



## I-95 Corridor Coalition

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

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



*November 2015*

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

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

*Prepared for:*

I-95 Corridor Coalition

*Sponsored by:*

I-95 Corridor Coalition

*Prepared by:*

Ali Haghani, Masoud Hamed, Xuechi Zhang, Kiana Roshan Zamir, Hyoshin Park  
University of Maryland, College Park

*Acknowledgements:*

The research team would like to express its gratitude for the assistance it received from the state highway officials in New Jersey during the course of this study. Their effort was instrumental during the data collection phase of the project. This report would not have been completed without their help.

*November 2015*

# 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 TomTom 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 when compared with the Standard Error of the Mean (SEM) Band. The Speed Error Bias (SEB) was within specifications for speed bins 0-15 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.

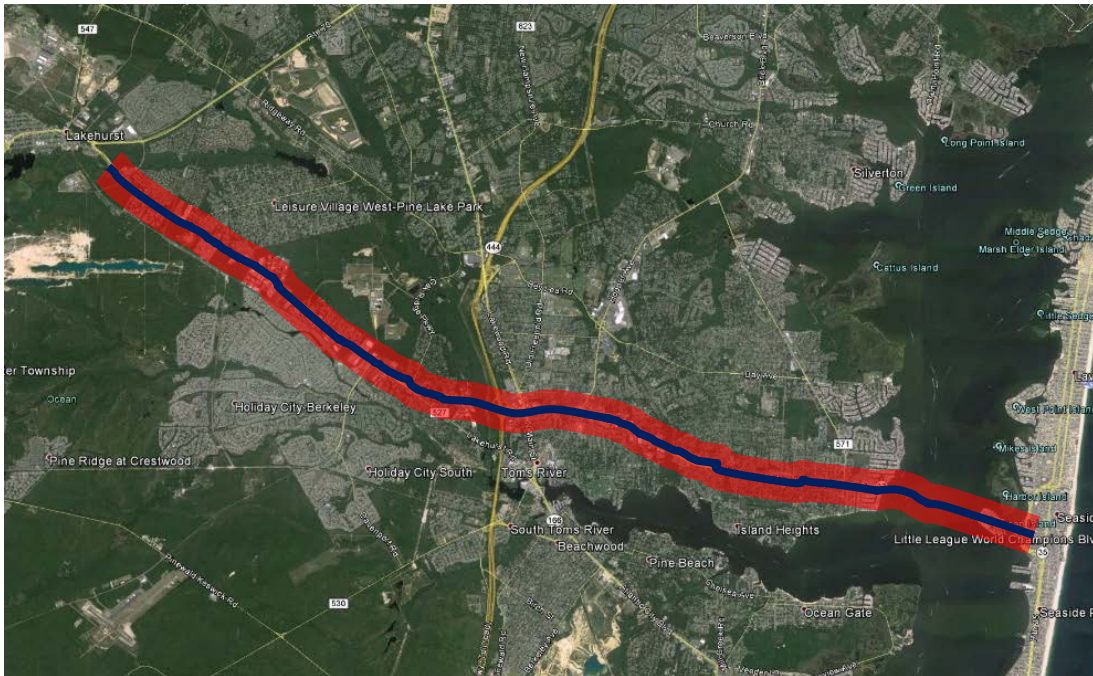
ES Table 1 - New Jersey Evaluation Summary for Arterial						
Speed Bin	Average Absolute Speed Error (<10mph)		Speed Error Bias (<5mph)		Number of 5 Minute Samples	Hours of Data Collection
	Comparison with SEM Band	Comparison with Mean	Comparison with SEM Band	Comparison with Mean		
0-15 MPH	4.7	6.6	4.7	6.6	248	21
15-25 MPH	7.0	12.1	7.0	12.1	2904	242
25-35 MPH	3.7	9.0	3.6	8.5	10776	898
>35 MPH	1.3	5.9	-0.4	0.3	16108	1342
All Speeds	2.7	7.6	1.8	4.4	30036	2503

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 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 US-1 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 Bluetooth<sup>TM</sup> Traffic Monitoring (BTM) sensors placed on the roadway. An algorithm was developed and documented in a separate report<sup>1</sup> 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 TomTom data feeds for individual data collection segments are provided in this separate report. This algorithm finds an equivalent TomTom travel time (and therefore travel speed) corresponding to each sample BTM travel time observation on the test segment of interest.

