



I-95 Corridor Coalition

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

Report for New Jersey (#13)
New Jersey Route 37



November 2015

I-95 CORRIDOR COALITION VEHICLE PROBE PROJECT VALIDATION OF HERE DATA NOVEMBER 2015

*Report for New Jersey (#13)
New Jersey Route 37*

Prepared for:

I-95 Corridor Coalition

Sponsored by:

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Evaluation Results for the State of New Jersey

Executive Summary

The data from the Vehicle Probe Project is validated using Bluetooth™ Traffic Monitoring (BTM) technology on a near monthly basis. The validation of arterial data is similar to that of freeway data, however the following should be noted. The boundaries of the speed bins used for arterials are different than those used for freeways to accommodate the lower speeds on this type of corridor.

BTMs sensor were deployed at the beginning and ending points of eighteen different segments along the NJ-37 corridor. Number of lanes varies between 2 and 3 per direction with average signal density of 1 signal per mile. Average Annual Daily Traffic (AADT) along the corridor is 37, 550 and the speed limit is 50 MPH.

The Bluetooth sensor deployment covers the range from NJ-35 to Colonial Dr. along NJ-37. Travel time data was collected for both directions along the arterial, between June 30 and July 12, 2015. The dataset collected represents approximately 2,923 hours of observations along 18 arterial segments, totaling approximately 23 miles. The total number of effective five-minute travel time samples observed was 35,076. Due to data quality considerations, seven segments were dropped from final validation.

ES Table 1, below summarizes the results of the comparison between the BTM reference data and the HERE data for arterial segments during the above noted time period. As shown, the average absolute speed error (AASE) was within specification in all speed bins. The Speed Error Bias (SEB) was within specifications for speed bins 15-25 MPH, 25-35 MPH and >35 MPH when compared with the Standard Error of the Mean (SEM) Band. Although the data are compared to these specifications, caution should be used when using probe data on arterial roadways. Other factors including signal density and traffic volume should be considered.

| ES Table 1 - New Jersey Evaluation Summary for Arterial | | | | | | |
|---|---------------------------------------|----------------------|--------------------------|----------------------|----------------------------|--------------------------|
| Speed Bin | Average Absolute Speed Error (<10mph) | | Speed Error Bias (<5mph) | | Number of 5 Minute Samples | Hours of Data Collection |
| | Comparison with SEM Band | Comparison with Mean | Comparison with SEM Band | Comparison with Mean | | |
| 0-15 MPH | 5.1 | 7.0 | 5.1 | 7.0 | 239 | 20 |
| 15-25 MPH | 2.8 | 7.2 | 2.8 | 6.9 | 2618 | 218 |
| 25-35 MPH | 0.9 | 5.1 | 0.7 | 3.3 | 10062 | 839 |
| >35 MPH | 1.3 | 5.4 | -1.2 | -3.3 | 16498 | 1375 |
| All Speeds | 1.9 | 6.0 | 1.2 | 3.0 | 29417 | 2451 |

Based upon data collected from June 30, 2015 through July 12, 2015 across 23 miles of roadway.

Data Collection

Travel time samples were collected along 18 arterial segments with the assistance of New Jersey Department of Transportation (NJDOT) personnel. Arterial segments studied were located on NJ-37 corridor from NJ-35 to Colonial Dr. Travel time data was collected for both directions along the NJ-37 arterial between June 30 and July 12, 2015. Segment locations were chosen with a high-likelihood of observing recurrent and non-recurrent congestion during peak and off-peak periods.

Figure 1 presents an overview snapshot of the placement of sensors for the collection of data on the NJ-37 corridor in New Jersey. Red segments represent arterial segments selected for analysis. Number of lanes varies between 2 and 3 per direction with average signal density of 1 signal per mile. Average Annual Daily Traffic (AADT) along the corridor is 37,550 and the speed limit is 50 MPH.

