PROBE DATA ANALYTICS SUITE

u s e r g r o u p

Web Meeting

March 8, 2018

Webcast and Audio Information

- The call-in phone number is:

  xxx-xxx-xxxx & enter xxxxxx# at the prompt

- Please call xxx-xxx-xxxx or difficulties with the web or audio application
- This is a virtual meeting experience
  - We have many people participating in this web meeting – so please mute your line until you are asking a question (press *6 to mute/unmute individual phone lines)
  - Please do not place call “on hold” as your hold music will be heard by the group
- This web meeting is being recorded
- All materials will be available to participants after the web meeting

Welcome

Co-chair

Kelly Wells, NCDOT

PDA Suite User Group Co-chair

Participating Agencies

Agency			
AutoReturn	FHWA	New Jersey DOT	Richmond Regional Planning District Commission
Baltimore Metropolitan Council	Florida DOT (AECOM, HDR)	New Jersey Institute of Technology	Rockingham Planning Commission
Charlotte (NC) DOT	INRIX	New York State DOT	South Jersey TPO
City of Tallahassee (FL)	I-95 Corridor Coalition	National Operations Center of Excellence	South Carolina DOT
CORE MPO	Jacobs	NJTPA (WSP)	TRANSCOM
County of Mercer (NJ)	Maine DOT	North Carolina DOT (ITRE)	USDOT
Durham-Chapel Hill-Carrboro MPO	Maryland DOT/SHA	Northern Virginia Transportation Authority	UMD CATT
DelDOT (WRA)	Maryland Transportation Authority	PA Turnpike Commission	UMD CATT Lab
DVRPC	Montgomery County Planning Commission (PA)	Pennsylvania DOT (Gannett Fleming, Jacobs, KMJ, Michael Baker, Pennoni)	Vermont AOT
FEMA	MWCOG	Port Authority NY & NJ	Virginia DOT/VTRC

Please confirm that your line is **muted** ***6**

Thank You!

Topics for today

- Coalition Update
- Setting up the Spotlight
- Spotlight Presentation: PennDOT-sponsored Enhancements to the Probe Data Analytics Suite
- PDA Suite: What's New / Coming Soon
- Feature Spotlight: What's New in the Bottleneck Ranking Tool
- Agency Input Session
- Wrap-up / Next Meeting

Introductions

Denise Markow, PE
I-95 Corridor Coalition
Director

Michael Pack
UMD CATT Lab
Director

Steve Gault, PE, PTOE
PennDOT
Consultant

Mark Franz, PhD
UMD CATT Lab
Lead Transportation
Analyst

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Coalition Update

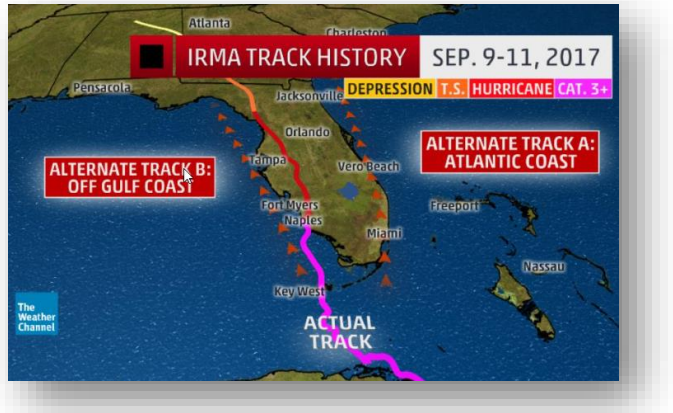
Denise Markow, PE
I-95 Corridor Coalition
Director

Coalition Update – Recent Meetings

–RITIS User Group
–January 18, 2018

–Coalition Steering Committee January 25, 2018
–Executive Board Strategic Planning Session February 27, 2018

–Semi-Annual Validation Meetings
–January 29, 2018



–Southern HOGS Exchange
–Hurricane Irma January 31-February 1, 2018

–Volume and Turning Movement Steering Committee
–February 13, 2018

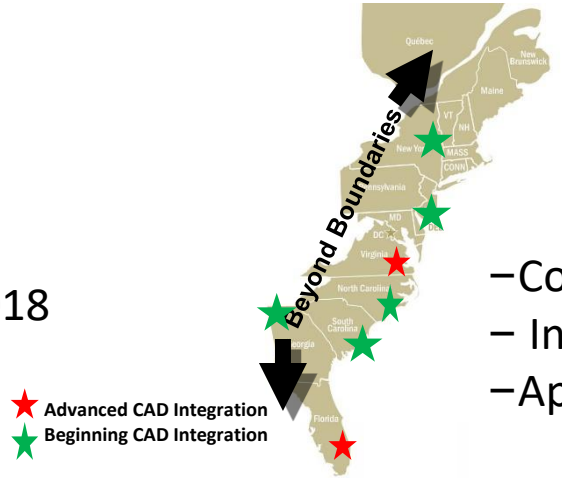
Coalition Update- Upcoming Meetings

- Maine Heavy Towing Workshop #2
- March 2, 2018 (postponed)

- Traveler Information Services Annual Meeting
- March 15, 2018

- Work Zone Monitoring Tools National Webinar
- April 19, 2018

- TSMO Strategic Planning Session March 14, 2018
- Steering Committee Work Plan Session April 12, 2018



- Computer Aided Dispatch Data
- Integration Workshop
- April 23-24, 2018

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What's New

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What's New

- **API**
- **Documentation Updates**
- **MAP-21 Subpart G support (Annual Hours of Peak Hour Excessive Delay per Capita)**
- **Multi-year MAP-21 visualization support**
- **Other MAP-21 additions (based on FHWA feedback)**
- **Trend Map modernization**
- **Bottleneck ranking features (columns, names, etc.)**
- **Multiple bugs and minor enhancements**

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The PDA API

- **API = Application Programing Interface**
- **For users who want to develop their own applications**
- **Provides access without the user interface**

CATT Lab PDA Web Service API

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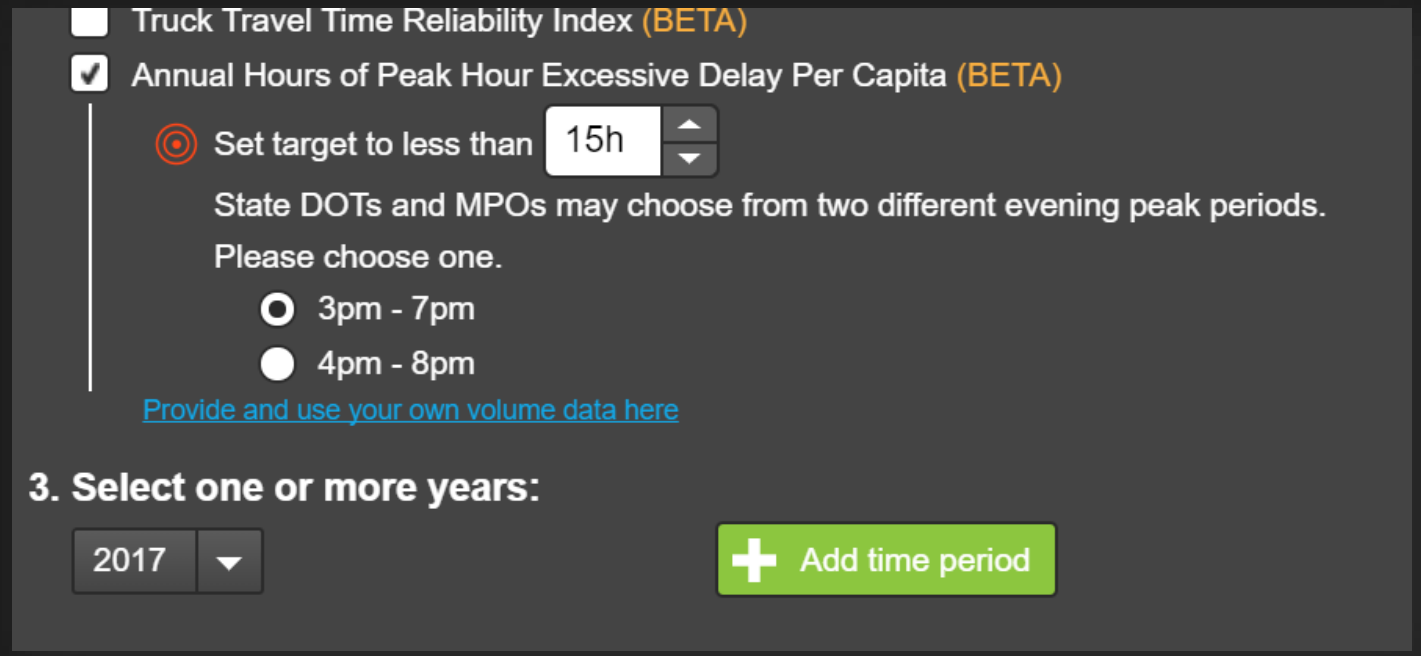
MAP-21

- **MAP-21 Subpart G support (Annual Hours of Peak Hour Excessive Delay per Capita)**
- **Multi-year MAP-21 visualization support**
- **Other MAP-21 additions (based on FHWA feedback)**



FYI for existing RITIS / PDA Suite users

For those states that have already purchased RITIS / PDA Suite
these data and tools are already available to you

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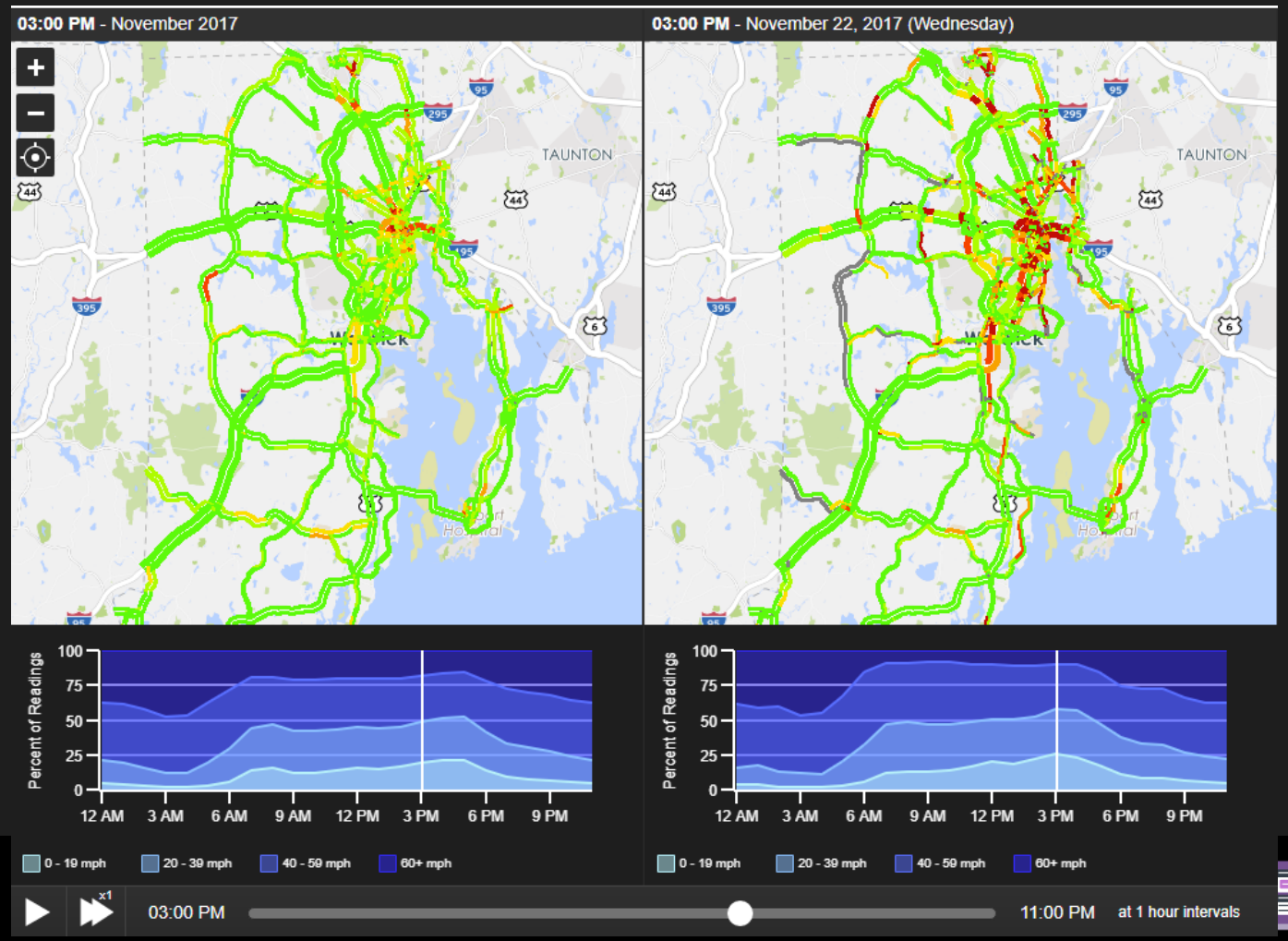
Trend Map Modernization

- No more Flash Player
- Uses less memory
- Can handle more TMCs and finer granularity
- % Readings over time chart



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Bottleneck Ranking

- **Deployed prior to the last User Group meeting**
- **Incremental updates have been made (including language/definitions)**
- **YOU requested a more thorough explanation of these changes**

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Pause for Q&A

In the spotlight…

PennDOT-sponsored Enhancements to the Probe Data Analytics Suite

Steve Gault, PE, PTOE
PennDOT
Consultant

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PennDOT-sponsored Enhancements to the Probe Data Analytics Suite

PDA User Group
March 8, 2018

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Steve Gault, P.E., PTOE
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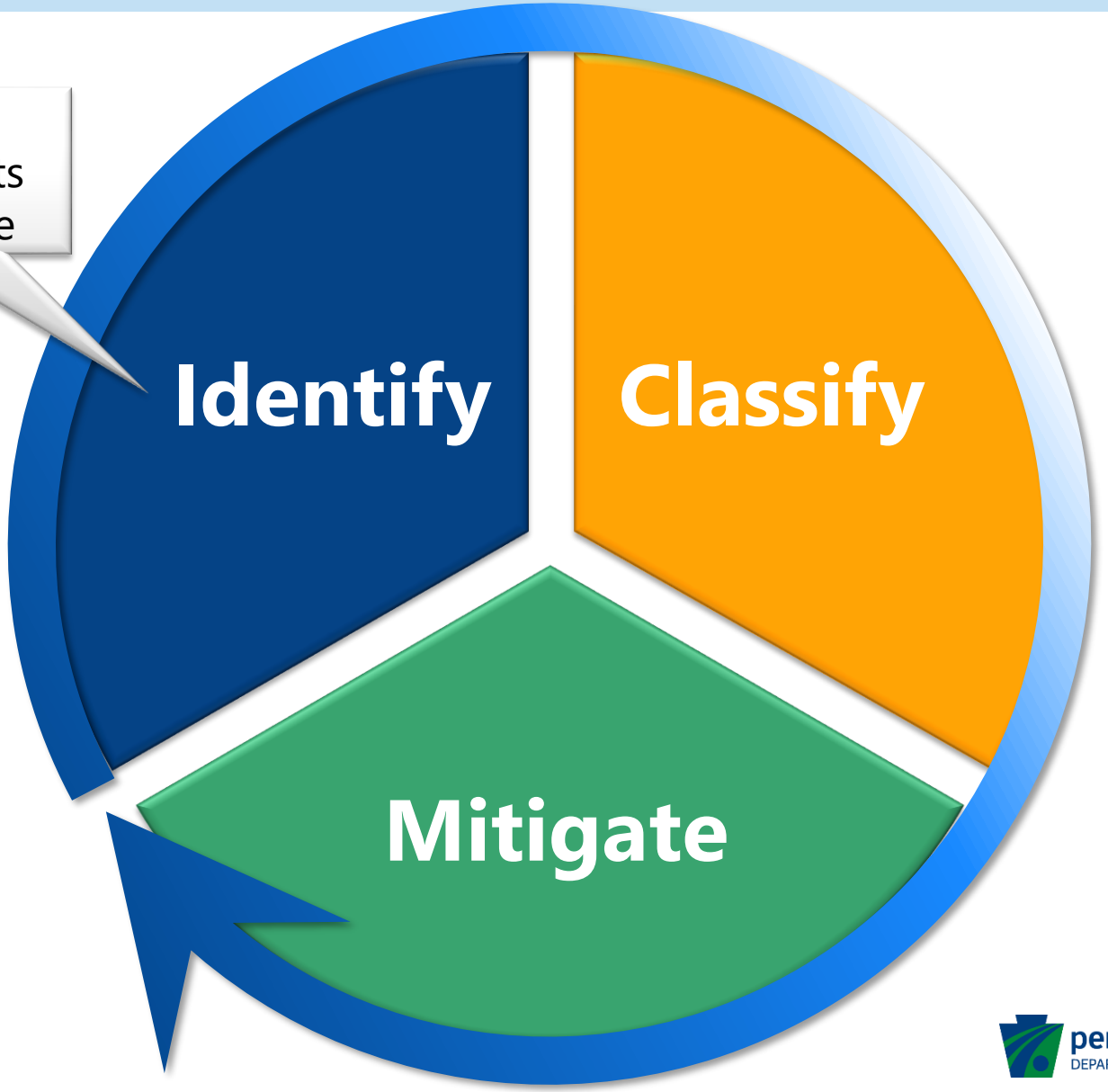
steve.gault@mbakerintl.com

PennDOT's TSMO Performance Metrics Framework

PDA Suite Enhancements Focused Here



Congestion Identification: Performance Measures

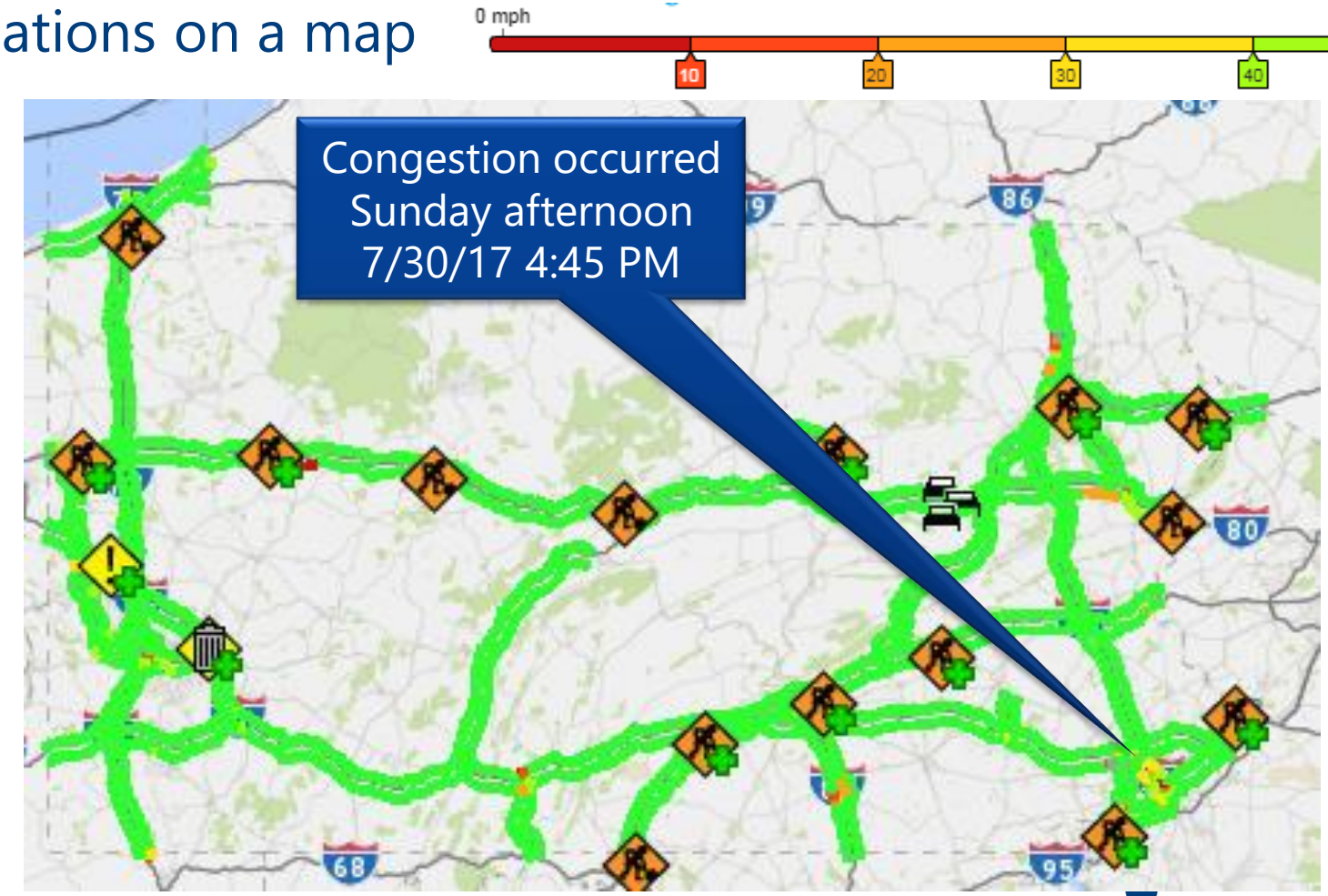
Measure	Questions Answered			
	How **Intense** is Congestion?	How **Reliable** is Travel Time?	**When** is Congestion Occurring?	**Where** is Congestion Occurring?
Time Delay	X		X	X
Time Delay per VMT	X		X	X
Delay Cost	X		X	X
Delay Cost per VMT	X		X	X
Travel Time Index (TTI)	X		X	X
Planning Time Index (PTI)		X	X	X
Buffer Time Index (BTI)		X	X	X
Bottleneck Identification and Ranking	X		X	X

Congestion Identification

- Congestion has both spatial and time dimensions
- Need to hold one dimension constant to visualize variation in the other dimensions
- Time constant → Map visual of where congestion is at that time
- Location constant → Timeline of when congestion occurs at that location

Identify Congestion: Where is Congestion Occurring?

