

# REVIEW ON TPB CONGESTION MANAGEMENT PROCESS AND PERFORMANCE-BASED PLANNING ACTIVITIES

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TPB Vehicle Probe Data Users Group (VPDUG) Meeting  
June 21, 2018



# Presentation Items

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- TPB Congestion Management Process (CMP) Activities
  - National Capital Region Congestion Report
  - Development of 2018 CMP Technical Report
- TPB Performance-Based Planning (PBPP) Activities
  - System Performance (NHS, Freight, CMAQ Program) Measures



# TPB Congestion Management Process (CMP) Activities



# What is Congestion Management Process (CMP) ?

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- The CMP is a requirement in metropolitan transportation planning
  - SAFETEA-LU and associated 2007 Federal regulations for metropolitan planning address CMP requirements
  - Retained in MAP-21 and FAST Act 2015
- Major Components of the CMP include:
  - Methods to monitor and evaluate system performance
  - Objectives and performance measures
  - Data collection and analysis
  - Identification and evaluation of anticipated performance of Congestion Management strategies
  - Assessment of the effectiveness of previously implemented strategies



# National Capital Region Congestion Report

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- A quarterly update of the National Capital Region's
  - Traffic congestion, in terms of Travel Time Index (TTI)
  - Travel time reliability, in terms of Planning Time Index (PTI)
  - Top-10 bottlenecks, and
  - Featured spotlight
- Travel Time Index (TTI):
  - The ratio of actual travel time to free-flow travel time
  - $TTI = 1.00$  means free flow conditions
- Planning Time Index (PTI):
  - The ratio of 95th percentile travel time to free flow travel time
  - The higher the index, the less reliable traffic conditions it represents



# Data for the Congestion Report

Probe Data Analytics Suite

Welcome, James | [My History](#) | [Help](#) | [Tutorials](#) | [Logout](#)

**Massive Data Downloader**  
Use the Massive Data Downloader to download raw probe data from our archive for offline analysis.

**1. Select roads**

Road Region List of TMC codes Map Saved TMC Set

Showing 38 of 597 available TMC sets Display Options

TMC Set	TMCs	Owner
CMPTechReportC13IL	16	j@m...
CMPTechReportC13OL	16	j@m...
CMPTechReportC14IL	14	j@m...
CMPTechReportC14OL	14	j@m...
TPB20180428	12985	j@m...
TPB20180313Interstate+USR	1970	j@m...
CMPTechReportC18	35	j@m...

+ Add selected TMC sets

Your selected roads Remove all

- District of Columbia (3138 TMCs)
- 4 counties in Maryland (5547 TMCs)
- 9 counties in Virginia (4280 TMCs)

+ Save as TMC set

**2. Select one or more date ranges**

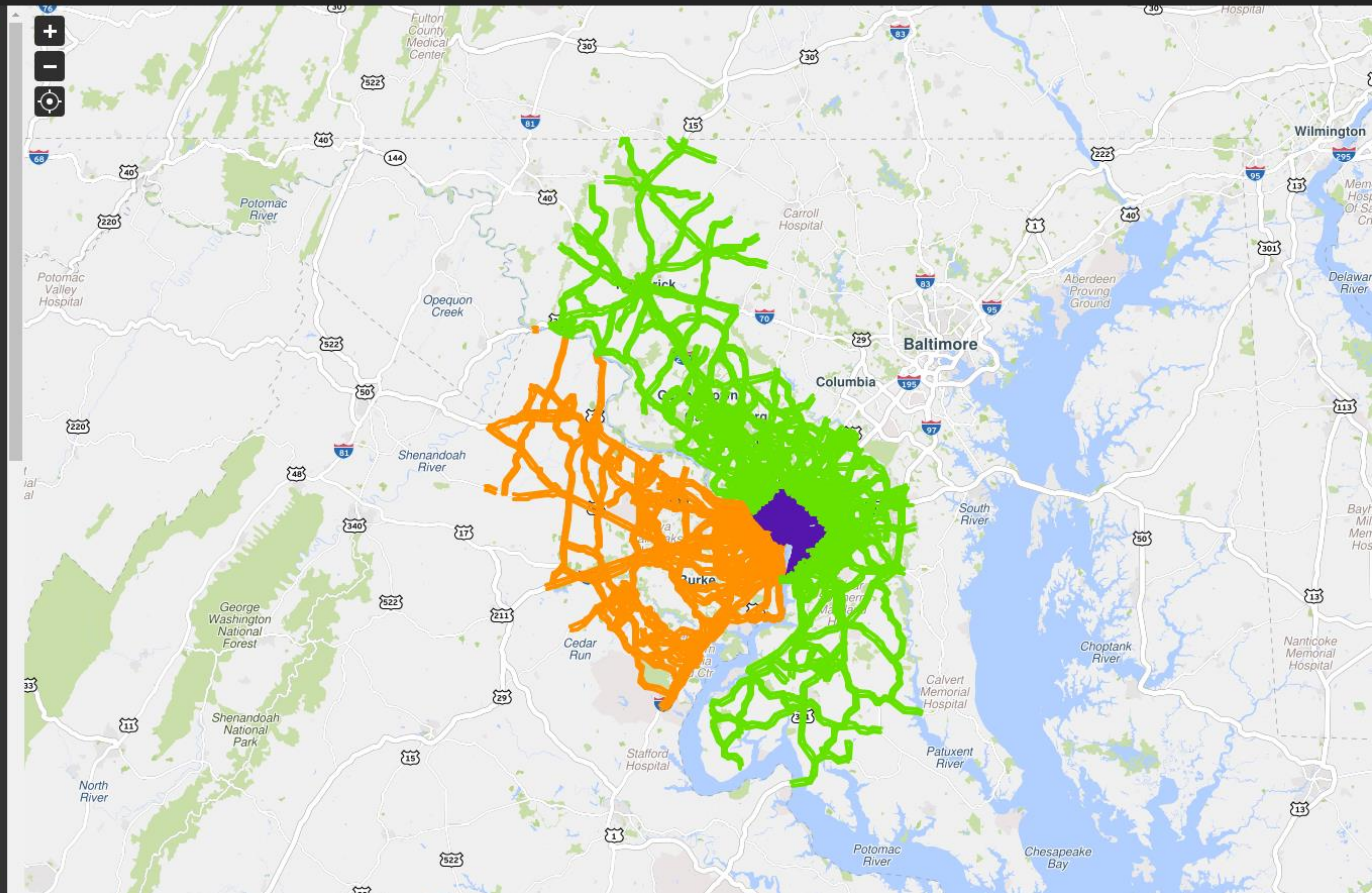
01/01/2018 - through - 03/31/2018 + Add another date range

**3. Select days of week**

Sun Mon Tue Wed Thu Fri Sat

**4. Select one or more times of day**

12:00 AM - to - 11:59 PM + Add another time of day



Source: The Probe Data Analytics (PDA) Suite of RITIS

# Resolution of The Data

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- Travel Time
  - In seconds or minutes
- Spatial
  - Road segments identified by traffic message channel (TMC) standard
  - TMC segments are not always handled identically between different map data providers
  - The TMC lengths provided by the original source (and included in the download files) are what is used in calculations behind the scenes
- Temporal
  - The finest: 1 minute
  - Averaging options: 5, 10, 15 minutes and 1 hour