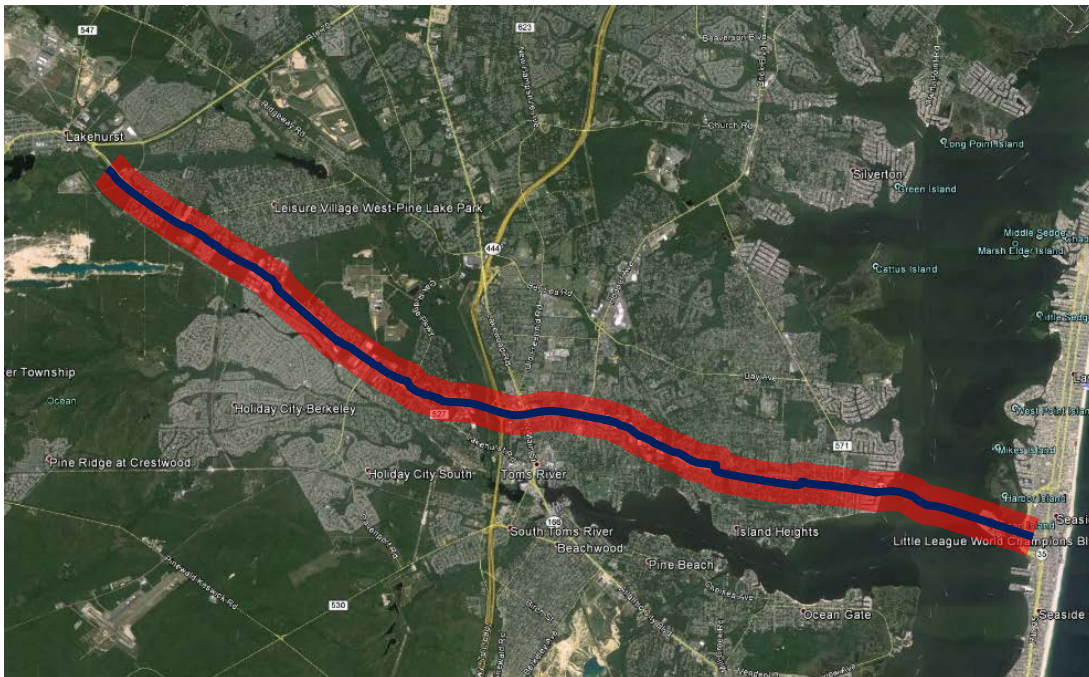


Figure 1 — Locations of all segments selected for analysis in New Jersey

TMC segments selected for validation in New Jersey

Table 1 presents the data collection segments from New Jersey. As a whole, these segments cover a total length of 23 arterial miles. Data collection segments are comprised of one or more Traffic Message Channel (TMC) base segments, such that the total length of the data collection segment is one mile long or greater for arterials. When appropriate, consecutive TMC segments are combined to form a data collection segment longer than one mile. Due to data quality considerations, seven of the 18 segments were dropped from final validation. Therefore, the results of the validation performed on 11 bidirectional arterial segments are included in this report. Table 1 contains the summary information on each data collection segment including the latitude/longitude coordinates of the locations at which the Bluetooth sensors were deployed along the NJ-37 in New Jersey 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 the 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 BluetoothTM Traffic Monitoring (BTM) sensors placed on the roadway. An algorithm was developed and documented in a separate report¹ as part of the initial VPP project and is being used for the validation of all vendors in VPPII. Details of the algorithm used to estimate equivalent path travel times based on HERE data feeds for individual data collection segments are provided in this 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.

¹ Ali Haghani, Masoud Hamed, Kaveh Farokhi Sadabadi, Estimation of Travel Times for Multiple TMC Segments, prepared for I-95 Corridor Coalition, February 2010 ([link](#))

