

# Improved in Depth HPMS Traffic Data Reviews

Office of Highway Policy Information

2018 Highway Information Seminar

Wednesday - October 31, 2018

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# Subjects Covered

- Key link level traffic data checks
- Extensive SAS runs performed
- Vehicle summary data - weighting
- GIS traffic data review



# 2018 (2017 data) HPMS Traffic Data Review Summary

- Common issue is missing data: Future AADT, AADT, Truck AADT, K factor, D factor, or % Peak Hour Truck
- Vehicle summary data must be VMT weighted
- % Peak SU/CU checked using the % Peak SU\*AADT vs SU AADT and peak hour SU values reported
- Annualize both the SU and CU AADT data
- Annual Axle Correction Factor (ACF) generation from WIM and per vehicle class data
- State to state check of AADT, SU AADT and CU AADT



# Traffic Data Reported in HPMS

## Traffic Volume

AADT

K Factor

D Factor

Future AADT

Ramp AADT

Metadata

## Vehicle Classification

AADT Single Unit

% Peak Single

AADT Combination

% Peak Combination

Summary Table



# Key Link Level Data SAS Checks

1. AADT full extent check
2. SU and CU AADT – NHS/PAS and all samples
3. K, D and % Peak (SU and CU) values – all samples
4. Ramp AADT full extent
5. FAADT – all samples



# Additional SAS Checks

- Range of values
- Data to data checks like:
  - $SU\ AADT + CU\ AADT > AADT$
  - $\% \text{ Peak } SU * AADT > 30\% \text{ of } SU\ AADT$
  - $\% \text{ Peak } CU * AADT > 30\% \text{ of } CU\ AADT$
  - many others (see staff for details)



# Key Link Level Data: K-Factor

**Facility\_Type\_VN <=3, Is\_sample=1,  
K\_FACTOR\_VN=null?**

- $K\_FACTOR \leq 4.2$  -- impossible
- $4.3\% < K\_factor \leq 5.0$  -- questionable
- $5.1\% < K\_factor \leq 6.9$  -- caution
- $7.0\% < K\_factor \leq 20.0$  -- acceptable
- $20.1\% < K\_factor \leq 25.0$  -- caution
- $K\_FACTOR > 25.1$  -- questionable



# HPMS Traffic Data Compared to Other Sources: “data needs to make sense”

- Population
- Fuel Consumption
- Number of licensed drivers
- Number of vehicles
- Gross Domestic Product (GDP)





# Vehicle Summary Data

U.S. Department of Transportation  
Federal Highway Administration

Highway Performance Monitoring System v8.0

Submittal Review National Maintenance

DATA EDITORS DATA VALIDATION SAMPLE MANAGEMENT CALCULATIONS REPORTS & ANALYSIS SUBMIT DATA ADMIN EXIT

State Summary Year: 2016 State: 9 - Connecticut

SUMMARY PAVEMENT DATA VEHICLE TYPE

Edit

	Rural			Urban		
	Interstate	Other Arterial	Other Rural	Interstate	Other Arterial	Other Urban
<b>Motorcycles</b>	0.04 %	1.71 %	1.77 %	0.34 %	1.12 %	1.54 %
<b>Passenger Cars</b>	74.17 %	72.42 %	73.06 %	80.75 %	78.41 %	73.75 %
<b>Light Trucks</b>	13.82 %	17.31 %	18.93 %	11.52 %	15.05 %	18.52 %
<b>Buses</b>	0.29 %	1.20 %	0.61 %	0.19 %	0.29 %	0.37 %
<b>Single Unit Trucks</b>	3.75 %	4.69 %	4.10 %	2.62 %	2.82 %	3.98 %
<b>Combination Trucks</b>	7.93 %	2.67 %	1.53 %	4.58 %	2.31 %	1.84 %
<b>Total</b>	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %

Last Modified On 6/1/2017 9:43:51 AM  
Last Modified By Dominguez, Facundo



# Vehicle Summary % Values Compared to Summation of the Link Values When Applied to Each Section Length

- VMT by CU obtained from the Vehicle Summary Table \* VM-2 VMT by FC should be equal to the CU AADT \* Section Lengths when they are all summed up for the whole state.