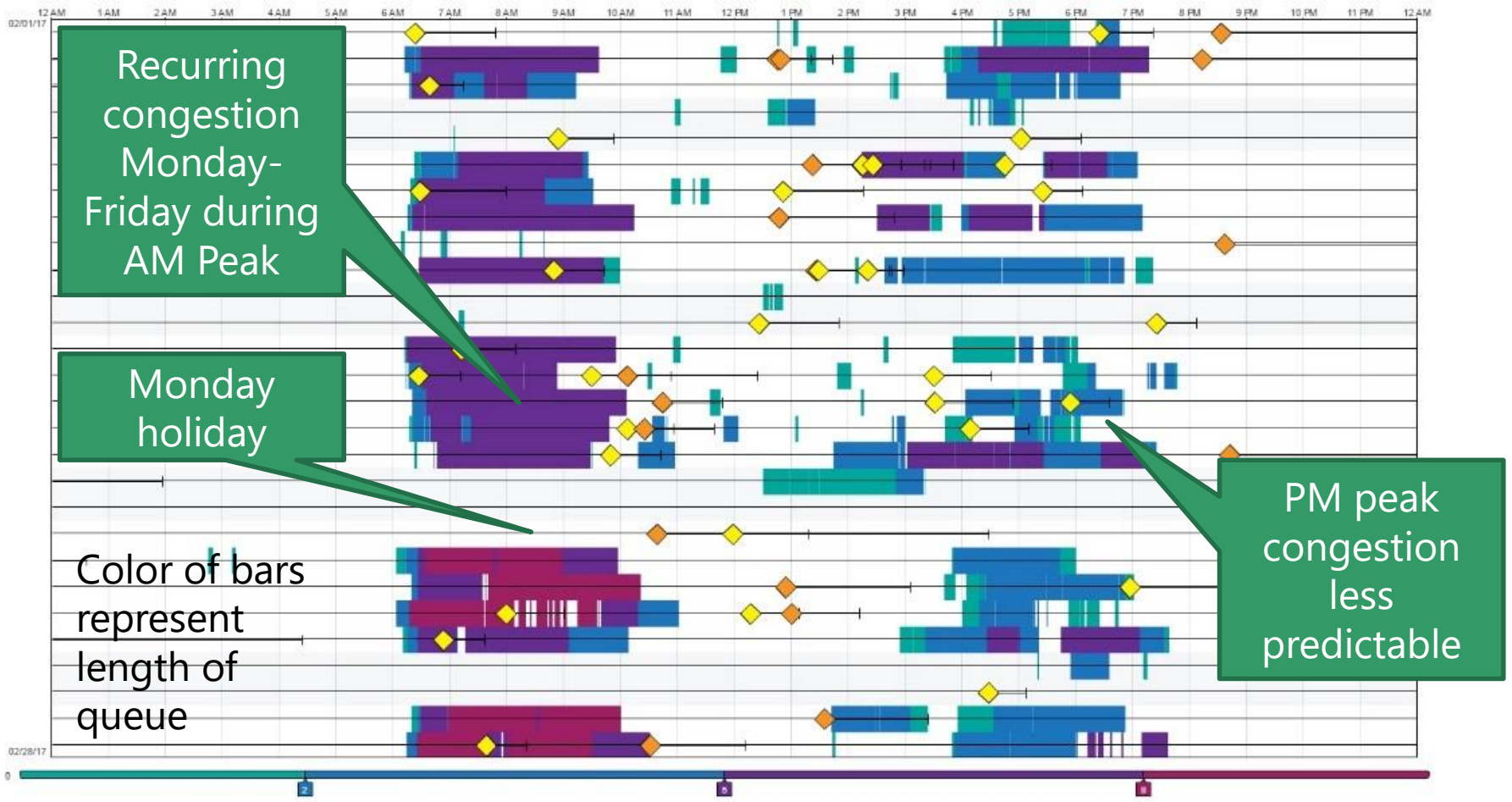
- Pick a snapshot in time and visualize congestion locations on a map



Source: PDA Suite, Trend Map

Identify Congestion: When is Congestion Happening?

- Pick a road or region, see timeline of when it's congested



Source: PDA Suite, Bottleneck Ranking Tool

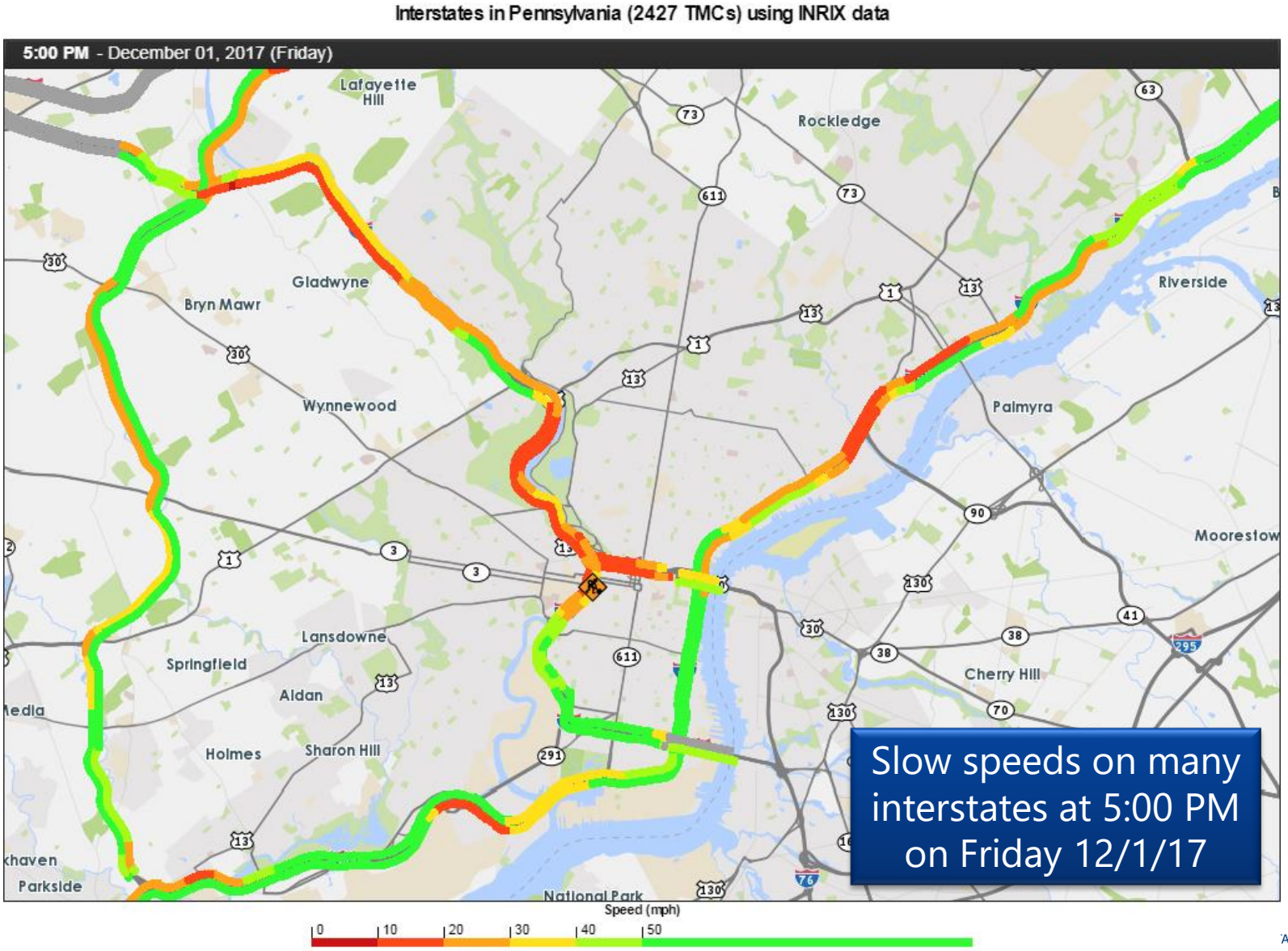
PDA Suite: PennDOT-Sponsored Enhancements

- Additional graphics options for chart exports (fonts, colors, labels, sizes, etc.)
- Additional metrics
  - Bottleneck attributes
  - Travel Time Index, Buffer Time Index, Planning Time Index
  - Delay Costs
- Application Programming Interface (API)
  - Anything that can be produced in PDA Suite can be automated and run on a recurring basis through API

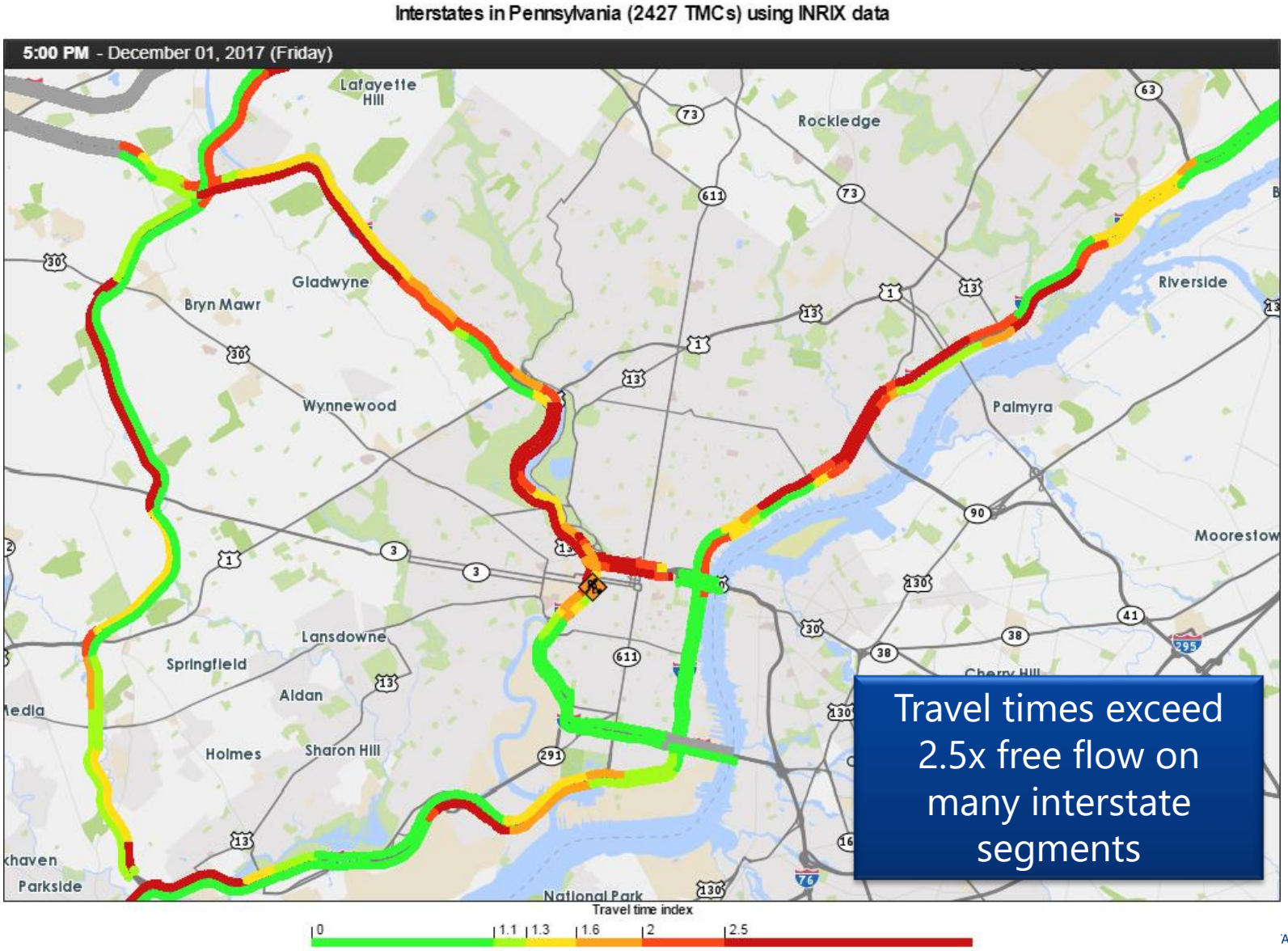
PDA Suite: Trend Map

- Allows the following metrics to be shown visually on a map by time of day
  - Speed
  - Travel Time Index
  - Buffer Time Index
  - Planning Time Index
- Time of day grouped in buckets from 1 minute to 1 hour
- Multiple days can be selected to compare results

