



## I-95 Corridor Coalition

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



*January 2012*

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# I-95 CORRIDOR COALITION VEHICLE PROBE PROJECT: VALIDATION OF INRIX DATA JANUARY 2012

## *Monthly Report*

*Prepared for:*

I-95 Corridor Coalition

*Sponsored by:*

I-95 Corridor Coalition

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*January 2012*

# Evaluation Results for the State of Virginia

## Executive Summary

Travel time samples were collected along approximately 19 freeway miles and nine miles of arterials from Tuesday, July 26, 2011 through Thursday, August 4, 2011 in Virginia. Freeway segments studied were located along I-66 in Arlington County and I-95 in Fairfax County. Of the total freeway miles where data was collected, approximately eight miles were for traditional freeway validation, and the balance were concentrated on portions of I-95 that had reversible flow lanes as a special study. The arterial data segments studied were located along US Route 1 and Virginia State Route 234 in Prince William County. Data collected for the traditional freeway validation was compared with travel time and speed data reported by INRIX as part of the I-95 Vehicle Probe project. The freeway validation data below represents approximately 732 hours of observations along 14 freeway segments, totaling approximately eight miles.

ES Table 1, below summarizes the results of the comparison between the validation data and the INRIX data for traditional freeway segments during this period. As shown, the average absolute speed error (AASE) was within specification for all speed bins even when errors are measured against the mean (rather than the SEM band). The speed error bias (SEB) was in specifications except in the 0 – 30 MPH speed bin. Several slowdowns during late night hours on I-66, most likely due to overnight construction and maintenance activities, created instances in which traffic was slowed, but the VPP reported normal flow conditions. Additional analysis to determine if such instances are appropriately flagged correlated by the Score attribute within the data feed is underway and will be forwarded at a later time.

<b>ES Table 1 - VA Evaluation Summary</b>						
<b>Speed Bin</b>	<b>Absolute Speed Error (&lt;10mph)</b>		<b>Speed Error Bias (&lt;5mph)</b>		<b>Number of 5 Minute Samples</b>	<b>Hours of Data Collection</b>
	Comparison with SEM Band	Comparison with Mean	Comparison with SEM Band	Comparison with Mean		
0-30 MPH	<b>7.70</b>	8.70	<b>6.30</b>	6.70	818	68.2
30-45 MPH	<b>6.00</b>	7.30	<b>3.90</b>	4.60	1332	111.0
45-60 MPH	<b>2.20</b>	4.00	<b>0.30</b>	1.00	3714	309.5
> 60 MPH	<b>1.80</b>	3.80	<b>-1.70</b>	-3.40	2916	243.0
All Speeds	3.16	4.87	0.74	0.62	8780	731.7

Based upon data collected from July 26, 2011 through August 4, 2011 across 7.7 miles of roadway.

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 Virginia was validated on six occasions: July 2008, November 2008, May 2009, November 2009, September 2010, and July/August 2011. These six validations represent nearly 7050 hours of observations along approximately 134 miles of freeway segments in Virginia. ES Table 2 provides a summary of the cumulative validation effort. As shown, the average

absolute speed error and speed error bias are within specification for all speed bins even when errors are measured against the mean.

<b>ES Table 2 - VIRGINIA - Cumulative to Date</b>						
<b>Speed Bin</b>	<b>Absolute Speed Error</b> (<10mph)		<b>Speed Error Bias</b> (<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	<b>5.02</b>	6.19	<b>2.18</b>	2.47	5118	426.5
30-45 MPH	<b>6.19</b>	8.47	<b>1.90</b>	3.07	5152	429.3
45-60 MPH	<b>2.67</b>	4.70	<b>0.00</b>	0.69	21283	1773.6
> 60 MPH	<b>2.04</b>	4.10	<b>-1.65</b>	-2.99	53021	4418.4
All Speeds	2.63	4.65	-0.79	-1.36	84574	7047.8

Arterial data collected along US Route 1 and VA Route 234 will be presented in a separate report. The Coalition is currently in the process of developing appropriate quality metrics and validation methods.

