

DEVELOPMENT OF 2018 CONGESTION MANAGEMENT PROCESS (CMP) TECHNICAL REPORT

An Update

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TPB Technical Committee
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Requirement for a CMP

- A Congestion Management Process (CMP) is a requirement in metropolitan transportation planning
 - Many generations of federal regulations for metropolitan planning have addressed CMP requirements
 - FAST Act retained these CMP requirements
 - Added an option for a Congestion Management Plan that TMAs could pursue – may be considered in the future
- The official CMP component is being wholly integrated into the overall long-range transportation plan (Visualize 2045) to address this requirement



The Series of CMP Technical Reports

- CMP Technical Reports were released in 2008, 2010, 2012, 2014, and 2016
- 2010 and 2014 Federal Certification of the TPB Process commended the CMP for its detailed documentation efforts in the CMP Technical Reports
- Draft 2018 CMP Technical Report being made available for review now, for Technical Committee acceptance as final at the September 7 meeting
- Included are documentation of both CMP-specific analyses and concomitant efforts



“The CMP” Is “in” Visualize 2045

- Bottom line – the “Performance Planning” Chapter 6 of Visualize 2045
 - Chapter 6 explains and integrates the three major performance drivers of regional transportation planning – PBPP, safety, and CMP
 - Visualize 2045 document will also have a CMP appendix (still under development) to provide more detail
- TPB will approve the CMP via its inclusion in Visualize 2045
 - The Technical Report is not the CMP – the CMP component within the Visualize 2045 document will be the “official” document
 - The Technical Report provides source information for the CMP
- Process and relationship of these documents may evolve in future years



Outline of the CMP Technical Report

- Executive Summary
- Chapter 1. Introduction
- Chapter 2. State of Congestion
- Chapter 3. Consideration and Implementation of Congestion Management Strategies
- Chapter 4. Studies of Congestion Management Strategies
- Chapter 5. How Results of The CMP Are Integrated Into The CLRP
- Chapter 6. Conclusions
- Appendices



Chapter 2. State of Congestion

2.1 Regional Travel Trends

2.2 Congestion on Highways

2.3 Congestion on Transit Systems

2.4 Other Congestion Monitoring and Data Consolidation Activities

2.5 National Comparison of the Washington Region's Congestion

2.6 Performance and Forecasting Analysis of the 2016 Financially Constrained Long-Range Transportation Plan (CLRP)



Chapter 3. Consideration and Implementation of Congestion Management Strategies (1/3)

3.1 Overview of Congestion Management Strategies

3.2 Demand Management Strategies

3.2.1 Commuter Connections Program

3.2.2 Local And Other Transportation Demand Management And Traffic Management Activities

3.2.3 Transit Systems

3.2.4 Pedestrian And Bicycle Transportation

3.2.5 Car Sharing

3.2.6 Land Use Strategies In The Washington Region



Chapter 3. Strategies (2/3)

3.3 Operational Management Strategies

3.3.1 High-occupancy Vehicle (HOV) Facilities

3.3.2 Variably Priced Lanes/Systems

3.3.3 Traffic Management

3.4 Integrative/Multi-Modal Strategies

3.4.1 Advanced Traveler Information Systems (ATIS)

3.4.2 Bus Priority Systems

3.4.3 Regional Its Architecture

3.4.4 Integrated Corridor Management (ICM)

3.4.5 Evaluating Significant Transportation Projects (Virginia)



Chapter 3. Strategies (3/3)

3.4 Integrative/Multi-Modal Strategies (cntd.)

3.4.6 Mobile Devices And Social Media

3.4.7 Traffic Management Activities Associated With Defense Base Closure And Realignment Commission (BRAC) Actions

3.5 Additional System Capacity

3.5.1 Documentation Of Congestion Management For Additional System Capacity

3.5.2 Where Additional System Capacity Is Needed And How The Additional System Capacity Will Be Managed Efficiently

3.6 Project-Related Congestion Management



Chapter 4. Studies of Congestion Management Strategies

4.1 Review of Performance Measures

4.2 Review of Congestion Management Strategies

4.3 Examples of Strategies Studies

4.3.1 Analysis Of Transportation Emissions Reduction Measures (TERMs)

4.3.2 Scenario Planning



Chapter 5. CMP Integration in Visualize 2045

- 5.1 Components of the CMP Are Integrated in Visualize 2045
- 5.2 Demand Management in Visualize 2045
- 5.3 Operational Management in Visualize 2045
- 5.4 Capacity Increases in Visualize 2045
- 5.5 Congestion Management Aspects of Special Studies and Initiatives



Chapter 6. CONCLUSIONS

- 6.1 Key Findings of the 2018 CMP Technical Report
 - 8 Key Findings
- 6.2 Recommendations for the Congestion Management Process
 - 17 Recommendations



Key Findings

1. Congestion analysis (similar)
2. Reliability analysis (similar)
3. Bottlenecks (similar)
4. Travel demand management continues its importance
5. Walking/biking continue to grow
6. Variably priced lanes offer travel options
7. MATOC continues its importance
8. Real-time information availability continues its importance



Report Recommendations (1 of 2)

1. Continue Commuter Connections
2. Continue MATOC
3. Consider Congestion Management Plan
4. Coordinate PBPP and CMP
5. Encourage integration of operations and travel demand components of congestion management
6. Pursue sufficient investment in the existing transportation system
7. Consider variable pricing and other management strategies
8. Encourage transit and explore transit priority strategies
9. Encourage congestion management for major construction projects



Report Recommendations (2 of 2)

10. Encourage access to non-auto modes
11. Continue and enhance traveler information
12. Look for safe public engagement through mobile/social media
13. Encourage connectivity within/between Activity Centers
14. Multiple data sources for congestion monitoring
15. Monitor freight trends
16. Collaborative planning for connected/autonomous vehicles
17. Monitor and enhance interactions with shared mobility services



Appendices

APPENDIX A – 2017 PEAK HOUR TRAVEL TIME INDEX

APPENDIX B – 2017 PEAK HOUR PLANNING TIME INDEX

APPENDIX C – 2010 AND 2015-2017 TRAVEL TIMES ALONG MAJOR FREEWAY
COMMUTE CORRIDORS

APPENDIX D – 2014 PERFORMANCE OF HIGH-OCCUPANCY VEHICLE FACILITIES ON
FREEWAYS IN THE WASHINGTON REGION

APPENDIX E – SUMMARY OF TRANSPORTATION EMISSION REDUCTION MEASURE
(TERM) ANALYSIS REPORT FY 2015-2017

APPENDIX F – SAMPLE CMP DOCUMENTATION FORM

APPENDIX G – REVIEW OF CONGESTION MANAGEMENT STRATEGIES



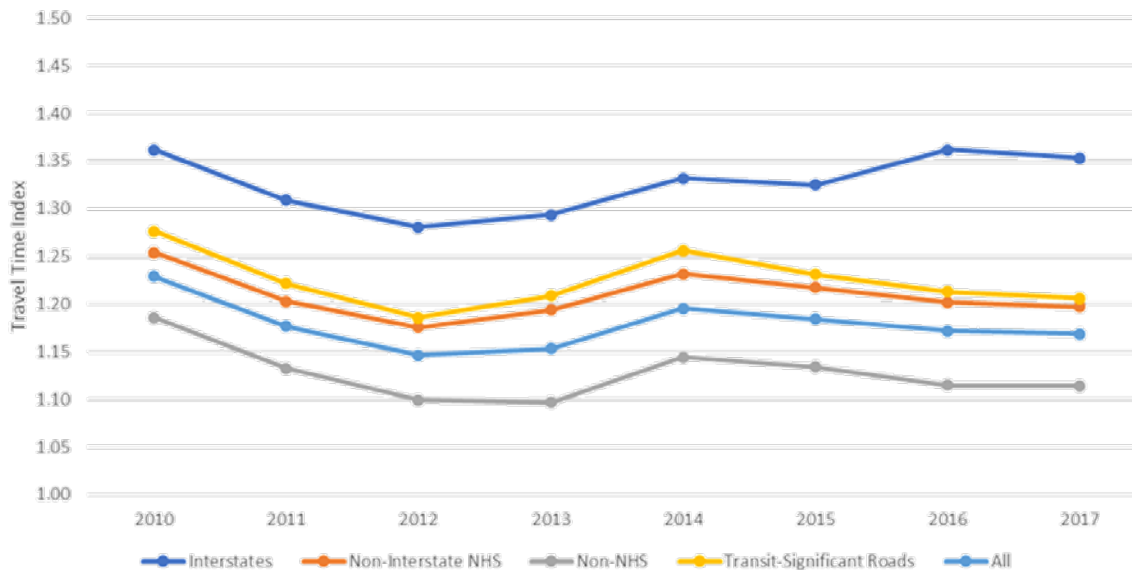
Regional Travel Trends (Draft)

Population, Employment, Vehicle Miles Traveled, Transit Ridership, and Travel Time Index in the TPB Planning Area



Peak Period Congestion – Travel Time Index

- Peak period congestion decreased between 2010 and 2012, but more recently has increased moderately
 - Travel Time Index* (TTI) decreased 6.7% between 2010 and 2012 and increased by 2.0% from 2012 to 2017.
 - Interstates remained the most congested highway category, followed by Transit-Significant roads**, non-Interstate NHS, and non-NHS.



