



I-95 Corridor Coalition

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



May 2009

I-95 CORRIDOR COALITION VEHICLE PROBE PROJECT: VALIDATION OF INRIX DATA MAY 2009

Monthly Report

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Evaluation Results for the State of New Jersey

Summary

Travel time samples were collected along just over 15 miles of freeways in New Jersey from Wednesday, April 8, 2009 to Thursday, April 23, 2009 and compared against travel time and speed data reported by INRIX as part of the I-95 Vehicle Probe project. The validation data represents approximately 1150 hours of observations along nine freeway segments in New Jersey. The table below summarizes the result of the comparison between the validation data and the INRIX data for the same period. Both the absolute average speed error and the speed error bias as measured against the SEM band are within the acceptable limits of the contract specifications.

Northern NJ Evaluation Summary						
State	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	6.40	7.40	3.50	3.90	84	7.0
30-45 MPH	8.10	10.20	4.20	5.30	59	4.9
45-60 MPH	2.00	5.00	0.40	2.20	578	48.2
> 60 MPH	2.80	5.40	-2.70	-4.70	13085	1090.4
All Speeds	2.81	5.42	-2.50	-4.32	13806	1150.5

Based upon data collected in April 2009

Data Collection

Bluetooth sensor deployments in New Jersey started on Wednesday, April 8, 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, April 23, 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. In total, results of validation on nine freeway TMC segments are reported in this document. These segments cover a total length of over 15 miles. The coordinates of the locations at which the Bluetooth sensors were deployed throughout the state of New Jersey are reported in Table 2 which also presents the distances that have been used in the estimation of Bluetooth speeds based on travel times.

Analysis of Results

Table 3 summarizes the data quality measures obtained as a result of comparison between Bluetooth and all reported INRIX speeds. In all speed bins, INRIX data passes 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.

Table 4 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 TMCs in New Jersey. Tables 5 and 6 present detailed data for individual TMC segments in New Jersey in similar format as Tables 3 and 4, respectively. A single observation taken by itself may be inaccurate, however, the averages over multiple observations and segments provide a confident assessment of quality. As such, rows in Table 5 with a very low number of observations should not be deemed as representative.