# Special Attention !

- Dramatic VMT % changes from year to year detected for various vehicle types lead to large changes in the VMT by vehicle type
- Some states have not adopted the FHWA VMT weighted method
- Some lower function class of roadways for certain geographical areas do not have class data
- Vehicle Summary Table VMT weighting is recommended

[https://www.fhwa.dot.gov/policyinformation/knowledgecenter/vmt\\_training/](https://www.fhwa.dot.gov/policyinformation/knowledgecenter/vmt_training/)



# VMT% Trends

U.S. Department of Transportation  
Federal Highway Administration

Highway Performance Monitoring System v8.0

Submittal Review National Maintenance

DATA EDITORS DATA VALIDATION SAMPLE MANAGEMENT CALCULATIONS REPORTS & ANALYSIS SUBMIT DATA ADMIN HELP EXIT

Reports Year: 2016 State: 11 - District of Columbia

Last updated: 3:02:31 PM

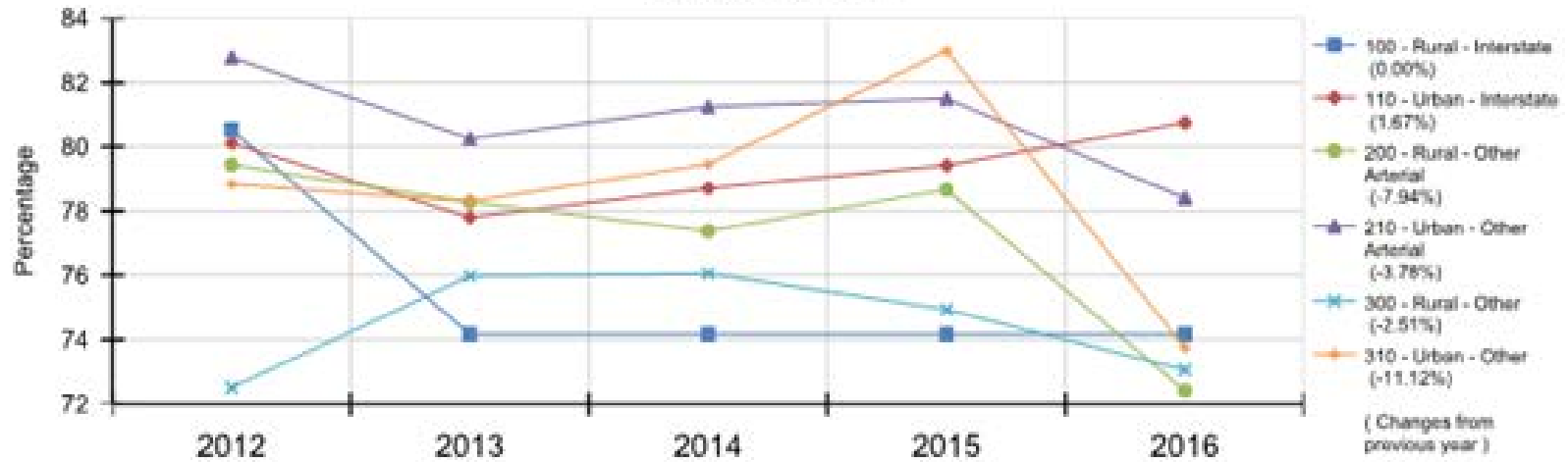
Report Name	Report Status	Submitted By	Submitted On	Last Modified On	Create	Cancel	Download	Preview PDF
Consistency	5 - Report Created	Carpenter, Edward	8/17/2017 10:18:08 AM	8/17/2017 11:31:12 AM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Extent and Travel on the Interstates	5 - Report Created	Carpenter, Edward	8/17/2017 10:18:08 AM	8/17/2017 11:31:16 AM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
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Extent and Travel Report	5 - Report Created	Carpenter, Edward	8/17/2017 10:18:08 AM	8/17/2017 11:31:31 AM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Extent and Travel Report (Urban/Rural Summary)	5 - Report Created	Carpenter, Edward	8/17/2017 10:18:08 AM	8/17/2017 11:31:33 AM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
IRI on the Federal Aid Highways	5 - Report Created	Carpenter, Edward	8/17/2017 10:18:08 AM	8/17/2017 11:31:36 AM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
IRI on the NHS	5 - Report Created	Carpenter, Edward	8/17/2017 10:18:08 AM	8/17/2017 11:31:38 AM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Length of Missing Pavement Data	5 - Report Created	Carpenter, Edward	8/17/2017 10:18:08 AM	8/17/2017 11:31:57 AM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Overview	5 - Report Created	Carpenter, Edward	8/17/2017 10:18:08 AM	8/17/2017 11:31:58 AM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Ownership	5 - Report Created	Carpenter, Edward	8/17/2017 10:18:08 AM	8/17/2017 11:32:00 AM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Pavement Report Card	5 - Report Created	Carpenter, Edward	8/17/2017 10:18:08 AM	8/17/2017 11:32:19 AM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Validation Summary	5 - Report Created	Carpenter, Edward	8/17/2017 10:18:08 AM	8/17/2017 11:32:20 AM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Sample Adequacy	5 - Report Created	Carpenter, Edward	8/17/2017 10:18:08 AM	8/17/2017 11:32:21 AM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Vehicle Summary Changes	5 - Report Created	Carpenter, Edward	8/17/2017 10:18:08 AM	8/17/2017 11:32:22 AM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Sample VMT Comparison	5 - Report Created	Carpenter, Edward	8/17/2017 10:18:08 AM	8/17/2017 11:32:26 AM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Sample and TOPS Review Report	5 - Report Created	Zhang, Patrick P	8/18/2017 8:30:35 AM	8/18/2017 8:36:12 AM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Inter-Active Reports

