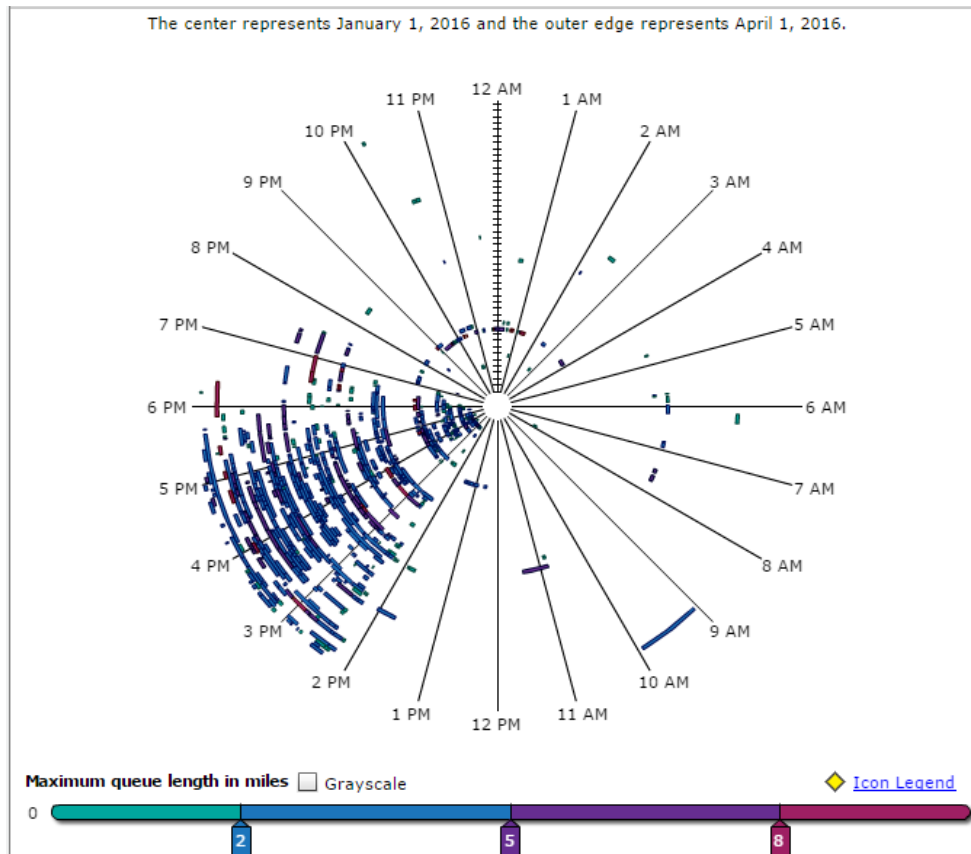
#10 Ranked Bottleneck in the Baltimore Region – 1st Quarter 2016



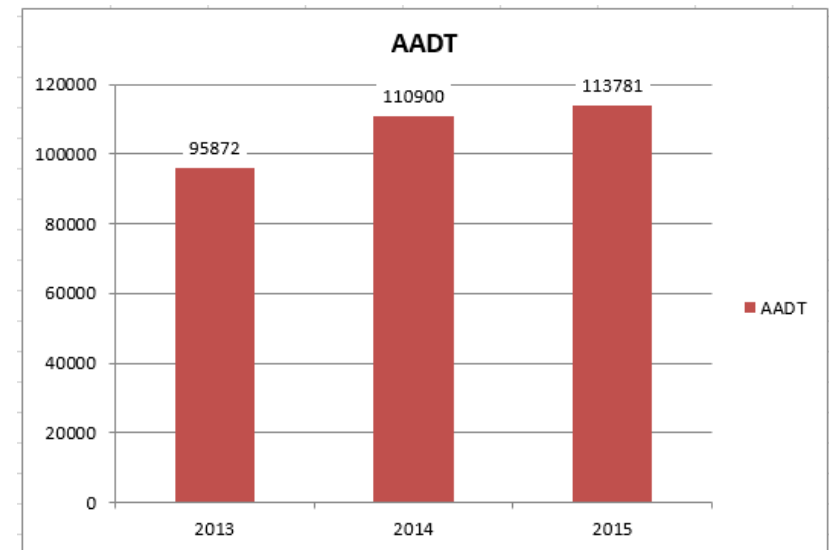
Notes: Recurring afternoon congestion. Level of Service "F" from 4:00 to 5:00pm. A primary cause appeared to be the discharge of traffic from NSA / Ft. Meade onto northbound MD 295 via the Connector Rd. Weaving and merging at the MD 32 interchange also contributed to the congestion.