# Data Aggregation

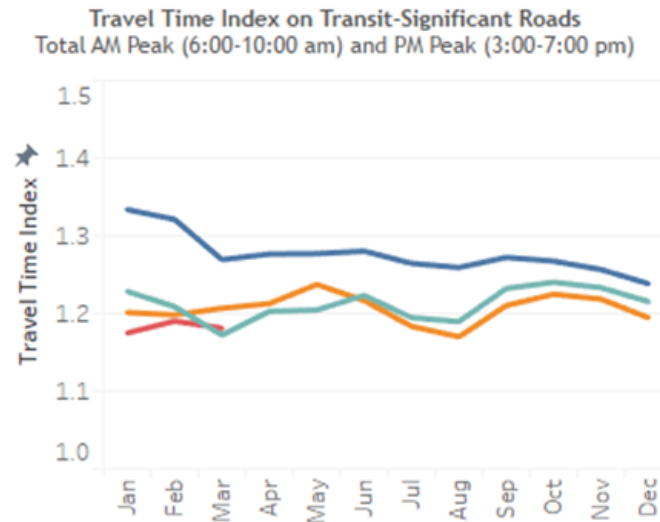
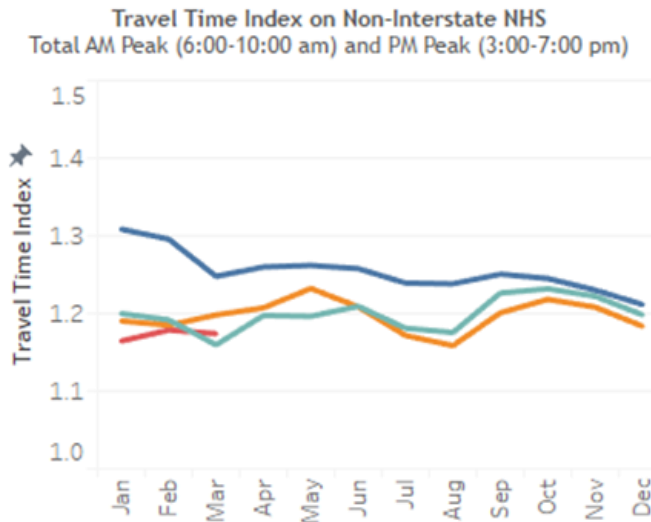
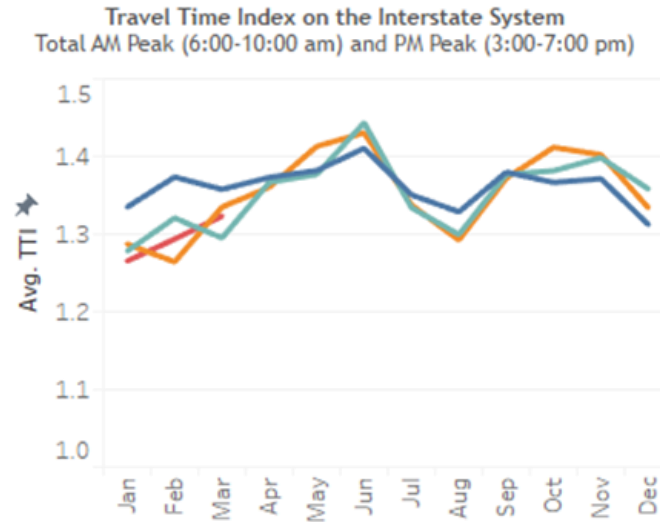
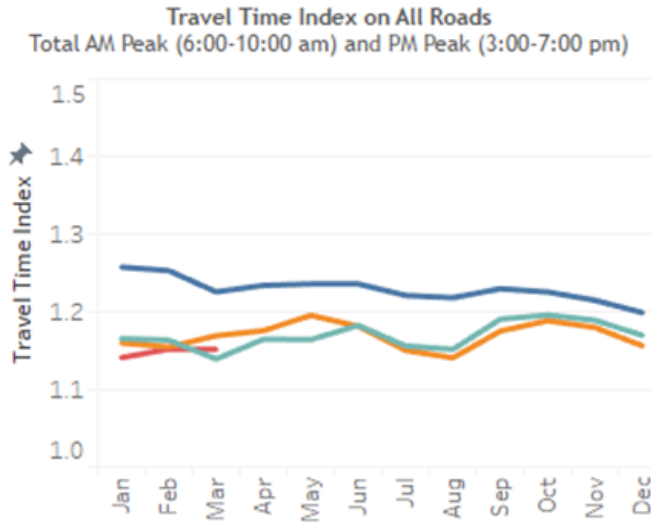
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- Assumption: NO OUTLIERS in the data
- Definition of measures
  - e.g.  $TTI = \frac{\text{Actual Travel Time}}{\text{Free Flow Travel Time}}$
- Aggregating travel time, or speed
  - $Speed = \frac{\text{Distance}}{\text{Time}}$
- Harmonic mean vs arithmetic mean
  - The harmonic mean provides the truest average when rates or ratios involved.
- Computational resources
  - What does “BIG” data mean?

