



I-95 Corridor Coalition

I-95 Corridor Coalition Vehicle
Probe Project: Validation of
INRIX Data
Monthly Report
New Jersey



April 2010

I-95 CORRIDOR COALITION VEHICLE PROBE PROJECT: VALIDATION OF INRIX DATA MARCH 2010

Monthly Report

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Evaluation Results for the State of New Jersey

Executive Summary

Travel time samples were collected using Bluetooth Traffic Monitoring technology along nearly 14 miles of the Route 42 freeway in New Jersey from Thursday, October 1, 2009 to Thursday, October 15, 2009 and compared with travel time and speed data reported by INRIX as part of the I-95 Vehicle Probe project. This section of freeway is the northern most portion of the Atlantic City Expressway connecting Philadelphia to popular destinations on the New Jersey shore. The validation data represents approximately 1980 hours of observations along ten freeway segments in New Jersey, two of which are standard TMC segments and the other eight are path segments comprised of multiple standard TMC segments. Since some TMC segments in this corridor are less than one mile long, when appropriate, consecutive TMC segments were combined to form path segments longer than one mile.

ES Table 1, below summarizes the results of the comparison between the validation data and the INRIX data for freeway segments for the same period. As shown, in the speed bins less than 45 mph, INRIX data fails to meet the data quality contract specifications. In the rest of speed bins, INRIX data quality is deemed as satisfactory based on the same requirements.

ES Table 1 - NJ Evaluation Summary						
State	Avg 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		
0-30 MPH	12.50	13.60	9.20	9.60	812	67.7
30-45 MPH	14.40	17.50	11.10	13.00	548	45.7
45-60 MPH	3.60	6.00	1.00	2.00	4718	393.2
> 60 MPH	3.70	6.30	-3.20	-5.20	17719	1476.6
All Speeds	4.23	6.75	-1.61	-2.85	23797	1983.1

Based upon data collected from Oct 1, 2009 through Oct 15, 2009 across 13.7 miles of roadway.

Closer inspection of the data indicates that the majority of data in the lower speed bins that fell outside of specification came from late evening and nighttime hours. This corresponded to nighttime construction/road maintenance activities on Route 42 during the validation period. The combination of relatively low volume (for freeways) and congestion induced by road construction activity proved the largest challenge to quality data. To illustrate the issue, the validation data was divided into two data sets, one for the period of 5:00 AM to 8:00 PM, corresponding to the periods of the of greatest volume and demand, and the second was from 8:00 PM to 5:00 AM, capturing periods of lower volume/demand. Absolute Average Speed Error (AASE) was recomputed for the lower speed bins during these two time periods. The results below show that during the daytime period (5:00 AM to 8:00 PM) the data specification are met for the AASE.

DETAILED ANALYSIS OF DATA QUALITY - by period of the day

- 5:00 AM to 8:00 PM
 - 0-30 MPH speed bin, AASE = 5.4 MPH based on >41 hours of data
 - 30-45 MPH speed bin, AASE = 6.8 MPH based on >20 hours of data
- 8:00 PM to 5:00 AM
 - 0-30 MPH speed bin, AASE = 24.0 MPH based on >25 hours of data
 - 30-45 MPH speed bin, AASE = 20.5 MPH based on >25 hours of data

The Vehicle Probe contract enforces quality specifications any time flow exceeds 500 vehicles per hour along a roadway. Because flow data is not readily available on the validation sites, the number of Bluetooth observations within a five minute time period is used to estimate flow. Because this sampling technique is subject to probabilistic uncertainty, it called into question whether all the late evening and nighttime data reflected flows >500 vph. In order to estimate the potential impact of this uncertainty, accuracy metrics were recomputed eliminating data from five minute periods and pairs of five minute periods in which the adjacent time periods did not exceed the volume threshold. With this more conservative estimate of volume, the quality metrics improved no more than 0.5 MPH in all speed categories, which was still outside the contract specifications.

The results from Route 42 in October reveal that data quality is sensitive to volume. This relationship will be monitored in future validation efforts.

As part of the on-going validation process, vehicle probe data from each state is validated on a rotating basis. Since the inception of the validation process, data on roadways in the State of New Jersey were validated on five occasions: September/October 2008, April 2009, June 2009, September 2009, and October 2009. This represents nearly 6800 hours of observations along 138 miles of freeway segments in New Jersey. ES Table 2 provides a summary of the cumulative validation effort. As shown, the absolute average speed error and the speed error bias are within the acceptable limits of the contract specifications, as measured against the SEM band, for the 45 – 60 MPH bin and the > 60 MPH bin. Note that of the approximately 155 hours of cumulative validation data less than 45 mph, 113 hours originate from the October validation, and thus the October results heavily weight the cumulative data quality for the lower two speed bins.

