Baltimore
Metropolitan
Council

Quarterly
Congestion Analysis Report
for the Baltimore Region

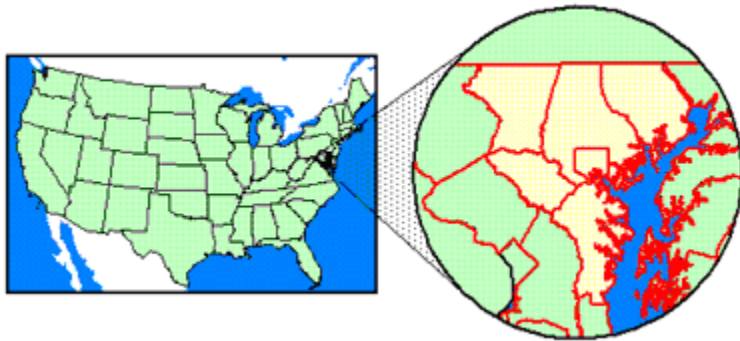# Top 10 Bottleneck Locations

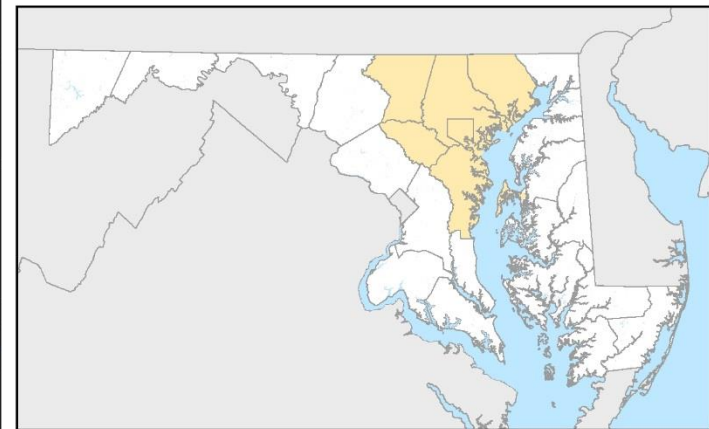2nd Quarter 2017

Table of Contents

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.
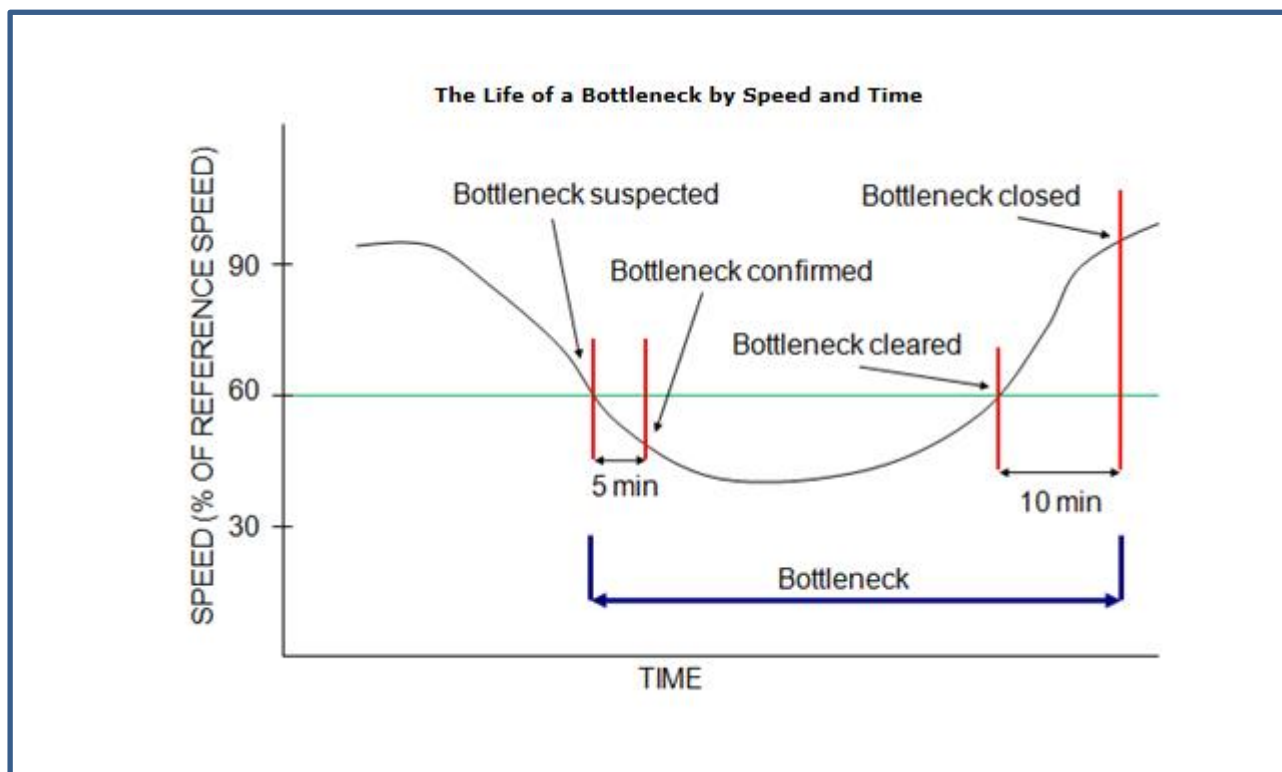
Baltimore Metropolitan Region

PENNSYLVANIA

Cecil County

Harford County

Carroll County
Westminster

Baltimore County
Cockeysville
Reisterstown
Owings Mills
Randallstown
Towson
Perry Hall

Frederick County

Aberdeen

Edgewood

Middle River

Baltimore City

Essex

Damascus

Howard County
Catonsville

Columbia
Elkridge

Glen Burnie

Kent County

Chesapeake Bay

Severn

Pasadena

Olney

Anne Arundel County

Arnold

Montgomery County

Rockville

Laurel

Odenton

Germantown

Queen Anne's County

Potomac

Annapolis

Bethesda

Greenbelt

Bowie

Hyattsville

DISTRICT OF COLUMBIA

VIRGINIA

Prince George's County

Oxon Hill

Clinton

Talbot County

Easton

Fort Washington

Calvert County

Charles County

Waldorf

0   10
Miles

Baltimore County

Fallstaff
Homeland
Hamilton
Pimlico
Roland Park
Belmar

Forest Park
Guilford
Hampden
Waverly

Walbrook
Baltimore City

Claremont
South Baltimore
Canton

West Baltimore
Cherry Hill

Clifford

Patapsco River

East Brooklyn

Anne Arundel County

0   2
Miles

N
W   E
S

3

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.

The Life of a Bottleneck by Speed and Time

4

Bottleneck Ranking Table

Rank	Map	Bottleneck head location	Impact ⓘ▼	Average max... ⓘ	Average daily dur... ⓘ	Total duration ⓘ	All Events/Inc... ⓘ
1	☑	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	☐	I-495 CW @ I-270 SPUR	27,167.59	5.25	2 h 45 m	3 d 10 h 48 m	57
3	☐	I-95 N @ MD-100/EXIT 43	23,117.99	5.08	2 h 50 m	3 d 13 h 01 m	113
4	☑	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	☐	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	☐	I-270 S @ MD-109/EXIT 22	21,832.78	4.45	3 h 09 m	3 d 22 h 48 m	50
7	☐	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

Icon	Description	Icon	Description	Icon	Description
	- Injury		- Hazmat		- Vehicle Fire
	- Police Activity		- Debris		- Collision
	- Fire		- Flood		- Disabled Vehicle
	- Closure		- Animal Struck		- Roadwork
	- Sports Event		- Special Event		- Emergency Roadwork
	- Delays		- Congestion		- Draw Bridge Opening
	- Signal System		- Incident		- Water Main Work
	- Tornado		- Fog		- Medical Emergency
	- Wind		- Fallen Rocks		- Overgrown Foliage
	- Fallen Tree		- Other		

Overview Map
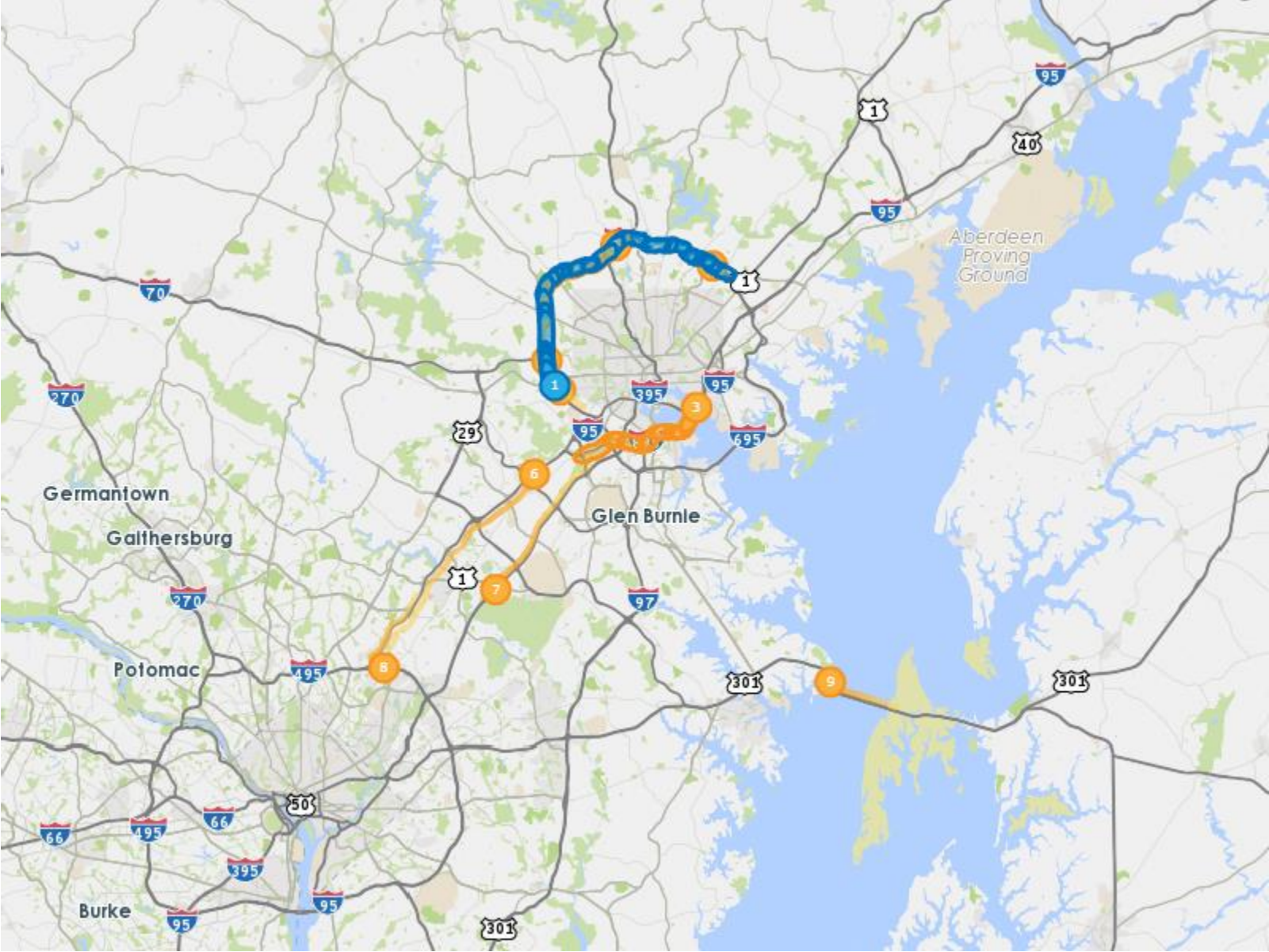
Top 10 Bottlenecks in the Baltimore Region
2nd Quarter 2017

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 @ US-40/EXIT 15	73,041	3.95	3 h 21 m	12 d 17 h 54 m	929
2	I-695 IL @ I-83/MD-25/EXIT 23	64,658	3.38	3 h 54 m	14 d 19 h 59 m	510
3	I-895 N @ HARBOR TUNNEL THWY NB	61,953	0.83	4 h 53 m	18 d 13 h 32 m	271
4	I-695 OL @ EDMONDSON AVE/EXIT 14	59,522	5.00	2 h 00 m	7 d 14 h 56 m	763
5	I-695 IL @ MD-41/PERRING PKWY/EXIT 30	56,292	3.17	2 h 33 m	9 d 16 h 49 m	596
6	I-95 N @ MD-100/EXIT 43	55,628	4.45	2 h 13 m	8 d 10 h 05 m	319
7	MD-295 S @ MD-198	50,147	2.80	3 h 27 m	13 d 02 h 42 m	203
8	I-95 S @ I-495/EXIT 27-25	44,548	2.12	3 h 44 m	14 d 05 h 11 m	160
9	US-50 W @ BAY BRIDGE	43,855	3.36	2 h 45 m	10 d 11 h 28 m	318
10	I-695 IL @ I-70/EXIT 16	42,053	2.01	3 h 21 m	12 d 17 h 13 m	249

