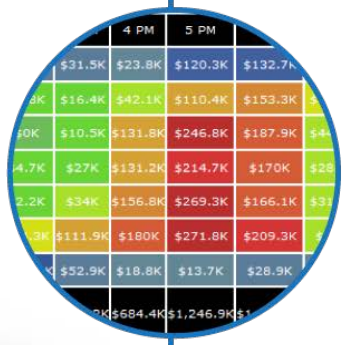
Performance Measures Around the Country

Current Practices, and a few Mistakes to Avoid.



CATT LABORATORY

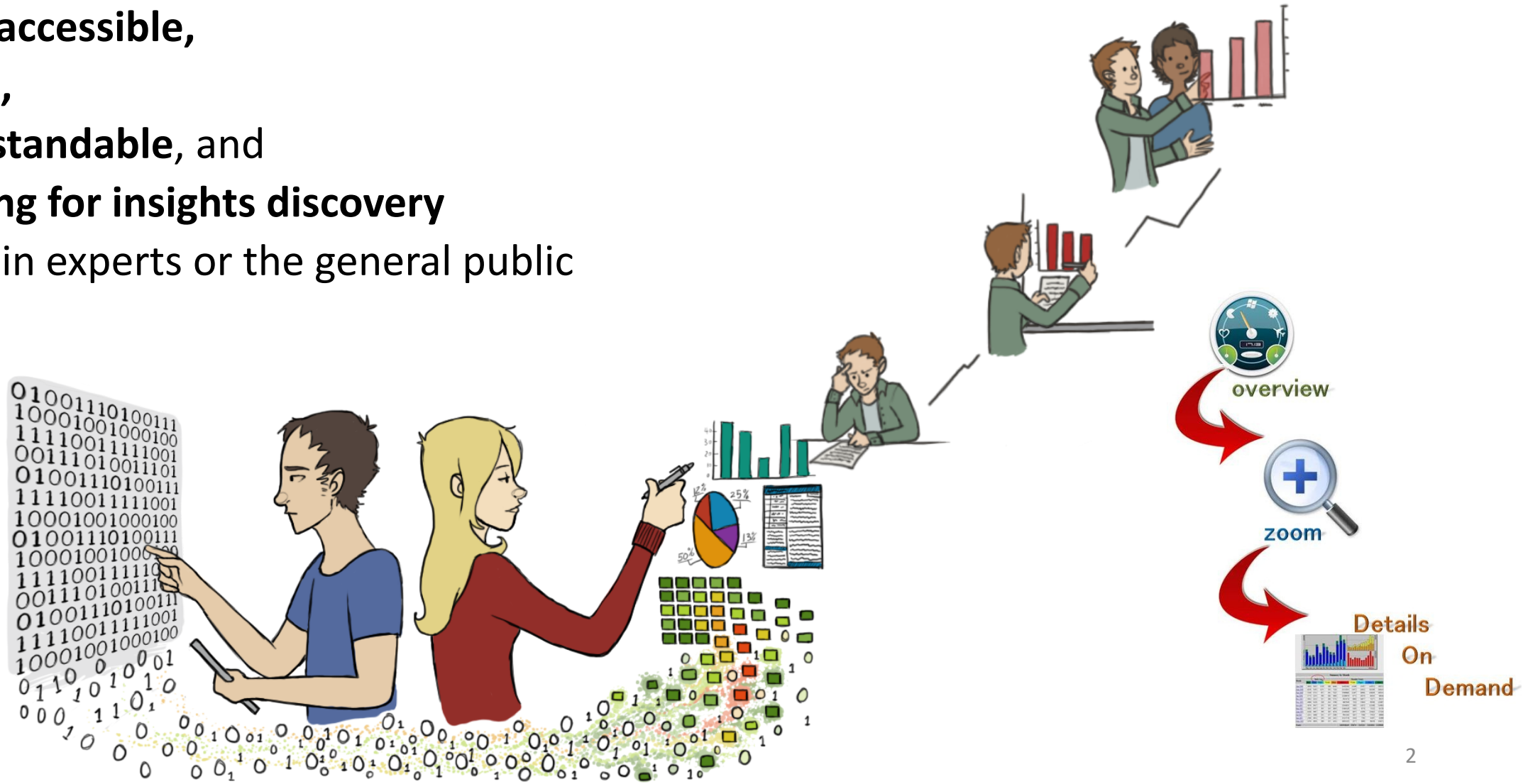
UNIVERSITY OF MARYLAND

An overview of MAP-21, Operations, Safety, Freight, Planniing, and other Performance Measures.

Our Goal with Data & Performance Measures:

- Provide tools to make data
  - **easily accessible,**
  - **usable,**
  - **understandable**, and
  - **allowing for insights discovery**

  To domain experts or the general public



Problem Identification, Project Prioritization, and After Action Review

CATT Lab | Vehicle Probe Project Suite | The Vehicle Probe Project ... | The Vehicle Probe Project ... | Bottleneck Ranking - Using...

https://vpp.ritis.org/suite/ranking/#/uuid=34e0a94b-60cd-4c46-a5cf-b5b62cd383be

Search

Vehicle Probe Project Suite

Welcome, Michael | Help | Screencasts | Logout

Bottleneck Ranking - Using INRIX data

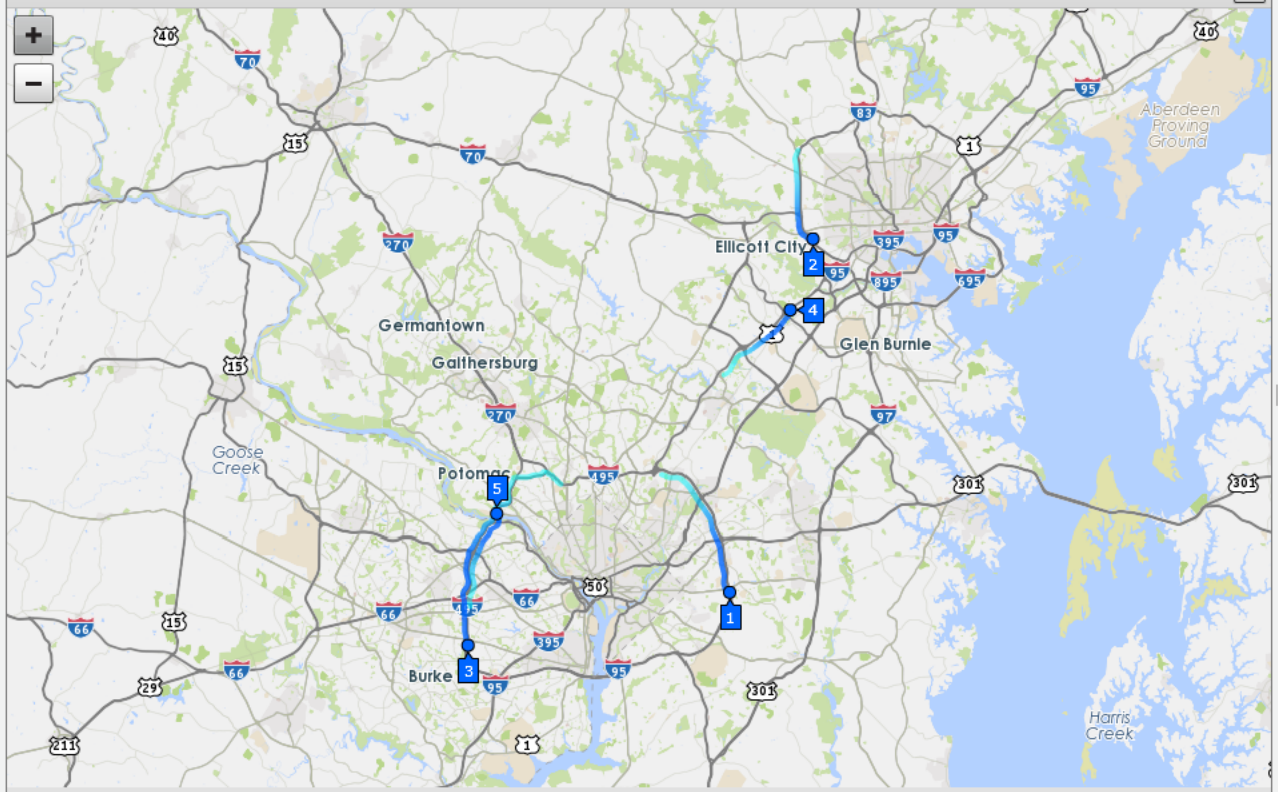
New search

Bottleneck locations from Interstates in MD (1185 tmcs) between June 1, 2016 and June 30, 2016 (614 total)

Rank	Map	Location	Average duration	Average max length (miles)	Occurrences	Impact factor	All Events/Incidents
1	☑	I-495 CW @ MD-214/CENTRAL AVE/EXIT 15	2 h 55 m	11.51	70	140,938	222
2	☑	I-695 CCW @ EDMONDSON AVE/EXIT 14	2 h 7 m	7.29	83	76,829	77
3	☑	I-495 CCW @ VA-236/LITTLE RIVER TPKE/EXIT 6	3 h 28 m	18.32	19	72,391	77
4	☑	I-95 N @ MD-100/EXIT 43	2 h 2 m	6.93	81	68,497	45
5	☑	I-495 CW @ CLARA BARTON PKWY/EXIT 41	2 h 46 m	7.42	45	55,421	17
6	☐	I-495 CCW @ GREENBELT METRO DR/EXIT 24	1 h 41 m	6.12	85	52,511	133

☐ Show Events/Incidents: ◉ During selected time range ○ Only during bottleneck conditions

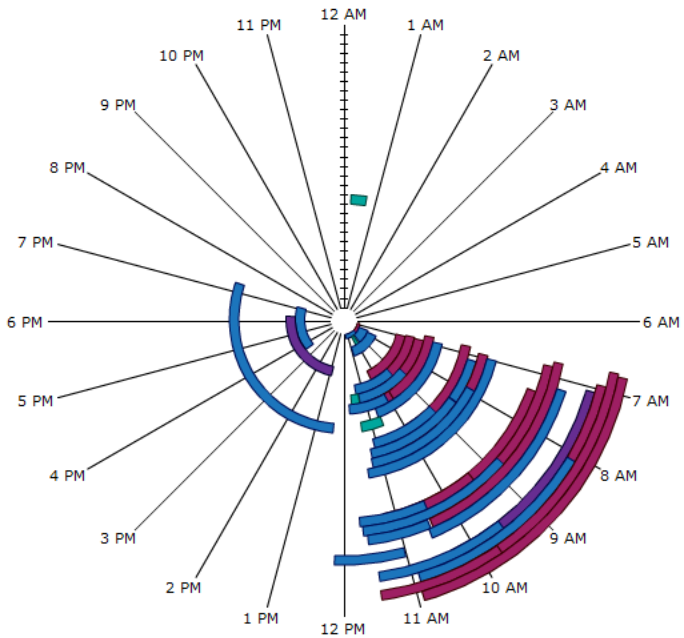
I-495 CW @ CLARA BARTON PKWY/EXIT 41



☑ Show ranks ☐ Highlight selected bottleneck ☐ Show events/incidents label next to rank

Occurrences Cycles: day ○ Line ◉ Spiral ○ Table

The center represents June 1, 2016 and the outer edge represents July 1, 2016.



Maximum queue length in miles ☐ Grayscale Icon Legend

0 — 2 — 5 — 8

When is it congested?

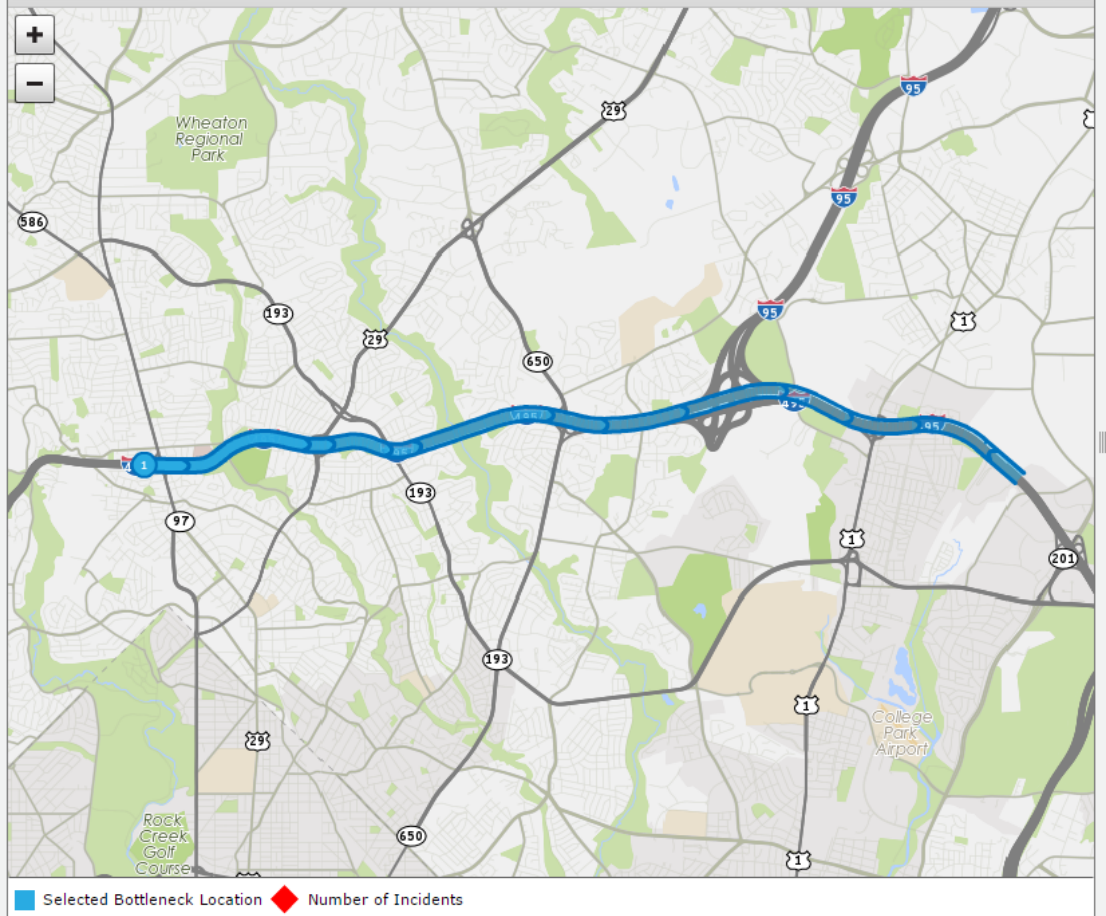
New search

Bottleneck Ranking Table for Interstates in MD (1185 tmcs) between October 1, 2015 and October 31, 2015 (628 total)

Display Options

Rank	Map	Bottleneck head location	Impact	Average duration	Average max length (miles)	Total duration	All Events/Incidents
1	☐	I-495 CCW @ MD-97/GEORGIA AVE/EXIT 31	25,595.13	14 m	3.06	5 d 03 h 32 m	166
2	☐	I-495 CW @ I-270 SPUR	24,661.76	51 m	4.32	3 d 09 h 36 m	48

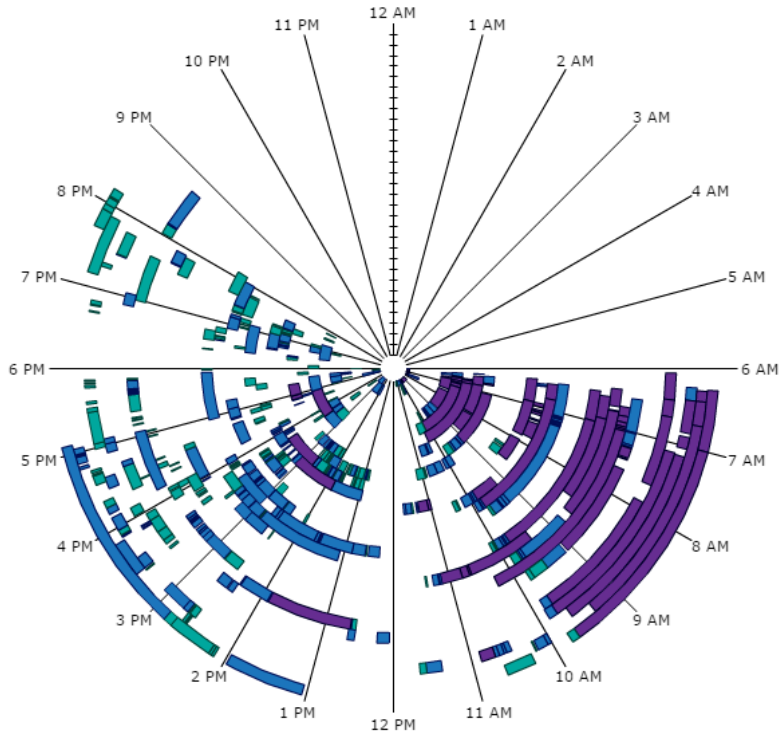
Map — for I-495 CCW @ MD-97/GEORGIA AVE/EXIT 31 — Display Options