Table 1
Segments selected for validation in New Jersey

| SEGMENT (Map Link) | DESCRIPTION | | | TMC CODES | | Deployment | | |
|-----------------------------------|-----------------------|---------------------|---|------------------------|------------------|--|------------------|----------------------------|
| | Highway New Jersey | State County | Starting at Ending at | Begin End | Length Number | Begin Lat/Lon End Lat/Lon | Length % Diff | All Lengths in Miles |
| Arterials | | | | | | | | |
| A4 NJ13-0004 | NJ-37 Westbound | New Jersey Ocean | Coolidge Ave Vaughn Ave | 120+07544 120P07544 | 0.72 2 | 39.951025 -74.139699 39.952420 -74.153002 | 0.72 -0.2% | |
| A5 NJ13-0005 | NJ-37 Westbound | New Jersey Ocean | Vaughn Ave Washington St | 120+07545 120P07545 | 0.51 2 | 39.952420 -74.153002 39.954342 -74.162214 | 0.51 0.9% | |
| A8 NJ13-0008 | NJ-37 Westbound | New Jersey Ocean | Clifton Ave Hooper Ave | 120+07548 120+07549 | 0.58 3 | 39.950214 -74.124077 39.950549 -74.131010 | 0.56 -3.4% | |
| A9 NJ13-0009 | NJ-37 Westbound | New Jersey Ocean | Hooper Ave NJ-166/Main St | 120P07549 120+07550 | 0.71 2 | 39.950549 -74.131010 39.951025 -74.139699 | 0.70 -1.8% | |
| A10 NJ13-0010 | NJ-37 Westbound | New Jersey Ocean | NJ-166/Main St Hospital Dr | 120P07550 120+10495 | 1.48 4 | 39.951025 -74.139699 39.952420 -74.153002 | 0.90 -39.3% | |
| A11 NJ13-0011 | NJ-37 Westbound | New Jersey Ocean | Hospital Dr Oak Ridge Pkwy | 120+10495 120P10495 | 0.99 2 | 39.952420 -74.153002 39.954342 -74.162214 | 0.64 -35.6% | |
| A12 NJ13-0012 | NJ-37 Westbound | New Jersey Ocean | Oak Ridge Pkwy Rubelle Pl | 120+10494 120+13245 | 2.55 3 | 39.954342 -74.162214 39.957649 -74.169999 | 0.77 -69.8% | |
| A14 NJ13-0014 | NJ-37 Westbound | New Jersey Ocean | Romana Ln Chemical Corp Entrance Rd | 120+13245 120+13245 | 1.97 1 | 39.960685 -74.177189 39.963570 -74.187499 | 0.55 -72.1% | |
| A15 NJ13-0015 | NJ-37 Westbound | New Jersey Ocean | Chemical Corp Entrance Rd Northampton Blvd | 120+13245 120+13245 | 1.97 1 | 39.963570 -74.187499 39.963683 -74.200637 | 0.90 -54.3% | |
| A16 NJ13-0016 | NJ-37 Westbound | New Jersey Ocean | Northampton Blvd Commonwealth Blvd | 120P13245 120+10493 | 0.80 2 | 39.963683 -74.200637 39.965783 -74.217358 | 0.82 2.2% | |
| A17 NJ13-0017 | NJ-37 Westbound | New Jersey Ocean | Commonwealth Blvd Buckingham Dr | 120P10493 120+10491 | 1.76 2 | 39.965783 -74.217358 39.967673 -74.228553 | 0.66 -62.5% | |

Table 1 (Cont'd)
Segments selected for validation in New Jersey

| SEGMENT (Map Link) | DESCRIPTION | | | TMC CODES | | Deployment | | |
|-----------------------------------|-----------------------|---------------------|---|------------------------|------------------|--|------------------|----------------------------|
| | Highway New Jersey | State County | Starting at Ending at | Begin End | Number Length | Begin Lat/Lon End Lat/Lon | Length % Diff | |
| Arterials | | | | | | | | All Lengths in Miles |
| A20 NJ13-0020 | NJ-37 Eastbound | New Jersey Ocean | Buckingham Dr Commonwealth Blvd | 120-10493 120N10493 | 1.78 2 | 39.960685 -74.177189 39.963570 -74.187499 | 0.66 -62.89% | |
| A21 NJ13-0021 | NJ-37 Eastbound | New Jersey Ocean | Commonwealth Blvd Northampton Blvd | 120-13245 120N13245 | 0.80 2 | 39.963570 -74.187499 39.963683 -74.200637 | 0.82 2.05% | |
| A22 NJ13-0022 | NJ-37 Eastbound | New Jersey Ocean | Northampton Blvd Chemical Corp Entrance Rd | 120-10494 120-10494 | 1.89 1 | 39.963683 -74.200637 39.965783 -74.217358 | 0.90 -52.34% | |
| A23 NJ13-0023 | NJ-37 Eastbound | New Jersey Ocean | Chemical Corp Entrance Rd Romana Ln | 120-10494 120-10494 | 1.89 1 | 39.965783 -74.217358 39.967673 -74.228553 | 0.55 -70.87% | |
| A25 NJ13-0025 | NJ-37 Eastbound | New Jersey Ocean | Rubelle Pl Oak Ridge Pkwy | 120-10494 120N10495 | 2.58 4 | 39.974214 -74.240690 39.976978 -74.245584 | 0.77 -70.17% | |
| A26 NJ13-0026 | NJ-37 Eastbound | New Jersey Ocean | Oak Ridge Pkwy Hospital Dr | 120-07551 120-07551 | 0.95 1 | 39.976978 -74.245584 39.982305 -74.252962 | 0.64 -32.44% | |
| A27 NJ13-0027 | NJ-37 Eastbound | New Jersey Ocean | Hospital Dr NJ-166/Main St | 120-07551 120-07550 | 1.49 3 | 39.982305 -74.252962 39.990116 -74.266576 | 0.90 -39.62% | |
| A28 NJ13-0028 | NJ-37 Eastbound | New Jersey Ocean | NJ-166/Main St Hooper Ave | 120N07550 120N07549 | 0.70 3 | 39.990116 -74.266576 39.996521 -74.279476 | 0.70 -0.70% | |
| A29 NJ13-0029 | NJ-37 Eastbound | New Jersey Ocean | Hooper Ave Clifton Ave | 120-07548 120-07547 | 0.59 3 | 39.996521 -74.279476 40.001753 -74.290070 | 0.56 -4.6% | |
| A32 NJ13-0032 | NJ-37 Eastbound | New Jersey Ocean | Washington St Vaughn Ave | 120N07545 120N07544 | 0.51 3 | 39.976978 -74.245584 39.982305 -74.252962 | 0.51 0.2% | |
| A33 NJ13-0033 | NJ-37 Eastbound | New Jersey Ocean | Vaughn Ave Coolidge Ave | 120-07543 120-07543 | 0.74 1 | 39.982305 -74.252962 39.990116 -74.266576 | 0.72 -2.2% | |

