Item #2
MOITS
May 13, 2014

2014
Congestion Management Process (CMP) Technical Report

Draft

MOITS Policy Task Force and Technical Subcommittee
May 13, 2014

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COG/TPB Staff

National Capital Region Transportation Planning Board (TPB)
Metropolitan Washington Council of Governments (COG)

Background of the CMP (1/2)

- A Congestion Management Process (CMP) is a requirement in metropolitan transportation planning
  - SAFETEA-LU and associated 2007 Federal regulations for metropolitan planning address CMP requirements
- Metropolitan long-range plans developed after July 1, 2007 must have a CMP
  - The official CMP component is wholly integrated into the CLRP to address the federal requirement
- **MAP-21 retains the CMP requirement, with enhanced requirements for monitoring and reporting of congestion and reliability**

Background of the CMP (2/2)

- 2006 Federal certification of the TPB process recommended demonstrating how the Congestion Management System (CMS, now CMP) was applied at critical stages of the metropolitan planning process, in the CLRP or a stand-alone document
- CMP Technical Reports were released in 2008, 2010 and 2012
- 2010 Federal Certification of the TPB Process commended the CMP for its detailed documentation efforts in the 2010 CMP Technical Report
- Draft 2014 CMP Technical Report now ready for review

Outline of the Report

- Executive Summary

1. Introduction
2. State of Congestion
3. Consideration and Implementation of Congestion Management Strategies
4. Studies of Congestion Management Strategies
5. How Results of the CMP Are Integrated into the CLRP
6. Conclusions (key findings and recommendations)

The 2014 CMP Technical Report:

- *Compiles information from a wide range of metropolitan transportation planning activities*
- *Provides some additional CMP specific analyses, particularly I-95 Corridor Coalition Vehicle Probe Project/INRIX data-based analyses*

Acknowledgements

The I-95 Corridor Coalition Vehicle Probe Project, INRIX, Inc.

The Vehicle Probe Project Suite, CATT Lab, University of Maryland

MOITS Participants

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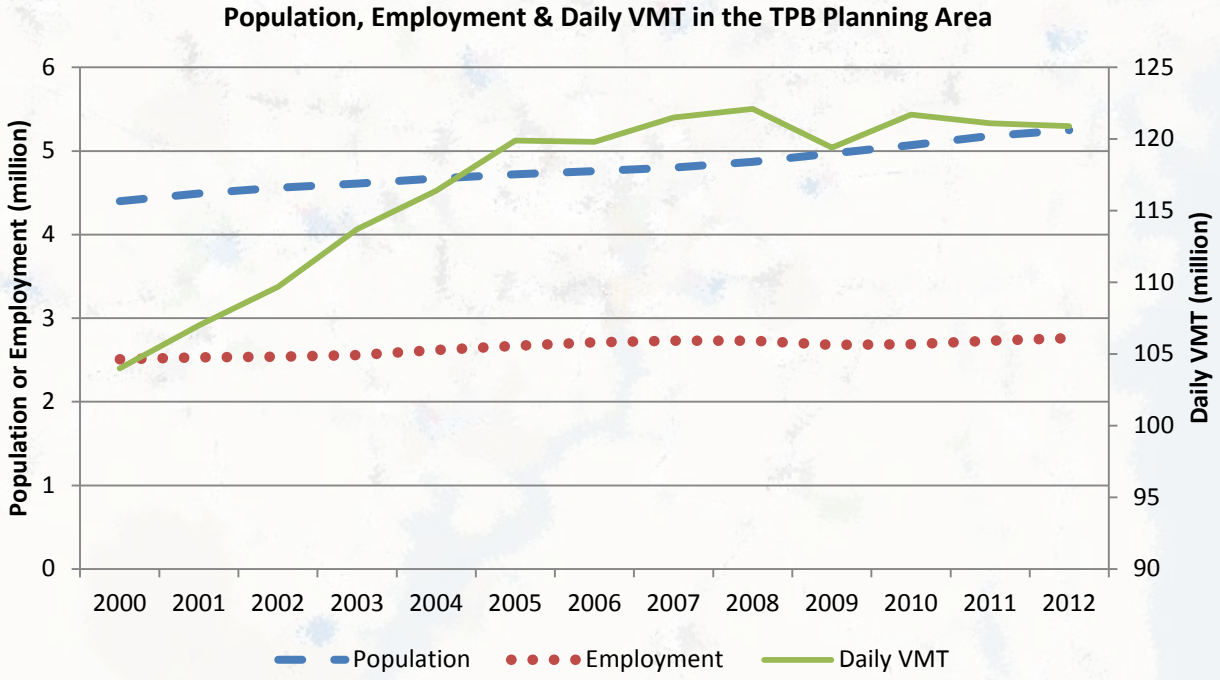
Part 1: State of Congestion

Wenjing Pu

Population, Employment and Daily VMT

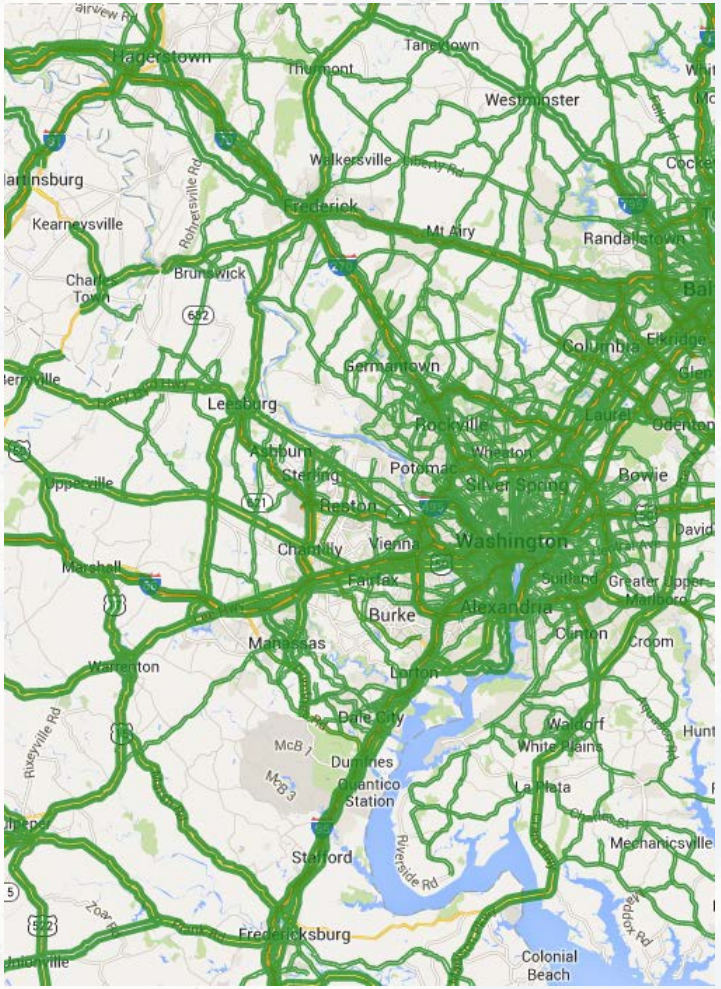
- From 2010 to 2012 in the TPB Planning Area
  - Population, up 3.6%
  - Employment, up 2.6%
  - **Daily VMT, down 0.7%**



Source: TPB's Regional Transportation Data Clearinghouse; Bureau of Labor Statistics' Quarterly Census of Employment and Wages.