Selected Bottleneck Location ◆ Number of Incidents

Time Spiral — for I-495 CCW @ MD-97/GEORGIA AVE/EXIT 31 — Display Options

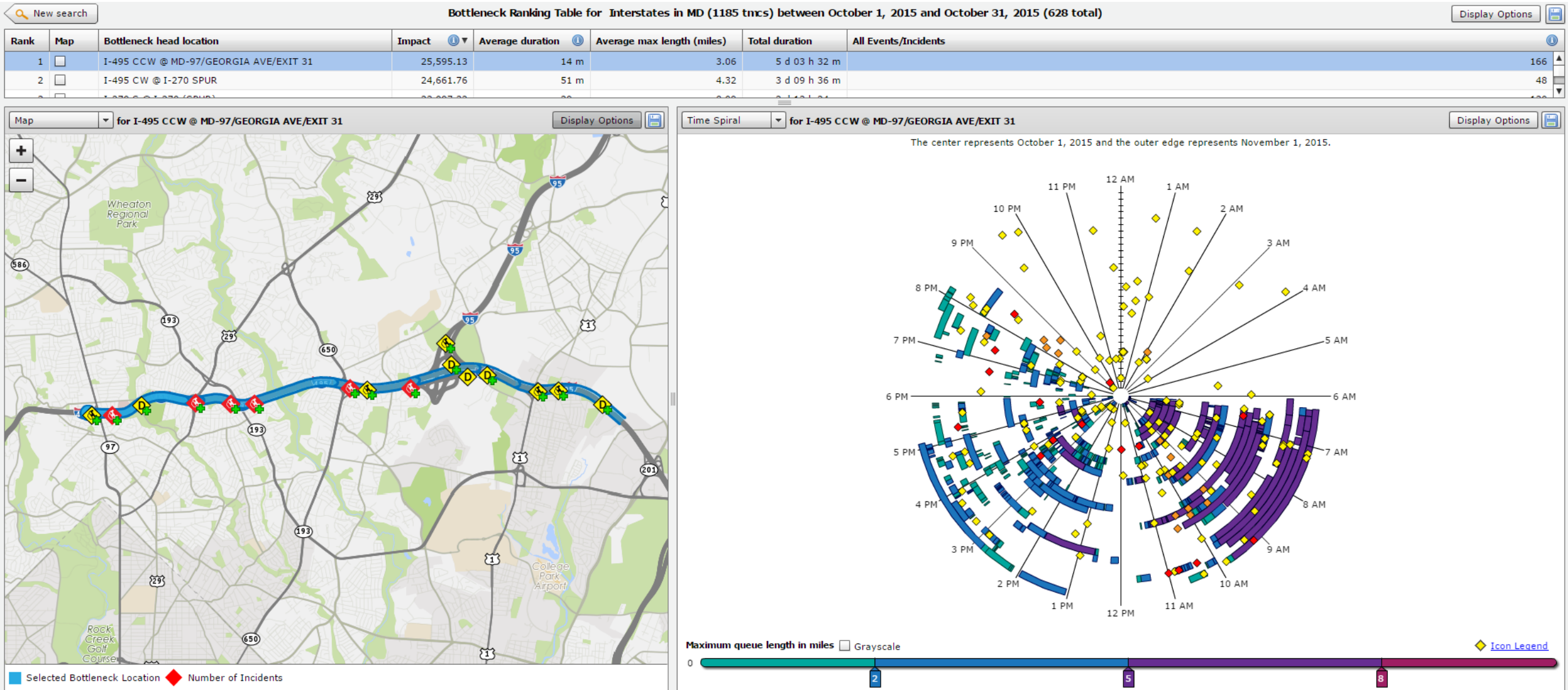
The center represents October 1, 2015 and the outer edge represents November 1, 2015.

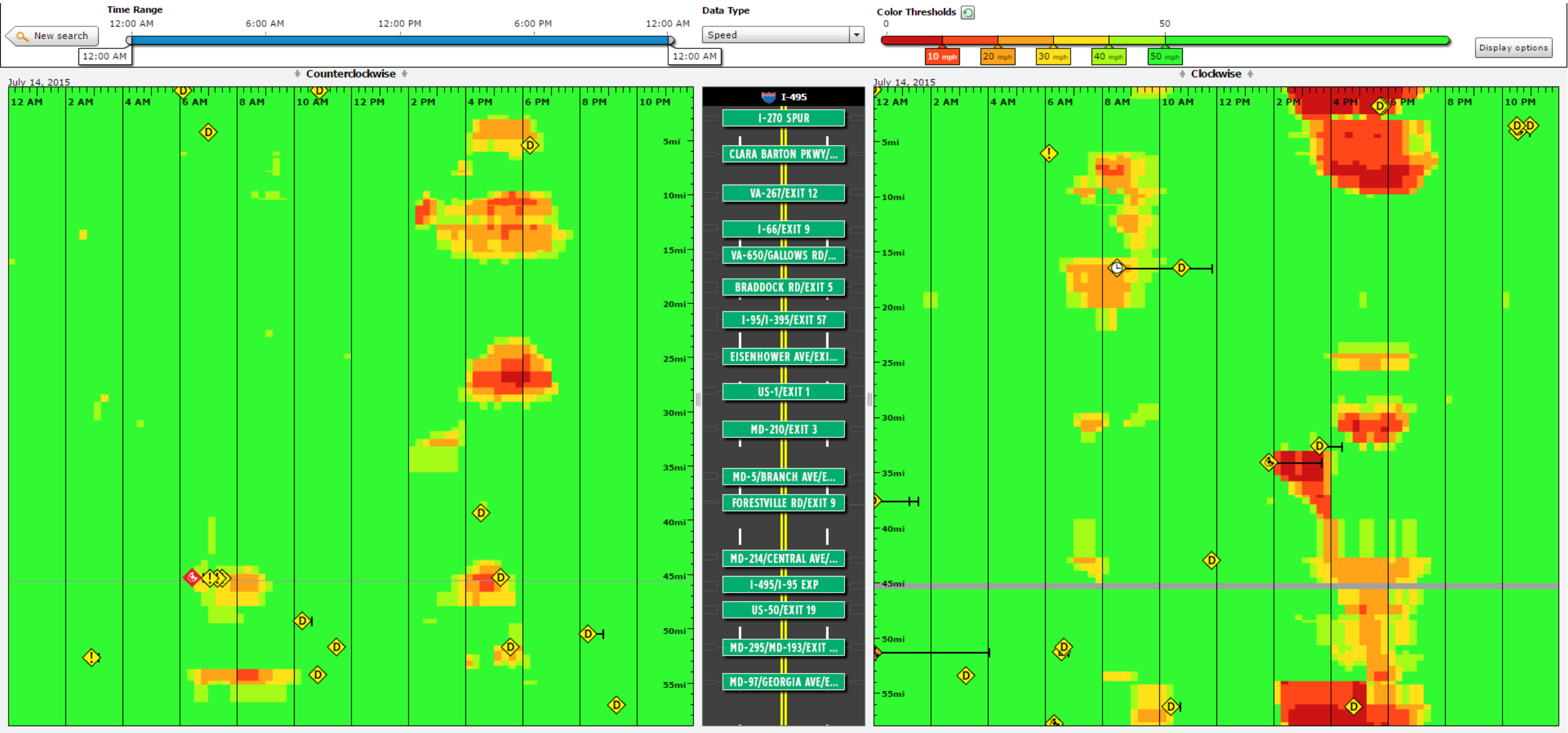


Maximum queue length in miles ☐ Grayscale — Icon Legend

0 — 2 — 5 — 8

Incident/Construction Impacts




Time Range
12:00 AM
6:00 AM
12:00 PM
6:00 PM
12:00 AM
New search
12:00 AM
12:00 AM
Data Type
Speed
Color Thresholds
0
50
10 mph
20 mph
30 mph
40 mph
50 mph
Display options
Counterclockwise
July 14, 2015
12 AM
2 AM
4 AM
6 AM
8 AM
10 AM
12 PM
2 PM
4 PM
6 PM
8 PM
10 PM
5mi
10mi
15mi
20mi
25mi
30mi
35mi
40mi
45mi
50mi
55mi
I-495
I-270 SPUR
CLARA BARTON PKWY/...
VA-267/EXIT 12
I-66/EXIT 9
VA-650/GALLOWS RD/...
BRADDOCK RD/EXIT 5
I-95/I-395/EXIT 57
EISENHOWER AVE/EXI...
US-1/EXIT 1
MD-210/EXIT 3
MD-5/BRANCH AVE/E...
FORESTVILLE RD/EXIT 9
MD-214/CENTRAL AVE/...
I-495/I-95 EXP
US-50/EXIT 19
MD-295/MD-193/EXIT ...
MD-97/GEORGIA AVE/E...
Clockwise
July 14, 2015

User Delay Cost at this Location: $50.8M

	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM	Daily Totals
7/01/15	$0K	$0.1K	$0.1K	$0K	$0K	$0K	$10.5K	$19.5K	$65.7K	$37.1K	$13.5K	$0.2K	$0K	$0K	$0.9K	$6.6K	$2.9K	$1.3K	$0.3K	$0K	$0K	$0K	$0K	$0K	$158.6K
7/02/15	$0K	$0K	$0K	$0K	$0K	$0K	$5.4K	$19.1K	$56K	$46K	$20.1K	$5.8K	$0.2K	$1K	$16.9K	$34.2K	$20K	$0.5K	$20.7K	$29.7K	$1.7K	$0K	$0.2K	$0K	$277.6K
7/03/15	$0K	$0K	$0K	$0K	$0K	$0K	$0K	$0K	$0K	$0K	$0K	$0K	$0K	$0K	$0K	$0K	$0.1K	$0K	$0K	$0.2K	$0K	$0.1K	$0.3K	$0.1K	$1K
7/04/15	$0.1K	$0.1K	$0.1K	$0K	$0K	$0K	$0K	$0K	$0K	$0.3K	$0.9K	$0K	$0K	$0K	$0K	$0.2K	$1.5K	$0.6K	$0.2K	$1.3K	$0.1K	$0K	$0.1K	$0.1K	$5.7K
7/05/15	$0.1K	$0K	$0K	$0K	$0K	$0K	$0K	$0K	$0K	$0K	$0K	$0K	$0K	$0K	$0.1K	$1.3K	$0.1K	$0K	$0K	$0K	$0K	$0.1K	$0K	$0K	$1.7K
7/06/15	$0K	$0K	$0K	$0K	$0K	$0K	$4.2K	$1.9K	$10.8K	$3.2K	$0K	$0K	$0.1K	$0.1K	$1.9K	$6.4K	$3.1K	$10.7K	$2.9K	$2.4K	$0.6K	$0.2K	$0K	$0K	$48.5K
7/07/15	$0K	$0K	$0K	$0K	$0K	$0K	$10.6K	$16.7K	$58.9K	$34.8K	$5.2K	$1.9K	$27.7K	$3.9K	$0.2K	$3.4K	$1.3K	$2.4K	$5.7K	$2.2K	$0K	$0K	$0K	$0K	$175K
7/08/15	$0K	$0K	$0K	$0K	$0K	$0K	$8.3K	$1.8K	$36.3K	$22.4K	$2.8K	$0K	$0.2K	$0.9K	$0K	$2.7K	$0K	$1.1K	$1.5K	$0.8K	$0K	$0.1K	$0K	$0K	$78.9K
7/09/15	$0K	$0K	$0K	$0K	$0K	$0K	$9.8K	$13.5K	$47.5K	$24.5K	$3.1K	$0K	$0.1K	$0K	$0.2K	$8.5K	$2.8K	$1.6K	$1.4K	$0.3K	$0K	$0.1K	$0K	$0.1K	$113.5K
7/10/15	$0K	$0K	$0K	$0K	$0K	$0K	$4.4K	$7.3K	$36.3K	$13.2K	$0.8K	$0K	$1.2K	$0.6K	$1.5K	$11.1K	$4.6K	$1.1K	$1.4K	$0K	$0K	$0.1K	$0.1K	$0.1K	$83.9K
7/11/15	$0K	$0.1K	$0K	$0K	$0K	$0K	$0K	$0.1K	$0K	$0K	$0K	$0.6K	$6K	$2.4K	$0.7K	$4K	$7K	$5.7K	$4.3K	$0K	$0K	$0.3K	$0.3K	$0.1K	$31.8K
7/12/15	$0.1K	$0.1K	$0.1K	$0K	$0K	$0K	$0.1K	$0K	$0K	$0K	$0K	$0K	$0K	$1.4K	$9.2K	$4.7K	$26K	$4.4K	$0.1K	$0K	$0K	$0.2K	$3.1K	$0.1K	$49.7K
7/13/15	$0K	$0.1K	$0K	$0K	$0K	$0K	$10.5K	$41.6K	$60.6K	$45.9K	$6.2K	$0K	$0.1K	$0K	$0.1K	$2.2K	$4.1K	$36.9K	$5.3K	$0.5K	$0K	$0K	$0K	$0K	$214.3K
7/14/15	$0K	$0K	$0K	$0K	$0K	$0K	$12.3K	$17.7K	$54K	$12.3K	$1.1K	$0K	$0K	$0.1K	$47.5K	$74.9K	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	$0.1K	$0K	$0K	$338.4K
7/15/15	$0K	$0.1K	$0K	$0K	$0K	$0K	$10.7K	$33.2K	$59.5K	$54.8K	$17.8K	$0.3K	$0.1K	$0K	$0.3K	$6.9K	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	$0.1K	$0.1K	$0K	$204.7K
7/16/15	$0K	$0K	$0K	$0K	$0K	$0K	$11.9K	$34.5K	$56.7K	$23.9K	$6.5K	$0.1K	$0.6K	$8.8K	$18.6K	$7.5K	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	$0.1K	$0.1K	$0K	$217.8K
7/17/15	$0.1K	$0K	$0K	$0K	$0K	$0K	$3.6K	$3.4K	$18K	$2.6K	$0K	$0K	$0K	$0K	$10K	$31.9K	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	$0K	$0.1K	$0K	$71.3K
7/18/15	$0K	$0K	$0K	$0K	$0K	$0K	$0K	$0K	$0.3K	$0.4K	$1.3K	$3.8K	$5.7K	$0.8K	$4K	$11.6K	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	$0.4K	$0.3K	$0.1K	$89.6K
7/19/15	$0K	$0.1K	$0K	$0K	$0K	$0K	$0K	$0K	$0K	$0K	$0K	$0K	$0.1K	$0.2K	$7.7K	$7.6K	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	$0.3K	$0.1K	$0K	$31.6K
7/20/15	$0K	$0K	$0K	$0K	$0K	$0K	$10.9K	$18.6K	$69K	$47K	$11.8K	$1K	$0.1K	$0K	$0.5K	$1.3K	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	$0K	$0K	$0.1K	$167.8K
7/21/15	$0K	$0K	$0K	$0K	$0K	$0K	$10.1K	$7.9K	$48K	$22K	$7.9K	$1.9K	$0.1K	$0K	$1K	$4.7K	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	$0.1K	$0K	$0K	$108.7K
7/22/15	$0K	$0K	$0.1K	$0K	$0K	$0K	$9.9K	$34.5K	$63.2K	$40.5K	$9.9K	$0.5K	$0K	$0.1K	$2K	$3.8K	$2.1K	$6.9K	$12.6K	$1.8K	$0K	$0.1K	$0.1K	$0K	$188.1K
7/23/15	$0K	$0K	$0K	$0K	$0K	$0K	$43.6K	$41.8K	$64.7K	$37.8K	$32.4K	$17.7K	$1.7K	$0K	$1.4K	$13.1K	$16.5K	$4.1K	$2.5K	$1.6K	$0.1K	$0.2K	$0.1K	$0.1K	$279.3K
7/24/15	$0K	$0K	$0K	$0K	$0K	$0K	$7.7K	$11.3K	$38.3K	$21.7K	$3.1K	$0.1K	$0.2K	$8.5K	$14.5K	$18.6K	$0K	$1.1K	$9.8K	$3.6K	$0K	$0.1K	$0.1K	$0K	$138.6K
7/25/15	$0K	$0.1K	$0K	$0K	$0K	$0K	$0K	$0K	$0K	$1.2K	$0.2K	$0K	$0.1K	$0.1K	$4.4K	$11.6K	$4.1K	$0K	$0.2K	$1.2K	$0K	$0.4K	$0.3K	$0.1K	$24.1K
7/26/15	$0.1K	$0K	$0K	$0K	$0K	$0K	$0K	$0K	$0K	$0K	$0K	$0K	$0.1K	$0.4K	$4.8K	$6K	$6.3K	$5K	$3.8K	$1.1K	$0.4K	$0.2K	$0K	$0K	$28.2K
7/27/15	$0K	$0K	$0K	$0K	$0K	$0.4K	$18.8K	$17.5K	$42.5K	$13.7K	$0K	$0K	$0K	$0K	$7.3K	$16.5K	$25.2K	$18.6K	$3.9K	$0.1K	$0K	$0.2K	$0.1K	$0K	$165.1K
7/28/15	$0K	$0K	$0K	$0K	$0K	$0K	$13.7K	$22.5K	$55.5K	$30.4K	$5.8K	$0.1K	$0.2K	$0K	$1K	$6.8K	$8.1K	$8.5K	$3.7K	$0.1K	$0K	$0.1K	N/A	N/A	$156.7K
7/29/15	N/A	N/A	N/A	$0K	$0K	$0K	$17K	$28.8K	$54.8K	$29.6K	$6.3K	$1K	N/A	$0K	$0K	$4.2K	$8.8K	$5.6K	$0.9K	$0K	$0K	$0.1K	$0.1K	$0K	$157.1K
7/30/15	$0K	$0K	$0K	$0K	$0K	$0K	$15.5K	$11.8K	$27.3K	$23.6K	$3.7K	$0K	$0K	$0.6K	$23.9K	$24.4K	$12.1K	$4.7K	$1.1K	$0K	$0K	$0.1K	$0.1K	$0.1K	$149.1K