Analysis of Arterial Results

Table 2 summarizes the data quality measures obtained as a result of a comparison between Bluetooth and all reported HERE speeds. Specifications used for comparison 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: 0-15 MPH, 15-25 MPH, 25-35 MPH, and > 35 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 95th 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. As shown, the average absolute speed error (AASE) was within specification for all the speed bins. The Speed Error Bias (SEB) was within specifications for all speed bins except for speed 0-15 mph when compared with the Standard Error of the Mean (SEM) Band.

TABLE 2 Data quality measures for arterial segments in New Jersey

| 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 | SEB | AASE | | |
| 0-15 | 5.1 | 5.1 | 7.0 | 7.0 | 239 | 20 |
| 15-25 | 2.8 | 2.8 | 6.9 | 7.2 | 2618 | 218 |
| 25-35 | 0.7 | 0.9 | 3.3 | 5.1 | 10062 | 839 |
| 35+ | -1.2 | 1.3 | -3.3 | 5.4 | 16498 | 1375 |

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 arterial data segments in this validation report.

Table 3 Percent observations meeting data quality criteria for arterial segments in New Jersey

| 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 | |
| 0-15 | 13% | 58% | 0% | 42% | 239 |
| 15-25 | 39% | 77% | 0% | 36% | 2618 |
| 25-35 | 72% | 94% | 0% | 56% | 10062 |
| 35+ | 70% | 90% | 0% | 55% | 16498 |

Tables 4 and 5 present detailed data for individual TMC segments in this validation 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 the small number of observations.

Table 4
Data quality measures for individual arterial validation segments in the state of
New Jersey