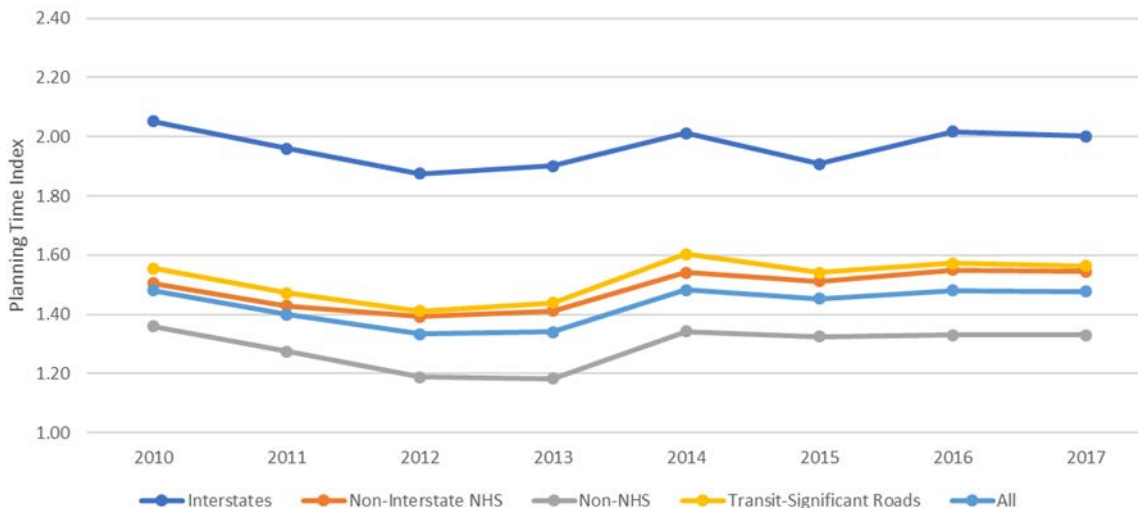
*Travel Time Index =
Actual travel time / Free flow
travel time.

** Transit-Significant Roads:
Directional road segments with
at least 6 buses running in the
AM peak hour.



Peak Period Travel Time Reliability

- Peak period travel time reliability improved between 2010 and 2012, but more recently has decreased moderately, almost to the 2010 level
 - Planning Time Index* (PTI) improved 10% between 2010 and 2012, but has almost gone back to the 2010 level in 2014, 2016, and 2017.
 - Most unreliable category is Interstates, followed by Transit-Significant Roads, non-Interstate NHS, and non-NHS.

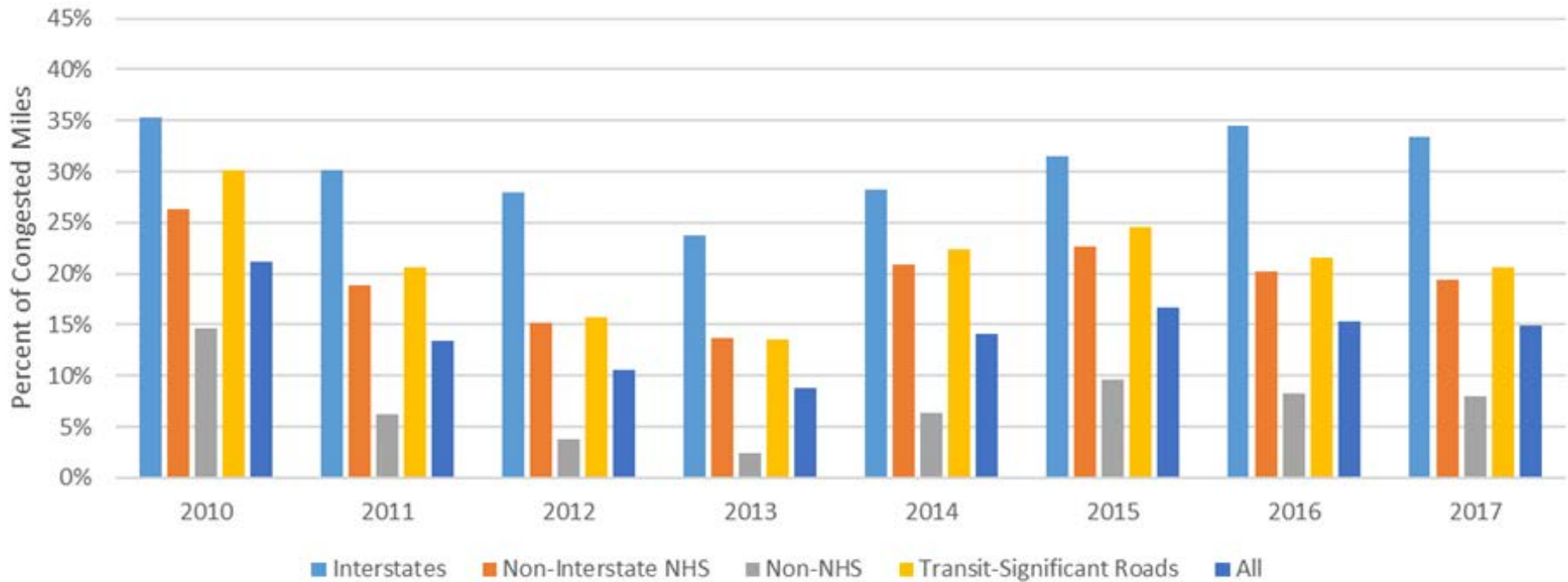


*Planning Time Index =
95th percentile travel time /
Free flow travel time



Peak Period Congestion – Percent of Congested Miles

- Overall, the percentage of congested* directional road miles was 21% in 2010, 11% in 2012 and 15% in 2017

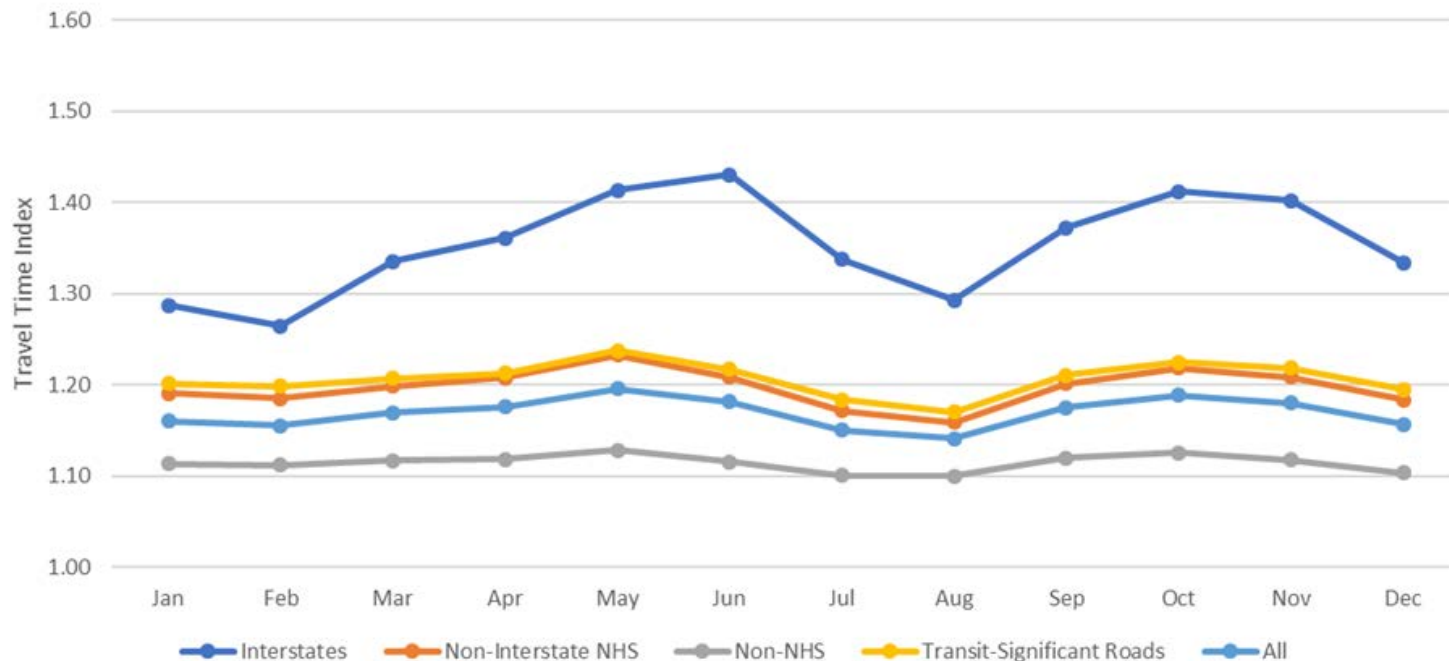


*Congestion is considered when Travel Time Index > 1.30.