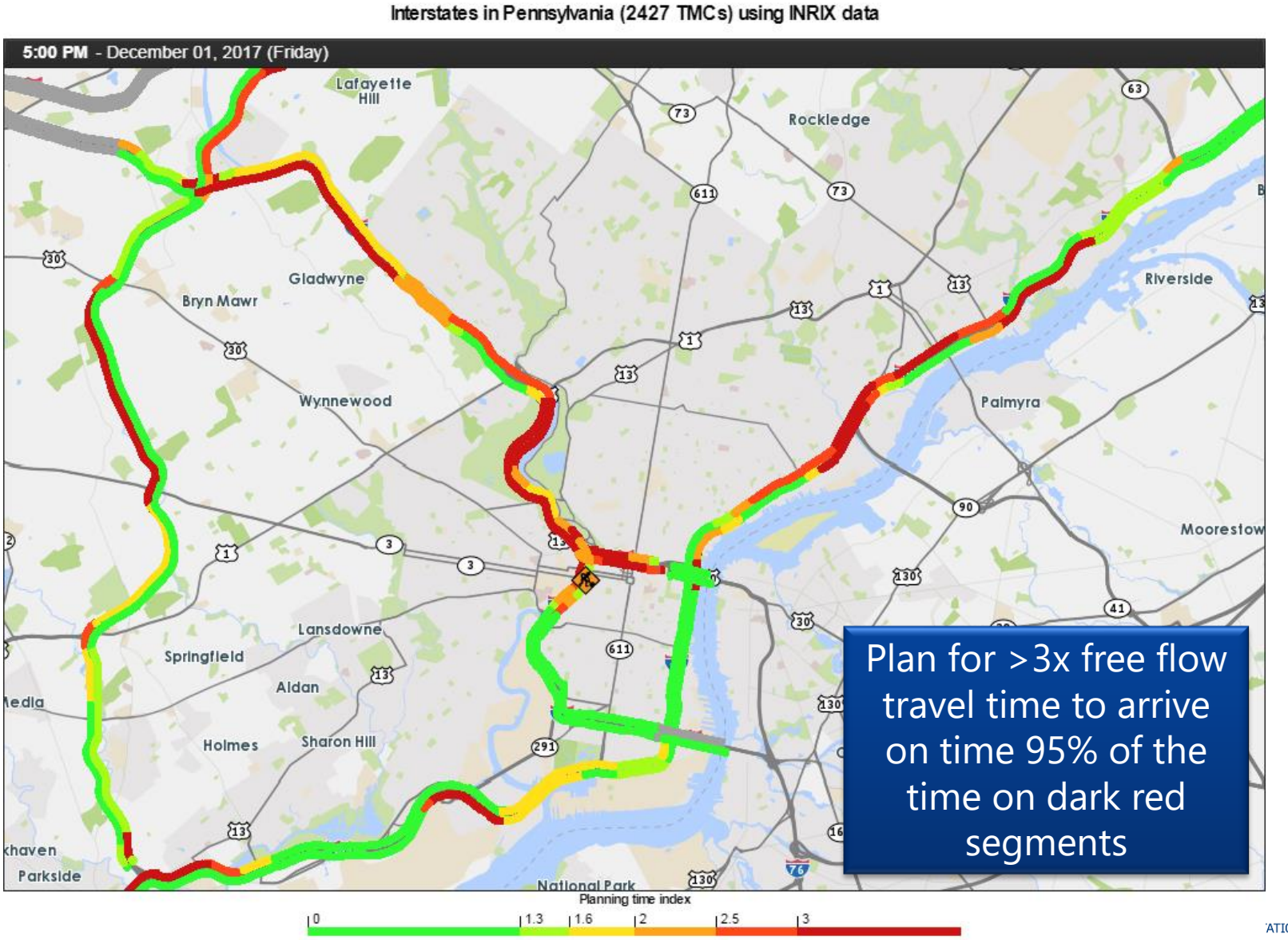
Trend Map: Speed



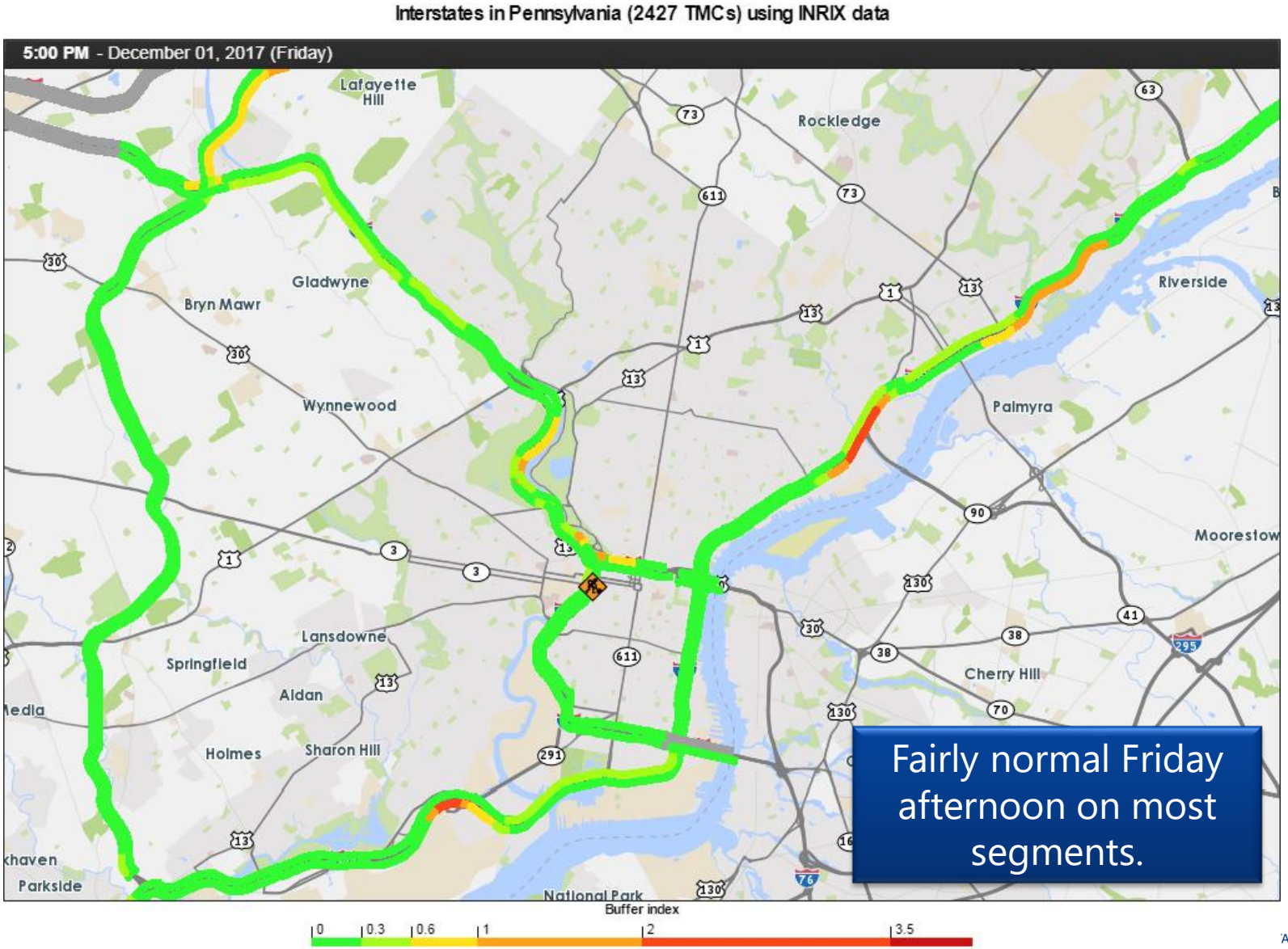
Trend Map: Travel Time Index



Trend Map: Planning Time Index



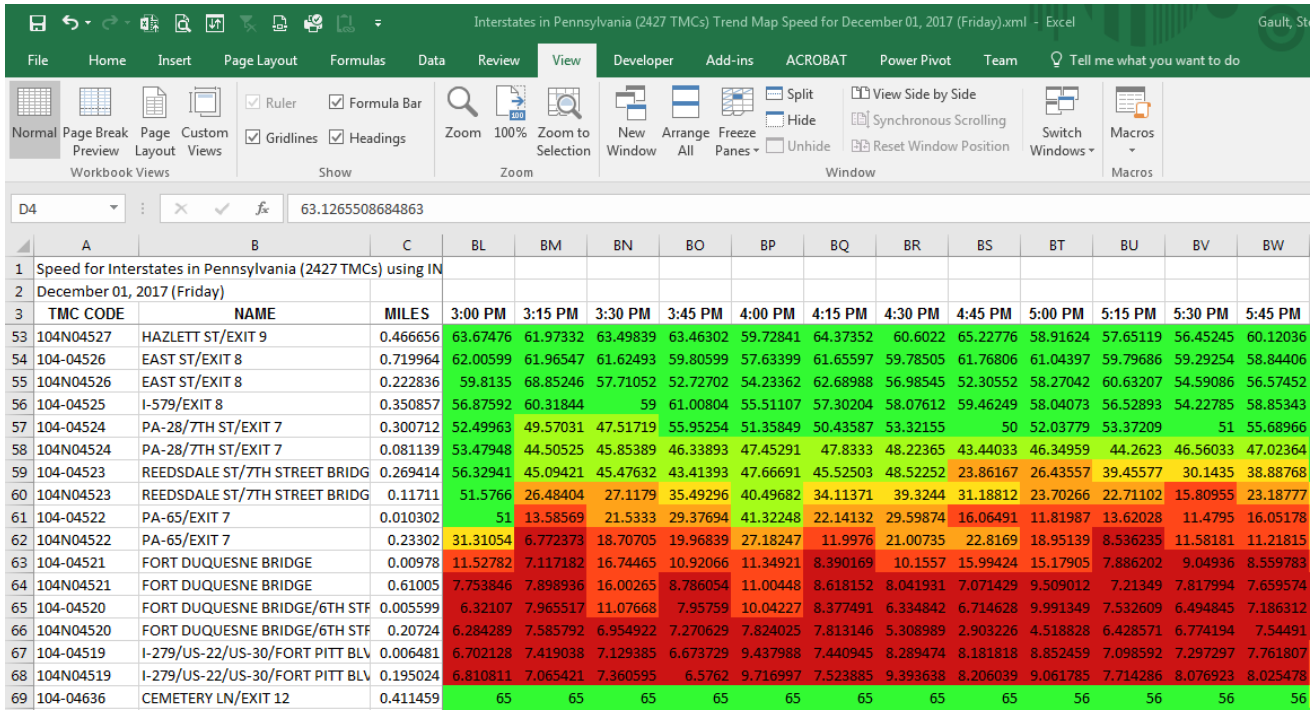
Trend Map: Buffer Time Index



Fairly normal Friday afternoon on most segments.

PDA Suite: Trend Map

- Export options
  - Excel file (XML document: Open With→Excel)
    - Will export whatever metric is current selected with results for every segment shown on the map, with color-coding of cells



	A	B	C	BL	BM	BN	BO	BP	BQ	BR	BS	BT	BU	BV	BW
1	Speed for Interstates in Pennsylvania (2427 TMCs) using IN														
2	December 01, 2017 (Friday)														
3	TMC CODE	NAME	MILES	3:00 PM	3:15 PM	3:30 PM	3:45 PM	4:00 PM	4:15 PM	4:30 PM	4:45 PM	5:00 PM	5:15 PM	5:30 PM	5:45 PM
53	104N04527	HAZLETT ST/EXIT 9	0.466656	63.67476	61.97332	63.49839	63.46302	59.72841	64.37352	60.6022	65.22776	58.91624	57.65119	56.45245	60.12036
54	104-04526	EAST ST/EXIT 8	0.719964	62.00599	61.96547	61.62493	59.80599	57.63399	61.65597	59.78505	61.76806	61.04397	59.79686	59.29254	58.84406
55	104N04526	EAST ST/EXIT 8	0.222836	59.8135	68.85246	57.71052	52.72702	54.23362	62.68988	56.98545	52.30552	58.27042	60.63207	54.59086	56.57452
56	104-04525	I-579/EXIT 8	0.350857	56.87592	60.31844	59	61.00804	55.51107	57.30204	58.07612	59.46249	58.04073	56.52893	54.22785	58.85343
57	104-04524	PA-28/7TH ST/EXIT 7	0.300712	52.49963	49.57031	47.51719	55.95254	51.35849	50.43587	53.32155	50	52.03779	53.37209	51	55.68966
58	104N04524	PA-28/7TH ST/EXIT 7	0.081139	53.47948	44.50525	45.85389	46.33893	47.45291	47.8333	48.22365	43.44033	46.34959	44.2623	46.56033	47.02364
59	104-04523	REEDSDALE ST/7TH STREET BRIDG	0.269414	56.32941	45.09421	45.47632	43.41393	47.66691	45.52503	48.52252	23.86167	26.43557	39.45577	30.1435	38.88768
60	104N04523	REEDSDALE ST/7TH STREET BRIDG	0.11711	51.5766	26.48404	27.1179	35.49296	40.49682	34.11371	39.3244	31.18812	23.70266	22.71102	15.80955	23.18777
61	104-04522	PA-65/EXIT 7	0.010302	51	13.58569	21.5333	29.37694	41.32248	22.14132	29.59874	16.06491	11.81987	13.62028	11.4795	16.05178
62	104N04522	PA-65/EXIT 7	0.23302	31.31054	6.772373	18.70705	19.96839	27.18247	11.9976	21.00735	22.8169	18.95139	8.536235	11.58181	11.21815
63	104-04521	FORT DUQUESNE BRIDGE	0.00978	11.52782	7.117182	16.74465	10.92066	11.34921	8.390169	10.1557	15.99424	15.17905	7.886202	9.04936	8.559783
64	104N04521	FORT DUQUESNE BRIDGE	0.61005	7.753846	7.898936	16.00265	8.786054	11.00448	8.618152	8.041931	7.071429	9.509012	7.21349	7.817994	7.659574
65	104-04520	FORT DUQUESNE BRIDGE/6TH STF	0.005599	6.32107	7.965517	11.07668	7.95759	10.04227	8.377491	6.334842	6.714628	9.991349	7.532609	6.494845	7.186312
66	104N04520	FORT DUQUESNE BRIDGE/6TH STF	0.20724	6.284289	7.585792	6.954922	7.270629	7.824025	7.813146	5.308989	2.903226	4.518828	6.428571	6.774194	7.54491
67	104-04519	I-279/US-22/US-30/FORT PITT BLV	0.006481	6.702128	7.419038	7.129385	6.673729	9.437988	7.440945	8.289474	8.181818	8.852459	7.098592	7.297297	7.761807
68	104N04519	I-279/US-22/US-30/FORT PITT BLV	0.195024	6.810811	7.065421	7.360595	6.5762	9.716997	7.523885	9.393638	8.206039	9.061785	7.714286	8.076923	8.025478
69	104-04636	CEMETERY LN/EXIT 12	0.411459	65	65	65	65	65	65	65	65	56	56	56	56

  - Screenshot image of map
  - Video (animated GIF or MP4)

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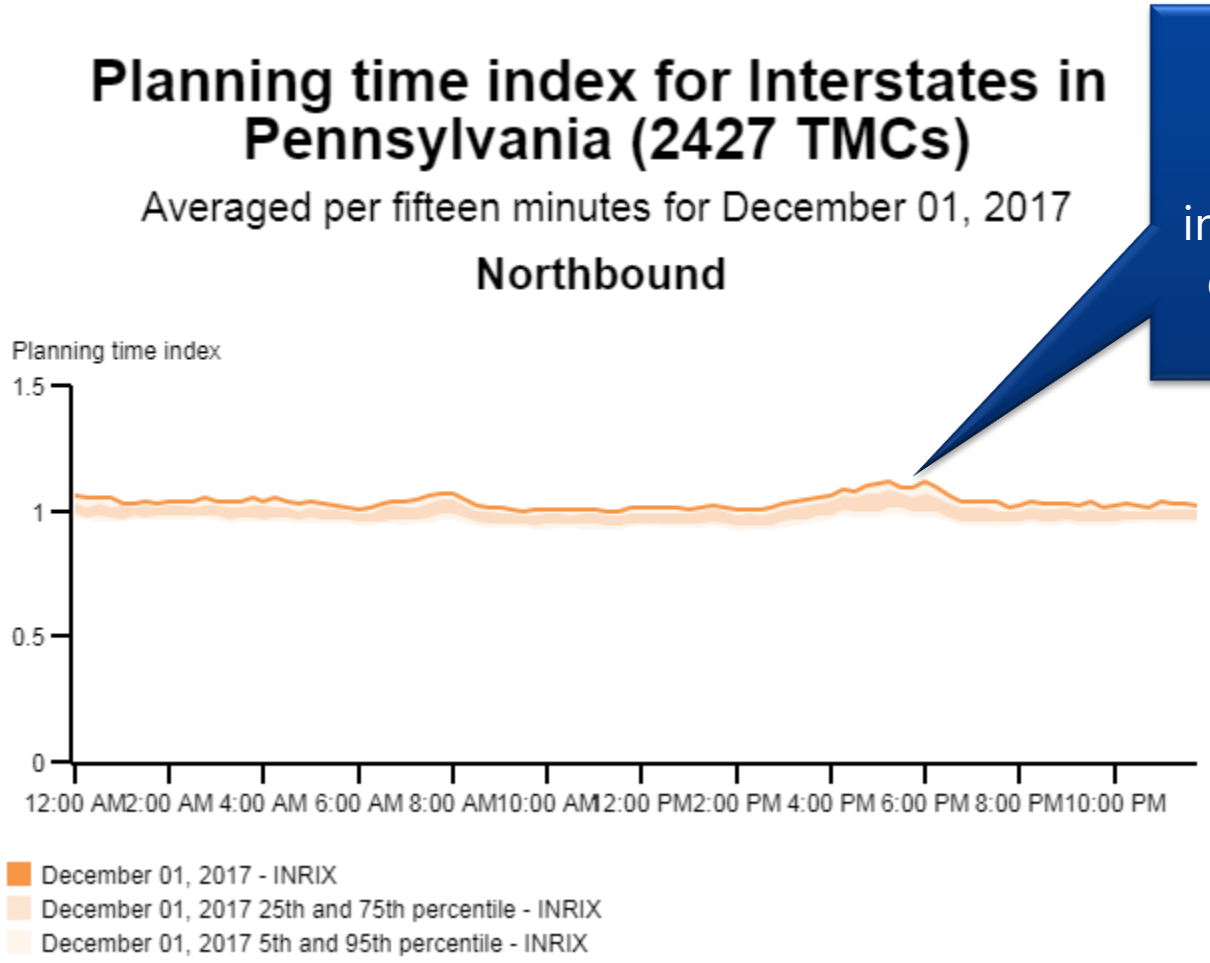
PDA Suite: Performance Charts

- Performance charts can be generated for:
  - Speed
  - Travel Time Index
  - Buffer Time Index
  - Planning Time Index
- Can choose to aggregate certain days of the week and hours of the day, for example just look at weekday peak periods

PDA Suite: Performance Charts



Plan an extra 20% average statewide for interstate travel during Friday PM peak

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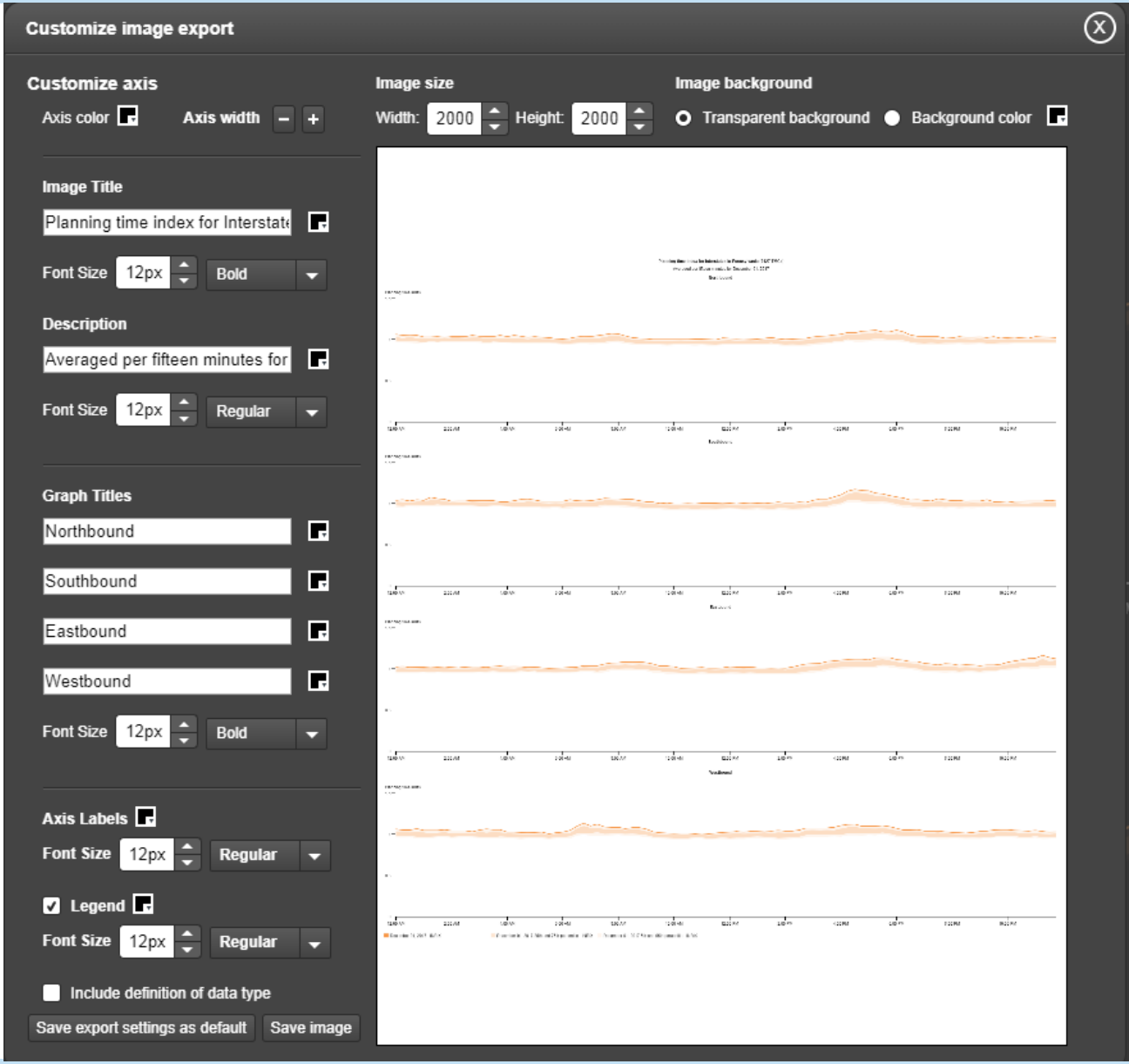
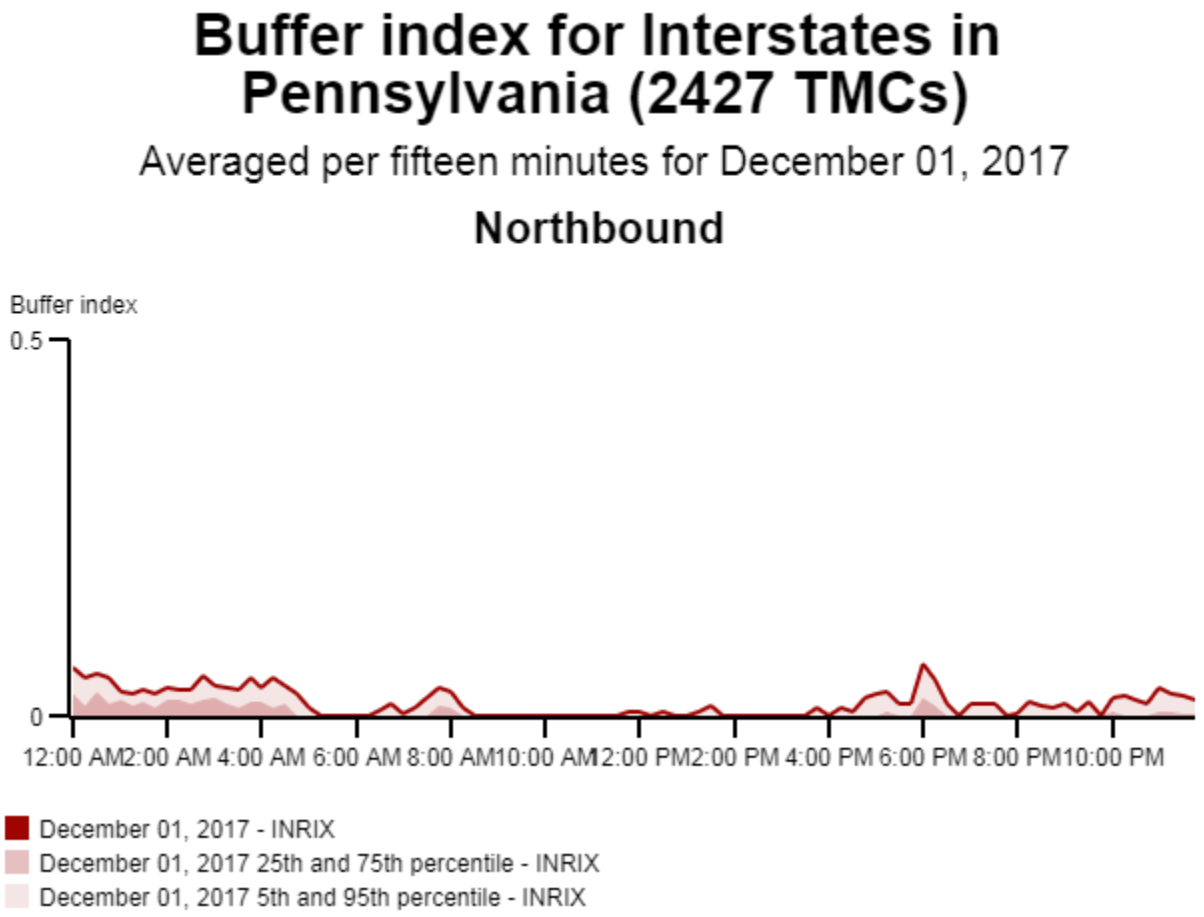
Performance Charts: Export Options