IL = Inner Loop   OL = Outer Loop   NB = Northbound   SB = Southbound   EB = Eastbound   WB = Westbound
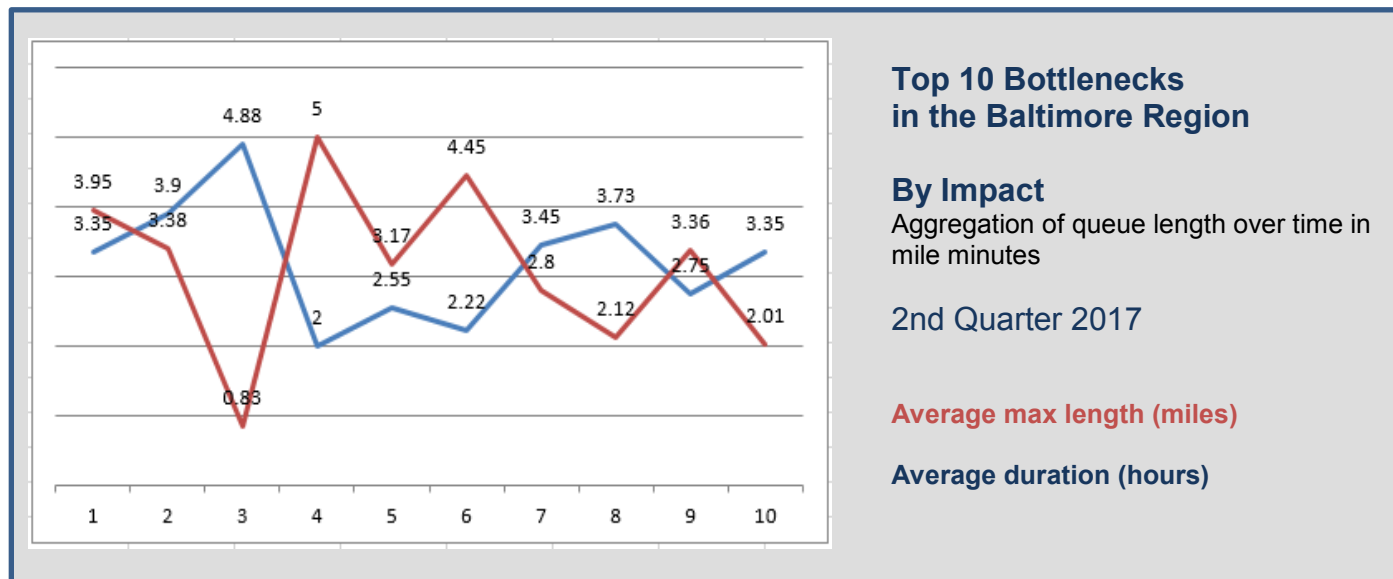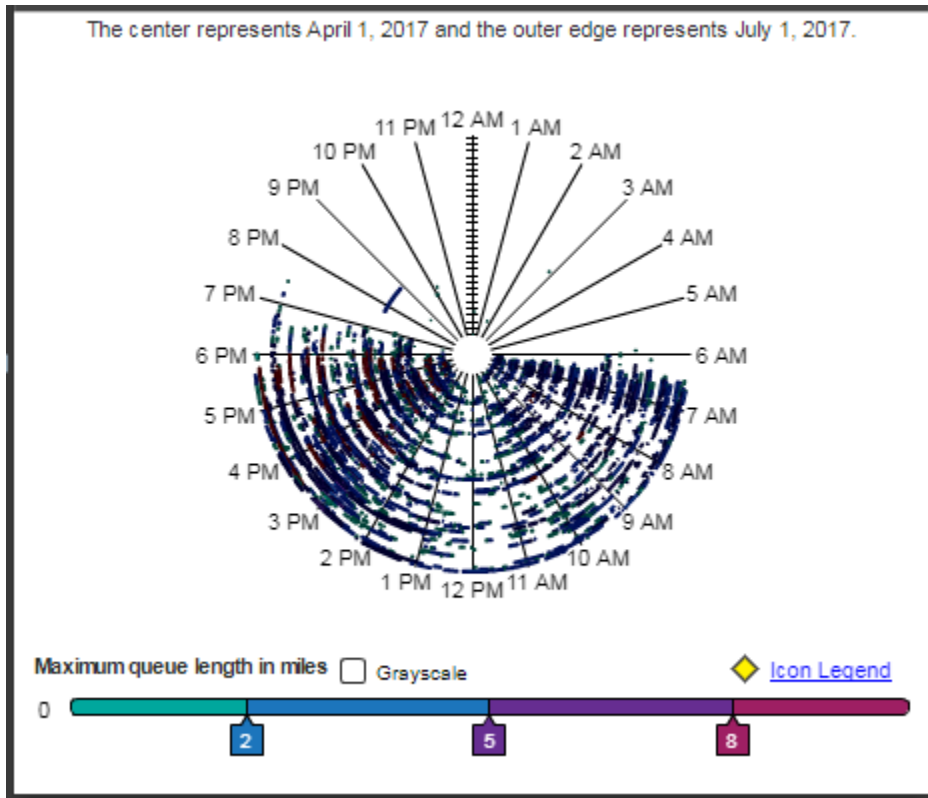

Top 10 Bottlenecks in the Baltimore Region

By Impact
Aggregation of queue length over time in mile minutes

2nd Quarter 2017

Average max length (miles)

Average duration (hours)

#1 Ranked Bottleneck in the Baltimore Region – 2nd Quarter 2017

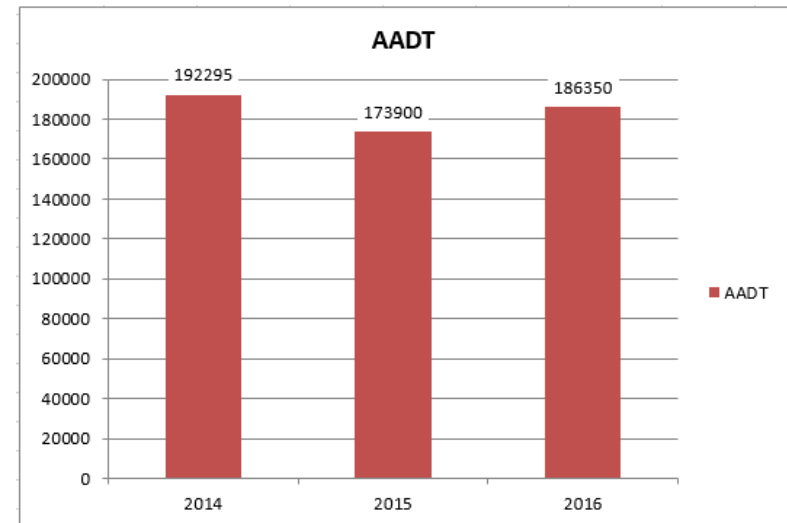| Location	Impact	Average max length (miles)	Average Daily Duration	Total Duration	All Events/Incidents
I-695 OL @ US-40/EXIT 15	73,041	3.95	3 h 21 m	12 d 17 h 54 m	929
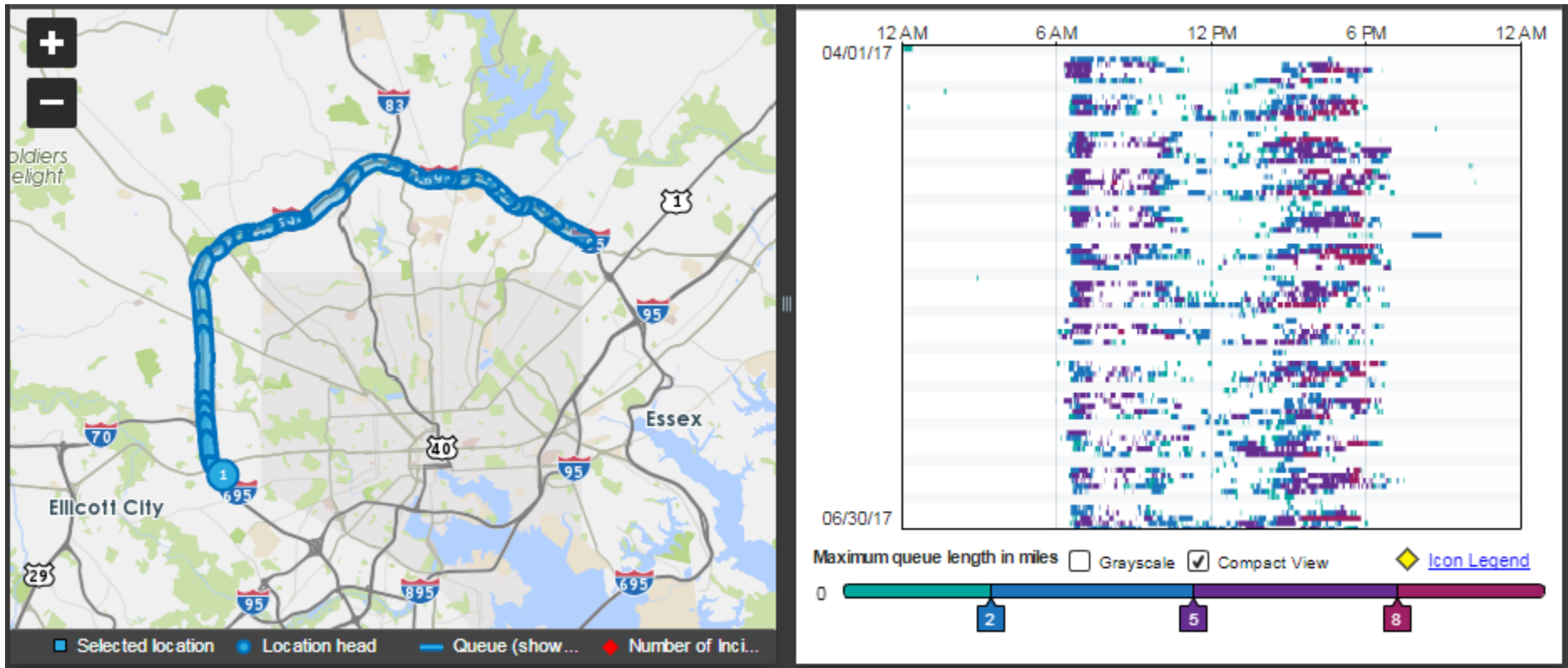
Notes: *Delays found in both the morning and afternoon. Longstanding bottleneck on the outer loop of the beltway primarily during the morning rush. High traffic volume area. Also contributing to congestion in the area is a beltway widening project.*

#1 Ranked Bottleneck in the Baltimore Region –2nd Quarter 2017

Location	Impact	Average max length (miles)	Average Daily Duration	Total Duration	All Events/Incidents
I-695 OL @ US-40/EXIT 15	73,041	3.95	3 h 21 m	12 d 17 h 54 m	929

The center represents April 1, 2017 and the outer edge represents July 1, 2017.

Maximum queue length in miles   Grayscale

0   2   5   8

Icon Legend

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

AADT

#2 Ranked Bottleneck in the Baltimore Region – 2nd Quarter 2017

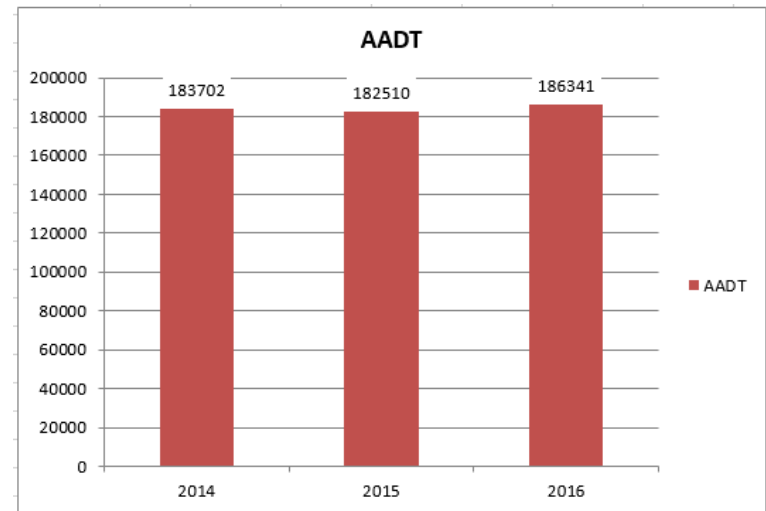| Location	Impact	Average max length (miles)	Average Daily Duration	Total Duration	All Events/Incidents
I-695 IL @ I-83/MD-25/EXIT 23	64,658	3.38	3 h 54 m	14 d 19 h 59 m	510

Notes: Rush hour congestion more severe during the AM peak period. 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

#2 Ranked Bottleneck in the Baltimore Region – 2nd Quarter 2017

Location	Impact	Average max length (miles)	Average Daily Duration	Total Duration	All Events/Incidents
I-695 IL @ I-83/MD-25/EXIT 23	64,658	3.38	3 h 54 m	14 d 19 h 59 m	510

The center represents April 1, 2017 and the outer edge represents July 1, 2017.