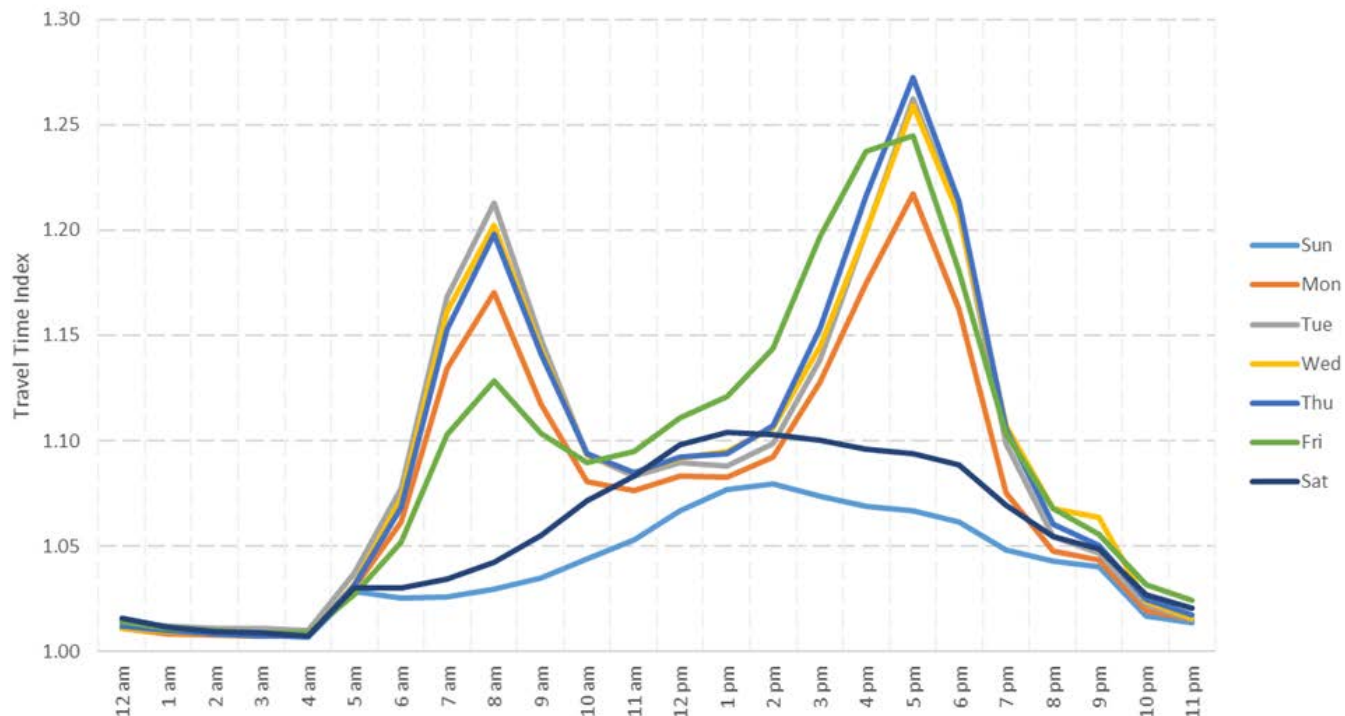
Monthly Variation of Congestion in 2017

- Monthly variations of congestion were most noticeable on the Interstate System, followed by the Transit-Significant Roads, the Non-Interstate NHS, and the Non-NHS
- The region overall had increasing congestion from January to May, then decreasing congestion through August. October had the highest level of congestion, after that, congestion kept decreasing for the rest of year.



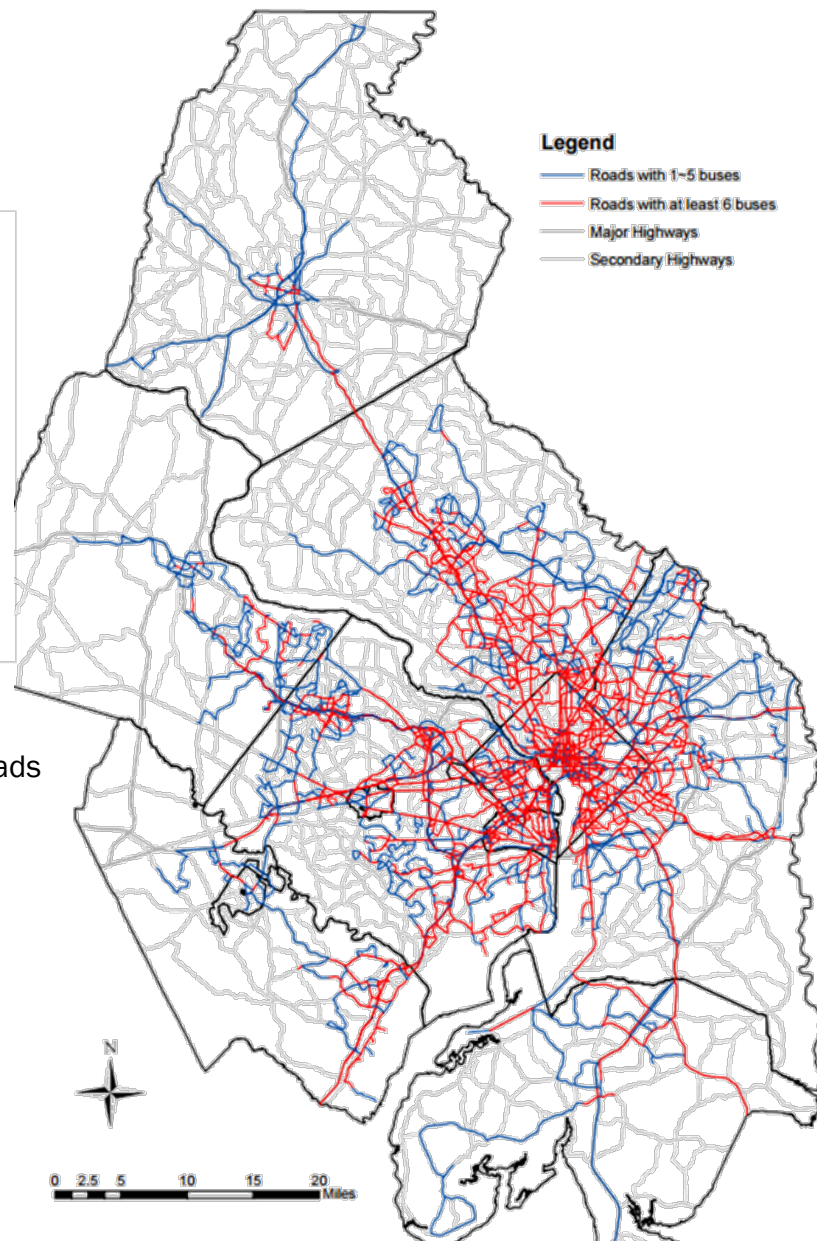
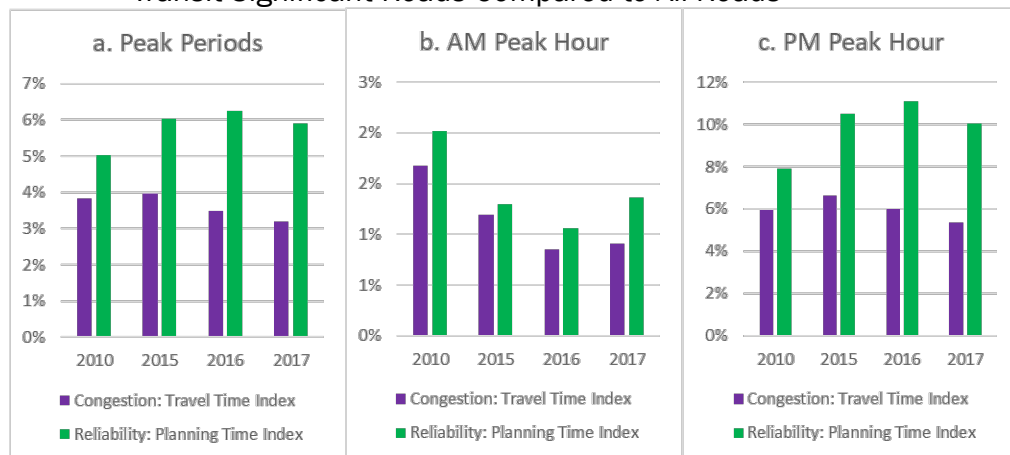
Day of Week Variation of Congestion in 2017

- The middle weekdays were the most congested days of a week with Thursday PM peak the worst and Friday PM peak one hour earlier than other weekdays
- Monday and Friday had unique traffic patterns
- Weekend days had the lowest traffic in a week and Sunday was even lower than Saturday

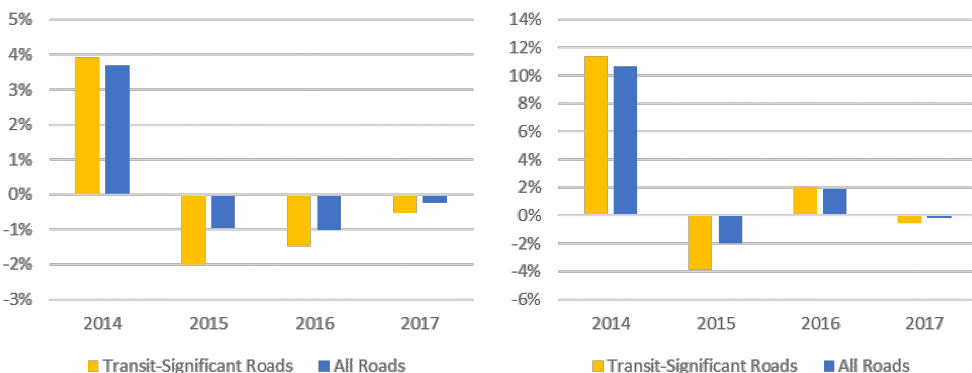


Congestion and Transit

Transit-Significant Roads Compared to All Roads



Congestion and Reliability Year-to-Year Changes of Transit-Significant Roads



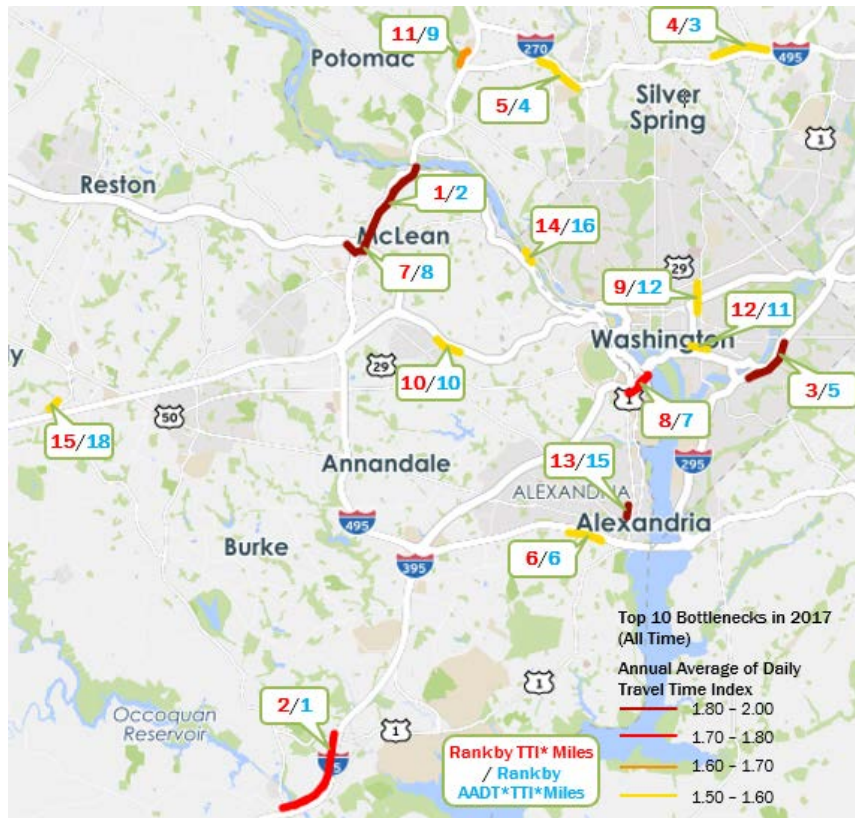
Top 10 Bottlenecks by Probe Data & AADT in 2017