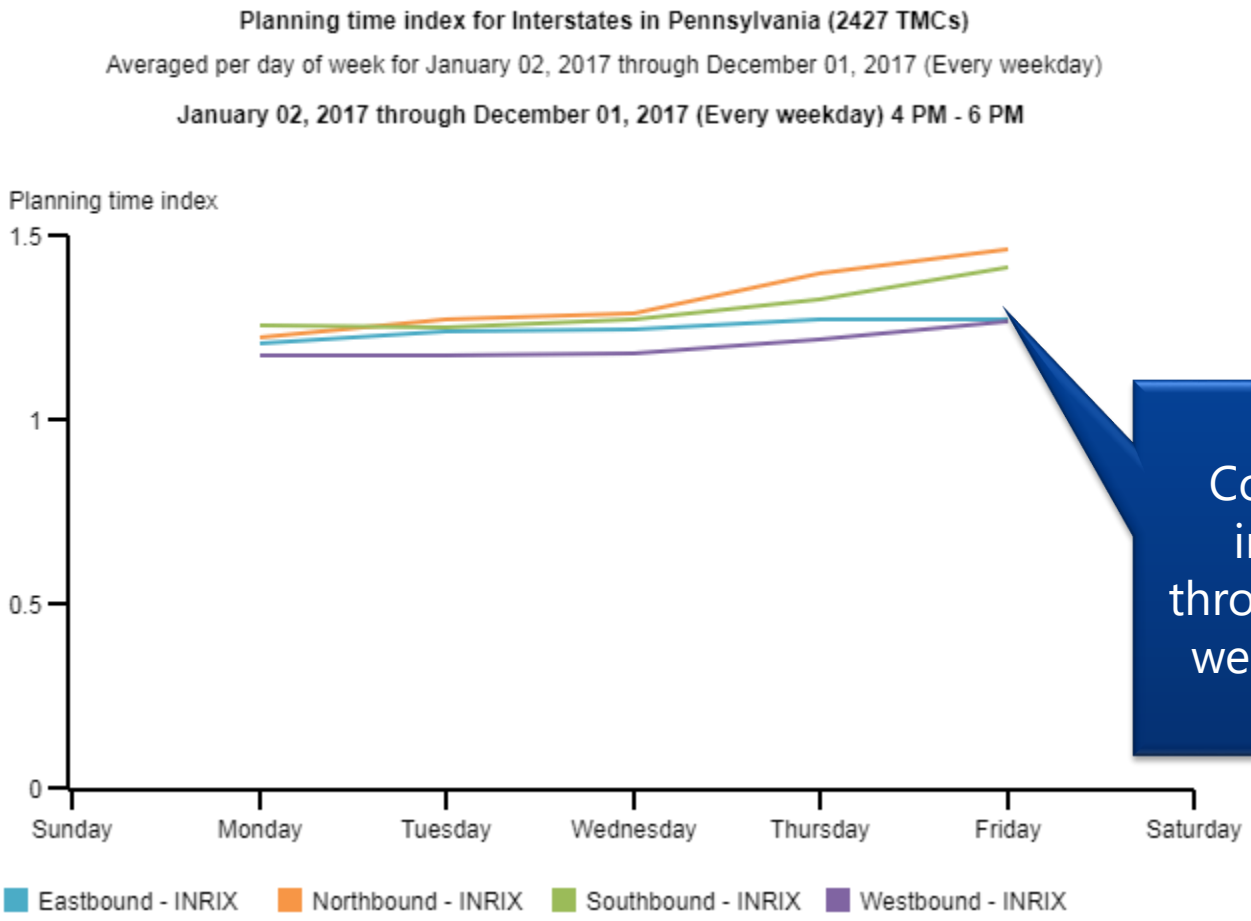
- Can use large pixel size so it will print well
- Can adjust colors & font sizes
- Can choose chart titles
- Recommend using transparent background



PDA Suite: Performance Charts



PDA Suite: Performance Charts



Congestion increases throughout the week in 2017

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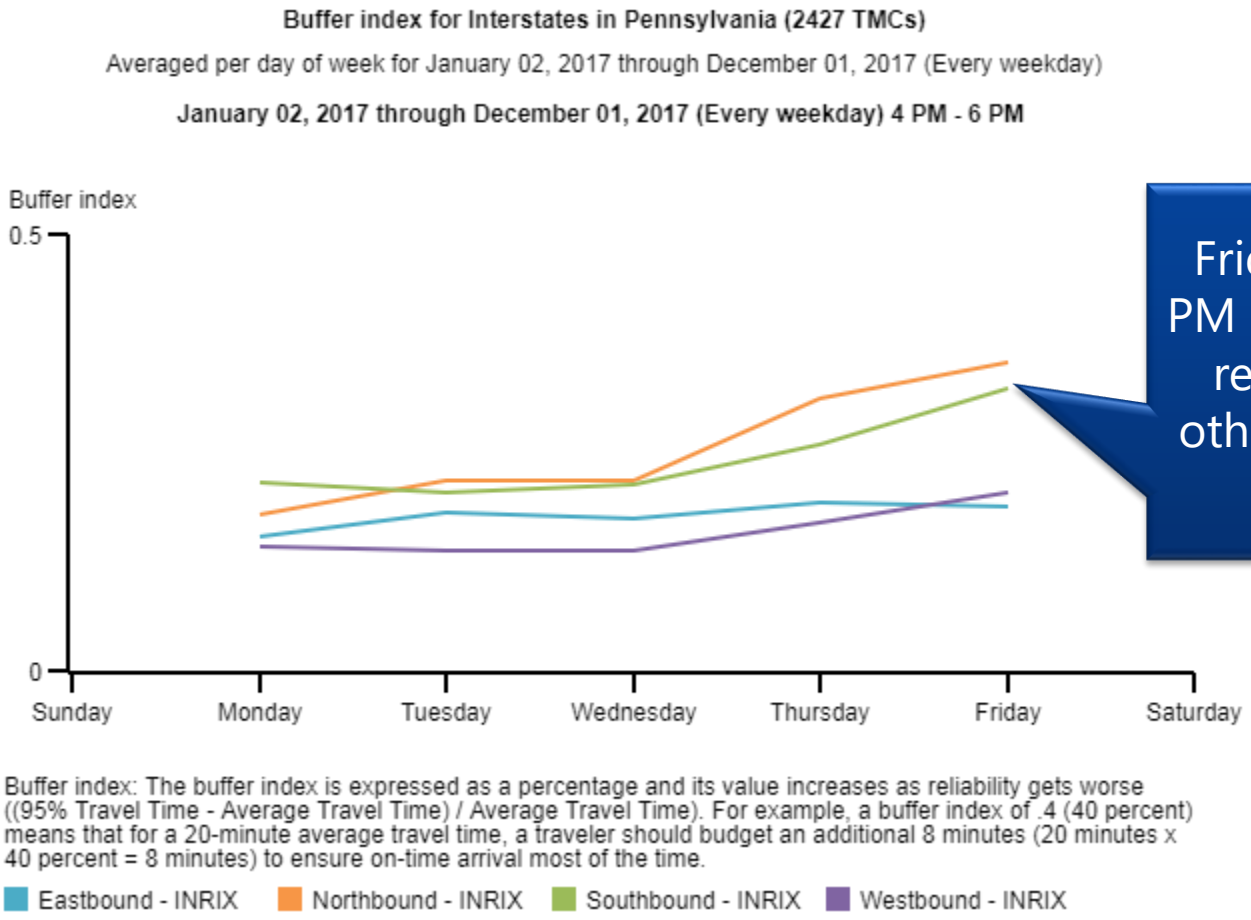
PDA Suite: Performance Charts



Option to include metric definition in chart export

Fridays during PM peak are less reliable than other weekdays in 2017

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PDA Suite: Bottleneck Ranking

- Bottlenecks exist whenever speeds drop below 60% of free-flow speed
- Bottlenecks have a head from which extend upstream
- Additional metrics added through PennDOT Project:
  - Base impact weighted by:
    - Speed differential
    - Congestion
    - Total Delay
  - Recommend changing ranking to **TOTAL DELAY** instead of base impact (click on column heading twice to rank with highest total delay first)
  - Total delay considers volume, magnitude of speed drop, and length of queue (not an exact delay measure due to computational complexity to allow results to be calculated in a timely manner)

Bottleneck Ranking

Bottleneck Ranking Table for Interstates in Pennsylvania (2427 TMCs) between November 1, 2017 and November 30, 2017 (1124 total)

Display Options

			Bottleneck Profile			Influences		Base impact weighted by			
Rank	Map	Head Location (approximate)	Average max length ...	Average daily duration	Total duration	All Events/Incidents	Base Impact	Speed differential	Congestion	▼TOTAL DELAY	External Tool Links
1	☐	I-95 S @ GIRARD AVE/EXIT 23	3.72	5 h 28 m	6 d 20 h 25 m	0	37,845.65	1,414,213.86	71,912.26	109,843,404,918.04	
2	☐	I-76 E @ BELMONT AVE/EXIT 338	3.94	4 h 37 m	5 d 18 h 54 m	1	43,772.93	1,517,512.32	76,140.80	76,849,858,661.14	
3	☐	I-476 S @ BALTIMORE PIKE/EXIT 3	4.27	3 h 26 m	4 d 07 h 14 m	0	26,374.41	912,152.99	40,168.62	46,968,581,531.79	
4	☐	I-76 W @ HOLLOW RD/EXIT 337	3.20	3 h 15 m	4 d 02 h 04 m	1	18,445.03	629,990.41	35,124.88	45,298,200,331.81	
5	☐	I-76 E @ SOUTH ST/EXIT 346	2.10	3 h 14 m	4 d 01 h 24 m	0	17,696.40	583,106.14	34,041.60	43,614,589,922.91	
6	☐	I-95 S @ PA-320/E 6TH ST/EXIT 6	1.13	6 h 14 m	7 d 19 h 30 m	2	16,242.07	593,885.00	29,154.33	40,185,822,342.67	
7	☐	I-76 W @ BELMONT AVE/EXIT 338	2.20	3 h 45 m	4 d 16 h 54 m	1	14,815.16	501,556.31	27,719.24	36,203,839,248.02	
8	☐	I-76 W @ MATSONFORD RD/EXIT 332	5.22	1 h 30 m	1 d 21 h 31 m	1	14,218.53	463,609.75	22,072.28	33,044,712,371.07	
9	☐	I-76 E @ SPRING GARDEN ST/EXIT 343	2.61	2 h 24 m	3 d 00 h 29 m	0	12,402.74	387,423.44	20,689.59	29,037,774,527.56	
10	☐	I-76 E @ US-30/US-13/GIRARD AVE/EXIT 342	1.91	3 h 29 m	4 d 09 h 03 m	0	12,282.67	388,039.31	19,663.64	28,664,075,616.21	

- Top 10 Interstate Bottlenecks in Pennsylvania (Nov. 2017)

Rank	Map	Head Location (approximate)
1	☐	I-95 S @ GIRARD AVE/EXIT 23
2	☐	I-76 E @ BELMONT AVE/EXIT 338
3	☐	I-476 S @ BALTIMORE PIKE/EXIT 3
4	☐	I-76 W @ HOLLOW RD/EXIT 337
5	☐	I-76 E @ SOUTH ST/EXIT 346
6	☐	I-95 S @ PA-320/E 6TH ST/EXIT 6
7	☐	I-76 W @ BELMONT AVE/EXIT 338
8	☐	I-76 W @ MATSONFORD RD/EXIT 332
9	☐	I-76 E @ SPRING GARDEN ST/EXIT 343
10	☐	I-76 E @ US-30/US-13/GIRARD AVE/EXIT 342

- Top Non-Philadelphia Area Interstate Bottlenecks (Nov. 2017)
  - #12: I-376 N @ Fort Pitt Tunnel
  - #19: I-376 W @ Squirrel Hill Tunnel
  - #31: I-83 S @ 2nd St/Exit 43
  - #32: I-376 E @ Squirrel Hill Tunnel
  - #33: I-83 N @ Union Deposit Road/Exit 48

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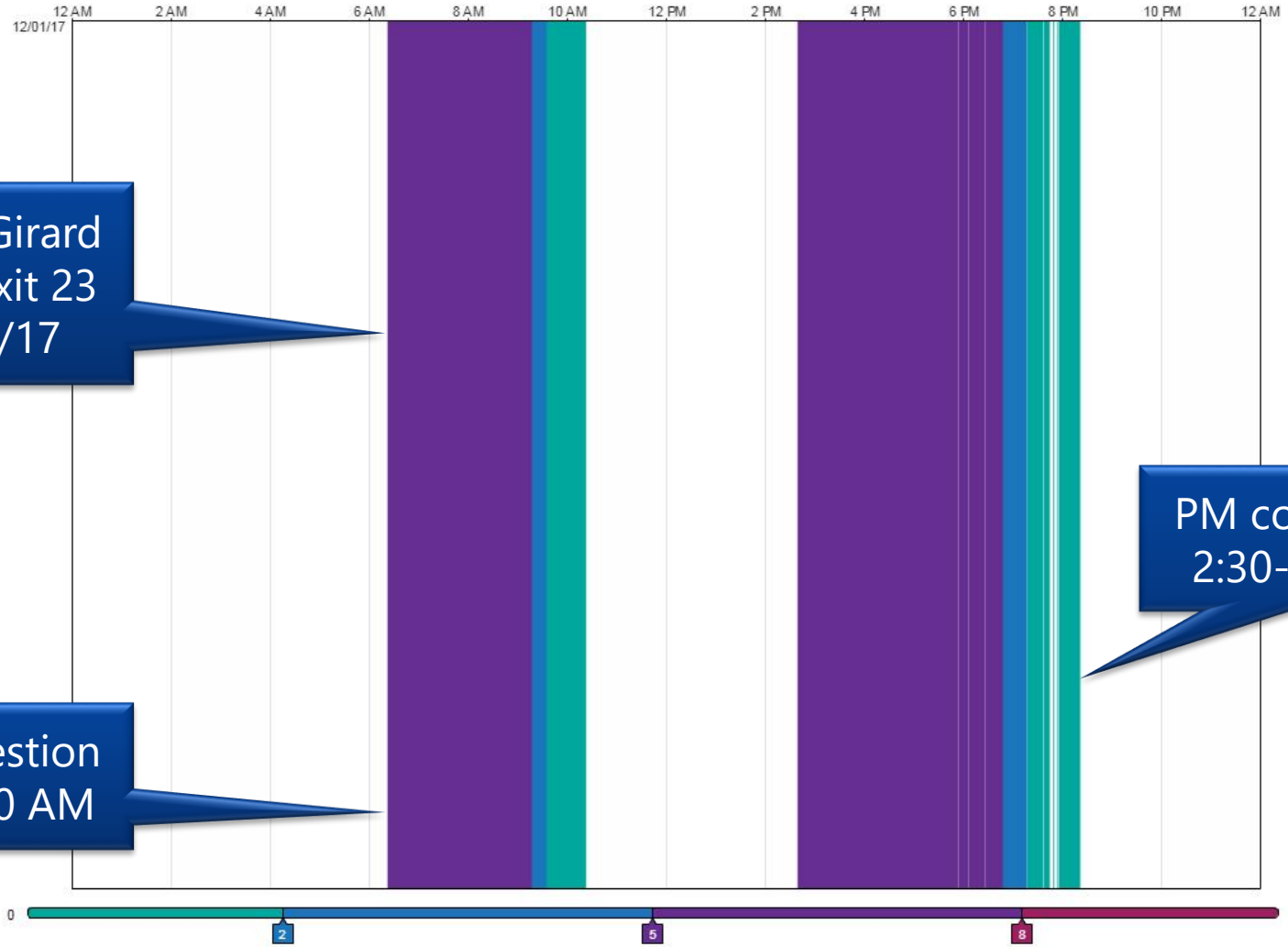
Bottleneck Ranking: Timeline



I-95 S @ Girard Avenue/Exit 23 on 12/1/17

PM congestion 2:30-8:30 PM

AM congestion 6:30-10:30 AM

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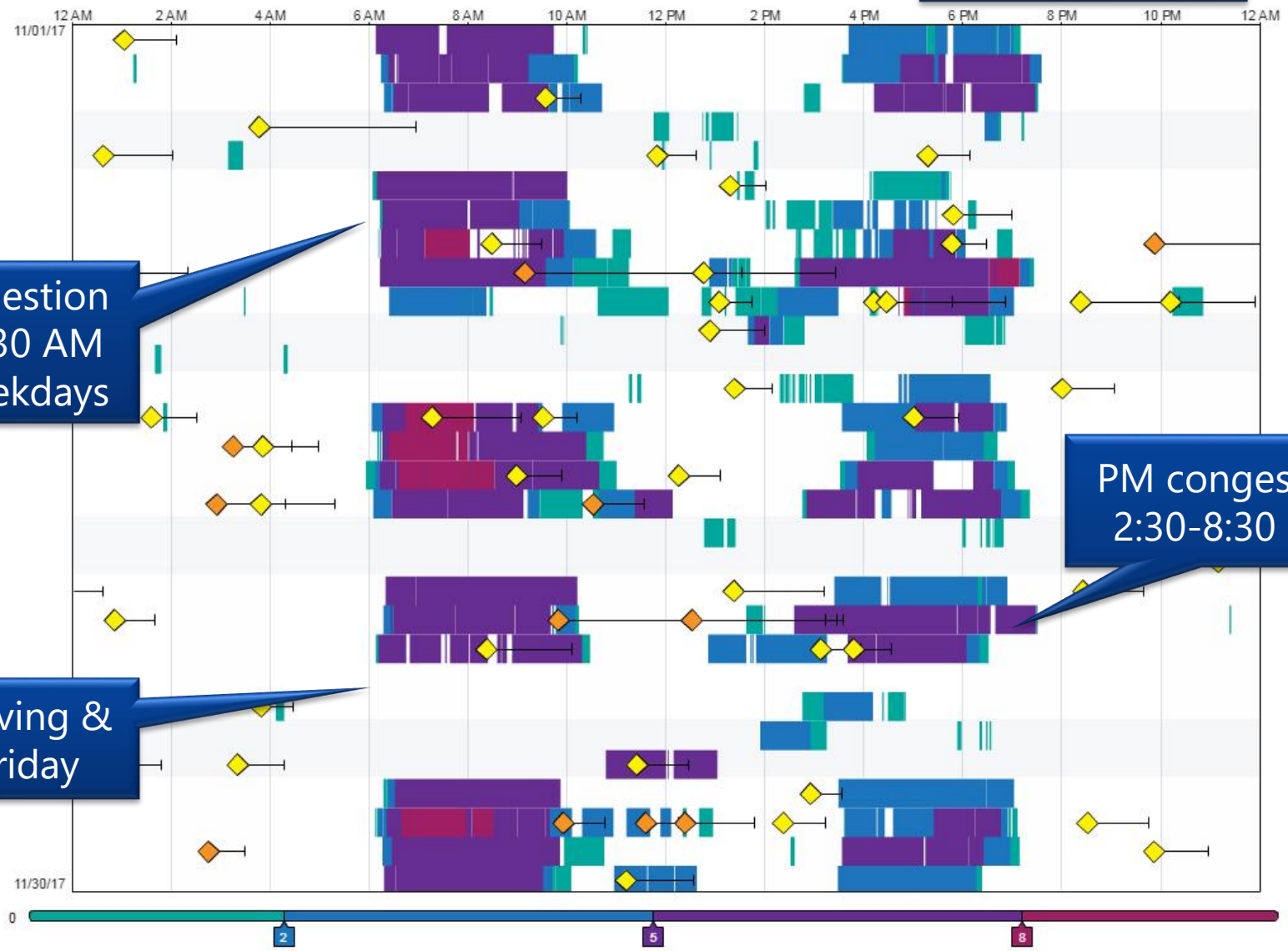
Bottleneck Ranking: Timeline

