PROCESS OF UTILIZING VPP SUITE AND INRIX DATA AT COG/TPB

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System Performance, Operations and Technology Subcommittee (SPOTS) &
Vehicle Probe Data Users Group (VPDUG) Joint Meeting

September 14, 2016

Goals

- Summarize
- Share
- Feedback

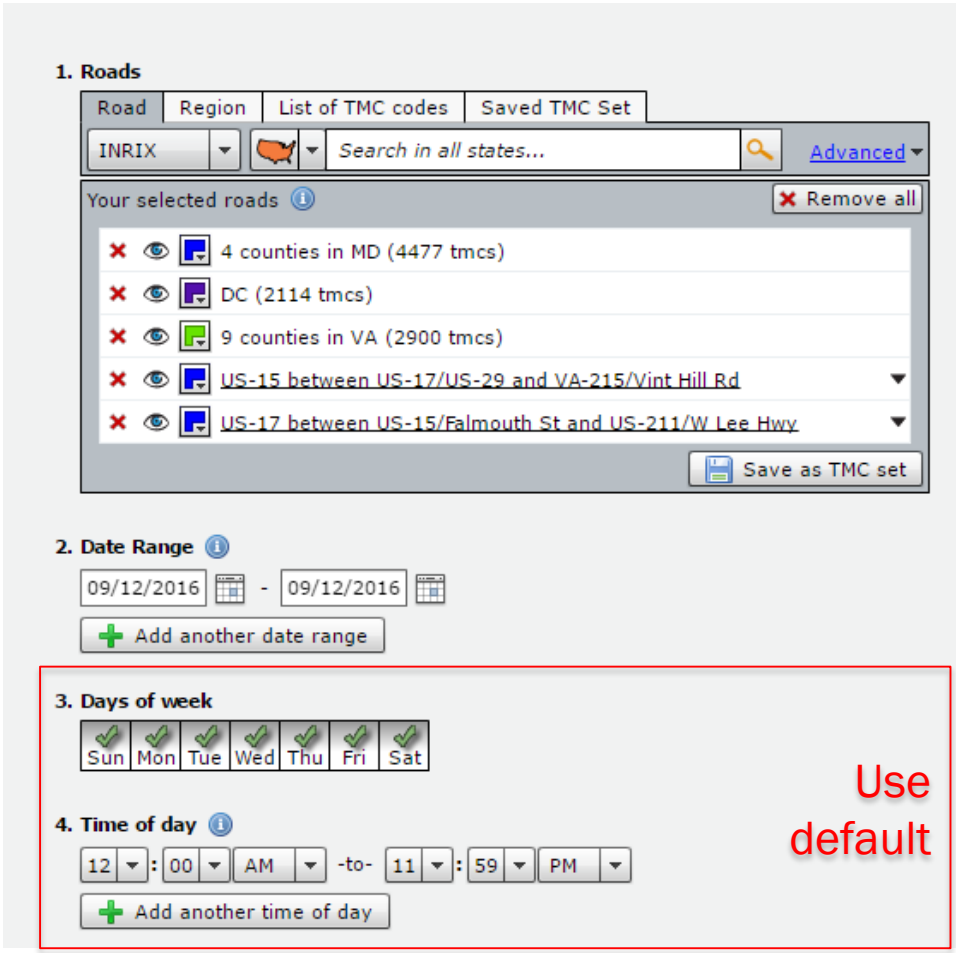
Products

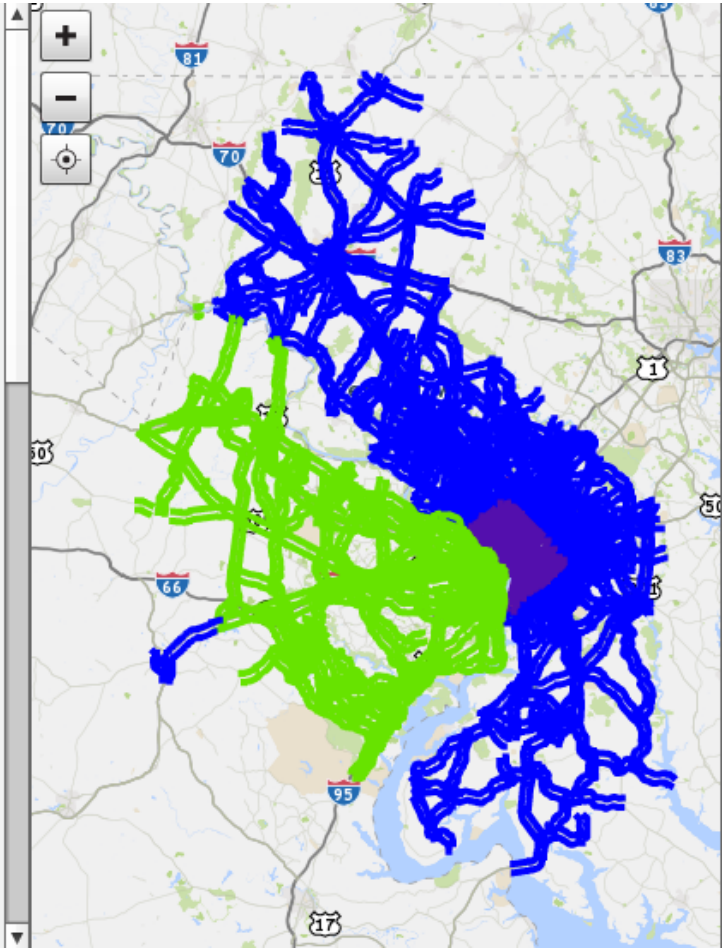
- Congestion Management Process (CMP) Technical Report:
  - 2010, 2012, 2014, and 2016
- Congestion Dashboard: https://www.mwcog.org/congestion/
- Event analyses: http://www.tpbne.ws/
  - Traffic "September Shock" (8/30/16)
  - SafeTrack Traffic Impact (7/19/16)
  - Traffic Prior to Memorial Day (5/24/16)
- Special studies:
  - Airport Ground Access Travel Time Study (2016)
  - ICC Before and After Study (2013)

Use of VPP Suite

- Download data
- Visualization and analysis
  - Trend Map
  - Performance Charts
  - Bottleneck Ranking
  - *Customized maps*
- TMC lookup