Location	State	Ave. TTI	Length (miles)	TTI*Miles	Rank by TTI*Miles	AADT	AADT*TTI* Miles	Rank by AADT* TTI*Miles
I-495 IL between Exit45/VA267 and Exit43/GW Pkwy	VA	1.89	3.25	6.16	1	158,932	979,612	2
I-95 SB between Lorton Rd/Exit 163 and Gordon Blvd/Exit 160	VA	1.78	3.36	5.97	2	199,147	1,188,452	1
DC-295 NB between Pennsylvania Ave SE and E Capitol St SE	DC	1.81	1.90	3.44	3	104,671	359,789	5
I-495 IL between Exit28/New Hampshire Ave and Exit 29/University Blvd E.	MD	1.52	1.71	2.59	4	210,814	546,526	3
I-495 IL between Exit 34/I-270 and Exit 33/Md-185	MD	1.52	1.55	2.35	5	212,690	500,565	4
I-495 OL around VA-241/TELEGRAPH RD/EXIT 2	VA	1.59	1.46	2.32	6	139,400	322,880	6
Interchange of Va-267 to I-495	VA	2.11	0.76	1.61	7	162,117	261,438	8
I-395 NB between Jefferson Davis Hwy and GW Pkwy	VA	1.76	0.88	1.56	8	182,964	285,010	7
N CAPITOL ST NE between H St NE and R St NW	DC	1.58	0.92	1.45	9	29,607	43,011	12
I-66 EB near Exit 69	VA	1.51	0.87	1.32	10	114,721	151,611	10

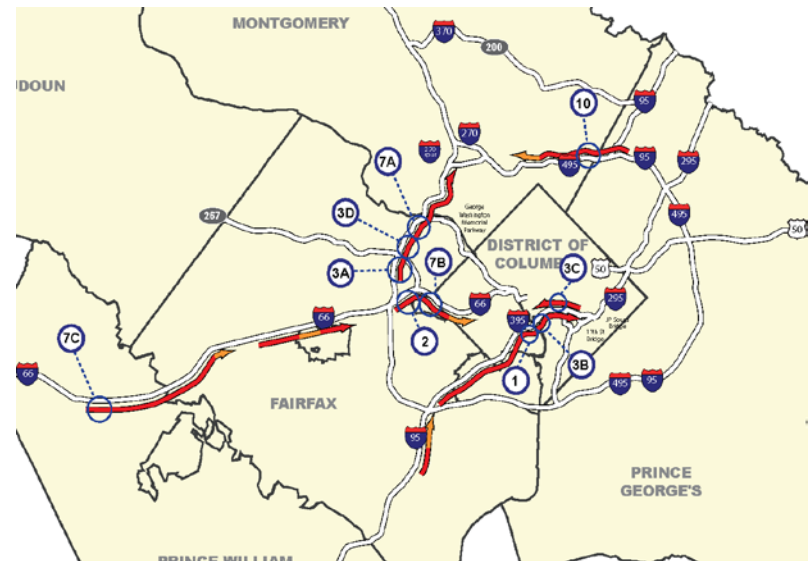


Top 10 Bottlenecks

Vehicle Probe Data, 2017



Skycomp, Spring 2014



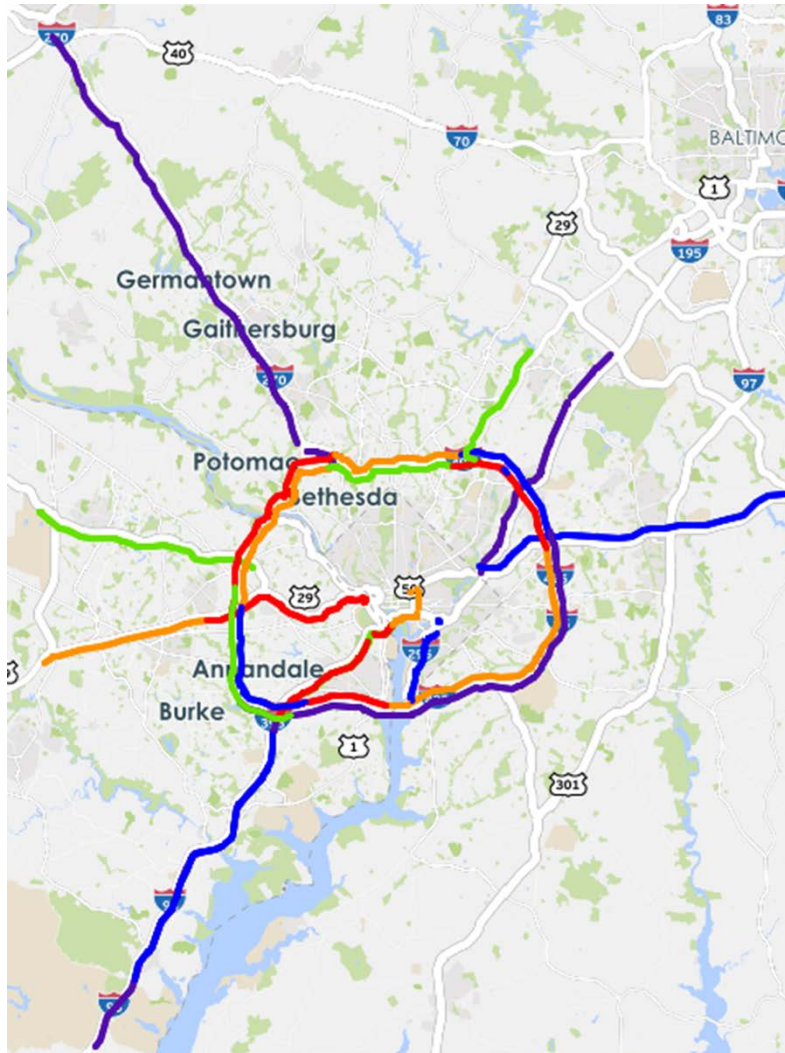
Top Ten Congested Segments on the Freeway System (2014)

Rank	Route	From	To	Density	Speed Range
1	NB I-395 (8:30-9:30 AM)	VA 27 (Washington Blvd)	VA 110 (Jefferson Davis Hwy)	150	5 MPH
2	EB I-66 (6:00-7:00 PM)	VA 7 (Leesburgh Pike)	VA 267	140	5 MPH
3A	Inner Loop I-495 (4:30-5:30 PM)	VA 123 (Chain Bridge Rd)	VA 267	120	5-10 MPH
3B	NB I-395 (8:30-9:30 AM)	VA 110 (Jefferson Davis Hwy)	George Washington Memorial Pkwy	120	5-10 MPH
3C	SB I-395 (5:00-6:00 PM)	4th St	12th St	120	5-10 MPH
3D	Inner Loop I-495 (4:30-5:30 PM)	VA 267	VA 193 (Georgetown Pike)	120	5-10 MPH
7A	Inner Loop I-495 (5:30-6:30 PM)	VA 193 (Georgetown Pike)	George Washington Memorial Pkwy	110	10-15 MPH
7B	EB I-66 (6:00-7:00 PM)	VA 267	Westmoreland St	110	10-15 MPH
7C	EB I-66 (6:00-7:00 PM)	VA 234 Bypass	VA 234 (Sudley Rd)	110	10-15 MPH
10	Outer Loop I-495 (7:00-8:00 AM)	MD 650 (New Hampshire Ave)	MD 193 (University Ave)	105	10-15 MPH

Note: Due to construction at the terminus of the Southeast Freeway, eastbound densities along this corridor were not included in the Top Ten list above.