Vehicle Probe Project (VPP)/INRIX Data Coverage

- TPB Planning Area
  - Interstate system, 520 (directional) miles
  - Non-Interstate NHS, 2,160 miles
  - Non-NHS, 2,820 miles
  - All roads, 5,500 miles

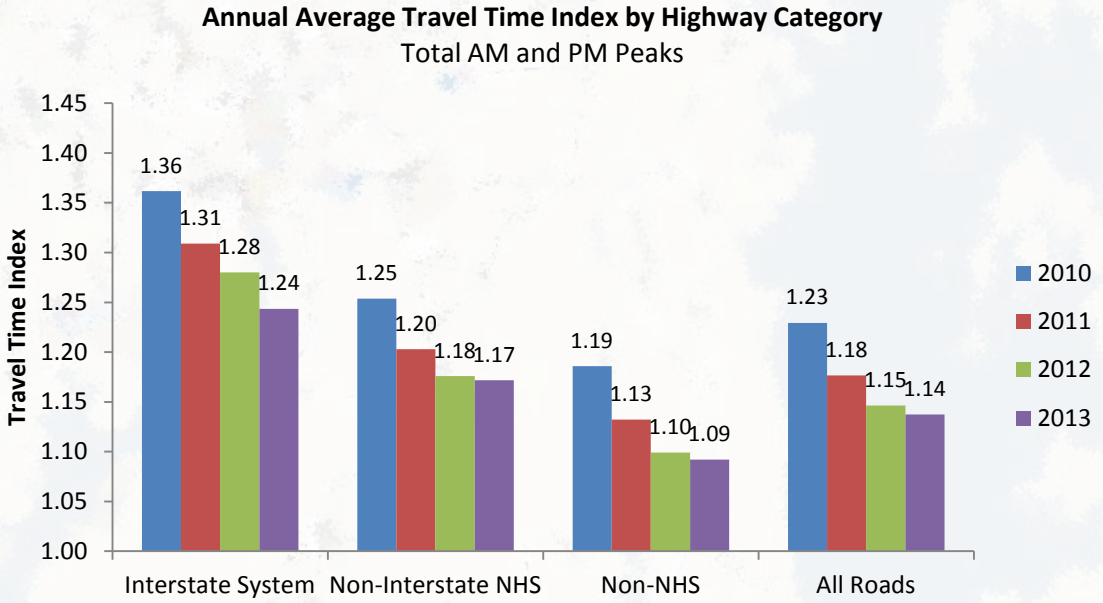


(Screenshot was captured on the I-95 Traffic Monitoring website http://i95.inrix.com/.)

Regional Congestion Trends, 2010-2013 (1/2)

- The Washington region experienced **decreasing** congestion during peak periods from 2010-2013; but the pace of decrease had **slowed down** significantly in 2013:
  1) The decrease in *Travel Time Index* from previous year was 4.3%, 2.6% and 0.8% in 2011, 2012 and 2013, respectively; the annual average decrease was 2.6%.

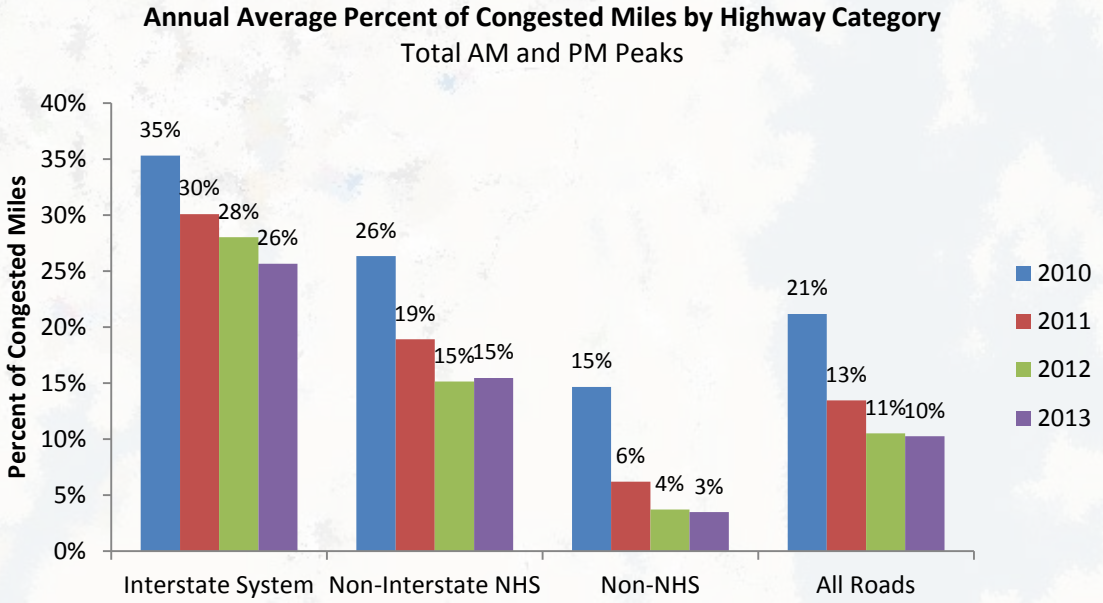
Note:
- Travel Time Index (TTI) is an indicator of the intensity of congestion, calculated as the ratio of actual travel time to free-flow travel time.
- AM Peak: 6:00-10:00 am
- PM Peak: 3:00-7:00 pm



Regional Congestion Trends, 2010-2013 (2/2)

2) The decrease in *Percent of Congested Miles* from previous year was 37%, 22% and 3% in 2011, 2012 and 2013, respectively; the annual average decrease was 21%.

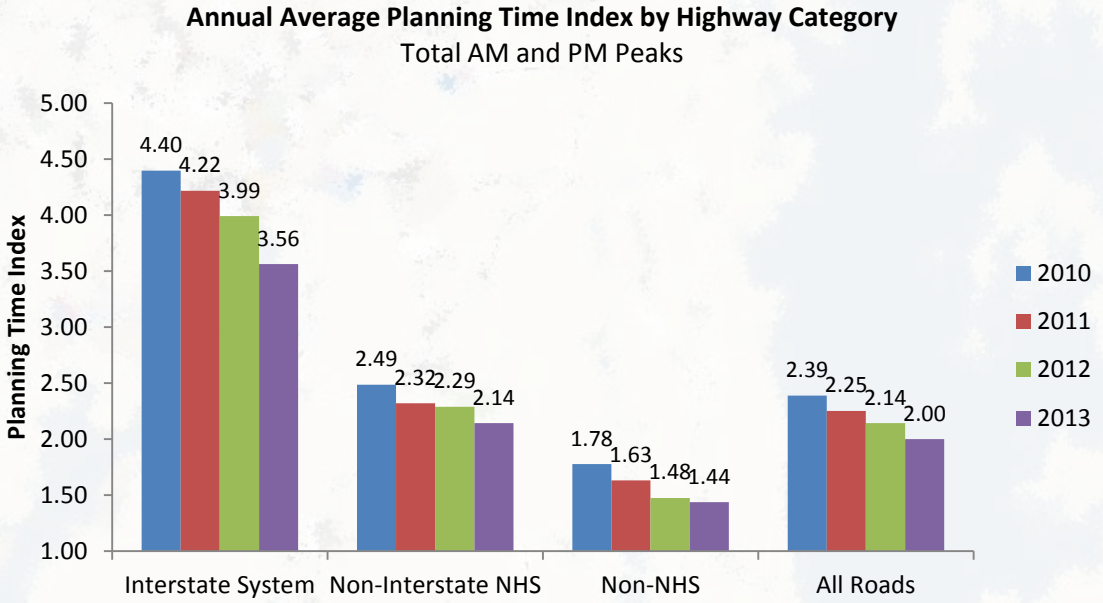
Note:
Percent of Congested (Directional) Miles is a system-wide measure that captures the spatial extent of congestion. Congestion is defined if actual travel time is 30% longer than the free-flow travel time, i.e., Travel Time Index > 1.3, according to the National Transportation Operations Coalition.