Maximum queue length in miles ☐ Grayscale

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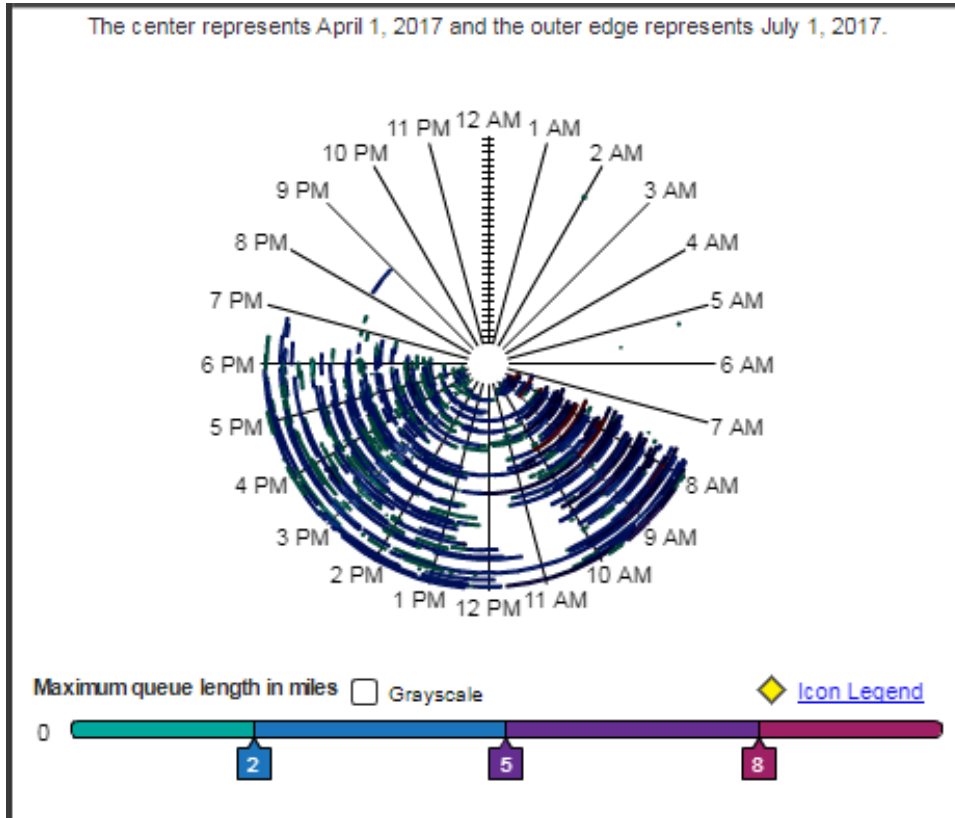
Traffic Volumes – Average Annual Daily Traffic (AADT)
STATION_DESCRIPTION   IS695-.50 MI N OF GREENSPRING AVE

#3 Ranked Bottleneck in the Baltimore Region – 2nd Quarter 2017

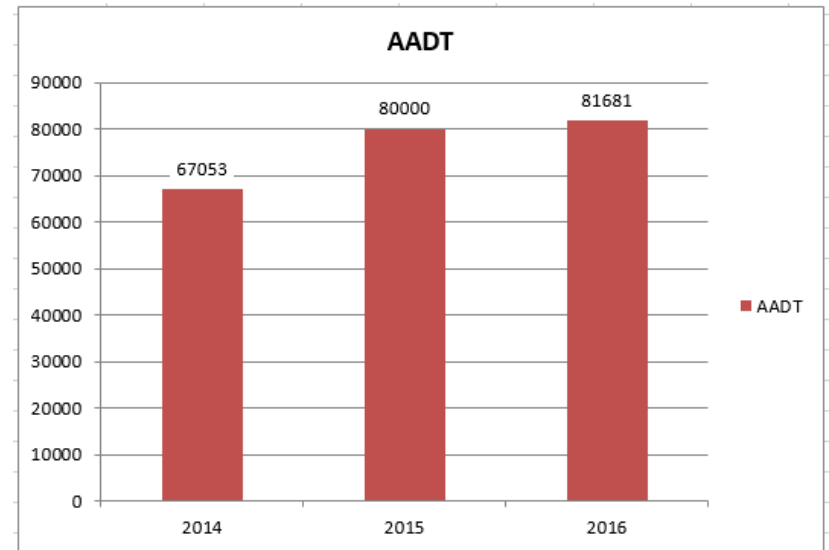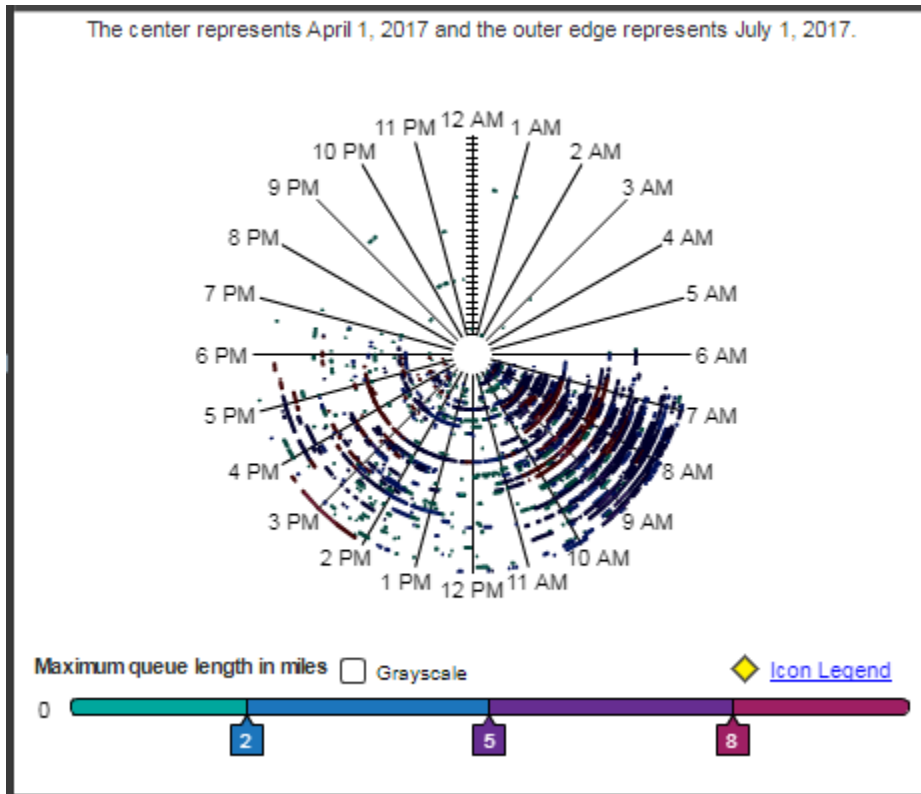| Location	Impact	Average max length (miles)	Average Daily Duration	Total Duration	All Events/Incidents
I-895 N @ HARBOR TUNNEL THWY NB	61,953	0.83	4 h 53 m	18 d 13 h 32 m	271
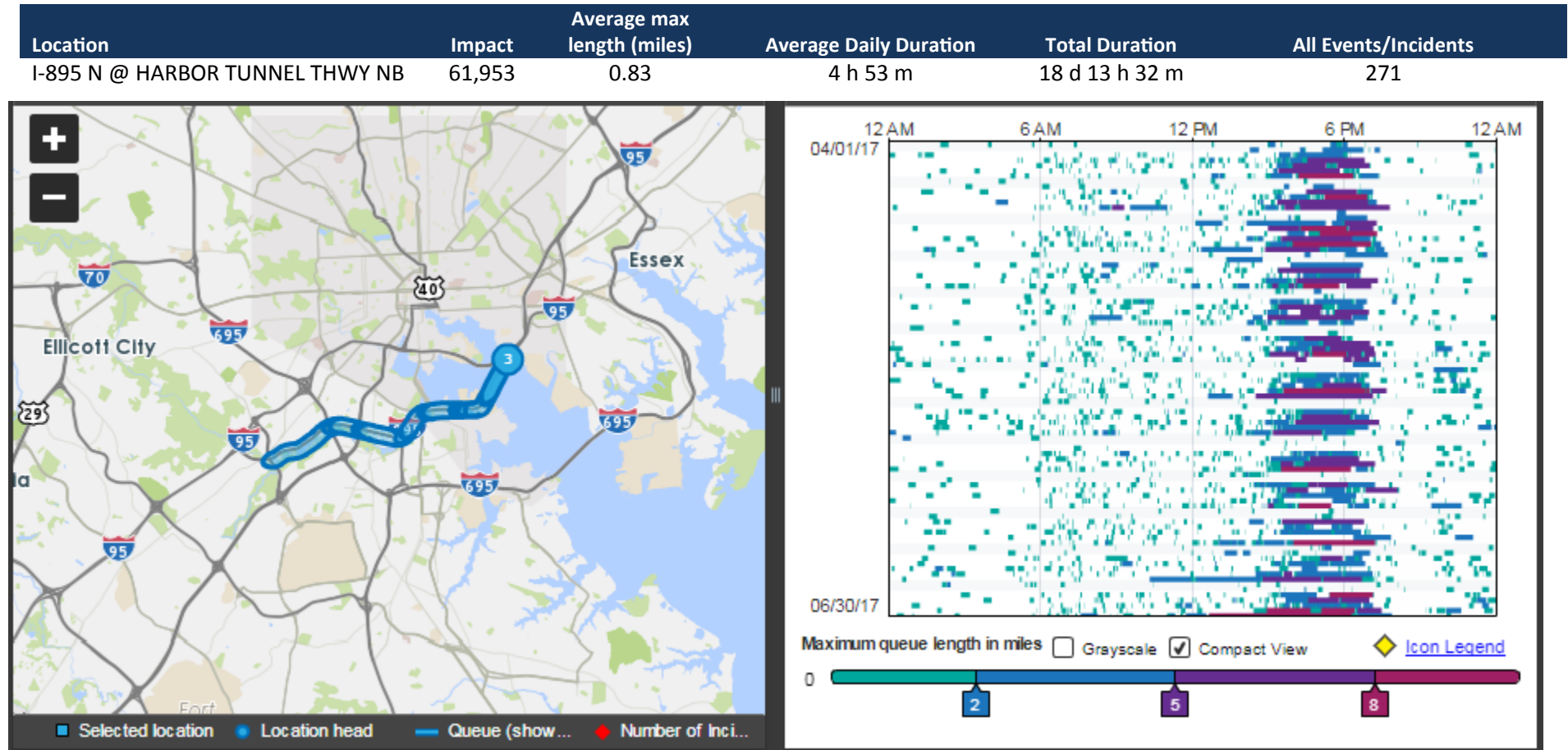
Notes: Backups start before the "K-Truss steel bridge" due to toll plaza and lane drop at the tunnel entrance and continue until traffic exits the tunnel. Bottleneck conditions exist intermittently at all times but become consistent and have higher impact during the PM rush hour.

#3 Ranked Bottleneck in the Baltimore Region – 2nd Quarter 2017

Location	Impact	Average max length (miles)	Average Daily Duration	Total Duration	All Events/Incidents
I-895 N @ HARBOR TUNNEL THWY NB	61,953	0.83	4 h 53 m	18 d 13 h 32 m	271

The center represents April 1, 2017 and the outer edge represents July 1, 2017.

