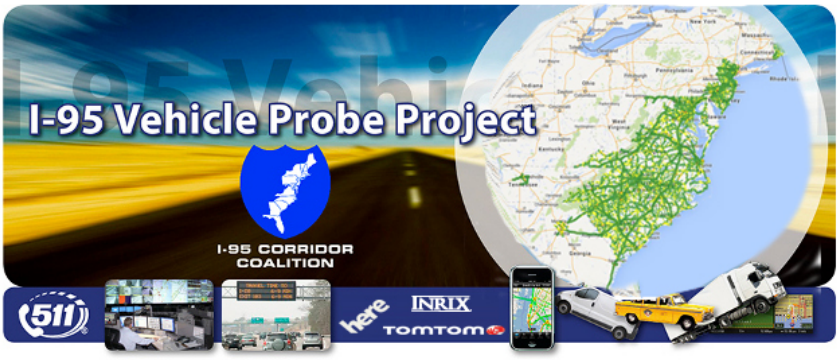


# I-95 Corridor Coalition

## I-95 Corridor Coalition Vehicle Probe Project: Validation of HERE Data

Monthly Report: Pennsylvania

I-95 CORRIDOR COALITION

*Dec 2014*

# I-95 CORRIDOR COALITION VEHICLE PROBE PROJECT VALIDATION OF HERE DATA DEC 2014

## *Monthly Report*

*Prepared for:*

I-95 Corridor Coalition

*Sponsored by:*

I-95 Corridor Coalition

*Prepared by:*

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*Acknowledgements:*

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*Dec 2014*

# Evaluation Results for the State of Pennsylvania

## *Executive Summary*

The data from the Vehicle Probe Project is validated using Bluetooth™ Traffic Monitoring (BTM) technology on a near monthly basis. BTMs sensor were deployed on the beginning and ending points of fourteen different segments along the I-83 and I-81 corridor. The Bluetooth sensor deployment covers the range from 32nd St/Exit 45 to Carlisle Rd/Simpson Ferry Rd/Exit 40 along I-83 and from US-322/Exit 70 to PA-114/Exit 18 along I-81. Travel time data was collected for both directions along the freeway, between October 9 through October 22, 2014. The dataset collected represents approximately 2300 hours of observations along fourteen freeway segments, totaling approximately 31.3 miles. The number of effective five-minute travel time samples observed was 27,596 in total.

ES Table 1, below summarizes the results of the comparison between BTM reference data and the HERE data for freeway segments during the above time period. As shown, the average absolute speed error (AASE) and Speed Error Bias (SEB) were within specification in all speed bins.

**ES Table 1 - Pennsylvania Evaluation Summary for Freeway**

| | **Absolute Speed Error (<10mph)** | | **Speed Error Bias (<5mph)** | | Number of 5 Minute Samples | Hours of Data Collection |
|---|---|---|---|---|---|---|
| **Speed Bin** | Comparison with SEM Band | Comparison with Mean | Comparison with SEM Band | Comparison with Mean | | |
| 0-30 MPH | 2.1 | 3.4 | 0.8 | 1.0 | 857 | 71.4 |
| 30-45 MPH | 3.1 | 5.2 | -0.2 | -0.2 | 643 | 53.6 |
| 45-60 MPH | 1.2 | 3.4 | -0.4 | -0.8 | 7825 | 652.1 |
| >60 MPH | 1.5 | 3.7 | -0.9 | -2.0 | 18271 | 1522.6 |
| All Speeds | 1.5 | 3.6 | -0.7 | -1.5 | 27596 | 2299.7 |

Based upon data collected from October 9 through October 22, 2014 across 31.3.3 miles of roadway.

## *Data Collection*

The data from the Vehicle Probe Project is validated using Bluetooth™ Traffic Monitoring (BTM) technology on a near monthly basis. BTMs sensor were deployed on the beginning and ending points of fourteen different segments along the I-83 and I-81 freeway corridor. The Bluetooth sensor deployment covers the range 32nd St/Exit 45 to Carlisle Rd/Simpson Ferry Rd/Exit 40 along I-83 and from US-322/Exit 70 to PA-114/Exit 18 along I-81. Travel time data was collected for both directions along the freeway. The data was collected between October 9th and October 22nd 2014 with the assistance of Pennsylvania Department of Transportation (PennDOT) personnel. Segment locations were chosen with a high-likelihood of observing recurrent and non-recurrent congestions during peak or off-peak periods.