Regional Highway Travel Time Reliability Trends 2010-2013

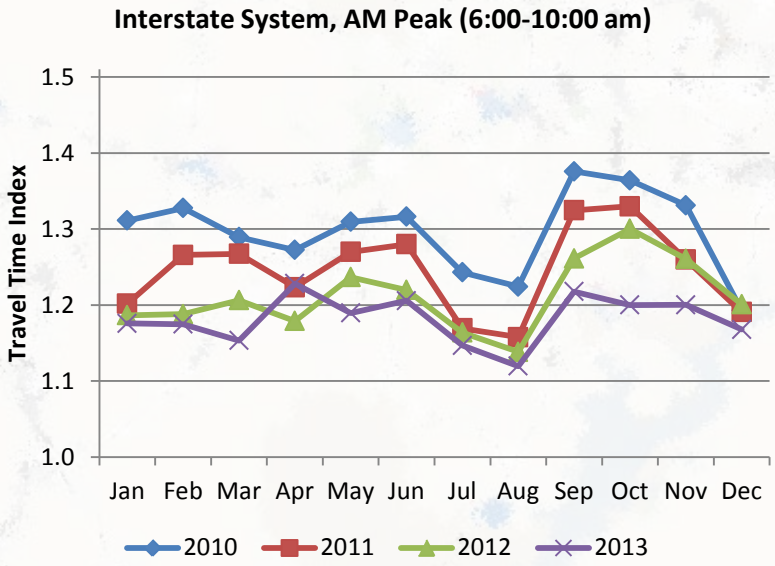
- The Washington region experienced **steady improvement** in travel time reliability during peak periods from 2010-2013:
  - The improvement in travel time reliability, measured by *Planning Time Index,* from previous year was 6%, 5% and 7% in 2011, 2012 and 2013, respectively; the annual average improvement was 6%.

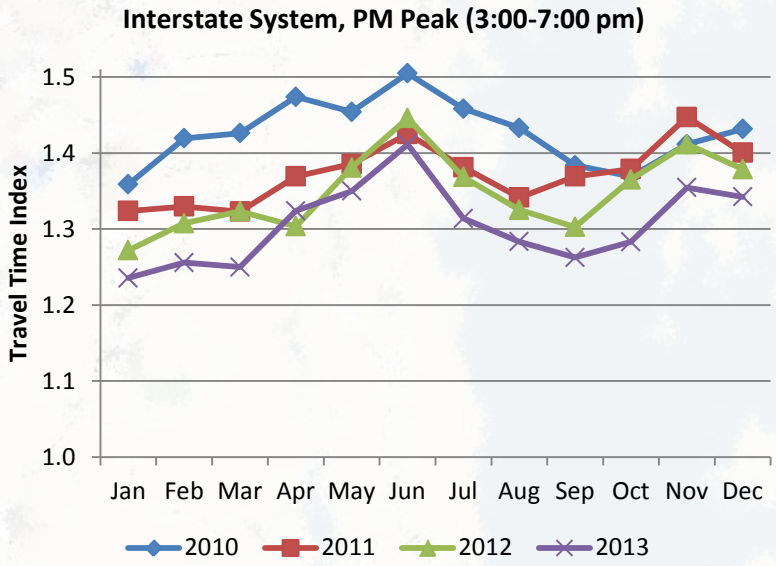
Note:
Planning Time Index (PTI) is a travel time reliability measure, defined as the 95th percentile travel time to free-flow travel time.



Congestion Seasonal Variations

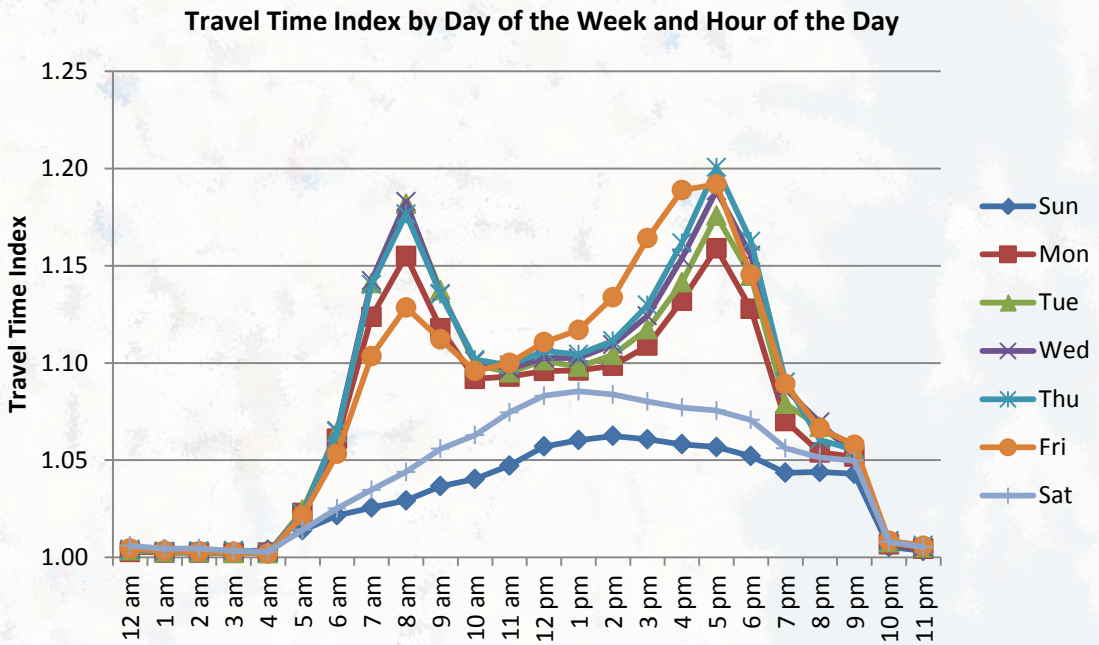
- Seasonal variation most significant with Interstate system (compared to non-Interstate NHS, non-NHS)
- AM Peak: low – Aug.; High – Sep.
- PM Peak: low – Jan./Sep.; High – Jun.





Congestion Day of Week Variations

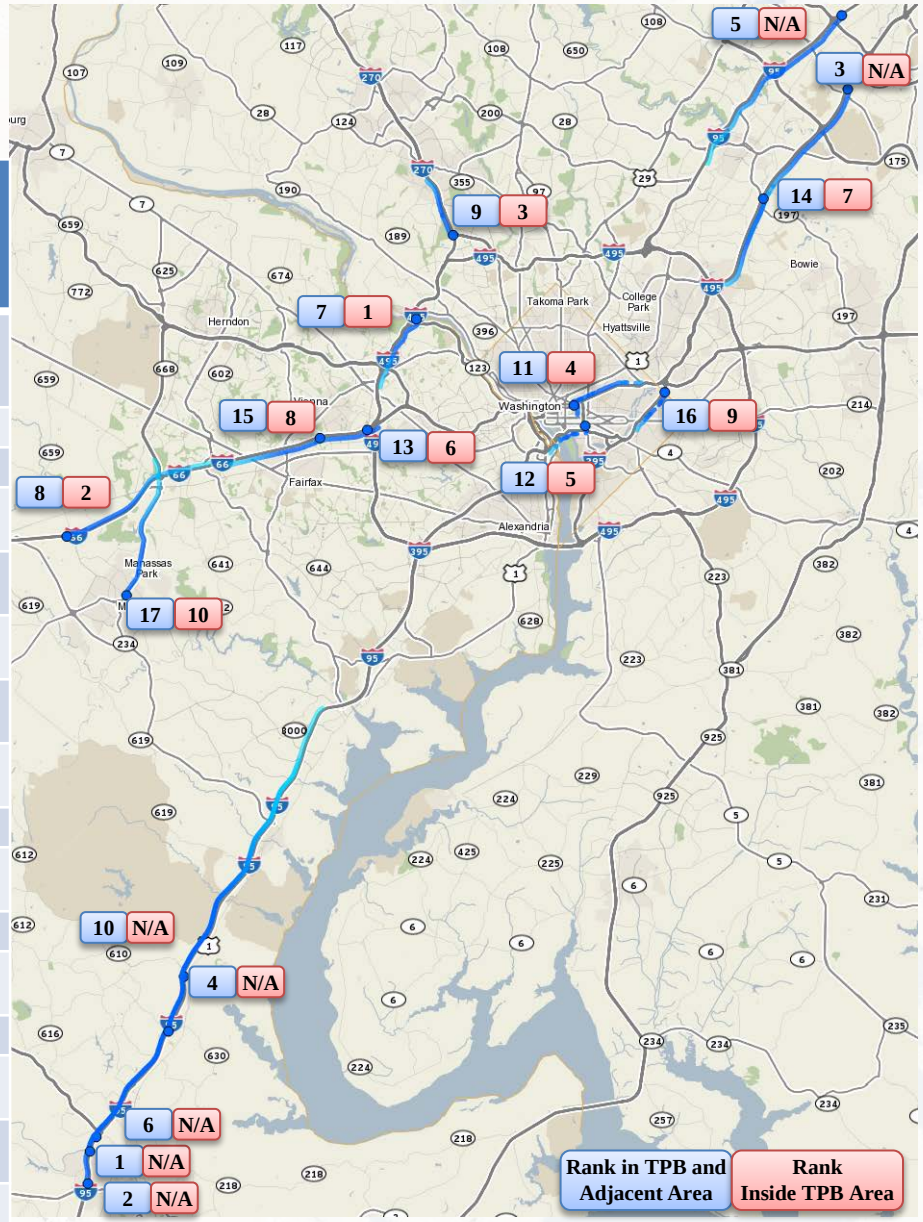
- Tue., Wed., & Thu. were the most congested weekdays with similar traffic patterns
- Mon. & Fri. had unique traffic patterns
- Weekend patterns



Note:
2013 “All Roads” data are used.