State	Avg 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		
0-30 MPH	11.81	13.08	8.80	9.40	1039	86.6
30-45 MPH	12.75	15.74	9.32	11.20	836	69.7
45-60 MPH	3.15	5.67	0.94	2.17	7605	633.8
> 60 MPH	2.78	5.29	-2.53	-4.44	71847	5987.3
All Speeds	3.04	5.53	-1.94	-3.48	64205	6777.3

Data Collection

Bluetooth sensor deployments in New Jersey started on Thursday, October 1, 2009. The actual deployments in New Jersey were performed with the assistance of New Jersey Department of Transportation (NJDOT) personnel. Sensors remained in the same position until they were retrieved two weeks later on Thursday, October 15, 2009. This round of data collections in New Jersey was designed to cover segments of the highways along which both recurrent and non-recurrent congestions could be expected during both peak and off-peak periods.

Figure 1 presents snapshots of the roadway segments over which Bluetooth sensors were deployed in New Jersey.

Table 1 presents a list of specific TMC segments that were selected as the validation sample in New Jersey. These segments cover a total length of approximately 14 miles. Since some TMC segments in this corridor are less than one mile long, when appropriate, consecutive TMC segments are combined to form path segments longer than one mile. In total, in this document results of validation performed on ten freeway segments are reported; two of which are standard TMC segments and the other eight are path segments combined from multiple standard TMC segments. The coordinates of the locations at which the Bluetooth sensors were deployed throughout the state of New Jersey are highlighted in Table 2. It should be noted that the configuration of consecutive TMC segments is such that the endpoint of one TMC segment and the start point of the next TMC segment are overlapping, so one Bluetooth sensor in that location is covering both TMC segments.

Finally, Table 3 summarizes the segment definitions used in the validation process which also presents the distances that have been used in the estimation of Bluetooth speeds based on travel times. Details of the algorithm used to estimate equivalent path travel times based on INRIX feeds for individual TMC segment are provided in the report titled “Estimation of Travel Times for Multiple TMC Segments” (dated February 2010) and available on the I-95 Corridor Coalition website.. This algorithm finds an equivalent INRIX travel time (and therefore travel speed) corresponding to each sample Bluetooth travel time observation on the path segment of interest.

Analysis of Results

Table 4 summarizes the data quality measures obtained as a result of comparison between Bluetooth and all reported INRIX speeds. In less than 45 mph speed bins, INRIX data fails to meet the data quality measures set forth in the contract when errors are measured as a distance from the 1.96 times the standard error band. In the rest of speed bins, INRIX data quality is deemed as satisfactory based on the same requirements. It should be noted that while the total number of observations in the low speed bins across all TMC segments are reasonable, as Table 6 indicates, the number of observations in low speed bins for some individual TMC segments are low.

Table 5 shows the percentage of the time intervals that fall within 5 mph of the SEM band and the mean for each speed bin for all TMC segments in New Jersey. Tables 6 and 7 present detailed data for individual TMC segments in New Jersey in similar format as Tables 4 and 5 respectively. Note that for some TMC segments in some speed bins the comparison results may not be reliable due to small number of observations.

Figures 2 and 3 show the overall speed error biases for different speed bins, and the average absolute speed errors for all validation segments in New Jersey, respectively. These figures correspond to Table 4.