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



Figure 1
TMC segments selected for validation in New Jersey

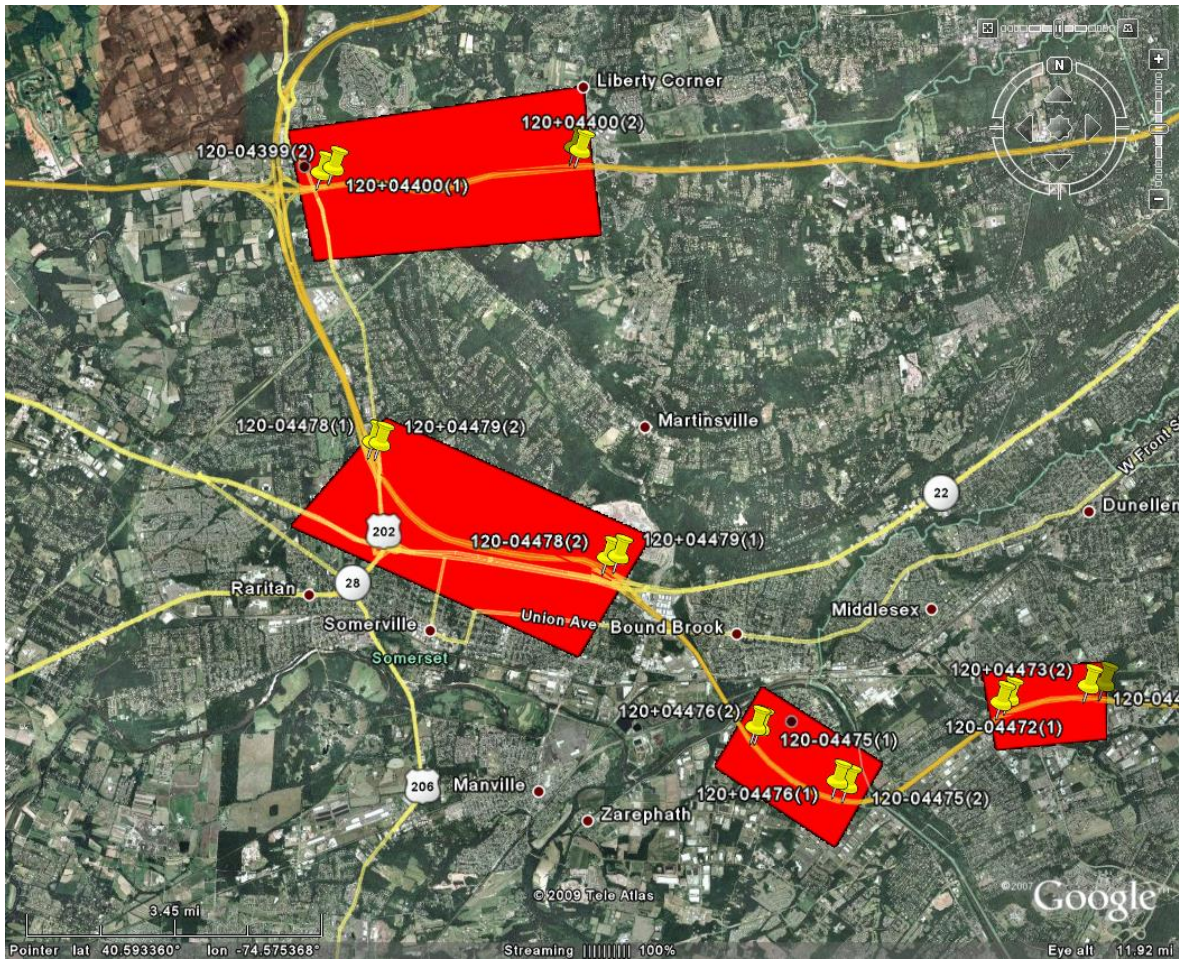


Figure 1 (Cont'd)
TMC segments selected for validation in New Jersey

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

TYPE	TMC	HIGHWAY	STARTING AT	ENDING AT	COUNTY	DIRECTION	LENGTH (mile)
Freeway	120+04400	I 78	I 287/EXIT 29	EXIT 33	SOMERSET	EASTBOUND	3.1
Freeway	120+04470	I 287	DURHAM AVE/EXIT 4	CO HWY 529/STELTON RD/EXIT 5	MIDDLESEX	NORTHBOUND	1.1
Freeway	120+04473	I 287	RANDOLPHVILLE RD/EXIT 7	CENTENNIAL AVE/POSSUMTOWN RD/EXIT 8	MIDDLESEX	NORTHBOUND	1.1
Freeway	120+04476	I 287	EASTON AVE/EXIT 10	WESTON CANAL RD/EXIT 12	SOMERSET	NORTHBOUND	1.1
Freeway	120+04479	I 287	US 22/EXIT 14	US 202/US 206/EXIT 17	SOMERSET	NORTHBOUND	3.1
Freeway	120-04469	I 287	CO HWY 529/STELTON RD/EXIT 5	DURHAM AVE/EXIT 4	MIDDLESEX	SOUTHBOUND	1.2
Freeway	120-04472	I 287	CENTENNIAL AVE/POSSUMTOWN RD/EXIT 8	RANDOLPHVILLE RD/EXIT 7	MIDDLESEX	SOUTHBOUND	1.1
Freeway	120-04475	I 287	WESTON CANAL RD/EXIT 12	EASTON AVE/EXIT 10	SOMERSET	SOUTHBOUND	1.2
Freeway	120-04478	I 287	US 202/US 206/EXIT 17	US 22/EXIT 14	SOMERSET	SOUTHBOUND	2.9
TOTAL							15.9