Figure 1 and 2 present snapshots of the placement of sensors for the collection of data on the I-83 and I-81 corridors in Pennsylvania. Red segments represent freeway segments selected for analysis.

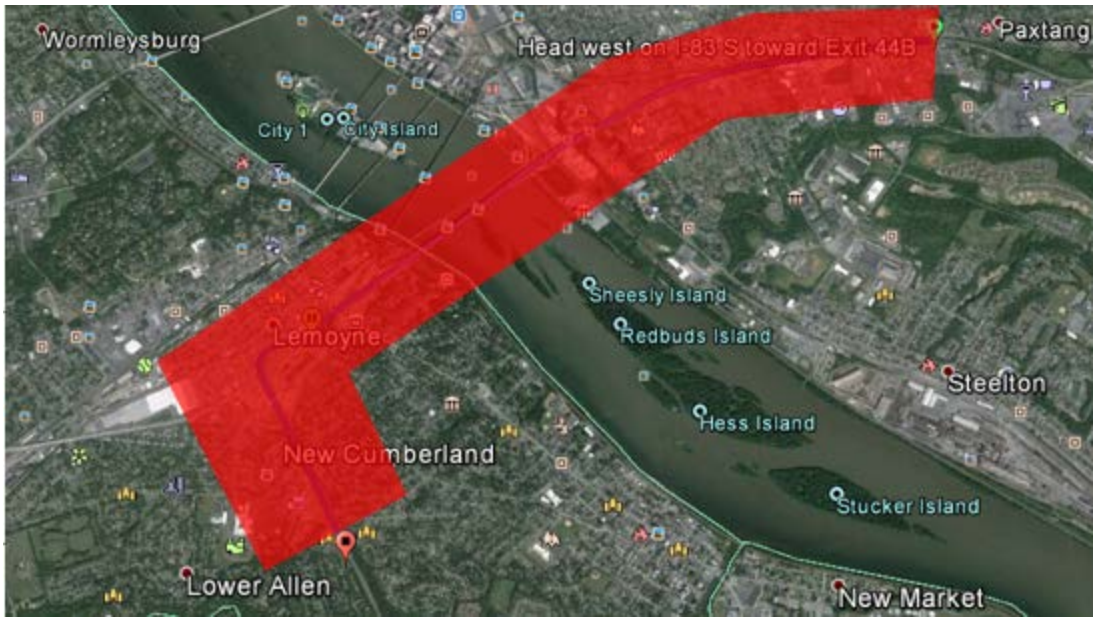


**Figure 1** — Locations of segments selected for analysis on I-83 in Pennsylvania

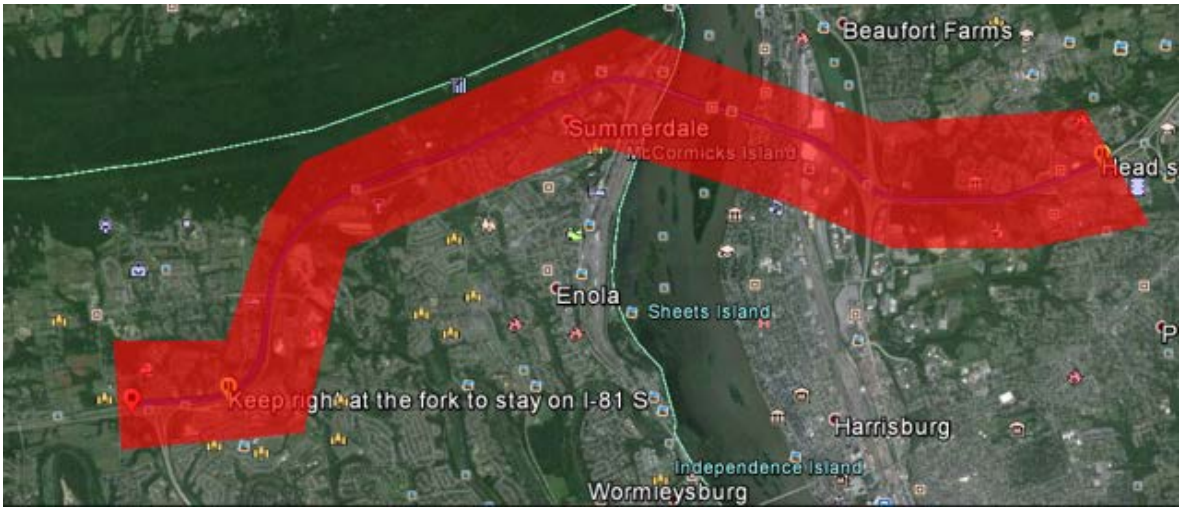


**Figure 2** — Locations of segments selected for analysis on I-81 in Pennsylvania

## TMC segments selected for validation in Pennsylvania

Table 1 presents a list of data collection segments from Pennsylvania. In total, these segments cover a total length of approximately 31.3 freeway miles. Data collection segments are comprised of one or more Traffic Message Channel (TMC) base segments, such that total length of the data collection segment is one mile long or greater for freeway. When appropriate, consecutive TMC segments are combined to form a data collection segment longer than one mile. The results of the validation performed on fourteen freeway segments are included in this report. Table 1 contains the summary information on each data collection segments. The latitude/longitude coordinates of the locations at which the Bluetooth sensors were deployed throughout the state of Pennsylvania are provided in Table 1 as well as an active map link to view the data collection segment in detail. Click on the map link to see a detailed map for the respective data collection segment. It should be noted that the configuration of test segments is often such that the endpoint of one segment coincides with the start point of the next segment, so that one Bluetooth sensor covers both data collection segments.

Table 1 also provides data on the precise length of the TMCs comprising the test segment as compared to the measured length between BTM sensors placed on the roadway. Details of the algorithm used to estimate equivalent path travel times based on HERE data feeds for individual data collection segments are provided in a separate report. This algorithm finds an equivalent HERE travel time (and therefore travel speed) corresponding to each sample BTM travel time observation on the test segment of interest.