| 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 | |
| NJ13-0004 | 0.72 | 0.72 | 0-15 | 6.5 | 6.5 | 7.9 | 7.9 | 5* |
| | | | 15-25 | 7.0 | 7.0 | 13.8 | 13.8 | 20* |
| | | | 25-35 | 1.0 | 1.1 | 4.6 | 5.4 | 544 |
| | | | 35+ | -1.0 | 1.2 | -3.1 | 5.1 | 1440 |
| NJ13-0005 | 0.50 | 0.51 | 0-15 | 18.6 | 18.6 | 20.6 | 20.6 | 8* |
| | | | 15-25 | 3.6 | 3.6 | 8.1 | 8.2 | 383 |
| | | | 25-35 | 0.8 | 0.9 | 4.2 | 5.1 | 1132 |
| | | | 35+ | -0.7 | 0.8 | -2.1 | 4.9 | 479 |
| NJ13-0008 | 0.58 | 0.56 | 0-15 | 5.8 | 5.8 | 7.7 | 7.7 | 57 |
| | | | 15-25 | 2.5 | 2.6 | 5.8 | 6.2 | 396 |
| | | | 25-35 | 0.2 | 0.4 | 1.2 | 3.8 | 940 |
| | | | 35+ | -1.2 | 1.2 | -3.7 | 5.3 | 523 |
| NJ13-0009 | 0.71 | 0.70 | 0-15 | 2.5 | 2.5 | 4.0 | 4.1 | 16* |
| | | | 15-25 | 1.2 | 1.2 | 3.6 | 4.4 | 267 |
| | | | 25-35 | 0.0 | 0.6 | -0.1 | 4.0 | 795 |
| | | | 35+ | -1.6 | 1.7 | -5.1 | 6.0 | 550 |
| NJ13-0010 | 089 | 0.90 | 0-15 | - | - | - | - | - |
| | | | 15-25 | 1.9 | 1.9 | 9.1 | 9.1 | 5* |
| | | | 25-35 | 0.4 | 0.4 | 2.4 | 3.5 | 324 |
| | | | 35+ | -1.0 | 1.1 | -4.5 | 5.6 | 747 |
| NJ13-0011 | 062 | 0.64 | 0-15 | - | - | - | - | - |
| | | | 15-25 | 5.9 | 5.9 | 11.6 | 11.6 | 16* |
| | | | 25-35 | 1.1 | 1.1 | 4.0 | 4.6 | 496 |
| | | | 35+ | -0.4 | 0.6 | -1.0 | 3.7 | 451 |
| NJ13-0012 | 0.78 | 0.77 | 0-15 | 2.0 | 2.0 | 9.2 | 9.2 | 1* |
| | | | 15-25 | 1.6 | 1.6 | 5.6 | 5.7 | 147 |
| | | | 25-35 | 0.3 | 0.7 | 1.8 | 3.9 | 458 |
| | | | 35+ | -1.0 | 1.1 | -2.6 | 4.8 | 294 |
| NJ13-0014 | 0.56 | 0.55 | 0-15 | - | - | - | - | - |
| | | | 15-25 | 5.0 | 5.0 | 11.5 | 11.5 | 15* |
| | | | 25-35 | 1.8 | 1.8 | 7.9 | 8.0 | 297 |
| | | | 35+ | -0.5 | 0.9 | -0.7 | 4.7 | 457 |
| NJ13-0015 | 0.90 | 0.90 | 0-15 | - | - | - | - | - |
| | | | 15-25 | 0.5 | 0.5 | 15.4 | 15.4 | 2* |
| | | | 25-35 | 0.7 | 0.7 | 4.9 | 6.0 | 47 |
| | | | 35+ | -2.2 | 2.3 | -5.6 | 6.6 | 612 |
| NJ13-0016 | 0.80 | 0.82 | 0-15 | - | - | - | - | - |
| | | | 15-25 | - | - | - | - | - |
| | | | 25-35 | 1.9 | 1.9 | 11.4 | 11.4 | 57 |
| | | | 35+ | -0.9 | 1.1 | -2.3 | 4.7 | 1229 |
| NJ13-0017 | 0.68 | 0.66 | 0-15 | - | - | - | - | - |
| | | | 15-25 | 1.2 | 1.2 | 18.8 | 18.8 | 1* |
| | | | 25-35 | 0.4 | 0.4 | 8.0 | 8.0 | 11* |
| | | | 35+ | -1.7 | 1.7 | -4.9 | 5.7 | 1484 |

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

Table 4 (Cont'd)
Data quality measures for individual arterial validation segments in the state of
New Jersey