Tuesday, July 14, 2015 3:00 PM

Delay cost:
Total: $74,852.1
Per VMT: $1.32

Hours of delay:
Person-hours: 3325h 53m 6s
Vehicle-hours: 2715h 29s

Vehicle miles traveled (VMT):
Total: 49,012 miles
Passenger: 44,111 miles
Commercial: 4,901 miles

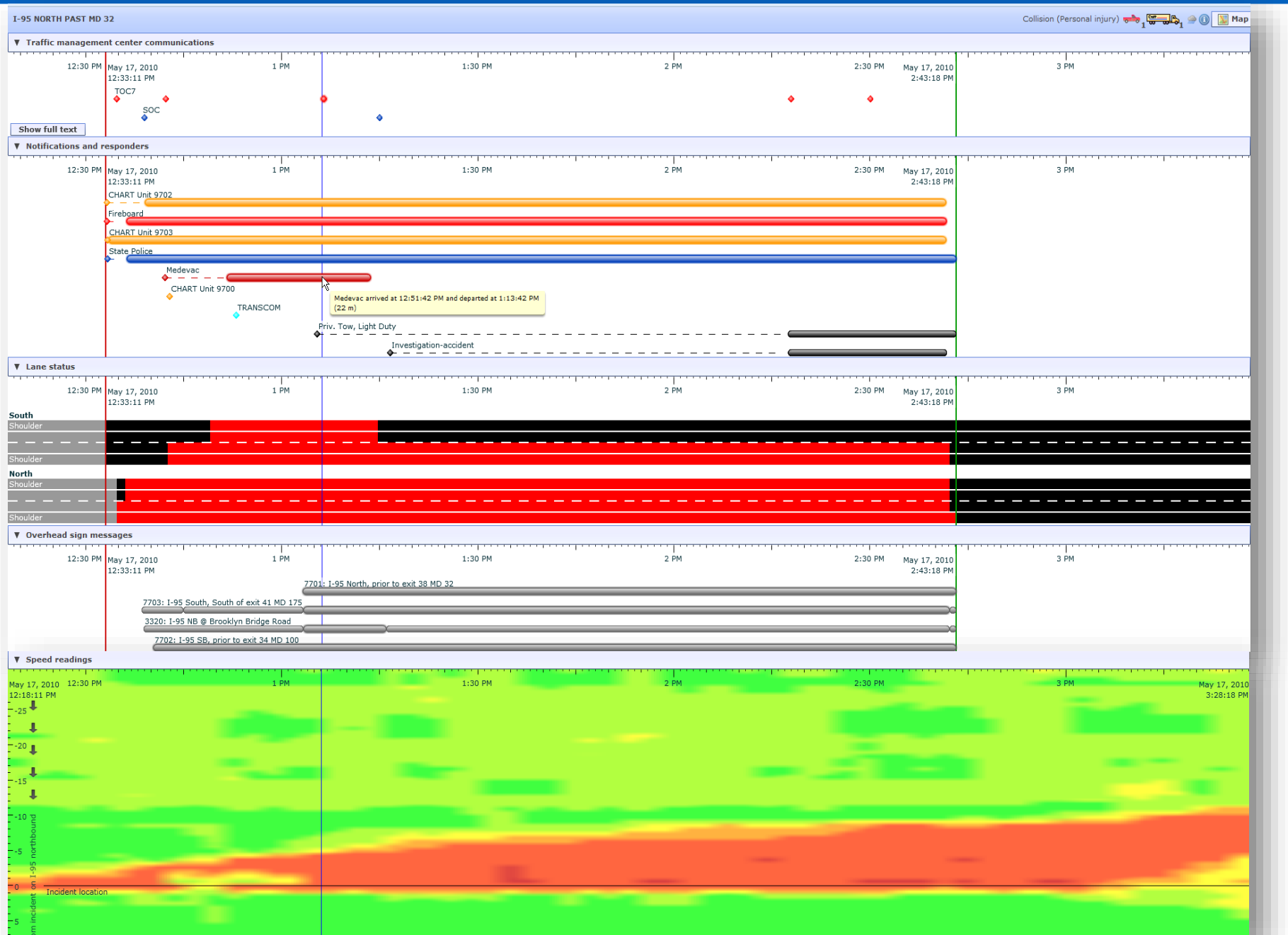
Delay per VMT: 3.3237 mins / mile

Data validity: 100%

Click the table cell to see links to congestion scans

Operations Performance Measures

Understanding Responder Actions & Implications

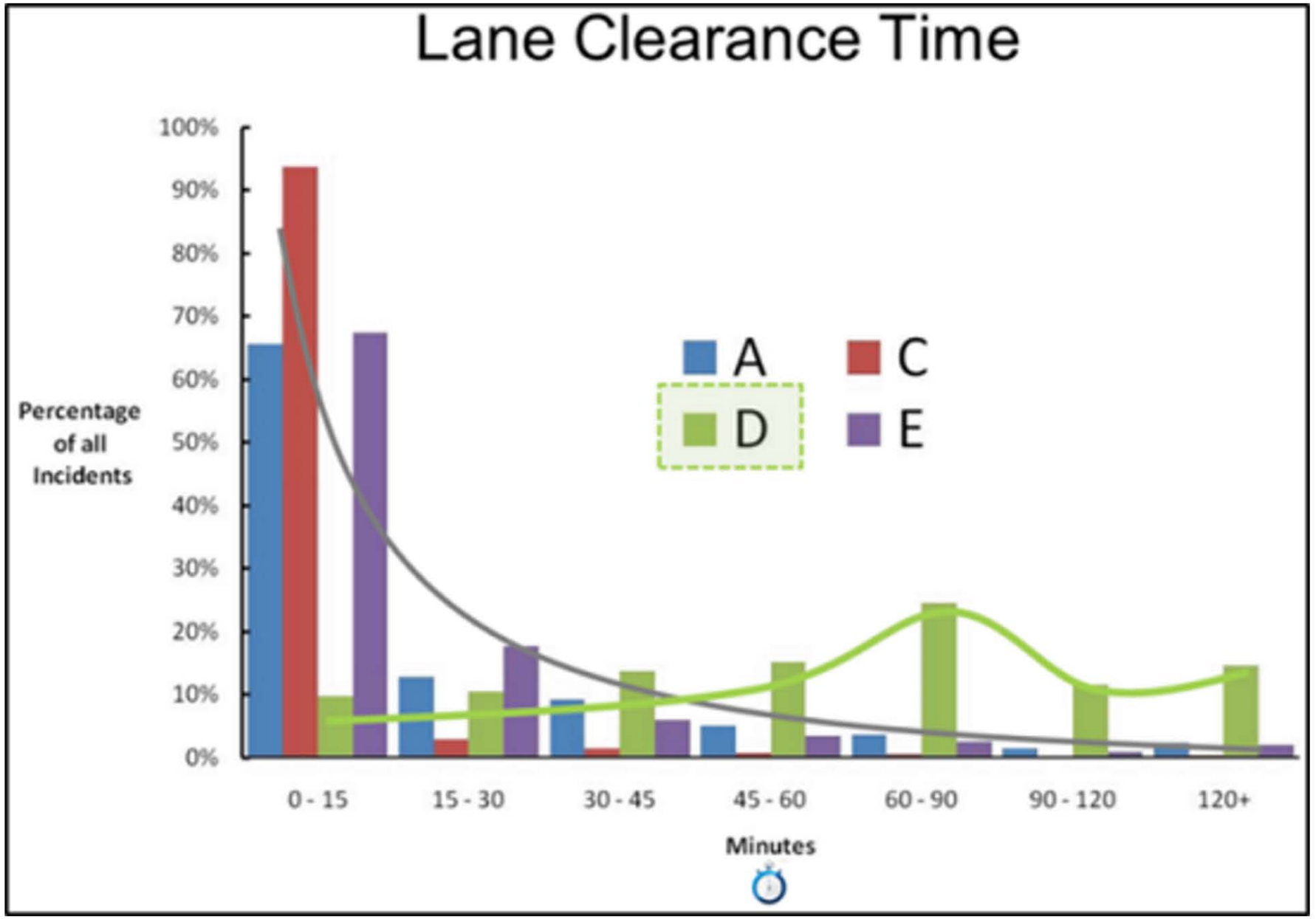


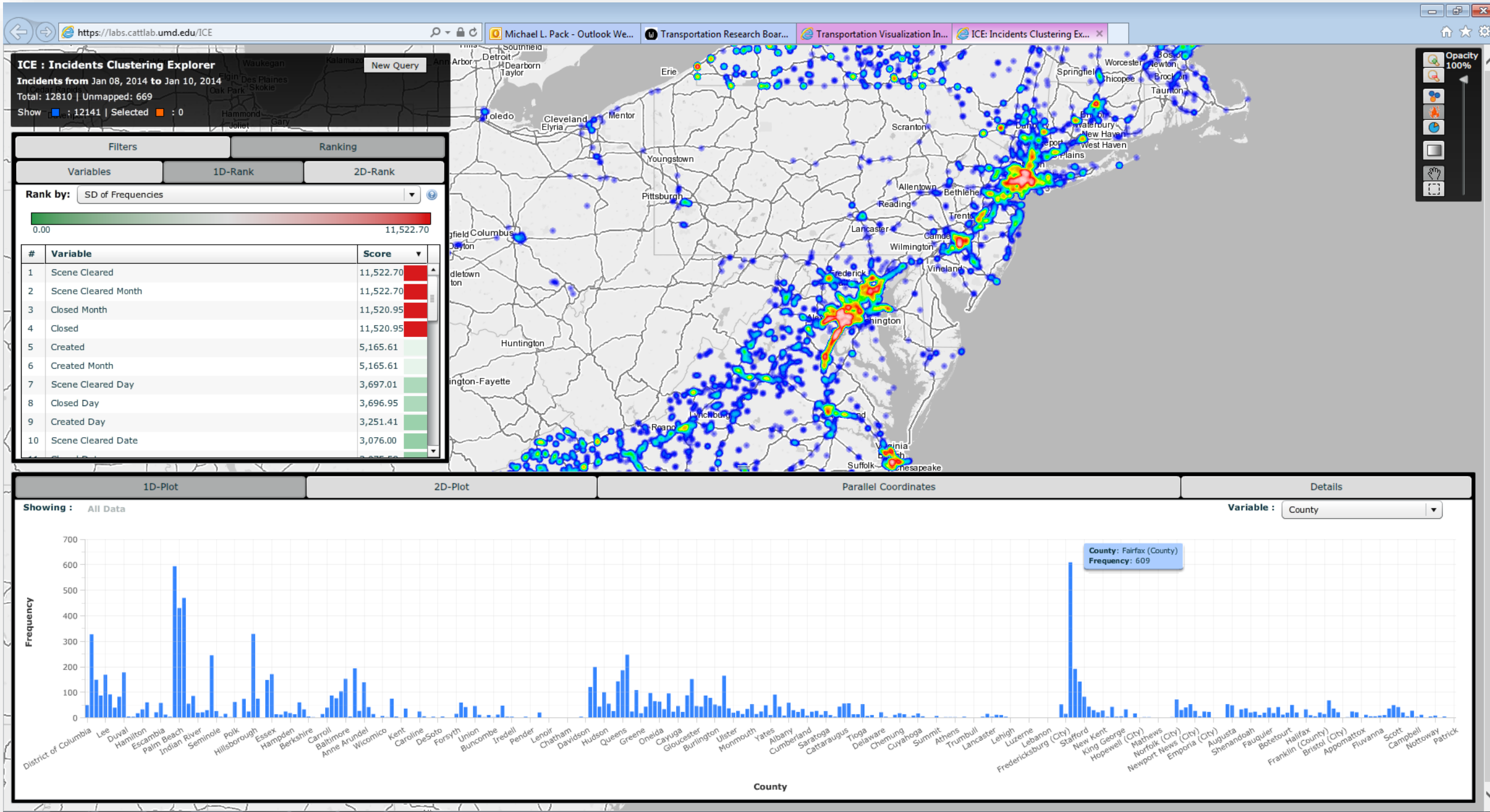
Operator and Responder Stats

- Incident duration. Response times. Lane Clearance times. Hot Spots, etc.

Responder	Notified or responded (all hours)	Responded (all hours)	Notified but no recorded response (all hours)	Response percentage (all hours)	Average response time
Signal Truck 467 BT 80423	6	1	5	17%	3 h 11 m 5 s
Signal Truck 489 BT 80095	1	1	0	100%	2 h 24 m 44 s
Signal Truck 463 BT 80202	1	1	0	100%	1 h 40 m
CHART Unit 9449 SG85670	1	1	0	100%	26 m 5 s
CHART Unit 9308 SG80622	1	1	0	100%	22 m 12 s
CHART Unit 9410 SG01791	1	1	0	100%	16 m 59 s
CHART Unit 9416 SG83513	5	3	2	60%	16 m 2 s
Fireboard	11	10	1	91%	14 m 7 s

Agency performance goals can be damaging!




https://labs.cattlab.umd.edu/ICE
Michael L. Pack - Outlook We...
Transportation Research Boar...
Transportation Visualization In...
ICE: Incidents Clustering Ex...
ICE : Incidents Clustering Explorer
New Query
Incidents from Jan 08, 2014 to Jan 10, 2014
Total: 12810 | Unmapped: 669
Show : 12141 | Selected : 0
Filters
Ranking
Variables
1D-Rank
2D-Rank
Rank by: SD of Frequencies
0.00
11,522.70
Variable Score
1 Scene Cleared 11,522.70
2 Scene Cleared Month 11,522.70
3 Closed Month 11,520.95
4 Closed 11,520.95
5 Created 5,165.61
6 Created Month 5,165.61
7 Scene Cleared Day 3,697.01
8 Closed Day 3,696.95
9 Created Day 3,251.41
10 Scene Cleared Date 3,076.00
Opacity 100%
1D-Plot
2D-Plot
Parallel Coordinates
Details
Showing : All Data
Variable : County
County: Fairfax (County)
Frequency: 609
Frequency
County
District of Columbia
Fairfax (County)
Fredericksburg (City)
Newport News (City)
Norfolk (City)
Virginia Beach
Suffolk
Chesapeake
10:42 PM
1/10/2014

MAP-21
and
Target Setting

Dashboard

+ Add widget

Select a dashboard...

MAP-21

MAP-21 | Advanced

1. Select geography:

- States: Select a state...
- or -
- Urbanized areas: Select an urbanized area...

2. Select year:

2015

3. Select measures :

- [ ] Level of Travel Time Reliability on interstates for all vehicles
- [ ] Level of Travel Time Reliability on non-interstates for all vehicles
- [ ] Level of Travel Time Reliability on interstates for trucks
- [ ] Uncongested interstates for trucks

4. Show data as:

- [ ] Graph

Collision (Personal injury) | NPMRDS Analytics - Das | CHART Reporting | Traffic Map :: RITIS | Regi

https://npmrds.ritis.org/analytics/my-dashboard/?widget=MAP-21

2015 MAP-21 Truck Travel Time Reliability for Illinois

Illinois

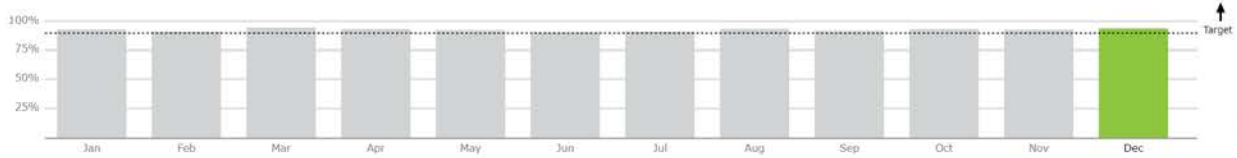
MAP-21 Truck Travel Time Reliability

2015 Target
at least
90%

92%
Year-to-Date
2015

93%
Month-to-Date
December

2015 Target: At least 90% of the system should have a TTTR less than 1.50



Show map...