I-95 S @ Girard Avenue/Exit 23
Nov. 2017



AM congestion 6:30-10:30 AM most weekdays

PM congestion 2:30-8:30 PM

Thanksgiving & Black Friday

Bottleneck Ranking: Elements Table

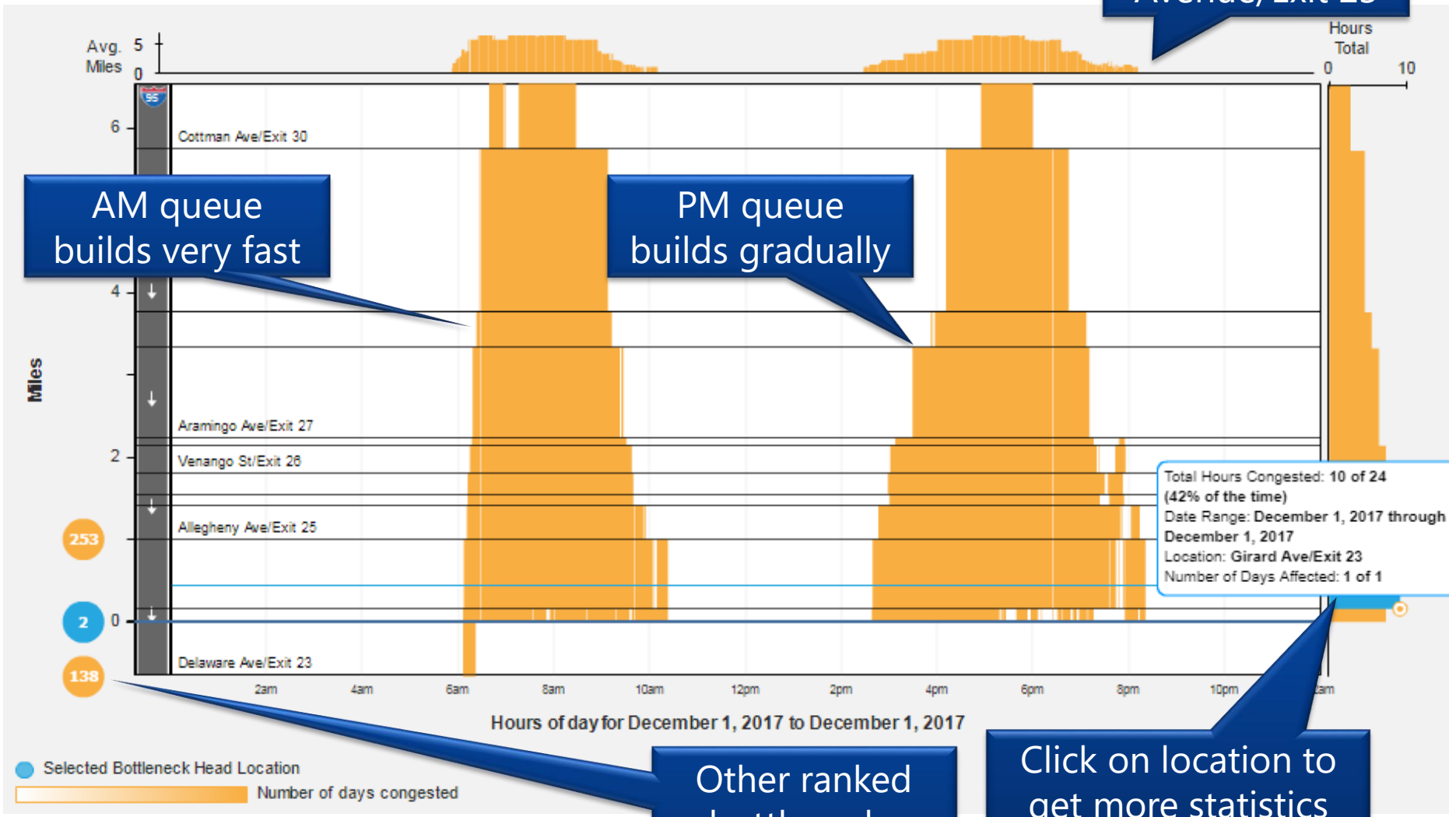
- This can also be exported to Excel

I-95 S @ Girard Avenue/Exit 23

Start time	End time	Duration	Max length (miles)	Impact	All events/incidents
Fri, Dec 1, 2017 6:21 AM	Fri, Dec 1, 2017 7:32 AM	1 h 11 m	6.55	421.10	0
Fri, Dec 1, 2017 7:32 AM	Fri, Dec 1, 2017 7:33 AM	1 m	6.39	6.39	0
Fri, Dec 1, 2017 7:33 AM	Fri, Dec 1, 2017 7:50 AM	17 m	6.55	111.34	0
Fri, Dec 1, 2017 7:50 AM	Fri, Dec 1, 2017 7:54 AM	4 m	6.39	25.56	0
Fri, Dec 1, 2017 7:54 AM	Fri, Dec 1, 2017 8:00 AM	6 m	6.55	39.30	0
Fri, Dec 1, 2017 8:00 AM	Fri, Dec 1, 2017 8:01 AM	1 m	6.39	6.39	0
Fri, Dec 1, 2017 8:01 AM	Fri, Dec 1, 2017 8:40 AM	39 m	6.55	245.09	0
Fri, Dec 1, 2017 8:40 AM	Fri, Dec 1, 2017 8:41 AM	1 m	5.60	5.60	0
Fri, Dec 1, 2017 8:41 AM	Fri, Dec 1, 2017 9:16 AM	35 m	5.75	181.87	0
Fri, Dec 1, 2017 9:16 AM	Fri, Dec 1, 2017 9:17 AM	1 m	3.18	3.18	0
Fri, Dec 1, 2017 9:17 AM	Fri, Dec 1, 2017 9:34 AM	17 m	3.34	45.41	0
Fri, Dec 1, 2017 9:34 AM	Fri, Dec 1, 2017 9:37 AM	3 m	1.99	5.98	0
Fri, Dec 1, 2017 9:37 AM	Fri, Dec 1, 2017 10:22 AM	45 m	1.81	47.78	0
Fri, Dec 1, 2017 2:38 PM	Fri, Dec 1, 2017 5:18 PM	2 h 40 m	6.55	642.15	0
Fri, Dec 1, 2017 5:18 PM	Fri, Dec 1, 2017 5:20 PM	2 m	6.39	12.78	0
Fri, Dec 1, 2017 5:20 PM	Fri, Dec 1, 2017 5:22 PM	2 m	6.55	13.10	0
Fri, Dec 1, 2017 5:22 PM			6.39	6.39	0
Fri, Dec 1, 2017 5:23 PM			6.55	19.65	0
Fri, Dec 1, 2017 5:26 PM			6.39	83.08	0
Fri, Dec 1, 2017 5:39 PM			6.55	91.69	0

Each line represents a time when speed dropped below 60% of free flow or queue length changed

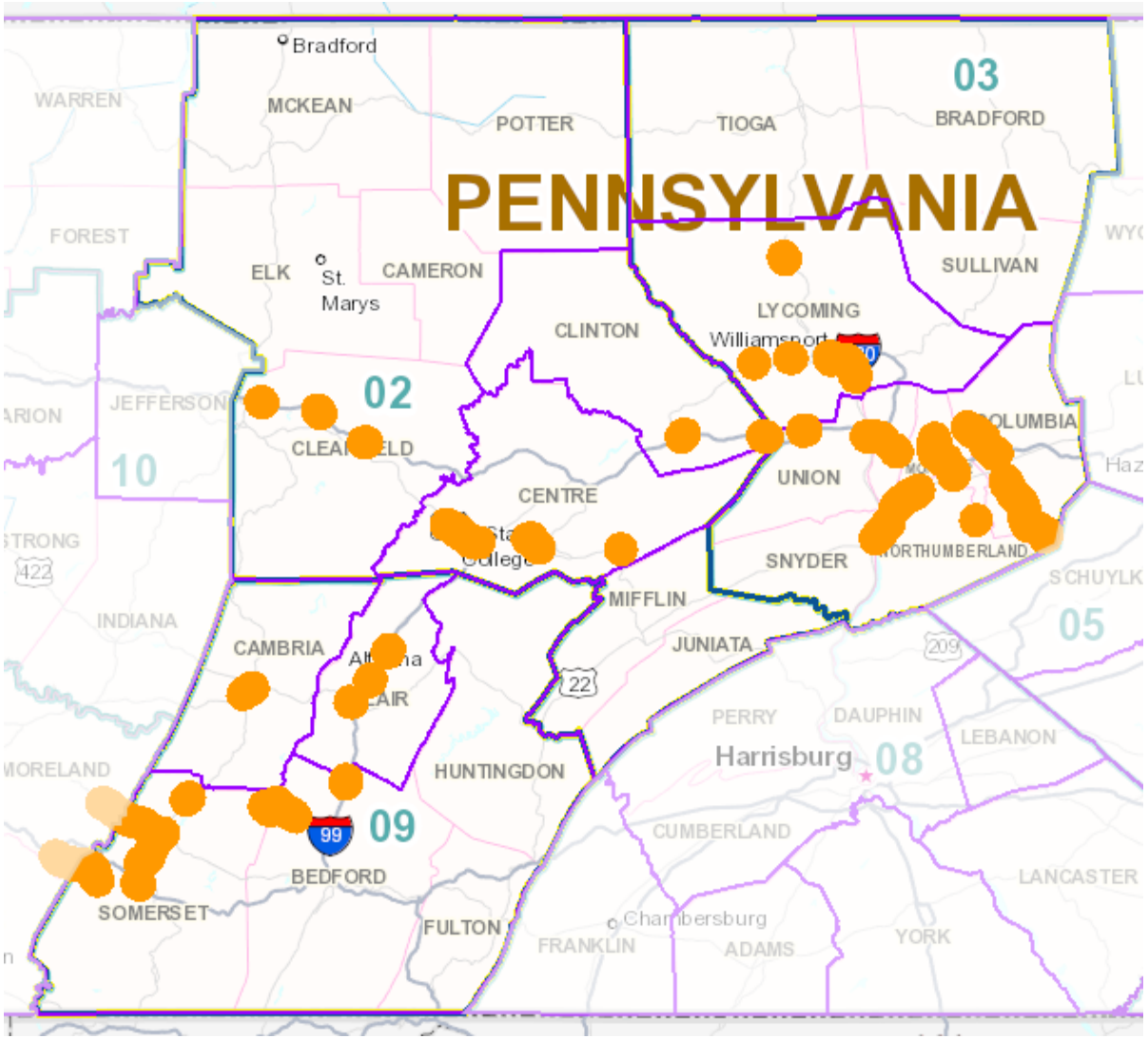
Bottleneck Ranking: Elements Graph



pennsylvania
DEPARTMENT OF TRANSPORTATION

PennDOT Implementation: Top-Ranked Bottlenecks

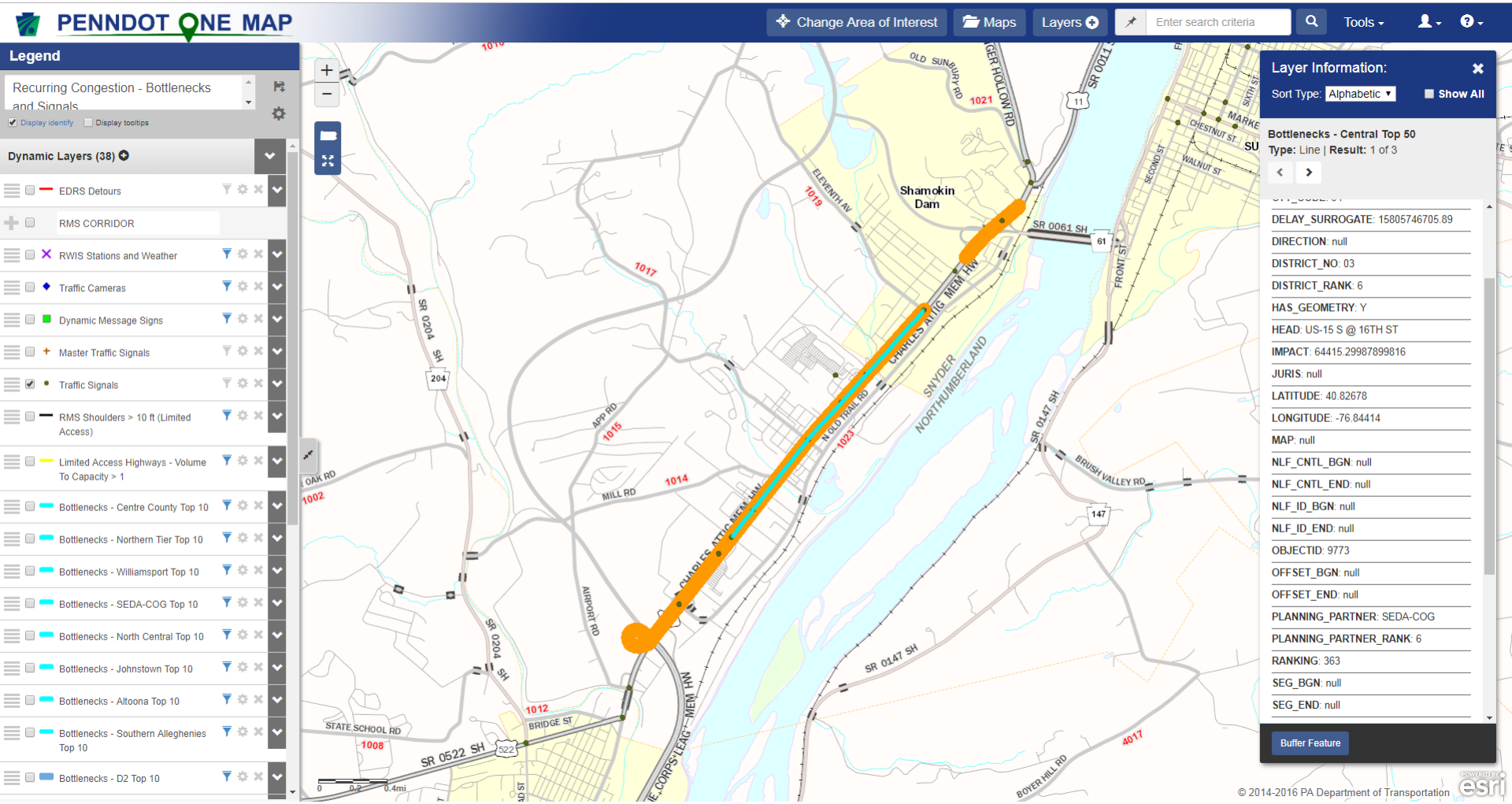
- Central Region (Districts 2, 3, 9)
- Top 50 Bottlenecks ranked by Total Delay



Source: http://onemap.penndot.gov/, Recurring Congestion Basemap

pennsylvania
DEPARTMENT OF TRANSPORTATION

Mapping: Local View of Top Ranked Bottlenecks



pennsylvania
DEPARTMENT OF TRANSPORTATION

Mapping to Solve Congestion

- Identify congestion using bottlenecks from PDA Suite
- Classify congestion with layers of potential causes
  - Traffic Signal Locations
  - Crash clusters (indicator of incident-caused congestion)
  - Weather data (flooding, winter restrictions)
  - Construction projects (indicator of work-zone congestion)
- Mitigate considering potential solutions
  - Locations of existing ITS devices
  - Locations with wide shoulders (candidates for hard shoulder running)

PDA Suite API

- Anything which can be generated by the PDA Suite User Interface can be automated through API
- Requests & responses use JSON format with an API Key assigned by UMD that is tied to a RITIS login


```
"id": "G__2159512",
"impact": 390221.73192599975,
"impactPercent": 2.0538367764944407E8,
"impactSpeedDiff": 1.2839190076595997E7,
"totalDuration": 46058.0,
"averageDuration": 225.77450980392157,
"averageDurationPerDay": 125.49863760217984,
"averageMaxLength": 6.0007840294117605,
"headLocation": "PA-477 N @ US-220",
"geometry": "-77.47788 41.08691,-77.477 41.08
41.08683,-77.47395 41.08667,-77.47368 41.0866
41.08602,-77.47187 41.08598,-77.47174 41.0859
41.08543,-77.46971 41.08518,-77.46945 41.0850
41.08477,-77.46822 41.08481,-77.46813 41.0848
41.08576,-77.46639 41.08587,-77.46631 41.0859
41.08582,-77.46565 41.08573,-77.46551 41.0856
"headGeometry": "-77.47788 41.08691",
"state": null,
"tmcs": ["103P17360", "103+17360", "103P17359"],
"volumeEstimate": 0,
"delaySurrogate": 0.0
```

PDA Suite APIs Available

- Segment Search
  - Determine TMCs which meet defined criteria (state, county, road type, road name, etc.)
- Bottleneck Search
  - Returns Bottlenecks
  - Can also request the elements associated with each bottleneck
- Jobs (submit request, check status, then request results)
  - Export (massive data downloader)
  - Performance Metrics
  - User Delay Cost

PDA Suite API: Bottlenecks

Example Bottleneck Data


```
"id": "G__2159927",
"impact": 14673.715390999972,
"impactPercent": 19322.120737999998,
"impactSpeedDiff": 457396.20020300016,
"totalDuration": 2653.95,
"averageDuration": 7.4549157303370785,
"averageDurationPerDay": 7.231471389645776,
"averageMaxLength": 5.567096648876389,
"headLocation": "I-99 N @ ATHERTON ST/GRAYS WOODS
BLVD/28TH DIVISION HWY",
"geometry": "-77.93855 40.81776,-77.93938
40.81799,-77.93988 40.81812,-77.94026 40.81823,...
"headGeometry": "-77.93855 40.81776",
"state": null,
"tmcs": ["103P14825", "103+14825", "103P15511",
"103+15511", "103P14824", "103+14824", "104+11701",
"104P04897", "104+04897", "104P04896", "104+04896",
"104P04895", "104+04895"],
"volumeEstimate": 9070,
"delaySurrogate": 4.1485835358412113E9
```