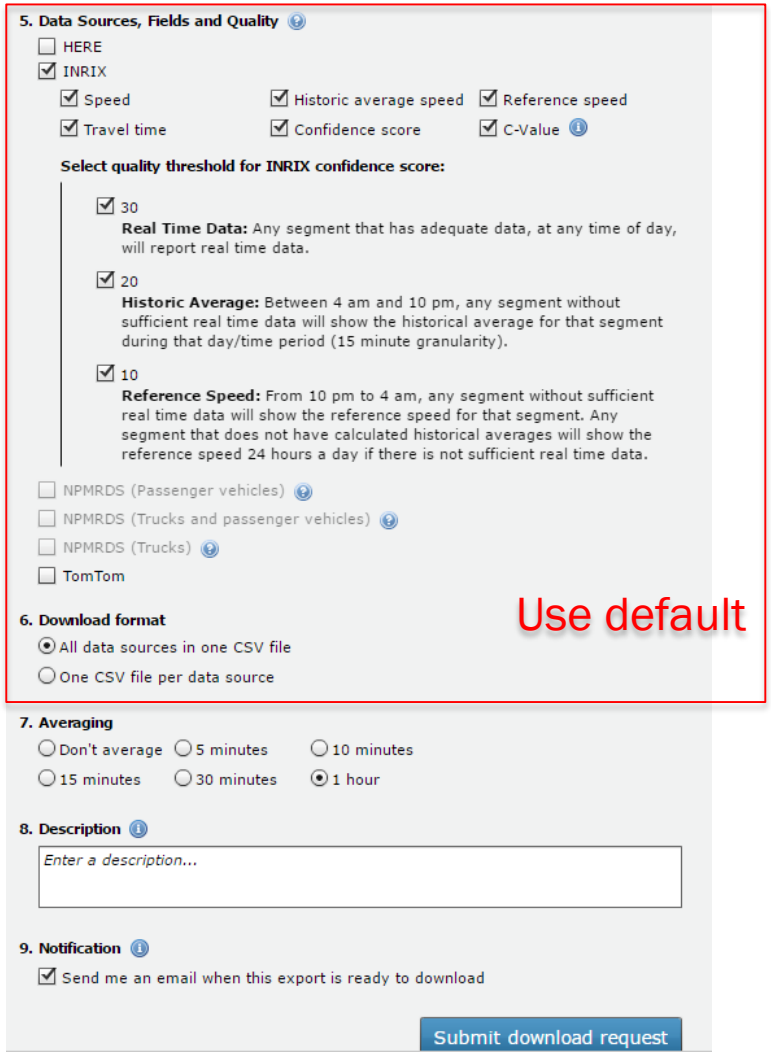
Download Data





Download Data

- Be cautious in using “Saved TMC Set” as it could be outdated
  - TMCs usually updated twice a year
  - Use “Region” to select counties/cities
  - *To VPP Suite: can you update “Saved TMC Set” with map updates?*
- Be cautious in selecting “4. Time of Day” when downloading “today’s data” as incomplete data set could exist
  - Make sure the entire selected time period has already happened. e.g., 12:00 AM to ~~11:59 PM~~ 1:00 PM (other wise, incomplete data may exist)
  - *To VPP Suite: any reason?*



Import Data to SAS

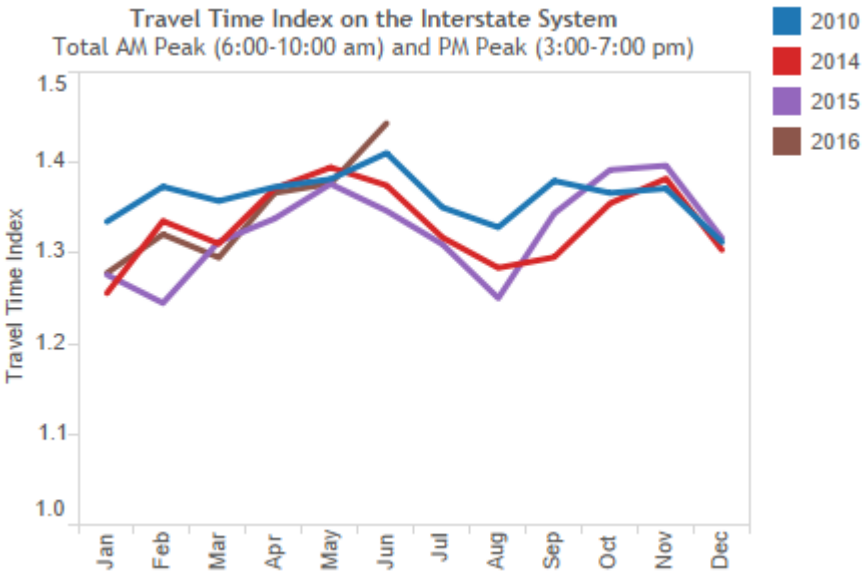
```
data a; infile P:\INRIXFull\01Raw\VPPSuite\2016q2\TPBMem1Hr2016q2\TPBMem1Hr2016q2.csv"
delimiter = ',' missover dsd firstobs=2;
informat TMC $9.;
informat Datetime $19.;
informat Speed best.;
informat AveSpeed best.;
informat RefSpeed best.;
informat TravelTimeMinutes best.;
informat Score best.;
informat Cvalue best.;
format TMC $9.;
format Datetime $19.;
format Speed best.;
format AveSpeed best.;
format RefSpeed best.;
format TravelTimeMinutes best.;
format Score best.;
format Cvalue best.;
input TMC Datetime Speed AveSpeed RefSpeed TravelTimeMinutes Score Cvalue;
run;

data r.TPBMem2016q2; set a;
informat ET datetime.;
format ET datetime.;
ET = dhms(mdy(substrn(Datetime,6,2), substrn(Datetime,9,2), substrn(Datetime,1,4)),
substrn(Datetime,12,2),substrn(Datetime,15,2),0);
drop Datetime;
run;
```

Good practice:
Always import TMC Table "TMC_Identification.csv" with each speed data import; TMCs and Speed Data go hand in hand.