**Table 1**
**Segments selected for validation in Pennsylvania**

| SEGMENT (Map Link) | DESCRIPTION Highway / Pennsylvania | State / County | Starting at / Ending at | TMC CODES Begin / End | Number / Length | Deployment Begin Lat/Lon / End Lat/Lon | Length / % Diff |
|---|---|---|---|---|---|---|---|
| **FREEWAY** | | | | | | | All Lengths in Miles |
| F1 | I-83 | Pennsylvania | 32nd St/Exit 45 | 103N04605 | 3 | 40.2583 -76.8377 | 1.33 |
| PA08-0001 | Southbound | Dauphin | 17th St/Exit 44 | 103N04603 | 1.33 | 40.2553 -76.8628 | -0.02% |
| F2 | I-83 | Pennsylvania | 17th St/Exit 44 | 103N04603 | 3 | 40.2553 -76.8628 | 1.23 |
| PA08-0002 | Southbound | Dauphin | John Harris Brg | 103N04601 | 1.23 | 40.2458 -76.8826 | -0.03% |
| F3 | I-83 | Pennsylvania | John Harris Brg | 103N04600 | 7 | 40.2458 -76.8826 | 1.73 |
| PA08-0003 | Southbound | Cumberland | Carlisle Rd/Simpson Ferry Rd/Exit 40 | 103N04613 | 1.68 | 40.2271 -76.8887 | 2.80% |
| F4 | I-83 | Pennsylvania | Carlisle Rd/Simpson Ferry Rd/Exit 40 | 103P04614 | 7 | 40.2257 -76.8875 | 1.8 |
| PA08-0004 | Northbound | Cumberland | Lowther St/Exit 42 | 103P04601 | 1.63 | 40.2459 -76.8817 | 10.64% |
| F5 | I-83 | Pennsylvania | Lowther St/Exit 42 | 103P04601 | 4 | 40.2459 -76.8817 | 1.25 |
| PA08-0005 | Northbound | Dauphin | 13th St/Exit 44 | 103P04604 | 1.33 | 40.2555 -76.8618 | -5.78% |
| F6 | I-83 | Pennsylvania | 13th St/Exit 44 | 103P04604 | 3 | 40.2555 -76.8618 | 1.28 |
| PA08-0006 | Northbound | Dauphin | 32nd St/Exit 45 | 103P04606 | 1.3 | 40.258 -76.8377 | -1.61% |
| F7 | I-81 | Pennsylvania | US-322/Exit 70 | 103N04526 | 2 | 40.3067 -76.8415 | 2.82 |
| PA08-0007 | Southbound | Dauphin | US-322/US-22/Exit 67 | 103N04525 | 2.82 | 40.3088 -76.889 | -0.18% |
| F8 | I-81 | Pennsylvania | US-322/US-22/Exit 67 | 103N04524 | 4 | 40.3088 -76.889 | 2.1 |
| PA08-0008 | Southbound | Dauphin | US-15/US-11/Exit 21 | 103N04521 | 2.24 | 40.3162 -76.9276 | -6.46% |