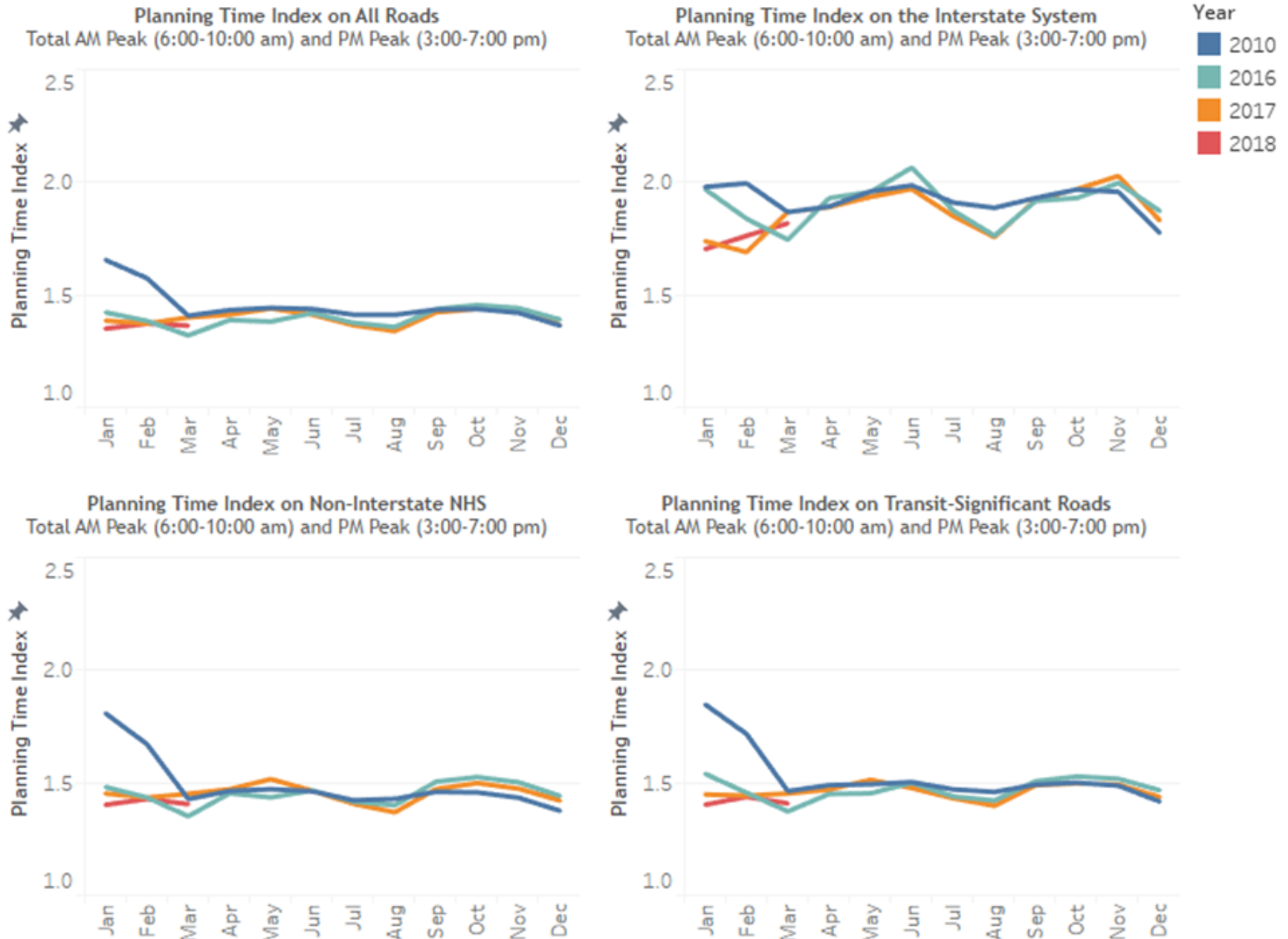




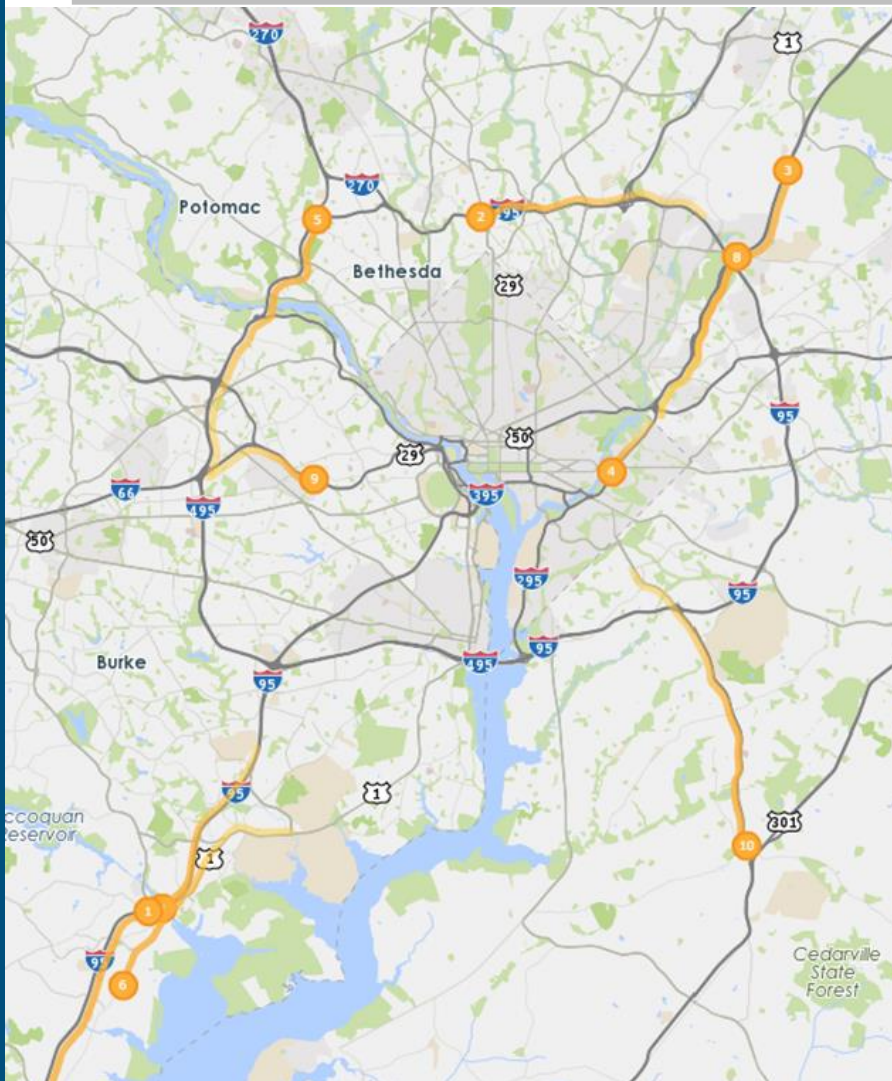
# Example of Monthly Travel Time Index



# Example of Monthly Planning Time



# Example of TOP 10 BOTTLENECKS



Rank (Last Quarter Rank)	Location	Impact factor
1 (1)*	I-95 S @ VA-123/EXIT 160	269,199
2 (3)	I-495 CCW @ MD-97/GEORGIA AVE/EXIT 31	150,339
3 (4)	MD-295 N @ POWDER MILL RD	106,612
4 (5)	DC-295 S @ CAPITOL ST	126,771
5 (2)	I-495 CW @ I-270 SPUR	170,437
6 (9)	US-1 S @ OPITZ BLVD	92,117
7 (7)	I-95 N @ VA-123/EXIT 160	93,598
8 (8)	MD-295 N @ I-495/I-95	77,415
9 (6)	I-66 E @ SYCAMORE ST/EXIT 69	89,997
10 (18)	MD-5 S @ MD-381/BRANDYWINE RD	84,319



# Development of 2018 CMP Technical Report

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- Biennial CMP Technical Reports since 2008, an ongoing activity.
- Outline of the report covers
  - 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



# Draft of the Chapter 2. STATE OF CONGESTION

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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

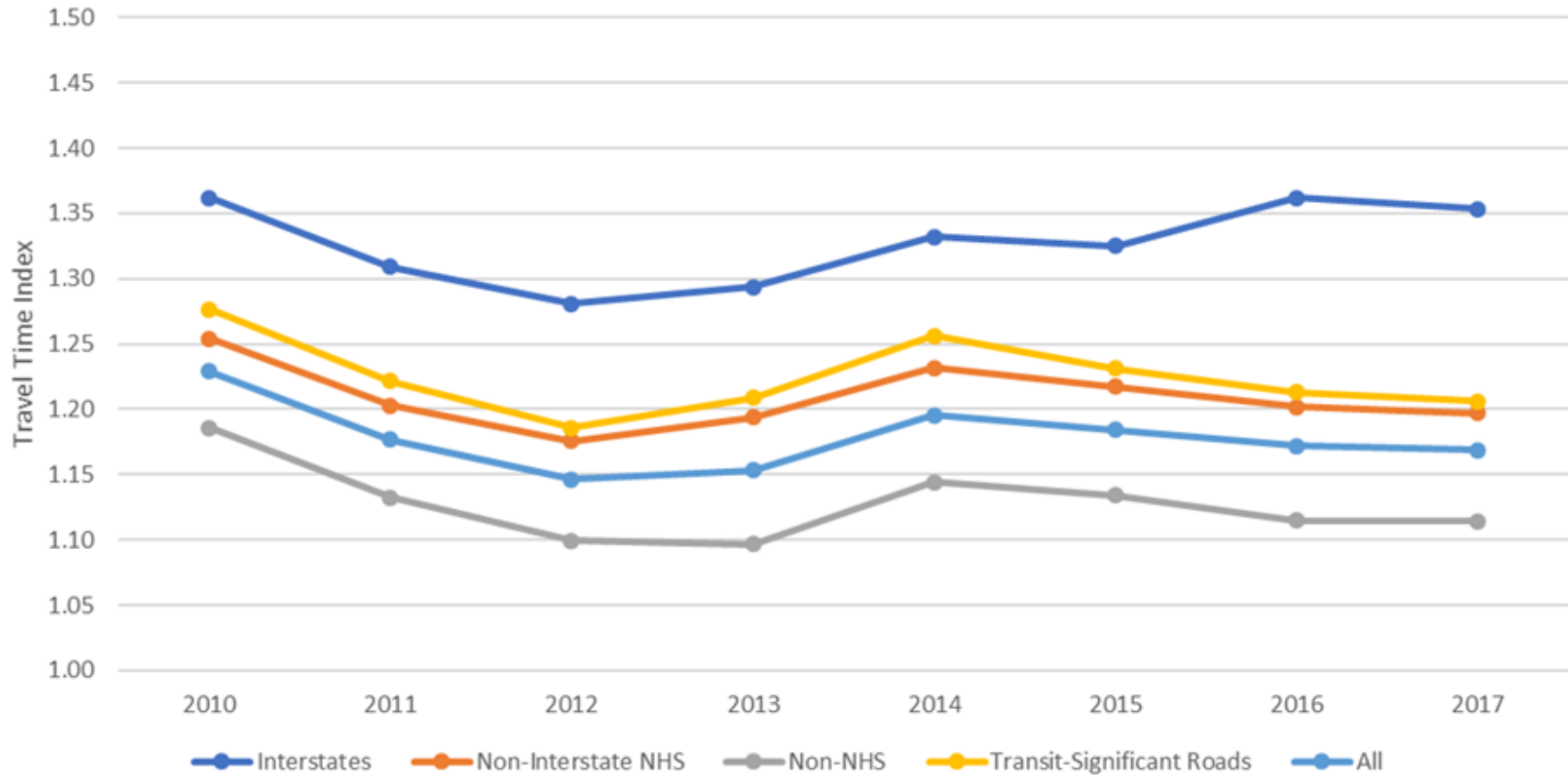
2.5 National Comparison of the Washington Region's Congestion