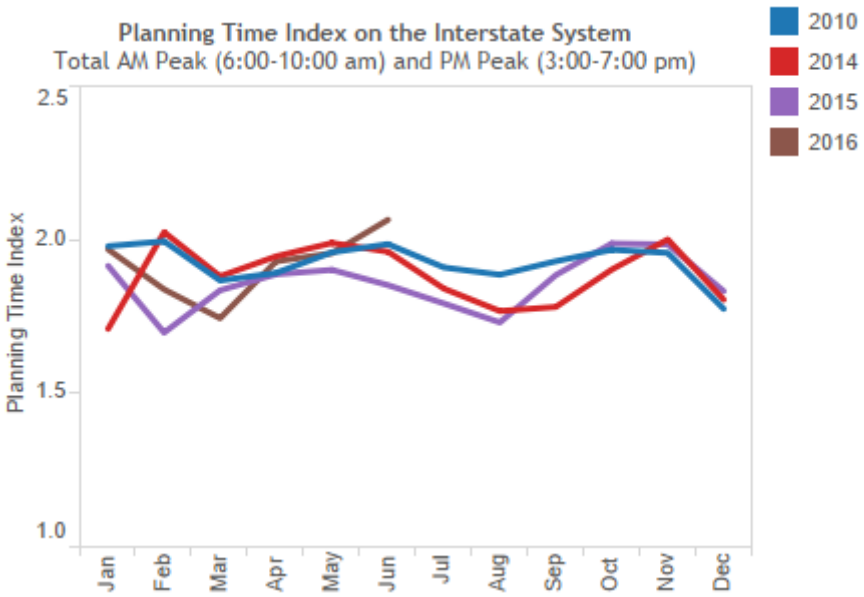
Monthly Travel Time Index

1. Aggregate the hourly data to monthly average data by day of the week and hour of the day.
   - Harmonic Mean should be used to aggregate speeds
   - For each TMC, the monthly data has 7 weekdays * 24 hours a day = 168 observations
2. For each TMC's 168 observations: TTI = Reference Speed/Speed and impose constraint: if TTI < 1 then TTI = 1
3. Calculate regional average TTI for non-holiday weekday AM peak (6:00-10:00 am) and PM Peak (3:00-7:00 pm) respectively, using segment length as the weight
4. Calculate the average TTI of the AM Peak and the PM Peak to obtain an overall monthly TTI for the region



Monthly Planning Time Index

1. Aggregate the hourly data to monthly average data by day of the week and hour of the day.
   - Harmonic Mean should be used to aggregate speeds
   - For each TMC, the monthly data has 7 weekdays * 24 hours a day = 168 observations
2. For each TMC's 168 observations: TTI = Reference Speed/Speed
3. For each TMC: PTI = 95th TTI for non-holiday weekday AM peak (6:00-10:00 am) and PM Peak (3:00-7:00 pm) respectively.
4. Calculate regional average PTI for AM and PM peak respectively, using segment length as the weight
5. Calculate the average PTI of the AM and PM Peak to obtain an overall monthly PTI



Top 10 Bottlenecks – TMC Selection

1. Select one or more roads.

Road | Region | List of TMC codes | Saved TMC Set

Filters... Showing 132 out of 407 available TMC sets

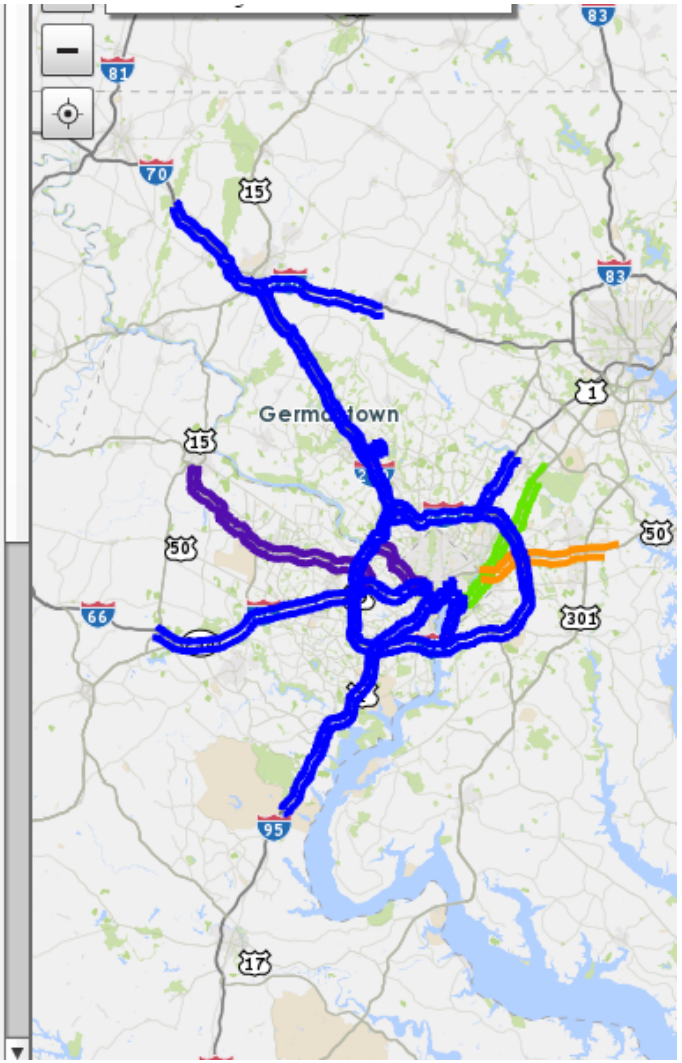
TMC Set	TMCs	Owner
TPBMem_Fwy_Core	775	wpu@mwcog.org
Bottleneck 20160201	1051	wpu@mwcog.org
TPBMemIS20160316	785	wpu@mwcog.org
TPBMemFwy20160325	1011	wpu@mwcog.org
TTID-TMC Matched 20160324	273	wpu@mwcog.org
MemorialDay20160509	1269	wpu@mwcog.org
Surge 1: > 100%	17	wpu@mwcog.org
Surge 1 First Week: > 100%	42	wpu@mwcog.org
Surge 1 First Week: 50~100%	165	wpu@mwcog.org