Example Bottleneck Element


```
"startTime": 1452639644,
"endTime": 1452640221,
"impact": 79.395101,
"impactPercent": 103.819355,
"impactSpeedDiff": 2012.071281,
"maxQueueLength": 8.958403,
"tmcs": ["103+06809", "103P07209"]
```

PDA Suite API: Performance Measures


```
"tmcGroupIndex": 165,
"periodId": 0,
"timeRangeIndex": 0,
"interval": 0,
"intervalString": null,
"requestIntervalIndex": 0,
"period": "January 01, 2016 through January 01,
2017",
"timeRange": "0-1440",
"tmcGroupAlias": "104P04850",
"speed": 67.27223156909943,
"averageSpeed": 66.21899337851922,
"referenceSpeed": 67.209296834809,
"length": 0.700397,
"bufferIndex": 0.034671771539362635,
"bufferTime": 0.02200335903511254,
"planningTimeIndex": 1.0501452630438903,
"planningTime": 0.6566221875,
"travelTimeIndex": 0.9990644767860006,
"travelTime": 0.6246830084242823,
"congestion": 100.0,
"averageCongestion": 98.52653798964181,
"compSpeed": 100.0,
"percentile95": 64.0,
"travelTimePercentiles": {
          "85": 0.6367245454545455,
          "95": 0.6566221875 },
"speedPercentiles": {
          "85": 71.0,
          "95": 73.0 },
"compSpeedPercentiles": {
          "85": 100.0,
          "95": 100.0 },
"bufferIndexPercentiles": {
          "85": 0.003318081492715282,
          "95": 0.034671771539362635 },
"bufferTimePercentiles": {
          "85": 0.002105716989657997,
          "95": 0.02200335903511254 },
"planningTimeIndexPercentiles": {
          "85": 1.0183226793152877,
          "95": 1.0501452630438903 },
"planningTimePercentiles": {
          "85": 0.6367245454545455,
          "95": 0.6566221875 },
"travelTimeIndexPercentiles": {
          "85": 1.0183226793152877,
          "95": 1.0501452630438903 },
"congestionPercentiles": {
          "85": 100.0,
          "95": 100.0 },
```

PDA Suite API: User Delay Cost

Daily


```
"daily_totals": {
"commercial": {
        "volume": 523056.025360,
        "delay_cost_per_vmt": 0.020683,
        "delay_person_hours": 176.379462,
        "delay_cost": 17724.372179,
        "delay_vehicle_hours": 176.379462,
        "cdi": 0.01234907,
        "vmt": 856968.865854
},
"passenger": {
        [same data format]
},
"combined": {
        "volume": 5230560.253603,
        "coverage": 100.00,
        "expected_weight": 1560926.688480,
        "delay_cost_per_vmt": 0.005386,
        "delay_person_hours": 2160.648415,
        "delay_cost": 53262.629114,
        "delay_vehicle_hours": 1763.794624,
        "cdi": 0.01234907,
        "vmt": 8569688.658536,
        "expected_received_weight": 0.000000
},
"date": "January 01, 2016"
```


Hourly


```
"commercial": {
        "volume": 21794.000000,
        "delay_cost_per_vmt": 0.026065,
        "delay_person_hours": 9.261554,
        "delay_cost": 930.693585,
        "delay_vehicle_hours": 9.261554,
        "cdi": 0.01556257,
        "vmt": 35707.029619 },
"passenger": {
        [same data format] },
“combined": {
        "volume": 217940.000000,
        "coverage": 100.00,
        "expected_weight": 65038.612020,
        "delay_cost_per_vmt": 0.006787,
        "delay_person_hours": 113.454039,
        "delay_cost": 2796.780995,
        "delay_vehicle_hours": 92.615542,
        "cdi": 0.01556257,
        "vmt": 357070.296188,
        "expected_received_weight":
0.000000
},
"date": "January 01, 2016 00:00:00",
"hour": 0
```

PROBE DATA ANALYTICS SUITE

Pause for Q&A

Feature spotlight…

What's New in the Bottleneck Ranking Tool

Mark Franz, PhD
UMD CATT Lab
Lead Transportation Analyst

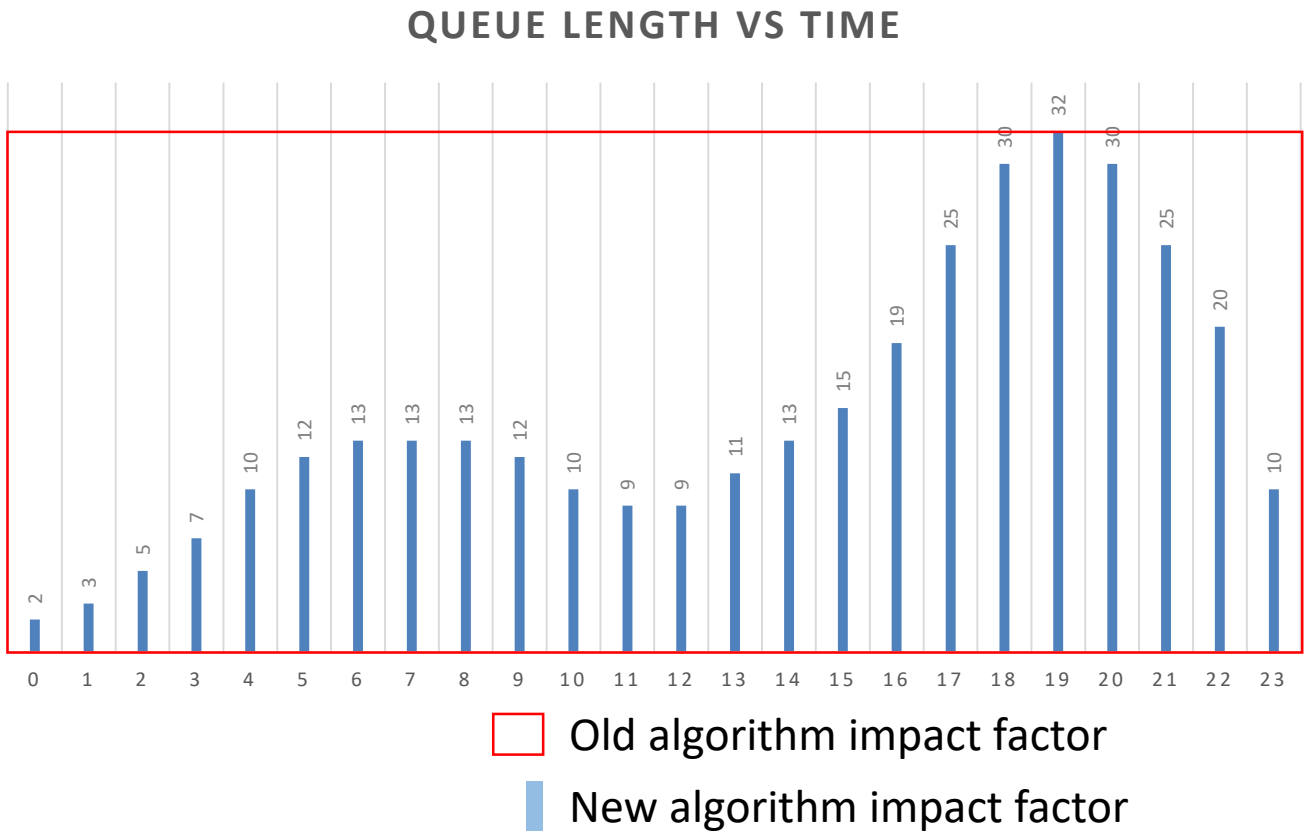
What’s new in bottleneck ranking?

- New bottleneck algorithm
- New bottleneck ranking table and metrics
- New data visualizations

New Algorithm vs Old Algorithm

Advantages of New Algorithm

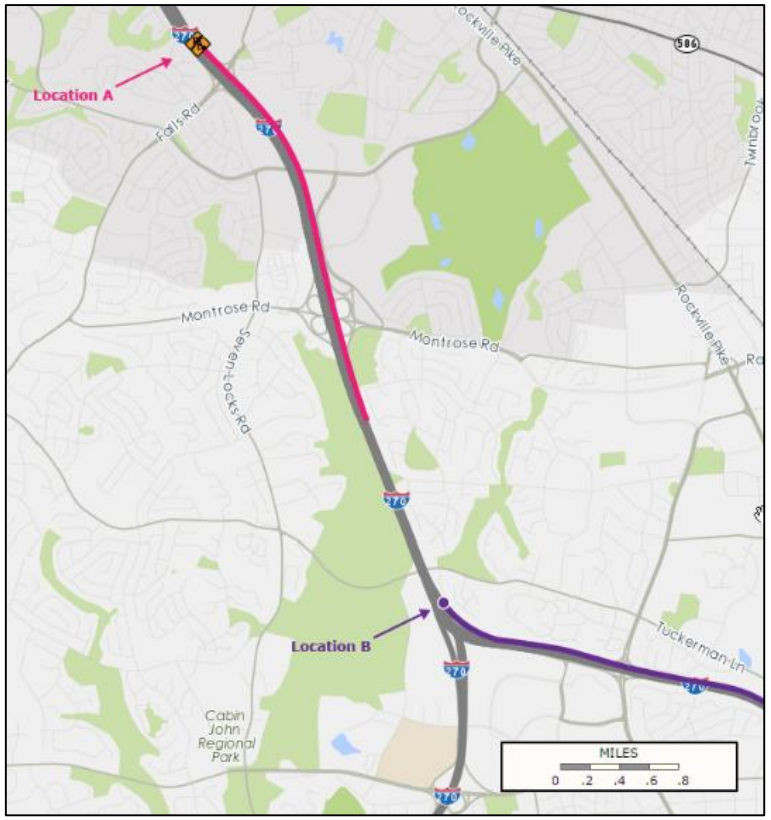
1. Estimates queue lengths at each time interval

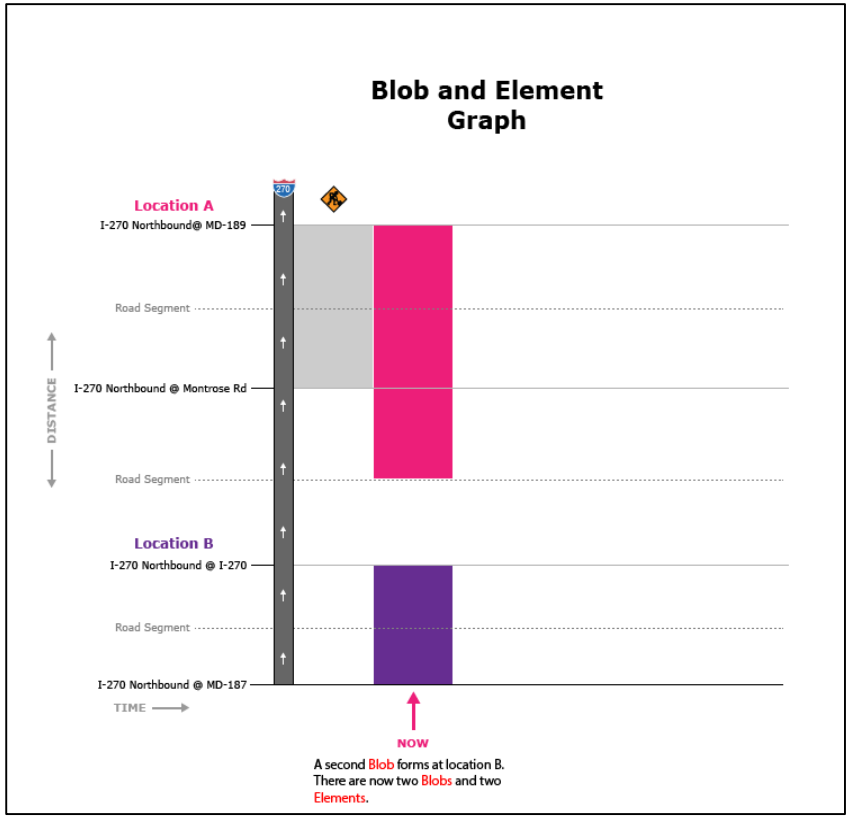


New Algorithm vs Old Algorithm

Advantages of New Algorithm

2. Considers evolution of congestion



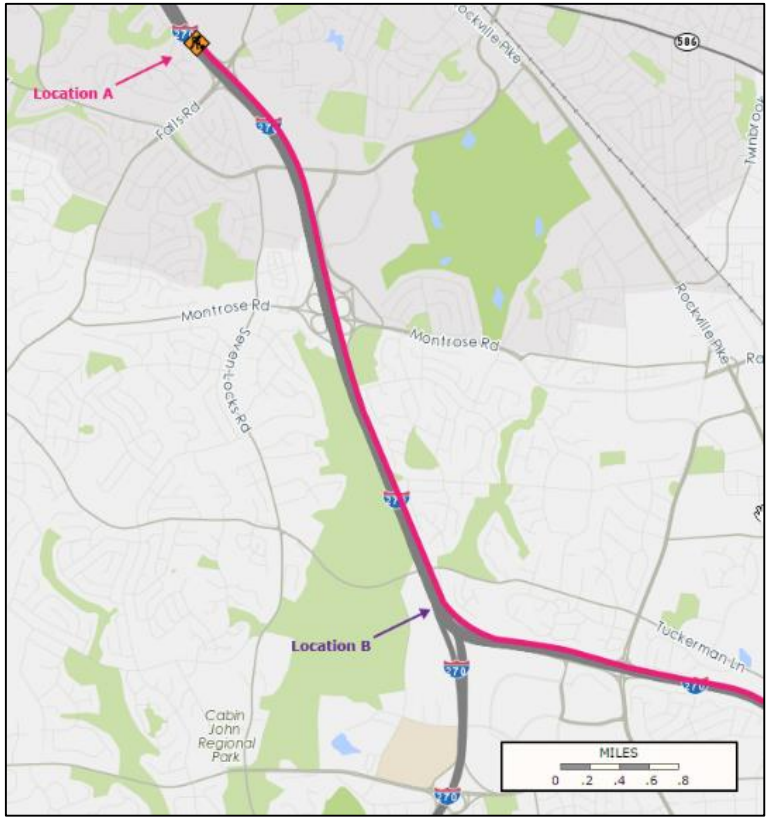


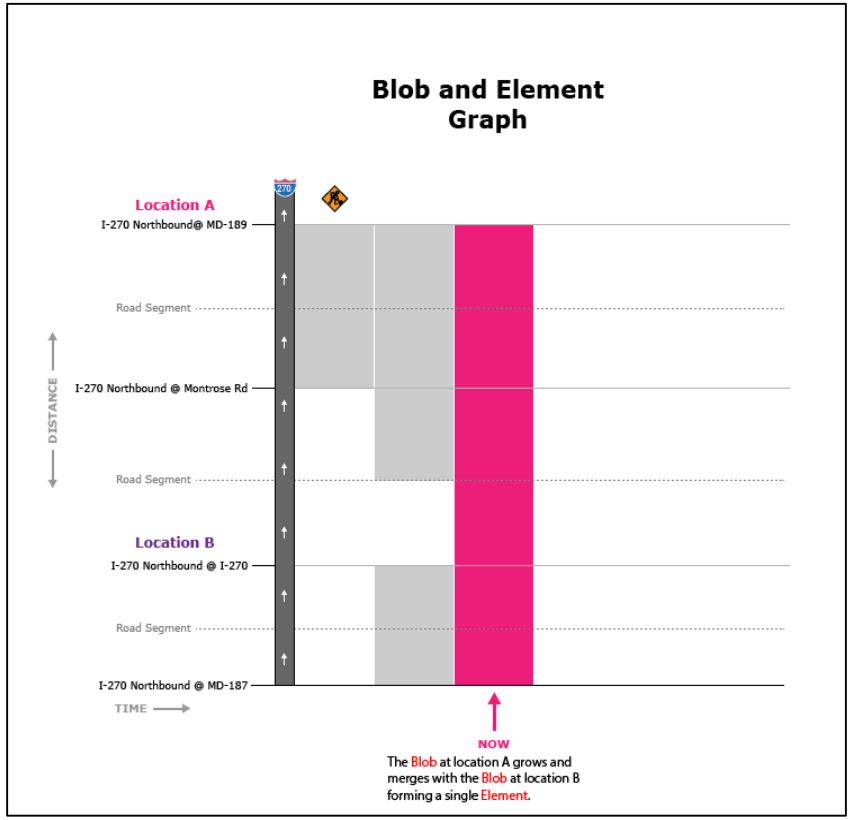
Time A

New Algorithm vs Old Algorithm

Advantages of New Algorithm

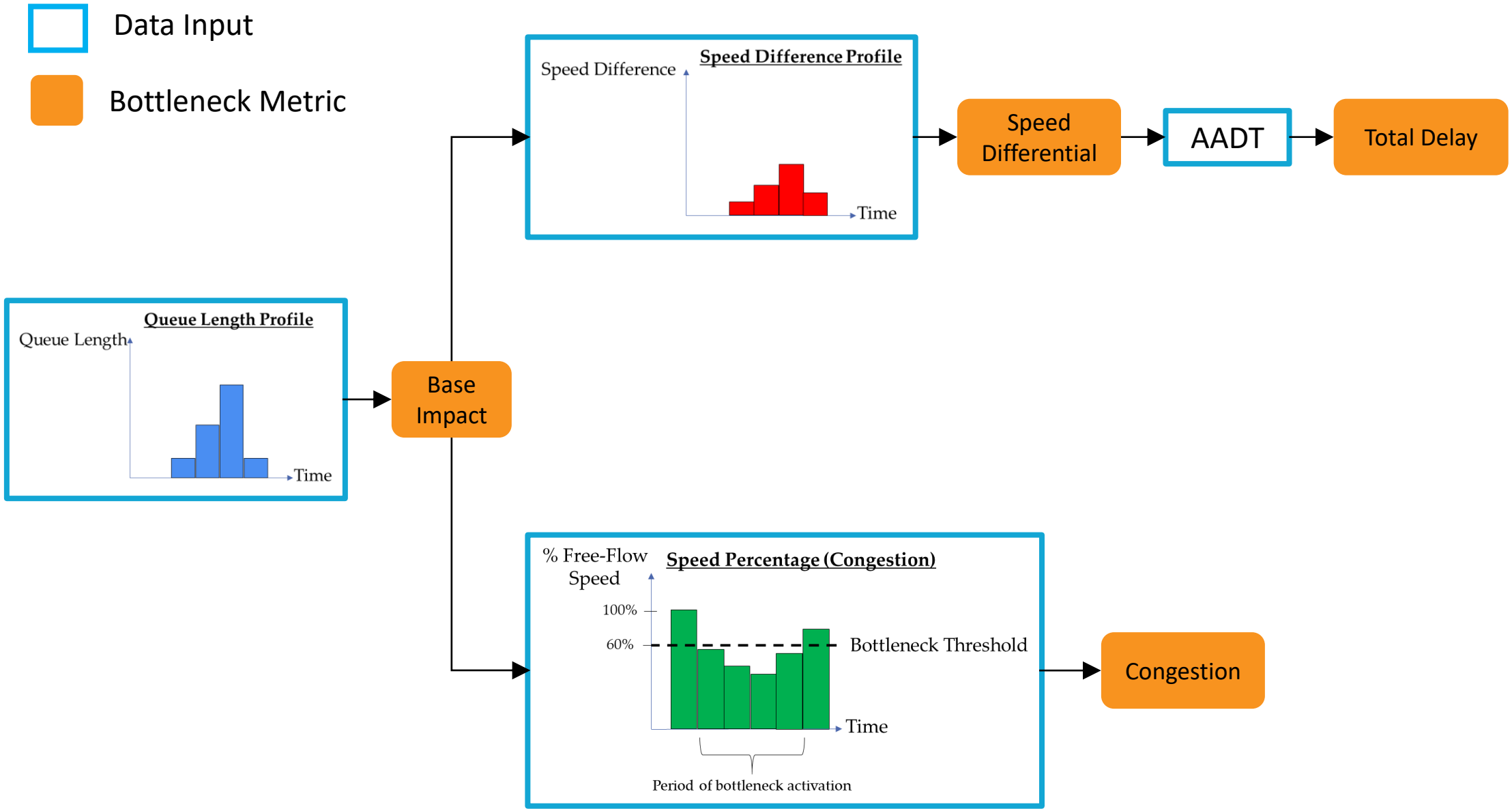
2. Considers evolution of congestion





Time B

New Bottleneck Table and Metrics



New Bottleneck Table and Metrics

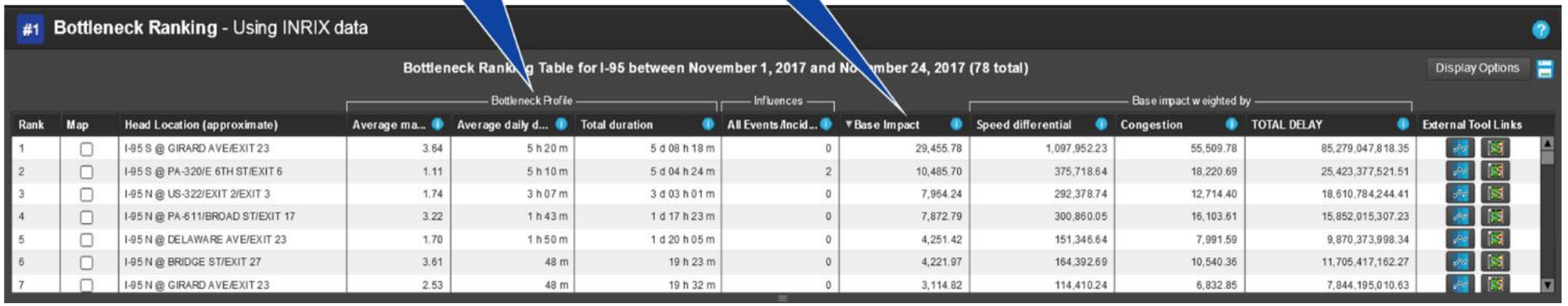
Bottleneck Ranking table changes

Bracketed Results Groupings

Base Impact

Base impact weighted by:

- Magnitude of Speed Drops
- Severity of Congestion
- Estimated Total Delay
- Link to External Tools



#1 **Bottleneck Ranking** - Using INRIX data

Bottleneck Ranking Table for I-95 between November 1, 2017 and November 24, 2017 (78 total)

Display Options

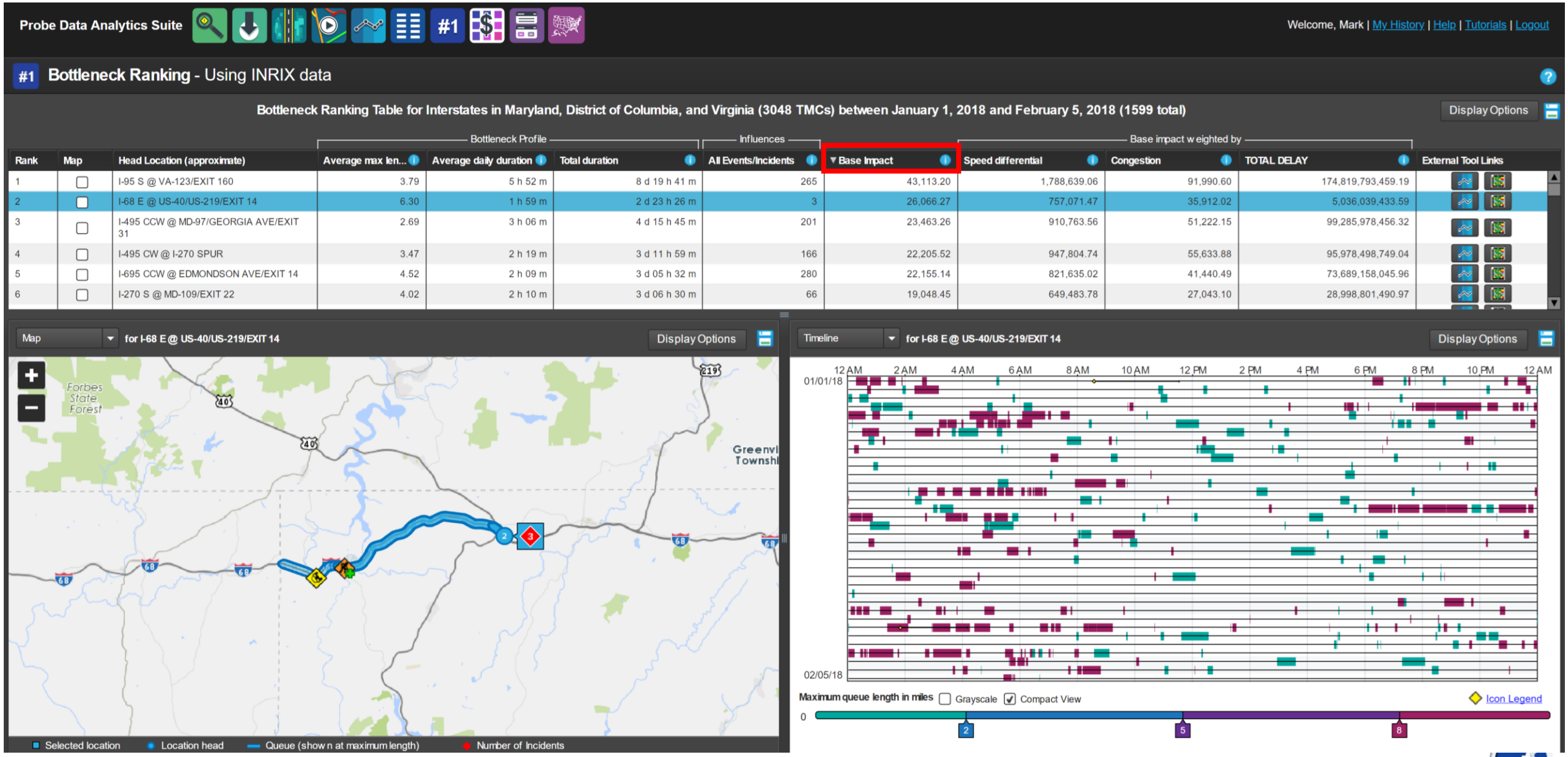
			Bottleneck Profile			Influences		Base impact weighted by			
Rank	Map	Head Location (approximate)	Average ma...	Average daily d...	Total duration	All Events/Incid...	▼Base Impact	Speed differential	Congestion	TOTAL DELAY	External Tool Links
1	☐	I-95 S @ GIRARD AVE/EXIT 23	3.64	5 h 20 m	5 d 08 h 18 m	0	29,455.78	1,097,952.23	55,509.78	85,279,047,818.35	
2	☐	I-95 S @ PA-320/E 6TH ST/EXIT 6	1.11	5 h 10 m	5 d 04 h 24 m	2	10,485.70	375,718.64	18,220.69	25,423,377,521.51	
3	☐	I-95 N @ US-322/EXIT 2/EXIT 3	1.74	3 h 07 m	3 d 03 h 01 m	0	7,964.24	292,378.74	12,714.40	18,610,784,244.41	
4	☐	I-95 N @ PA-611/BROAD ST/EXIT 17	3.22	1 h 43 m	1 d 17 h 23 m	0	7,872.79	300,860.05	16,103.61	15,852,015,307.23	
5	☐	I-95 N @ DELAWARE AVE/EXIT 23	1.70	1 h 50 m	1 d 20 h 05 m	0	4,251.42	151,346.64	7,991.59	9,870,373,998.34	
6	☐	I-95 N @ BRIDGE ST/EXIT 27	3.61	48 m	19 h 23 m	0	4,221.97	164,392.69	10,540.36	11,705,417,162.27	
7	☐	I-95 N @ GIRARD AVE/EXIT 23	2.53	48 m	19 h 32 m	0	3,114.82	114,410.24	6,832.85	7,844,195,010.63	

Use Case: DC, MD, VA Interstate Bottlenecks

For Jan 1- Feb 5, 2018:

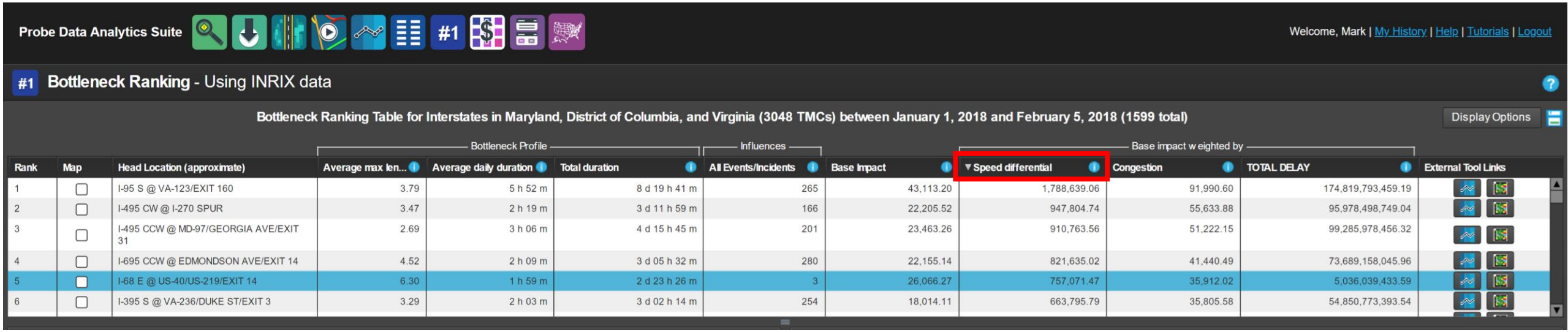
- Bottleneck ranking from the individual driver's perspective
- Bottleneck ranking considering total delay (cost to society)

Use Case: DC, MD, VA Interstate Bottlenecks



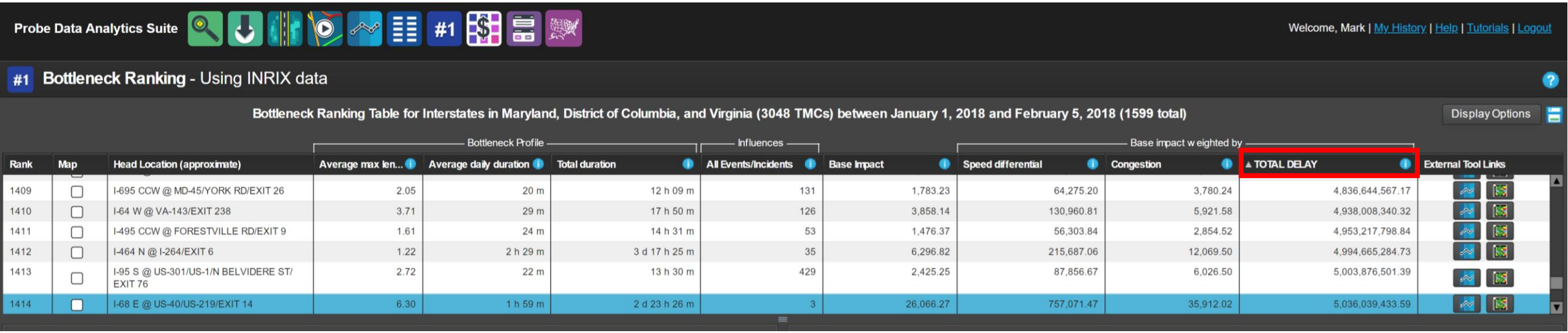
Use Case: DC, MD, VA Interstate Bottlenecks

- What is the worst bottleneck from the individual driver's perspective?



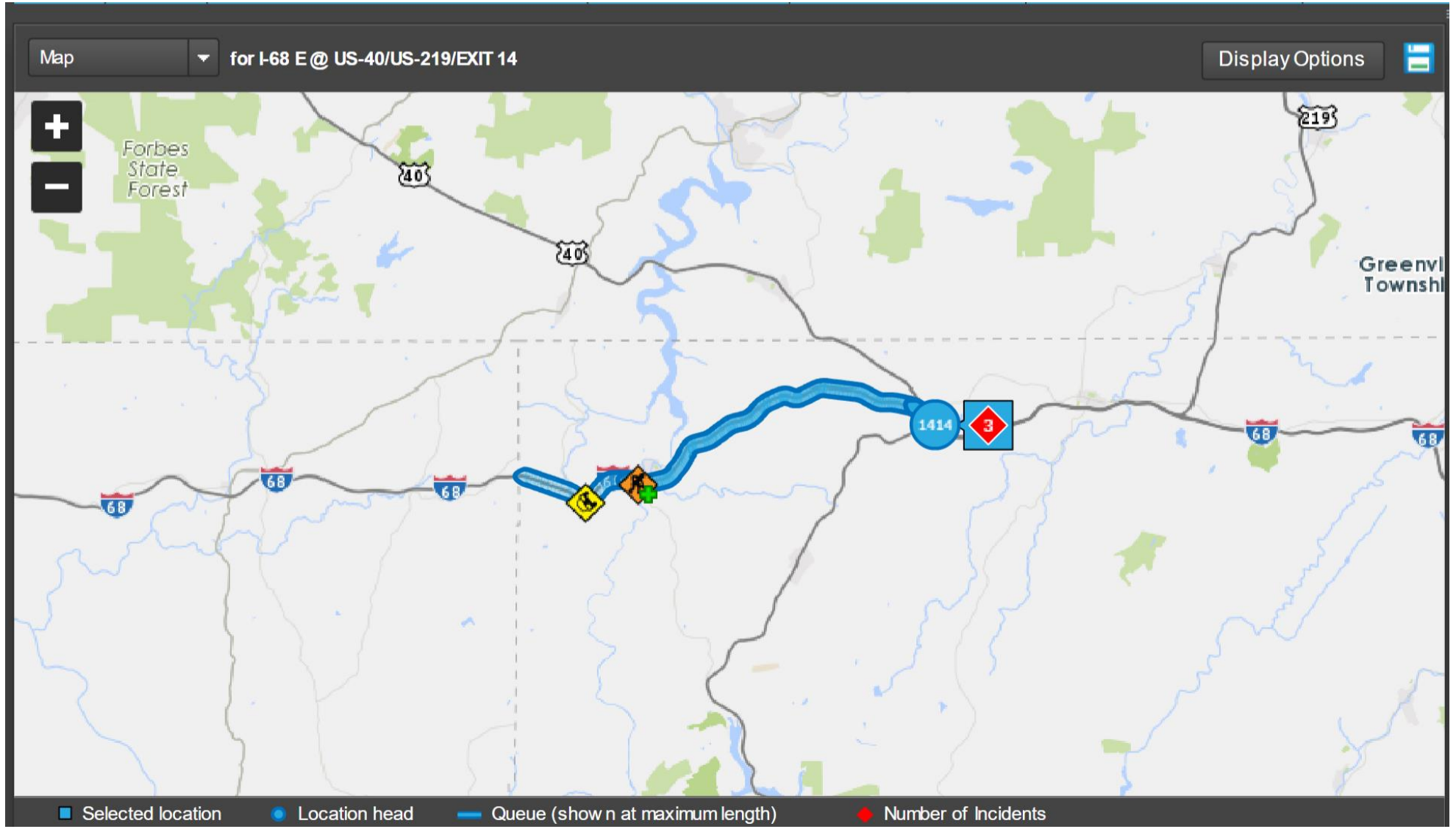
Use Case: DC, MD, VA Interstate Bottlenecks

- What bottleneck causes the most total delay (cost to society)?



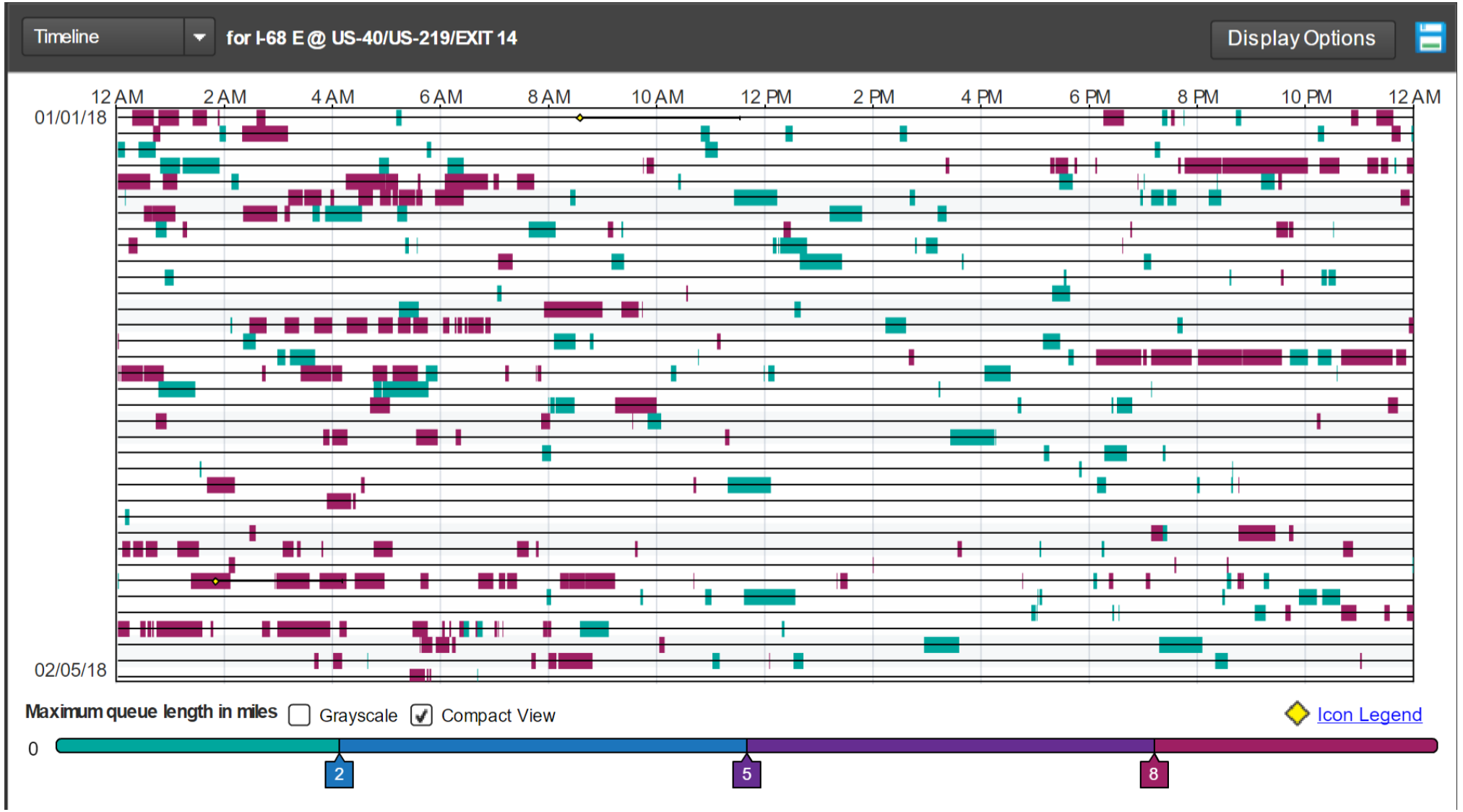
Use Case: DC, MD, VA Interstate Bottlenecks