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



# Example of Congestion on Highways

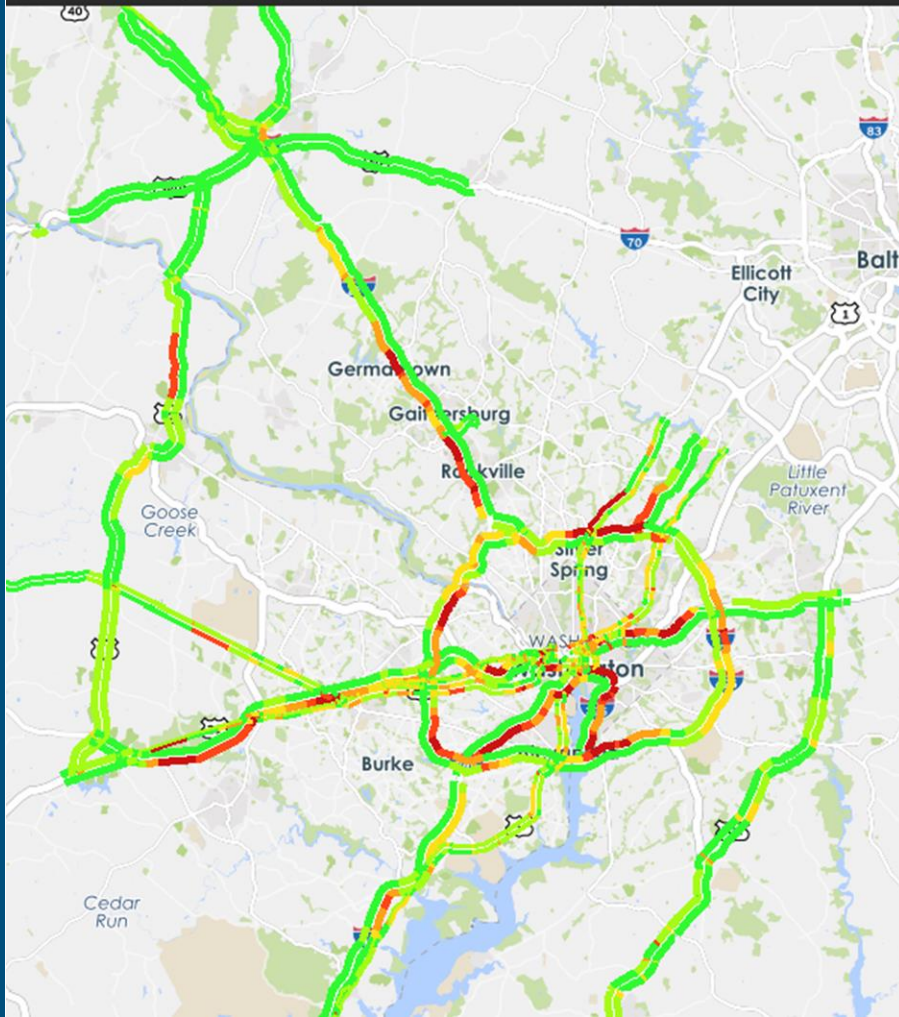
Annual Average Travel Time Index by Highway Category: Total AM and PM Peaks



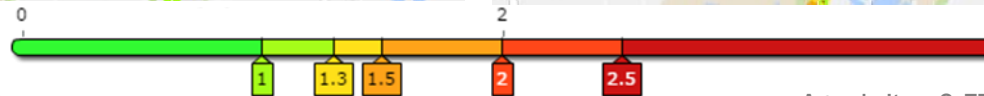
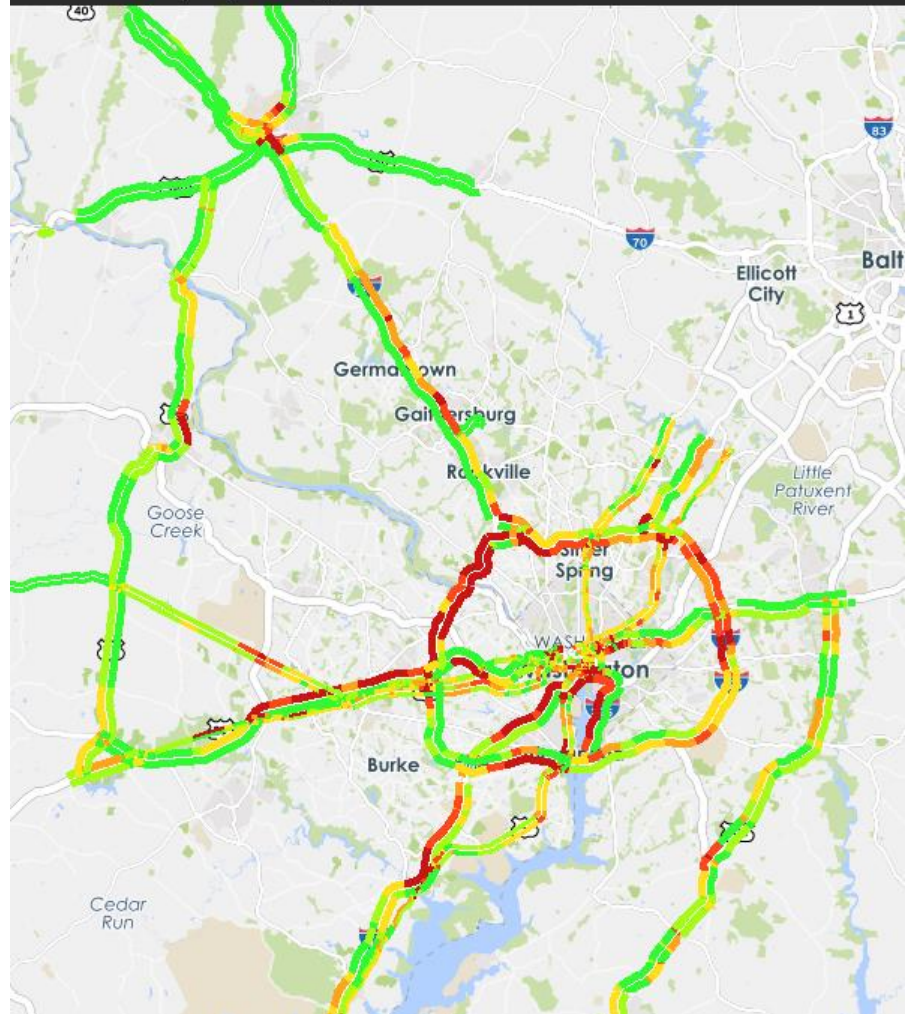


# Example of 2017 Peak Hour TTI

08:00 AM - 2017 (Every weekday)