Maximum queue length in miles ☐ Grayscale

◇ Icon Legend
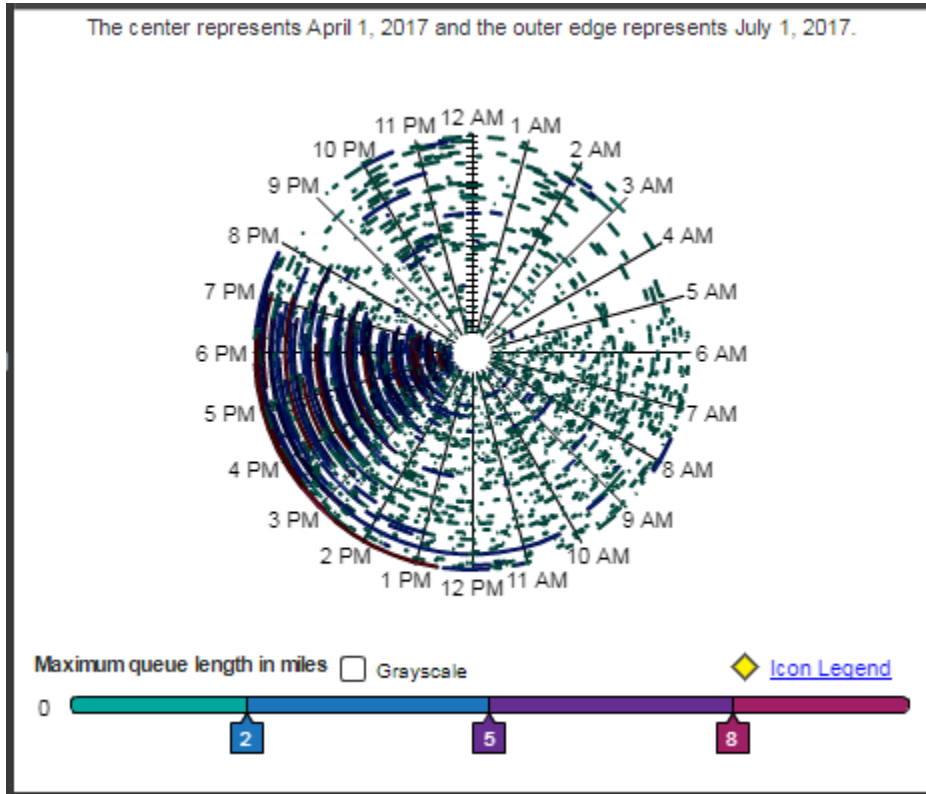
Traffic Volumes – Average Annual Daily Traffic (AADT)
STATION_DESCRIPTION   IS 895-.30 MI S OF FRANKFURST AVE

#4 Ranked Bottleneck in the Baltimore Region – 2nd Quarter 2017

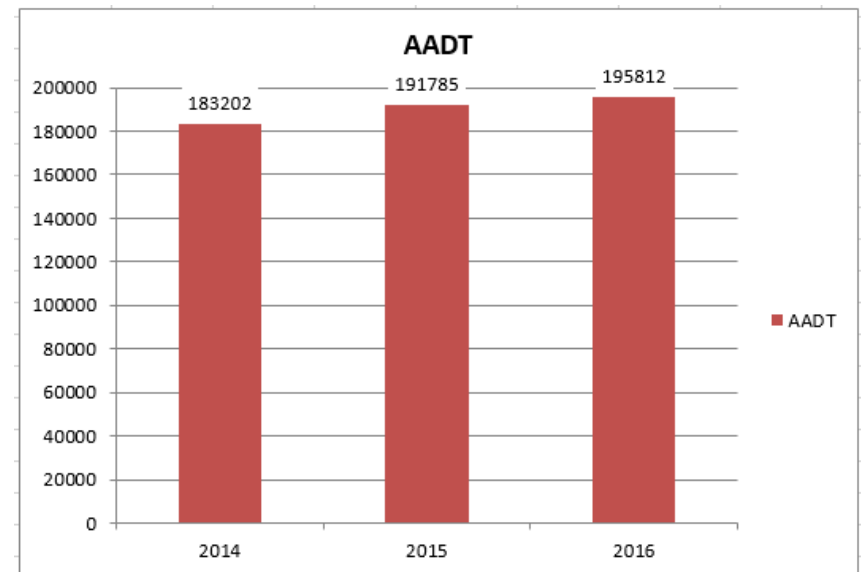| Location	Impact	Average max length (miles)	Average Daily Duration	Total Duration	All Events/Incidents
I-695 OL @ EDMONDSON AVE/EXIT 14	59,522	5.00	2 h 00 m	7 d 14 h 56 m	763
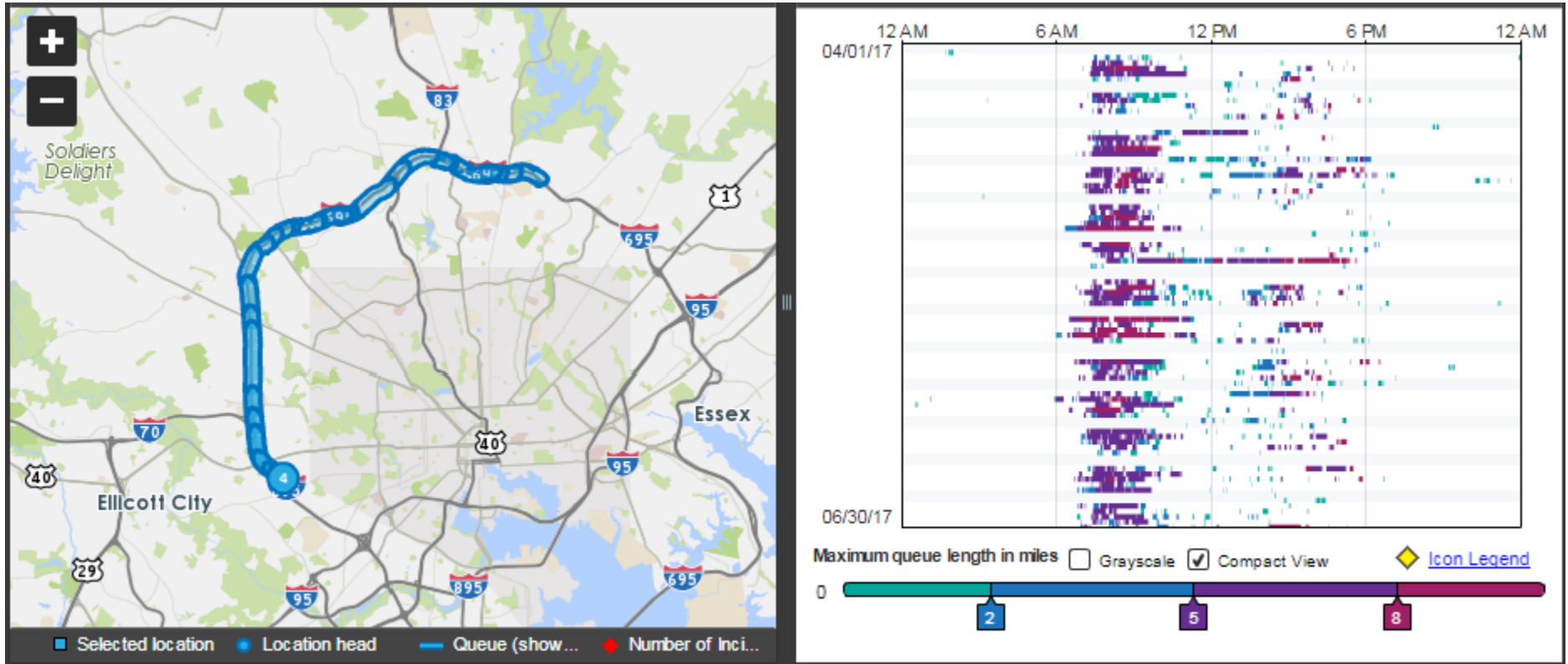
Notes: Longstanding bottleneck on the outer loop of the beltway primarily during the morning rush. High traffic volume area. Delays extend back as far as MD-26/Liberty Rd. Also contributing to congestion in the area is a beltway widening project which began in February. "The plan is for crews to add 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)

#4 Ranked Bottleneck in the Baltimore Region – 2nd Quarter 2017

Location	Impact	Average max length (miles)	Average Daily Duration	Total Duration	All Events/Incidents
I-695 OL @ EDMONDSON AVE/EXIT 14	59,522	5.00	2 h 00 m	7 d 14 h 56 m	763

The center represents April 1, 2017 and the outer edge represents July 1, 2017.

Maximum queue length in miles — Grayscale — Icon Legend

Traffic Volumes – Average Annual Daily Traffic (AADT)
STATION_DESCRIPTION   IS695 – 100 ft South of Ingleside Ave (ATR#32)

AADT

2014	2015	2016
183202	191785	195812

#5 Ranked Bottleneck in the Baltimore Region – 2nd Quarter 2017

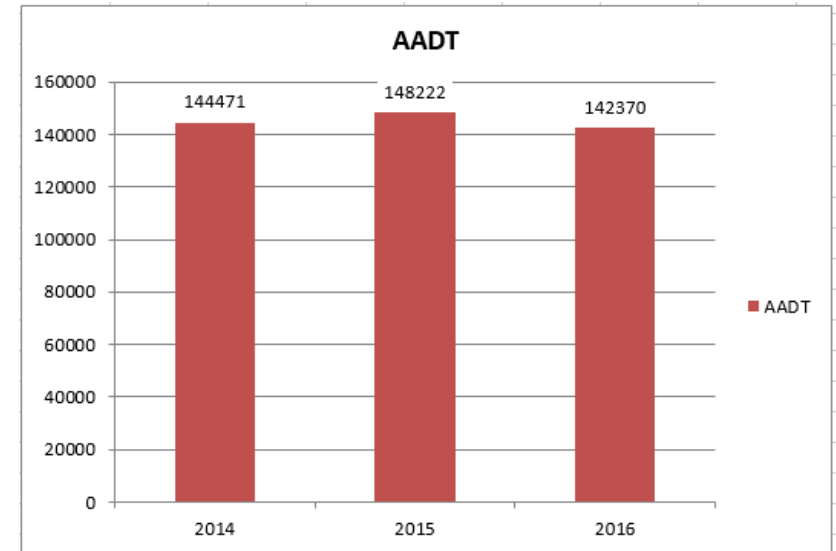| Location	Impact	Average max length (miles)	Average Daily Duration	Total Duration	All Events/Incidents
I-695 IL @ MD-41/PERRING PKWY/EXIT 30	56,292	3.17	2 h 33 m	9 d 16 h 49 m	596
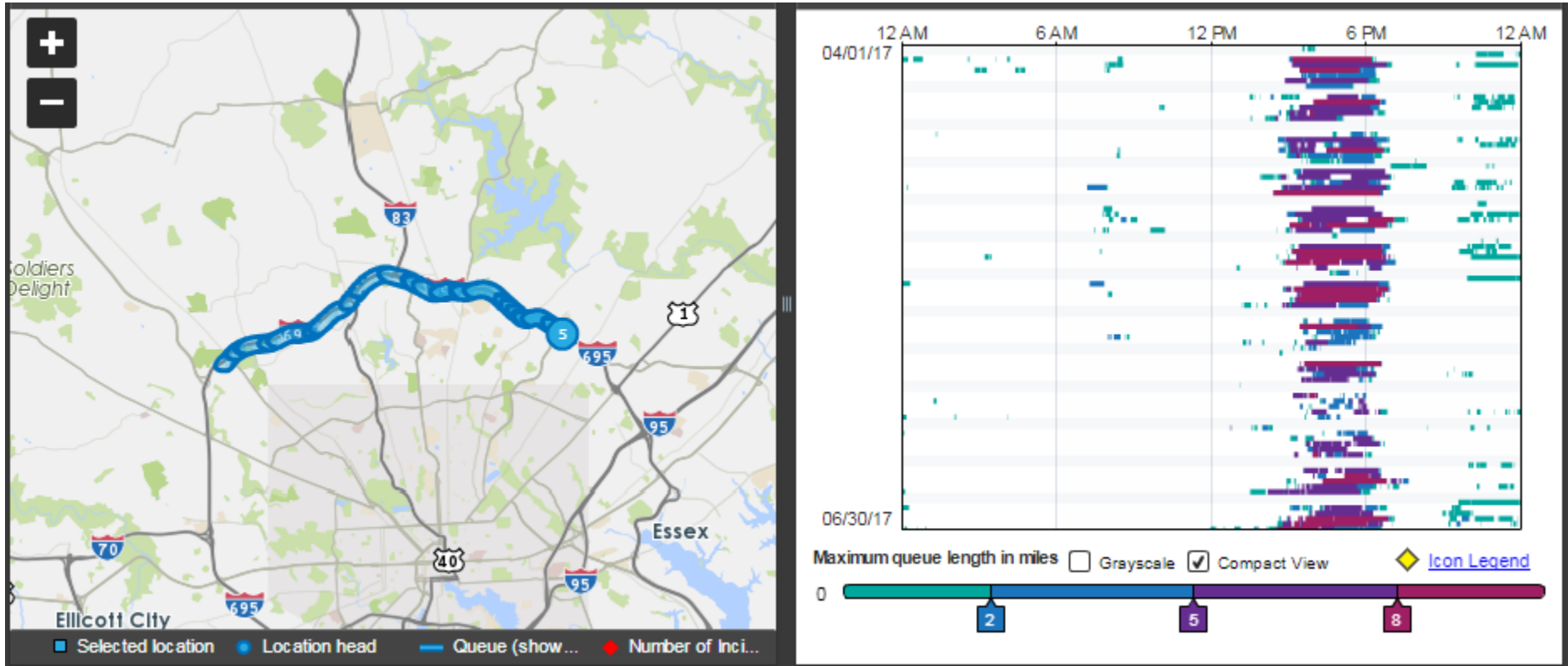
Notes: Congestion was most severe between I-83 and Providence Rd in the afternoon PM peak period. Factors contributing to this long standing and extended congested zone: merging and weaving associated with traffic at each interchange and a lane drop (to 3 lanes) at MD-45/York Rd.

#5 Ranked Bottleneck in the Baltimore Region – 2nd Quarter 2017

Location	Impact	Average max length (miles)	Average Daily Duration	Total Duration	All Events/Incidents
I-695 IL @ MD-41/PERRING PKWY/EXIT 30	56,292	3.17	2 h 33 m	9 d 16 h 49 m	596

The center represents April 1, 2017 and the outer edge represents July 1, 2017.