| 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 | |
| NJ13-0020 | 0.68 | 0.66 | 0-15 | - | - | - | - | - |
| | | | 15-25 | 13.8 | 13.8 | 19.3 | 19.3 | 3* |
| | | | 25-35 | 1.2 | 1.2 | 10.4 | 10.4 | 103 |
| | | | 35+ | -1.4 | 1.4 | -3.5 | 6.2 | 949 |
| NJ13-0021 | 0.80 | 0.82 | 0-15 | - | - | - | - | - |
| | | | 15-25 | 7.7 | 7.7 | 23.6 | 23.6 | 3* |
| | | | 25-35 | 2.1 | 2.1 | 12.3 | 12.3 | 53 |
| | | | 35+ | -0.5 | 0.9 | -0.6 | 5.0 | 969 |
| NJ13-0022 | 0.90 | 0.90 | 0-15 | - | - | - | - | - |
| | | | 15-25 | 0.0 | 0.0 | 5.1 | 5.1 | 5* |
| | | | 25-35 | 0.1 | 0.4 | 1.4 | 3.9 | 138 |
| | | | 35+ | -2.3 | 2.3 | -7.3 | 7.9 | 429 |
| NJ13-0023 | 0.56 | 0.55 | 0-15 | - | - | - | - | - |
| | | | 15-25 | 1.1 | 1.1 | 6.6 | 6.6 | 24* |
| | | | 25-35 | 0.3 | 0.3 | 1.5 | 3.5 | 183 |
| | | | 35+ | -2.0 | 2.0 | -6.6 | 7.2 | 417 |
| NJ13-0025 | 0.79 | 0.77 | 0-15 | - | - | - | - | - |
| | | | 15-25 | 3.9 | 3.9 | 8.3 | 8.3 | 348 |
| | | | 25-35 | 1.3 | 1.3 | 5.4 | 5.9 | 385 |
| | | | 35+ | -0.5 | 0.6 | -1.9 | 4.3 | 99 |
| NJ13-0026 | 0.63 | 0.64 | 0-15 | 9.7 | 9.7 | 19.0 | 19.0 | 1* |
| | | | 15-25 | 1.3 | 1.3 | 8.0 | 8.0 | 8* |
| | | | 25-35 | 0.2 | 0.5 | 1.1 | 3.7 | 288 |
| | | | 35+ | -1.6 | 1.6 | -4.9 | 5.6 | 528 |
| NJ13-0027 | 0.89 | 0.90 | 0-15 | 5.6 | 5.6 | 9.0 | 9.0 | 10* |
| | | | 15-25 | 1.5 | 1.5 | 6.0 | 6.2 | 125 |
| | | | 25-35 | -0.2 | 0.4 | -0.2 | 3.3 | 454 |
| | | | 35+ | -2.0 | 2.0 | -6.9 | 7.2 | 291 |
| NJ13-0028 | 0.70 | 0.70 | 0-15 | 4.0 | 4.0 | 5.3 | 5.3 | 124 |
| | | | 15-25 | 1.2 | 1.3 | 3.4 | 4.5 | 332 |
| | | | 25-35 | 0.1 | 0.8 | 0.8 | 4.2 | 838 |
| | | | 35+ | -1.2 | 1.2 | -4.7 | 5.3 | 205 |
| NJ13-0029 | 0.59 | 0.56 | 0-15 | 10.4 | 10.4 | 18.0 | 18.0 | 5* |
| | | | 15-25 | 1.9 | 1.9 | 7.2 | 7.3 | 227 |
| | | | 25-35 | 0.2 | 0.5 | 2.0 | 4.2 | 975 |
| | | | 35+ | -1.1 | 1.1 | -4.2 | 5.4 | 531 |
| NJ13-0032 | 0.51 | 0.51 | 0-15 | - | - | - | - | - |
| | | | 15-25 | 5.5 | 5.5 | 11.1 | 11.2 | 278 |
| | | | 25-35 | 1.6 | 1.6 | 6.5 | 7.0 | 949 |
| | | | 35+ | -0.4 | 0.8 | -0.2 | 4.7 | 651 |
| NJ13-0033 | 0.74 | 0.72 | 0-15 | 5.4 | 5.4 | 8.4 | 8.4 | 12* |
| | | | 15-25 | 5.6 | 5.6 | 10.5 | 10.5 | 5* |
| | | | 25-35 | 0.9 | 1.0 | 6.5 | 7.0 | 228 |
| | | | 35+ | -1.3 | 1.4 | -2.9 | 4.9 | 1498 |

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

Table 5
Observations meeting data quality criteria for individual arterial validation segments
in the state of New Jersey