Major Freeway Commute Routes



Route Code	Description
C1	I-270 between I-370/Sam Eig Hwy/Exit 9 and I-70/US-40
C2	I-270 between I-370/Sam Eig Hwy/Exit 9 and I-495/MD-355
C3	VA-267 between VA-28/Exit 9a and VA-123/Exit 19
C4	I-66 between VA-28/Exit 53 and I-495/Exit 64
C5	I-66 between I-495/Exit 64 and Theodore Roosevelt Memorial Bridge
C6	I-95 between VA-234/Exit 152 and Franconia Rd/Exit 169
C7	I-95 HOV between VA-234/Exit 152 and Franconia Rd/Exit 169
C8	I-395 between I-95 and H St
C9	I-395 HOV between I-95 and US-1
C10	US-50 between MD-295/Kenilworth Ave and US-301/Exit 13
C11	MD-295 between US-50/MD-201/Kenilworth Ave and MD-198
C12	I-95 between I-495/Exit 27-25 and MD-198/Exit 33
C13	I-495 between I-270/Exit 35 and I-95/Exit 27
C14	I-495 between I-95/Exit 27 and US-50/Exit 19
C15	I-495 between US-50/Exit 19 and I-95/I-395/Exit 57
C16	I-495 between I-95/I-395/Exit 57 and I-66/Exit 9
C17	I-495 between I-66/Exit 9 and I-270/Exit 35
C18	I-295 between I-495 and 11 th St. Bridge



Travel Time on Major Freeway Commute Routes, 8:00-9:00 AM

Route	Length (miles)	Average Travel Time in AM Peak Hour 8:00-9:00 am (min)				Reliable (95th) Travel Time* in AM Peak Hour 8:00-9:00 am (min)				2017 Changes in Average Travel Time in AM Peak Hour (min)			2017 Changes in 95th Travel Time in AM Peak Hour (min)		
		2010	2015	2016	2017	2010	2015	2016	2017	vs. 2010	vs. 2015	vs. 2016	vs. 2010	vs. 2015	vs. 2016
C1: I-270 SB from I-70 to I-370	24	41	38	38	36	84	69	67	64	-5	-2	-2	-20	-5	-3
C2: I-270 SB from I-370 to I-495	11	25	22	23	22	47	46	49	41	-3	0	-1	-7	-6	-8
C3: VA-267 EB from VA-28 to VA-123	14	25	21	21	21	58	36	37	36	-5	0	0	-22	0	-1
C4: I-66 EB from VA-28 to I-495	13	29	23	24	24	61	37	39	39	-5	2	0	-22	2	0
C5: I-66 EB from I-495 to TR Bridge	10	27	19	22	18	50	33	42	29	-10	-1	-4	-21	-5	-14
C6: I-95 NB from VA-234 to Exit 169	19	28	23	24	25	66	40	41	43	-3	2	1	-23	3	2
C7: I-95 NB HOV from VA-234 to Exit 169	25	19	15	15	21	26	17	16	22	2	6	6	-4	6	6
C8: I-395 NB from I-95 to H St.	14	45	44	46	44	96	93	98	87	0	1	-2	-9	-6	-11
C9: I-395 NB HOV from I-495 to US-1	12	16	15	14	14	31	27	27	21	-2	0	0	-10	-6	-6
C10: US-50 WB from US-301 to MD-295	13	58	62	62	63	83	83	80	81	4	0	1	-2	-2	1
C11: MD-295 SB from MD-198 to US-50	16	29	29	30	28	65	49	51	45	0	0	-1	-20	-4	-7
C12: I-95 SB from MD-198 to I-495	8	13	13	14	14	28	24	24	25	1	1	0	-3	1	0
C13: I-495 IL from I-270 to I-95	10	14	13	13	13	22	20	20	20	-1	0	0	-2	0	0
C14: I-495 IL from I-95 to US-50	9	11	11	11	12	14	15	16	17	1	1	0	3	2	1
C15: I-495 IL from US-50 to I-95	28	30	41	42	43	47	77	76	78	14	2	1	31	1	1
C16: I-495 IL from I-95 to I-66	10	29	18	19	20	49	31	32	34	-9	2	1	-16	3	2
C17: I-495 IL from I-66 to I-270	14	19	26	27	27	31	47	47	47	8	1	-1	16	0	-1
C13: I-495 OL from I-95 to I-270	11	33	34	33	33	52	56	54	51	0	0	0	-2	-5	-3
C14: I-495 OL from US-50 to I-95	10	17	16	15	15	30	26	24	25	-2	0	0	-6	-2	0
C15: I-495 OL from I-95 to US-50	29	35	36	38	37	55	55	61	57	2	2	-1	2	2	-4
C16: I-495 OL from I-66 to I-95	10	11	11	11	11	12	13	14	14	0	0	0	2	0	-1
C17: I-495 OL from I-270 to I-66	13	17	15	17	18	26	21	24	27	1	3	1	1	6	3
C18: I-295 NB from I-495 to 11th St. Brdg.	6	14	15	17	16	35	37	41	33	2	1	-1	-2	-4	-9



Travel Time on Major Freeway Commute Routes, 5:00-6:00 PM

Route	Length (miles)	Average Travel Time in PM Peak Hour 5:00-6:00 pm (min)				Reliable (95th) Travel Time* in PM Peak Hour 5:00-6:00 pm				2015 Changes in Average Travel Time in PM Peak Hour			2015 Changes in 95th Travel Time in PM Peak Hour (min)		
		2010	2015	2016	2017	2010	2015	2016	2017	vs. 2010	vs. 2015	vs. 2016	vs. 2010	vs. 2015	vs. 2016
C1: I-270 NB from I-370 to I-70	24	23	23	22	23	26	24	24	24	0	0	0	-1	0	0
C2: I-270 NB from I-495 to I-370	11	15	12	12	12	29	18	19	17	-3	0	-1	-12	-1	-2
C3: VA-267 WB from I-66 to VA-28	14	17	15	15	15	25	19	19	20	-2	0	0	-6	0	1
C4: I-66 WB from I-495 to VA-28	13	15	16	14	14	24	25	20	18	-2	-2	0	-7	-7	-2
C5: I-66 WB from TR Bridge to I-495	10	22	23	26	26	36	36	41	42	4	3	0	6	6	1
C6: I-95 SB from Exit 169 to VA-234	19	20	19	20	19	25	27	31	30	0	0	0	5	3	0
C7: I-95 SB HOV from Exit 169 to VA-234	25	22	17	17	24	39	21	22	31	2	7	7	-8	10	8
C8: I-395 SB from H St. to I-95	14	22	25	29	31	40	49	59	59	9	6	2	18	9	0
C9: I-395 SB HOV from US-1 to I-495	12	12	12	13	14	16	19	17	18	2	2	1	2	0	2
C10: US-50 EB from MD-295 to US-301	13	49	53	54	54	54	60	59	59	5	1	0	5	-1	0
C11: MD-295 NB from US-50 to MD-198	16	20	26	26	25	32	45	44	41	5	-1	-1	9	-3	-3
C12: I-95 NB from I-495 to MD-198	8	8	12	11	11	18	19	19	19	3	-1	0	1	-1	0
C13: I-495 IL from I-270 to I-95	10	25	21	24	29	48	42	42	53	4	8	5	5	11	11
C14: I-495 IL from I-95 to US-50	9	17	23	22	21	31	38	37	35	4	-2	-1	4	-3	-2
C15: I-495 IL from US-50 to I-95	28	32	36	40	41	47	54	62	64	9	6	1	17	9	2
C16: I-495 IL from I-95 to I-66	10	13	10	10	10	26	11	12	11	-4	0	0	-15	0	-1
C17: I-495 IL from I-66 to I-270	14	42	44	47	51	93	86	89	90	9	7	4	-3	4	1
C13: I-495 OL from I-95 to I-270	11	21	14	14	14	50	27	30	24	-7	0	-1	-26	-3	-6
C14: I-495 OL from US-50 to I-95	10	16	15	17	19	30	25	27	30	3	3	2	-1	4	3
C15: I-495 OL from I-95 to US-50	29	34	47	53	58	61	91	98	105	24	10	5	44	15	7
C16: I-495 OL from I-66 to I-95	10	16	16	19	20	24	25	27	30	3	3	1	5	4	2
C17: I-495 OL from I-270 to I-66	13	35	31	36	38	69	56	62	66	3	7	2	-3	9	4
C18: I-295 SB from 11th St. Brdg. to I-495	6	6	6	6	6	7	7	7	6	0	0	0	0	0	0