### **Data Collection**

Bluetooth sensor deployments in Virginia started on Tuesday, July 26, 2011. The actual deployments in Virginia were performed with the assistance of Virginia Department of Transportation (VDOT) personnel. Sensors remained in the same position until they were retrieved one week later on Thursday, August 4, 2011. This round of data collection in Virginia 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 a snapshot of the roadway segments over which Bluetooth sensors were deployed in Virginia. In this figure, red segments represent freeway segments selected for analysis in this round of validation. The blue segments represent arterial segments.

Table 1 presents a list of specific TMC segments that were selected as the validation sample in Virginia. These segments cover a total length of about 19 freeway miles, and about nine arterial 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. This document includes the results of validation performed on four freeway and four arterial segments. All four freeway segments considered 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 Virginia 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.

Data was collected on reversible flow lanes on I-95 south of the I-495 Beltway for special analysis. These segments are described in the table; however, they are not included in the official statistical results. Analysis will be presented in a separate report. The analysis of data collected on arterial segments will also be presented in a separate report.

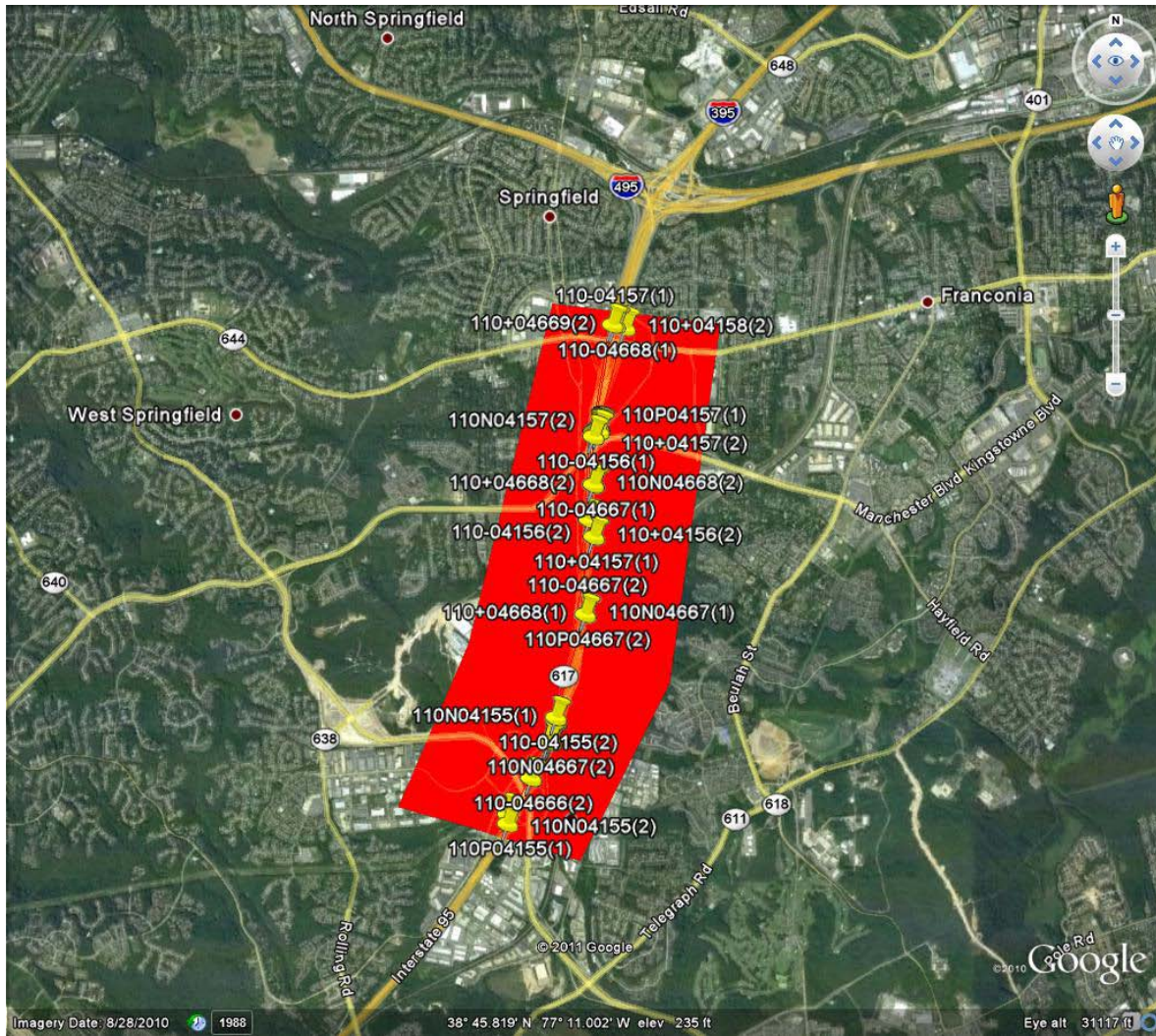
Finally, Table 3 summarizes the segment definitions used in the validation process which also presents the distances that have been used in the estimation of Bluetooth speeds based on travel times. Details of the algorithm used to estimate equivalent path travel times based on INRIX data feeds for individual TMC segments are provided in a separate report. 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***