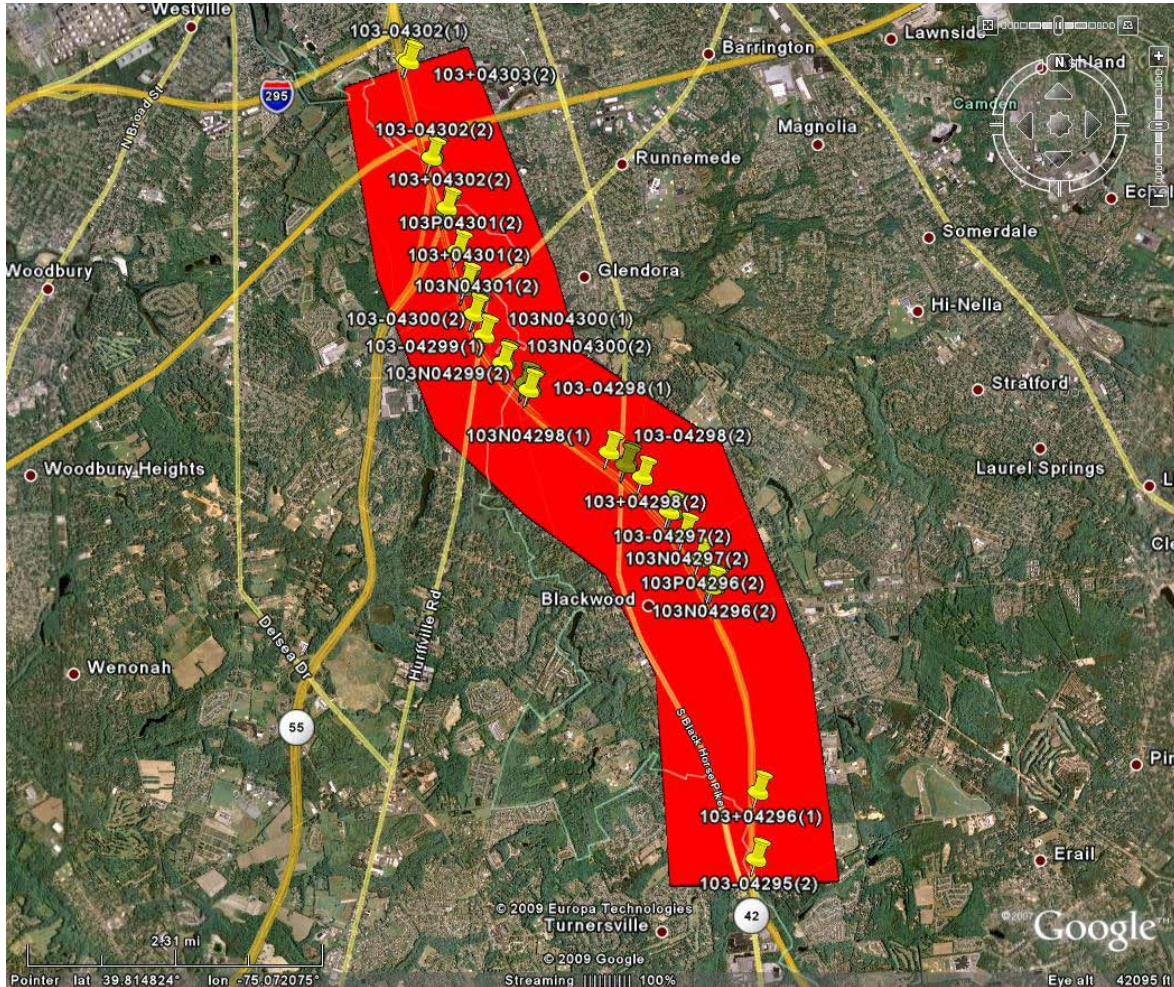


Figure 1
TMC segments selected for validation in New Jersey

Table 1
Traffic Message Channel segments picked for validation in New Jersey

TYPE	TMC	HIGHWAY	STARTING AT	ENDING AT	COUNTY	DIRECTION	LENGTH (mile)
Freeway	103-04302	NJ-42	CREEK RD	NJ-55/EXIT 13	GLOUCESTER	SOUTHBOUND	0.80
Freeway	103N04302	NJ-42	NJ-55/EXIT 13	NJ-55/EXIT 13	GLOUCESTER	SOUTHBOUND	0.44
Freeway	103-04301	NJ-42	NJ-55/EXIT 13	CLEMENTS BRIDGE RD/EXIT 12	GLOUCESTER	SOUTHBOUND	0.61
Freeway	103N04301	NJ-42	CLEMENTS BRIDGE RD/EXIT 12	CLEMENTS BRIDGE RD/EXIT 12	GLOUCESTER	SOUTHBOUND	0.22
Freeway	103-04300	NJ-42	CLEMENTS BRIDGE RD/EXIT 12	RTE-41/HURFFVILLE RD	GLOUCESTER	SOUTHBOUND	0.18
Freeway	103N04300	NJ-42	RTE-41/HURFFVILLE RD	RTE-41/HURFFVILLE RD	GLOUCESTER	SOUTHBOUND	0.26
Freeway	103-04299	NJ-42	RTE-41/HURFFVILLE RD	LOWER LANDING RD/EXIT 10B	CAMDEN	SOUTHBOUND	0.24
Freeway	103N04299	NJ-42	LOWER LANDING RD/EXIT 10B	LOWER LANDING RD/EXIT 10B	CAMDEN	SOUTHBOUND	0.06
Freeway	103-04298	NJ-42	LOWER LANDING RD/EXIT 10B	NJ-168/BLACK HORSE PIKE	CAMDEN	SOUTHBOUND	0.80
Freeway	103N04298	NJ-42	NJ-168/BLACK HORSE PIKE	NJ-168/BLACK HORSE PIKE	CAMDEN	SOUTHBOUND	0.16
Freeway	103-04297	NJ-42	NJ-168/BLACK HORSE PIKE	COLES RD	CAMDEN	SOUTHBOUND	0.50
Freeway	103N04297	NJ-42	COLES RD	COLES RD	CAMDEN	SOUTHBOUND	0.21
Freeway	103-04296	NJ-42	COLES RD	CHURCH ST	CAMDEN	SOUTHBOUND	0.44
Freeway	103N04296	NJ-42	CHURCH ST	CHURCH ST	CAMDEN	SOUTHBOUND	0.02