Add selected TMC sets

Your selected roads | Remove all

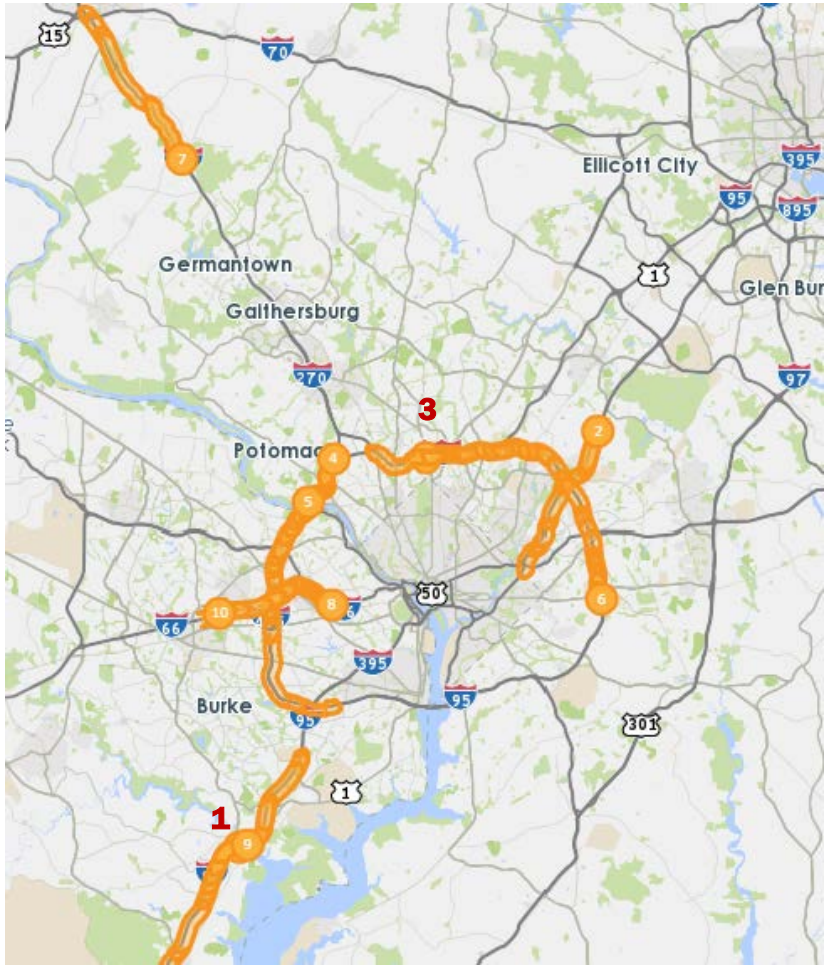
- Interstates in 14 counties throughout MD, DC, and VA (847 tmcs)
- VA-267
- DC-295
- MD-295 between Eastern Ave and ARUNDEL--PRINCE GEORGE'S ...
- US-50
- US-50 between MD-295/Kenilworth Ave and ARUNDEL--PRINCE G...
- GEORGE WASHINGTON PKWY
- MD-295 between Eastern Ave and ARUNDEL--PRINCE GEORGE'S ...
- US-50 between DC--MD State Border and ARUNDEL--PRINCE GE...

Save as TMC set



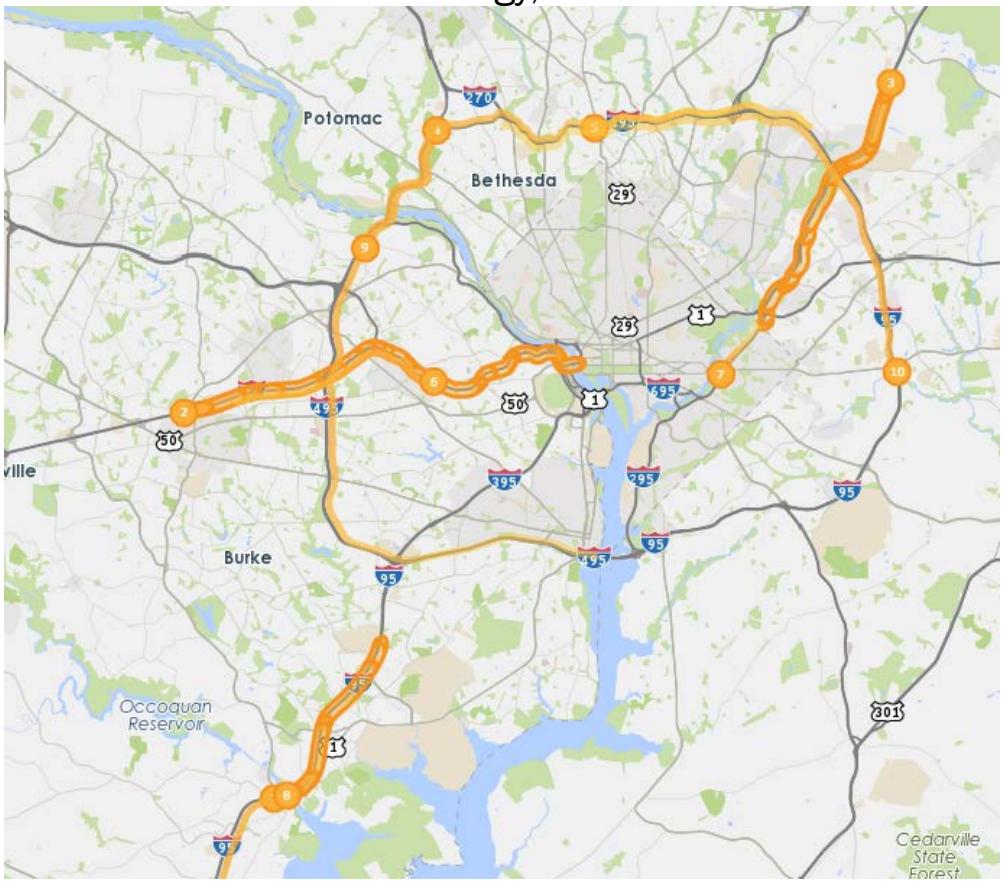
Top 10 Bottlenecks – Summary Map

- To VPP Suite:
  - Rank number too small
  - Overlap numbers
  - Directionality
  - Differentiation between bottlenecks
  - *Real-time tracking vs. historical performance assessment*