| 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 | |
| NJ13-0004 | 0-15 | 1 | 20% | 2 | 40% | 0 | 0% | 2 | 40% | 5* |
| | 15-25 | 0 | 0% | 4 | 20% | 0 | 0% | 2 | 10% | 20* |
| | 25-35 | 137 | 25% | 387 | 71% | 1 | 0% | 286 | 53% | 544 |
| | 35+ | 439 | 30% | 1095 | 76% | 2 | 0% | 860 | 60% | 1440 |
| NJ13-0005 | 0-15 | 0 | 0% | 2 | 25% | 0 | 0% | 2 | 25% | 8* |
| | 15-25 | 19 | 5% | 155 | 40% | 0 | 0% | 91 | 24% | 383 |
| | 25-35 | 293 | 26% | 853 | 75% | 3 | 0% | 631 | 56% | 1132 |
| | 35+ | 156 | 33% | 371 | 77% | 0 | 0% | 292 | 61% | 479 |
| NJ13-0008 | 0-15 | 0 | 0% | 19 | 33% | 0 | 0% | 14 | 25% | 57 |
| | 15-25 | 65 | 16% | 232 | 59% | 0 | 0% | 173 | 44% | 396 |
| | 25-35 | 343 | 36% | 819 | 87% | 1 | 0% | 665 | 71% | 940 |
| | 35+ | 151 | 29% | 370 | 71% | 0 | 0% | 290 | 55% | 523 |
| NJ13-0009 | 0-15 | 2 | 13% | 11 | 69% | 0 | 0% | 11 | 69% | 16* |
| | 15-25 | 78 | 29% | 217 | 81% | 0 | 0% | 182 | 68% | 267 |
| | 25-35 | 260 | 33% | 670 | 84% | 2 | 0% | 527 | 66% | 795 |
| | 35+ | 146 | 27% | 365 | 66% | 1 | 0% | 278 | 51% | 550 |
| NJ13-0010 | 0-15 | - | - | - | - | - | - | - | - | - |
| | 15-25 | 0 | 0% | 1 | 20% | 0 | 0% | 0 | 0% | 5* |
| | 25-35 | 132 | 41% | 284 | 88% | 0 | 0% | 240 | 74% | 324 |
| | 35+ | 188 | 25% | 526 | 70% | 1 | 0% | 410 | 55% | 747 |
| NJ13-0011 | 0-15 | - | - | - | - | - | - | - | - | - |
| | 15-25 | 0 | 0% | 2 | 13% | 0 | 0% | 0 | 0% | 16* |
| | 25-35 | 118 | 24% | 383 | 77% | 0 | 0% | 294 | 59% | 496 |
| | 35+ | 163 | 36% | 396 | 88% | 0 | 0% | 330 | 73% | 451 |
| NJ13-0012 | 0-15 | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 1* |
| | 15-25 | 25 | 17% | 95 | 65% | 0 | 0% | 67 | 46% | 147 |
| | 25-35 | 122 | 27% | 382 | 83% | 0 | 0% | 327 | 71% | 458 |
| | 35+ | 87 | 30% | 219 | 74% | 0 | 0% | 182 | 62% | 294 |
| NJ13-0014 | 0-15 | - | - | - | - | - | - | - | - | - |
| | 15-25 | 0 | 0% | 2 | 13% | 0 | 0% | 0 | 0% | 15* |
| | 25-35 | 40 | 13% | 141 | 47% | 0 | 0% | 78 | 26% | 297 |
| | 35+ | 144 | 32% | 362 | 79% | 1 | 0% | 287 | 63% | 457 |
| NJ13-0015 | 0-15 | - | - | - | - | - | - | - | - | - |
| | 15-25 | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 2* |
| | 25-35 | 10 | 21% | 36 | 77% | 0 | 0% | 26 | 55% | 47 |
| | 35+ | 109 | 18% | 351 | 57% | 0 | 0% | 262 | 43% | 612 |
| NJ13-0016 | 0-15 | - | - | - | - | - | - | - | - | - |
| | 15-25 | - | - | - | - | - | - | - | - | - |
| | 25-35 | 3 | 5% | 8 | 14% | 0 | 0% | 6 | 11% | 57 |
| | 35+ | 329 | 27% | 916 | 75% | 1 | 0% | 729 | 59% | 1229 |
| NJ13-0017 | 0-15 | - | - | - | - | - | - | - | - | - |
| | 15-25 | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 1* |
| | 25-35 | 0 | 0% | 4 | 36% | 0 | 0% | 3 | 27% | 11* |
| | 35+ | 262 | 18% | 938 | 63% | 0 | 0% | 730 | 49% | 1484 |