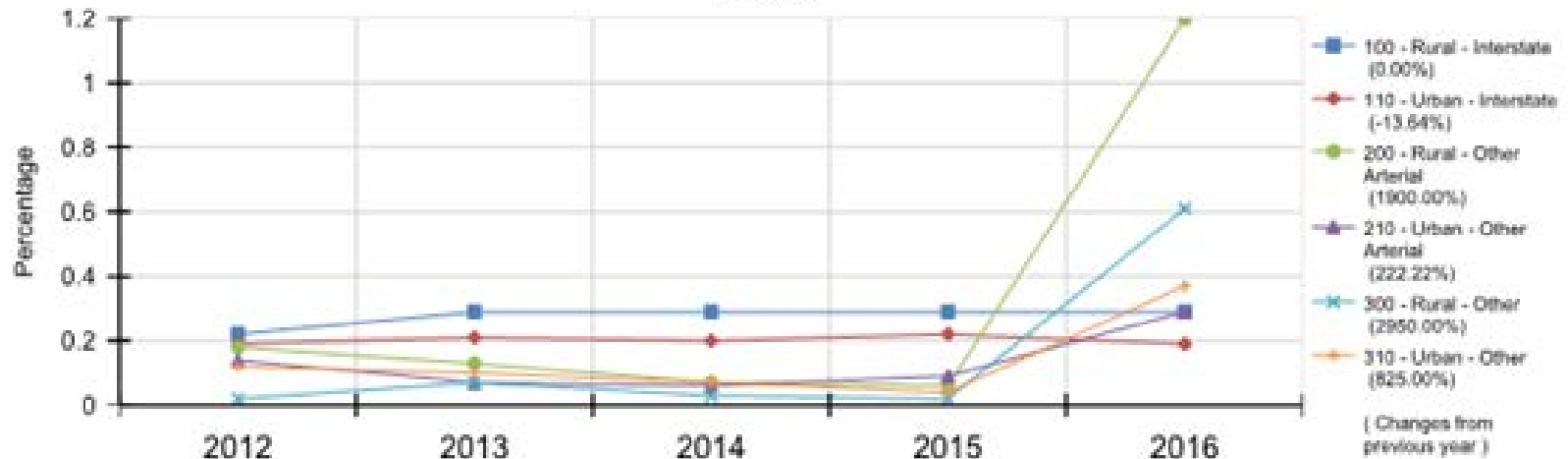
Create Selected Reports Cancel Selected Reports Download Selected Reports



## Passenger Cars



## Buses



# Factoring for Classification Counts

- Factor all portable classification counts to properly annualize at a minimum the 6 vehicle types in the HPMS Vehicle Summary Table (classes:1, 2, 3, 4, 5-7, 8-13) 2016 TMG PDF pages 3-31 thru 3-49 (86 – 104)
- Factoring will reduce error rates by 15% to 40% depending on the roadway
- 1/3 of all portable counts should be class
- Must have class sites in each factor group for each vehicle type
- Factor for HOD, DOW, MOY and year to year
- Factor just like volume but for each vehicle type
- Properly normalize the data so total volumes are consistent
- See the 2016 TMG for a worked out example