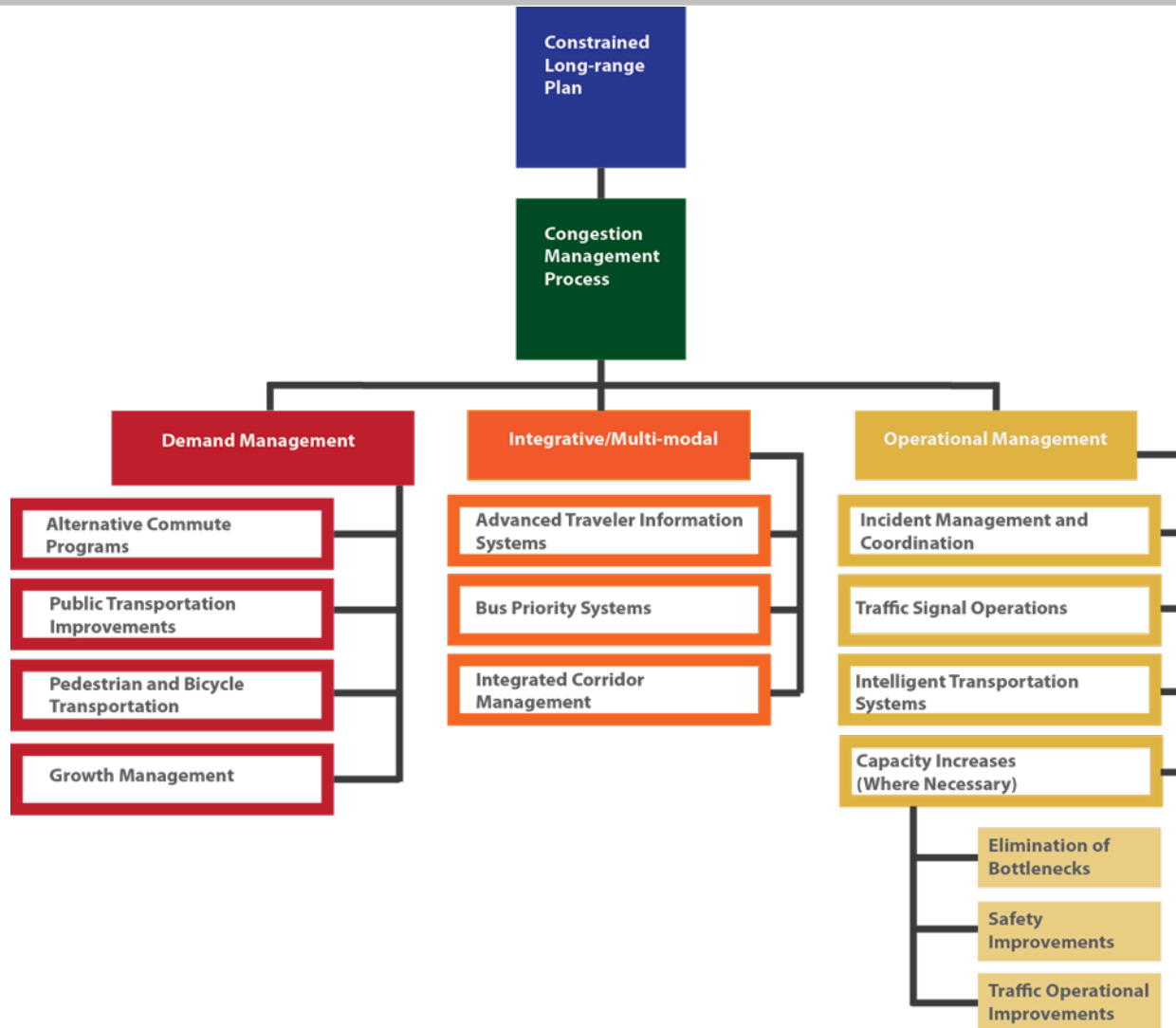


National Comparison of the Washington Region's Congestion

Texas A&M Transportation Institute (2014 data)			INRIX Traffic Scorecard (2016 data)			TomTom Traffic Index (2016 data)		
Annual Hours of Delay per Auto Commuter			Average Hours Wasted in Traffic			Extra Travel Time compared to Free Flow Conditions		
Metro Area	Value	Rank	Metro Area	Value	Rank	Metro Area	Value	Rank
Washington	82	1	Los Angeles	102	1	Los Angeles	45%	1
Los Angeles	80	2	New York	91	2	San Francisco	39%	2
San Francisco	78	3	San Francisco	79	3	New York	35%	3
New York	74	4	Atlanta	70	4	Seattle	34%	4
San Jose	67	5	Miami	64	5	San Jose	32%	5
Boston	64	6	Washington	63	6	Miami	30%	6
Seattle	63	7	Boston	60	7	Portland	29%	7
Chicago	61	8	Chicago	57	8	Honolulu	29%	8
Houston	61	8	Seattle	55	9	Washington	29%	9
Riverside	59	10	Dallas	54	10	Boston	28%	10

Source: Texas A&M Transportation Institute, 2015 Urban Mobility Scorecard; INRIX, Traffic Scorecard; TomTom, Traffic Index.

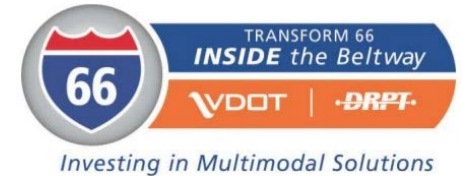
Congestion Management Strategies



Selected Congestion Management Strategies



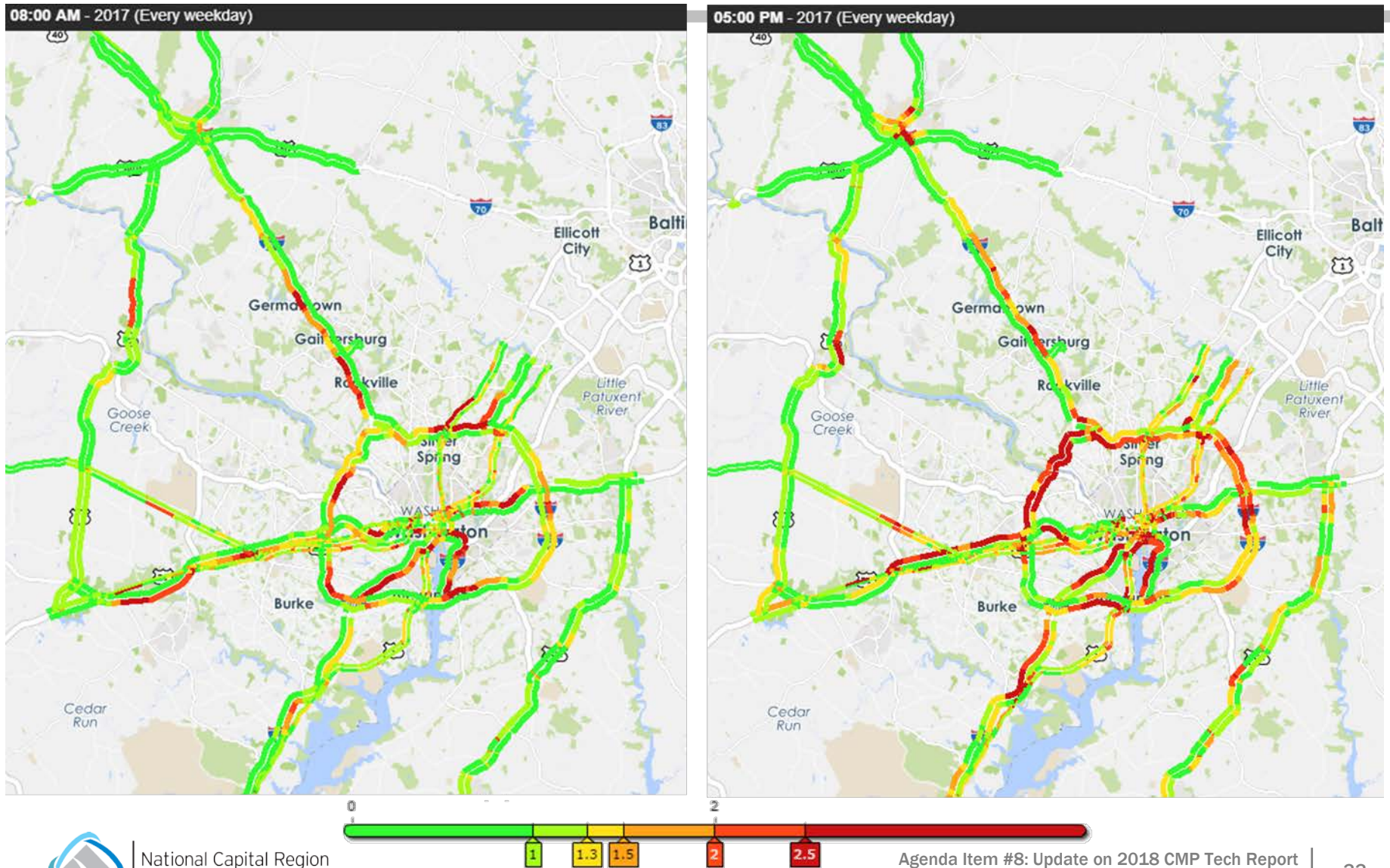
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Smart DC Information Session #SmartDC