Using NPMRDS (Trucks and passenger vehicles) data

Updated Oct 4, 2016 11:58 AM (87m ago)

2015 MAP-21 Truck Travel Time Reliability for Illinois

Using NPMRDS (Trucks and passenger vehicles) data

Updated Oct 4, 2016 11:58 AM (87m ago)

2015 MAP-21 Non-interstate NHS Travel Time Reliability for Illinois

Illinois

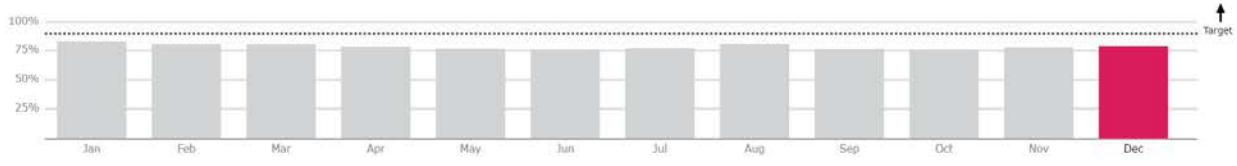
MAP-21 Non-interstate NHS Travel Time Reliability

2015 Target
at least
90%

77.8%
Year-to-Date
2015

78.4%
Month-to-Date
December

2015 Target: At least 90% of the system should have a LOTTR less than 1.50

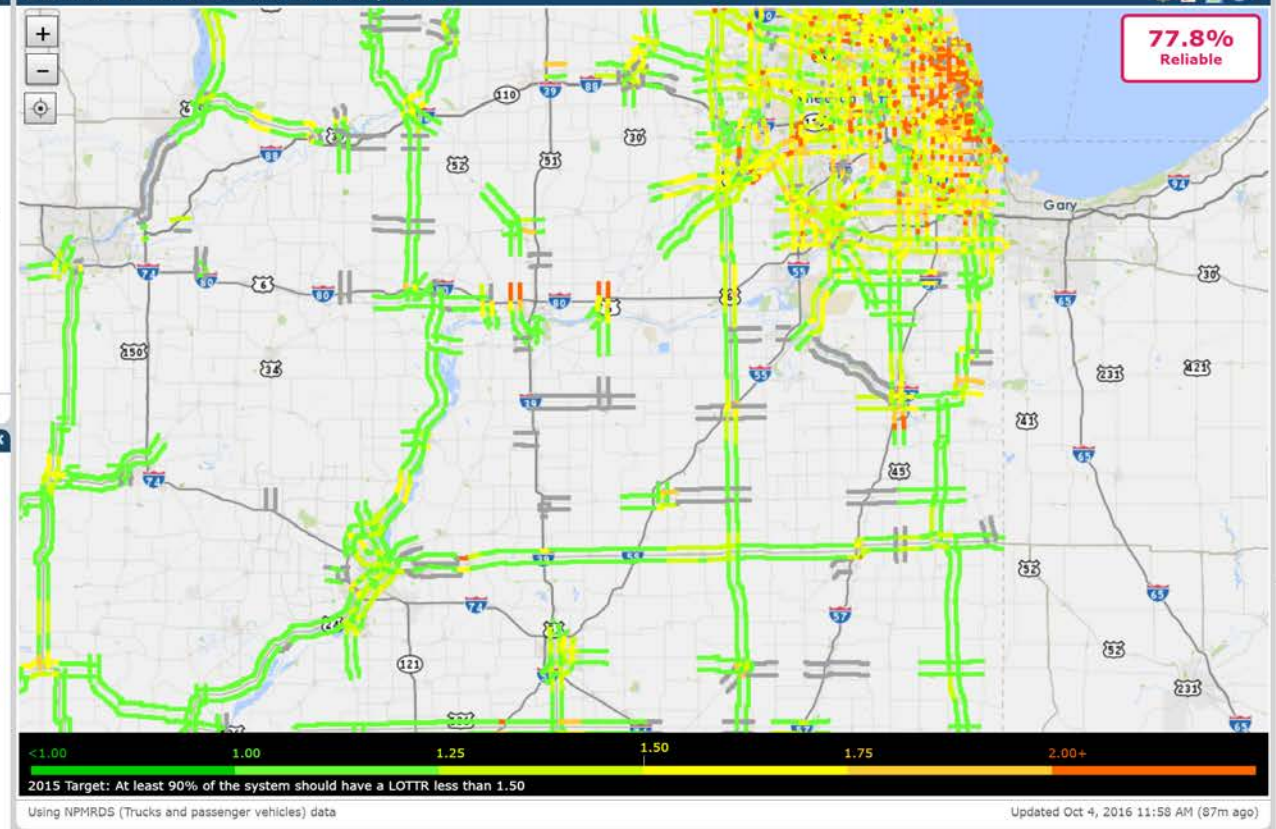


Show map...

Using NPMRDS (Trucks and passenger vehicles) data

Updated Oct 4, 2016 11:58 AM (87m ago)

2015 MAP-21 Non-interstate NHS Travel Time Reliability for Illinois



Using NPMRDS (Trucks and passenger vehicles) data

Updated Oct 4, 2016 11:58 AM (87m ago)

2015 MAP-21 Interstate System Travel Time Reliability for Illinois

Illinois

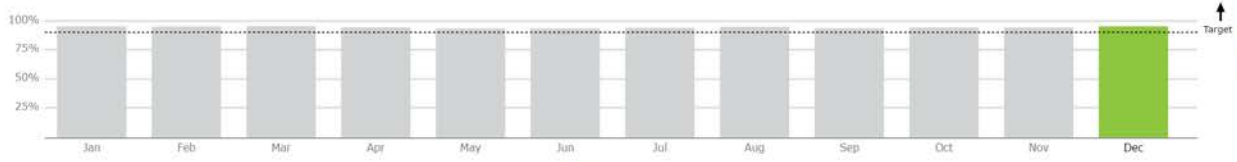
MAP-21 Interstate System Travel Time Reliability

2015 Target
at least
90%

93.7%
Year-to-Date
2015

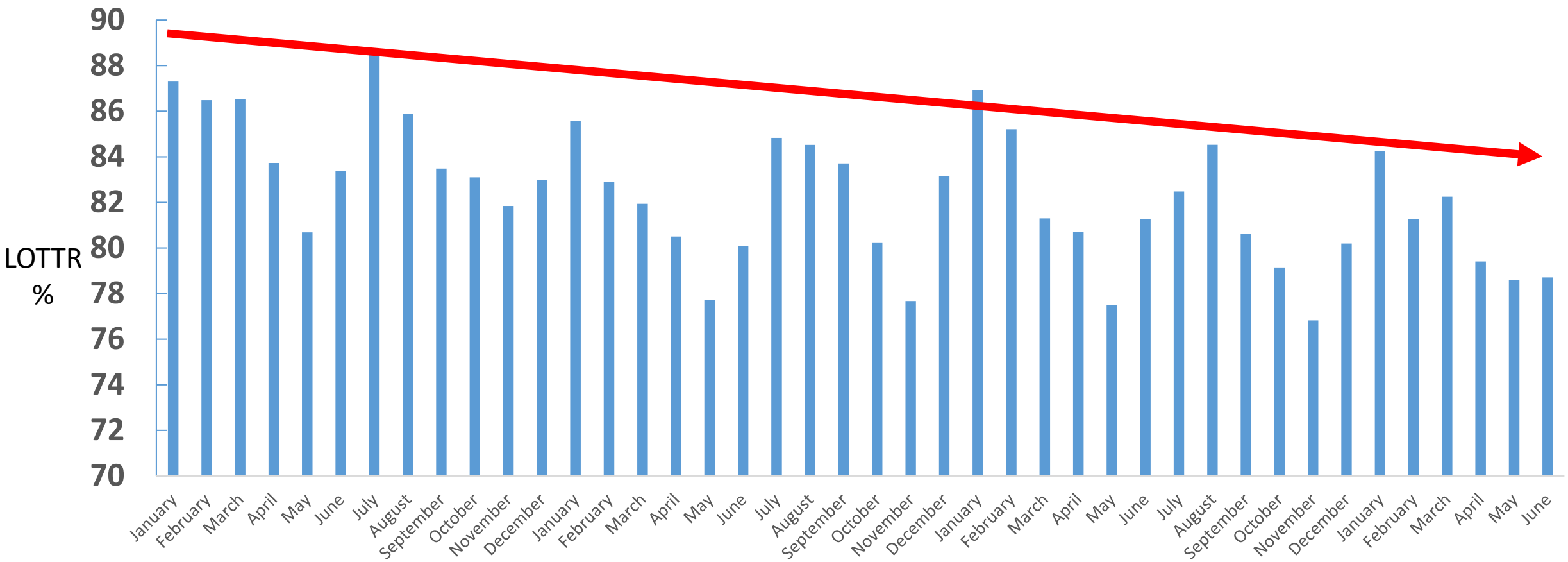
94.7%
Month-to-Date
December

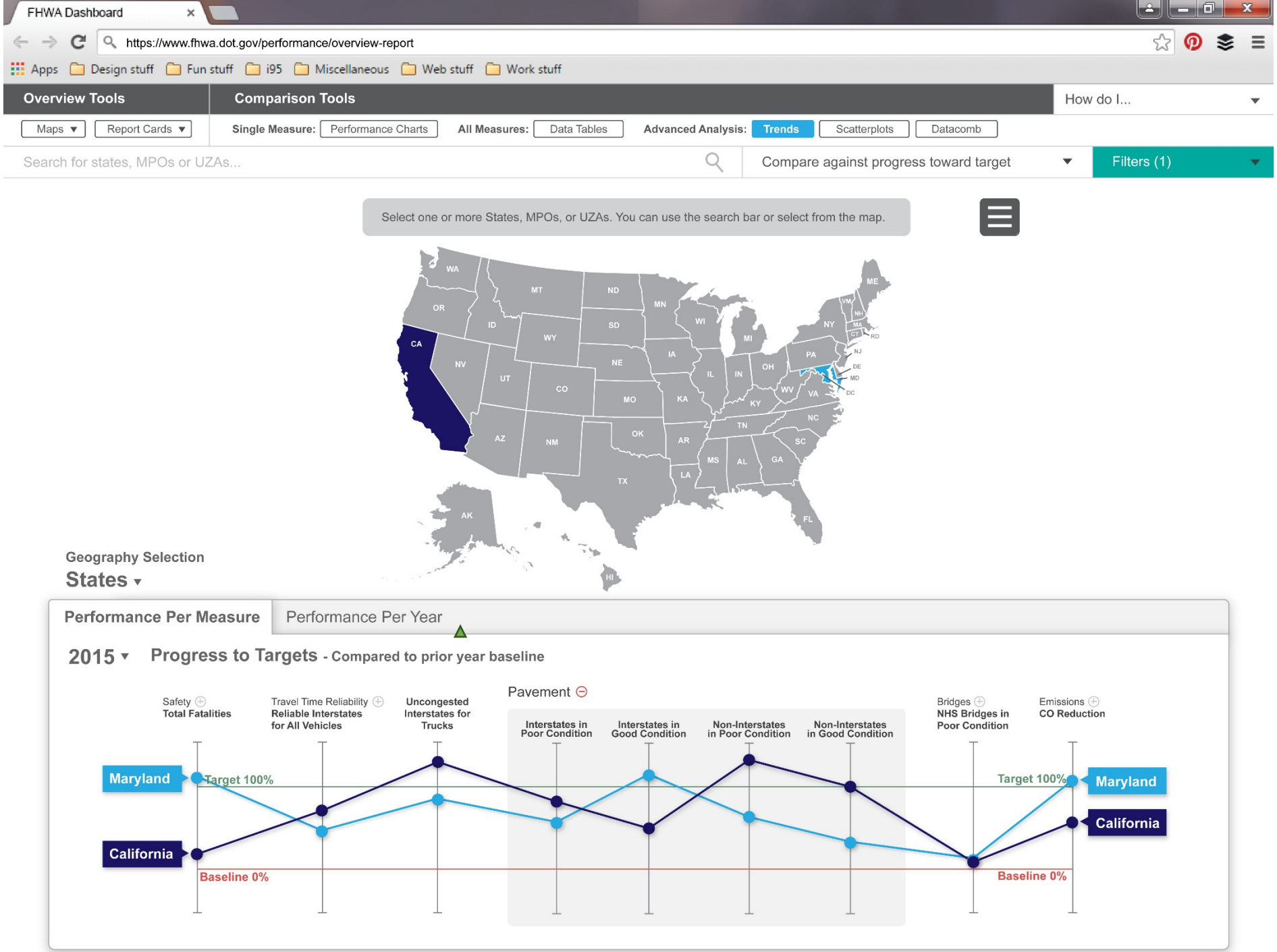
2015 Target: At least 90% of the system should have a LOTTR less than 1.50



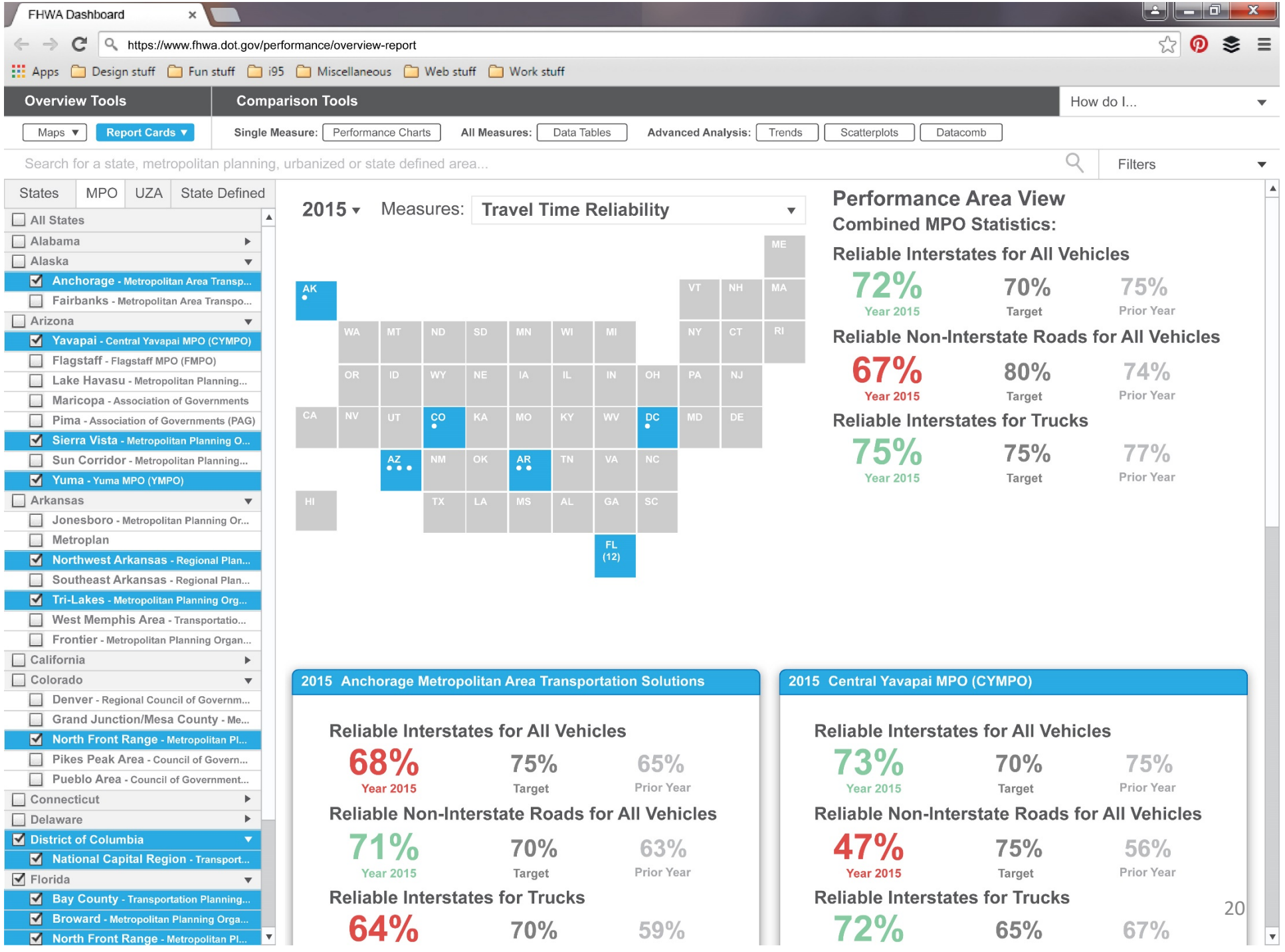
Show map...

