Improved in Depth HPMS Traffic Data Reviews

Office of Highway Policy Information
2017 Highway Information Seminar
Wednesday, November 15
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Office Organizational Chart

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Clarissa Smith
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Helen Davidson

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Chris Allen
Rob Rozycki
Tom Roff
Ron Erickson
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Dr. Wenjing Pu, PE
Mike Slattery
Dawn Edwards
Vacant
Apara Banerjee

1 – Indicates contractor
Topic Areas

• Key link Level traffic data QA/QC updates
• Vehicle Summary data
• GIS traffic data review
2016 HPMS Traffic Data Review Summary

• More states submitted the traffic data on time 2016
• More states pass the review first time 2016
• The most common issue is missing data: Future AADT, AADT, Truck AADT, K factor, D factor, and %Peak Truck
• Two States put vehicle summary data at incorrect columns
• 6 state Vehicle summary data has dramatic changes
• Future AADT does not make sense (it may be created in a different tool, does not link to HPMS properly)
Key Link Level Data: F_System missing example
## Key Link Level Data: AADT - Full extent data

<table>
<thead>
<tr>
<th>Functional System</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
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<tbody>
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<td>Int</td>
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<td>OPA</td>
<td>MiA</td>
<td>MaC</td>
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<td>FE+R</td>
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<td>FE+R</td>
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<td>FE+R</td>
<td></td>
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<tr>
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<td>FE+R</td>
<td>FE+R</td>
<td>FE+R</td>
<td>FE+R</td>
<td>FE+R</td>
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</tbody>
</table>

FE = Full Extent  
R = Ramp
Key Link Level Data: AADT Full extent check

AADT is a full extend data item for rural FC=1 to 5, urban FC=1 to 6. It should not be 0 or null.

1. Facility_Type_VN <=3, F_System_VN=1,2,3,4,5, AADT_VN=0 or null?

2. Facility_Type_VN <=3, F_System_VN=6, Urban_Code_VN<>99999, AADT_VN=0 or null?
# Key Link Level Data: AADT Single Unit Vehicle & Combination Truck

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<thead>
<tr>
<th>Functional System</th>
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<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
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<td>FE</td>
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<td>SP</td>
<td>SP</td>
<td>SP</td>
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<td>FE</td>
<td>SP</td>
<td>SP</td>
<td>SP</td>
<td>SP</td>
<td>SP</td>
</tr>
</tbody>
</table>

FE = Full Extent  
R = Ramp  
SP = Sample Panel
Key Link Level Data: Truck AADT (full extent & sample panel)

Truck AADT data is a full extend data item for interstate, and NHS and sample panel data for other function classes

1. Facility_Type_VN <=3, F_System_VN=1, AADT_Single_Unit_VN=null? AADT_Combination_Truck_VN =null?
2. Facility_Type_VN <=3, NHS_VN=1, AADT_Single_Unit_VN=null? AADT_Combination_Truck_VN =null? AADT_VN=0 or null?
3. Facility_Type_VN <=3, Is_sample=1, AADT_Single_Unit_VN=null? AADT_Combination_Truck_VN =null?
Key Link Level Data: Future AADT, K factor, D-factor

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<tr>
<th>Functional System</th>
<th>NHS</th>
<th>Int</th>
<th>OFE</th>
<th>OPA</th>
<th>MiA</th>
<th>MaC</th>
<th>MiC</th>
<th>Local</th>
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<td>SP</td>
<td>SP</td>
<td>SP</td>
<td>SP</td>
<td>SP</td>
</tr>
</tbody>
</table>

FE = Full Extent  
R = Ramp  
SP = Sample Panel
Key Link Level Data: K-Factor

Facility_Type_VN <=3, Is_sample=1, K_FACTOR_VN=null?