2013 Top Bottlenecks - by Speed

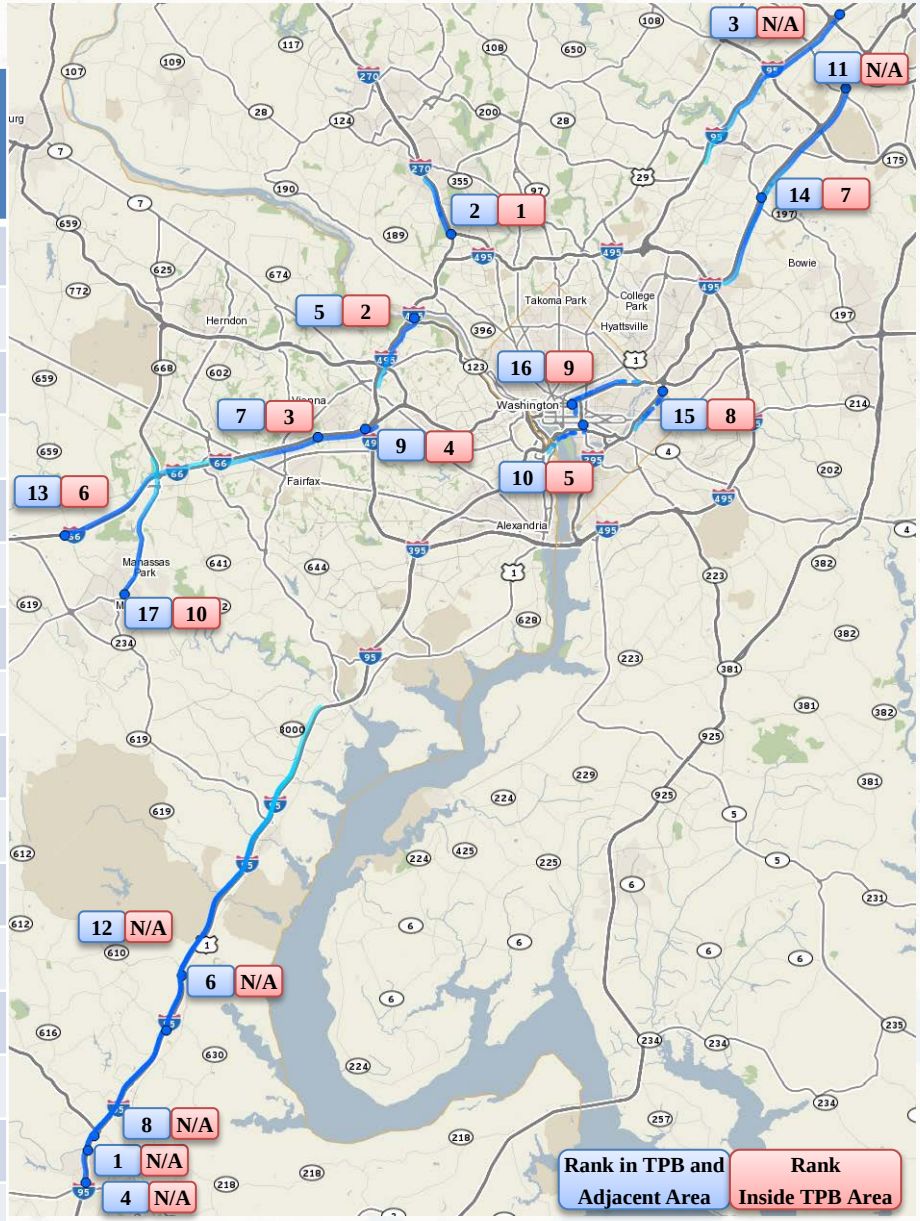
Rank in TPB and Adjacent Area	Rank Inside TPB Area	Location	Average Duration	Average Queue Length (miles)	Occurrences	Impact Factor
1	N/A	I-95 SB @ Fredericksburg/Stafford Co Line	5 h 6 m	32.0	311	3,055,956
2	N/A	I-95 SB @ VA-3/Exit 130	5 h 45 m	32.3	115	1,283,658
3	N/A	MD-295 NB @ MD-175	3 h 48 m	13.8	261	823,541
4	N/A	I-95 SB @ VA-630/Exit 140	4 h 6 m	20.1	161	795,652
5	N/A	I-95 NB @ MD-100/Exit 43	2 h 51 m	14.5	279	756,736
6	N/A	I-95 SB @ US-17/Exit 133	5 h 8 m	30.2	60	657,455
7	1	I-495 CW @ American Legion Bridge	2 h 47 m	4.7	800	640,474
8	2	I-66 WB @ VA-234/Exit 47	2 h 21 m	10.9	339	604,192
9	3	I-270 Spur SB @ I-270	1 h 42 m	6.4	884	591,198
10	N/A	I-95 SB @ US-1/VA-610/Exit 143	3 h 9 m	12.0	175	558,193
11	4	US-50 WB @ 10th St	4 h 19 m	13.1	145	546,624
12	5	I-395 NB @ 2nd St	1 h 43 m	3.8	1388	534,048
13	6	I-66 EB @ I-495/Exit 64	1 h 53 m	4.6	968	513,693
14	7	MD-295 NB @ MD-197/Exit 11	2 h 47 m	6.7	444	505,186
15	8	I-66 EB @ Vaden Dr/Exit 62	1 h 58 m	6.5	567	490,498
16	9	DC-295 NB @ Eastern Ave	2 h 49 m	3.9	428	334,024
17	10	VA-28 SB @ Prescott Ave/Sudley Rd	3 h 23 m	8.2	196	330,540



Note: Bottleneck ranking was produced by the VPP Suite (vpp.ritis.org) ; Impact factor = duration (minutes) * queue length (miles) * occurrences.

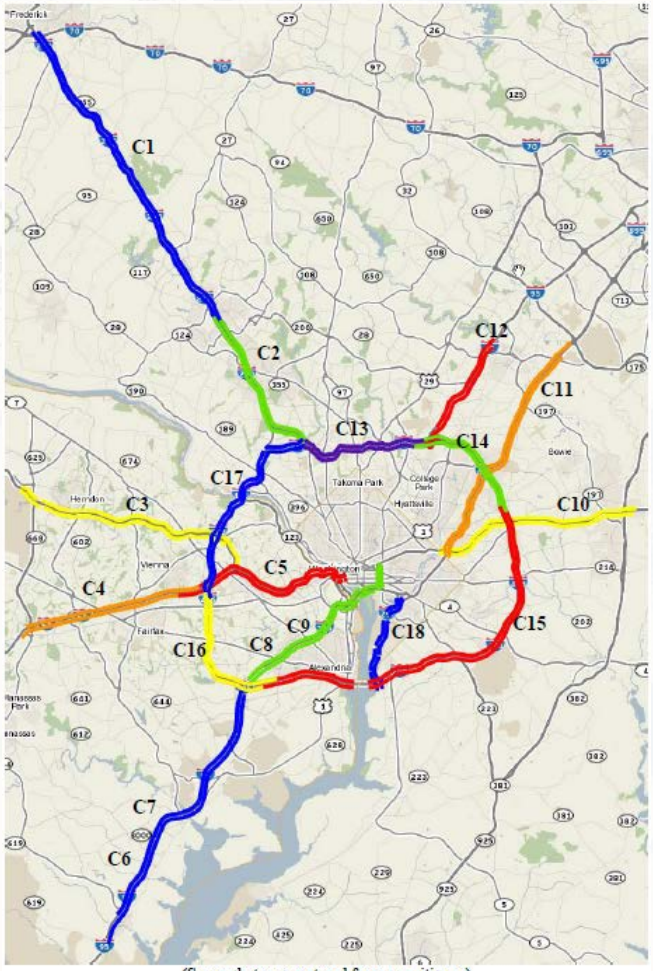
2013 Top Bottlenecks
- by Speed and AADT