LOTTR % in Maryland is Trending Downward Since 2013




FHWA Dashboard
https://www.fhwa.dot.gov/performance/overview-report
Apps
Design stuff
Fun stuff
i95
Miscellaneous
Web stuff
Work stuff
Overview Tools
Comparison Tools
How do I...
Maps
Report Cards
Single Measure:
Performance Charts
All Measures:
Data Tables
Advanced Analysis:
Trends
Scatterplots
Datacomb
Search for states, MPOs or UZAs...
Compare against progress toward target
Filters (1)
Select one or more States, MPOs, or UZAs. You can use the search bar or select from the map.
Geography Selection
States
Performance Per Measure
Performance Per Year
2015
Progress to Targets - Compared to prior year baseline
Safety
Total Fatalities
Travel Time Reliability
Reliable Interstates for All Vehicles
Uncongested Interstates for Trucks
Pavement
Interstates in Poor Condition
Interstates in Good Condition
Non-Interstates in Poor Condition
Non-Interstates in Good Condition
Bridges
NHS Bridges in Poor Condition
Emissions
CO Reduction
Maryland
California
Target 100%
Baseline 0%

Fatal Collision Rate State Comparison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Performance Charts
All Measures:
Data Tables
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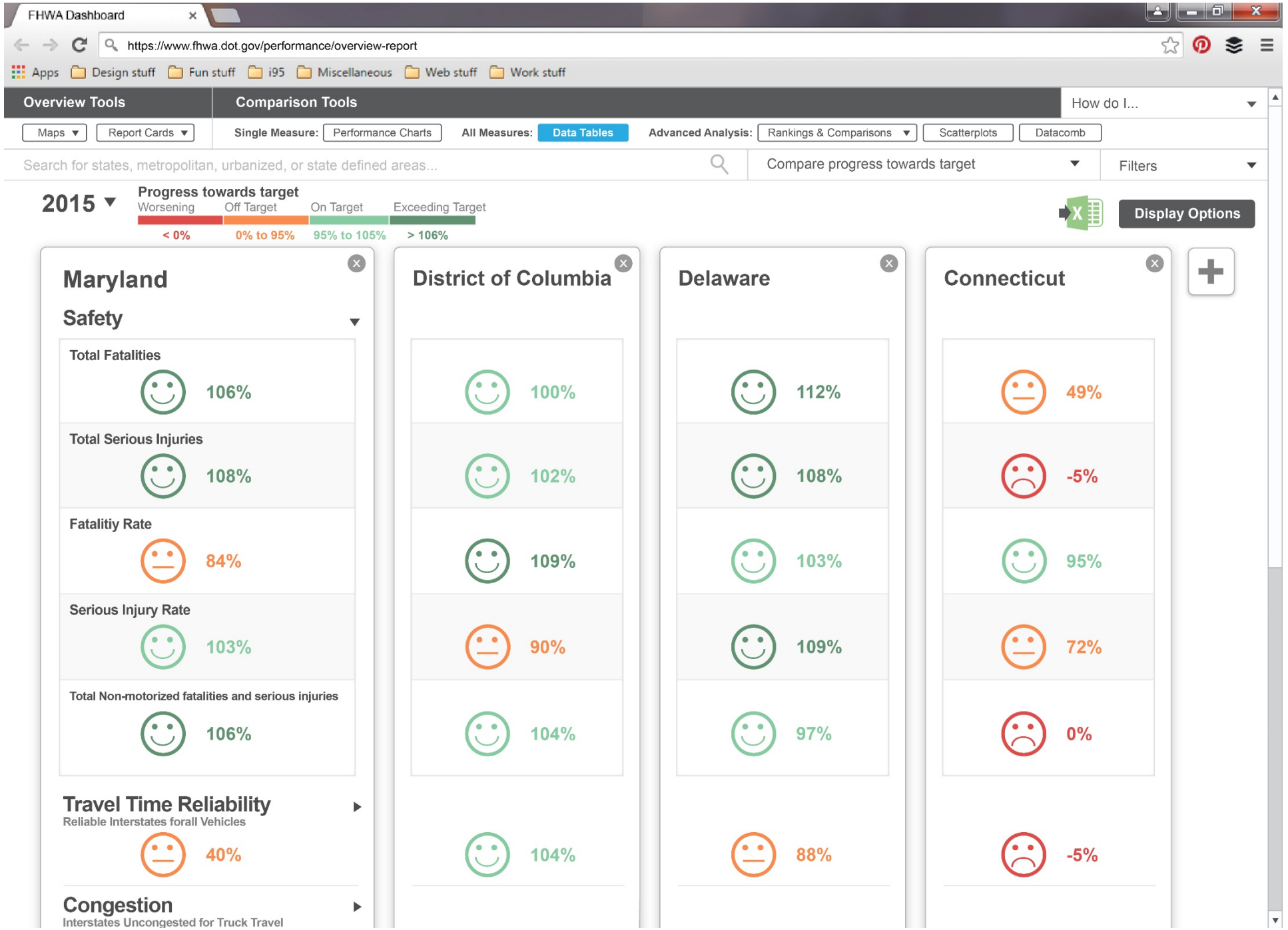
Scatterplots
Datacomb
Search for a state, metropolitan planning, urbanized or state defined area...
Filters
States
MPO
UZA
State Defined
All States
Alabama
Alaska
Anchorage - Metropolitan Area Transp...
Fairbanks - Metropolitan Area Transpo...
Arizona
Yavapai - Central Yavapai MPO (CYMPO)
Flagstaff - Flagstaff MPO (FMPO)
Lake Havasu - Metropolitan Planning...
Maricopa - Association of Governments
Pima - Association of Governments (PAG)
Sierra Vista - Metropolitan Planning O...
Sun Corridor - Metropolitan Planning...
Yuma - Yuma MPO (YMPO)
Arkansas
Jonesboro - Metropolitan Planning Or...
Metroplan
Northwest Arkansas - Regional Plan...
Southeast Arkansas - Regional Plan...
Tri-Lakes - Metropolitan Planning Org...
West Memphis Area - Transportatio...
Frontier - Metropolitan Planning Organ...
California
Colorado
Denver - Regional Council of Governm...
Grand Junction/Mesa County - Me...
North Front Range - Metropolitan Pl...
Pikes Peak Area - Council of Govern...
Pueblo Area - Council of Government...
Connecticut
Delaware
District of Columbia
National Capital Region - Transport...
Florida
Bay County - Transportation Planning...
Broward - Metropolitan Planning Orga...
North Front Range - Metropolitan Pl...
2015
Measures:
Travel Time Reliability
ME
AK
VT
NH
MA
WA
MT
ND
SD
MN
WI
MI
NY
CT
RI
OR
ID
WY
NE
IA
IL
IN
OH
PA
NJ
CA
NV
UT
CO
KA
MO
KY
WV
DC
MD
DE
AZ
NM
OK
AR
TN
VA
NC
HI
TX
LA
MS
AL
GA
SC
FL (12)
Performance Area View
Combined MPO Statistics:
Reliable Interstates for All Vehicles
72%
Year 2015
70%
Target
75%
Prior Year
Reliable Non-Interstate Roads for All Vehicles
67%
Year 2015
80%
Target
74%
Prior Year
Reliable Interstates for Trucks
75%
Year 2015
75%
Target
77%
Prior Year
2015 Anchorage Metropolitan Area Transportation Solutions
Reliable Interstates for All Vehicles
68%
Year 2015
75%
Target
65%
Prior Year
Reliable Non-Interstate Roads for All Vehicles
71%
Year 2015
70%
Target
63%
Prior Year
Reliable Interstates for Trucks
64%
70%
59%
2015 Central Yavapai MPO (CYMPO)
Reliable Interstates for All Vehicles
73%
Year 2015
70%
Target
75%
Prior Year
Reliable Non-Interstate Roads for All Vehicles
47%
Year 2015
75%
Target
56%
Prior Year
Reliable Interstates for Trucks
72%
65%
67%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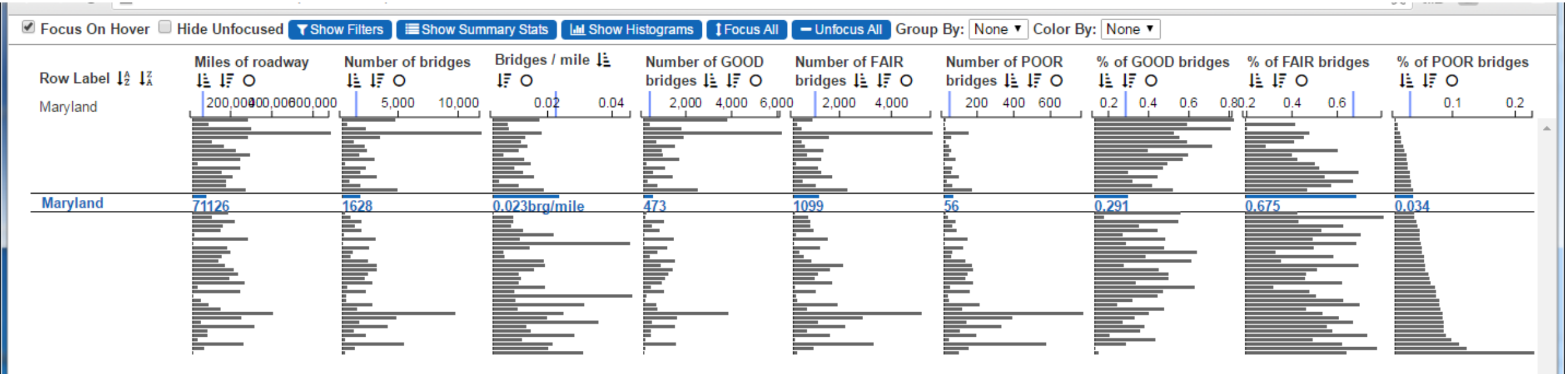
Maps
Report Cards
Single Measure:
Performance Charts
All Measures:
Data Tables
Advanced Analysis:
Rankings & Comparisons
Scatterplots
Datacomb
Search for states, metropolitan, urbanized, or state defined areas...
Compare progress towards target
Filters
2015
Progress towards target
Worsening
Off Target
On Target
Exceeding Target
< 0%
0% to 95%
95% to 105%
> 106%
Display Options
Maryland
Safety
Total Fatalities
106%
Total Serious Injuries
108%
Fatalitiy Rate
84%
Serious Injury Rate
103%
Total Non-motorized fatalities and serious injuries
106%
Travel Time Reliability
Reliable Interstates forall Vehicles
40%
Congestion
Interstates Uncongested for Truck Travel
District of Columbia
100%
102%
109%
90%
104%
104%
Delaware
112%
108%
103%
109%
97%
88%
Connecticut
49%
-5%
95%
72%
0%
-5%

Bridge Conditions by State



We all need to be on the same page…

- Standardization of Definitions & Methodologies is critical.
- ONLY documenting each agency's methods will:
  - allow for reproducibility, but
  - Lead to confusion, and
  - will NOT allow for any form of national performance reporting

I-95 CORRIDOR COALITION

Partners in Using Archived Operations Data

Example: Reliability & the Buffer Time Index

$$\frac{(95\%\ Travel\ Time - Average\ Travel\ Time)}{Average\ Travel\ Time}$$

Seems pretty straight forward, right?!

The issues on the following slides are REAL.

These come from over 20 states and 5+ consultants/universities who do this professionally.

$$\frac{(95\%\ Travel\ Time - Average\ Travel\ Time)}{Average\ Travel\ Time}$$

Philosophical Issue:

- What's the correct %?

95% 80% 75% ???

Employer perspective:

- Is it okay to be significantly late to work, a meeting, etc. once/week?
- Or is it okay to be significantly late to these things once per month?

What about daycare? School? Doctor's Appointments?

$$\frac{(95\%\ Travel\ Time - Average\ Travel\ Time)}{Average\ Travel\ Time}$$

Mathematical Issue

Agency 1: single value for the entire data set

Agency 2: Monthly aggregate values for each segment, broken down by day-of-week and hour-of-day.

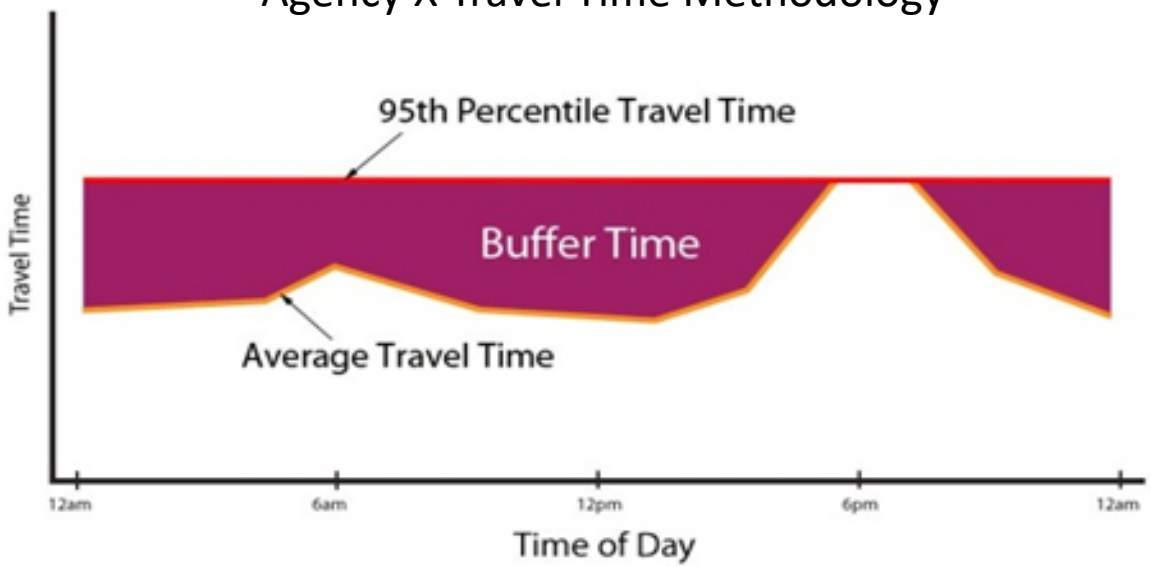
Case Study

- Analyze travel time data for:
  - weekdays:
  - the month of January.

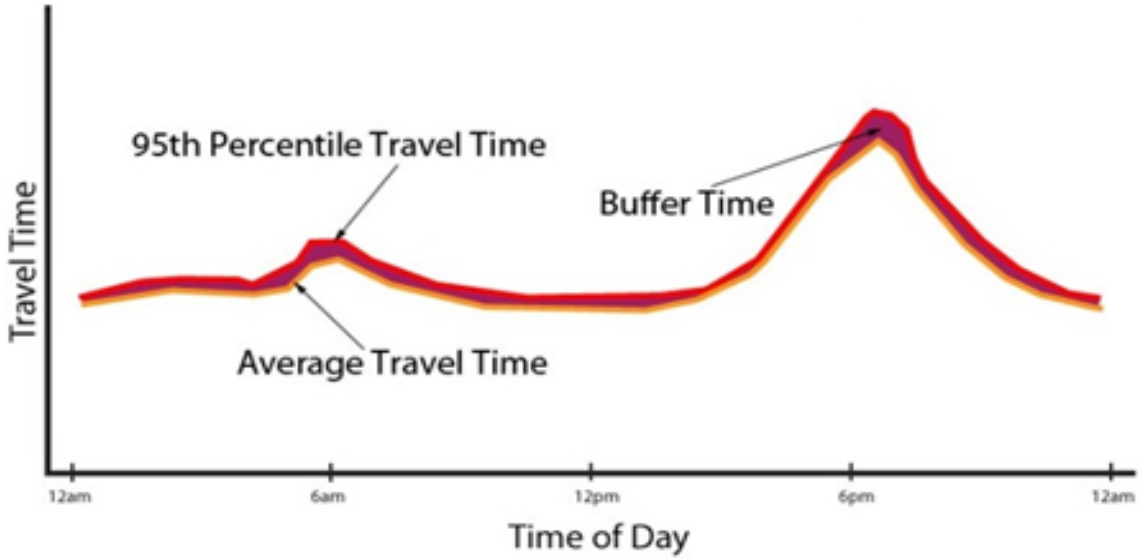
JANUARY						
SUN	MON	TUE	WED	THU	FRI	SAT
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

- How would the two approaches change the meaning of reliability?