---

<sup>1</sup> 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
<a href="#">A4 NJ13-0004</a>	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%	
<a href="#">A5 NJ13-0005</a>	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%	
<a href="#">A8 NJ13-0008</a>	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%	
<a href="#">A9 NJ13-0009</a>	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%	
<a href="#">A10 NJ13-0010</a>	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%	
<a href="#">A11 NJ13-0011</a>	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%	
<a href="#">A12 NJ13-0012</a>	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%	
<a href="#">A14 NJ13-0014</a>	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%	
<a href="#">A15 NJ13-0015</a>	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%	
<a href="#">A16 NJ13-0016</a>	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%	
<a href="#">A17 NJ13-0017</a>	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	All Lengths in Miles
<b>Arterials</b>								
<a href="#">A20 NJ13-0020</a>	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%	
<a href="#">A21 NJ13-0021</a>	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%	
<a href="#">A22 NJ13-0022</a>	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%	
<a href="#">A23 NJ13-0023</a>	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%	
<a href="#">A25 NJ13-0025</a>	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%	
<a href="#">A26 NJ13-0026</a>	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%	
<a href="#">A27 NJ13-0027</a>	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%	
<a href="#">A28 NJ13-0028</a>	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%	
<a href="#">A29 NJ13-0029</a>	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%	
<a href="#">A32 NJ13-0032</a>	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%	
<a href="#">A33 NJ13-0033</a>	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 TomTom 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 95<sup>th</sup> 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 when compared with the Standard Error of the Mean (SEM) Band. The Speed Error Bias (SEB) was within specifications for speed bins 0-15 MPH, 25-35 MPH and >35 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	4.7	4.7	6.6	6.6	248	21
15-25	7.0	7.0	12.1	12.1	2904	242
25-35	3.6	3.7	8.5	9.0	10776	898
35+	-0.4	1.3	0.3	5.9	16108	1342

Table 3 shows the percentage of the time TomTom data falls within 5 mph of the SEM band and the mean for each speed bin for all the 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	15%	65%	0%	55%	248
15-25	19%	47%	0%	16%	2904
25-35	44%	67%	0%	34%	10776
35+	67%	91%	0%	48%	16108

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	1.4	1.4	2.1	2.6	5*
			15-25	1.3	1.5	6.7	7.4	21*
			25-35	0.0	0.2	1.2	2.7	582
			35+	-2.9	2.9	-8.2	8.2	1549
NJ13-0005	0.50	0.51	0-15	5.2	5.2	6.9	7.0	8*
			15-25	2.2	2.2	6.4	6.5	423
			25-35	0.3	0.4	2.5	3.5	1221
			35+	-2.1	2.1	-7.1	7.2	503
NJ13-0008	0.58	0.56	0-15	6.5	6.5	8.3	8.4	61
			15-25	9.1	9.1	14.0	14.1	430
			25-35	4.1	4.2	10.1	10.4	1016
			35+	-0.3	0.6	0.7	4.7	564
NJ13-0009	0.71	0.70	0-15	3.5	3.5	5.9	5.9	18*
			15-25	6.7	6.7	11.1	11.3	297
			25-35	4.4	4.5	9.4	9.9	877
			35+	0.0	0.6	1.4	4.6	589
NJ13-0010	089	0.90	0-15	-	-	-	-	-
			15-25	15.0	15.0	21.4	21.4	7*
			25-35	5.7	5.7	12.6	12.6	358
			35+	0.6	0.9	3.7	5.8	823
NJ13-0011	062	0.64	0-15	-	-	-	-	-
			15-25	14.5	14.5	20.4	20.4	18*
			25-35	7.5	7.5	12.8	12.9	592
			35+	1.3	1.5	5.8	6.7	489
NJ13-0012	0.78	0.77	0-15	12.0	12.0	23.1	23.1	2*
			15-25	7.5	7.5	12.7	12.7	167
			25-35	4.6	4.6	9.7	9.9	544
			35+	0.6	0.9	3.6	5.5	312
NJ13-0014	0.56	0.55	0-15	-	-	-	-	-
			15-25	14.0	14.0	22.5	22.5	19*
			25-35	6.8	6.8	15.3	15.4	336
			35+	0.7	1.1	5.2	6.7	534
NJ13-0015	0.90	0.90	0-15	-	-	-	-	-
			15-25	9.0	9.0	25.9	25.9	4*
			25-35	5.2	5.2	14.0	14.0	56
			35+	-0.1	0.9	1.2	4.8	703
NJ13-0016	0.80	0.82	0-15	-	-	-	-	-
			15-25	-	-	-	-	-
			25-35	4.7	4.7	16.6	16.6	62
			35+	0.2	0.7	2.4	4.7	1310
NJ13-0017	0.68	0.66	0-15	-	-	-	-	-
			15-25	7.2	7.2	24.8	24.8	1*
			25-35	4.6	4.6	14.8	14.8	11*
			35+	-0.1	0.6	0.6	3.9	1612