Maximum queue length in miles ☐ Grayscale

◆ Icon Legend
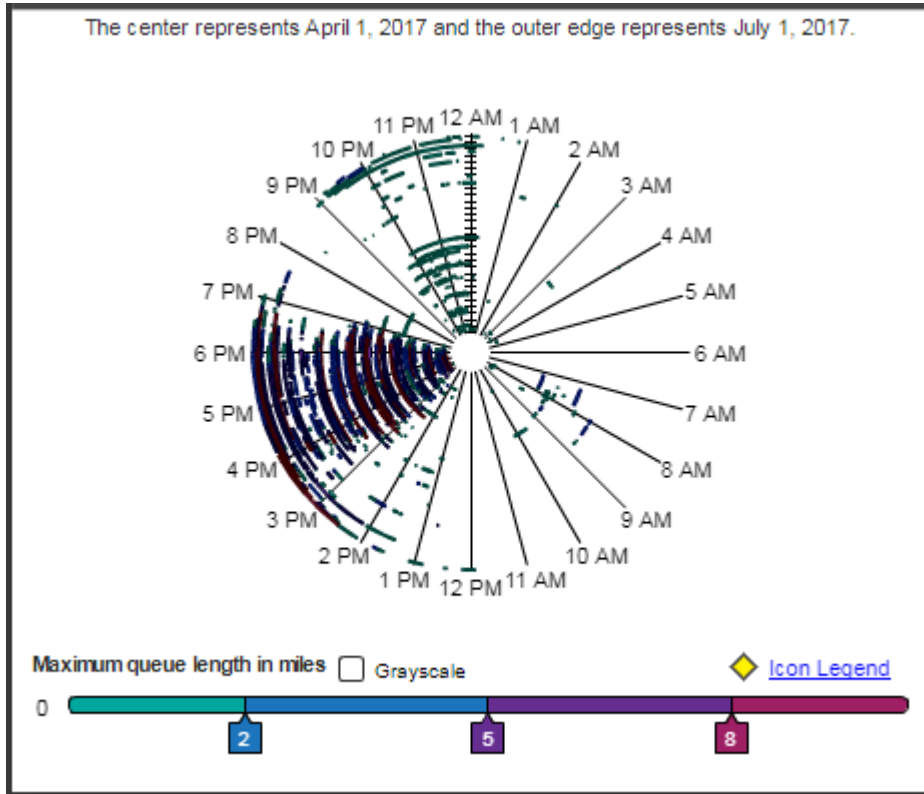
Traffic Volumes – Average Annual Daily Traffic (AADT)
STATION_DESCRIPTION   IS695-.20 MI N OF MD542

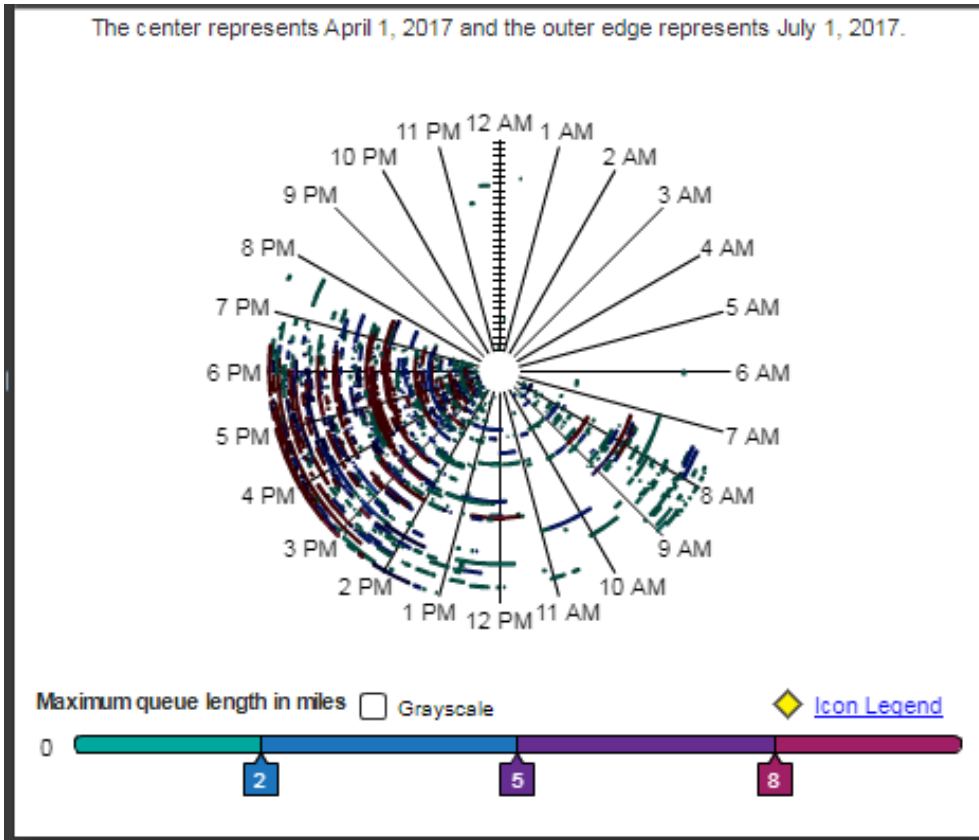## #6 Ranked Bottleneck in the Baltimore Region – 2nd Quarter 2017

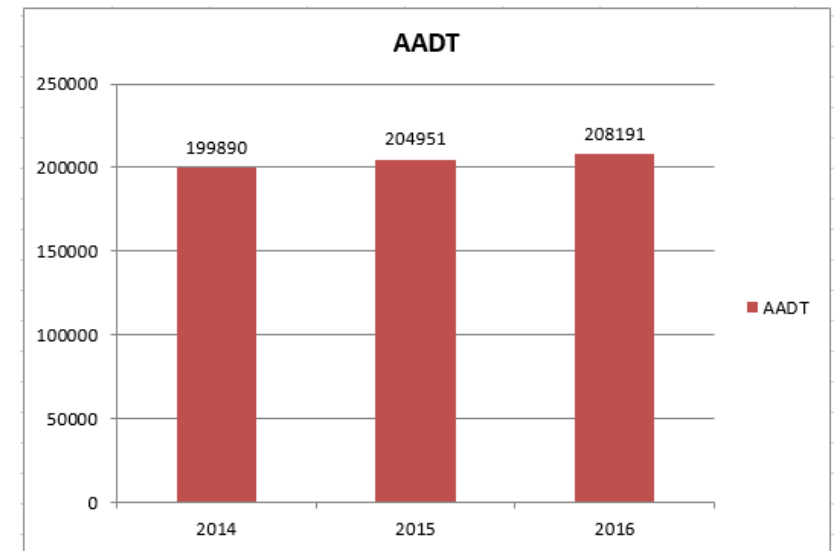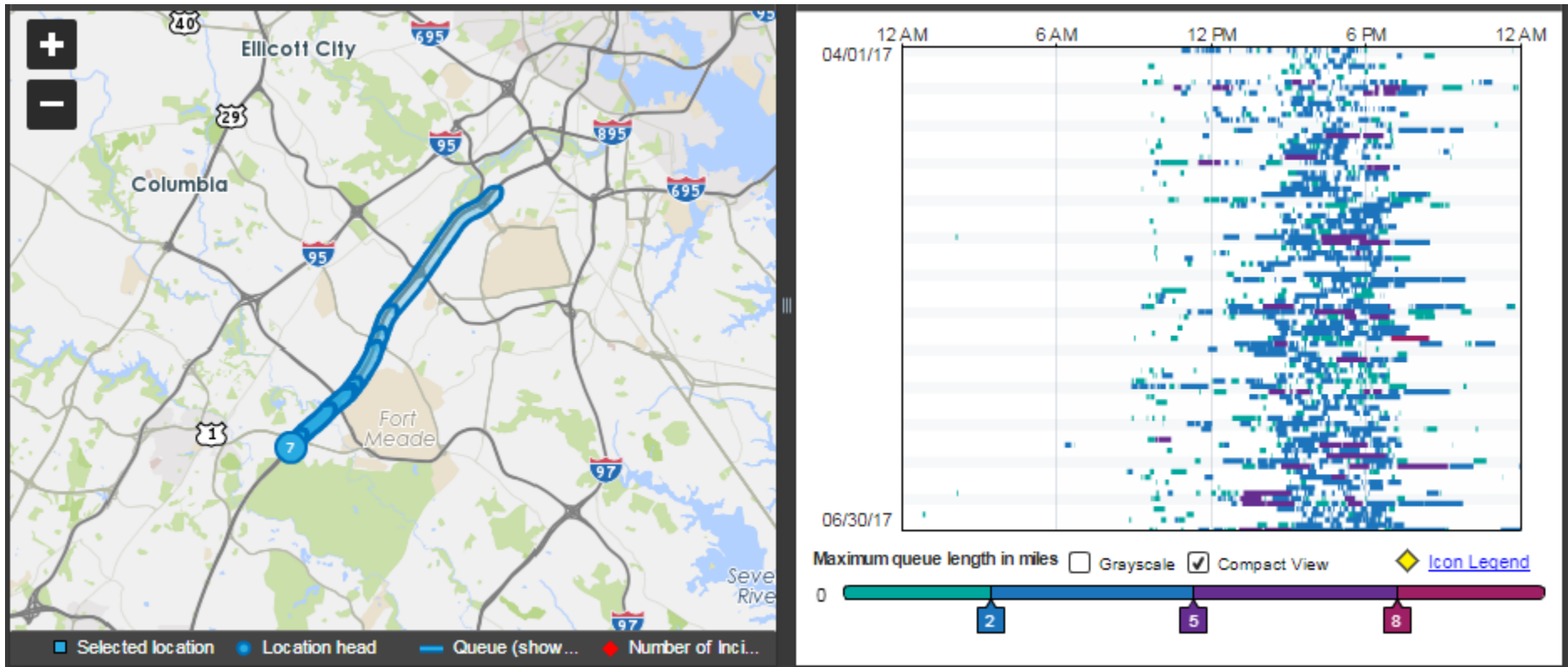| Location	Impact	Average max length (miles)	Average Daily Duration	Total Duration	All Events/Incidents
I-95 N @ MD-100/EXIT 43	55,628	4.45	2 h 13 m	8 d 10 h 05 m	319
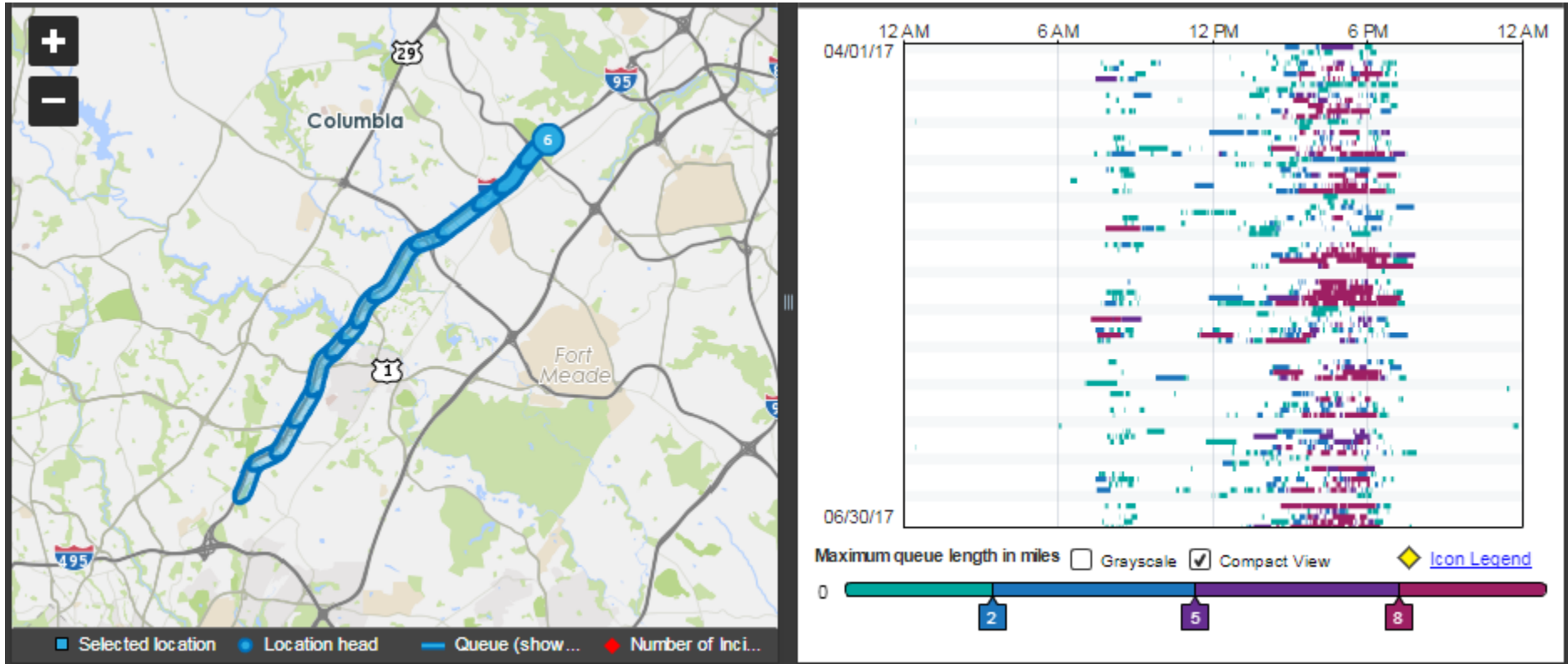
Notes: Congestion in the afternoon rush hour. Contributing factors include traffic entering at MD-175, weaving to exit at MD-100, and the half-mile uphill grade midway between MD-175 and MD-100.