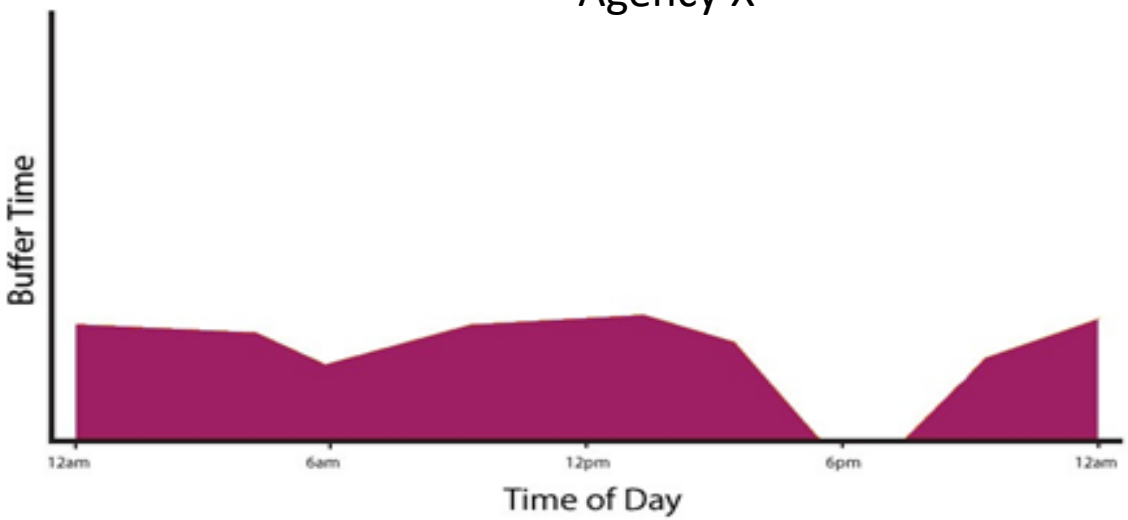
Agency X Travel Time Methodology



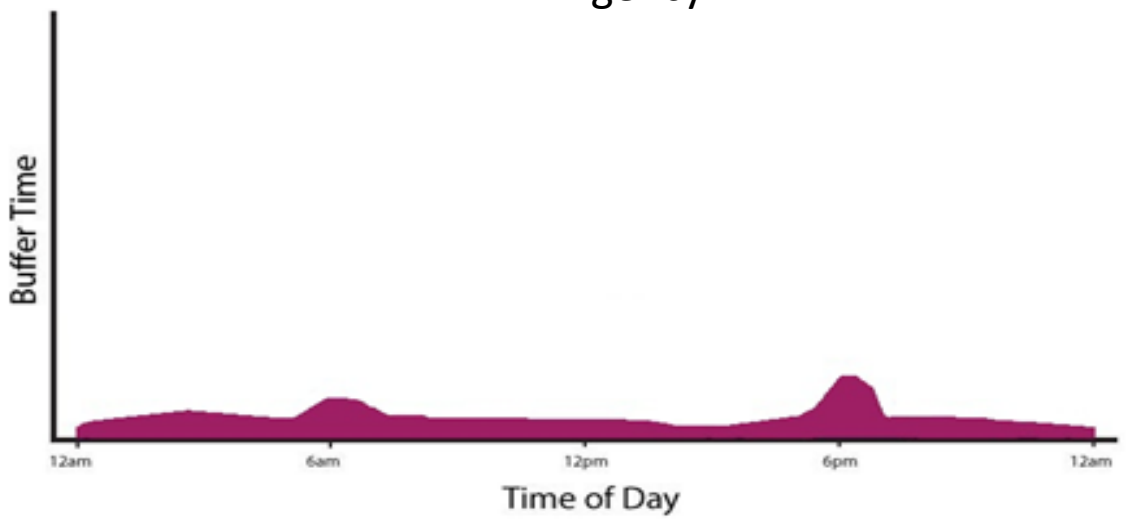
Agency Y Travel Time Methodology



Agency X



Agency Y

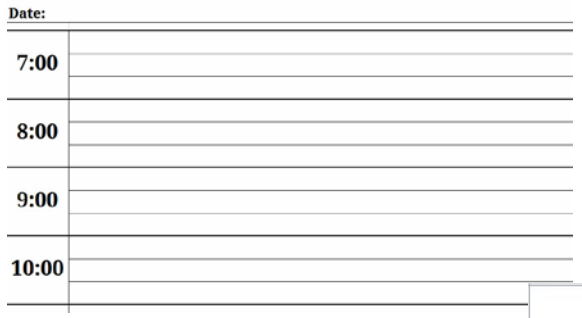


$$\frac{(95\%\ Travel\ Time - Average\ Travel\ Time)}{Average\ Travel\ Time}$$

How should we calculate the AVERAGE TRAVEL TIME?

Agency X's method: Use avg. of the date-range being analyzed. "Actual Average Travel Time"

Hour or Day



Week

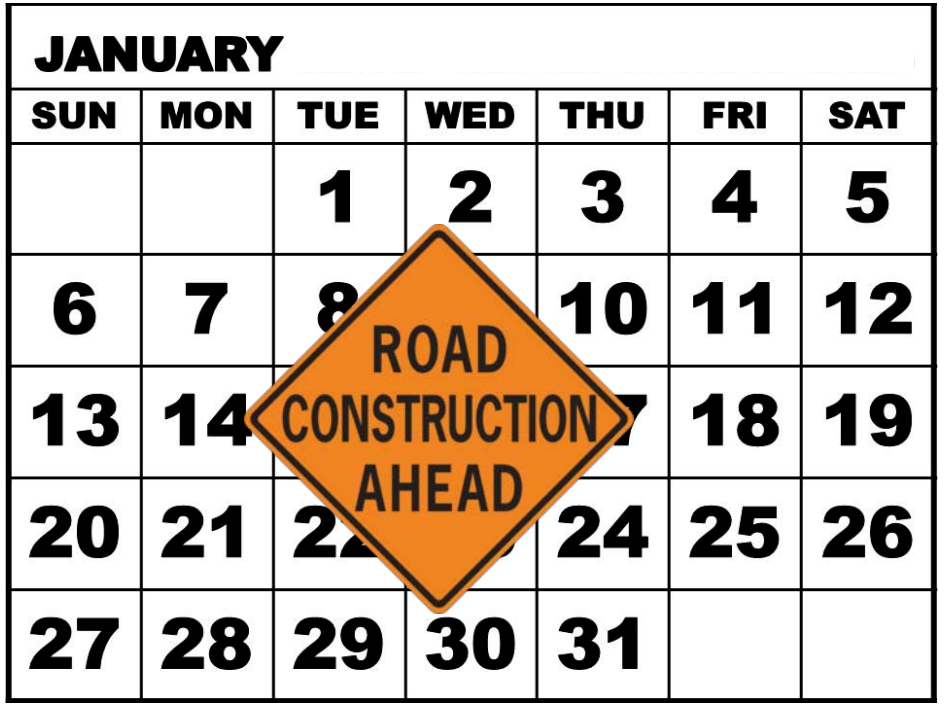
Month

Year

Agency Y method: a "*Historic* Average *Travel Time*", broken down by day of week and hour of day. This value is based on data received for the given day of week and hour of day, not just the data set being analyzed, and supposedly represents what travelers expect the travel time to be on a larger scale. (yearly, quarterly/seasonal, or multi-year)

Case Study

- Analyze travel time data for:
  - a single month along a road on which a major road construction project was occurring.

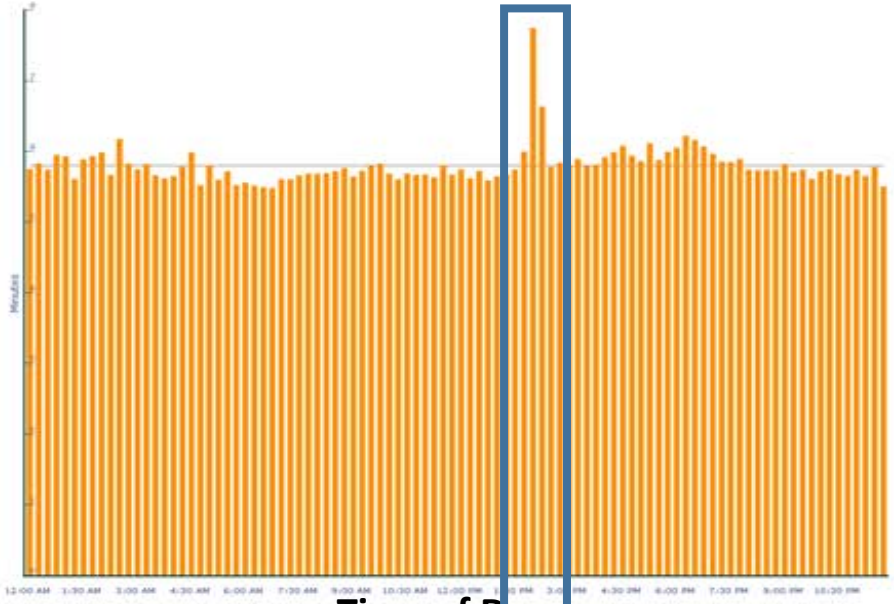


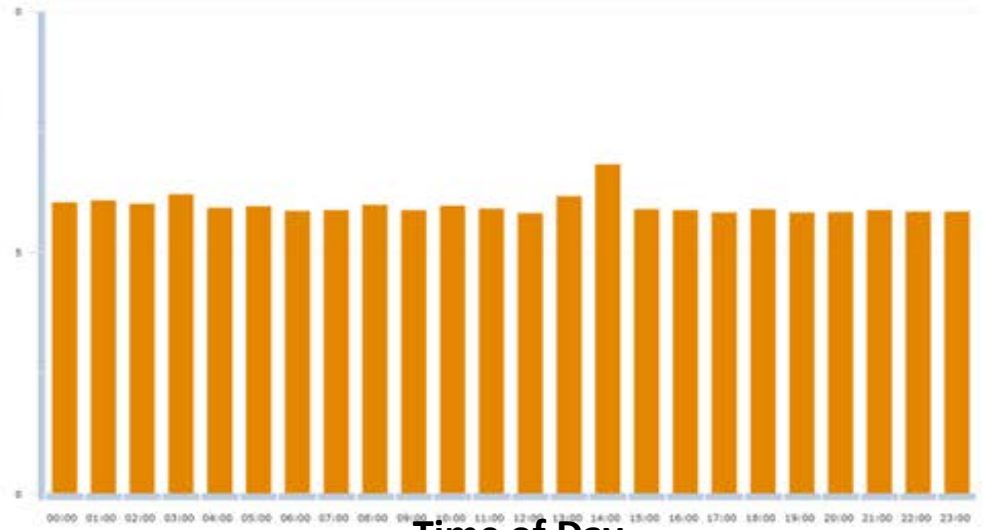
- How would the two approaches change the meaning of reliability?