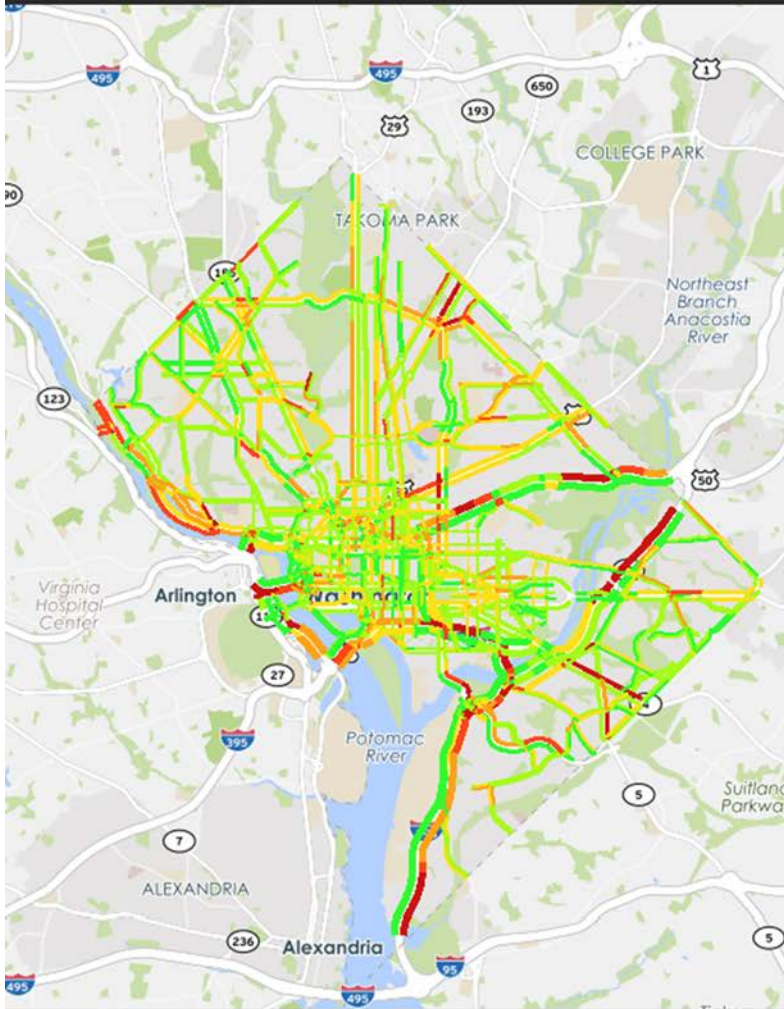


Example of 2017 Peak Hour TTI - Appendix A

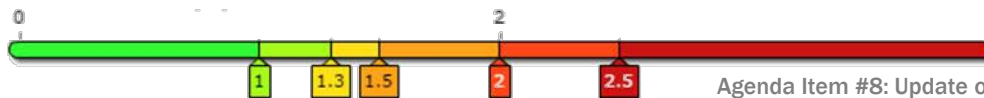
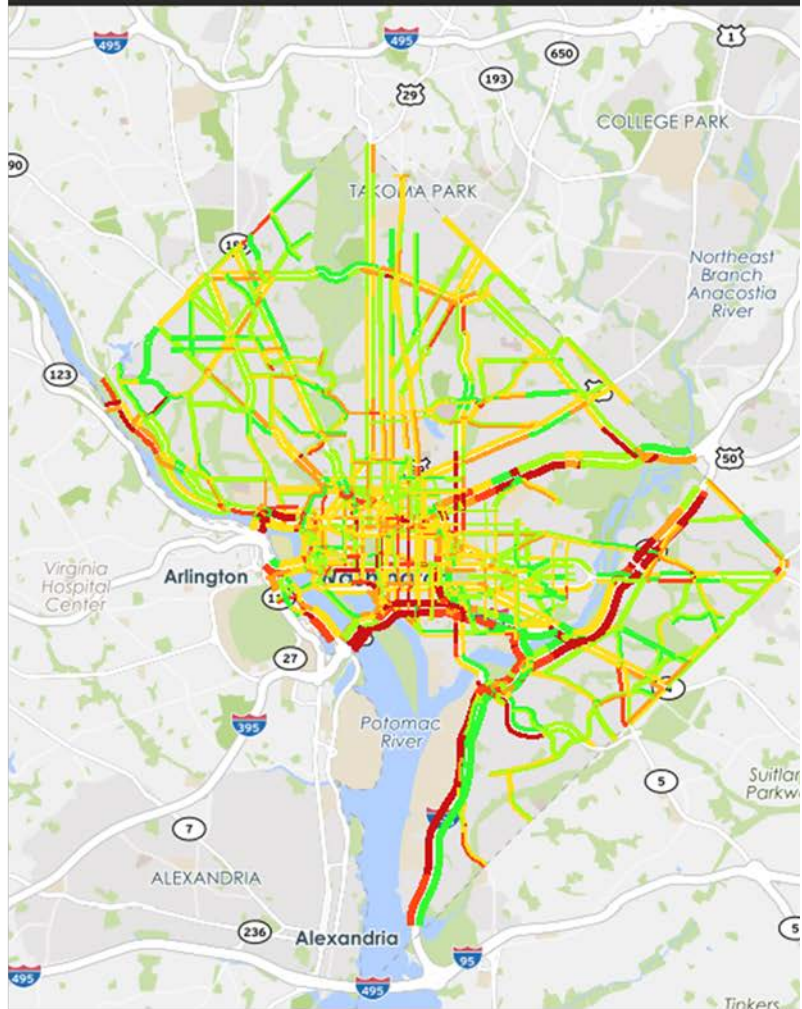


Example of 2017 Peak Hour TTI - Appendix A

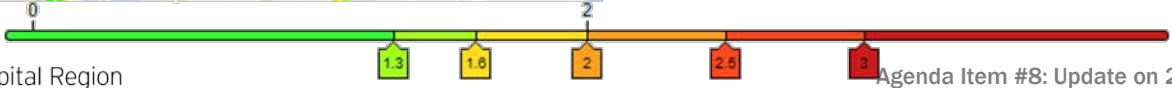
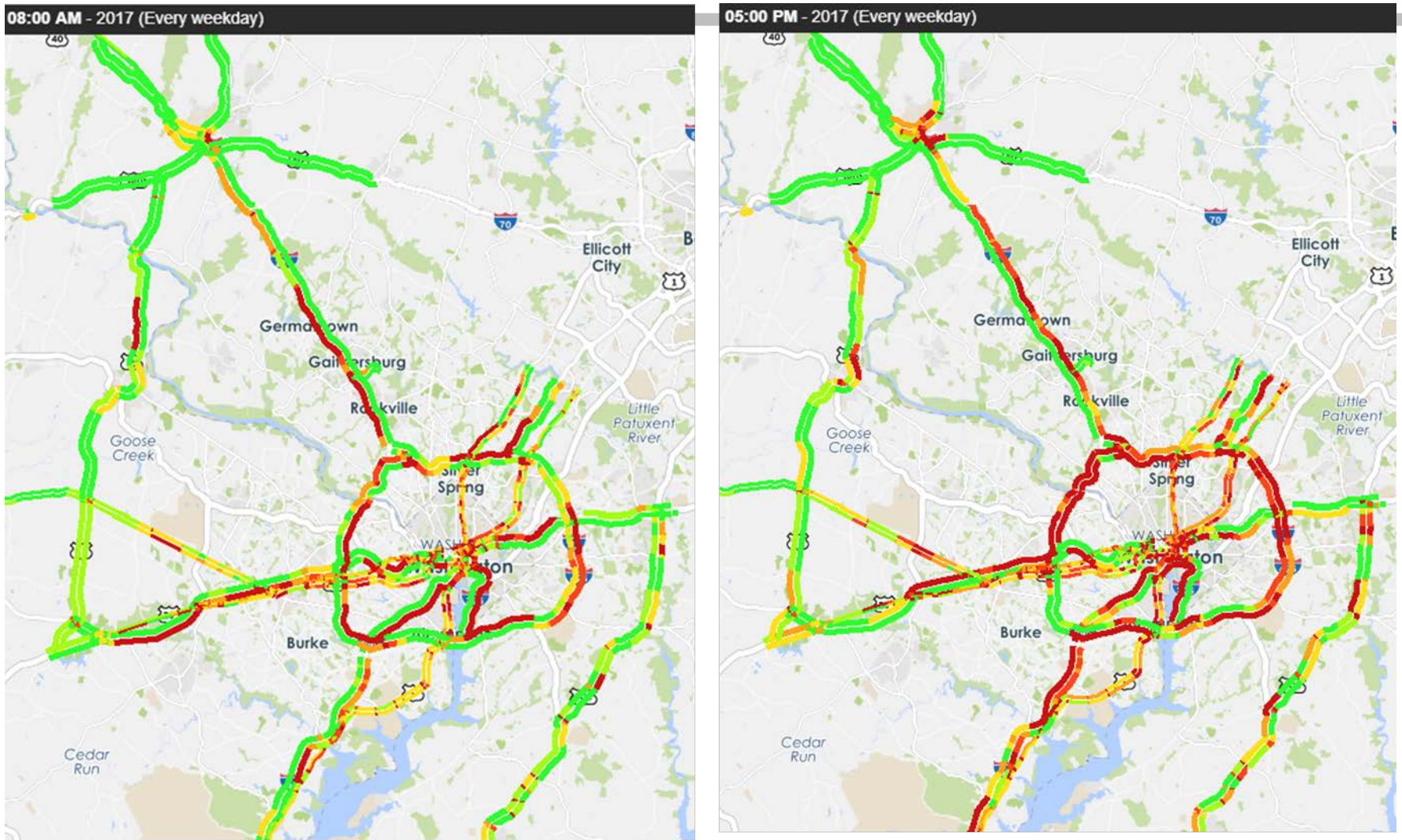
08:00 AM - 2017 (Every weekday)



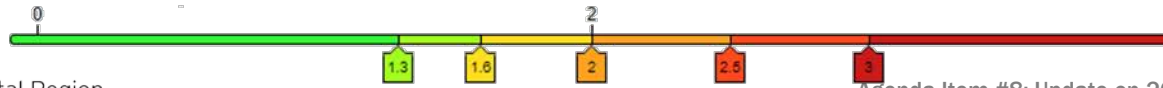
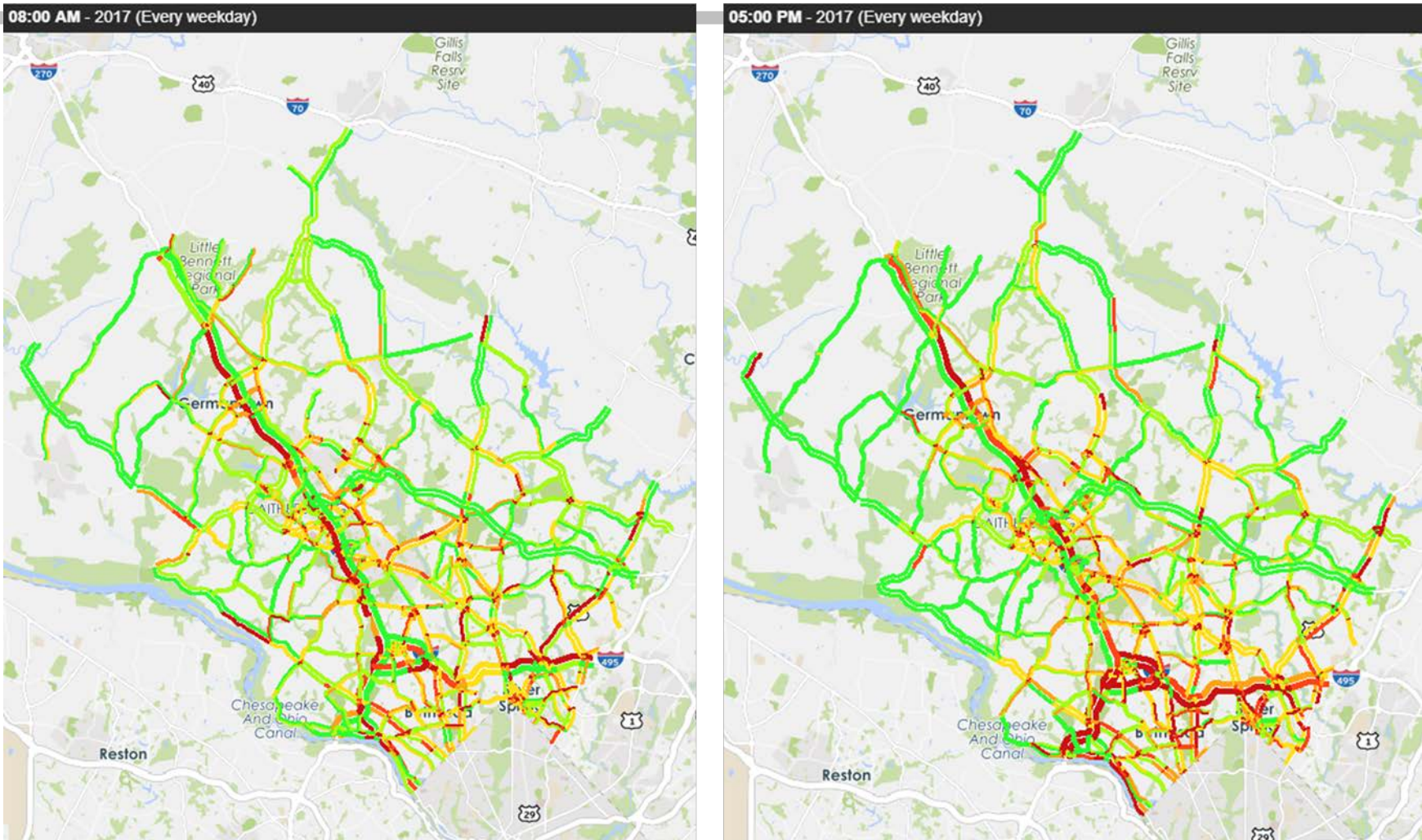
05:00 PM - 2017 (Every weekday)