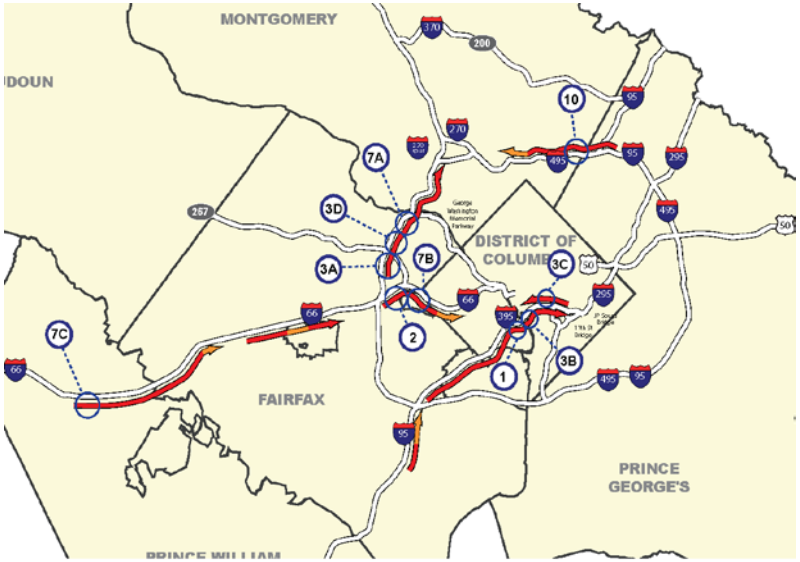


Bottlenecks – VPP Suite vs Skycomp

Vehicle Probe Project (VPP) Suite New Methodology, 2015



Skycomp, Spring 2014

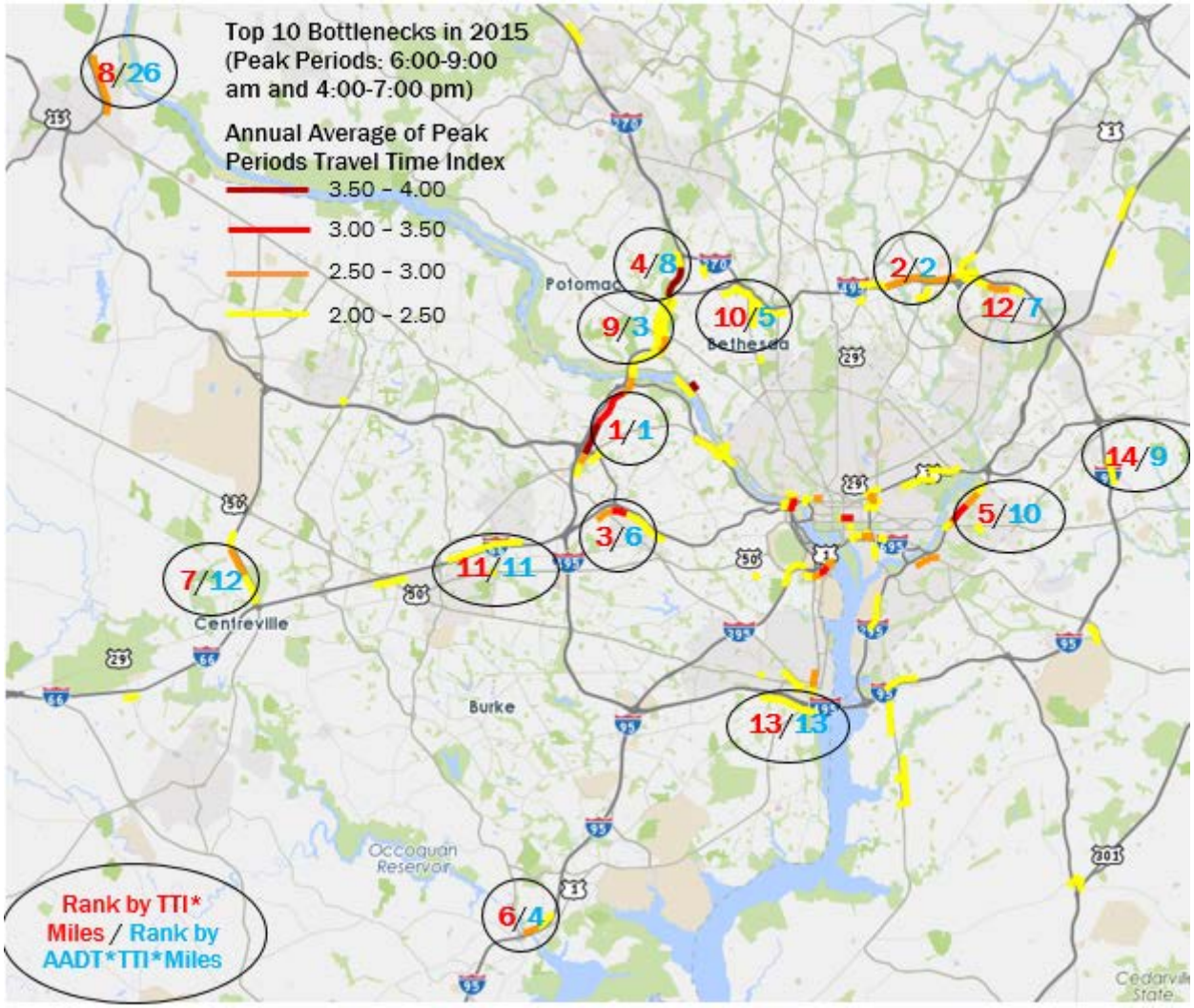


Top Ten Congested Segments on the Freeway System (2014)

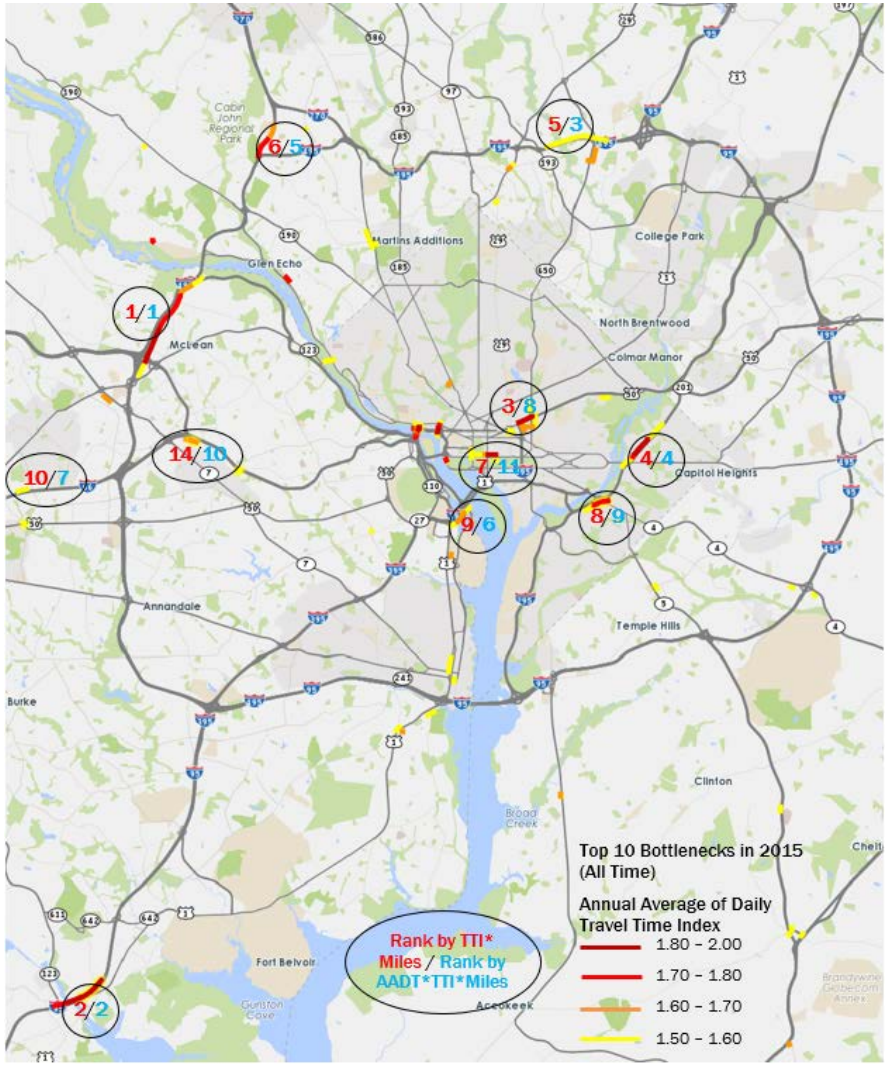
Rank	Route	From	To	Density	Speed Range
1	NB I-395 (8:30-9:30 AM)	VA 27 (Washinton Blvd)	VA 110 (Jefferson Davis Hwy)	150	5 MPH
2	EB I-66 (6:00-7:00 PM)	VA 7 (Leesburgh Pike)	VA 267	140	5 MPH
3A	Inner Loop I-495 (4:30-5:30 PM)	VA 123 (Chain Bridge Rd)	VA 267	120	5-10 MPH
3B	NB I-395 (8:30-9:30 AM)	VA 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 AM)	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.