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	120+04400	40.64439	-74.63813	40.64655	-74.57959	3.12	40.64272	-74.63735	40.64633	-74.58085	3.01	-3.3%
Freeway	120+04470	40.55306	-74.41414	40.55627	-74.43407	1.12	40.55377	-74.41432	40.55753	-74.43302	1.05	-6.2%
Freeway	120+04473	40.55636	-74.46278	40.55397	-74.48398	1.14	40.55688	-74.46282	40.55413	-74.48417	1.15	1.1%
Freeway	120+04476	40.54307	-74.52074	40.55112	-74.53851	1.12	40.53982	-74.52138	40.54925	-74.53978	1.19	6.3%
Freeway	120+04479	40.57666	-74.57141	40.59456	-74.62277	3.09	40.57760	-74.57027	40.59492	-74.62288	3.16	2.2%
Freeway	120-04469	40.55636	-74.43461	40.55300	-74.41377	1.18	40.55672	-74.43437	40.55243	-74.41258	1.24	5.8%
Freeway	120-04472	40.55316	-74.48573	40.55597	-74.46622	1.06	40.55310	-74.48532	40.55660	-74.46618	1.05	-1.0%
Freeway	120-04475	40.55066	-74.53751	40.54214	-74.51869	1.17	40.54813	-74.53947	40.53910	-74.52015	1.21	2.9%
Freeway	120-04478	40.59418	-74.62167	40.57735	-74.57338	2.91	40.59363	-74.62252	40.57740	-74.57295	2.98	2.3%
TOTAL		15.92					16.05					

Table 3
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	3.5	6.4	3.9	7.4	84
30-45	4.2	8.1	5.3	10.2	59
45-60	0.4	2.0	2.2	5.0	578
60+	-2.7	2.8	-4.7	5.4	13085

Table 4
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	5%	63%	0%	51%	84
30-45	14%	41%	0%	36%	59
45-60	48%	88%	0%	58%	578
60+	35%	78%	0%	54%	13085

Table 5
Data quality measures for individual freeway 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	
120+04400	3.12	3.01	0-30					
			30-45	2.3	2.3	22.7	22.7	2
			45-60	1.5	2.2	6.7	8.0	16
			60+	-4.2	4.3	-6.8	7.2	915
120+04470	1.12	1.05	0-30					
			30-45	17.8	17.8	18.3	18.3	1
			45-60	0.2	0.7	0.9	3.3	82
			60+	-3.2	3.3	-6.2	6.7	745
120+04473	1.14	1.15	0-30					
			30-45					
			45-60	0.2	0.2	5.5	5.5	4
			60+	-3.1	3.2	-5.8	6.3	974
120+04476	1.12	1.19	0-30	15.5	16.7	15.8	17.9	8
			30-45	5.6	6.0	6.3	6.9	15
			45-60	-0.6	3.3	-0.2	5.4	80
			60+	-2.3	2.4	-4.2	4.8	1156
120+04479	3.09	3.16	0-30					
			30-45	17.9	17.9	18.1	18.1	1
			45-60	1.4	1.4	6.5	7.2	11
			60+	-2.7	2.8	-4.7	5.2	2436
120-04469	1.18	1.24	0-30	1.8	5.7	2.1	6.5	42
			30-45	5.0	8.2	5.4	9.6	20
			45-60	0.0	2.0	1.4	4.9	135
			60+	-2.8	3.1	-4.6	5.6	1046
120-04472	1.06	1.05	0-30	1.8	4.5	2.0	5.2	22
			30-45	7.9	13.7	8.4	16.0	3
			45-60	1.3	2.0	4.6	5.5	43
			60+	-3.3	3.4	-5.7	6.4	2099
120-04475	1.17	1.21	0-30	2.1	2.9	4.0	5.2	8
			30-45	-1.5	7.2	-0.8	10.4	7
			45-60	0.8	2.1	2.5	4.6	141
			60+	-1.2	1.6	-2.4	3.9	1098
120-04478	2.91	2.98	0-30	8.8	10.9	9.2	11.6	4
			30-45	1.0	9.4	0.8	10.8	10
			45-60	1.3	1.6	4.6	5.7	66
			60+	-1.9	2.1	-3.5	4.2	2616