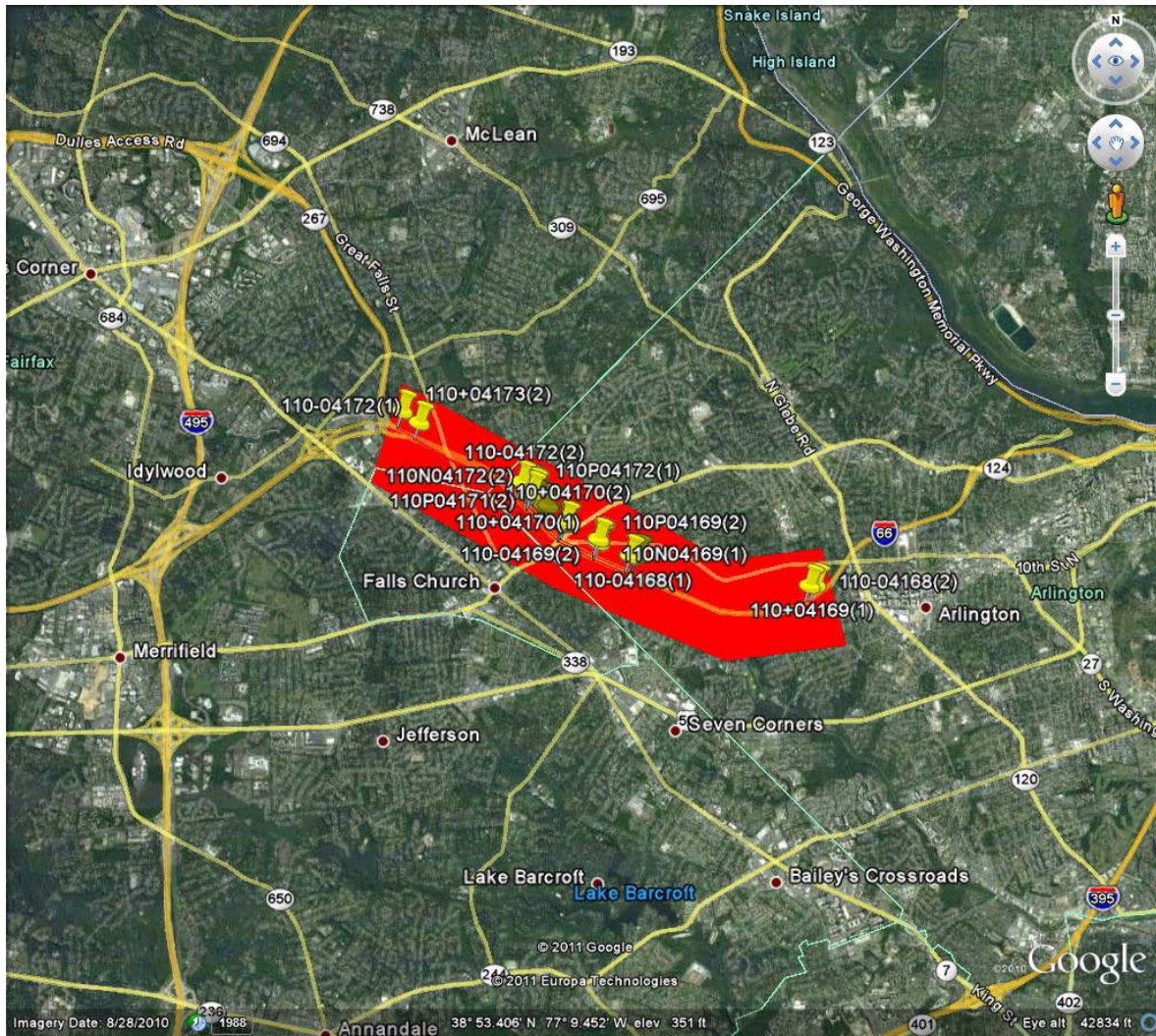
Table 4 summarizes the data quality measures obtained as a result of comparison between Bluetooth and all reported INRIX speeds. In all speed bins, except less than 30 mph, INRIX data meets the data quality measures set forth in the contract when errors are measured as a distance from the 1.96 times the standard error band.