**Table 1 (Cont'd)**
**Segments selected for validation in Pennsylvania**

| SEGMENT (Map Link) | DESCRIPTION Highway / Pennsylvania | State / County | Starting at / Ending at | TMC CODES Begin / End | Number / Length | Deployment Begin Lat/Lon / End Lat/Lon | | Length / % Diff |
|---|---|---|---|---|---|---|---|---|
| **FREEWAY** | | | | | | | | All Lengths in Miles |
| F9 | I-81 | Pennsylvania | US-15/US-11/Exit 21 | 103N04521 | 1 | 40.3162 | -76.9276 | 3.18 |
| PA08-0009 | Southbound | Cumberland | PA-944/Wertzville Rd/Exit 61 | 103N04521 | 3.26 | 40.2948 | -76.9798 | -2.49% |
| F10 | I-81 | Pennsylvania | PA-944/Wertzville Rd/Exit 61 | 103N04521 | 2 | 40.2948 | -76.9798 | 2.3 |
| PA08-00010 | Southbound | Cumberland | PA-581/Exit 19 | 103N04520 | 2.22 | 40.2751 | -77.0058 | 3.62% |
| F11 | I-81 | Pennsylvania | PA-581/Exit 19 | 103P04520 | 2 | 40.2713 | -77.0369 | 4 |
| PA08-0011 | Northbound | Cumberland | PA-944/Wertzville Rd/Exit 61 | 103P04521 | 4.07 | 40.2938 | -76.98 | -1.68% |
| F12 | I-81 | Pennsylvania | PA-944/Wertzville Rd/Exit 61 | 103P04522 | 1 | 40.2938 | -76.98 | 3.1 |
| PA08-0012 | Northbound | Cumberland | US-15/US-11/Exit 21 | 103P04522 | 3.06 | 40.3151 | -76.9287 | 1.26% |
| F13 | I-81 | Pennsylvania | US-15/US-11/Exit 21 | 103P04522 | 4 | 40.3151 | -76.9287 | 2.38 |
| PA08-0013 | Northbound | Cumberland | US-322/US-22/Exit 67 | 103P04525 | 2.49 | 40.3069 | -76.8868 | -4.43% |
| F14 | I-81 | Pennsylvania | US-322/US-22/Exit 67 | 103P04525 | 3 | 40.3069 | -76.8868 | 2.56 |
| PA08-0014 | Northbound | Dauphin | US-322/Exit 70 | 103P04527 | 2.58 | 40.3057 | -76.8417 | -0.68% |

## *Analysis of Freeway Results*

Table 2 summarizes the data quality measures obtained as a result of comparison between Bluetooth and all reported HERE speeds. Specifications include the Average Absolute Speed Error (AASE) and the Speed Error Bias (SEB).