#10 Ranked Bottleneck in the Baltimore Region – 1st Quarter 2016

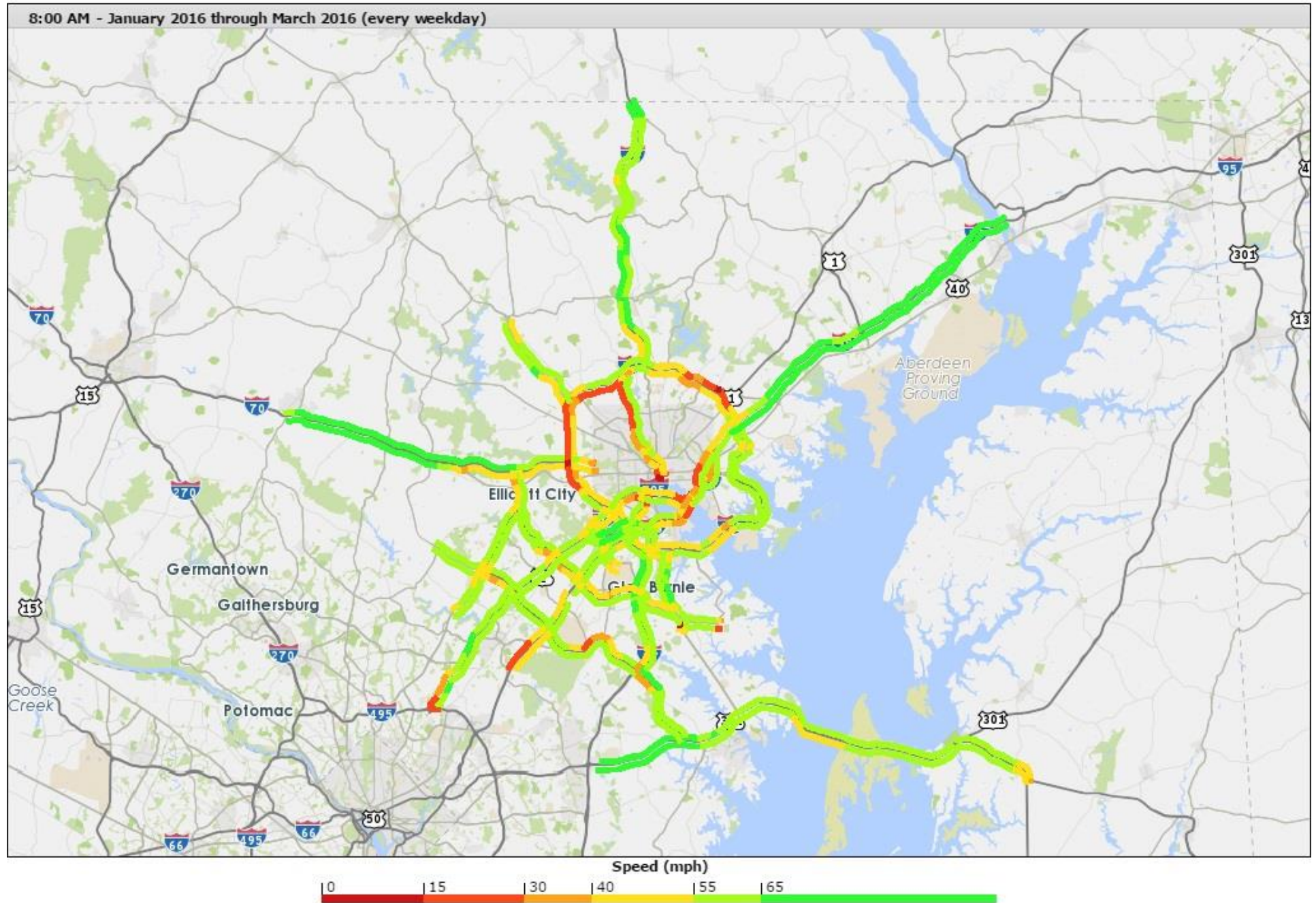
Location	Impact	Average max length (miles)	Average Daily Duration	Total Duration	All Events/Incidents
MD-295 NB @ MD-175	22,887	3.91	1 h 12 m	4 d 14 h 37 m	205