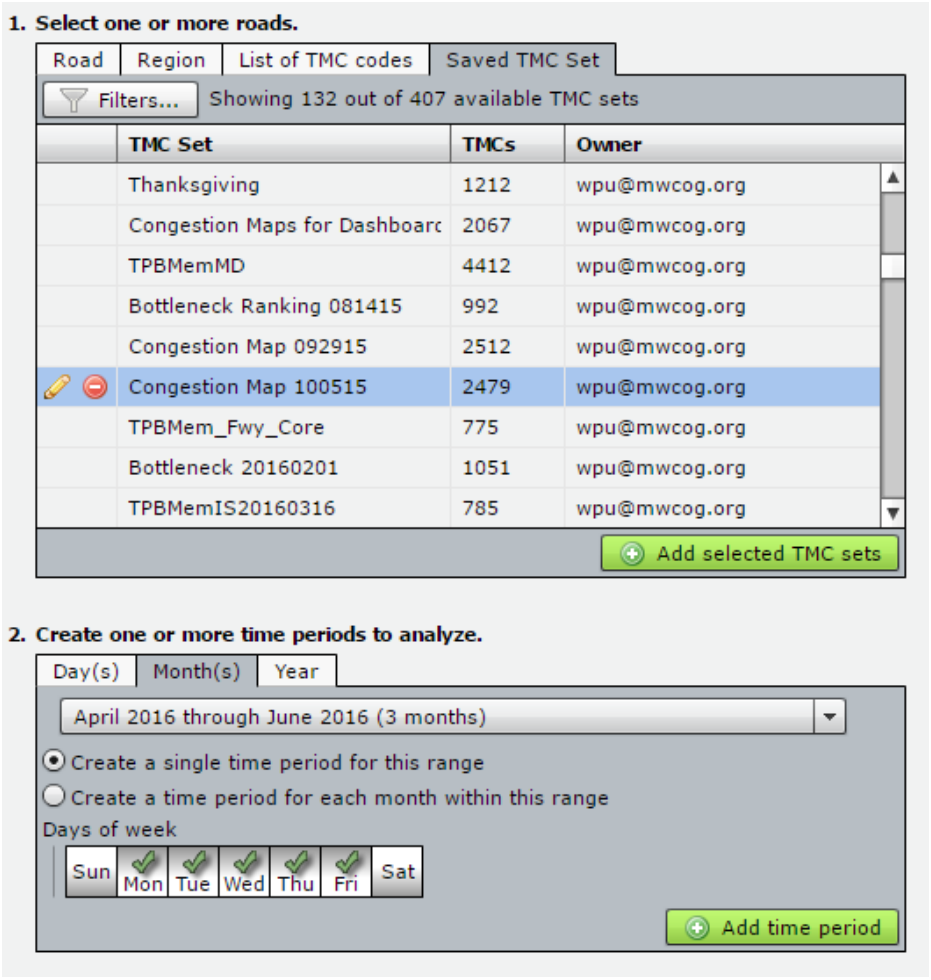
Top Bottlenecks – Peak Periods

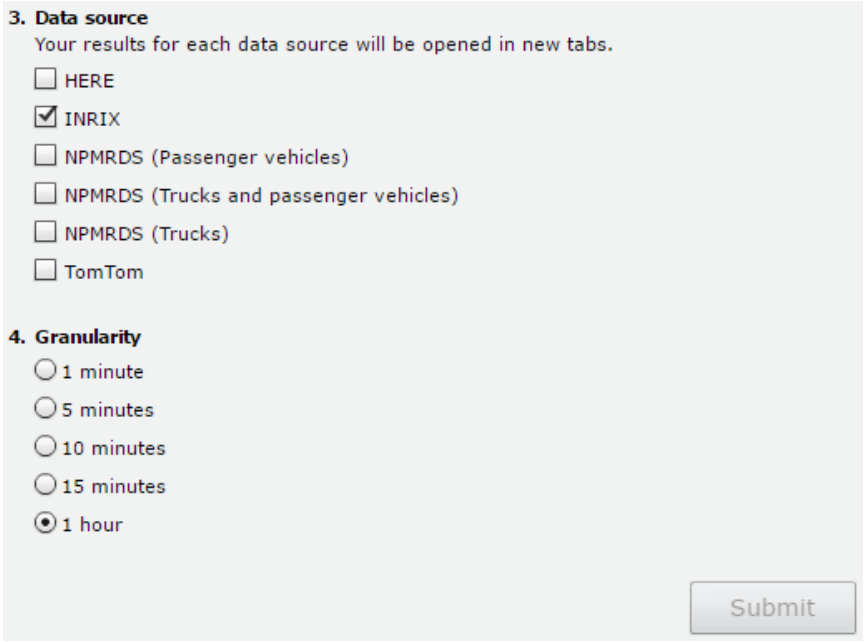


Top Bottlenecks – All Time



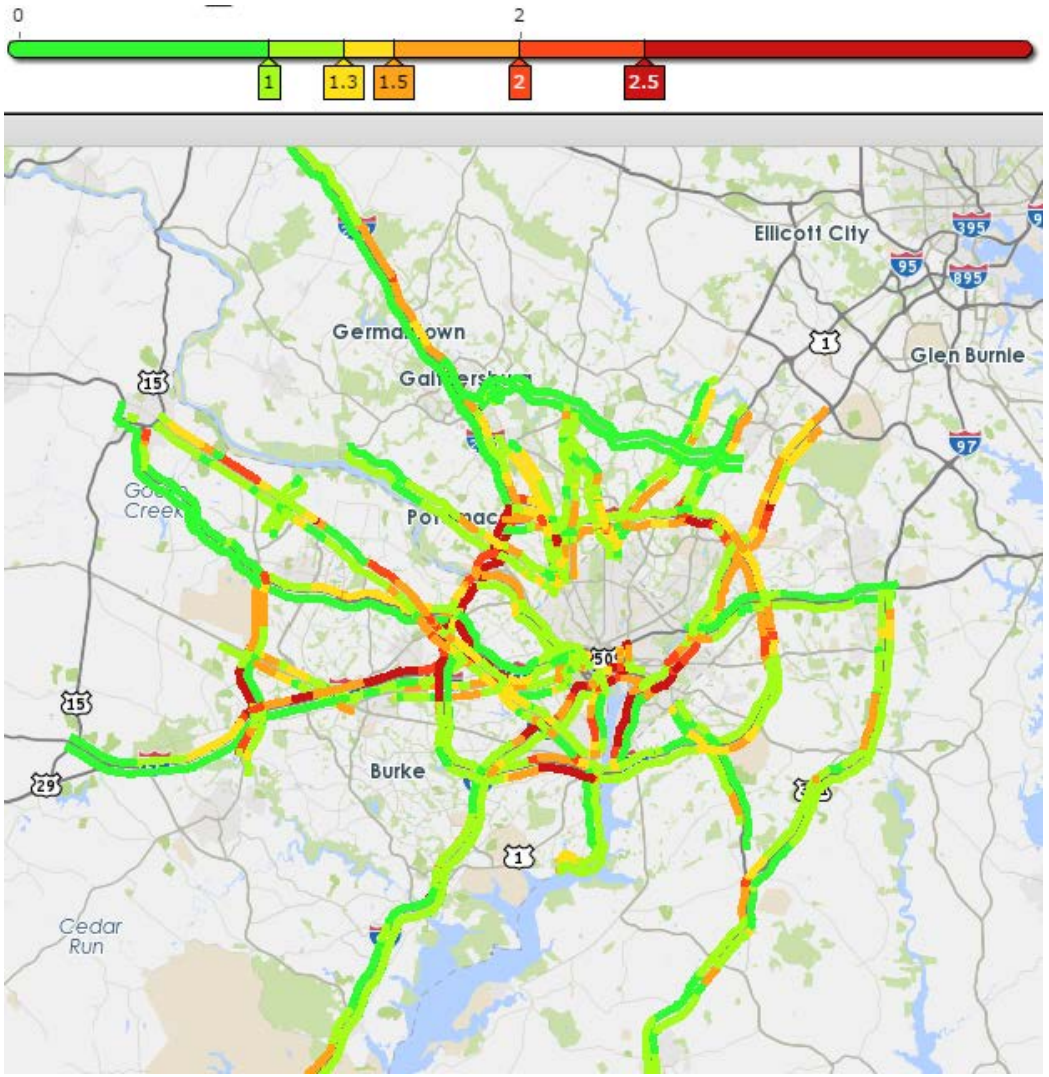
Congestion Map – Use Trend Map