Average Absolute Speed Error (AASE)
The AASE is defined as the mean absolute value of the difference between the mean speed reported from the VPP and the ground truth mean speed for a specified time period. The AASE is the primary accuracy metric. Based on the contract specifications, the speed data from the VPP shall have a maximum average absolute error of 10 miles per hour (MPH) in each of four speed ranges: 0-30 MPH, 30-45 MPH, 45-60 MPH, and > 60 MPH.

Speed Error Bias (SEB)
The SEB is defined as the average speed error (not the absolute value) in each speed range. SEB is a measure of whether the speed reported in the VPP consistently under or over estimates speed as compared to ground truth speed. Based on the contract specifications, the VPP data shall have a maximum SEB of +/- 5 MPH in each of speed ranges as defined above.

The results are presented as compared against the mean of the ground truth data as well as the 95$^{th}$ percent confidence interval for the mean, referred to as the Standard Error of the Mean (SEM) band. The SEM band takes into account any uncertainty in the ground truth speed as measured by BTM equipment due to limited samples and/or data variance. Contract specifications are assessed against the SEM band. (See the *Vehicle Probe Project: Data Use and Application Guide* for additional details on the validation process.) The AASE in the lower two speed bands have proven to be the critical specification (and most difficult) to attain, and are highlighted in Table 2. The AASE below 10 MPH met contract specifications. The AASE below 5 MPH are considered exceptional quality. As shown, the average absolute speed error (AASE) was within specification for all the speed bins.

**TABLE 2 Data quality measures for freeway segments in Pennsylvania**

| SPEED BIN | Data Quality Measures for | | | | No. of 5 Minute Samples | Hours of Data Collection |
|---|---|---|---|---|---|---|
| | 1.96 SEM Band | | Mean | | | |
| | SEB 5 mph (contract specifications) | AASE 10 mph (contract specifications) | SEB | AASE | | |
| 0-30 | 0.8 | 2.1 | 1.0 | 3.4 | 857 | 71 |
| 30-45 | -0.2 | 3.1 | -0.2 | 5.2 | 643 | 54 |
| 45-60 | -0.4 | 1.2 | -0.8 | 3.4 | 7825 | 652 |
| 60+ | -0.9 | 1.5 | -2.0 | 3.7 | 18271 | 1523 |

Table 3 shows the percentage of the time HERE data falls within 5 mph of the SEM band and the mean for each speed bin for all freeway data segments in Pennsylvania.

**Table 3 Percent observations meeting data quality criteria for freeway segments in Pennsylvania**

| SPEED BIN | Data Quality Measures for | | | | No. of Obs. |
|---|---|---|---|---|---|
| | 1.96 SEM Band | | Mean | | |
| | Percentage falling inside the band | Percentage falling within 5 mph of the band | Percentage equal to the mean | Percentage within 5 mph of the mean | |
| 0-30 | 31% | 88% | 0% | 77% | 857 |
| 30-45 | 31% | 76% | 0% | 59% | 643 |
| 45-60 | 57% | 93% | 0% | 78% | 7825 |
| 60+ | 48% | 92% | 0% | 74% | 18271 |

Tables 4 and 5 present detailed data for individual TMC segments in Pennsylvania in a similar format as Tables 2 and 3, respectively. Note that for some segments and in some speed bins the comparison results may not be reliable due to small number of observations.

