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

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

*6

Thank You!

March 8, 2018
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
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)

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

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

– Traveler Information Services Annual Meeting
– March 15, 2018

– Computer Aided Dispatch Data
– Integration Workshop
– April 23-24, 2018
What’s New
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
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

- Introduction
- Notation used in this document
- Glossary
- API key
- Segment Search
  - Segment Search Request
  - Segment Search Response
  - Segment Search Example
  - Segment Search Error Codes
  - Segment Search Assumptions and Constraints
- Bottleneck Data Requests
  - Bottleneck Search Example
  - Bottleneck Search Response
  - Bottleneck Element Response
  - Bottleneck Search Error Codes
  - Bottleneck Search Assumptions and Constraints
- Jobs
  - Job Status Request
  - Job Status Response
  - Job Status Example
  - Job Status Error Codes
  - Job Submission Response
  - Export Job
    - Export Job Request
    - Retrieving Export Job Results
  - Performance Metrics Job
    - Performance Metrics Job Request
    - Performance Job Results
  - User Delay Cost Job
    - User Delay Cost Job Request
    - User Delay Cost Job Results
    - Job Error Codes
- Further Documentation
- 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)

### MAP-21

- Truck Travel Time Reliability Index (BETA)
- Annual Hours of Peak Hour Excessive Delay Per Capita (BETA)
  - Set target to less than 15h
  - State DOTs and MPOs may choose from two different evening peak periods. Please choose one.
    - 3pm - 7pm
    - 4pm - 8pm
  - Provide and use your own volume data here

3. Select one or more years:

   - [ ] 2017

   + Add time period
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
• No more Flash Player
• Uses less memory
• Can handle more TMCs and finer granularity
• % Readings over time chart
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
Pause for Q&A
PennDOT-sponsored Enhancements to the Probe Data Analytics Suite

Steve Gault, PE, PTOE
PennDOT
Consultant
PennDOT-sponsored Enhancements to the Probe Data Analytics Suite

PDA User Group
March 8, 2018

Steve Gault, P.E., PTOE
717.221.2069
c-stgault@pa.gov
steve.gault@mbakerintl.com
PennDOT’s TSMO Performance Metrics Framework

- Identify
- Classify
- Mitigate

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?**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Time Delay</th>
<th>Time Delay per VMT</th>
<th>Delay Cost</th>
<th>Delay Cost per VMT</th>
<th>Travel Time Index (TTI)</th>
<th>Planning Time Index (PTI)</th>
<th>Buffer Time Index (BTI)</th>
<th>Bottleneck Identification and Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Delay</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time Delay per VMT</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delay Cost</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delay Cost per VMT</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Travel Time Index (TTI)</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planning Time Index (PTI)</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buffer Time Index (BTI)</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bottleneck Identification and Ranking</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
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

Each bar represents one day of February 2017

Recurring congestion Monday-Friday during AM Peak

Monday holiday

Color of bars represent length of queue

Time of day on horizontal axis (midnight to midnight)

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
Slow speeds on many interstates at 5:00 PM on Friday 12/1/17
Travel times exceed 2.5x free flow on many interstate segments.
Plan for >3x free flow travel time to arrive on time 95% of the time on dark red segments.
Trend Map: Buffer Time Index

Interstates in Pennsylvania (2427 TMCs) using INRIX data

5:00 PM - December 01, 2017 (Friday)

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

- Screenshot image of map
- Video (animated GIF or MP4)
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
Plan an extra 20% average statewide for interstate travel during Friday PM peak.
• Can use large pixel size so it will print well
• Can adjust colors & font sizes
• Can choose chart titles
• Recommend using transparent background
Buffer index for Interstates in Pennsylvania (2427 TMCs)
Averaged per fifteen minutes for December 01, 2017
Northbound

- December 01, 2017 - INRIX
- December 01, 2017 25th and 75th percentile - INRIX
- December 01, 2017 5th and 95th percentile - INRIX
Planning time index for Interstates in Pennsylvania (2427 TMCs)
Averaged per day of week for January 02, 2017 through December 01, 2017 (Every weekday)
January 02, 2017 through December 01, 2017 (Every weekday) 4 PM - 6 PM

Congestion increases throughout the week in 2017
Fridays during PM peak are less reliable than other weekdays in 2017.

Buffer index: The buffer index is expressed as a percentage and its value increases as reliability gets worse ((95% Travel Time - Average Travel Time) / Average Travel Time). For example, a buffer index of 0.4 (40 percent) means that for a 20-minute average travel time, a traveler should budget an additional 8 minutes (20 minutes x 40 percent = 8 minutes) to ensure on-time arrival most of the time.

- Eastbound - INRIX
- Northbound - INRIX
- Southbound - INRIX
- Westbound - INRIX
• 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

- Top 10 Interstate Bottlenecks in Pennsylvania (Nov. 2017)
  - #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/I 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
I-95 S @ Girard Avenue/Exit 23 on 12/1/17

AM congestion 6:30-10:30 AM

PM congestion 2:30-8:30 PM
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
Each line represents a time when speed dropped below 60% of free flow or queue length changed.