- Data Visualizations: Map View



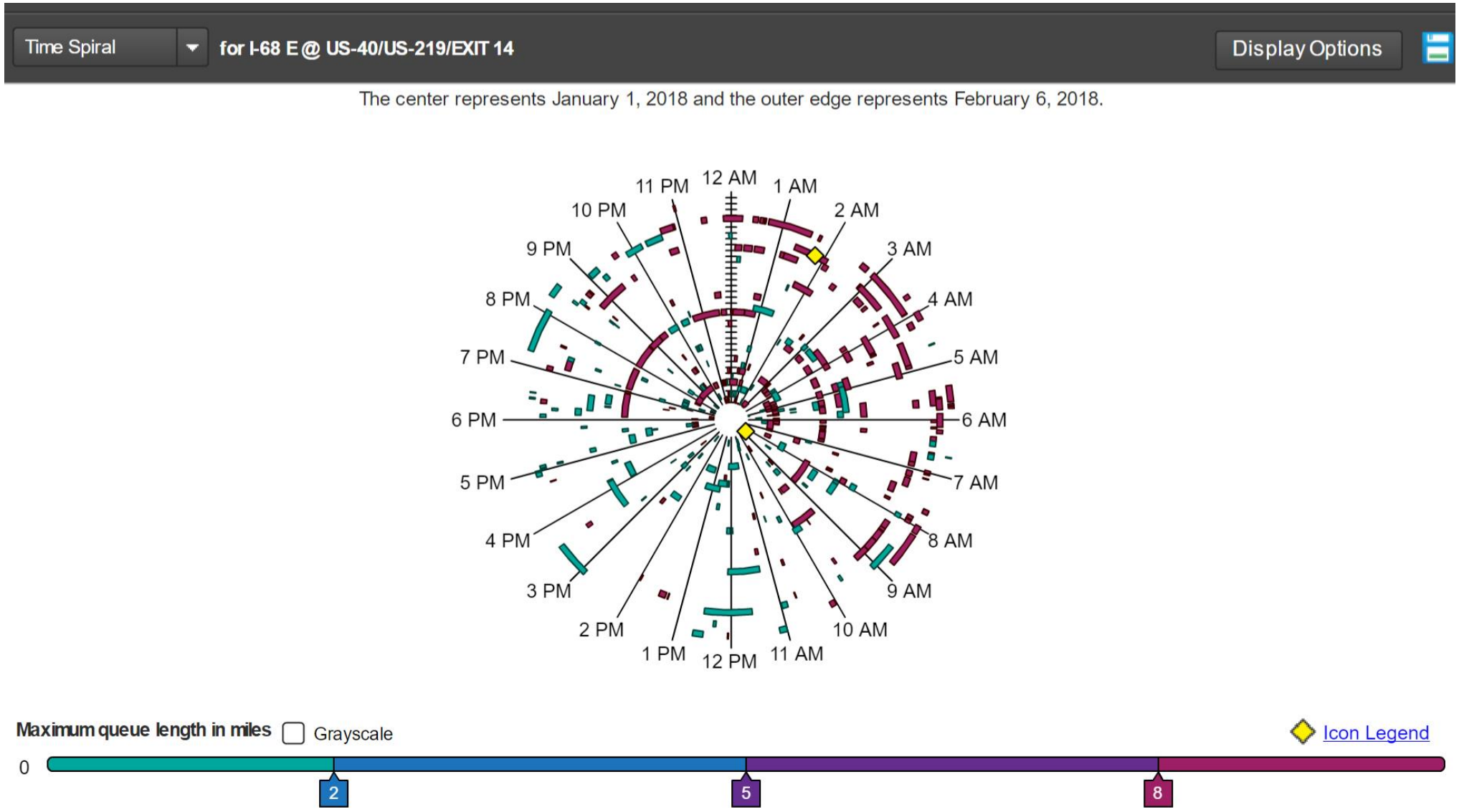
Use Case: DC, MD, VA Interstate Bottlenecks

- Data Visualizations: Timeline Chart



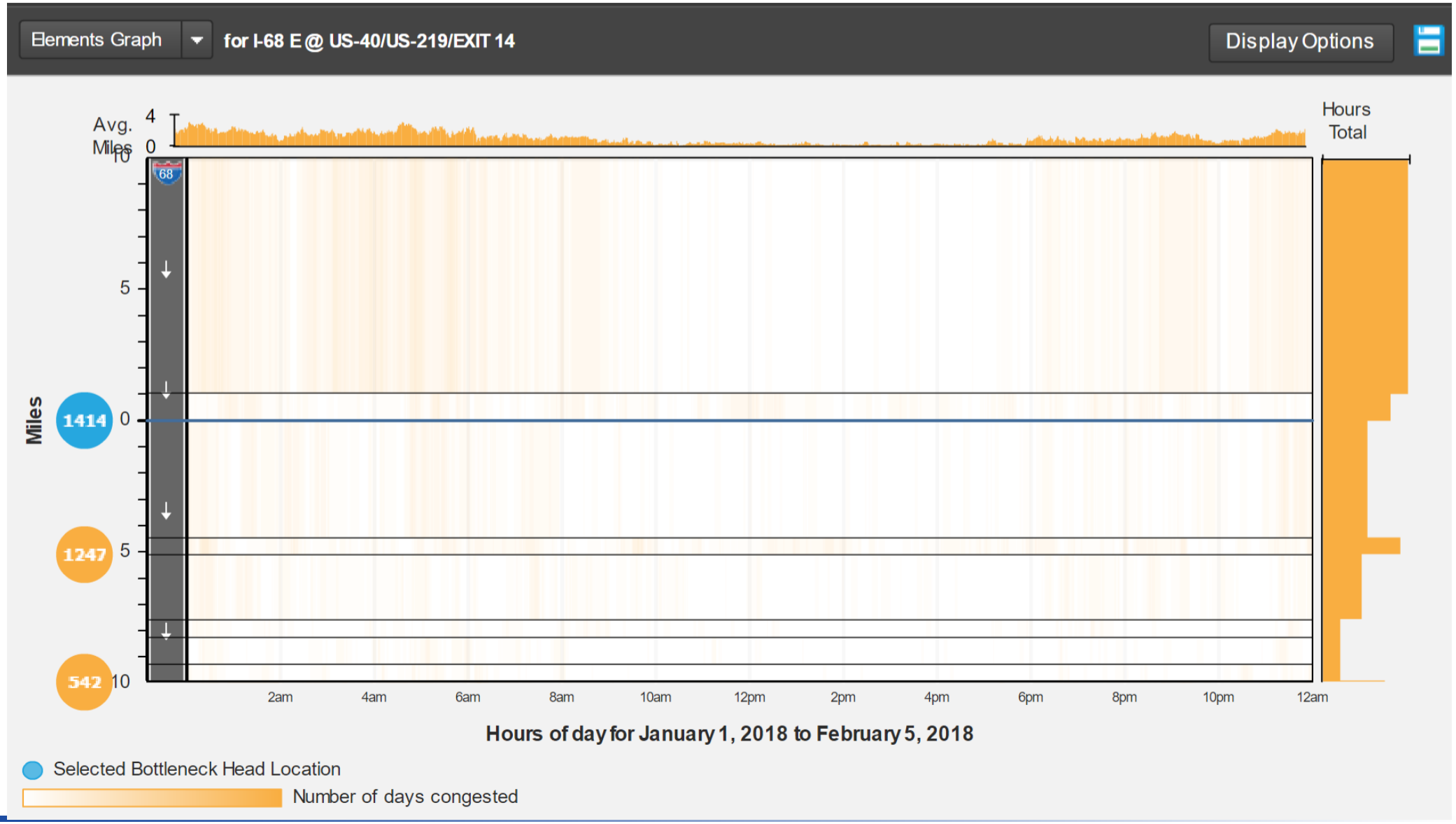
Use Case: DC, MD, VA Interstate Bottlenecks

- Data Visualizations: Time Spiral



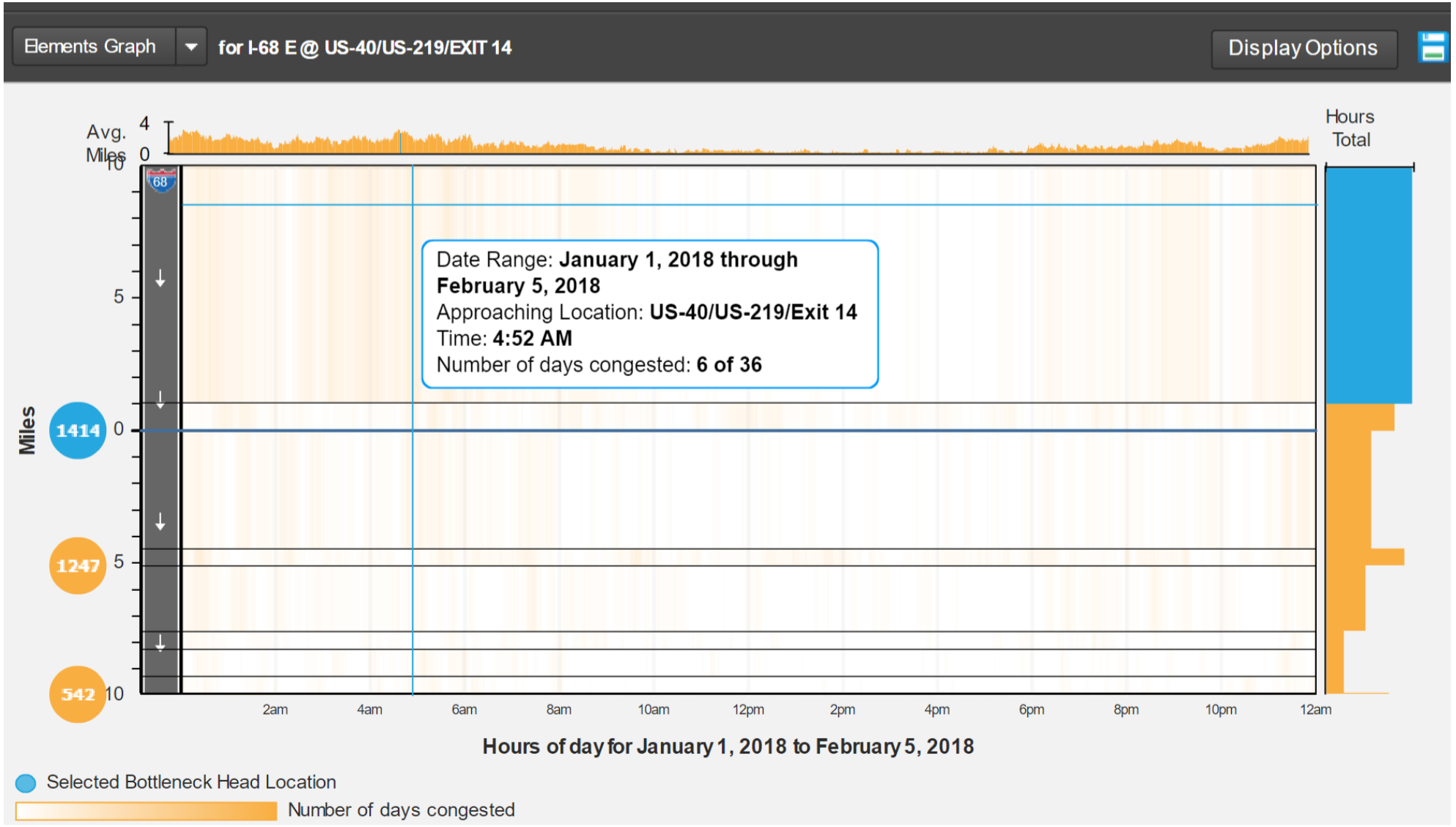
Use Case: DC, MD, VA Interstate Bottlenecks

- Data Visualizations: Elements Chart



Use Case: DC, MD, VA Interstate Bottlenecks

- Data Visualizations: Elements Chart



PROBE DATA ANALYTICS SUITE

Pause for Q&A

PROBE DATA ANALYTICS SUITE

Coming soon…

PROBE DATA ANALYTICS SUITE

OD Analytics




BMC Planning Model Suite

Trips that travelled on the selected road segments

Currently using the BMC Base Scenario Data Set | Switch Data Set

Map Controls | Tour Filters | Time Range

Road Selection

69

Geographic resolution

County

Show the...

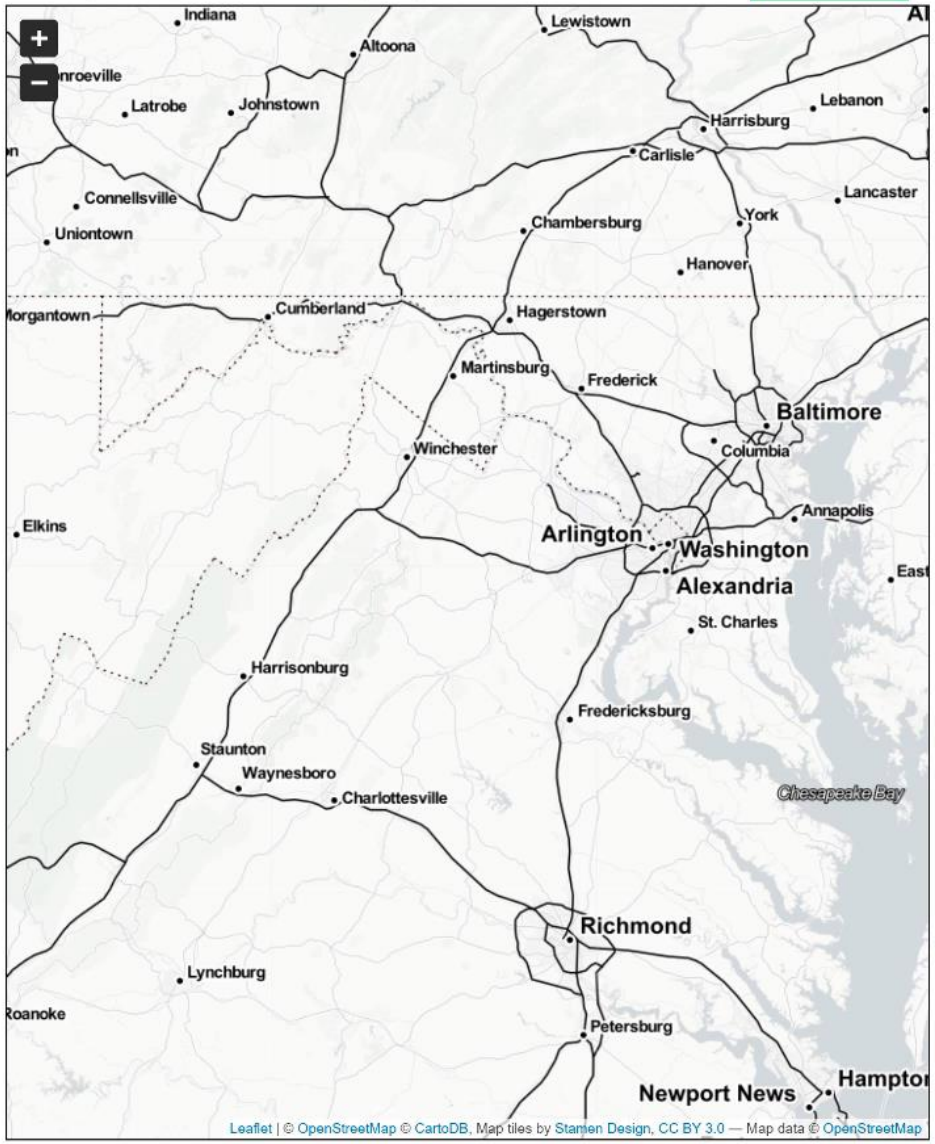
- (•) Origins of trips passing through selected road segment
- ( ) Destinations of trips passing through the selected road segment

Data appearance

- [ ] Show values on map

Number of trip origins

View Matrix | Submit



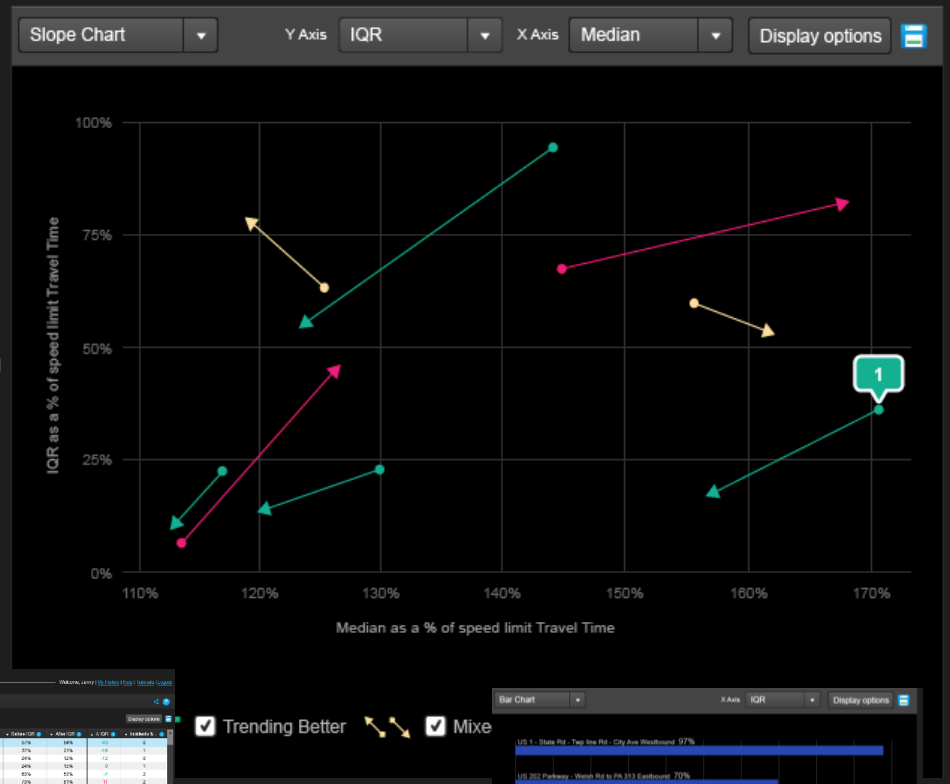
PROBE DATA ANALYTICS SUITE

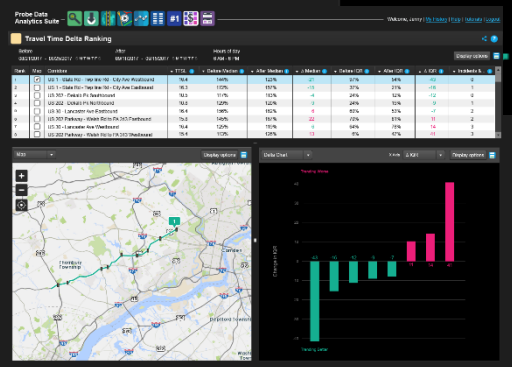
XD Support

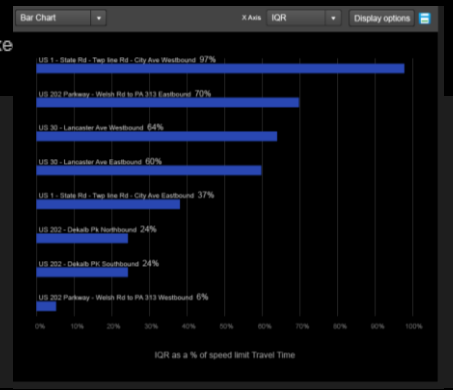
- Finer Granularity
- Coverage beyond TMCs
- Higher storage costs
- Greater computational load

PROBE DATA ANALYTICS SUITE

Arterial Performance Measures







Agency Input Session

"What's on your mind?"

Wrap Up

Denise Markow, I-95 Corridor Coalition

Questions?

Please contact:

PDA Suite – Denise Markow 301.789.9088 or dmarkow@i95coalition.org

PDA Suite Technical Support – vpp-support@ritis.org or Michael Pack at packml@umd.edu

Logistics – Joanna Reagle 610.228.0760 or jreagle@kmjinc.com