Table 6
Observations meeting data quality criteria for individual freeway 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	
120+04400	0-30									
	30-45	0	0%	2	100%	0	0%	0	0%	
	45-60	6	38%	13	81%	0	0%	4	25%	
	60+	236	26%	576	63%	0	0%	338	37%	
120+04470	0-30									
	30-45	0	0%	0	0%	0	0%	0	0%	
	45-60	54	66%	80	98%	1	1%	63	77%	
	60+	235	32%	533	72%	0	0%	304	41%	
120+04473	0-30									
	30-45									
	45-60	3	75%	4	100%	0	0%	2	50%	
	60+	311	32%	712	73%	0	0%	416	43%	
120+04476	0-30	0	0%	2	25%	0	0%	2	25%	
	30-45	3	20%	9	60%	0	0%	9	60%	
	45-60	24	30%	61	76%	0	0%	48	60%	
	60+	420	36%	946	82%	0	0%	673	58%	
120+04479	0-30									
	30-45	0	0%	0	0%	0	0%	0	0%	
	45-60	7	64%	10	91%	0	0%	2	18%	
	60+	728	30%	1889	78%	0	0%	1307	54%	
120-04469	0-30	4	10%	29	69%	0	0%	25	60%	
	30-45	3	15%	7	35%	0	0%	7	35%	
	45-60	69	51%	118	87%	0	0%	87	64%	
	60+	388	37%	792	76%	9	1%	553	53%	
120-04472	0-30	0	0%	15	68%	0	0%	10	45%	
	30-45	0	0%	0	0%	0	0%	0	0%	
	45-60	21	49%	36	84%	0	0%	22	51%	
	60+	770	37%	1540	73%	0	0%	994	47%	
120-04475	0-30	0	0%	6	75%	0	0%	5	63%	
	30-45	0	0%	3	43%	0	0%	2	29%	
	45-60	62	44%	127	90%	0	0%	83	59%	
	60+	541	49%	980	89%	0	0%	783	71%	
120-04478	0-30	0	0%	1	25%	0	0%	1	25%	
	30-45	2	20%	3	30%	0	0%	3	30%	
	45-60	31	47%	61	92%	0	0%	27	41%	
	60+	984	38%	2243	86%	0	0%	1742	67%	