### Bottleneck Ranking: Elements Table

<table>
<thead>
<tr>
<th>Start time</th>
<th>End time</th>
<th>Duration</th>
<th>Max length (miles)</th>
<th>Impact</th>
<th>All events/incidents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fri, Dec 1, 2017 6:21 AM</td>
<td>Fri, Dec 1, 2017 7:32 AM</td>
<td>1 h 11 m</td>
<td>6.55</td>
<td>421.10</td>
<td>0</td>
</tr>
<tr>
<td>Fri, Dec 1, 2017 7:32 AM</td>
<td>Fri, Dec 1, 2017 7:33 AM</td>
<td>1 m</td>
<td>6.39</td>
<td>6.39</td>
<td>0</td>
</tr>
<tr>
<td>Fri, Dec 1, 2017 7:33 AM</td>
<td>Fri, Dec 1, 2017 7:50 AM</td>
<td>17 m</td>
<td>6.55</td>
<td>111.34</td>
<td>0</td>
</tr>
<tr>
<td>Fri, Dec 1, 2017 7:50 AM</td>
<td>Fri, Dec 1, 2017 7:54 AM</td>
<td>4 m</td>
<td>6.39</td>
<td>25.56</td>
<td>0</td>
</tr>
<tr>
<td>Fri, Dec 1, 2017 7:54 AM</td>
<td>Fri, Dec 1, 2017 8:00 AM</td>
<td>6 m</td>
<td>6.55</td>
<td>39.30</td>
<td>0</td>
</tr>
<tr>
<td>Fri, Dec 1, 2017 8:00 AM</td>
<td>Fri, Dec 1, 2017 8:01 AM</td>
<td>1 m</td>
<td>6.39</td>
<td>6.39</td>
<td>0</td>
</tr>
<tr>
<td>Fri, Dec 1, 2017 8:01 AM</td>
<td>Fri, Dec 1, 2017 8:40 AM</td>
<td>30 m</td>
<td>6.55</td>
<td>245.09</td>
<td>0</td>
</tr>
<tr>
<td>Fri, Dec 1, 2017 8:40 AM</td>
<td>Fri, Dec 1, 2017 8:41 AM</td>
<td>1 m</td>
<td>5.60</td>
<td>5.60</td>
<td>0</td>
</tr>
<tr>
<td>Fri, Dec 1, 2017 8:41 AM</td>
<td>Fri, Dec 1, 2017 9:16 AM</td>
<td>35 m</td>
<td>5.75</td>
<td>181.87</td>
<td>0</td>
</tr>
<tr>
<td>Fri, Dec 1, 2017 9:16 AM</td>
<td>Fri, Dec 1, 2017 9:17 AM</td>
<td>1 m</td>
<td>3.18</td>
<td>3.18</td>
<td>0</td>
</tr>
<tr>
<td>Fri, Dec 1, 2017 9:17 AM</td>
<td>Fri, Dec 1, 2017 9:34 AM</td>
<td>17 m</td>
<td>3.34</td>
<td>45.41</td>
<td>0</td>
</tr>
<tr>
<td>Fri, Dec 1, 2017 9:34 AM</td>
<td>Fri, Dec 1, 2017 9:37 AM</td>
<td>3 m</td>
<td>1.99</td>
<td>5.98</td>
<td>0</td>
</tr>
<tr>
<td>Fri, Dec 1, 2017 9:37 AM</td>
<td>Fri, Dec 1, 2017 10:22 AM</td>
<td>45 m</td>
<td>1.81</td>
<td>47.78</td>
<td>0</td>
</tr>
<tr>
<td>Fri, Dec 1, 2017 2:38 PM</td>
<td>Fri, Dec 1, 2017 5:18 PM</td>
<td>2 h 40 m</td>
<td>6.55</td>
<td>642.15</td>
<td>0</td>
</tr>
<tr>
<td>Fri, Dec 1, 2017 5:18 PM</td>
<td>Fri, Dec 1, 2017 5:20 PM</td>
<td>2 m</td>
<td>6.39</td>
<td>12.78</td>
<td>0</td>
</tr>
<tr>
<td>Fri, Dec 1, 2017 5:20 PM</td>
<td>Fri, Dec 1, 2017 5:22 PM</td>
<td>2 m</td>
<td>6.55</td>
<td>13.10</td>
<td>0</td>
</tr>
<tr>
<td>Fri, Dec 1, 2017 5:22 PM</td>
<td>Fri, Dec 1, 2017 5:23 PM</td>
<td></td>
<td>6.39</td>
<td>6.39</td>
<td>0</td>
</tr>
<tr>
<td>Fri, Dec 1, 2017 5:23 PM</td>
<td>Fri, Dec 1, 2017 5:28 PM</td>
<td></td>
<td>6.55</td>
<td>19.65</td>
<td>0</td>
</tr>
<tr>
<td>Fri, Dec 1, 2017 5:28 PM</td>
<td>Fri, Dec 1, 2017 5:39 PM</td>
<td></td>
<td>6.39</td>
<td>83.08</td>
<td>0</td>
</tr>
</tbody>
</table>
Bottleneck Ranking: Elements Graph