Freeway	103-04295	NJ-42	CHURCH ST	NJ-168/ATLANTIC CITY EXPY	GLOUCESTER	SOUTHBOUND	2.19
Freeway	103+04296	NJ-42	NJ-168/ATLANTIC CITY EXPY	CHURCH ST	CAMDEN	NORTHBOUND	1.67
Freeway	103P04296	NJ-42	CHURCH ST	CHURCH ST	CAMDEN	NORTHBOUND	0.24
Freeway	103+04297	NJ-42	CHURCH ST	COLES RD	CAMDEN	NORTHBOUND	0.43
Freeway	103P04297	NJ-42	COLES RD	COLES RD	CAMDEN	NORTHBOUND	0.00
Freeway	103+04298	NJ-42	COLES RD	NJ-168/BLACK HORSE PIKE	CAMDEN	NORTHBOUND	0.36
Freeway	103P04298	NJ-42	NJ-168/BLACK HORSE PIKE	NJ-168/BLACK HORSE PIKE	CAMDEN	NORTHBOUND	0.16
Freeway	103+04299	NJ-42	NJ-168/BLACK HORSE PIKE	LOWER LANDING RD/EXIT 10B	CAMDEN	NORTHBOUND	0.96
Freeway	103P04299	NJ-42	LOWER LANDING RD/EXIT 10B	LOWER LANDING RD/EXIT 10B	CAMDEN	NORTHBOUND	0.06
Freeway	103+04300	NJ-42	LOWER LANDING RD/EXIT 10B	RTE-41/HURFFVILLE RD	GLOUCESTER	NORTHBOUND	0.24
Freeway	103P04300	NJ-42	RTE-41/HURFFVILLE RD	RTE-41/HURFFVILLE RD	GLOUCESTER	NORTHBOUND	0.43
Freeway	103+04301	NJ-42	RTE-41/HURFFVILLE RD	CLEMENTS BRIDGE RD/EXIT 12	GLOUCESTER	NORTHBOUND	0.25
Freeway	103P04301	NJ-42	CLEMENTS BRIDGE RD/EXIT 12	CLEMENTS BRIDGE RD/EXIT 12	GLOUCESTER	NORTHBOUND	0.26
Freeway	103+04302	NJ-42	CLEMENTS BRIDGE RD/EXIT 12	NJ-55/EXIT 13	GLOUCESTER	NORTHBOUND	0.35
Freeway	103P04302	NJ-42	NJ-55/EXIT 13	NJ-55/EXIT 13	GLOUCESTER	NORTHBOUND	0.42
Freeway	103+04303	NJ-42	NJ-55/EXIT 13	CREEK RD	CAMDEN	NORTHBOUND	0.76
TOTAL							13.7

Table 2
TMC segment lengths and distances between sensor deployment locations in the state of New Jersey