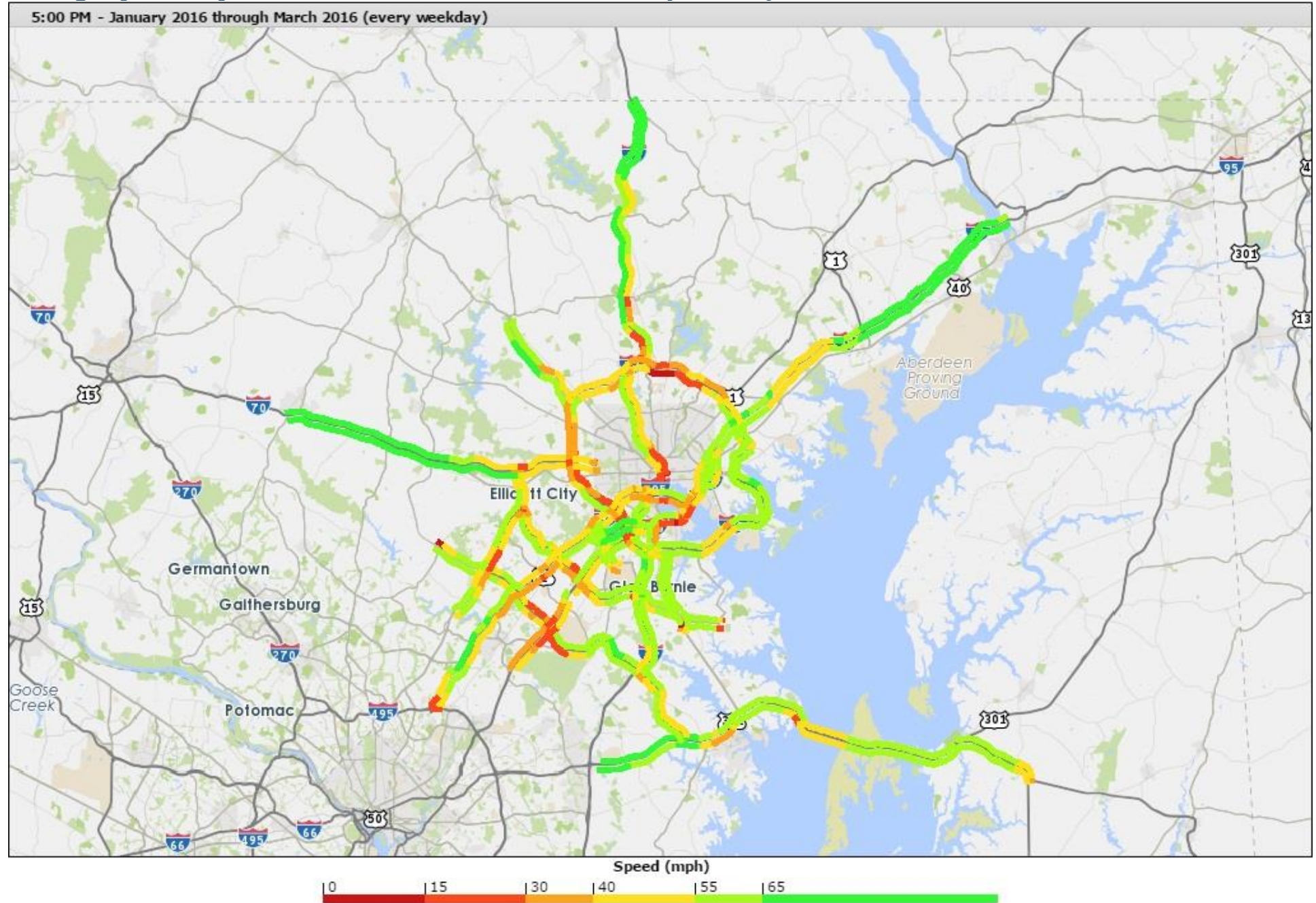
Traffic Volumes – Average Annual Daily Traffic (AADT)
STATION_DESCRIPTION MD295-.25 MI S OF MD175