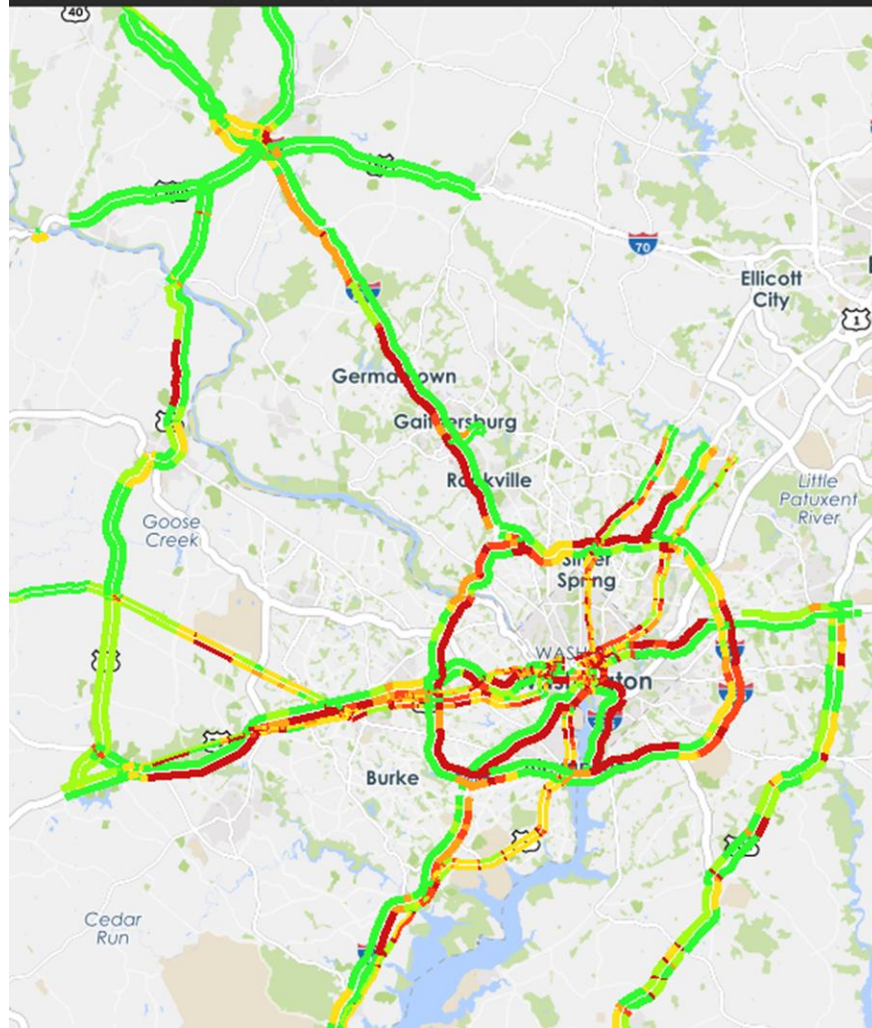
05:00 PM - 2017 (Every weekday)



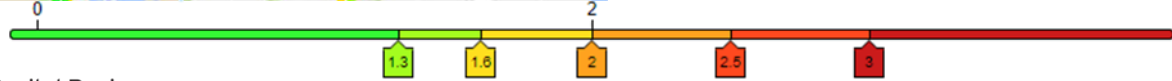
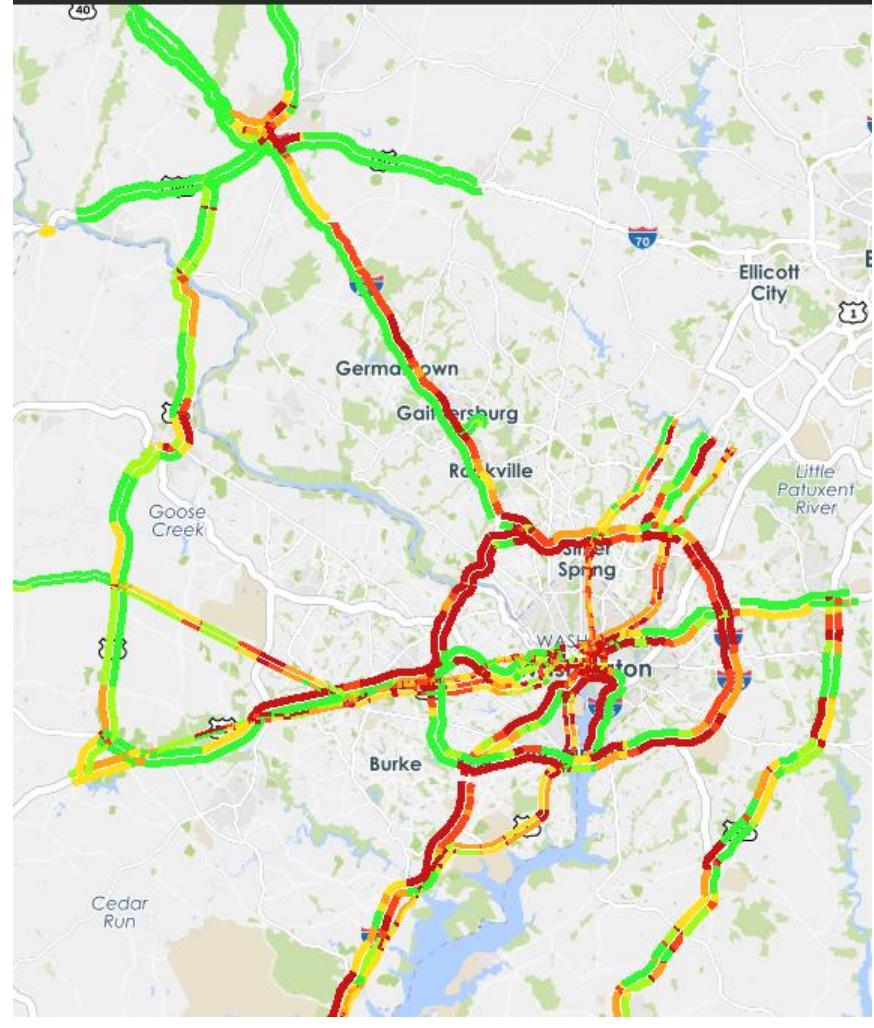


# Example of 2017 Peak Hour PTI

08:00 AM - 2017 (Every weekday)