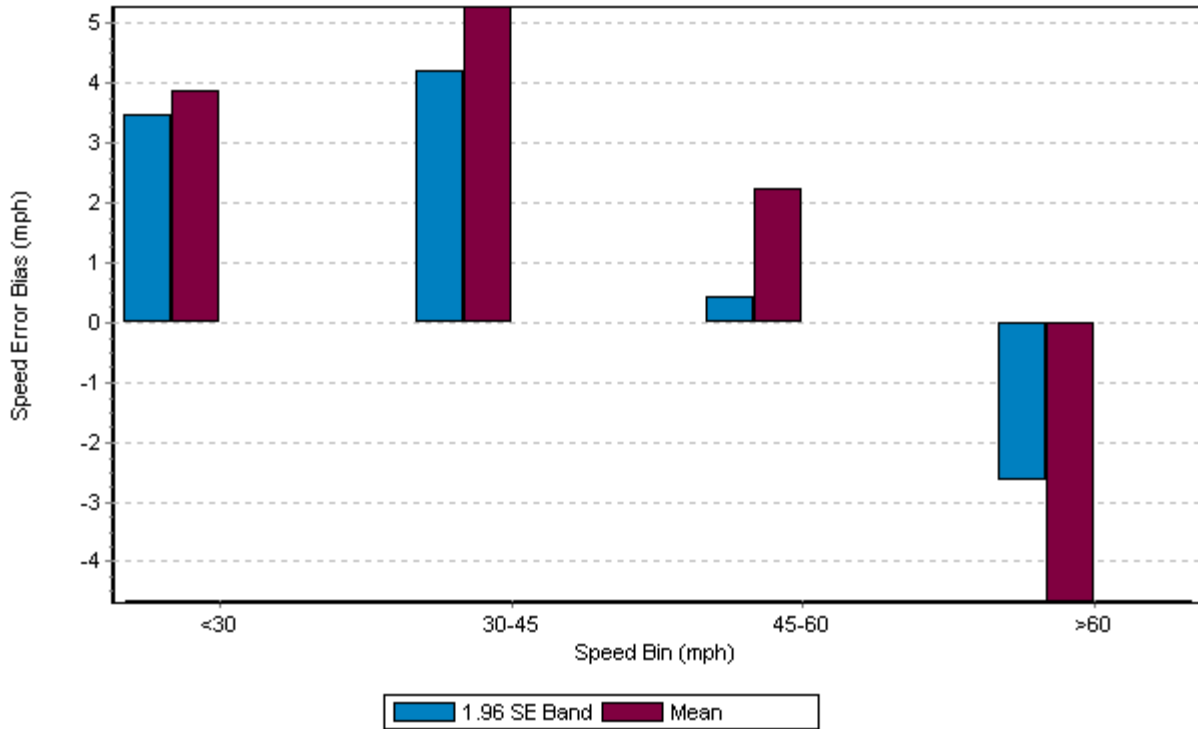


Figure 2
Speed error bias for freeway segments greater than one mile in New Jersey

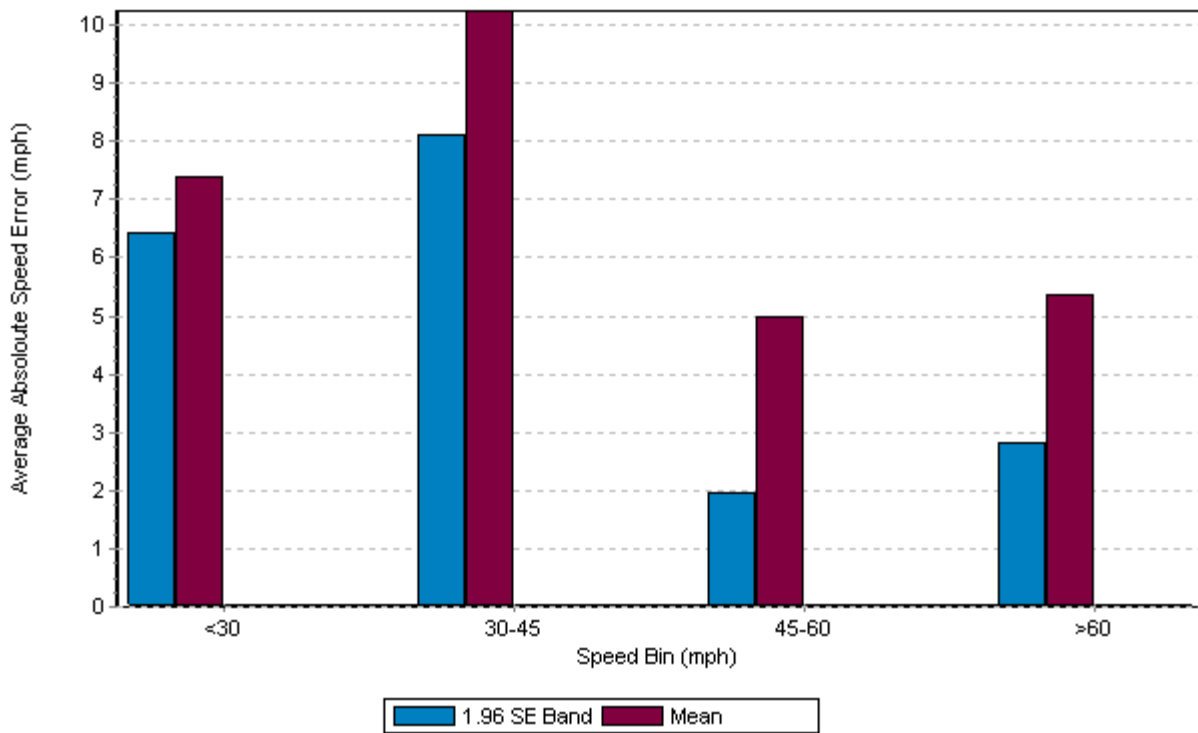


Figure 3
Average absolute speed error for freeway segments greater than one mile in New Jersey