\*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	19.2	19.2	24.6	24.6	3*
			25-35	3.4	3.4	15.9	15.9	112
			35+	-0.3	0.7	1.6	5.8	1025
NJ13-0021	0.80	0.82	0-15	-	-	-	-	-
			15-25	9.4	9.4	25.9	25.9	3*
			25-35	5.0	5.0	16.3	16.3	55
			35+	0.3	0.9	3.4	5.7	1045
NJ13-0022	0.90	0.90	0-15	-	-	-	-	-
			15-25	4.8	4.8	14.1	14.1	6*
			25-35	2.8	2.9	10.2	10.6	157
			35+	0.0	0.9	1.7	6.2	493
NJ13-0023	0.56	0.55	0-15	-	-	-	-	-
			15-25	9.1	9.1	17.6	17.6	28*
			25-35	3.1	3.1	9.7	10.1	230
			35+	-0.1	0.7	2.7	5.9	465
NJ13-0025	0.79	0.77	0-15	-	-	-	-	-
			15-25	11.0	11.0	15.6	15.7	420
			25-35	6.8	6.9	13.4	13.4	422
			35+	0.1	0.6	3.3	5.4	105
NJ13-0026	0.63	0.64	0-15	22.7	22.7	32.0	32.0	1*
			15-25	6.4	6.4	16.1	16.1	10*
			25-35	7.3	7.3	13.7	13.9	340
			35+	1.6	1.9	5.5	6.7	583
NJ13-0027	0.89	0.90	0-15	10.1	10.1	13.5	13.5	10*
			15-25	9.6	9.6	17.0	17.0	137
			25-35	5.1	5.1	11.5	11.6	510
			35+	0.5	0.9	3.0	5.1	317
NJ13-0028	0.70	0.70	0-15	3.0	3.0	4.2	4.3	125
			15-25	7.6	7.6	11.8	12.0	364
			25-35	5.3	5.3	10.7	10.9	929
			35+	0.4	0.8	3.6	5.4	230
NJ13-0029	0.59	0.56	0-15	12.5	12.5	19.9	19.9	6*
			15-25	3.8	3.8	9.8	9.9	244
			25-35	0.5	0.6	3.4	4.1	1065
			35+	-1.3	1.4	-6.0	6.2	567
NJ13-0032	0.51	0.51	0-15	-	-	-	-	-
			15-25	5.1	5.1	10.5	10.6	296
			25-35	2.7	2.7	6.9	7.5	1048
			35+	-0.2	1.4	-0.4	6.1	687
NJ13-0033	0.74	0.72	0-15	4.3	4.3	7.0	7.0	12*
			15-25	3.7	3.8	8.8	9.9	6*
			25-35	2.3	2.3	6.6	6.9	253
			35+	-1.4	2.4	-2.6	6.8	1603

\*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	2	40%	5	100%	0	0%	5	100%	5*
	15-25	12	57%	19	90%	0	0%	7	33%	21*
	25-35	515	88%	579	99%	1	0%	492	85%	582
	35+	811	52%	1214	78%	1	0%	521	34%	1549
NJ13-0005	0-15	1	13%	4	50%	0	0%	4	50%	8*
	15-25	178	42%	362	86%	0	0%	165	39%	423
	25-35	1014	83%	1206	99%	1	0%	900	74%	1221
	35+	310	62%	420	84%	1	0%	195	39%	503
NJ13-0008	0-15	7	11%	33	54%	0	0%	26	43%	61
	15-25	43	10%	137	32%	0	0%	36	8%	430
	25-35	308	30%	623	61%	0	0%	169	17%	1016
	35+	444	79%	546	97%	0	0%	311	55%	564
NJ13-0009	0-15	2	11%	15	83%	0	0%	10	56%	18*
	15-25	61	21%	137	46%	0	0%	67	23%	297
	25-35	218	25%	505	58%	1	0%	151	17%	877
	35+	442	75%	577	98%	0	0%	328	56%	589
NJ13-0010	0-15	-	-	-	-	-	-	-	-	-
	15-25	0	0%	0	0%	0	0%	0	0%	7*
	25-35	65	18%	171	48%	0	0%	13	4%	358
	35+	581	71%	774	94%	0	0%	363	44%	823
NJ13-0011	0-15	-	-	-	-	-	-	-	-	-
	15-25	0	0%	3	17%	0	0%	0	0%	18*
	25-35	91	15%	191	32%	0	0%	72	12%	592
	35+	261	53%	433	89%	0	0%	158	32%	489
NJ13-0012	0-15	0	0%	0	0%	0	0%	0	0%	2*
	15-25	17	10%	66	40%	0	0%	12	7%	167
	25-35	142	26%	327	60%	0	0%	108	20%	544
	35+	203	65%	300	96%	0	0%	142	46%	312
NJ13-0014	0-15	-	-	-	-	-	-	-	-	-
	15-25	1	5%	4	21%	0	0%	0	0%	19*
	25-35	46	14%	112	33%	0	0%	14	4%	336
	35+	343	64%	501	94%	0	0%	193	36%	534
NJ13-0015	0-15	-	-	-	-	-	-	-	-	-
	15-25	0	0%	0	0%	0	0%	0	0%	4*
	25-35	13	23%	29	52%	0	0%	3	5%	56
	35+	518	74%	659	94%	3	0%	421	60%	703
NJ13-0016	0-15	-	-	-	-	-	-	-	-	-
	15-25	-	-	-	-	-	-	-	-	-
	25-35	11	18%	34	55%	0	0%	0	0%	62
	35+	962	73%	1253	96%	0	0%	785	60%	1310
NJ13-0017	0-15	-	-	-	-	-	-	-	-	-
	15-25	0	0%	0	0%	0	0%	0	0%	1*
	25-35	2	18%	7	64%	0	0%	0	0%	11*
	35+	1220	76%	1556	97%	15	1%	1135	70%	1612