Agency X

Agency Y

Travel Time minutes

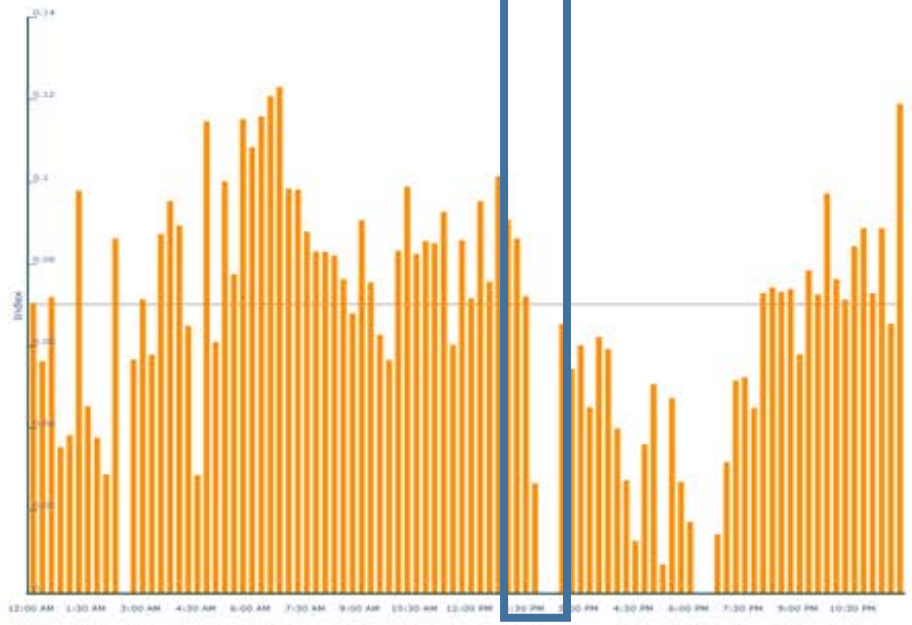


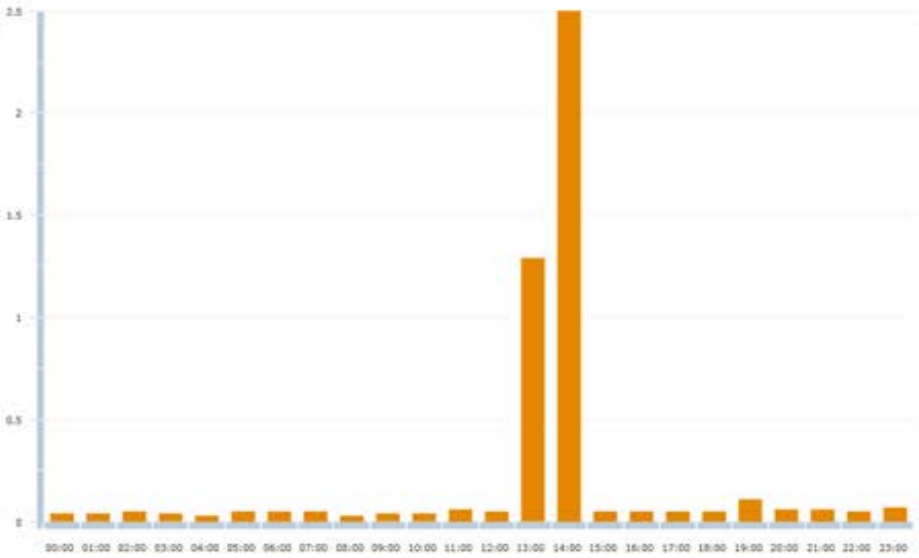


Time of Day

Time of Day

Buffer Time Index



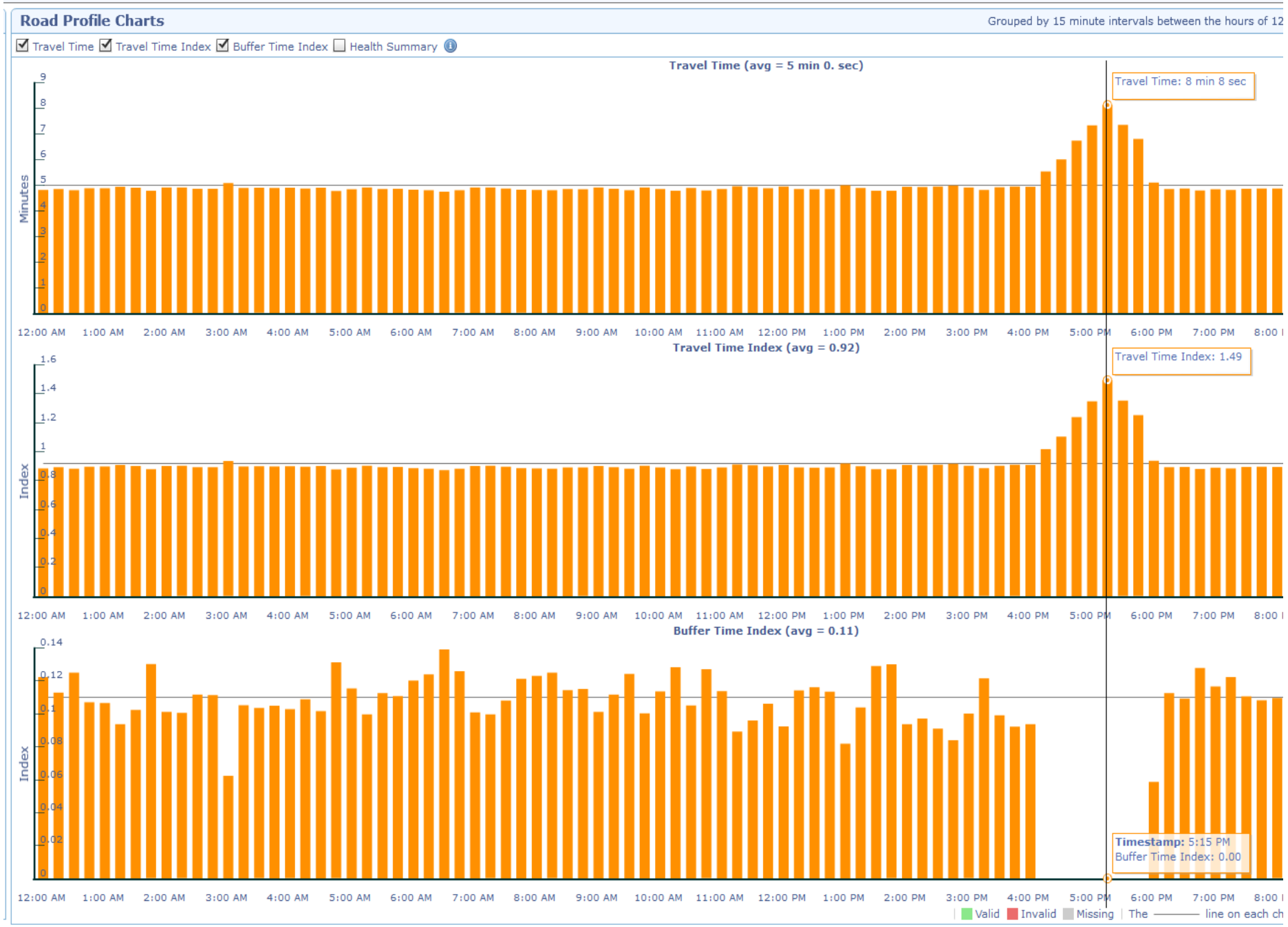


Rush Hour Example

Travel Time by Time of Day

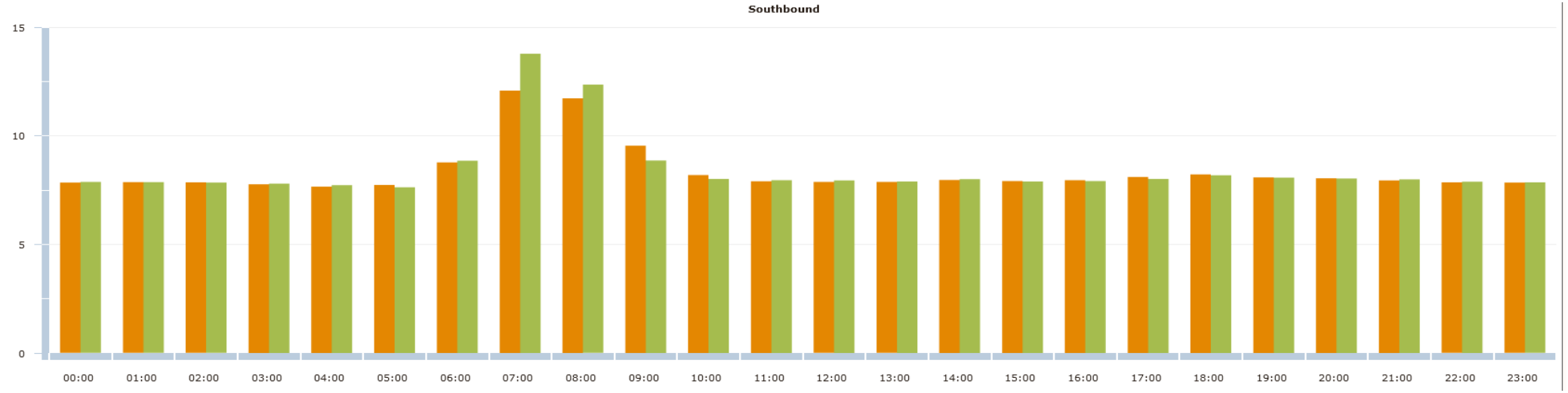
Travel Time Index by Time of Day

Buffer Time Index by Time of Day

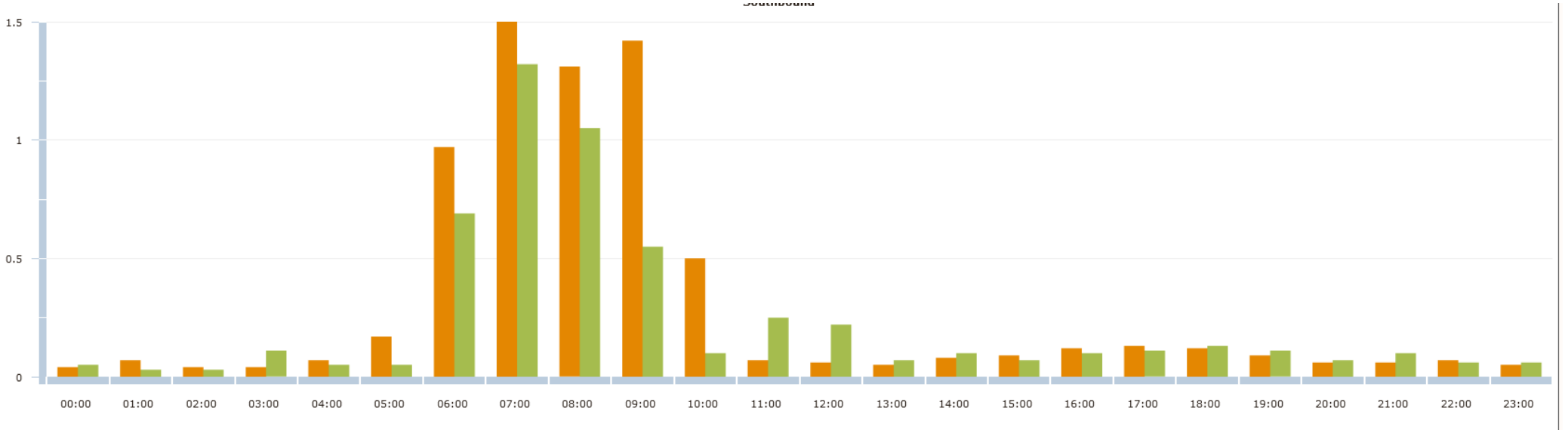


Rush Hour Example

Travel Time

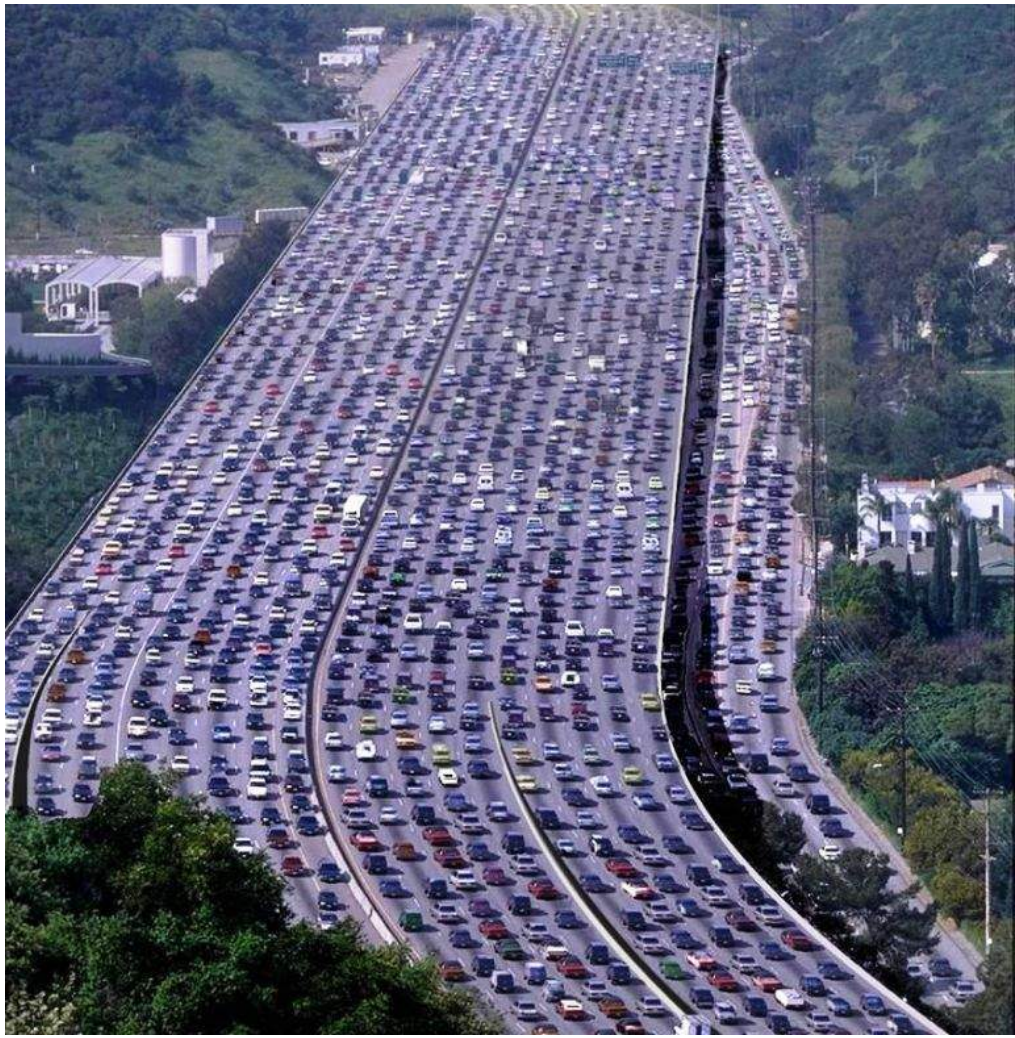


Buffer Time Index



Example 3: Defining congestion

- What's the threshold for Congestion in:



Work Zone Performance

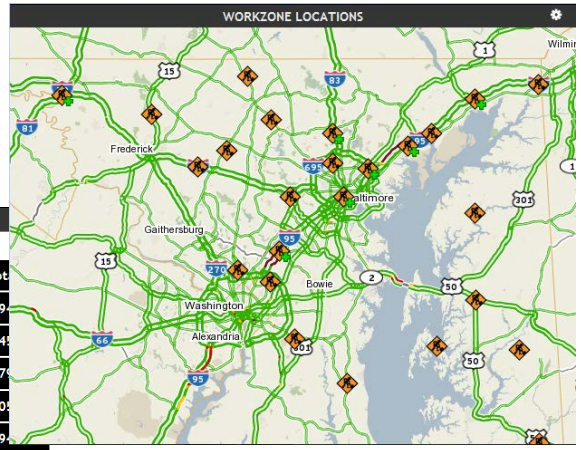
Performance Monitoring

Three disparate audiences and corresponding goals identified:

- **Audience**: Project Engineers and Managers
- **Goals**:
  - Real time performance
  - Alerts when thresholds exceeded
  - Potential actions based on identified performance

- **Audience**: Public Relations
- **Goals**:
  - Real time and historical performance
  - Responding to complaints and inquiries

- **Audience**: Planners and Decision Makers
- **Goals**:
  - Closure costs
  - Review of previous performance



Regional performance

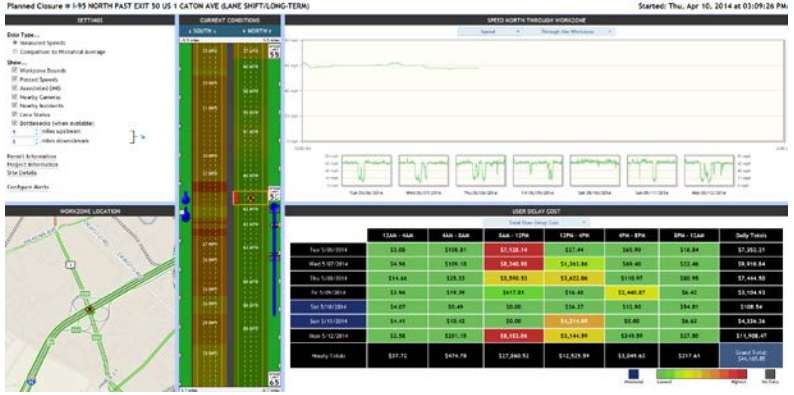
USER DELAY COST BY CORRIDOR AND DAY OF WEEK

Total User Delay Cost

	I-95	I-695	US-50	I-70	Daily Tot
Sun 5/04/2014	$2,293,148.25	$27,007.79	$91,719.43	$24,818.81	$2,436,69
Mon 5/05/2014	$2,690,597.77	$790,679.54	$245,683.44	$176,684.45	$3,903,64
Tue 5/06/2014	$2,615,804.89	$862,341.67	$384,208.20	$48,224.65	$3,910,57
Wed 5/07/2014	$2,845,013.60	$884,413.37	$380,984.89	$115,593.89	$4,226,00
Thu 5/08/2014	$1,467,929.80	$1,655,892.91	$499,083.14	$248,688.56	$3,871,59
Fri 5/09/2014	$1,892,924.58	$1,144,372.86	$315,555.14	$107,486.88	$3,460,339.47
Sat 5/10/2014	$3,304,754.54	$303,579.23	$121,740.65	$14,313.28	$3,744,387.71
Sun 5/11/2014	$2,435,040.40	$48,424.94	$268,858.10	$6,513.70	$2,758,837.15
Corridor Totals	$19,545,213.84	$5,716,712.31	$2,307,833.00	$742,324.22	Grand Total: $28,312,083.35

Weekend Lowest Highest No Data

Corridor performance



Individual work zone performance

Work Zone Dashboard

Workzone Dashboard

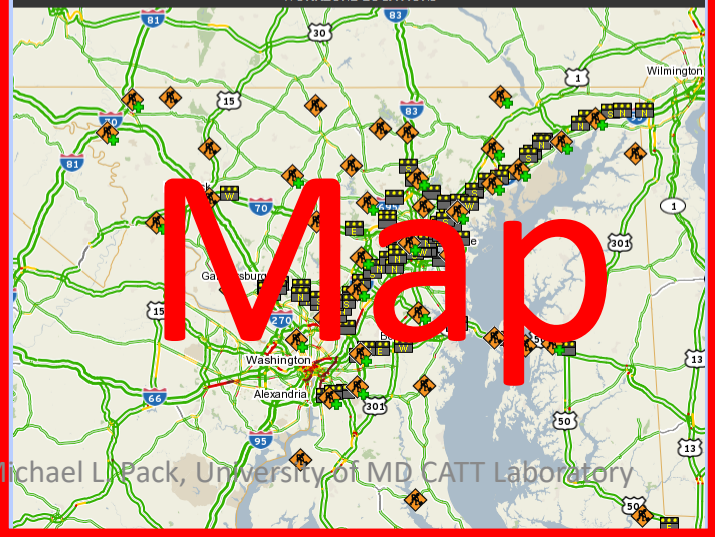
CURRENT WORKZONES IN MARYLAND

REGION/EVENT	# OF NEARBY INCIDENTS	QUEUE LENGTH (MI)	USER DELAY COST ($)
Maryland (76)	2043	1.06	$374,858.0
Allegany (3)	0	0	$9,618.00
I-68 EAST AT PLEASANT VALLEY RD	0	0	$1,396.00
US 220 SOUTH SOUTH OF MP 12.75	0	0	$59.00
I-68 WEST FROM S JOHNSON ST TO PARK ST	0	0	$8,163.00
Anne Arundel (2)	0	0	$18,167.00
MD 198 EAST AT MD 295	0	0	$8,374.00
MD 2 NORTH AT MD 255	0	0	$9,793.00
Baltimore (15)	197	0.22	$77,435.00
MD 26 EAST AT DEER PARK RD	0	0	$9,738.00
I-95 NORTH PAST EXIT 64 I 695 BALTIMORE BELTWAY[MM.64.3-64.8]	0	0	$431.00
MD 45 NORTH BETWEEN OLD PADONIA RD AND BEAVER RUN LA	0	0	$5,942.00
[illegible] 295 ENTRANCE (MM 3.6-4.7) LONG TERM SHOULDER CLOSURE	83	0	$9,748.00
[illegible]	0	0	$3,718.00
MD 45 SOUTH [illegible]	0	0	$880.00
[illegible]	0	0	$8,648.00
[illegible]	0	0	$9,028.00
I-70 EAST BETWEEN ROLLING RD AND COOKS LA	0	0	$5,854.00
MD 25 NORTH BETWEEN JOPPA RD AND GREENSPRING VALLEY RD	0	0.22	$58.00
I-695 OUTER LOOP FROM EXIT 18 MD 26 LIBERTY RD TO EXIT 17 MD 122 SECURITY BLVD	0	0	$6,995.00
MD 25 SOUTH/NORTH FROM MT CARMEL RD TO BENSON MILL RD	0	0	$939.00
MD 147 SOUTH BETWEEN KNOLL ACRES DR AND NORTH WIND RD	0	0	$2,107.00
I-95 SOUTH SOUTH OF EXIT 49 I 695 BALTIMORE BELTWAY	1	0	$4,168.00
MD 45 SOUTH FROM WINDWOOD RD TO [illegible]	0	0	$9,181.00
Baltimore City (4)	178	0	$26,997.00
I-95 NORTH PAST EXIT 50 US 1 CATON AVE [illegible]	17	0	$9,485.00
I-895 NORTH AT POTEE ST ON POTEE ST	0	0	$2,945.00
I-695 INNER LOOP PAST EXIT 1 MD 173 [illegible]	0	0	$9,257.00
I-895 SOUTH AT EXIT 7 MD 2 POTEE ST [illegible]	161	0	$5,310.00
Calvert (1)	0	0	$324.00
MD 231 EAST BETWEEN SKIPJACK RD AND STAFFORD RD	0	0	$324.00
Carroll (3)	1	0	$18,550.00
MD 26 WEST AT MP 16.7	0	0	$7,678.00
MD 97 SOUTH/NORTH AT OLD HANOVER RD	0	0	$1,092.00
MD 26 EAST/WEST BETWEEN MD 27 AND BUFFALO RD	1	0	$9,780.00
Cecil (4)	20	0	$22,638.00
US 40 WEST AT Thomas Hatem Memorial Bridge	0	0	$5,919.00
I-95 SOUTH PRIOR TO EXIT 100 MD 272 NORTHEAST RD (MM 99.54 -96.73)	19	0	$7,744.00
I-95 SOUTH PAST EXIT 93 MD 222 BAINBRIDGE RD (MM92-89)	0	0	$7,475.00
I-95 SOUTH PAST EXIT 100 MD 272 NORTHEAST RD[MM 100-98.51]	1	0	$1,173.00