Rank in TPB and Adjacent Area	Rank Inside TPB Area	Location	Average Duration	Queue Length (miles)	Occurrences	Impact Factor	2011 AADT*
1	N/A	I-95 SB @ Fred./Sta. Co Line	5 h 6 m	32.0	311	3,055,956	70,500
2	1	I-270 Spur SB @ I-270	1 h 42 m	6.4	884	591,198	133,326
3	N/A	I-95 NB @ MD-100/Exit 43	2 h 51 m	14.5	279	756,736	97,667
4	N/A	I-95 SB @ VA-3/Exit 130	5 h 45 m	32.3	115	1,283,658	56,500
5	2	I-495 CW @ AM Bridge	2 h 47 m	4.7	800	640,474	107,242
6	N/A	I-95 SB @ VA-630/Exit 140	4 h 6 m	20.1	161	795,652	67,000
7	3	I-66 EB @ Vaden Dr/Exit 62	1 h 58 m	6.5	567	490,498	89,000
8	N/A	I-95 SB @ US-17/Exit 133	5 h 8 m	30.2	60	657,455	65,500
9	4	I-66 EB @ I-495/Exit 64	1 h 53 m	4.6	968	513,693	81,000
10	5	I-395 NB @ 2nd St	1 h 43 m	3.8	1388	534,048	75,716
11	N/A	MD-295 NB @ MD-175	3 h 48 m	13.8	261	823,541	48,225
12	N/A	I-95 SB @ US-1/Exit 143	3 h 9 m	12.0	175	558,193	70,500
13	6	I-66 WB @ VA-234/Exit 47	2 h 21 m	10.9	339	604,192	63,500
14	7	MD-295 NB @ MD-197/	2 h 47 m	6.7	444	505,186	53,535
15	8	DC-295 NB @ Eastern Ave	2 h 49 m	3.9	428	334,024	56,374
16	9	US-50 WB @ 10th St	4 h 19 m	13.1	145	546,624	12,146
17	10	VA-28 SB @ Sudley Rd	3 h 23 m	8.2	196	330,540	14,464



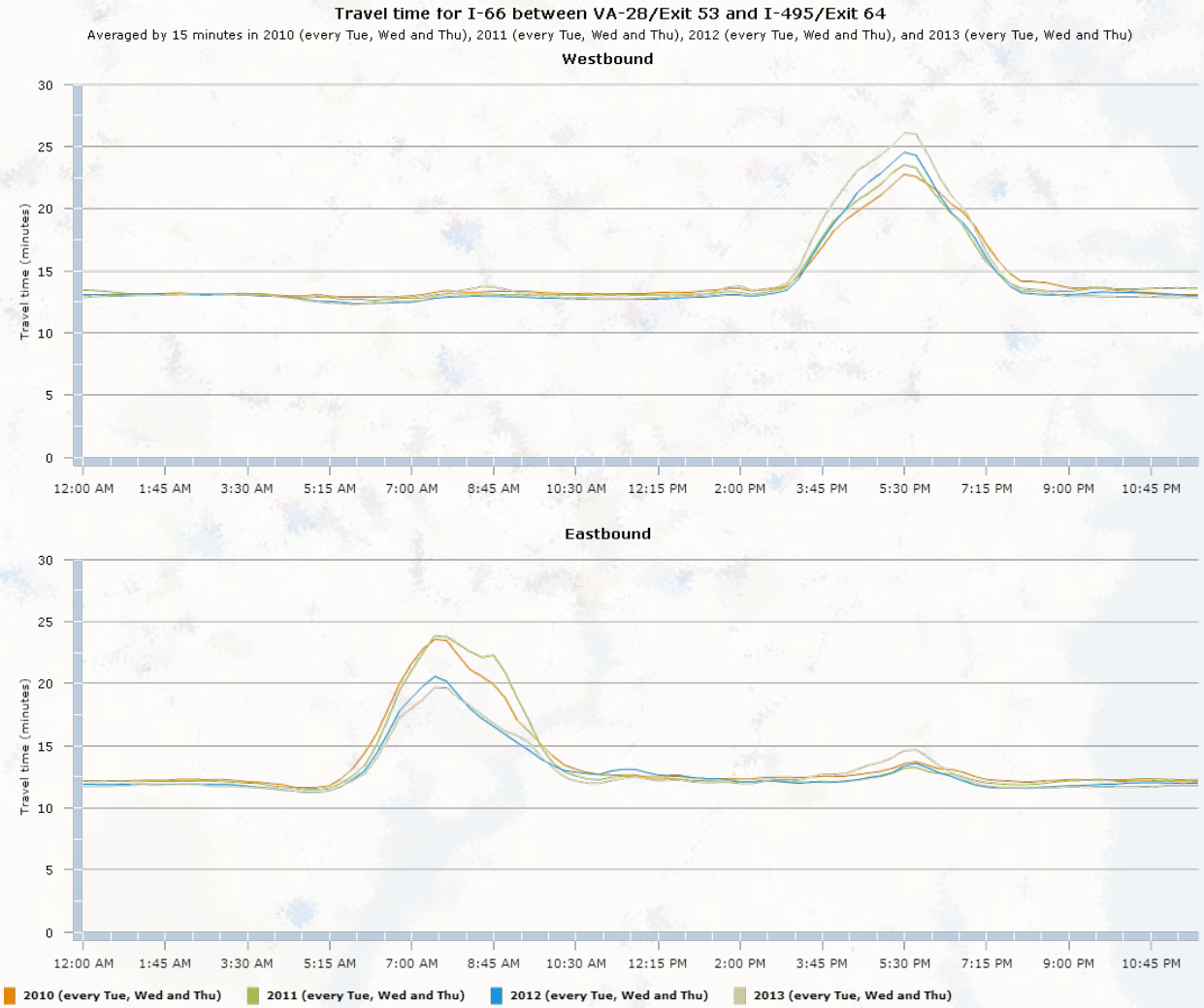
Travel Times along Major Freeway Commute Routes - Route Definition

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 11th St. Bridge



(Screenshot was captured from vpp.ritis.org)

Travel Times along Major Freeway Commute Routes - Travel Times by Time of Day, 2010-2013



Appendix C shows all routes.