**Table 4**
**Data quality measures for individual freeway validation segments in the state of Pennsylvania**

| TMC | Standard TMC length | Bluetooth distance | SPEED BIN | Data Quality Measures for | | | | No. of Obs. |
|---|---|---|---|---|---|---|---|---|
| | | | | 1.96 SEM Band | | Mean | | |
| | | | | Speed Error Bias | Average Absolute Speed Error | Speed Error Bias | Average Absolute Speed Error | |
| **PA08-0001** | 1.3 | 1.3 | 0-30 | 0.0 | 2.6 | -0.4 | 3.8 | 46 |
| | | | 30-45 | -2.7 | 3.8 | -3.5 | 5.3 | 97 |
| | | | 45-60 | -0.4 | 1.1 | -0.9 | 2.8 | 692 |
| | | | 60+ | -1.9 | 2.0 | -4.4 | 4.8 | 559 |
| **PA08-0002** | 1.2 | 1.2 | 0-30 | 0.2 | 1.4 | 0.2 | 2.5 | 160 |
| | | | 30-45 | 0.5 | 3.2 | 1.2 | 5.5 | 35 |
| | | | 45-60 | -0.6 | 1.0 | -1.3 | 3.1 | 1000 |
| | | | 60+ | -2.2 | 2.2 | -5.2 | 5.4 | 1085 |
| **PA08-0003** | 1.7 | 1.7 | 0-30 | 0.9 | 2.0 | 1.1 | 3.5 | 28* |
| | | | 30-45 | -1.4 | 2.7 | -1.4 | 5.2 | 112 |
| | | | 45-60 | -0.6 | 1.0 | -1.3 | 3.2 | 1951 |
| | | | 60+ | -2.7 | 2.7 | -10.3 | 10.3 | 18* |
| **PA08-0004** | 1.6 | 1.8 | 0-30 | 1.3 | 2.2 | 2.0 | 3.9 | 160 |
| | | | 30-45 | 0.7 | 1.9 | 0.8 | 4.6 | 103 |
| | | | 45-60 | -0.4 | 1.0 | -1.2 | 3.2 | 1495 |
| | | | 60+ | -2.9 | 2.9 | -8.0 | 8.0 | 127 |
| **PA08-0005** | 1.3 | 1.3 | 0-30 | -0.1 | 1.6 | -0.4 | 3.5 | 158 |
| | | | 30-45 | -1.3 | 3.5 | -2.2 | 6.5 | 73 |
| | | | 45-60 | -2.5 | 2.7 | -4.5 | 5.3 | 514 |
| | | | 60+ | -3.8 | 3.8 | -8.0 | 8.1 | 1484 |
| **PA08-0006** | 1.3 | 1.3 | 0-30 | 0.6 | 1.8 | 0.8 | 3.0 | 205 |
| | | | 30-45 | 0.9 | 3.0 | 1.3 | 4.6 | 148 |
| | | | 45-60 | 0.2 | 1.0 | 0.7 | 3.1 | 1648 |
| | | | 60+ | -1.4 | 1.5 | -4.4 | 4.7 | 186 |
| **PA08-0008** | 2.2 | 2.1 | 0-30 | 0.6 | 1.0 | 0.8 | 2.3 | 12* |
| | | | 30-45 | 1.2 | 2.4 | 1.6 | 4.2 | 28* |
| | | | 45-60 | 0.5 | 0.7 | 1.0 | 2.4 | 59 |
| | | | 60+ | -1.6 | 1.8 | -3.7 | 4.2 | 2214 |
| **PA08-0009** | 3.3 | 3.2 | 0-30 | - | - | - | - | - |
| | | | 30-45 | -5.2 | 5.2 | -6.4 | 6.4 | 3* |
| | | | 45-60 | 1.7 | 3.4 | 3.7 | 5.9 | 263 |
| | | | 60+ | 0.9 | 1.2 | 1.9 | 3.0 | 3022 |

*Results in the specified row may not be reliable due to small number of observation