SEGMENT TYPE	TMC	STANDARD TMC					SENSOR DEPLOYMENT					ERROR IN SEGMENT LENGTH (%)
		Endpoint (1)		Endpoint (2)		Length (mile)	Endpoint (1)		Endpoint (2)		Length (mile)	
		Lat	Long	Lat	Long		Lat	Long	Lat	Long		
Freeway	103-04302	39.862337	-75.100530	39.851143	-75.096806	0.80	39.862208	-75.100640	39.852098	-75.097280	0.72	-9.9%
Freeway	103N04302	39.851143	-75.096806	39.844931	-75.094714	0.44	39.852098	-75.097280	39.844975	-75.094975	0.50	13.8%
Freeway	103-04301	39.844931	-75.094714	39.836369	-75.091837	0.61	39.844975	-75.094975	39.837348	-75.092237	0.55	-10.7%
Freeway	103N04301	39.836369	-75.091837	39.833420	-75.090539	0.22	39.837348	-75.092237				
Freeway	103-04300	39.833420	-75.090539	39.831010	-75.089027	0.18						
Freeway	103N04300	39.831010	-75.089027	39.827911	-75.086294	0.26						
Freeway	103-04299	39.827911	-75.086294	39.825430	-75.083172	0.24	39.828015	-75.086197				
Freeway	103N04299	39.825430	-75.083172	39.824835	-75.082448	0.06						
Freeway	103-04298	39.824835	-75.082448	39.817808	-75.070584	0.80	39.824877	-75.082528				
Freeway	103N04298	39.817808	-75.070584	39.816340	-75.068176	0.16						
Freeway	103-04297	39.816340	-75.068176	39.811064	-75.061719	0.50	39.816265	-75.068242	39.811397	-75.062180	0.47	-7.0%
Freeway	103N04297	39.811064	-75.061719	39.808528	-75.059522	0.21	39.811397	-75.062180				
Freeway	103-04296	39.808528	-75.059522	39.802842	-75.055703	0.44						
Freeway	103N04296	39.802842	-75.055703	39.802561	-75.055521	0.02						
Freeway	103-04295	39.802561	-75.055521	39.771700	-75.048944	2.19	39.802373	-75.055522	39.771355	-75.049108	2.20	0.4%
Freeway	103+04296	39.779313	-75.048641	39.802579	-75.055146	1.67	39.779220	-75.048632	39.802898	-75.055295	1.70	1.6%
Freeway	103P04296	39.802579	-75.055146	39.805740	-75.057217	0.24	39.802898	-75.055295	39.805898	-75.057242	0.23	-5.1%
Freeway	103+04297	39.805740	-75.057217	39.811057	-75.061288	0.43	39.805898	-75.057242				
Freeway	103P04297	39.811057	-75.061288	39.811076	-75.061306	0.00						
Freeway	103+04298	39.811076	-75.061306	39.814953	-75.065696	0.36						
Freeway	103P04298	39.814953	-75.065696	39.816564	-75.067984	0.16						
Freeway	103+04299	39.816564	-75.067984	39.825000	-75.082204	0.96	39.816667	-75.067967				
Freeway	103P04299	39.825000	-75.082204	39.825618	-75.082915	0.06						
Freeway	103+04300	39.825618	-75.082915	39.828140	-75.086056	0.24	39.825865	-75.083138	39.828443	-75.086665	0.26	6.0%
Freeway	103P04300	39.828140	-75.086056	39.833494	-75.090244	0.43	39.828443	-75.086665				
Freeway	103+04301	39.833494	-75.090244	39.836936	-75.091667	0.25						
Freeway	103P04301	39.836936	-75.091667	39.840585	-75.092907	0.26						
Freeway	103+04302	39.840585	-75.092907	39.845483	-75.094547	0.35	39.840612	-75.092813	39.846257	-75.094695	0.40	14.9%
Freeway	103P04302	39.845483	-75.094547	39.851385	-75.096570	0.42	39.846257	-75.094695	39.851368	-75.096335	0.36	-13.8%
Freeway	103+04303	39.851385	-75.096570	39.862022	-75.100137	0.76	39.851368	-75.096335	39.861672	-75.099645	0.73	-3.6%
TOTAL						13.72						

Table 3
Path segments identified for validation in New Jersey

Validation Segment	STANDARD SEGMENTS INCLUDED					STARTING AT	ENDING AT	LENGTH (MILE)		
	TMC(1)	TMC(2)	TMC(3)	TMC(4)	TMC(5)			Standard	Deployment	Error (%)
NJ05-0019	103-04302	103N04302				CREEK RD	NJ-55/EXIT 13	1.24	1.22	-1.4%
NJ05-0020	103-04301	103N04301	103-04300	103N04300		NJ-55/EXIT 13	RTE-41/HURFFVILLE RD	1.27	1.27	0.1%
NJ05-0021	103-04299	103N04299	103-04298	103N04298		RTE-41/HURFFVILLE RD	NJ-168/BLACK HORSE PIKE	1.25	1.26	0.3%
NJ05-0022	103-04297	103N04297	103-04296	103N04296		NJ-168/BLACK HORSE PIKE	CHURCH ST	1.18	1.18	0.7%
103-04295	103-04295					CHURCH ST	NJ-168/ATLANTIC CITY EXPY	2.19	2.20	0.4%
103+04296	103+04296					NJ-168/ATLANTIC CITY EXPY	CHURCH ST	1.67	1.70	1.6%
NJ05-0025	103P04296	103+04297	103P04297	103+04298	103P04298	CHURCH ST	NJ-168/BLACK HORSE PIKE	1.19	1.17	-1.7%
NJ05-0026	103+04299	103P04299	103+04300			NJ-168/BLACK HORSE PIKE	RTE-41/HURFFVILLE RD	1.25	1.29	2.6%
NJ05-0027	103P04300	103+04301	103P04301	103+04302		RTE-41/HURFFVILLE RD	NJ-55/EXIT 13	1.29	1.31	1.1%
NJ05-0028	103P04302	103+04303				NJ-55/EXIT 13	CREEK RD	1.18	1.09	-7.2%
Total								13.72	13.69	-0.2%