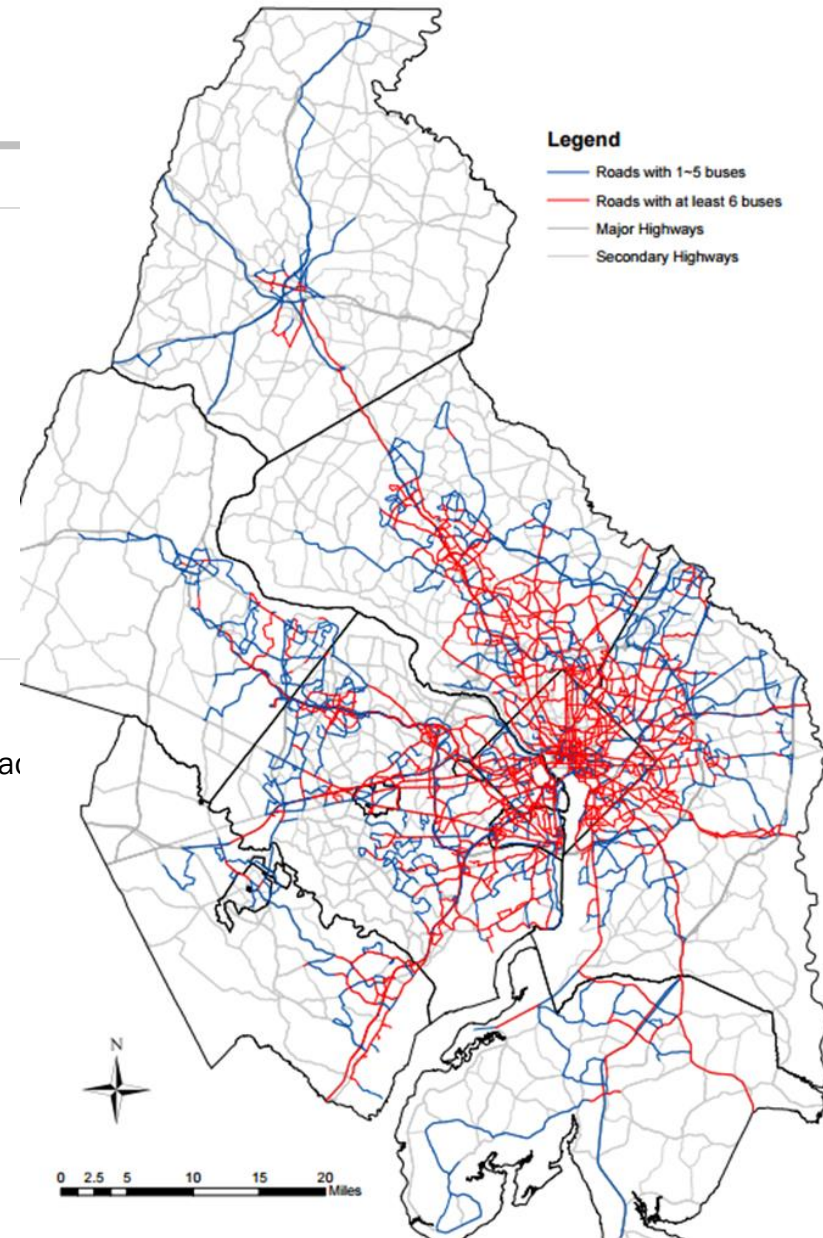
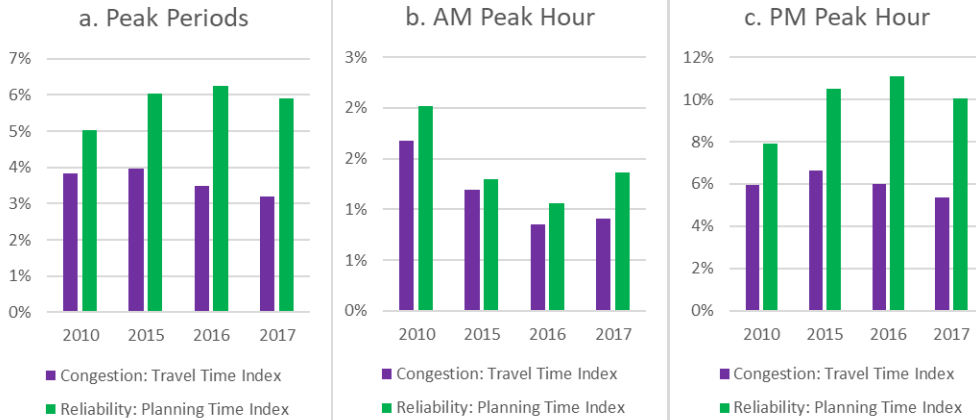
05:00 PM - 2017 (Every weekday)



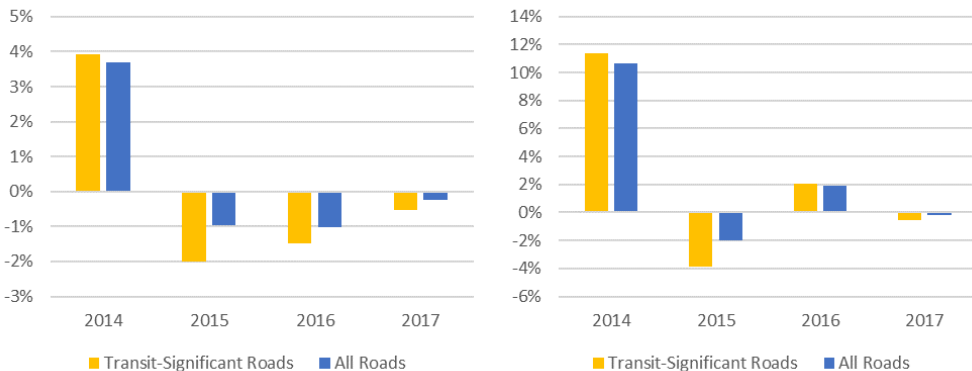


# Congestion on Transit Significant Network

## Transit-Significant Roads Compared to All Roads



## Congestion and Reliability Year-to-Year Changes of Transit-Significant Road

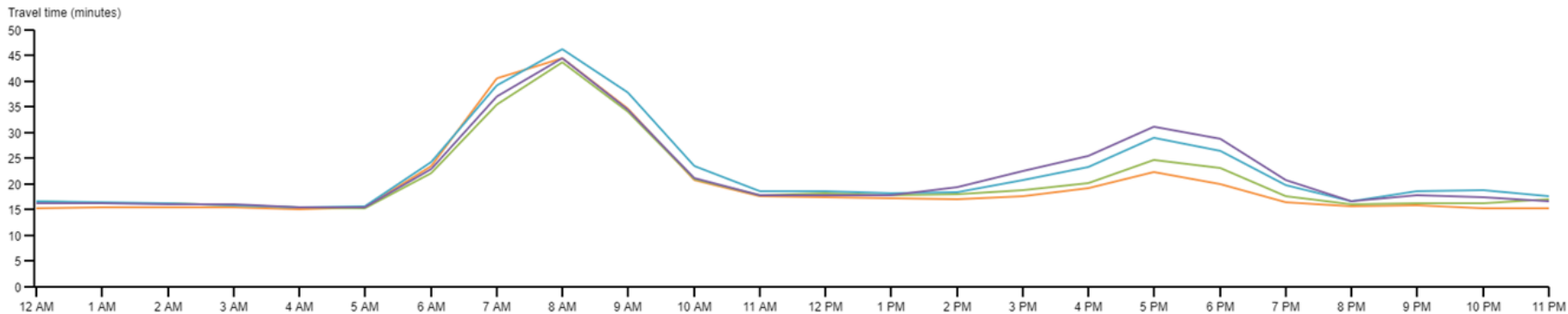


# Example of Travel Times Along A Major Freeway Commute Corridor

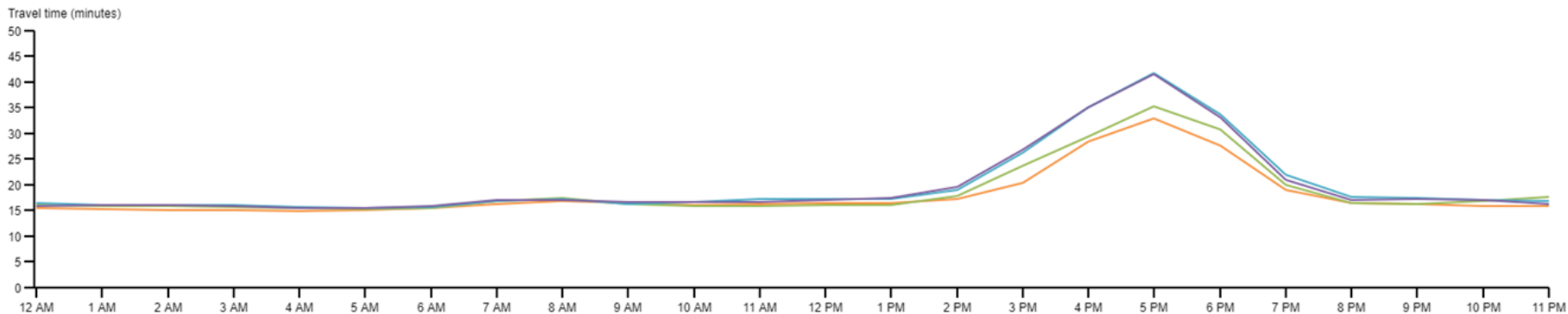
Travel time for I-395 between I-95/I-495 and H St