## Table 4 (Cont'd)
## Data quality measures for individual freeway validation segments in the state of Pennsylvania

| TMC | Standard TMC length | Bluetooth distance | SPEED BIN | Data Quality Measures for | | | | No. of Obs. |
|---|---|---|---|---|---|---|---|---|
| | | | | 1.96 SEM Band | | Mean | | |
| | | | | Speed Error Bias | Average Absolute Speed Error | Speed Error Bias | Average Absolute Speed Error | |
| **PA08-0010** | 2.2 | 2.3 | 0-30 | 4.1 | 4.5 | 4.5 | 5.2 | 88 |
| | | | 30-45 | 3.7 | 5.2 | 4.3 | 6.7 | 30 |
| | | | 45-60 | -0.2 | 3.3 | 1.4 | 6.1 | 50 |
| | | | 60+ | -0.3 | 0.7 | -0.6 | 2.4 | 2202 |
| **PA08-0011** | 4.1 | 4.0 | 0-30 | - | - | - | - | - |
| | | | 30-45 | 0.6 | 1.7 | 0.5 | 3.1 | 8* |
| | | | 45-60 | -0.1 | 1.7 | 0.4 | 3.7 | 75 |
| | | | 60+ | -0.2 | 0.7 | -0.5 | 2.3 | 2381 |
| **PA08-0012** | 3.1 | 3.1 | 0-30 | - | - | - | - | - |
| | | | 30-45 | - | - | - | - | - |
| | | | 45-60 | 1.6 | 1.8 | 3.2 | 4.1 | 25* |
| | | | 60+ | -0.5 | 1.0 | -1.1 | 2.6 | 2525 |
| **PA08-0013** | 2.5 | 2.4 | 0-30 | - | - | - | - | - |
| | | | 30-45 | 9.0 | 9.7 | 9.9 | 12.0 | 6* |
| | | | 45-60 | -2.6 | 3.9 | -2.1 | 6.6 | 53 |
| | | | 60+ | -1.3 | 1.5 | -3.0 | 3.6 | 2468 |

*Results in the specified row may not be reliable due to small number of observations

## Table 5
## Observations meeting data quality criteria for individual freeway validation segments in the state of Pennsylvania

| TMC | SPEED BIN | Data Quality Measures for | | | | | | | | No. of Obs. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1.96 SEM Band | | | | Mean | | | | |
| | | Speed Error Bias | | Average Absolute Speed Error | | Speed Error Bias | | Average Absolute Speed Error | | |
| | | No. falling inside the band | % falling inside the band | No. falling within 5 mph of the band | % falling within 5 mph of the band | No. equal to the mean | % equal to the mean | No. within 5 mph of the mean | % within 5 mph of the mean | |
| PA08-0001 | 0-30 | 7 | 15% | 39 | 85% | 0 | 0% | 32 | 70% | 46 |
| | 30-45 | 10 | 10% | 70 | 72% | 0 | 0% | 52 | 54% | 97 |
| | 45-60 | 415 | 60% | 657 | 95% | 1 | 0% | 589 | 85% | 692 |
| | 60+ | 203 | 36% | 496 | 89% | 0 | 0% | 326 | 58% | 559 |
| PA08-0002 | 0-30 | 51 | 32% | 150 | 94% | 0 | 0% | 144 | 90% | 160 |
| | 30-45 | 14 | 40% | 25 | 71% | 0 | 0% | 21 | 60% | 35 |
| | 45-60 | 627 | 63% | 953 | 95% | 0 | 0% | 826 | 83% | 1000 |
| | 60+ | 391 | 36% | 913 | 84% | 0 | 0% | 530 | 49% | 1085 |
| PA08-0003 | 0-30 | 9 | 32% | 23 | 82% | 0 | 0% | 20 | 71% | 28* |
| | 30-45 | 40 | 36% | 90 | 80% | 0 | 0% | 64 | 57% | 112 |
| | 45-60 | 1162 | 60% | 1838 | 94% | 0 | 0% | 1553 | 80% | 1951 |
| | 60+ | 6 | 33% | 14 | 78% | 0 | 0% | 1 | 6% | 18* |
| PA08-0004 | 0-30 | 54 | 34% | 139 | 87% | 0 | 0% | 116 | 73% | 160 |
| | 30-45 | 51 | 50% | 87 | 84% | 0 | 0% | 71 | 69% | 103 |
| | 45-60 | 917 | 61% | 1428 | 96% | 1 | 0% | 1189 | 80% | 1495 |
| | 60+ | 40 | 32% | 102 | 80% | 0 | 0% | 21 | 17% | 127 |
| PA08-0005 | 0-30 | 69 | 44% | 141 | 89% | 0 | 0% | 114 | 72% | 158 |
| | 30-45 | 20 | 27% | 54 | 74% | 0 | 0% | 31 | 42% | 73 |
| | 45-60 | 212 | 41% | 432 | 84% | 3 | 1% | 323 | 63% | 514 |
| | 60+ | 374 | 25% | 1007 | 68% | 0 | 0% | 382 | 26% | 1484 |
| PA08-0006 | 0-30 | 61 | 30% | 187 | 91% | 0 | 0% | 165 | 80% | 205 |
| | 30-45 | 43 | 29% | 111 | 75% | 0 | 0% | 94 | 64% | 148 |
| | 45-60 | 936 | 57% | 1561 | 95% | 2 | 0% | 1364 | 83% | 1648 |
| | 60+ | 98 | 53% | 171 | 92% | 0 | 0% | 102 | 55% | 186 |
| PA08-0008 | 0-30 | 5 | 42% | 11 | 92% | 0 | 0% | 11 | 92% | 12* |
| | 30-45 | 6 | 21% | 24 | 86% | 0 | 0% | 22 | 79% | 28* |
| | 45-60 | 42 | 71% | 57 | 97% | 0 | 0% | 51 | 86% | 59 |
| | 60+ | 934 | 42% | 1963 | 89% | 0 | 0% | 1451 | 66% | 2214 |