Table 4
Data quality measures for freeway segments greater than one mile in New Jersey

SPEED BIN	Data Quality Measures for				No. of Obs.
	1.96 SE Band		Mean		
	Speed Error Bias	Average Absolute Speed Error	Speed Error Bias	Average Absolute Speed Error	
0-30	9.2	12.5	9.6	13.6	812
30-45	11.1	14.4	13.0	17.5	548
45-60	1.0	3.6	2.0	6.0	4718
60+	-3.2	3.7	-5.2	6.3	17719

Table 5
Percent observations meeting data quality criteria for freeway segments greater than one mile in New Jersey

SPEED BIN	Data Quality Measures for				No. of Obs.
	1.96 SE 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	9%	48%	0%	43%	812
30-45	9%	28%	0%	19%	548
45-60	37%	74%	0%	55%	4718
60+	32%	72%	0%	48%	17719

Table 6
Data quality measures for individual freeway validation segments greater than one mile in the state of New Jersey

TMC	Standard TMC length	Bluetooth distance	SPEED BIN	Data Quality Measures for				No. of Obs.
				1.96 SE Band		Mean		
				Speed Error Bias	Average Absolute Speed Error	Speed Error Bias	Average Absolute Speed Error	
103+04296	1.67	1.70	0-30	21.5	24.0	22.0	25.1	130
			30-45	0.7	11.8	3.3	17.2	31
			45-60	-0.7	4.6	0.5	7.6	235
			60+	-3.2	3.4	-5.3	6.0	2368
103-04295	2.19	2.20	0-30					
			30-45	10.9	10.9	12.4	12.4	3*
			45-60	0.6	1.5	2.1	3.8	168
			60+	-1.8	2.0	-3.3	4.1	2406
NJ05-0019	1.24	1.22	0-30	3.6	3.6	5.1	5.1	1*
			30-45	-0.8	4.4	-0.8	7.3	59
			45-60	-2.7	3.2	-3.5	5.8	372
			60+	-3.0	3.1	-5.7	6.0	1642
NJ05-0020	1.27	1.27	0-30	11.0	11.6	12.1	13.3	26*
			30-45	-0.7	7.7	-0.8	10.0	12*
			45-60	-0.3	2.1	0.0	4.0	466
			60+	-2.9	3.0	-5.0	5.3	1990
NJ05-0021	1.25	1.26	0-30	8.4	8.5	9.5	9.6	17*
			30-45	4.9	10.8	9.3	16.6	11*
			45-60	-0.4	2.1	-0.1	4.1	328
			60+	-3.2	3.4	-5.3	5.9	2154
NJ05-0022	1.18	1.18	0-30	9.6	12.4	9.8	13.0	16*
			30-45	3.9	8.7	6.9	12.6	21*
			45-60	0.2	1.9	1.3	4.0	837
			60+	-1.4	2.0	-2.5	4.1	1176
NJ05-0025	1.19	1.17	0-30	9.7	15.9	10.1	17.4	191
			30-45	11.7	12.9	15.1	17.1	76
			45-60	0.8	3.5	2.4	7.0	175
			60+	-6.4	6.4	-10.0	10.1	1638
NJ05-0026	1.25	1.29	0-30	12.6	14.1	13.1	14.8	142
			30-45	23.3	23.5	25.8	26.1	219
			45-60	6.8	7.5	9.4	10.4	943
			60+	2.9	3.9	4.9	6.4	745
NJ05-0027	1.29	1.31	0-30	2.3	5.2	2.5	6.0	151
			30-45	-1.7	8.0	-1.8	10.9	38
			45-60	-1.1	2.7	-1.4	5.2	330
			60+	-7.6	7.6	-11.0	11.0	1879
NJ05-0028	1.18	1.09	0-30	0.6	4.1	0.6	5.2	138
			30-45	0.6	5.3	0.8	7.4	78
			45-60	-0.5	3.0	0.5	5.3	864
			60+	-1.9	2.5	-3.2	4.9	1721