Table 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 Virginia. Tables 6 and 7 present detailed data for individual TMC segments in Virginia in similar format as Tables 4 and 5, respectively. Note that for some segments and in some speed bins the comparison results may not be reliable due to small number of observations.

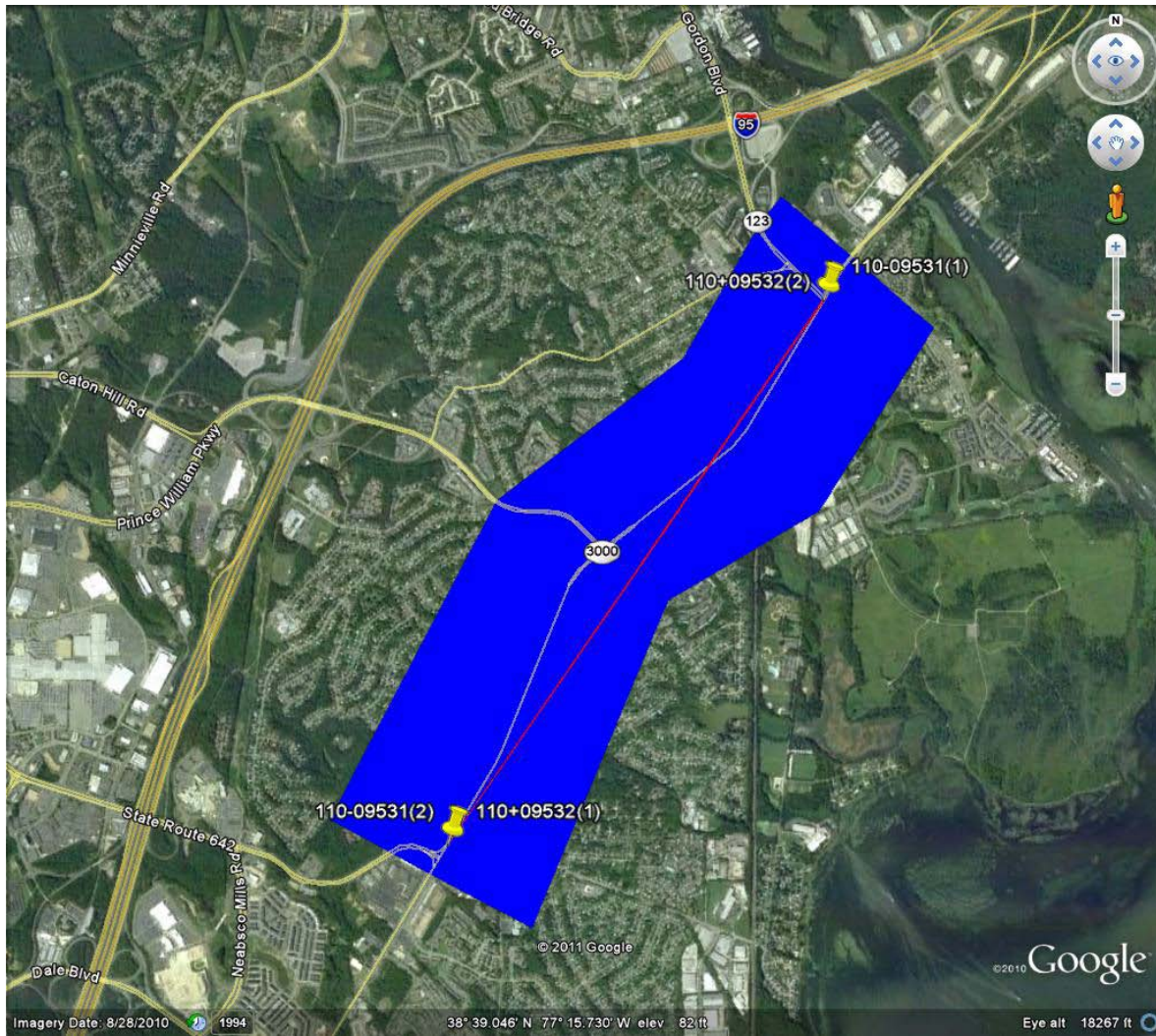
Figures 2 and 3 show the overall speed error biases for different speed bins, and the average absolute speed errors for all validation segments in Virginia, respectively. These figures correspond to Table 4.