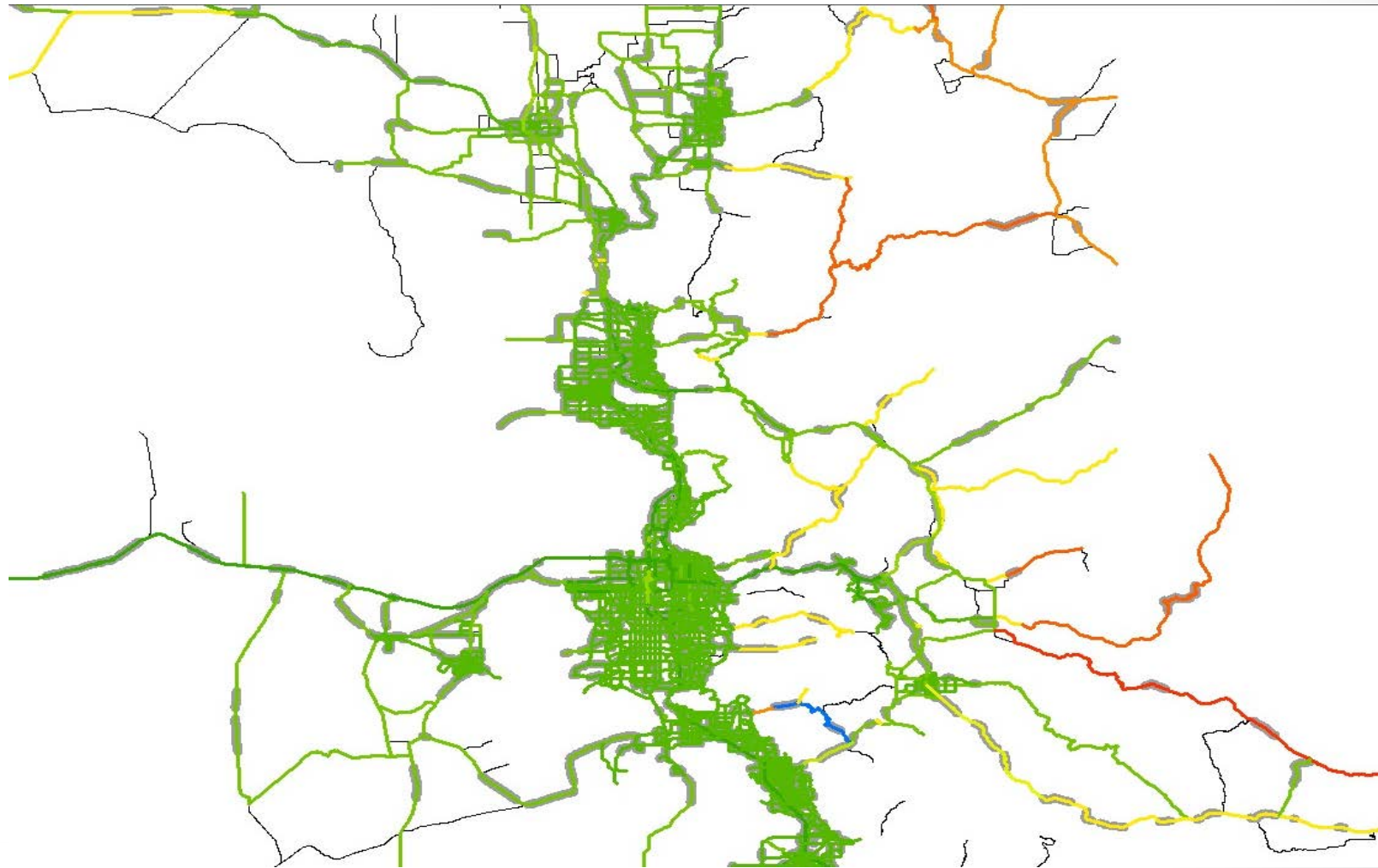
# GIS Review of HPMS Traffic Data

## It's Getting Better!!

- AADT – Annual Average Daily Traffic
- Ramp AADT
- Future AADT
- D Factor and K Factor
- % Peak SU and % Peak CU
- SU AADT and CU AADT
- State to state AADT
- State to state both SU AADT and CU AADT