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

Table 7
Observations meeting data quality criteria for individual freeway validation segments
greater than one mile in the state of New Jersey

TMC	SPEED BIN	Data Quality Measures for								No. of Obs.
		1.96 SE 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	
103+04296	0-30	3	2%	30	23%	0	0%	25	19%	130
	30-45	5	16%	8	26%	0	0%	2	6%	31
	45-60	95	40%	168	71%	0	0%	111	47%	235
	60+	838	35%	1791	76%	2	0%	1212	51%	2368
103-04295	0-30	0	0%	1	33%	0	0%	1	33%	3*
	30-45	71	42%	153	91%	0	0%	123	73%	168
	45-60	883	37%	2102	87%	0	0%	1598	66%	2406
	60+	0	0%	1	100%	0	0%	0	0%	1*
NJ05-0019	0-30	17	29%	37	63%	0	0%	23	39%	59
	30-45	183	49%	284	76%	0	0%	223	60%	372
	45-60	568	35%	1256	76%	6	0%	776	47%	1642
	60+	4	15%	14	54%	0	0%	13	50%	26*
NJ05-0020	0-30	2	17%	4	33%	0	0%	4	33%	12*
	30-45	194	42%	392	84%	0	0%	329	71%	466
	45-60	679	34%	1560	78%	0	0%	1120	56%	1990
	60+	2	12%	8	47%	0	0%	7	41%	17*
NJ05-0021	0-30	1	9%	3	27%	0	0%	2	18%	11*
	30-45	153	47%	282	86%	0	0%	242	74%	328
	45-60	679	32%	1623	75%	0	0%	1098	51%	2154
	60+	0	0%	6	38%	0	0%	5	31%	16*
NJ05-0022	0-30	2	10%	8	38%	0	0%	6	29%	21*
	30-45	410	49%	741	89%	2	0%	597	71%	837
	45-60	542	46%	1038	88%	0	0%	791	67%	1176
	60+	16	8%	63	33%	0	0%	56	29%	191
NJ05-0025	0-30	7	9%	15	20%	0	0%	7	9%	76
	30-45	69	39%	119	68%	0	0%	78	45%	175
	45-60	253	15%	742	45%	0	0%	299	18%	1638
	60+	6	4%	70	49%	0	0%	63	44%	142
NJ05-0026	0-30	4	2%	14	6%	0	0%	10	5%	219
	30-45	66	7%	353	37%	0	0%	148	16%	943
	45-60	190	26%	514	69%	0	0%	322	43%	745
	60+	12	8%	103	68%	0	0%	96	64%	151
NJ05-0027	0-30	4	11%	16	42%	0	0%	8	21%	38
	30-45	142	43%	269	82%	0	0%	202	61%	330
	45-60	181	10%	709	38%	0	0%	233	12%	1879
	60+	27	20%	98	71%	0	0%	85	62%	138
NJ05-0028	0-30	10	13%	46	59%	0	0%	39	50%	78
	30-45	376	44%	737	85%	0	0%	543	63%	864
	45-60	771	45%	1425	83%	0	0%	1070	62%	1721
	60+									