#6 Ranked Bottleneck in the Baltimore Region – 2nd Quarter 2017

Location	Impact	Average max length (miles)	Average Daily Duration	Total Duration	All Events/Incidents
I-95 N @ MD-100/EXIT 43	55,628	4.45	2 h 13 m	8 d 10 h 05 m	319

The center represents April 1, 2017 and the outer edge represents July 1, 2017.

Traffic Volumes – Average Annual Daily Traffic (AADT)
STATION_DESCRIPTION   IS 95 .08-MILE S OF MD 103 (ATR#39)

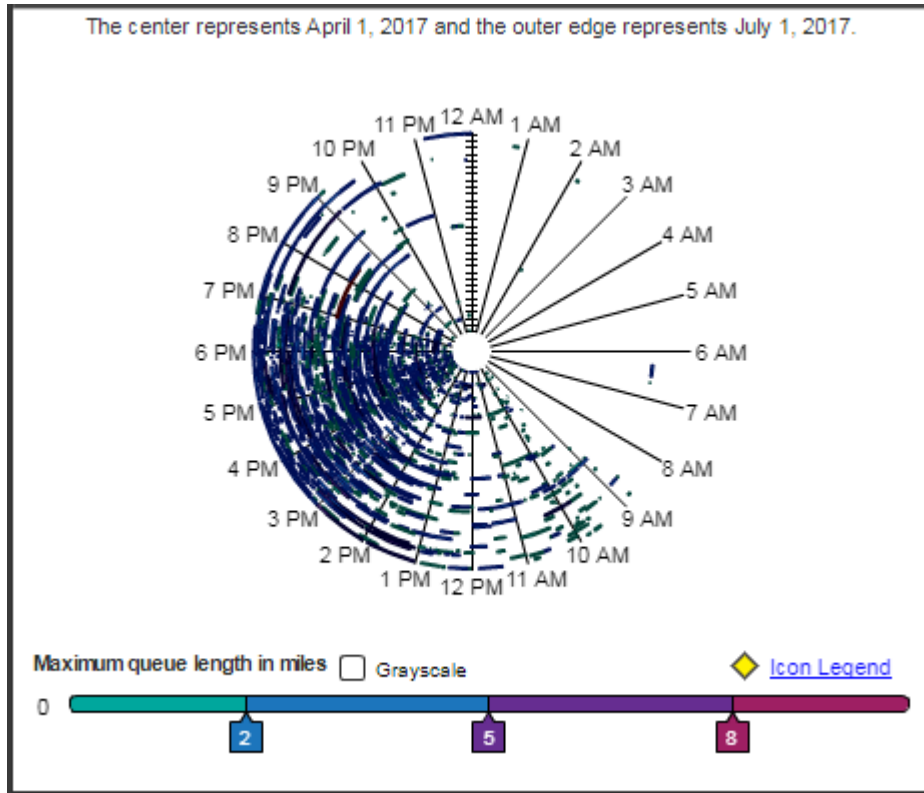# #7 Ranked Bottleneck in the Baltimore Region – 2nd Quarter 2017

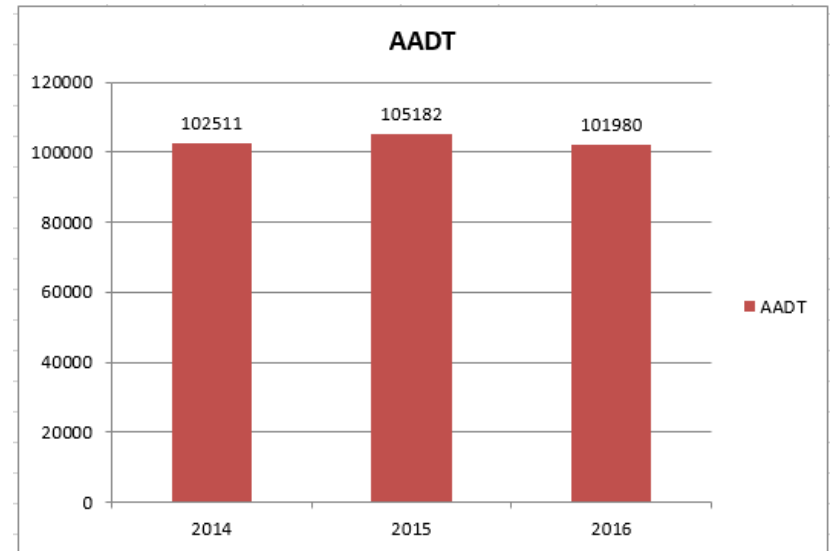| Location	Impact	Average max length (miles)	Average Daily Duration	Total Duration	All Events/Incidents
MD-295 S @ MD-198	50,147	2.80	3 h 27 m	13 d 02 h 42 m	203

Notes: Southbound PM congestion extending from MD-198 just barely extending into the southern portion of the Baltimore region near Fort Meade occurring during both the morning and afternoon peak periods. Volume related delays caused by factors such as Baltimore commuters to DC and Fort Meade and the MD-295 merge with the heavily congested Capital Beltway

#7 Ranked Bottleneck in the Baltimore Region – 2nd Quarter 2017

Location	Impact	Average max length (miles)	Average Daily Duration	Total Duration	All Events/Incidents
MD-295 S @ MD-198	50,147	2.80	3 h 27 m	13 d 02 h 42 m	203

The center represents April 1, 2017 and the outer edge represents July 1, 2017.

Maximum queue length in miles ☐ Grayscale

Icon Legend

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

AADT

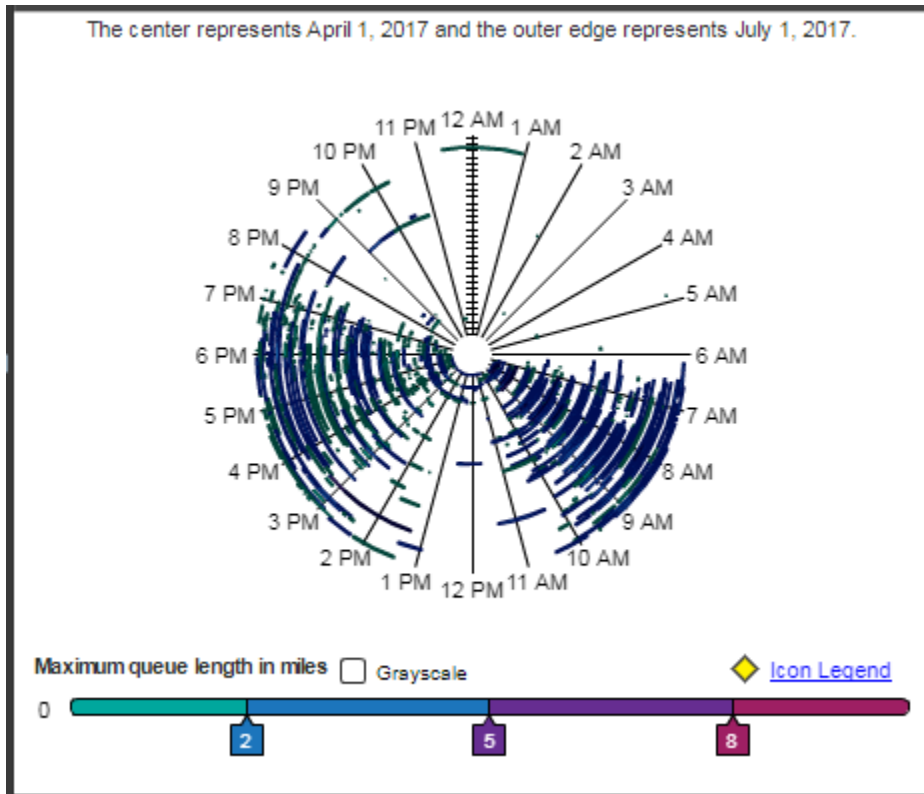## #8 Ranked Bottleneck in the Baltimore Region – 2nd Quarter 2017

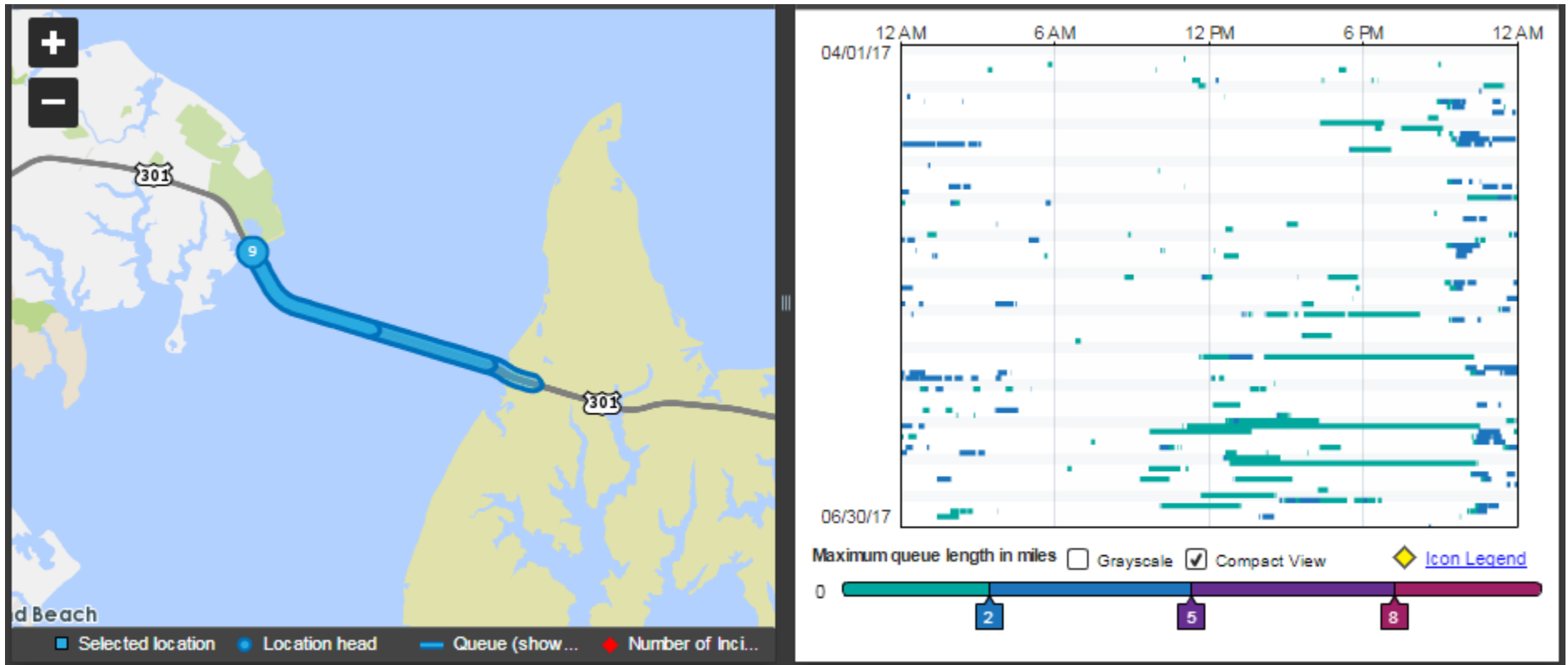| Location	Impact	Average max length (miles)	Average Daily Duration	Total Duration	All Events/Incidents
I-95 S @ I-495/EXIT 27-25	44,548	2.12	3 h 44 m	14 d 05 h 11 m	160

Selected location • Location head — Queue (show... ♦ Number of Inci...