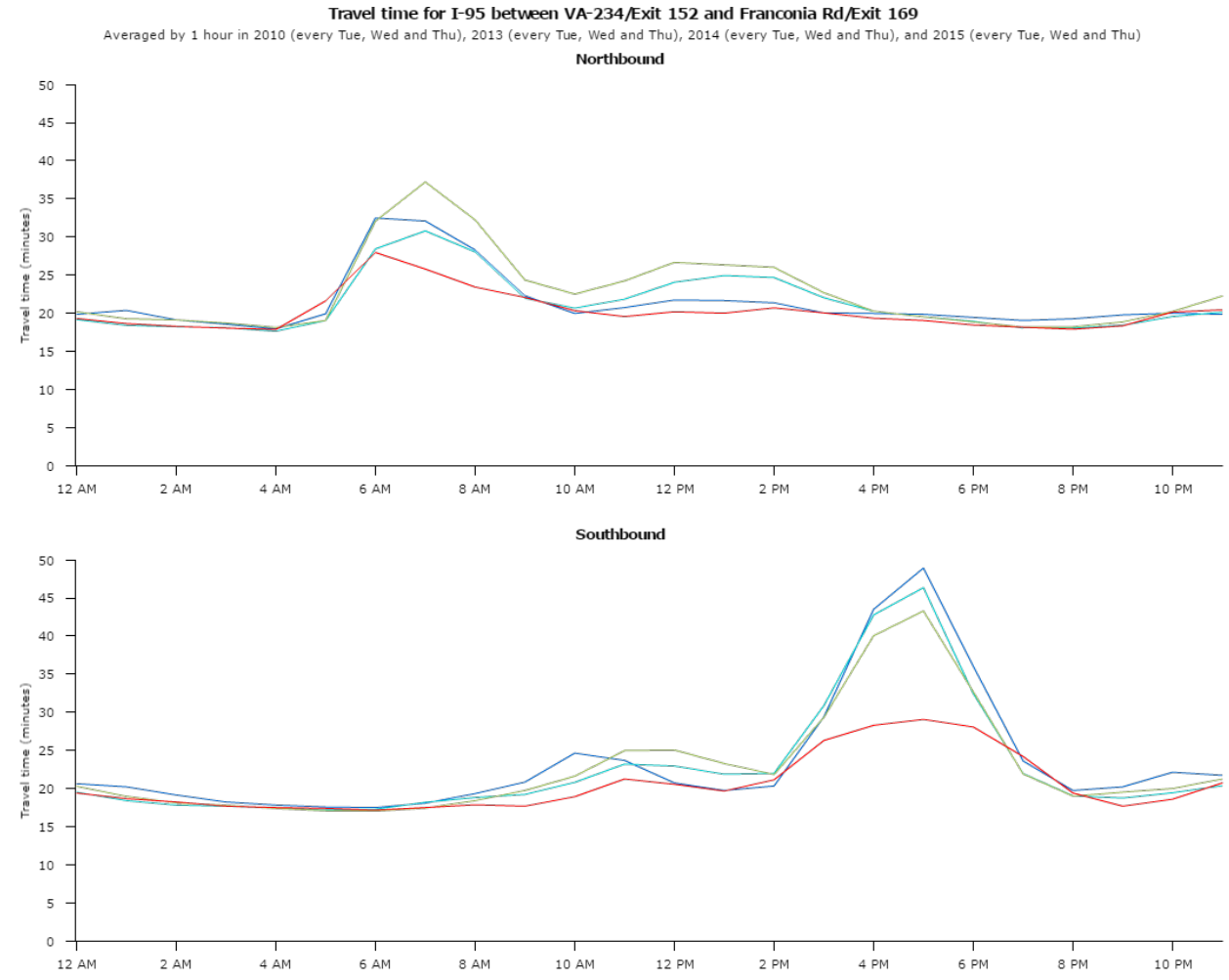


Congestion Map

- Select Travel Time Index as the performance measure
- Change scale bar
- Select hour: 8:00-9:00 am for AM peak hour; 5:00-6:00 pm for PM peak hour