\*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	41	37%	80	71%	0	0%	0	0%	112
	35+	824	80%	968	94%	5	0%	481	47%	1025
NJ13-0021	0-15	-	-	-	-	-	-	-	-	-
	15-25	0	0%	0	0%	0	0%	0	0%	3*
	25-35	12	22%	27	49%	0	0%	0	0%	55
	35+	779	75%	979	94%	0	0%	511	49%	1045
NJ13-0022	0-15	-	-	-	-	-	-	-	-	-
	15-25	3	50%	5	83%	0	0%	0	0%	6*
	25-35	79	50%	117	75%	0	0%	47	30%	157
	35+	374.0	76%	463.0	94%	0.0	0%	206.0	42%	493
NJ13-0023	0-15	-	-	-	-	-	-	-	-	-
	15-25	5	18%	12	43%	0	0%	0	0%	28*
	25-35	115	50%	172	75%	0	0%	71	31%	230
	35+	356	77%	445	96%	0	0%	217	47%	465
NJ13-0025	0-15	-	-	-	-	-	-	-	-	-
	15-25	24	6%	84	20%	0	0%	16	4%	420
	25-35	75	18%	170	40%	0	0%	31	7%	422
	35+	83	79%	101	96%	0	0%	49	47%	105
NJ13-0026	0-15	0	0%	0	0%	0	0%	0	0%	1*
	15-25	3	30%	4	40%	0	0%	0	0%	10*
	25-35	40	12%	107	31%	0	0%	25	7%	340
	35+	285	49%	491	84%	0	0%	193	33%	583
NJ13-0027	0-15	0	0%	0	0%	0	0%	0	0%	10*
	15-25	10	7%	30	22%	0	0%	6	4%	137
	25-35	116	23%	270	53%	0	0%	40	8%	510
	35+	225	71%	297	94%	0	0%	163	51%	317
NJ13-0028	0-15	20	16%	96	77%	0	0%	86	69%	125
	15-25	52	14%	142	39%	0	0%	62	17%	364
	25-35	196	21%	468	50%	0	0%	137	15%	929
	35+	161	70%	225	98%	0	0%	104	45%	230
NJ13-0029	0-15	0	0%	0	0%	0	0%	0	0%	6*
	15-25	66	27%	169	69%	0	0%	38	16%	244
	25-35	836	79%	1030	97%	3	0%	701	66%	1065
	35+	391.0	69%	511.0	90%	0.0	0%	276.0	49%	567
NJ13-0032	0-15	-	-	-	-	-	-	-	-	-
	15-25	67	23%	179	60%	0	0%	64	22%	296
	25-35	591	56%	789	75%	1	0%	513	49%	1048
	35+	417	61%	619	90%	1	0%	302	44%	687
NJ13-0033	0-15	5	42%	8	67%	0	0%	5	42%	12*
	15-25	2	33%	5	83%	0	0%	2	33%	6*
	25-35	165	65%	194	77%	1	0%	129	51%	253
	35+	824	51%	1296	81%	6	0%	661	41%	1603

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