Maximum queue length in miles ☐ Grayscale ☑ Compact View ◇ Icon Legend
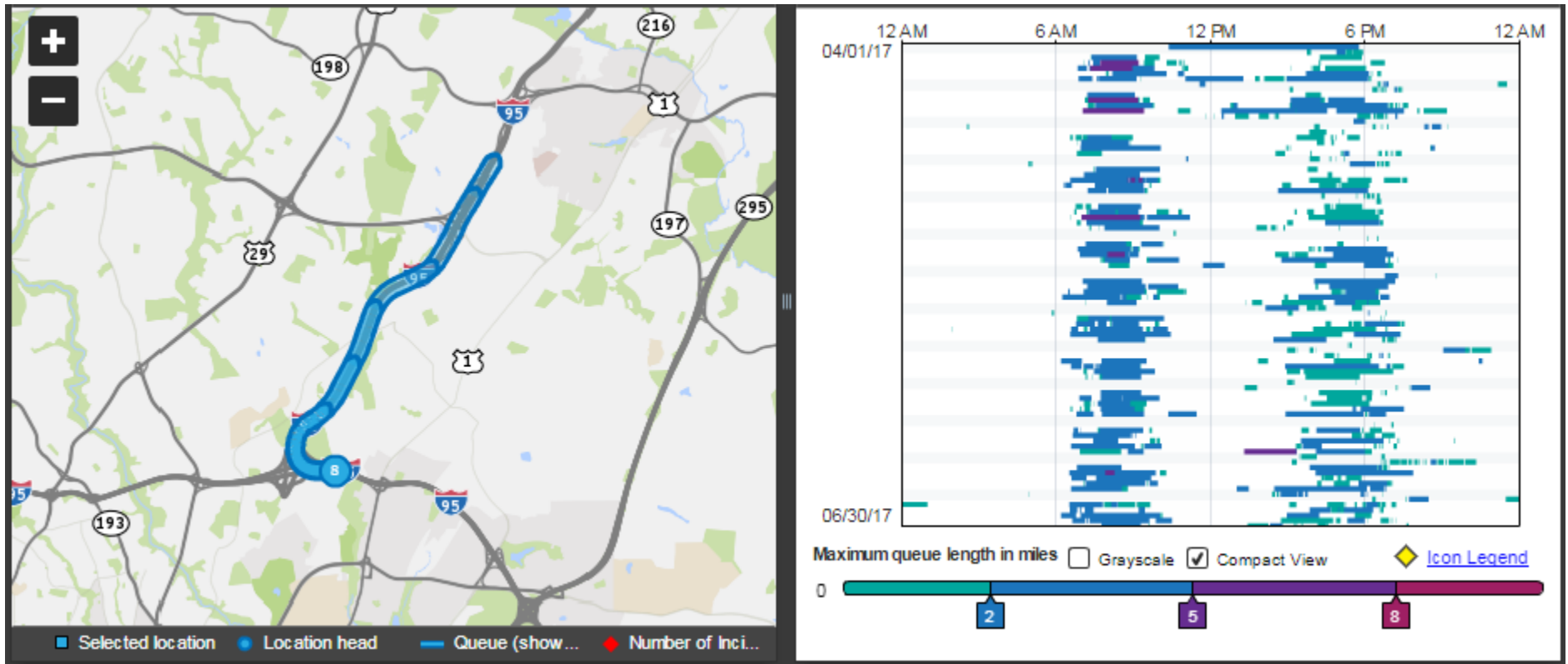
Notes: I-95 merge with the Capital Beltway I-495. Congestion seen in the morning and afternoon rush hour sometimes extending into the southern portion of the Baltimore region.

#8 Ranked Bottleneck in the Baltimore Region – 2nd Quarter 2017

Location	Impact	Average max length (miles)	Average Daily Duration	Total Duration	All Events/Incidents
I-95 S @ I-495/EXIT 27-25	44,548	2.12	3 h 44 m	14 d 05 h 11 m	160

The center represents April 1, 2017 and the outer edge represents July 1, 2017.

Maximum queue length in miles ☐ Grayscale

◆ Icon Legend

Traffic Volumes – Average Annual Daily Traffic (AADT)
STATION_DESCRIPTION   IS95 -.50 MI S OF MD216
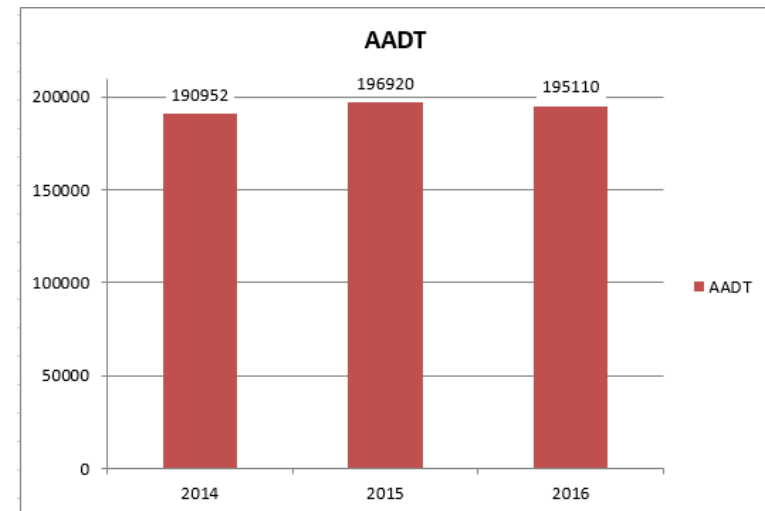
AADT

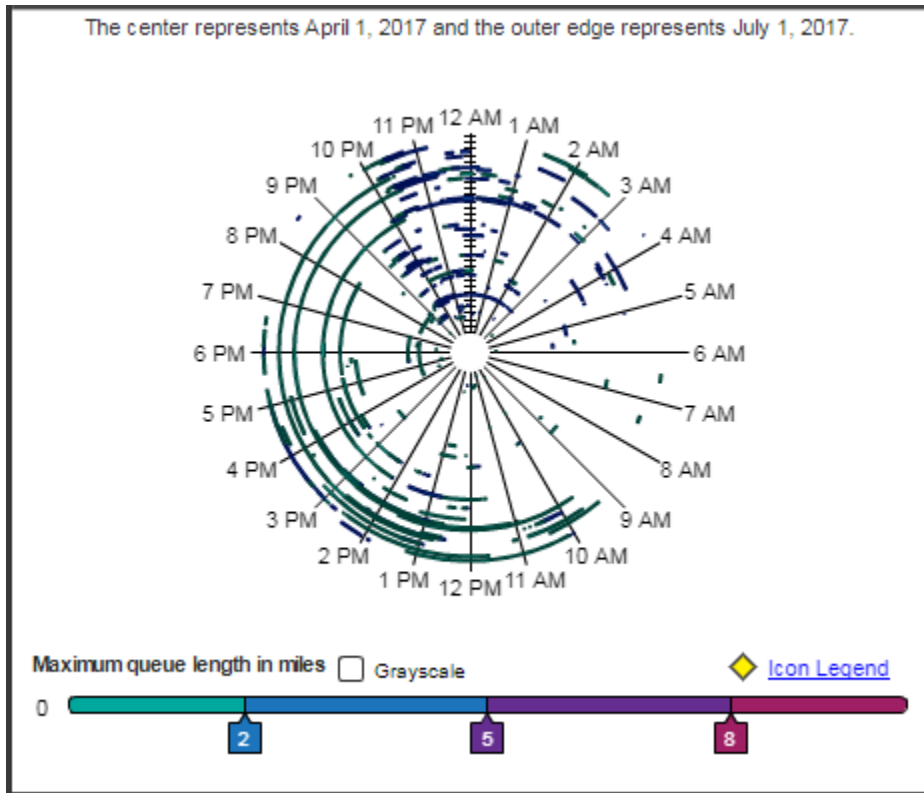## #9 Ranked Bottleneck in the Baltimore Region – 2nd Quarter 2017

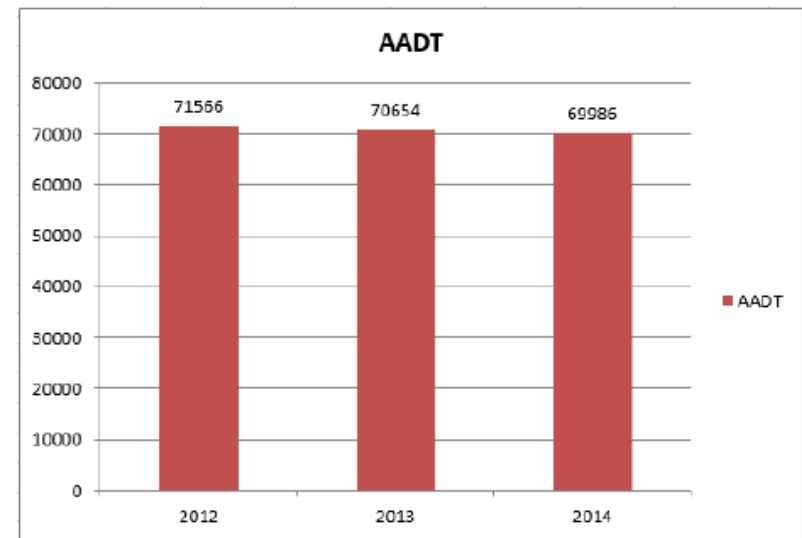| Location	Impact	Average max length (miles)	Average Daily Duration	Total Duration	All Events/Incidents
US-50 W @ BAY BRIDGE TOLL PLAZA	43,855	3.36	2 h 45 m	10 d 11 h 28 m	318

Notes: Bridge Maintenance project Lane closures and changing traffic patterns between 10am and 11pm on selected dates in the time period.

#9 Ranked Bottleneck in the Baltimore Region – 2nd Quarter 2017

Location	Impact	Average max length (miles)	Average Daily Duration	Total Duration	All Events/Incidents
US-50 W @ BAY BRIDGE TOLL PLAZA	43,855	3.36	2 h 45 m	10 d 11 h 28 m	318

The center represents April 1, 2017 and the outer edge represents July 1, 2017.

Maximum queue length in miles ☐ Grayscale

◆ Icon Legend

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

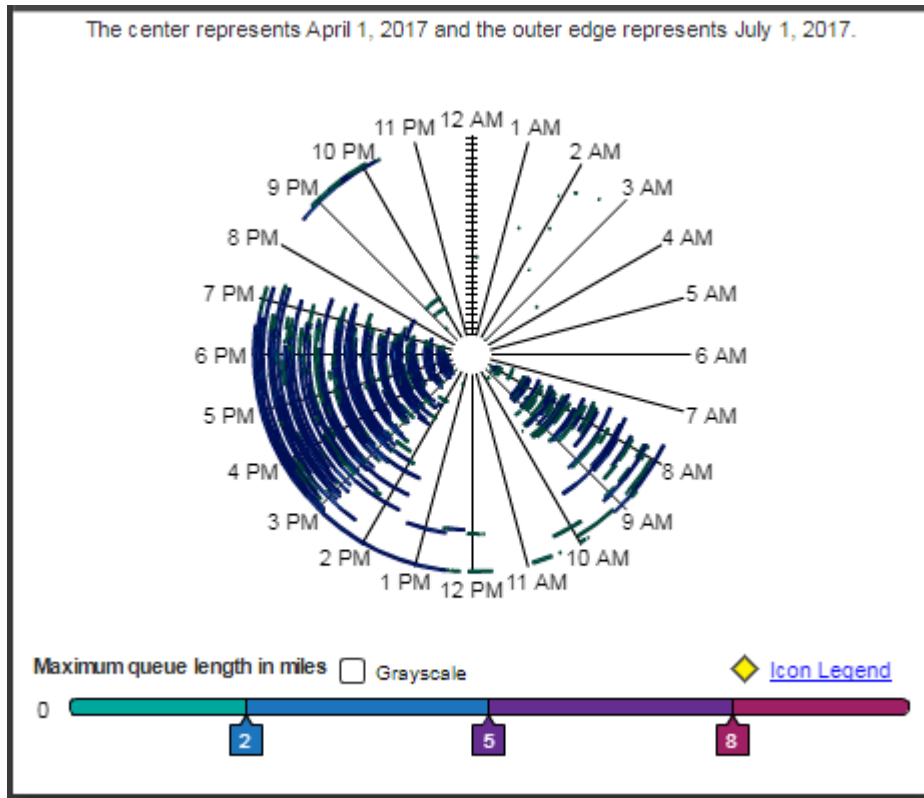## #10 Ranked Bottleneck in the Baltimore Region – 2nd Quarter 2017