*Results in the specified row may not be reliable due to small number of observations

## Table 5 (Cont'd)
## Observations meeting data quality criteria for individual freeway validation segments in the state of Pennsylvania

| TMC | SPEED BIN | Data Quality Measures for | | | | | | | | No. of Obs. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1.96 SEM Band | | | | Mean | | | | |
| | | Speed Error Bias | | Average Absolute Speed Error | | Speed Error Bias | | Average Absolute Speed Error | | |
| | | No. falling inside the band | % falling inside the band | No. falling within 5 mph of the band | % falling within 5 mph of the band | No. equal to the mean | % equal to the mean | No. within 5 mph of the mean | % within 5 mph of the mean | |
| PA08-0009 | 0-30 | - | - | - | - | - | - | - | - | - |
| | 30-45 | 0 | 0% | 1 | 33% | 0 | 0% | 1 | 33% | 3* |
| | 45-60 | 55 | 21% | 190 | 72% | 0 | 0% | 114 | 43% | 263 |
| | 60+ | 1452 | 48% | 2872 | 95% | 0 | 0% | 2542 | 84% | 3022 |
| PA08-0010 | 0-30 | 10 | 11% | 62 | 70% | 0 | 0% | 54 | 61% | 88 |
| | 30-45 | 9 | 30% | 17 | 57% | 0 | 0% | 15 | 50% | 30 |
| | 45-60 | 14 | 28% | 41 | 82% | 0 | 0% | 29 | 58% | 50 |
| | 60+ | 1367 | 62% | 2148 | 98% | 1 | 0% | 1989 | 90% | 2202 |
| PA08-0011 | 0-30 | - | - | - | - | - | - | - | - | - |
| | 30-45 | 3 | 38% | 7 | 88% | 0 | 0% | 7 | 88% | 8* |
| | 45-60 | 31 | 41% | 67 | 89% | 0 | 0% | 54 | 72% | 75 |
| | 60+ | 1456 | 61% | 2336 | 98% | 2 | 0% | 2156 | 91% | 2381 |
| PA08-0012 | 0-30 | - | - | - | - | - | - | - | - | - |
| | 30-45 | - | - | - | - | - | - | - | - | - |
| | 45-60 | 8 | 32% | 22 | 88% | 0 | 0% | 18 | 72% | 25* |
| | 60+ | 1308 | 52% | 2445 | 97% | 0 | 0% | 2224 | 88% | 2525 |
| PA08-0013 | 0-30 | - | - | - | - | - | - | - | - | - |
| | 30-45 | 1 | 17% | 2 | 33% | 0 | 0% | 2 | 33% | 6* |
| | 45-60 | 13 | 25% | 37 | 70% | 0 | 0% | 28 | 53% | 53 |
| | 60+ | 1116 | 45% | 2287 | 93% | 0 | 0% | 1844 | 75% | 2468 |

*Results in the specified row may not be reliable due to small number of observations