TOP CRITICAL WORKZONES

SEVERITY/EVENT	LANE STATUS	QUEUE LENGTH (MI)	USER DELAY COST ($)

WORKZONE LOCATIONS



USER DELAY COST BY CORRIDOR AND DAY OF WEEK

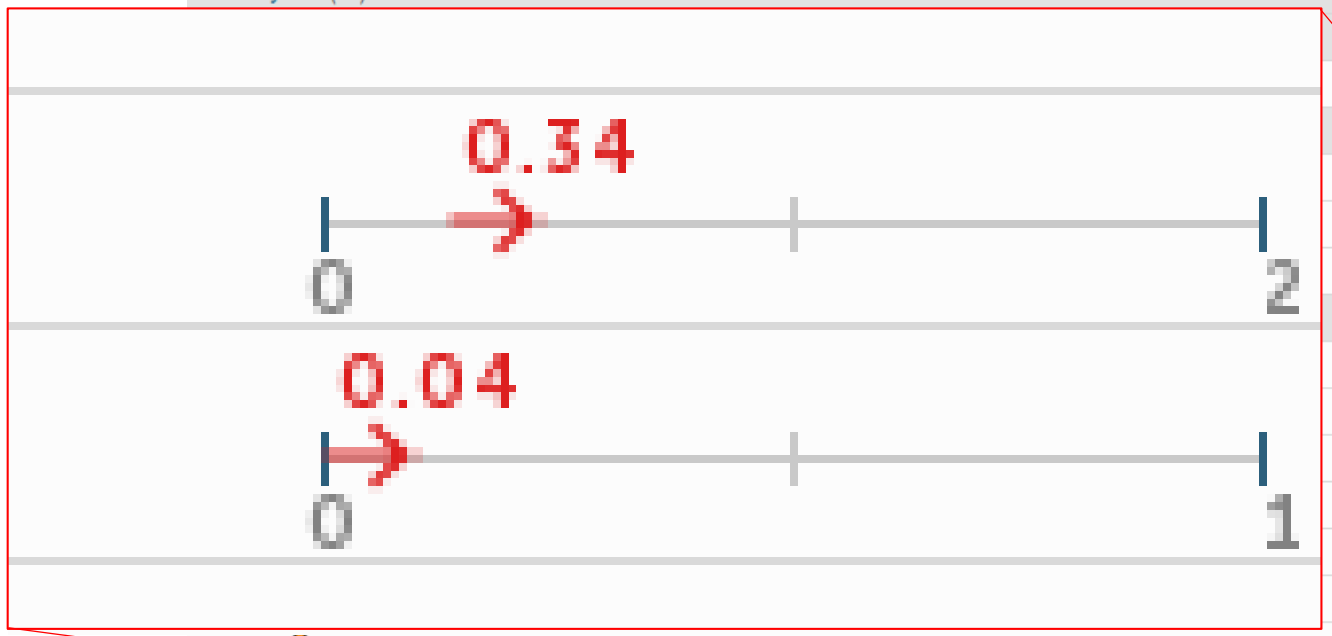
Total User Delay Cost

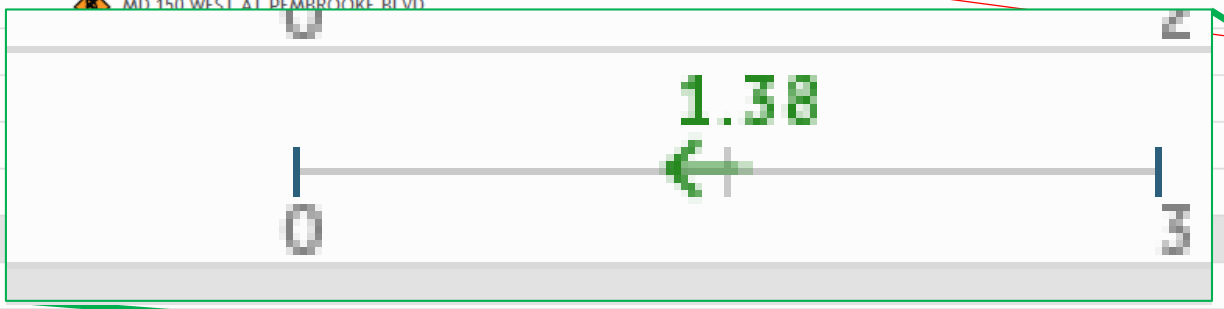
	I-95	I-695	US-50	I-70	Daily Totals
Wed 4/09/2014	$2,678,358.64	$626,606.88	$229,861.28	$48,652.15	$3,583,478.94
Thu 4/10/2014	$1,239,852.54	$1,050,702.81	$301,406.33	$77,104.65	$2,669,066.33
Fri 4/11/2014	[illegible]	$1,105,801.53	$474,634.47	$107,010.25	$3,493,788.29
Sat 4/12/2014	$3,367,462	[illegible]	[illegible]	[illegible]	$3,660,917.46
Sun 4/13/2014	$2,548,28[illegible]	[illegible]	$83,9[illegible]	$8,[illegible]	$2,677,692.82
Mon 4/14/2014	[illegible]	[illegible]	$19[illegible]	$184,7[illegible]	$3,369,250.33
Tue 4/15/2014	$2,838,798.60	$905,736.49	$258,710.91	$125,3[illegible]	$4,128,557.87
Wed 4/16/2014	$2,937,018.16	$500,186.92	$212,687.02	$83,203.90	$3,733,096.00
Corridor Totals	$20,077,788.75	$4,729,538.59	$1,867,770.87	$640,749.82	Grand Total: $27,315,848.03

Weekend | Lowest | Highest | No Data

Overview List Critical Map Delay

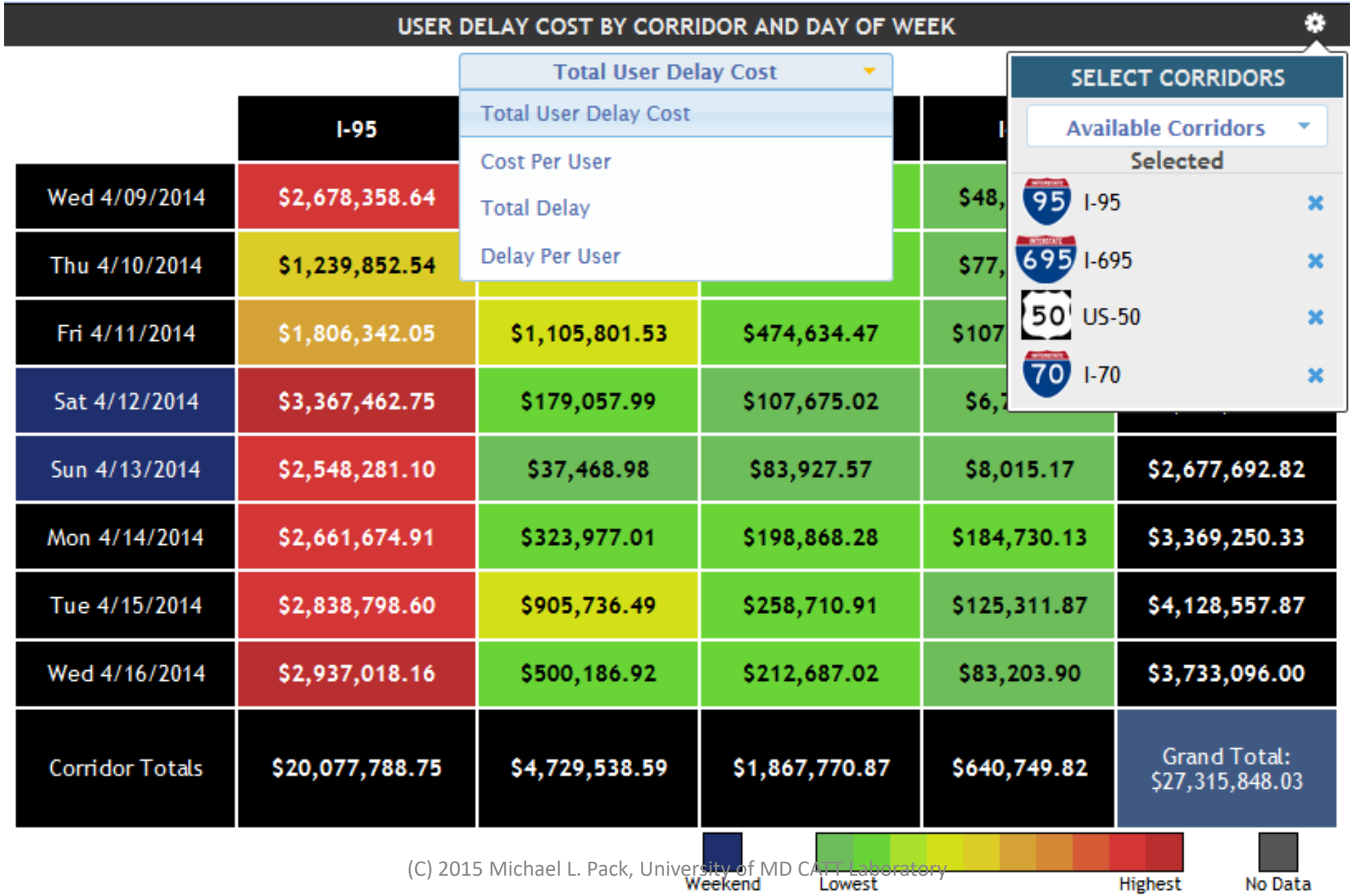
Current Work Zone List





REGION/EVENT	# OF NEARBY INCIDENTS	QUEUE LENGTH (MI)	USER DELAY COST ($)
Maryland (55)	527	5.24	$310,306.00
	0	0	$6,278.00
	0		$20,774.00
	87	2.73	$78,513.00
I-695 OUTER LOOP AT HARFORD RD			
MD 26 EAST/WEST BETWEEN PIKESWOOD DR AND TIVERTON RD			
I-83 NORTH AT EXIT 31 MIDDLETOWN RD			
MD 150 WEST AT PEMBROOKE BLVD			
	2	1.38	$14,329.00
I-695 INNER LOOP AT MP 49.3 (FRANCIS SCOTT KEY BRIDGE)			
I-695 OUTER LOOP WEST OF EXIT 1 MD 173 HAWKINS POINT RD (CURTIS CREEK DRAWBRIDGE)			
Calvert (3)	0	0	$24,014.00

UDC Options and Corridor Selection



	I-95				
Wed 4/09/2014	$2,678,358.64			$48,	
Thu 4/10/2014	$1,239,852.54			$77,	
Fri 4/11/2014	$1,806,342.05	$1,105,801.53	$474,634.47	$107	
Sat 4/12/2014	$3,367,462.75	$179,057.99	$107,675.02	$6,7	
Sun 4/13/2014	$2,548,281.10	$37,468.98	$83,927.57	$8,015.17	$2,677,692.82
Mon 4/14/2014	$2,661,674.91	$323,977.01	$198,868.28	$184,730.13	$3,369,250.33
Tue 4/15/2014	$2,838,798.60	$905,736.49	$258,710.91	$125,311.87	$4,128,557.87
Wed 4/16/2014	$2,937,018.16	$500,186.92	$212,687.02	$83,203.90	$3,733,096.00
Corridor Totals	$20,077,788.75	$4,729,538.59	$1,867,770.87	$640,749.82	Grand Total: $27,315,848.03

Individual Work Zone Profile

Planned Closure @ I-695 INNER LOOP BETWEEN EXIT 12 MD 372 WILKENS AVE AND EXIT 13 MD 144 FREDERICK RD

Started: Thu, Apr 24, 2014 at 09:24:56 AM

SETTINGS

Settings

Data Type...
- Measured Speeds
- Comparison to Historical Average

Show...
- Work Zone Bounds
- Posted Speeds
- Associated VMS
- Nearby Cameras
- Nearby Incidents
- Lane Status
- Bottlenecks (when available)

5 miles upstream

5 miles downstream

Permit Information

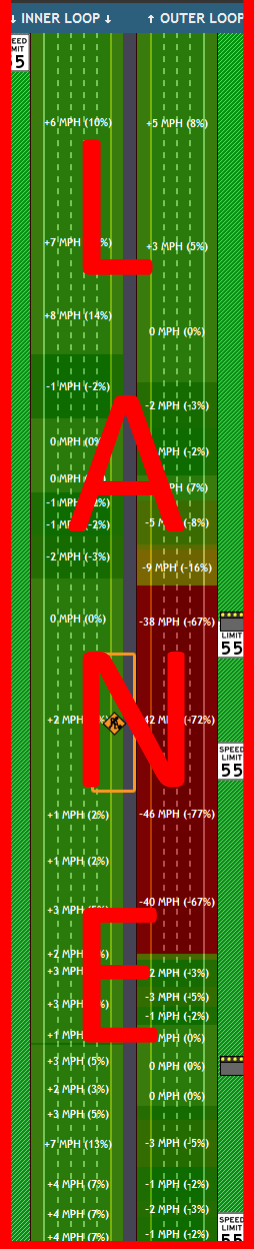
Project Information

Site Details

Configure Alerts

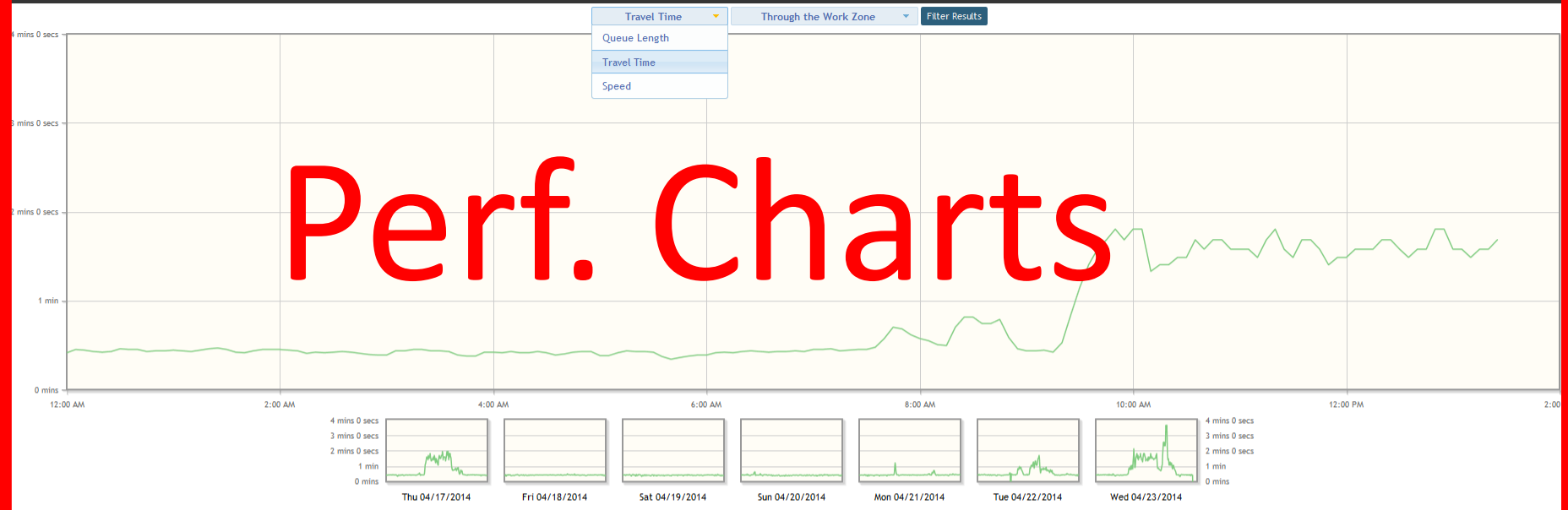
CURRENT CONDITIONS

LANE



TRAVEL TIME THROUGH WORKZONE ONLY

Perf. Charts



WORK ZONE LOCATION

Map

USER DELAY COST

Delay

Total User Delay Cost

	12AM - 4AM	4AM - 8AM	8AM - 12PM	12PM - 4PM	4PM - 8PM	8PM - 12AM	Daily Totals
Thu 4/17/2014	$11.52	$183.00	$9,306.97	$16,405.23	$2,958.90	$67.58	$28,933.20
Fri 4/18/2014	$6.17	$29.46	$82.00	$221.35	$127.06	$50.00	$516.04
Sat 4/19/2014	$27.17	$7.65			$17.28	$46.01	$123.66
Sun 4/20/2014	$39.81	$24.66			$26.78	$18.42	$115.80
Mon 4/21/2014	$2.46	$48.75			$899.54	$131.35	$1,973.63
Tue 4/22/2014	$25.38	$264.46	$1,819.65	$8,771.39	$2,675.70	$189.00	$13,745.58
Wed 4/23/2014	$20.52	$477.24	$12,525.82	$13,993.07	$16,213.27	$80.23	$43,310.14
Hourly Totals	$133.04	$1,035.22	$24,525.89	$39,522.78	$22,918.53	$582.59	Grand Total: $88,718.06

Weekend | Lowest | Highest | No Data