Travel Times along Major Freeway Commute Routes - AM Peak Travel Times, 2010-2013

Route	Length (miles)	Average Travel Time in Peak Period (min)				Reliable (95th) Travel Time* in Peak Period (min)				2013 Change in Average Travel Time in Peak Period (min)			2013 Change in 95th Travel Time in Peak Period (min)		
		2010	2011	2012	2013	2010	2011	2012	2013	vs. 2010	vs. 2011	vs. 2012	vs. 2010	vs. 2011	vs. 2012
C1: I-270 SB from I-70 to I-370	24	33	29	29	29	81	65	60	58	-4	0	0	-23	-7	-2
C2: I-270 SB from I-370 to I-495	10	16	14	13	14	35	34	29	29	-2	-1	0	-7	-5	0
C3: VA-267 EB from VA-28 to VA-123	14	18	18	15	15	43	39	29	29	-3	-2	0	-14	-10	0
C4: I-66 EB from VA-28 to I-495	12	19	20	17	17	48	41	35	32	-3	-3	0	-16	-9	-2
C5: I-66 EB from I-495 to TR Bridge	13	20	19	16	17	43	42	34	34	-3	-3	0	-9	-8	-1
C6: I-95 NB from VA-234 to Exit 169	20	25	24	24	24	61	61	59	56	-1	0	-1	-5	-5	-3
C7: I-95 NB HOV from VA-234 to Exit 169	18	18	17	17	17	28	27	24	23	-1	-1	0	-5	-4	-1
C8: I-395 NB from I-95 to H St.	13	24	24	23	23	66	68	65	62	-1	-2	-1	-3	-6	-2
C9: I-395 NB HOV from I-495 to US-1	11	14	14	13	13	31	30	29	27	-1	-1	0	-5	-3	-2
C10: US-50 WB from US-301 to MD-295	14	17	16	16	16	32	31	28	28	-1	0	0	-4	-3	0
C11: MD-295 SB from MD-198 to US-50	16	21	20	19	19	50	47	42	40	-2	-1	0	-10	-6	-2
C12: I-95 SB from MD-198 to I-495	8	11	10	9	9	28	28	20	19	-2	-1	0	-9	-9	-1
C13: I-495 IL from I-270 to I-95	10	12	11	11	11	18	18	18	16	-1	0	0	-3	-2	-2
C14: I-495 IL from I-95 to US-50	9	10	10	9	9	12	12	12	12	0	0	0	0	-1	0
C15: I-495 IL from US-50 to I-95	28	28	28	27	29	41	38	41	46	1	1	2	5	8	5
C16: I-495 IL from I-95 to I-66	10	17	17	14	11	39	36	34	16	-7	-6	-3	-22	-20	-18
C17: I-495 IL from I-66 to I-270	14	16	16	15	15	25	24	25	26	-1	-1	0	1	2	1
C13: I-495 OL from I-95 to I-270	10	20	19	17	18	43	44	38	38	-2	-1	1	-5	-6	0
C14: I-495 OL from US-50 to I-95	10	12	12	11	11	24	25	22	20	-1	0	0	-4	-5	-2
C15: I-495 OL from I-95 to US-50	29	31	30	29	28	46	46	43	39	-3	-2	-1	-7	-7	-5
C16: I-495 OL from I-66 to I-95	11	10	10	10	10	12	12	11	10	-1	-1	0	-2	-1	0
C17: I-495 OL from I-270 to I-66	14	15	15	15	14	23	23	20	18	-1	-2	-1	-5	-5	-2
C18: I-295 NB from I-495 to 11th St. Brdg.	6	10	9	10	9	28	25	30	25	0	0	0	-3	-1	-5

* The majority (95%) of trips spent equal to or less than the reliable (95th) travel time on the specified route. On average, a traveler could successfully complete the travel on the specified route within the reliable travel time during 19 out of 20 trips (only 1 trip could exceed the reliable travel time).

Travel Times along Major Freeway Commute Routes - PM Peak Travel Times, 2010-2013

Route	Length (miles)	Average Travel Time in Peak Period (min)				Reliable (95th) Travel Time* in Peak Period (min)				2013 Change in Average Travel Time in Peak Period (min)			2013 Change in 95th Travel Time in Peak Period (min)		
		2010	2011	2012	2013	2010	2011	2012	2013	vs. 2010	vs. 2011	vs. 2012	vs. 2010	vs. 2011	vs. 2012
C1: I-270 NB from I-370 to I-70	24	30	29	29	28	63	55	54	52	-2	-1	-1	-11	-3	-2
C2: I-270 NB from I-495 to I-370	9	12	12	12	12	23	25	24	24	0	0	0	1	-1	0
C3: VA-267 WB from I-66 to VA-28	15	17	16	15	15	25	22	22	21	-1	-1	0	-4	-1	-1
C4: I-66 WB from I-495 to VA-28	13	19	20	20	22	38	43	43	45	2	2	1	7	2	1
C5: I-66 WB from TR Bridge to I-495	11	15	14	13	14	31	33	28	29	-1	0	1	-1	-4	1
C6: I-95 SB from Exit 169 to VA-234	18	30	28	29	29	89	77	82	83	-1	1	0	-6	6	0
C7: I-95 SB HOV from Exit 169 to VA-234	17	18	17	17	18	30	28	27	34	-1	0	1	4	6	6
C8: I-395 SB from H St. to I-95	14	20	22	22	21	39	45	44	45	1	-1	0	6	0	1
C9: I-395 SB HOV from US-1 to I-495	11	12	12	11	11	20	17	17	17	-1	0	0	-2	0	0
C10: US-50 EB from MD-295 to US-301	13	15	14	14	14	21	20	19	19	-1	0	0	-2	-1	-1
C11: MD-295 NB from US-50 to MD-198	15	24	23	21	22	51	53	48	51	-3	-1	0	0	-2	3
C12: I-95 NB from I-495 to MD-198	7	9	8	8	8	15	16	15	18	0	0	1	3	2	3
C13: I-495 IL from I-270 to I-95	10	18	17	16	15	43	44	41	39	-3	-3	-1	-4	-5	-2
C14: I-495 IL from I-95 to US-50	9	12	12	12	12	24	27	26	25	0	0	0	1	-2	-1
C15: I-495 IL from US-50 to I-95	28	30	29	28	28	45	44	42	36	-3	-1	0	-9	-8	-6
C16: I-495 IL from I-95 to I-66	10	11	11	10	9	25	24	15	11	-2	-1	0	-14	-13	-4
C17: I-495 IL from I-66 to I-270	14	25	23	24	24	83	84	81	72	-1	1	0	-11	-12	-9
C13: I-495 OL from I-95 to I-270	10	14	12	11	11	40	34	23	26	-3	-1	0	-14	-8	3
C14: I-495 OL from US-50 to I-95	10	12	11	11	12	24	24	19	22	0	0	0	-2	-2	3
C15: I-495 OL from I-95 to US-50	29	31	30	30	31	54	61	59	61	0	0	1	6	0	1
C16: I-495 OL from I-66 to I-95	11	13	12	12	11	23	23	19	16	-3	-2	-1	-7	-8	-3
C17: I-495 OL from I-270 to I-66	14	23	23	20	16	65	66	62	33	-7	-6	-4	-31	-33	-29
C18: I-295 SB from 11th St. Brdg. to I-495	6	10	10	10	10	21	22	22	21	0	0	0	0	-2	-1

* The majority (95%) of trips spent equal to or less than the reliable (95th) travel time on the specified route. On average, a traveler could successfully complete the travel on the specified route within the reliable travel time during 19 out of 20 trips (only 1 trip could exceed the reliable travel time).