Example of 2017 Peak Hour PTI - Appendix B



Example of 2017 Peak Hour PTI - Appendix B

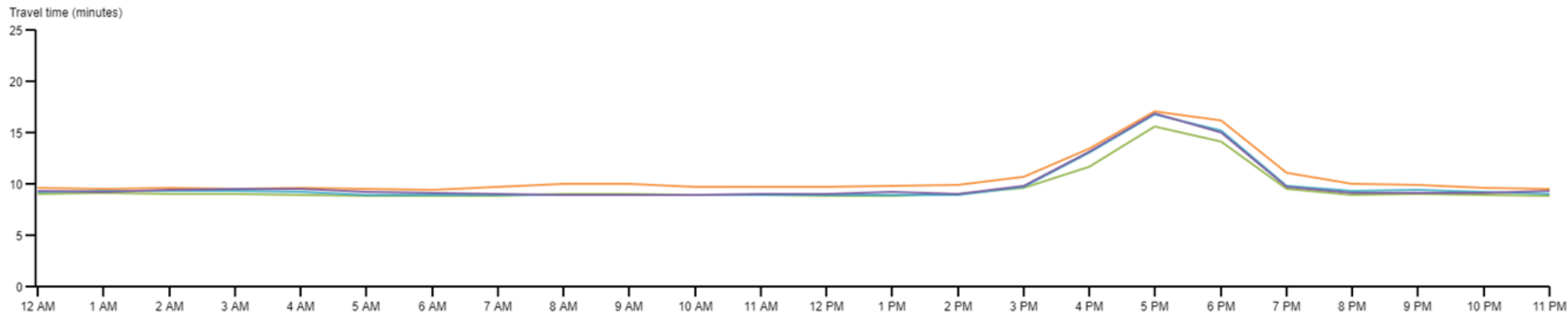


Example of 2017 Travel Time - Appendix C

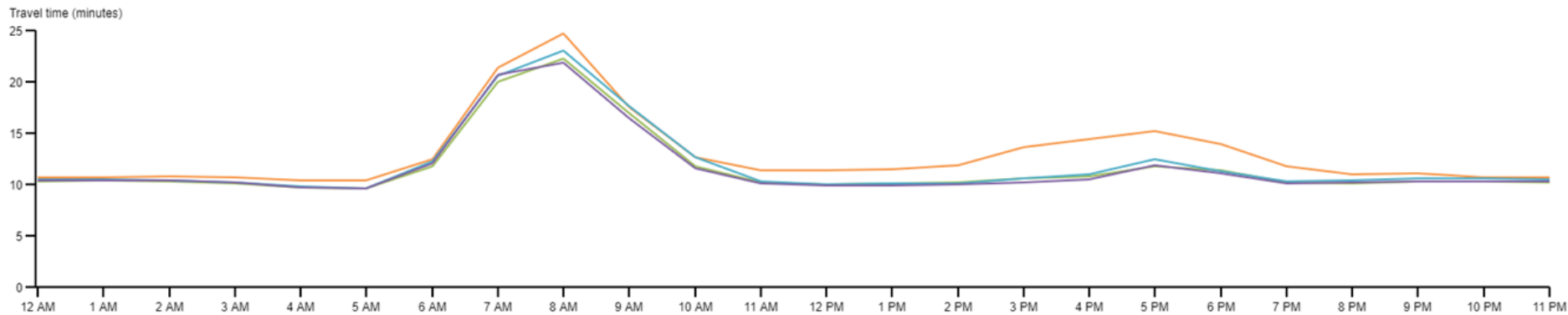
Travel time for I-270 between I-370/Sam Eig Hwy/Exit 9 and I-495/MD-355

Averaged per hour for 2010 (Every Tuesday, Wednesday, and Thursday), 2015 (Every Tuesday, Wednesday, and Thursday), 2016 (Every Tuesday, Wednesday, and Thursday), and 2017 (Every Tuesday, Wednesday, and Thursday)

Northbound



Southbound

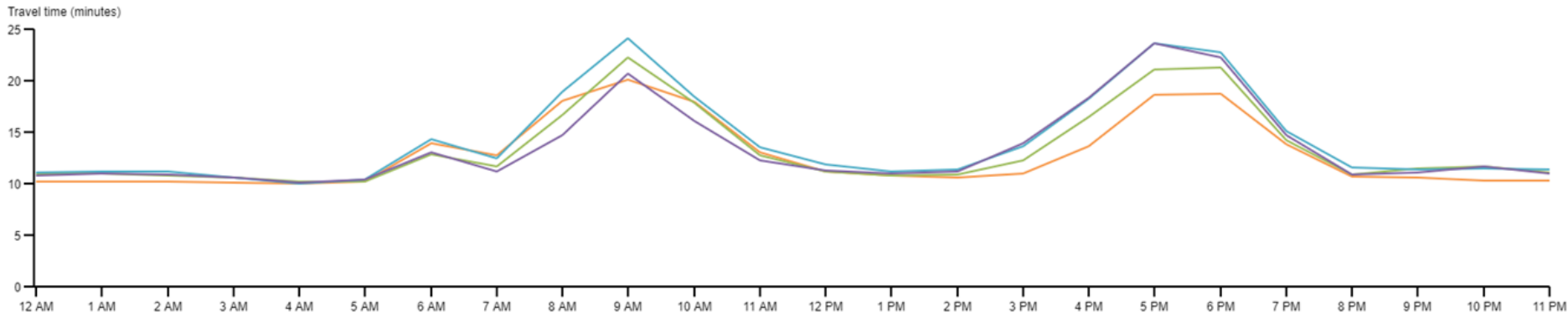


Example of 2017 Travel Time - Appendix C

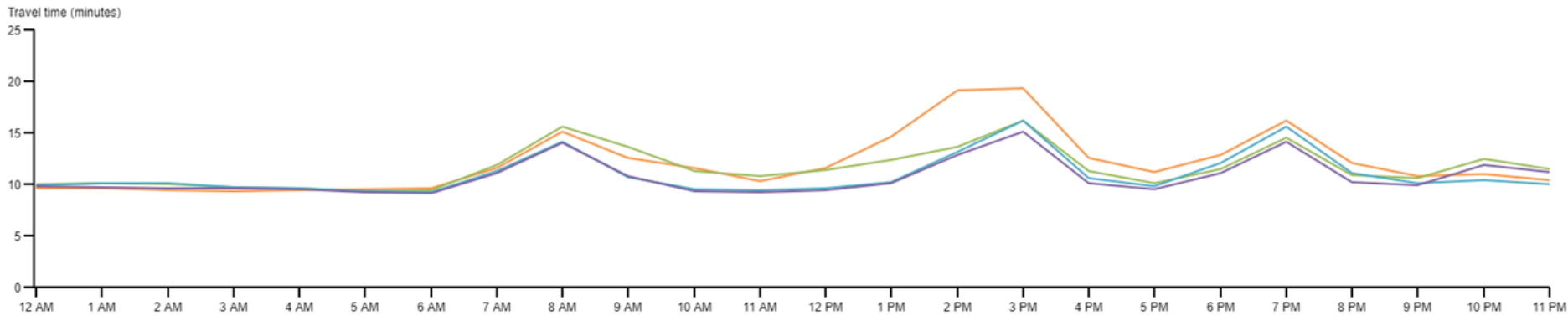
Travel time for I-66 between US-50/Arlington Memorial Bridge and VA-7/Leesburg Pike/Exit 66

Averaged per hour for 2010 (Every Tuesday, Wednesday, and Thursday), 2015 (Every Tuesday, Wednesday, and Thursday), 2016 (Every Tuesday, Wednesday, and Thursday), and 2017 (Every Tuesday, Wednesday, and Thursday)

Eastbound



Westbound



Timeline

- **Preliminary draft – today**
- Review by SPOTS on 8/2/2018
- **Acceptance by TPB Tech Committee– 9/7/2018**
 - Later briefings to other committees, including Commuter Connections Subcommittee, as necessary
- TPB will receive the “official” CMP information within Visualize 2045



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