- K_FACTOR <= 4.2% -- impossible
- 4.2% < K_factor <= 6.0% -- questionable
- 6.0% < K_factor <= 7.0% -- caution
- 7.0% < K_factor <= 15.0% -- acceptable
- 15.0% < K_factor <= 20.0% -- caution
- K_FACTOR > 20.0% -- questionable
Big Picture - “data need to make sense”

- Population
- Fuel Consumption
- Number of licensed drivers
- Number of vehicles
- Gross Domestic Product (GDP)
Total VMT % of Change

• Population growth %
• GDP growth %
• Fuel Consumption %
Vehicle Summary Data

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<th></th>
<th>Urban</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Interstate</td>
<td>Other Arterial</td>
<td>Other Rural</td>
<td>Interstate</td>
</tr>
<tr>
<td>Motorcycles</td>
<td>0.04 %</td>
<td>1.71 %</td>
<td>1.77 %</td>
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<tr>
<td>Passenger Cars</td>
<td>74.17 %</td>
<td>72.42 %</td>
<td>73.06 %</td>
<td>80.75 %</td>
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<tr>
<td>Light Trucks</td>
<td>13.82 %</td>
<td>17.31 %</td>
<td>18.93 %</td>
<td>11.52 %</td>
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<tr>
<td>Buses</td>
<td>0.29 %</td>
<td>1.20 %</td>
<td>0.61 %</td>
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<tr>
<td>Single Unit Trucks</td>
<td>3.75 %</td>
<td>4.69 %</td>
<td>4.10 %</td>
<td>2.62 %</td>
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<tr>
<td>Combination Trucks</td>
<td>7.93 %</td>
<td>2.67 %</td>
<td>1.53 %</td>
<td>4.58 %</td>
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<tr>
<td>Total</td>
<td>100.00 %</td>
<td>100.00 %</td>
<td>100.00 %</td>
<td>100.00 %</td>
</tr>
</tbody>
</table>

Last Modified On: 6/1/2017 9:43:51 AM
Last Modified By: Dominguez, Facundo
Truck VMT for Interstate Method A

\[ Truck \ VMT = \sum_{i=1}^{n} \text{Truck AADT}_i \cdot \text{Length}_i \]

- Truck AADT has been released every year in HPMS shape file
- Daily Truck VMT for interstate can be calculated easily by all users
Truck VMT for Interstate by VM-4 Method B

Truck VMT = VMT \cdot VMT\% 

- VMT can be obtained from VM-2 
- VMT\% can be obtained from VM-4 
- Both tables are released annually in HS
Challenges

MethodA = MethodB?
Special Attention !

• Dramatic VMT % changes for Motorcycle, Bus and Combination Truck, consequently VMT by vehicle type has dramatic changes
• Some states have not adopted FHWA VMT weighted method
• Some lower function class of roadways for certain geographical areas do not have class data
VMT% Trends

- 6 vehicle types by 6 function class groups, trend of each of 36 VMT%
- States are expected to use FHWA vehicle summary data procedure
- Dramatic changes will be altered and asked to resubmit
Get Class Data Ready

- County is the smallest jurisdiction in HPMS. The VMT weighted method at county level produces a stable result
- Review class data for possible data quality issues
- Annualize and seasonally adjust class data – keep and annualize the 6 vehicle types for HPMS for all class counts (both portable and permanent)
- Add county code, function classes, urban types to the class data set
- Use class data to calculate vehicle counts percentage by urban type, function classes, county
Sequence

• Upload (submit) your HPMS traffic data
• Download your HPMS traffic immediately and perform QA/QC steps
• Resubmit as needed, download again to verify errors have been fixed
• Final HPMS data is going to be used for truck VMT and VMT weights
Key steps

Step 1. Calculate VMT by function classes (11 of our 14) and by county

Step 2. Obtain VMT for R6, R7, and U7 from Extent Travel Report

Step 3. Calculate Truck VMT% for Interstate, NHS, and sample panel segments by function classes and by county
Step 1 A: download final data
Step 1B: Calculate VMT for Weights
Step 2A: R6 and R7 Daily VMT