**Figure 1**  
**TMC segments selected for validation in Virginia**

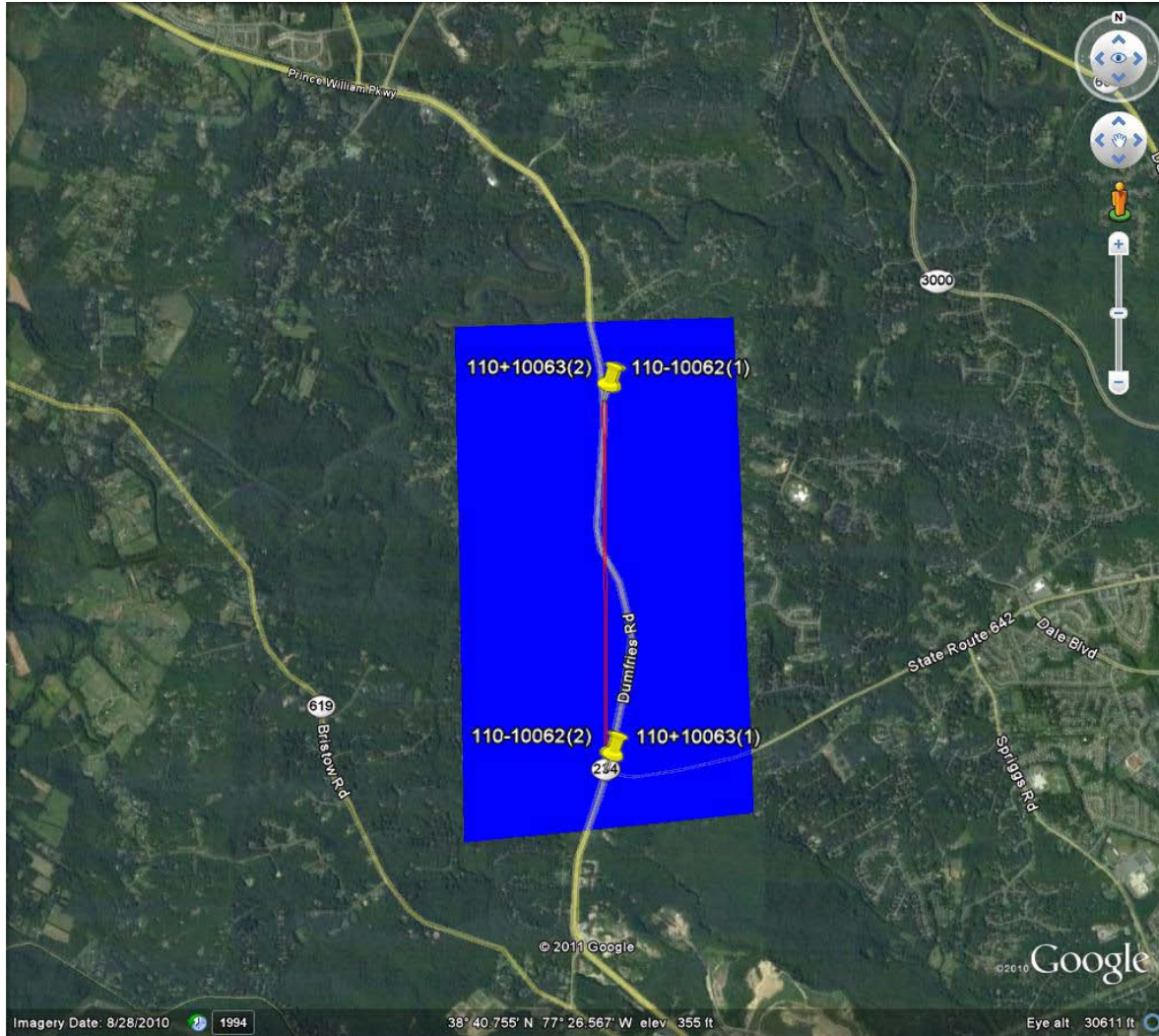


**Figure 1**  
**TMC segments selected for validation in Virginia (Cont'd)**



**Figure 1**  
**TMC segments selected for validation in Virginia (Cont'd)**





**Figure 1**  
**TMC segments selected for validation in Virginia (Cont'd)**

**Table 1**  
**Traffic Message Channel segments picked for validation in Virginia**

<b>No.</b>	<b>TYPE</b>	<b>TMC</b>	<b>HIGHWAY</b>	<b>STARTING AT</b>	<b>ENDING AT</b>	<b>COUNTY</b>	<b>DIRECTION</b>	<b>LENGTH (mile)</b>
1	Freeway	110-04172	I-66	VA-267/EXIT 67	WESTMORELAND ST/EXIT 68	ARLINGTON	EASTBOUND	1.0