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



— 2010 (Every Tue, Wed, and Thu) — 2015 (Every Tue, Wed, and Thu) — 2016 (Every Tue, Wed, and Thu) — 2017 (Every Tue, Wed, and Thu)



# TPB Performance-Based Planning (PBPP) Activities



# What is Performance-Based Planning and Programming (PBPP) ?

- The PBPP process is a requirement for MPOs, States, and providers of public transportation originating in the federal surface transportation MAP-21 and FAST Acts.
- PBPP is the **application of performance management** within the planning and programming process **to achieve desired performance outcomes** for the multimodal transportation system. PBPP includes a range of activities and products:
  - Development of **long range transportation plans**
  - Federally-required plans and processes – such as Strategic Highway Safety Plans (SHSPs), Asset Management Plans, the Congestion Management Process (CMP), and Transit Agency Asset Management and Safety Plans
  - Programming documents, including State and metropolitan Transportation Improvement Programs (STIPs and **TIPs**)



# National Performance Management Research Data Set (NPMRDS)

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- Procured and sponsored by the Federal Highway Administration (FHWA)
- An archived speed and travel time data set (including associated location referencing data)
  - for Passenger vehicles, Trucks, and Trucks and Passenger vehicles combined.
  - covering the National Highway System (NHS) and select roadways near 26 key border crossings
  - at 5 minute intervals, while no missing data;
  - not use imputed data;
  - monthly update.
- Available at [npmrds.ritis.org](http://npmrds.ritis.org)



# NPMRDS Changes

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- Traffic Message Channel (TMC) can be changed over time
- Data from February 2017 onward is provided by a team led by the Center for Advanced Transportation Technology Laboratory (CATT Lab) at University of Maryland.
- Greater coverage: adheres to the following monthly data completeness commitments:
  - Interstate Truck Coverage — Total: 60%
  - Interstate Truck Coverage — Peak (M-F, 6a-8p): 70%
  - Interstate All-Vehicles — Total: 75%
  - Interstate All-Vehicles — Peak: 85%
  - Non-Interstate All Vehicles — Total: 25%
  - Non-Interstate All Vehicles — Peak: 35%



# RITIS MAP-21 Widget

**MAP-21**

**2. Select measures:**

- Percent of the Person-Miles Traveled on the Interstate That Are Reliable (the Interstate Travel Time Reliability measure) (BETA)
  - Set target to at least
- Percent of the Person-Miles Traveled on the Non-Interstate NHS That Are Reliable (the Non-Interstate NHS Travel Time Reliability measure) (BETA)
  - Set target to at least
- Truck Travel Time Reliability Index (BETA)
  - Set target to less than
- Annual Hours of Peak Hour Excessive Delay Per Capita (BETA)
  - Set target to less than
  - 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

Your selected time periods: 2017

**4. Show data as:**

Graph  
 Map

**5. Name MAP-21 widget(s)**

Annual Hours of Peak Hour Excessive Delay Per Capita for DC - National Capital Region Transportation Planning Board, Washington (TPB)  
Truck Travel Time Reliability Index for DC - National Capital Region Transportation Planning Board, Washington (TPB)  
Non-Interstate NHS Travel Time Reliability for DC - National Capital Region Transportation Planning Board, Washington (TPB)  
Interstate Travel Time Reliability for DC - National Capital Region Transportation Planning Board, Washington (TPB)

The map displays the National Capital Region with a blue outline. Four blue arrows point to specific features on the map: "Interstate" points to a major highway, "Non-Interstate" points to a smaller road, "Truck" points to a road segment, and "PHED" points to a specific geographic area within the region.



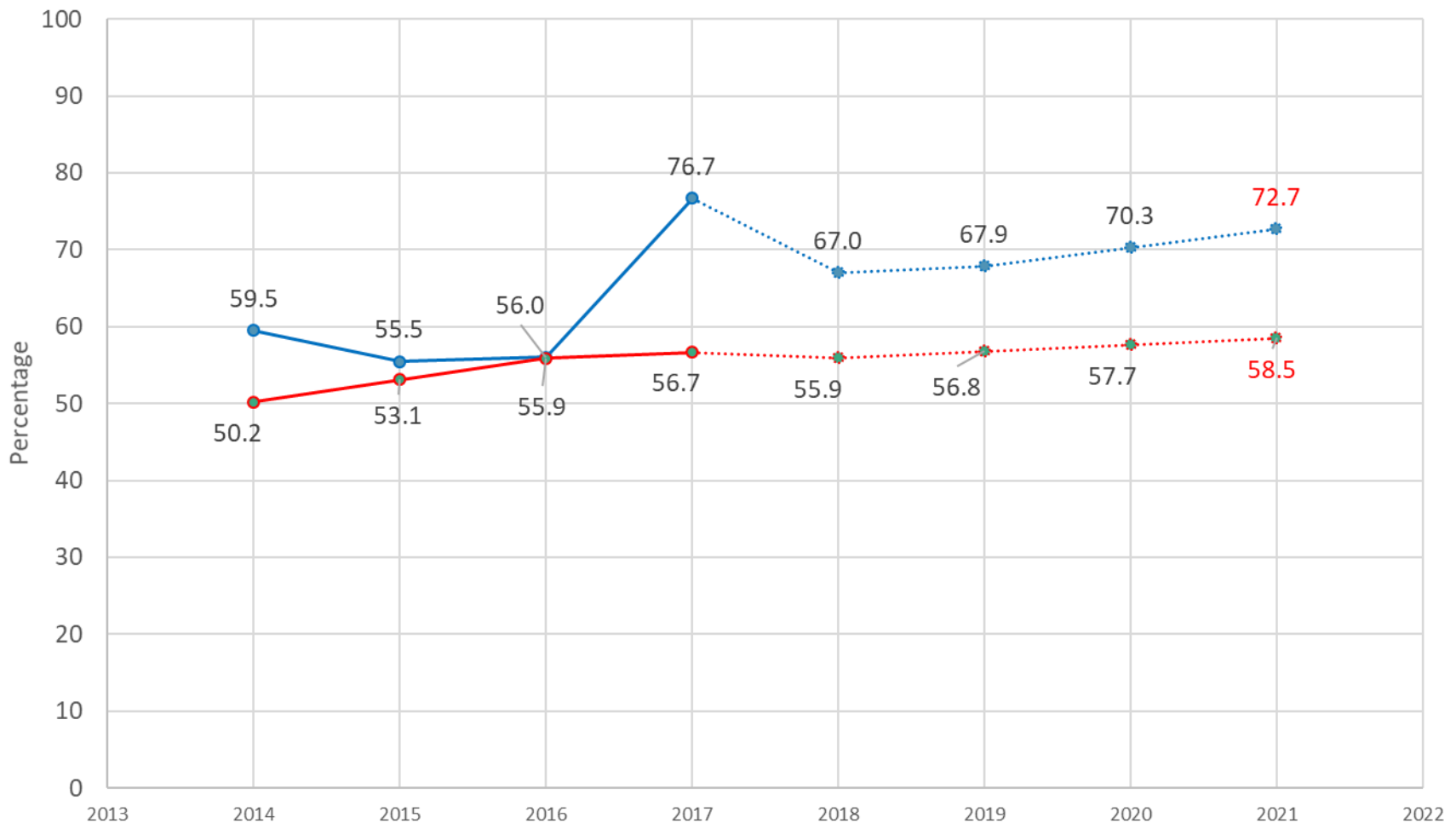
# TPB Target Setting: TTR - DRAFT

<b>DRAFT</b>	<b>CY 2018 – 2021 Four Year Target</b>
<b>TTR – Interstate</b> Percent of person-miles traveled on the Interstate System that are reliable	<b>58.5%</b>
<b>TTR - Non-Interstate NHS</b> Percent of person-miles traveled on the non-Interstate NHS that are reliable	<b>72.7%</b>