Average Speed Maps – AM Peak Period 8:00-9:00 Weekdays: 1st Quarter 2016



Average Speed Maps - PM Peak Period 5:00-6:00 Weekdays: 4th Quarter 2015



The Vehicle Probe Project

Data and graphics in this report were generated from the *Vehicle Probe Project* suite. *The Vehicle Probe Project* (VPP) is a groundbreaking initiative and collaborative effort among the I-95 Corridor Coalition, University of Maryland, INRIX, HERE and TomTom and has been providing comprehensive and continuous real-time travel information for more than seven years. Member agencies like the Baltimore Metropolitan Council have found numerous uses for the data beyond simply travel information.

There are now 7,000 centerline freeway miles, more than **20,000 freeway and arterial miles** in all, including continuous coverage of the I-95 corridor from New Jersey through Florida. Coverage also exists in Rhode Island. The network includes full coverage of freeways and major arterials in North Carolina and the Tidewater area of Virginia, full or nearly full coverage of limited access roads in New Jersey, Maryland and South Carolina and the northern and eastern portions of Florida. In addition, coverage now includes ramps at 160 major highway-to-highway interchanges, with all states having interchanges included except Georgia.

Agency Participation

As the value of the data from the Vehicle Probe Project is realized through the various applications and the continued quality via the validation efforts, the member states have increased their commitment to this project. In fact, all of the participating states have committed their own funds to continue this project and many have increased their coverage far beyond the initial core area.

Numerous Uses for the Data

I-95 Corridor Coalition member agencies have found many uses for the vehicle probe data, including:

- Travel Information for 511 (web and phone) Systems, Dynamic Message Signs, and Kiosks
- Travel Time Calculations for Message Boards
- Performance Measures and Travel Time Reliability Support
- Traffic Pattern Observations (in-state and multi-state)
- Trip Planning (www.i95travelinfo.net)
- Performance Measures Tool – Continuing the momentum in performance analysis, the newest initiative from the Coalition is the Vehicle Probe Project Suite. The basic tools include:

Bottleneck and Incident dashboard

Massive Raw Data Downloader

Historical Data Visualizations and Performance Measures (Congestion Scan)

UMD CATT Lab made the VPP suite available to participating agencies. For the training video, please visit <http://vpp.ritis.org/suite/screencast/>

Should you have any questions, please contact:

- For general project questions, Marygrace Parker at 518-852-4083 or i95mgp@ttlc.net
For the Vehicle Probe Project Suite, Michael L. Pack at 301-405-0722 or packml@umd.edu

Project Manager · Victor Henry

Author · Edward Style

Mike Kelly, Executive Director

Todd Lang, Director of Transportation Planning

Regina Aris, Assistant Director of Transportation Planning

Data Collection Contributors

I-95 Corridor Coalition · University of Maryland CATT Lab · INRIX

Skycomp



Baltimore Metropolitan Council

Offices @ McHenry Row | 1500 Whetstone Way, Suite 300 | Baltimore, Maryland 21230

www.baltometro.org