Arterials

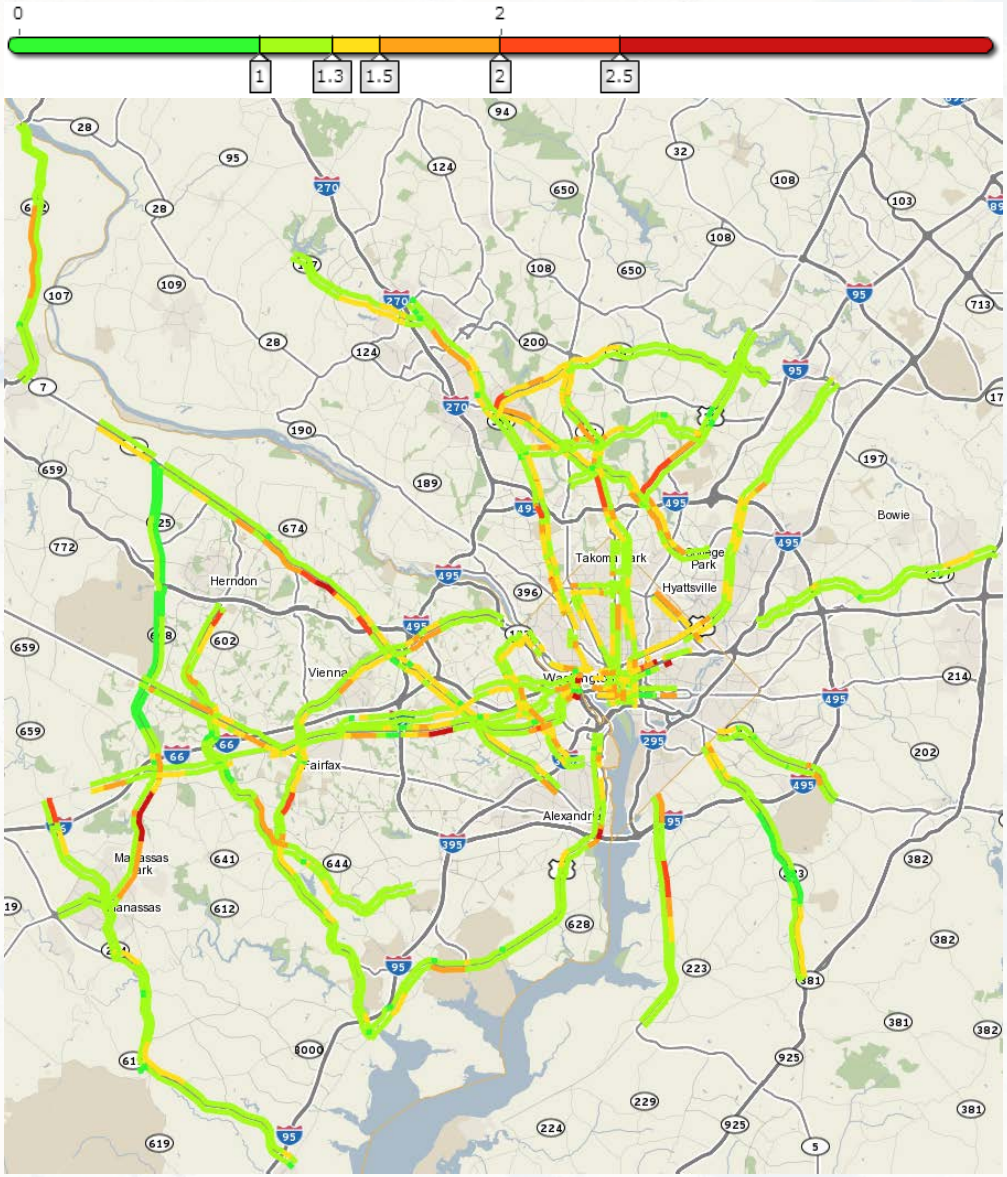
AM Peak Hour

Congestion Level:

- TTI = 1.0: Free flow
- 1.0<TTI<=1.3: Minimal
- 1.3<TTI<=1.5: Minor
- 1.5<TTI<=2.0: Moderate
- 2.0<TTI<=2.5: Heavy
- 2.5<TTI: Severe

Travel Time Index and Planning Time Index on all National Highway System are shown in Appendices A and B.

Travel Time Index during 8:00-9:00 am on Middle Weekdays in 2013



Arterials

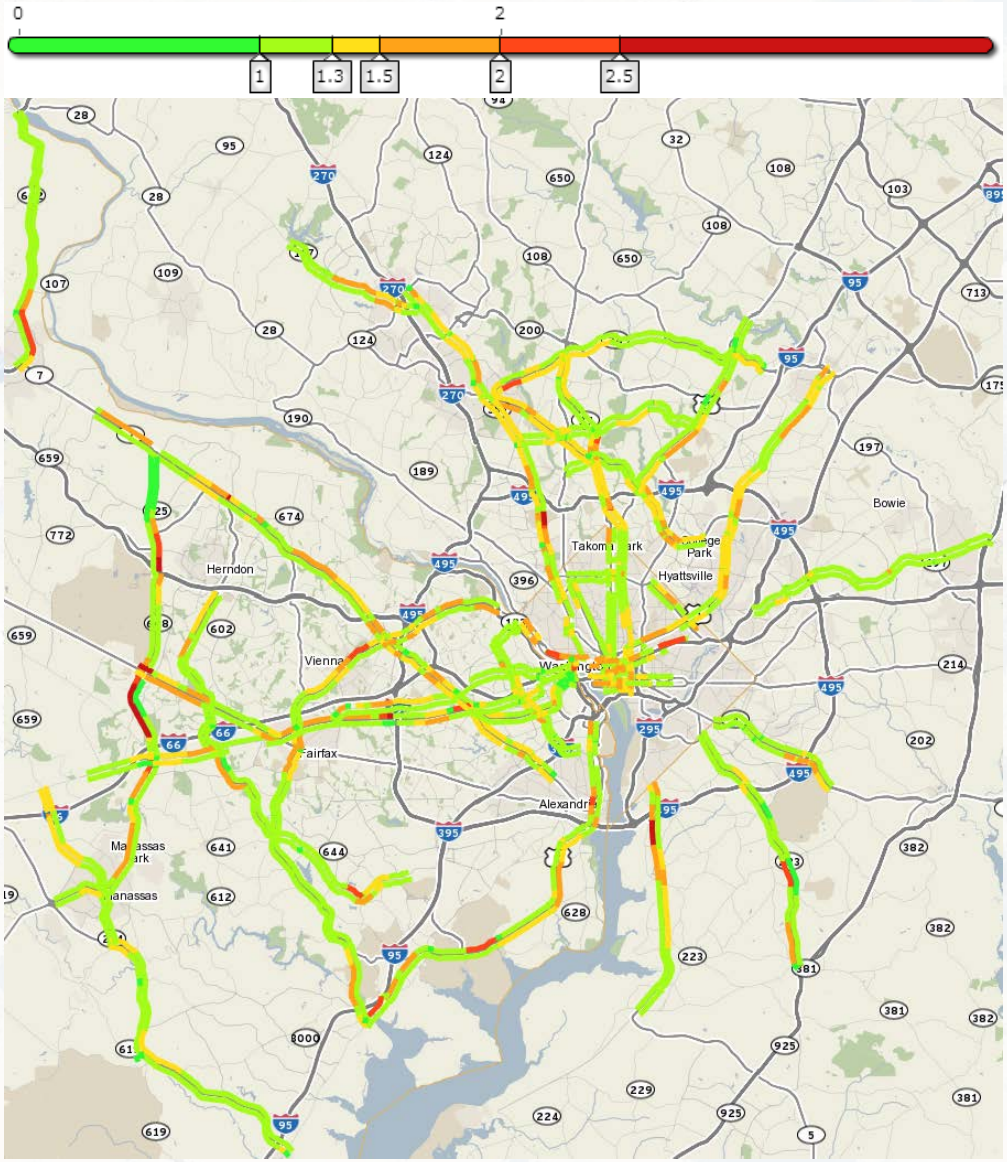
PM Peak Hour

Congestion Level:

- TTI = 1.0: Free flow
- 1.0<TTI<=1.3: Minimal
- 1.3<TTI<=1.5: Minor
- 1.5<TTI<=2.0: Moderate
- 2.0<TTI<=2.5: Heavy
- 2.5<TTI: Severe