### Extent and Travel Report
Urbanized Area Summary

<table>
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<tr>
<th></th>
<th>2016</th>
<th>2015</th>
<th>% Change</th>
<th>2016</th>
<th>2015</th>
<th>% Change</th>
<th>2016</th>
<th>2015</th>
<th>% Change</th>
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<tbody>
<tr>
<td>99999 - Rural</td>
<td>495.18</td>
<td>495.18</td>
<td>0.00%</td>
<td>2,020.88</td>
<td>2,020.88</td>
<td>0.00%</td>
<td>10,712,885.00</td>
<td>10,294,885.00</td>
<td>4.08%</td>
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<tr>
<td>2 - PA - Other Freeways and Expressways</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00%</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00%</td>
<td>0.00</td>
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</tr>
<tr>
<td>3 - PA - Other</td>
<td>2,658.96</td>
<td>2,657.71</td>
<td>-0.03%</td>
<td>5,905.30</td>
<td>5,906.71</td>
<td>-0.02%</td>
<td>11,476,331.70</td>
<td>11,017,845.10</td>
<td>4.16%</td>
</tr>
<tr>
<td>4 - Minor Arterial</td>
<td>2,223.47</td>
<td>2,225.49</td>
<td>-0.09%</td>
<td>4,540.73</td>
<td>4,544.78</td>
<td>-0.09%</td>
<td>4,955,682.60</td>
<td>4,810,971.30</td>
<td>3.01%</td>
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<tr>
<td>5 - Major Collector</td>
<td>8,174.09</td>
<td>8,168.75</td>
<td>0.07%</td>
<td>18,380.16</td>
<td>16,349.48</td>
<td>0.07%</td>
<td>5,013,009.60</td>
<td>4,856,283.70</td>
<td>3.21%</td>
</tr>
<tr>
<td>6 - Minor Collector</td>
<td>7,929.34</td>
<td>8,037.48</td>
<td>-1.36%</td>
<td>15,858.68</td>
<td>16,074.98</td>
<td>-1.36%</td>
<td>2,099,702.00</td>
<td>2,121,444.00</td>
<td>-1.02%</td>
</tr>
<tr>
<td>7 - Local</td>
<td>37,113.08</td>
<td>37,056.71</td>
<td>0.15%</td>
<td>74,228.16</td>
<td>74,113.42</td>
<td>0.15%</td>
<td>5,557,672.00</td>
<td>8,085,148.00</td>
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<tr>
<td>Total</td>
<td>58,592.1</td>
<td>58,641.3</td>
<td>-0.08%</td>
<td>118,911.9</td>
<td>119,010.2</td>
<td>-0.08%</td>
<td>39,313,782.9</td>
<td>39,186,577.1</td>
<td>1.60%</td>
</tr>
</tbody>
</table>

R6=?
R7=?
Step 2B U7 Daily VMT

**HPMS 8.0.1**

**Extent and Travel Report**

**Urbanized Area Summary**

<table>
<thead>
<tr>
<th>All Areas</th>
<th>Miles</th>
<th>Lane Miles</th>
<th>Daily Vehicle Miles</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>2016</td>
<td>2015</td>
<td>% Change</td>
</tr>
<tr>
<td>1 - Interstate</td>
<td>729.58</td>
<td>729.58</td>
<td>0.00%</td>
</tr>
<tr>
<td>2 - PA - Other Freeways and Expressways</td>
<td>59.54</td>
<td>57.22</td>
<td>-4.06%</td>
</tr>
<tr>
<td>3 - PA - Other</td>
<td>3,512.69</td>
<td>3,513.71</td>
<td>-0.02%</td>
</tr>
<tr>
<td>4 - Minor Arterial</td>
<td>3,507.67</td>
<td>3,511.17</td>
<td>-0.10%</td>
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<tr>
<td>5 - Major Collector</td>
<td>10,298.45</td>
<td>10,290.24</td>
<td>0.26%</td>
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<tr>
<td>6 - Minor Collector</td>
<td>8,423.71</td>
<td>8,532.33</td>
<td>-1.27%</td>
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<tr>
<td>7 - Local</td>
<td>46,999.13</td>
<td>46,909.49</td>
<td>0.19%</td>
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<tr>
<td>Total</td>
<td>73,529.0</td>
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<td>-0.02%</td>
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</table>