# Targets Developed by Averaging Extrapolated Trends and TDM Indicator



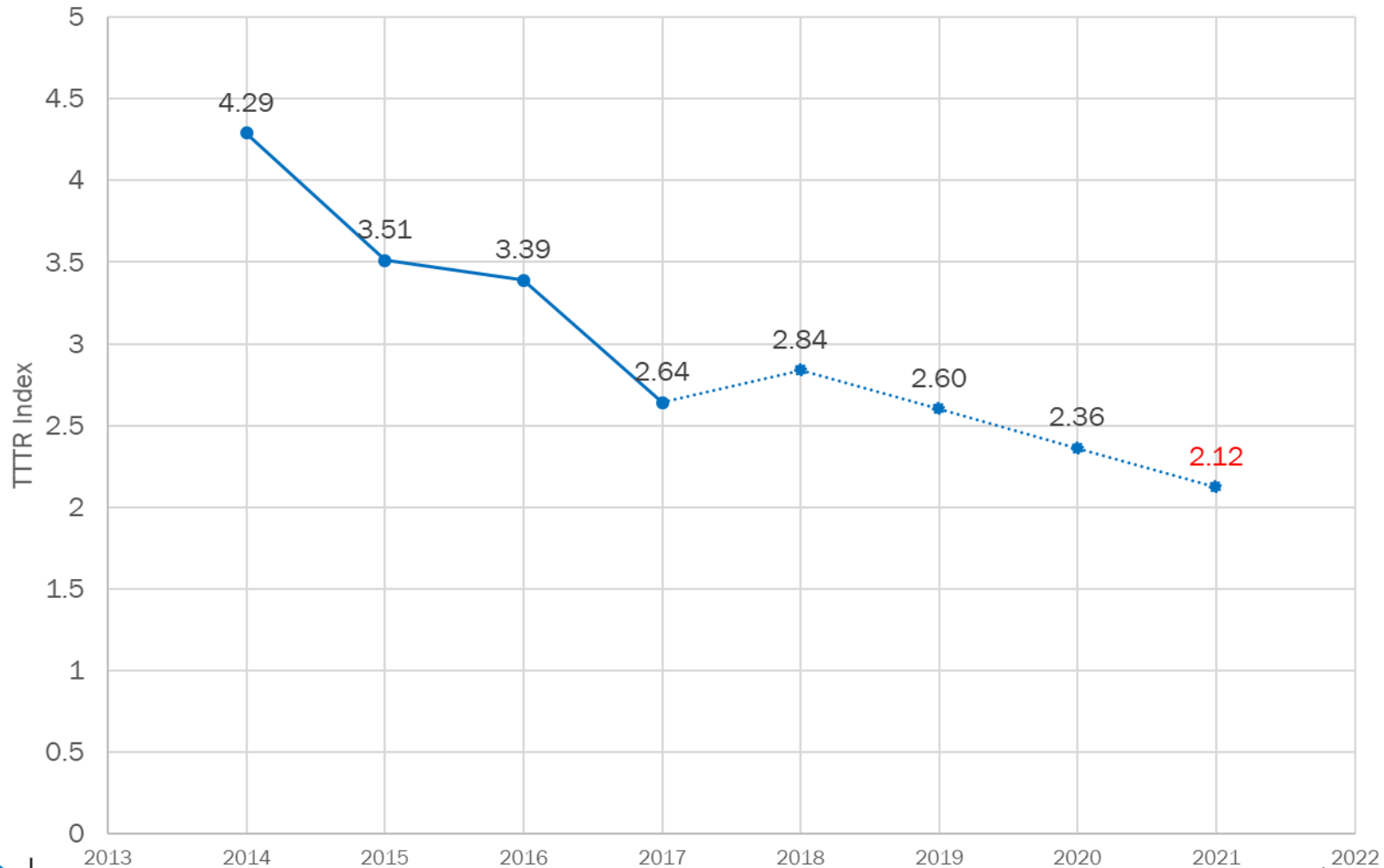
# TPB Target Setting: TTTR - DRAFT

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<b>DRAFT</b>	<b>CY 2018 – 2021 Four Year Target</b>
<b>TTTR Index (Interstate)</b> Ratio of the Interstate System Mileage providing for Reliable Truck Travel Times	<b>2.12</b>



# Target Developed by Averaging Extrapolated Trends and TDM Indicator



# Traffic Congestion Measures & Draft Targets

- System Performance: Congestion Mitigation and Air Quality (CMAQ) Program

## Measures: \*

- Peak Hour Excessive Delay (PHED):  
Annual hours of peak hour excessive delay per capita
- Mode Share (Non-SOV):  
Percent of Non-SOV Travel on the NHS

## Targets:

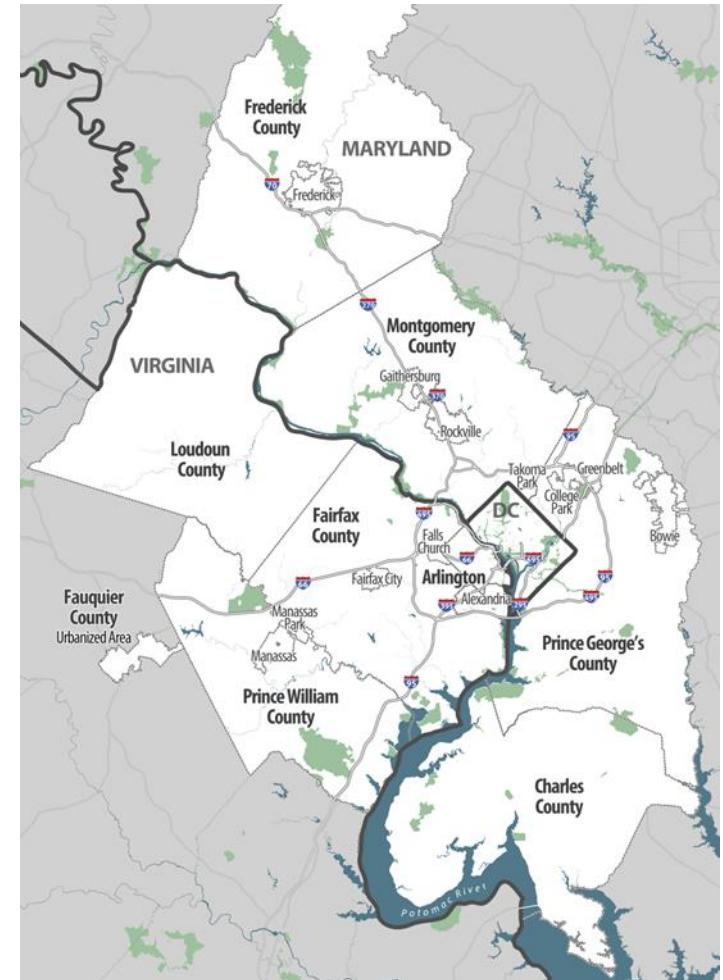
Performance Measure for the Washington DC-MD-VA Urbanized Area	CY 2018-2019 Two-Year Target	CY 2018-2019 Four-Year Target
Peak Hour Excessive Delay (PHED)	Not Required	26.7 Hours**
Mode Share (Non-SOV)	36.9 %	37.2%

\*Prescribed by FHWA rulemaking on System Performance: Highway and Freight, CMAQ published on January 18, 2018, with an effective date of May 20, 2017

\*\*Updated as of May 21, 2018

# Summary and Outlook

- Reviewed TPB CMP and PBPP activities
  - Products by activities
  - Data and analytics
- Discuss probe data-related issues to support performance-based transportation planning and programming.
- Stimulate probe data information exchange, user experience sharing, and professional skills development.



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National Capital Region  
**Transportation Planning Board**