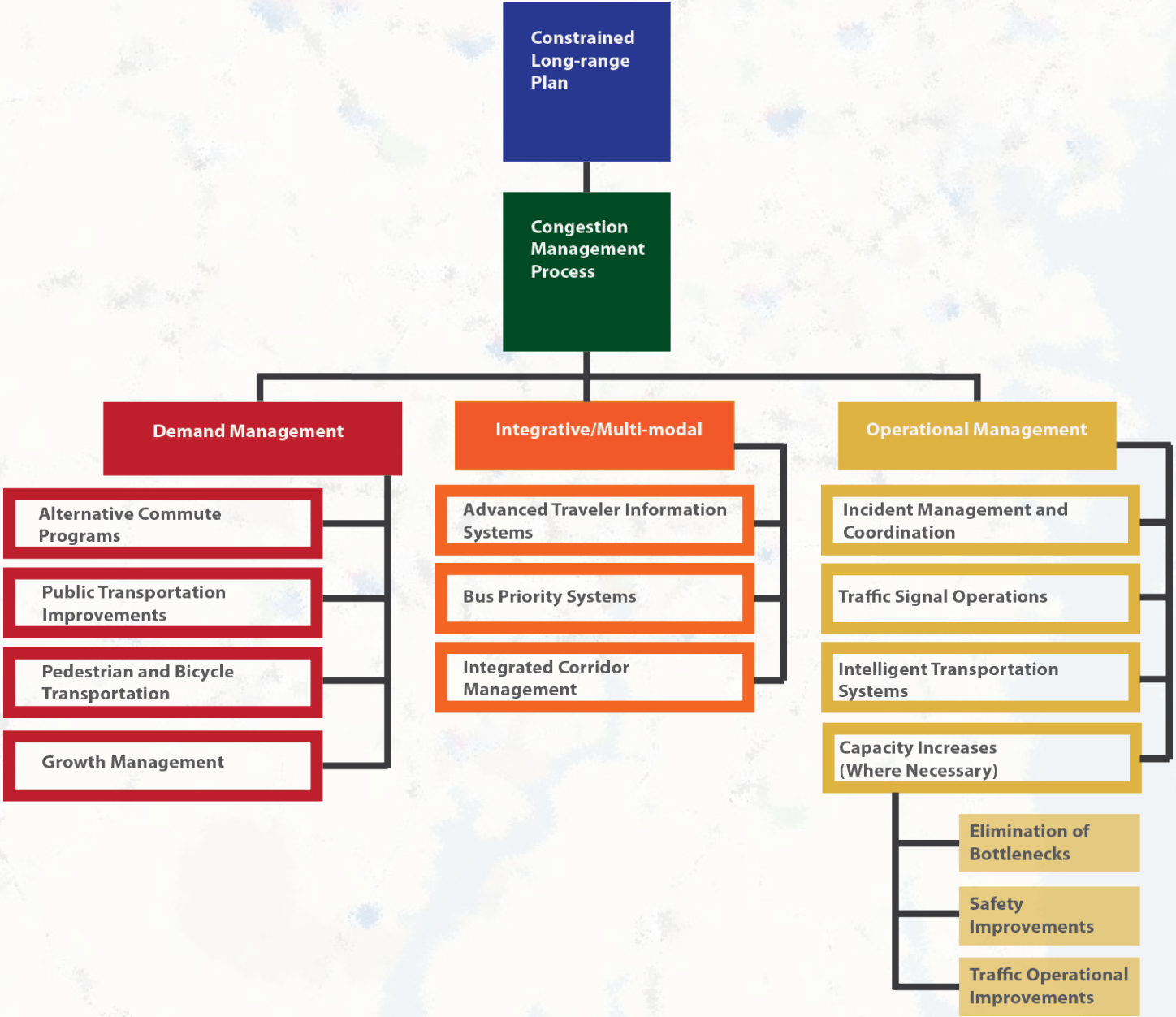
Travel Time Index and Planning Time Index on all National Highway System are shown in Appendices A and B.

Travel Time Index during 5:00-6:00 pm on Middle Weekdays in 2013



Part 2:
Congestion Management Strategies, CMP-CLRP Integration, and Recommendations

Erin Morrow


Constrained Long-range Plan
Congestion Management Process
Demand Management
Alternative Commute Programs
Public Transportation Improvements
Pedestrian and Bicycle Transportation
Growth Management
Integrative/Multi-modal
Advanced Traveler Information Systems
Bus Priority Systems
Integrated Corridor Management
Operational Management
Incident Management and Coordination
Traffic Signal Operations
Intelligent Transportation Systems
Capacity Increases (Where Necessary)
Elimination of Bottlenecks
Safety Improvements
Traffic Operational Improvements

New Strategies in 2014 CMP Report

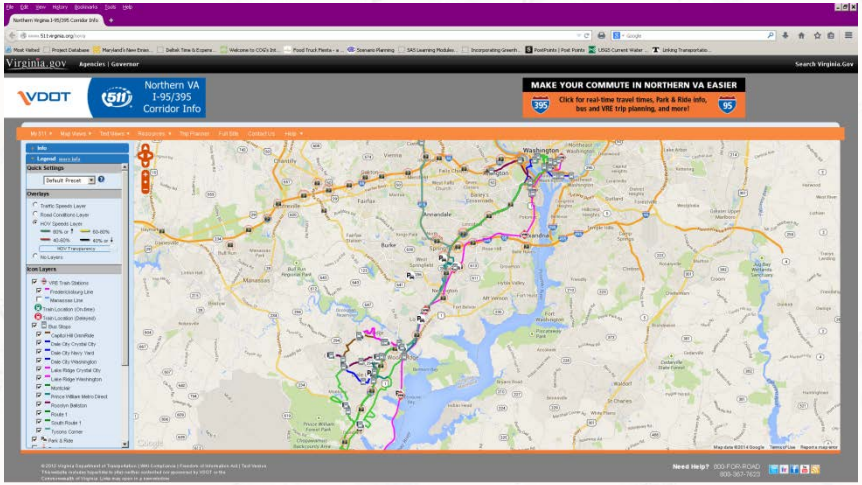
- Demand Management Strategies
  - Transit
    - Weekend service on MARC Penn Line
    - Crystal City-Potomac Yard Transitway
    - DC Streetcar
    - Metrorail Silver Line
  - Bicycle/Pedestrian Programs
    - Transportation Alternatives Program
  - Land Use Strategies
    - New Regional Activity Center map and *Place + Opportunity*

New Strategies in 2014 CMP Report

- Operational Management Strategies
  - 495 Express Lanes
  - DDOT Traffic Signal Timing Project
  - Enhancements to MATOC Program
  - VDOT's I-66 Active Traffic Management Project

New Strategies in 2014 CMP Report

- Integrative/Multi-modal Strategies
  - Implementation of VDOT ICM project in I-95 and US-1 Corridors



  - Advanced Traveler Information Systems
  - Mobile Devices and Social Media

CMP-CLRP Integration

- Monitor and evaluate transportation system performance
- Define and analyze strategies
- Implement strategies and assess
- Compile project-specific congestion management information

Regional Transportation Priorities Plan

1. **Meet Our Existing Obligations**: Maintain the Transportation System We Already Have
2. **Strengthen Public Confidence and Ensure Fairness**: Pursue Greater Accountability, Efficiency, and Accessibility
3. **Move More People and More Goods More Efficiency**: Alleviate Congestion and Crowding and Accommodate Future Growth

Regional Transportation Priorities Plan

- Alleviate roadway bottlenecks
- Increase roadway efficiency
- Promote commute alternatives
- Increase bicycle and pedestrian infrastructure
- Apply priority bus treatments
- More capacity on the existing transit system
- Bus rapid transit (BRT) and other cost-effective transit alternatives
- Express toll lanes

Recommendations (1/5)

1. **Refine the Congestion Management Process to help meet the requirements stipulated by MAP-21 and its subsequent federal regulations.**
2. **Continue the Commuter Connections program.**
3. **Continue and enhance the MATOC program and support agency/jurisdictional transportation management activities.**

Recommendations (2/5)

4. **Pursue sufficient investment in the existing transportation system, which is important for addressing congestion.**
5. **Encourage implementation of congestion management for major construction projects.**
6. **Consider variable pricing and other management strategies in conjunction with capacity increasing projects.**

Recommendations (3/5)

7. **Continue to encourage transit in the Washington region and explore transit priority strategies.**
8. **Continue to encourage access to non-auto travel modes.**
9. **Pursue increased integration of operations management and travel demand management components of congestion management for more efficient use of the existing transportation network.**

Recommendations (4/5)

10. **Continue and enhance providing real-time, historical, and multimodal traveler information.**
11. **Continue to look for ways to interface with the public through new technology such as mobile devices and social media.**
12. **Encourage connectivity within and between Regional Activity Centers.**

Recommendations (5/5)

13. **Continue and enhance the regional congestion monitoring program with multiple data sources.**
14. **Continue to monitor recent trends in congestion**.

Review Schedule

- May 13, 2014 – Presentation to MOITS
- May 20, 2014 – Presentation to Commuter Connections Subcommittee
- May 28, 2014 – Comments due
- June 6, 2014 – Initial presentation to TPB Tech Committee (tentative)
- June 27, 2014 – Final presentation to TPB Tech Committee (tentative)

Please send comments to:

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