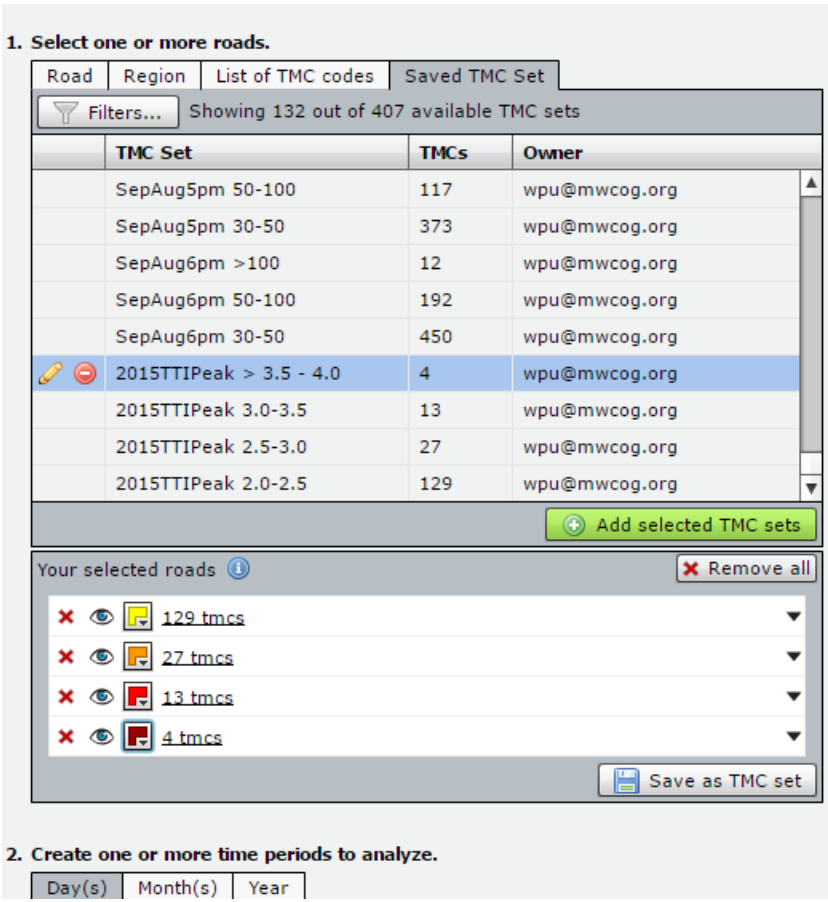


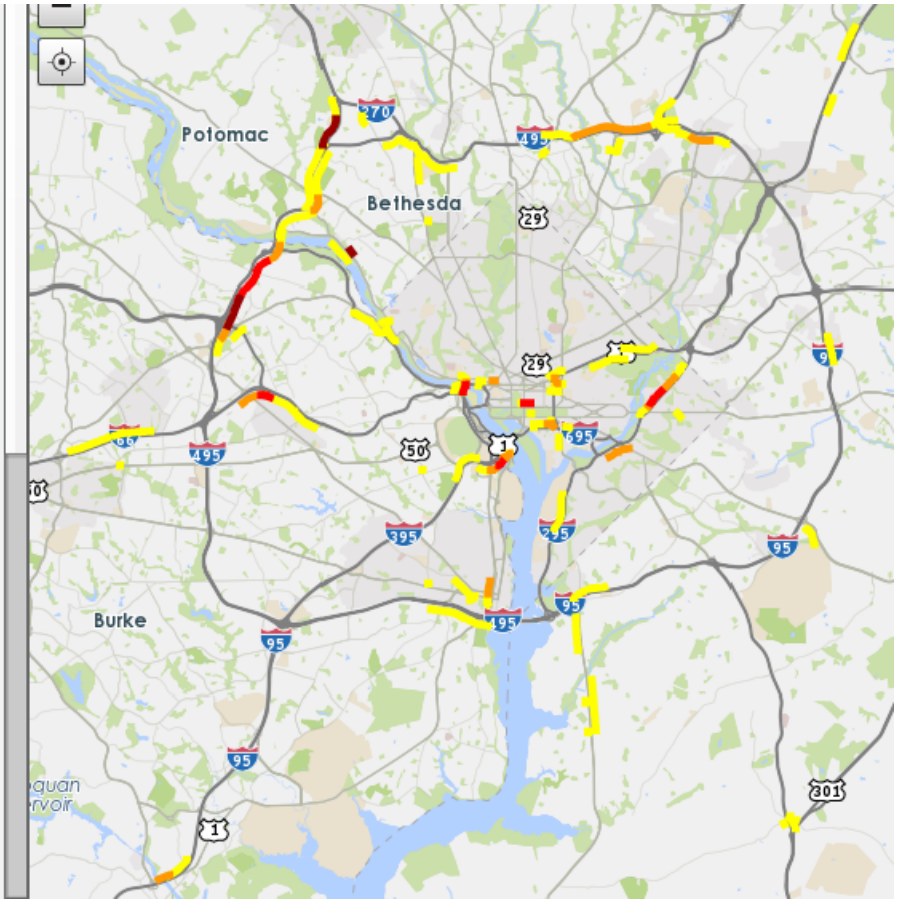
Route Travel Times – Performance Charts



- To VPP Suite: font size too small

Customized Maps





Summary

- VPP Suite has a number of tools that we can utilize, especially visualization of bottlenecks, maps and performance measures
- Customized computation needed sometimes for the time being
- When averaging speeds, Harmonic Mean should be used
- When averaging Travel Time Index, impose TTI >= 1 first
- Use the same calculation procedure for a performance measure over time
- Speed data and TMC table go hand in hand
- Always double check your calculations, i.e. use the number of observations, total miles of TMCs, etc.
- Don’t be afraid of SAS, a small number (<10) of procedures can go a long way (libname; data; proc sql; proc sort; proc summary; proc export)

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