I-95 S @ Girard Avenue/Exit 23

AM queue builds very fast

PM queue builds gradually

Other ranked bottlenecks overlapping

Click on location to get more statistics
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
Mapping: Local View of Top Ranked Bottlenecks
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
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
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"]
"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": 66.2189937851922,
"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_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": 21794.000000,
    "delay_vehicle_hours": 1763.794624,
    "cdi": 0.01234907,
    "vmt": 357070.296188,
    "expected_received_weight": 0.000000
  },
  "date": "January 01, 2016"
},

"commercial": {
  "volume": 21794.000000,
  "delay_cost_per_vmt": 0.026065,
  "delay_person_hours": 9.261554,
  "delay_cost": 93.0693585,
  "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
Pause for Q&A
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

(queue length vs time graph)

Old algorithm impact factor
New algorithm impact factor
New Algorithm vs Old Algorithm

Advantages of New Algorithm
2. Considers evolution of congestion
New Algorithm vs Old Algorithm

Advantages of New Algorithm
2. Considers evolution of congestion
New Bottleneck Table and Metrics

Data Input

Bottleneck Metric

Base Impact

Queue Length Profile

Speed Difference Profile

Speed Differential

AADT

Total Delay

% Free-Flow Speed

Speed Percentage (Congestion)

Bottleneck Threshold

Time

Period of bottleneck activation

Congestion

I-95 Corridor Coalition › PDA Suite User Group

March 8, 2018
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
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

#### Bottleneck Ranking - Using INRIX data

<table>
<thead>
<tr>
<th>Rank</th>
<th>Map</th>
<th>Head Location (approximate)</th>
<th>Average max inst.</th>
<th>Average daily duration</th>
<th>Total duration</th>
<th>All Events/Incidents</th>
<th>Speed differential</th>
<th>Congestion</th>
<th>Base Impact</th>
<th>Weighted by</th>
<th>TOTAL DELAY</th>
<th>External Tool Links</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I-95 S @ VA-123/EXIT 160</td>
<td>3.79</td>
<td>5 h 52 m</td>
<td>8 h 19 h 41 m</td>
<td>265</td>
<td>43,113.20</td>
<td>1,799,639.06</td>
<td>91,290.60</td>
<td></td>
<td>174,819,793,459.19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>I-495 N @ US-40/US-219/EXIT 14</td>
<td>6.30</td>
<td>1 h 59 m</td>
<td>2 d 23 h 26 m</td>
<td>3</td>
<td>26,066.27</td>
<td>757,071.47</td>
<td>35,912.02</td>
<td></td>
<td>50,036,039,433.59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>I-495 CCW @ MD-57/GEORGIA AVE/EXIT 31</td>
<td>2.69</td>
<td>3 h 06 m</td>
<td>4 d 16 h 45 m</td>
<td>201</td>
<td>23,463.26</td>
<td>910,763.56</td>
<td>51,222.15</td>
<td></td>
<td>99,285,978,456.32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>I-495 S @ I-270 SPUR</td>
<td>3.47</td>
<td>2 h 19 m</td>
<td>3 d 11 h 59 m</td>
<td>166</td>
<td>22,205.52</td>
<td>947,804.74</td>
<td>55,633.88</td>
<td></td>
<td>95,978,498,749.04</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>I-695 CCW @ EDWOOD AVE/EXIT 14</td>
<td>4.52</td>
<td>2 h 09 m</td>
<td>3 d 05 h 32 m</td>
<td>289</td>
<td>22,155.14</td>
<td>821,635.02</td>
<td>41,440.49</td>
<td></td>
<td>73,689,158,045.96</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>I-270 S @ MD-196/EXIT 22</td>
<td>4.02</td>
<td>2 h 10 m</td>
<td>3 d 06 h 30 m</td>
<td>68</td>
<td>19,048.45</td>
<td>649,483.78</td>
<td>27,043.10</td>
<td></td>
<td>28,998,851,490.07</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Map for I-495 N @ US-40/US-219/EXIT 14

- **Selected location**
- **Location head**
- **Queue (show n at maximum length)**
- **Number of Incidents**

#### Timeline for I-495 N @ US-40/US-219/EXIT 14

- **Maximum queue length in miles**
- **Compact View**
- **Icon Legend**

---

I-95 Corridor Coalition › PDA Suite User Group

March 8, 2018
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

The center represents January 1, 2018 and the outer edge represents February 6, 2018.
Use Case: DC, MD, VA Interstate Bottlenecks

- Data Visualizations: Elements Chart
Use Case: DC, MD, VA Interstate Bottlenecks

- Data Visualizations: Elements Chart

Date Range: January 1, 2018 through February 5, 2018
Time: 4:52 AM
Number of days congested: 6 of 36
Pause for Q&A
Coming soon...
OD Analytics
PROBE DATA
ANALYTICS SUITE

XD Support

- Finer Granularity
- Coverage beyond TMCs
- Higher storage costs
- Greater computational load
Arterial Performance Measures
Agency Input Session

“What’s on your mind?”

March 8, 2018
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