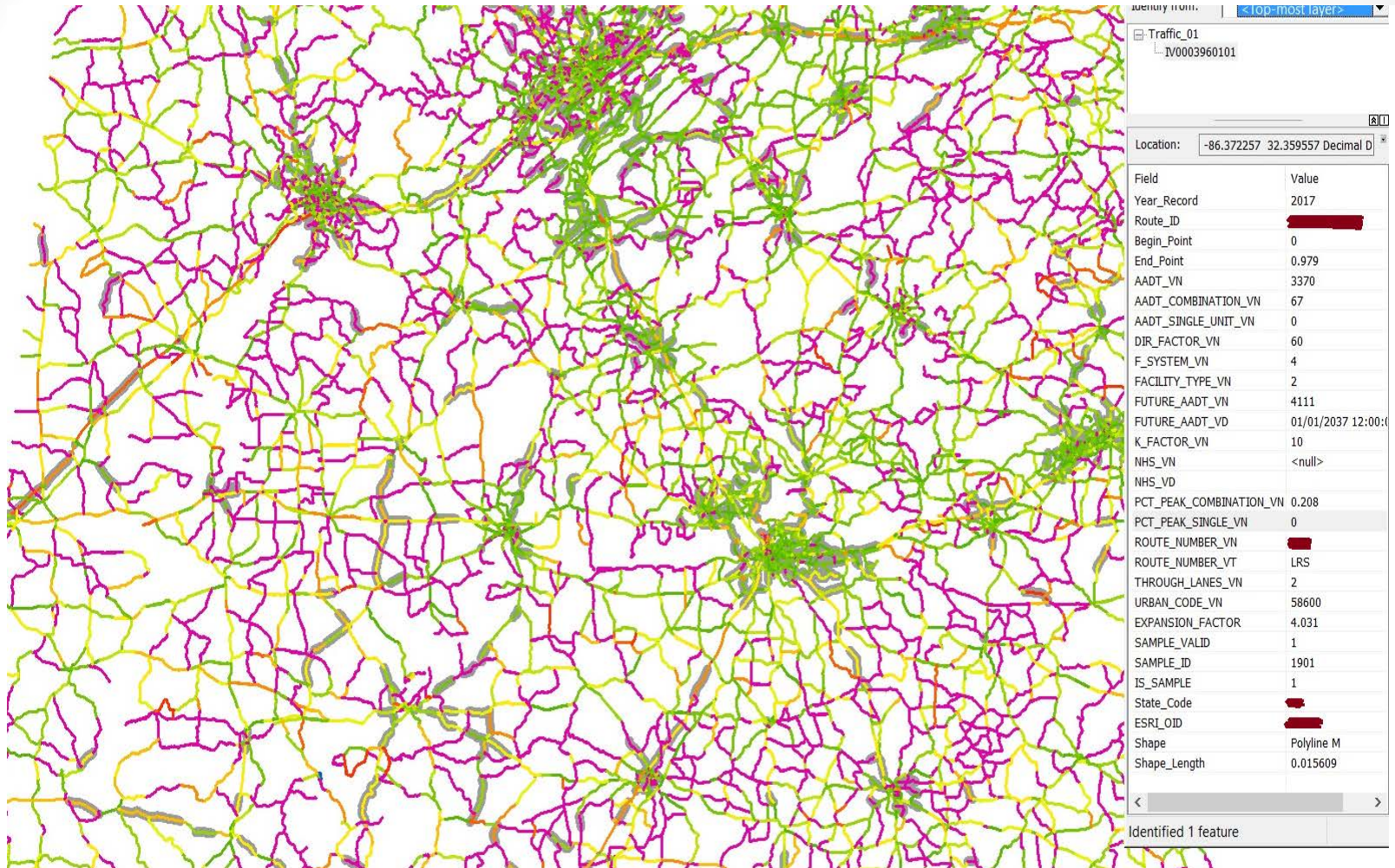


# GIS Traffic Review – K Factors Reported By Area/Roadway





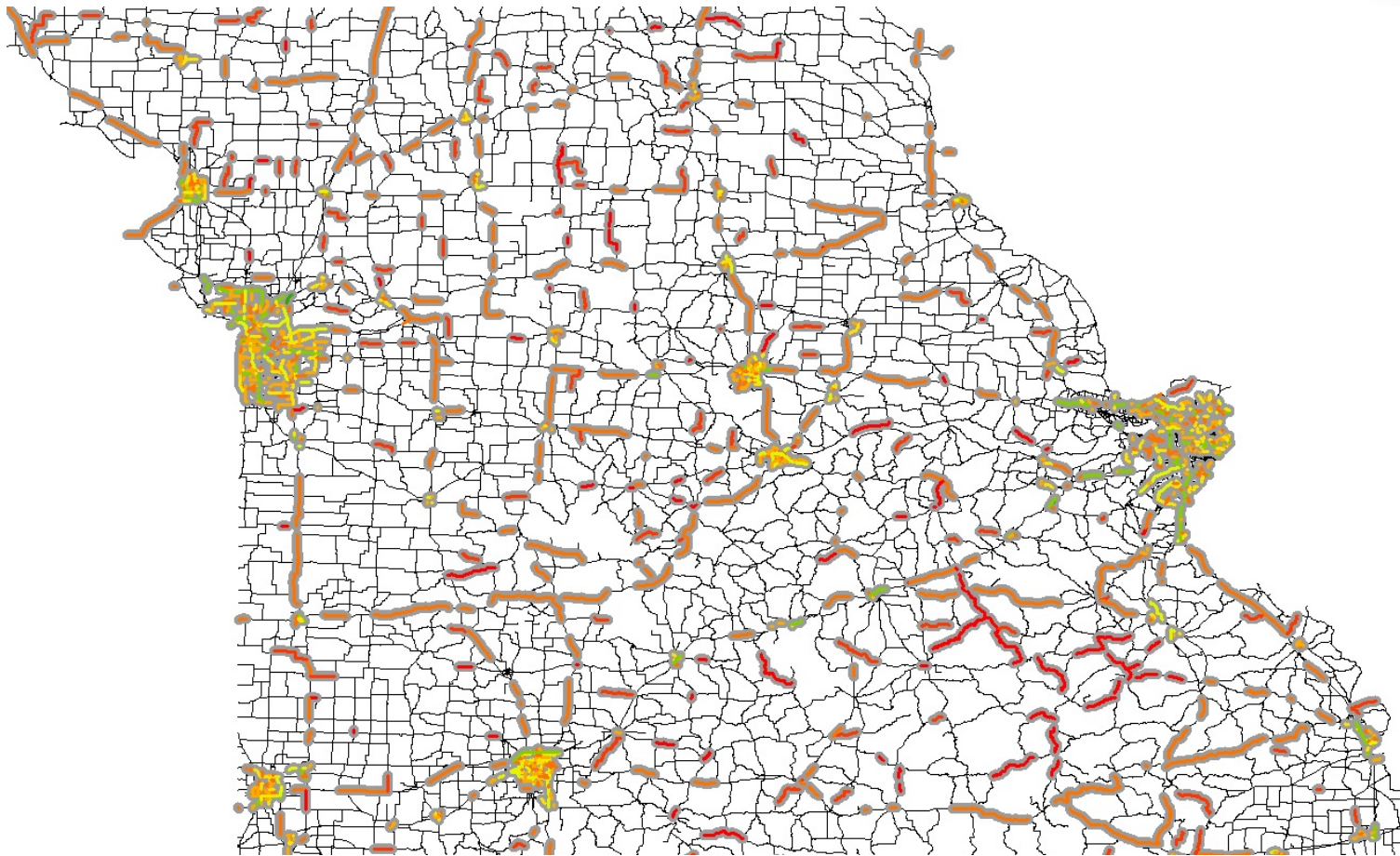
# GIS Traffic Review - % Peak SU



Zero SU AADT when AADT>3,300 also many zero % values reported adjacent to much higher % Peak SU values all around the state.



# GIS Traffic Review - % Peak SU



Urban values look fine – rural values all seem to be nearly one of two values reported, there is little variance by route which one would expect.