*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 arterial validation segments
in the state of New Jersey

| 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 | |
| NJ13-0020 | 0-15 | - | - | - | - | - | - | - | - | - |
| | 15-25 | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 3* |
| | 25-35 | 6 | 6% | 34 | 33% | 0 | 0% | 8 | 8% | 103 |
| | 35+ | 302 | 32% | 627 | 66% | 2 | 0% | 466 | 49% | 949 |
| NJ13-0021 | 0-15 | - | - | - | - | - | - | - | - | - |
| | 15-25 | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 3* |
| | 25-35 | 0 | 0% | 6 | 11% | 0 | 0% | 2 | 4% | 53 |
| | 35+ | 301 | 31% | 731 | 75% | 0 | 0% | 553 | 57% | 969 |
| NJ13-0022 | 0-15 | - | - | - | - | - | - | - | - | - |
| | 15-25 | 0 | 0% | 4 | 80% | 0 | 0% | 3 | 60% | 5* |
| | 25-35 | 57 | 41% | 121 | 88% | 1 | 1% | 96 | 70% | 138 |
| | 35+ | 85.0 | 20% | 230.0 | 54% | 1.0 | 0% | 156.0 | 36% | 429 |
| NJ13-0023 | 0-15 | - | - | - | - | - | - | - | - | - |
| | 15-25 | 2 | 8% | 15 | 63% | 0 | 0% | 9 | 38% | 24* |
| | 25-35 | 87 | 48% | 166 | 91% | 0 | 0% | 142 | 78% | 183 |
| | 35+ | 101 | 24% | 242 | 58% | 1 | 0% | 159 | 38% | 417 |
| NJ13-0025 | 0-15 | - | - | - | - | - | - | - | - | - |
| | 15-25 | 6 | 2% | 107 | 31% | 0 | 0% | 56 | 16% | 348 |
| | 25-35 | 54 | 14% | 232 | 60% | 0 | 0% | 150 | 39% | 385 |
| | 35+ | 40 | 40% | 82 | 83% | 0 | 0% | 68 | 69% | 99 |
| NJ13-0026 | 0-15 | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 1* |
| | 15-25 | 1 | 13% | 3 | 38% | 0 | 0% | 1 | 13% | 8* |
| | 25-35 | 106 | 37% | 251 | 87% | 0 | 0% | 219 | 76% | 288 |
| | 35+ | 108 | 20% | 361 | 68% | 0 | 0% | 262 | 50% | 528 |
| NJ13-0027 | 0-15 | 0 | 0% | 3 | 30% | 0 | 0% | 3 | 30% | 10* |
| | 15-25 | 17 | 14% | 76 | 61% | 0 | 0% | 47 | 38% | 125 |
| | 25-35 | 162 | 36% | 414 | 91% | 0 | 0% | 352 | 78% | 454 |
| | 35+ | 47 | 16% | 156 | 54% | 0 | 0% | 107 | 37% | 291 |
| NJ13-0028 | 0-15 | 4 | 3% | 73 | 59% | 0 | 0% | 67 | 54% | 124 |
| | 15-25 | 77 | 23% | 256 | 77% | 0 | 0% | 208 | 63% | 332 |
| | 25-35 | 240 | 29% | 685 | 82% | 0 | 0% | 542 | 65% | 838 |
| | 35+ | 71 | 35% | 154 | 75% | 0 | 0% | 113 | 55% | 205 |
| NJ13-0029 | 0-15 | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% | 5* |
| | 15-25 | 25 | 11% | 112 | 49% | 0 | 0% | 71 | 31% | 227 |
| | 25-35 | 337 | 35% | 832 | 85% | 1 | 0% | 645 | 66% | 975 |
| | 35+ | 147.0 | 28% | 397.0 | 75% | 0.0 | 0% | 286.0 | 54% | 531 |
| NJ13-0032 | 0-15 | - | - | - | - | - | - | - | - | - |
| | 15-25 | 6 | 2% | 46 | 17% | 0 | 0% | 24 | 9% | 278 |
| | 25-35 | 124 | 13% | 528 | 56% | 1 | 0% | 322 | 34% | 949 |
| | 35+ | 189 | 29% | 519 | 80% | 1 | 0% | 412 | 63% | 651 |
| NJ13-0033 | 0-15 | 0 | 0% | 3 | 25% | 0 | 0% | 1 | 8% | 12* |
| | 15-25 | 1 | 20% | 1 | 20% | 0 | 0% | 1 | 20% | 5* |
| | 25-35 | 27 | 12% | 129 | 57% | 0 | 0% | 79 | 35% | 228 |
| | 35+ | 397 | 27% | 1096 | 73% | 0 | 0% | 907 | 61% | 1498 |

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