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

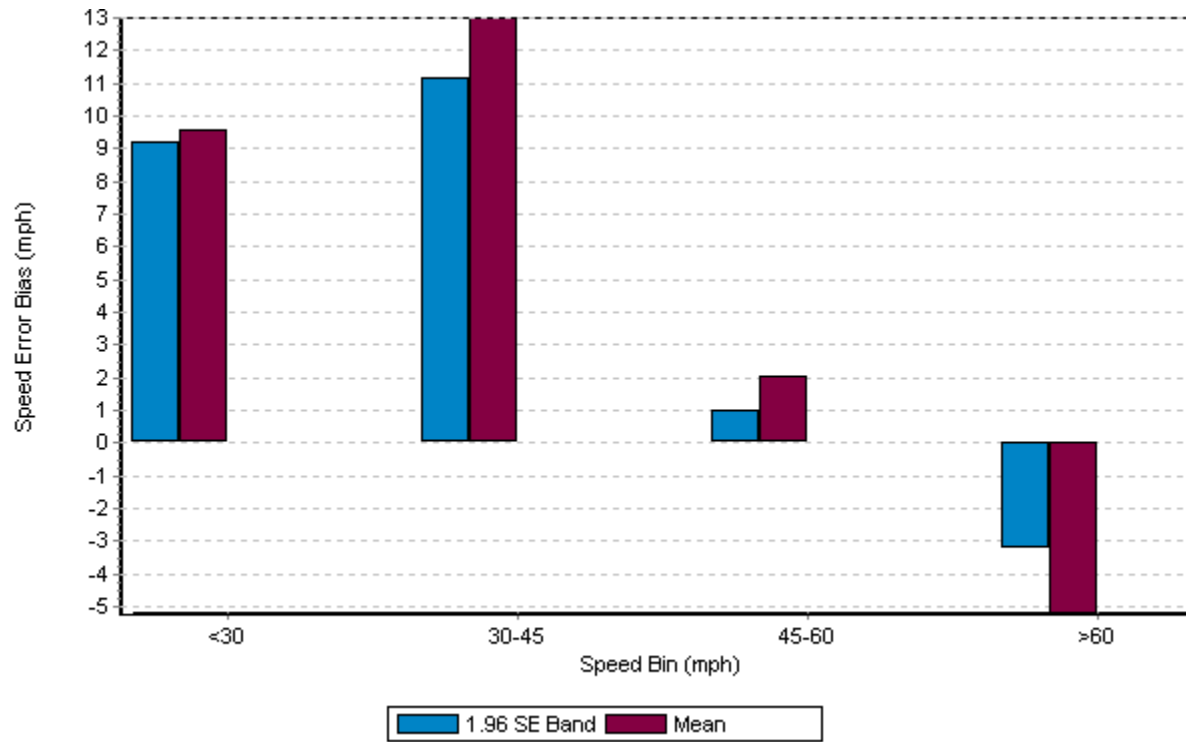


Figure 2
Speed error bias for freeway segments greater than one mile in New Jersey

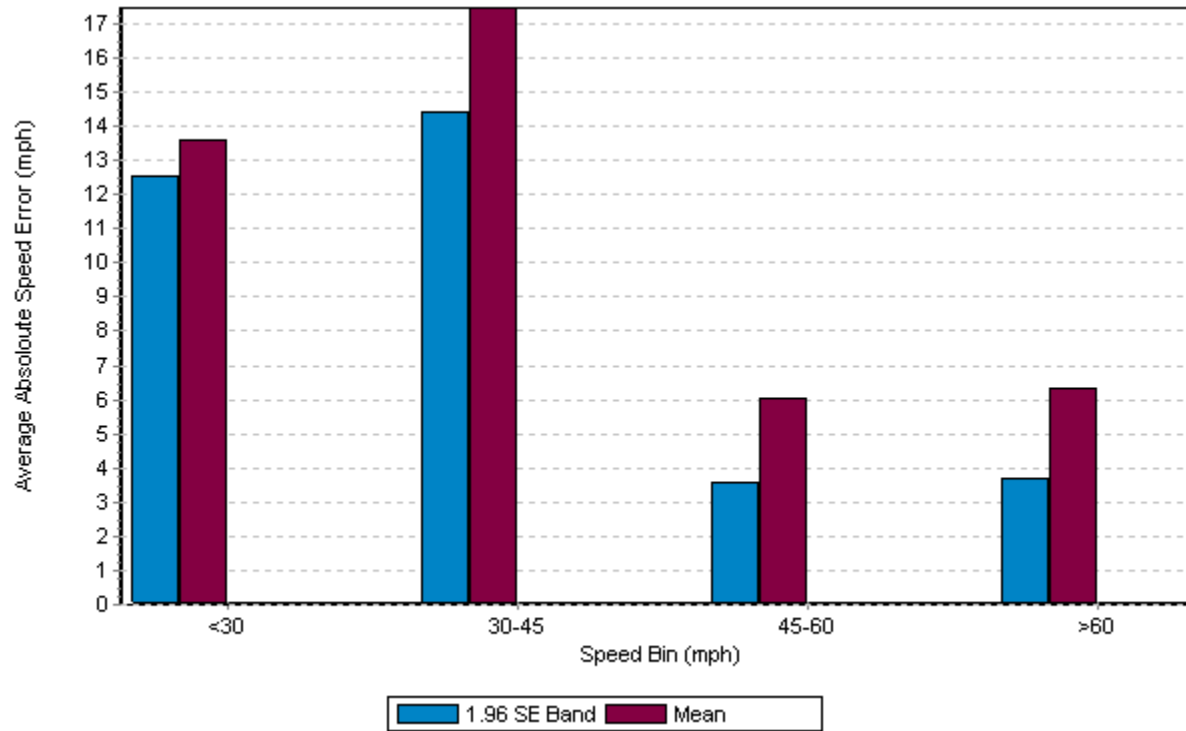


Figure 3
Average absolute speed error for freeway segments greater than one mile in New Jersey

Break.;