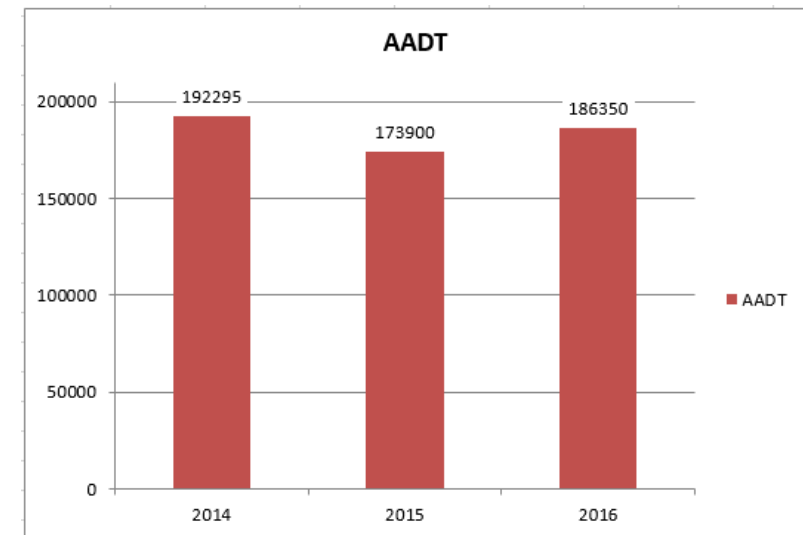| Location	Impact	Average max length (miles)	Average Daily Duration	Total Duration	All Events/Incidents
I-695 IL @ I-70/EXIT 16	42,053	2.01	3 h 21 m	12 d 17 h 13 m	249
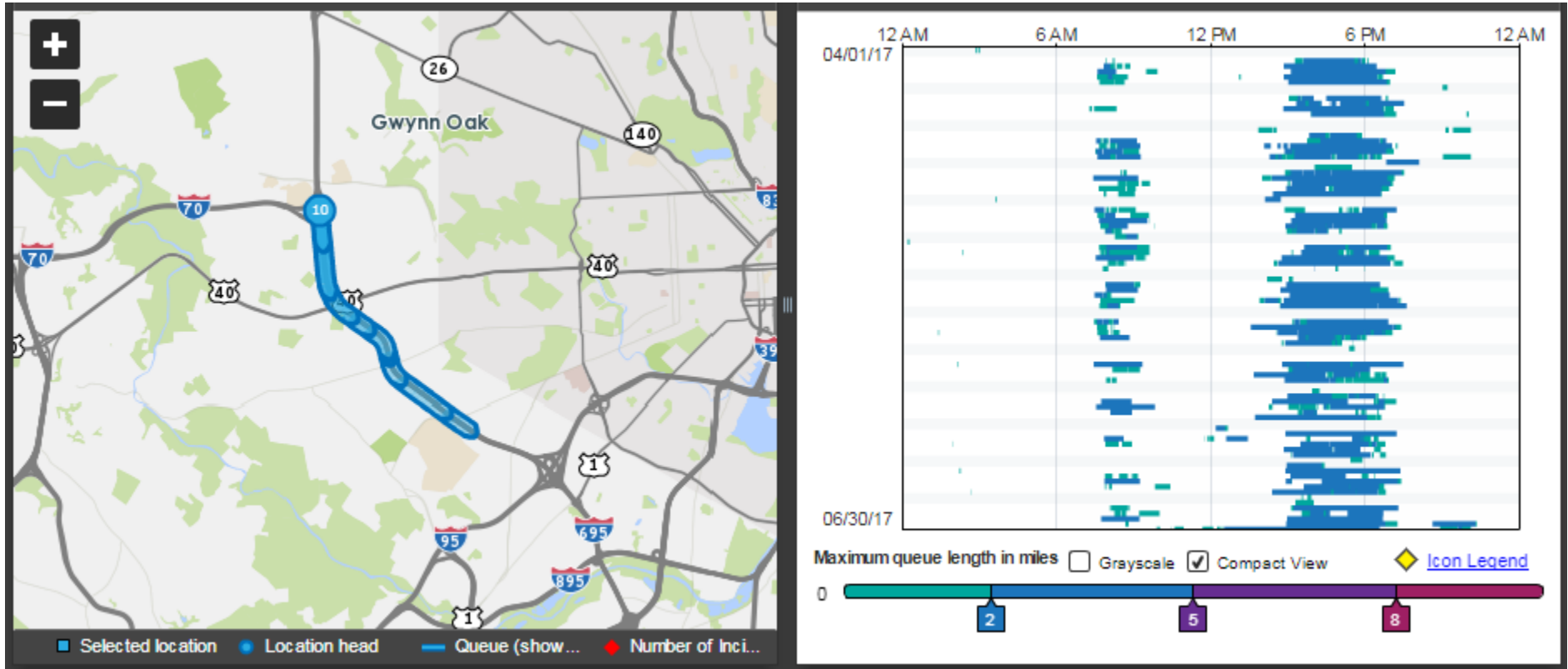
Notes: Normal inner-loop congestion with the greatest delays between MD 144 and the lane drop at I-70. High-volume ramps from Security Blvd, I-70 and US 40 contributed to the congestion.

#10 Ranked Bottleneck in the Baltimore Region – 2nd Quarter 2017

Location	Impact	Average max length (miles)	Average Daily Duration	Total Duration	All Events/Incidents
I-695 IL @ I-70/EXIT 16	42,053	2.01	3 h 21 m	12 d 17 h 13 m	249

The center represents April 1, 2017 and the outer edge represents July 1, 2017.

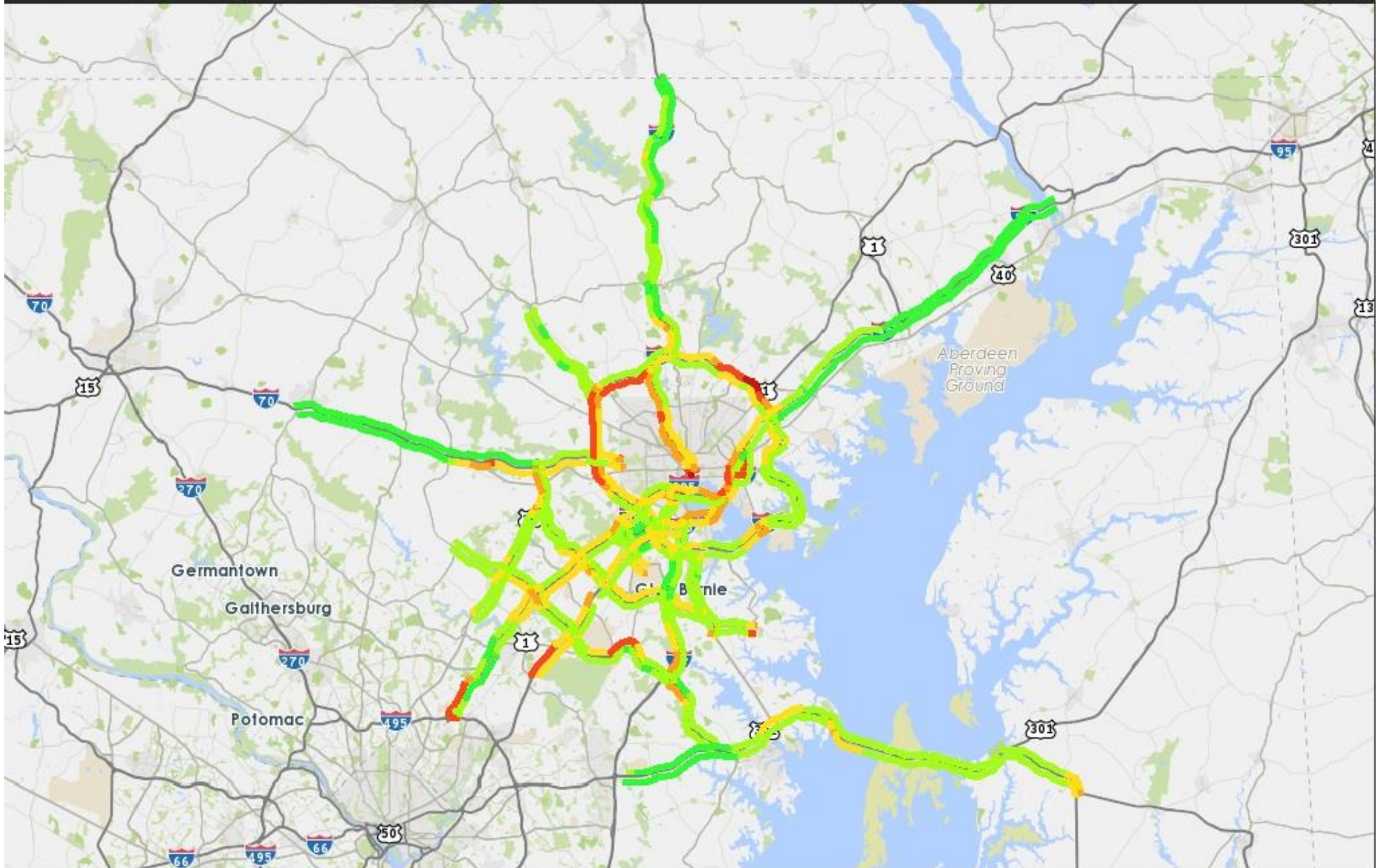Maximum queue length in miles ☐ Grayscale

◆ Icon Legend

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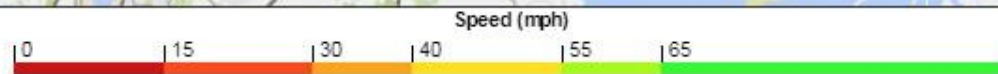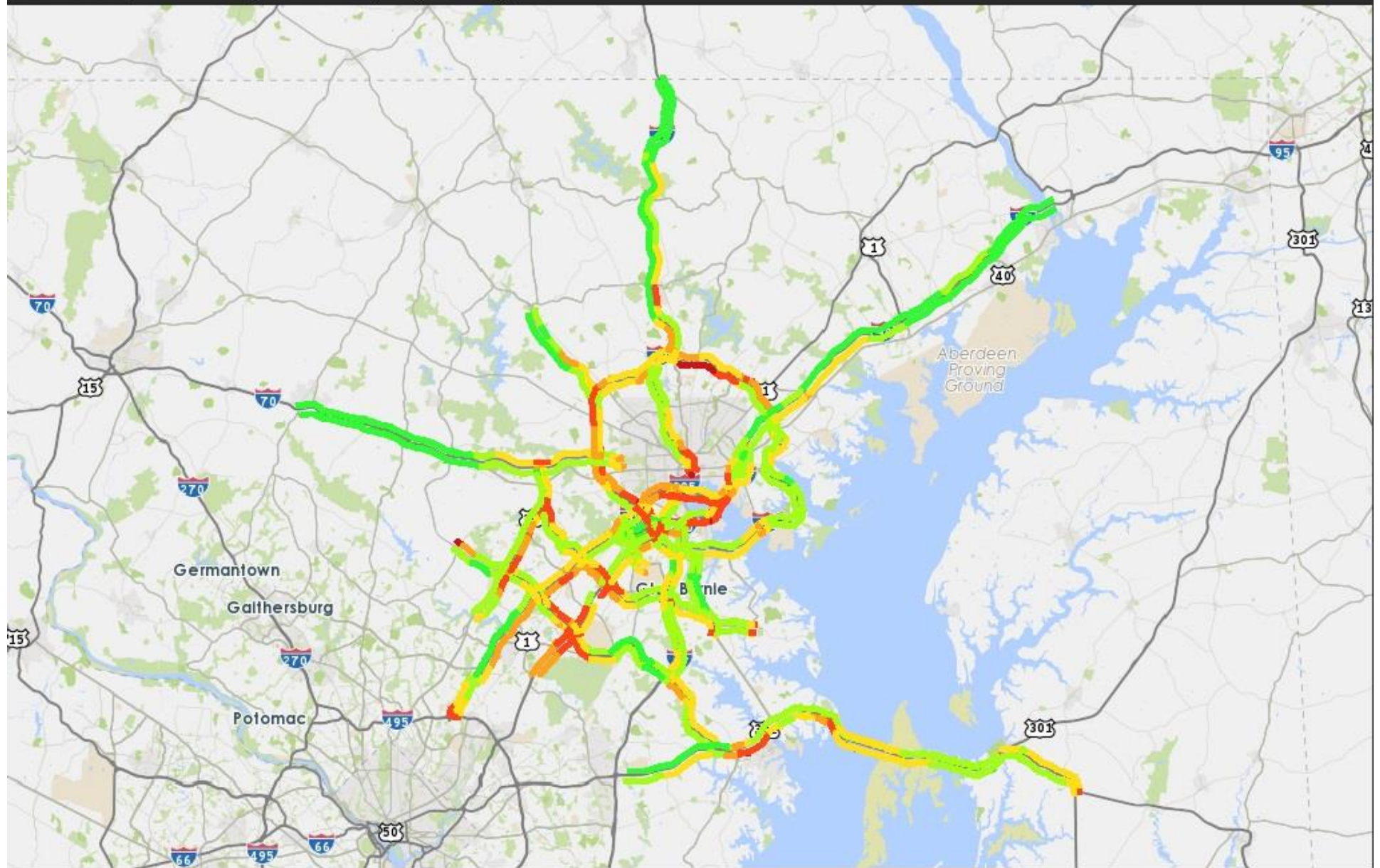*STATION_DESCRIPTION   IS695-.50 MI S OF IS70*

Average Speed Maps – AM Peak Period 8:00-9:00 Weekdays: 2nd Quarter 2017

8:00 AM - April 2017 through June 2017 (every weekday)

Speed (mph)

| 0 | 15 | 30 | 40 | 55 | 65 |
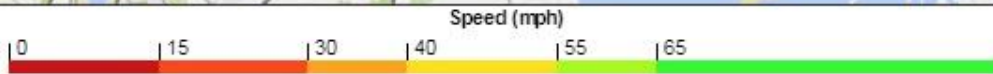
Average Speed Maps – PM Peak Period 5:00-6:00 Weekdays: 2nd Quarter 2017

5:00 PM - April 2017 through June 2017 (every weekday)

Speed (mph)

0   15   30   40   55   65

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 Tom Tom 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*

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