Table Of Contents

- Layers
  - Traffic\_37
    - AADT\_SINGLE\_UNIT\_
      - 1.000000 - 50.000000
      - 50.000001 - 125.0000
      - 125.000001 - 250.0000
      - 250.000001 - 450.0000
      - 450.000001 - 750.0000
      - 750.000001 - 1000.00
      - 1000.000001 - 1400.00
      - 1400.000001 - 1820.00
      - 1820.000001 - 2330.00
      - 2330.000001 - 3020.00
      - 3020.000001 - 4010.00
      - 4010.000001 - 6190.00
    - IS\_SAMPLE
      - 0
      - 1
  - Traffic\_37
    - AADT\_VN
      - 9.000000 - 195000.00

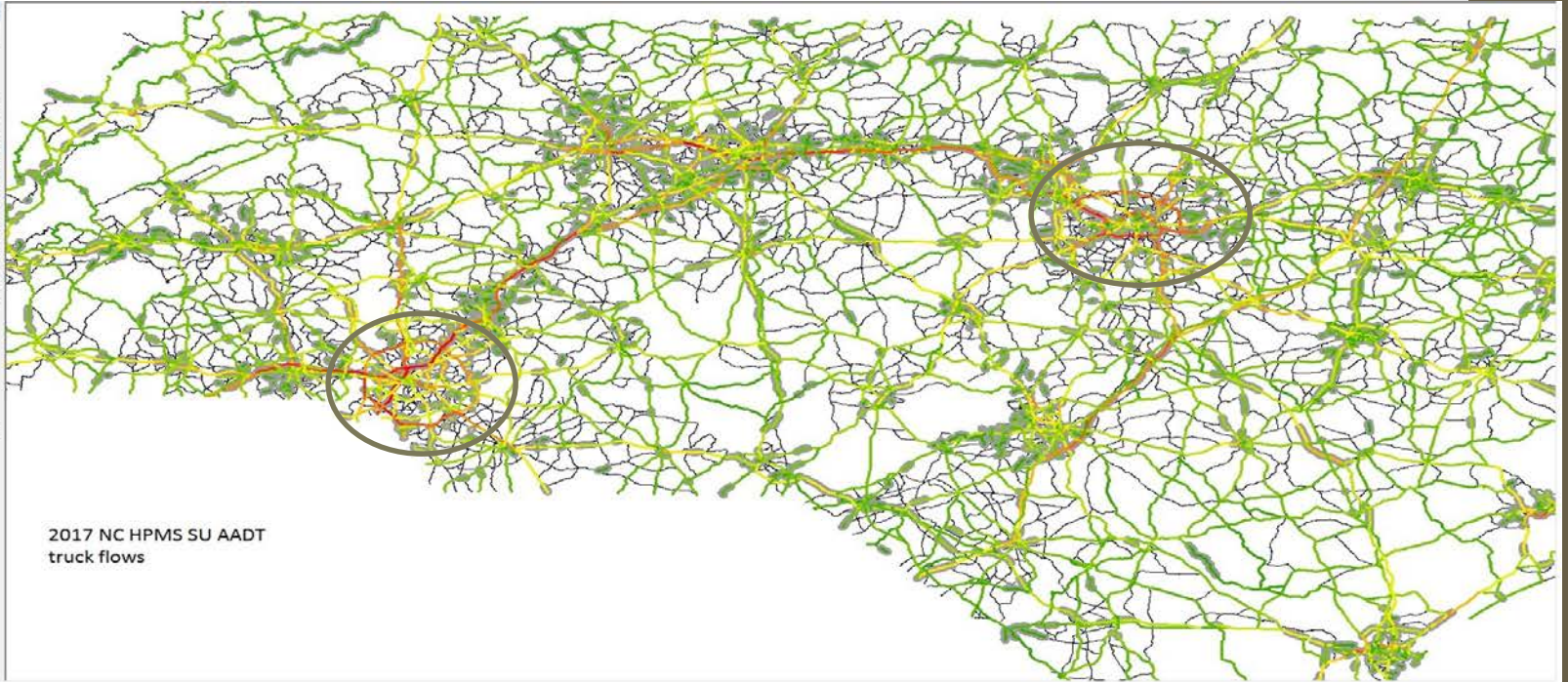
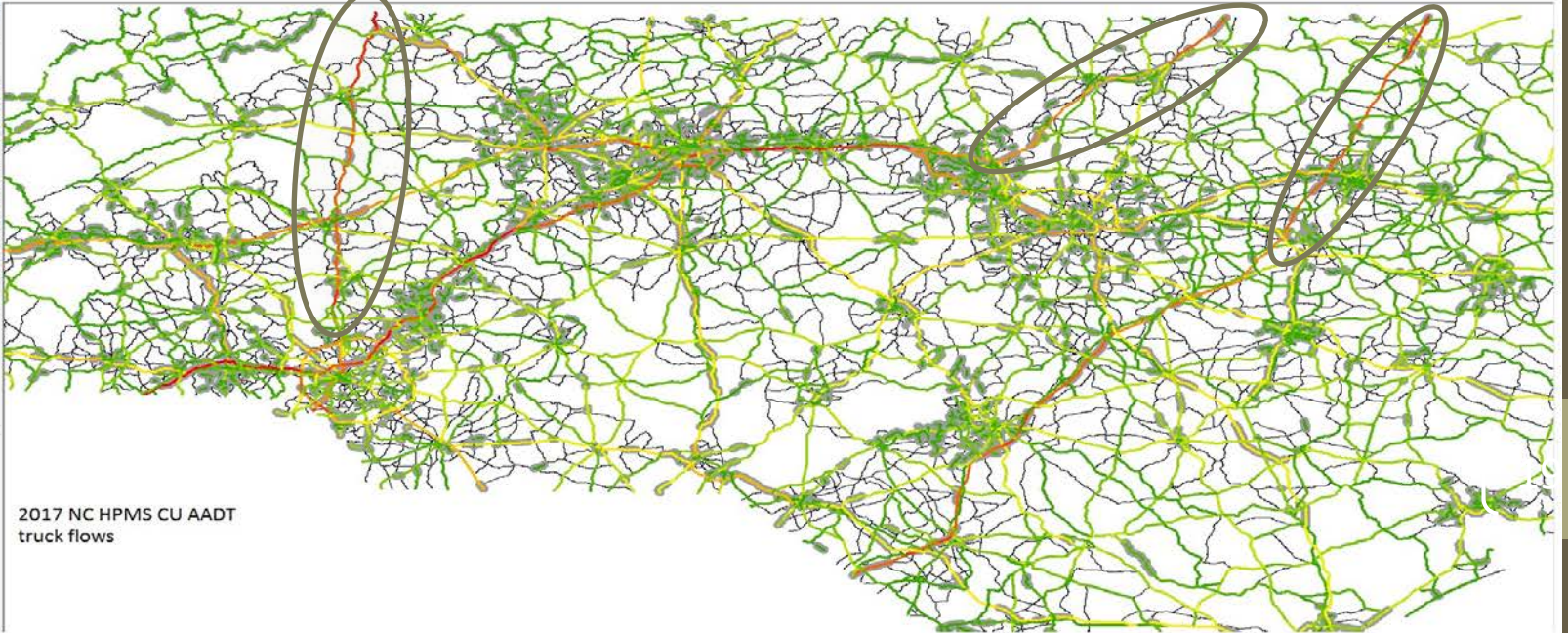


Table Of Contents

- Layers
  - Traffic\_37
    - AADT\_COMBINATION\_
      - 1.000000 - 75.000000
      - 75.000001 - 150.0000
      - 150.000001 - 250.0000
      - 250.000001 - 400.0000
      - 400.000001 - 750.0000
      - 750.000001 - 1300.00
      - 1300.000001 - 2200.00
      - 2200.000001 - 3500.00
      - 3500.000001 - 5300.00
      - 5300.000001 - 6880.00
      - 6880.000001 - 8740.00
      - 8740.000001 - 13270.00
    - IS\_SAMPLE
      - 0
      - 1
  - Traffic\_37
    - AADT\_VN
      - 9.000000 - 195000.00



# HPMS DATA GIS Review Feedback

- **What can be improved:**

- GIS review – is by route data reported showing travel trends that have large changes or if there are large changes they are verified okay.
- % Peak SU and CU – check AADT, SU AADT and % Peak SU to make sure the proper ratio of number of trucks is in the peak hour that balances well with not too few or not too many for the day.

- **What is going right:**

- GIS networks are looking a lot better
- AADT and Ramp AADT - excellent
- SU AADT and CU AADT – for the most part the by route data looks great
- State to state AADT – nearly all checked out fine, nice job

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