**955 - Albany, OR**

<table>
<thead>
<tr>
<th></th>
<th>Miles</th>
<th>Lane Miles</th>
<th>Daily Vehicle Miles</th>
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<td>1 - Interstate</td>
<td>8.67</td>
<td>8.67</td>
<td>0.00%</td>
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<tr>
<td>2 - PA - Other Freeways and Expressways</td>
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<td>0.00</td>
<td>0.00%</td>
</tr>
<tr>
<td>3 - PA - Other</td>
<td>17.21</td>
<td>17.21</td>
<td>0.00%</td>
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<tr>
<td>4 - Minor Arterial</td>
<td>35.74</td>
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<td>5 - Major Collector</td>
<td>45.31</td>
<td>45.31</td>
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<td>6 - Minor Collector</td>
<td>15.68</td>
<td>15.78</td>
<td>-0.03%</td>
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<td>7 - Local</td>
<td>100.02</td>
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<td>Total</td>
<td>313.5</td>
<td>312.6</td>
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**U7=All-R7**
Step 3  Calculate Truck VMT%

Truck AADT: FS=1 or NHS=1 or Is_sample=1, and facility type<=3
Alternative: AADT_Combination_vn<>0, facility type<=3

<table>
<thead>
<tr>
<th>Begin_Poi</th>
<th>End_Point</th>
<th>AADT_VN</th>
<th>AADT_C</th>
<th>AADT_SIN</th>
<th>COUNTY_F_SYSTEM</th>
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<th>IS_SAMPLE</th>
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<th>VMT</th>
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<td>99998</td>
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<td>2</td>
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<td>1.7</td>
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<td>220</td>
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</table>
Knowledge Center

The following presentations are short, single subject matter presentations that may be used as a reference on how to report data to the FHWA Office of Highway Policy Information. The ultimate reference for reporting is the Guide to Reporting Highway Statistics.

Motor Fuel Reporting

- Form 551M and 555 (Revenue) – Reporting Monthly Motor Fuel Data

Vehicle Registrations

- Form 561 – Vehicle Registration Reporting
- Form 566 – State Motor Vehicle and Motor Carrier Revenue
- Form 571 – State Taxation of Motor Carriers

Highway Travel

- HPMS Pavement Performance Data Report Card Webinar
- How To Submit Annual Highway Performance Monitoring (HPMS) Vehicle Summary Data
  - Part 1 – Understand What the Vehicle Summary Data Is (PowerPoint, 4.3 mb)
  - Part 2 – Processes and approaches associated with the FHWA method (PowerPoint, 1.6 mb)
  - Part 3 – Understand Some HPMS Data Items and Other Related Concepts (PowerPoint, 2.0 mb)
  - Part 4 – HPMS Vehicle Summary Data Computation (PowerPoint, 430 kb)

Heavy Vehicle Use Tax

- Heavy Vehicle Use Tax Governor's Certification

Finance

Driver Registrations

If you are having trouble viewing any of the above presentations, please contact Michael Dougherty at (202) 366-9234, or michael.dougherty@dot.gov.
VMT Weighting Method Website

https://www.fhwa.dot.gov/policyinformation/knowledgecenter/vmt_training/
GIS Review of Traffic Data

- 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
2017 GIS Review Feedback

• **What can be improved:**
  • GIS review – is data reported by route show 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 to few or not to many for the day.
  • FAADT – ratio the same, lower FAADT than AADT, ratio of near zero growth or very large growth of 300% reported.

• **What is going right:**
  • GIS networks are looking a lot better
  • AADT and Ramp AADT
  • SU AADT and CU AADT
  • State to state AADT
GIS Demonstration

Questions/Comments

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