2	Freeway	110N04172	I-66	WESTMORELAND ST/EXIT 68	WESTMORELAND ST/EXIT 68	ARLINGTON	EASTBOUND	0.1
3	Freeway	110-04171	I-66	WESTMORELAND ST/EXIT 68	25TH ST	ARLINGTON	EASTBOUND	0.1
4	Freeway	110N04171	I-66	25TH ST	25TH ST	ARLINGTON	EASTBOUND	0.0
5	Freeway	110-04170	I-66	25TH ST	US-29/VA-237/EXIT 69	ARLINGTON	EASTBOUND	0.1
6	Freeway	110N04170	I-66	US-29/VA-237/EXIT 69	US-29/VA-237/EXIT 69	ARLINGTON	EASTBOUND	0.2
7	Freeway	110-04169	I-66	US-29/VA-237/EXIT 69	SYCAMORE ST/EXIT 69	ARLINGTON	EASTBOUND	0.3
8	Freeway	110N04169	I-66	SYCAMORE ST/EXIT 69	SYCAMORE ST/EXIT 69	ARLINGTON	EASTBOUND	0.3
9	Freeway	110-04168	I-66	SYCAMORE ST/EXIT 69	FAIRFAX DR/EXIT 71	ARLINGTON	EASTBOUND	1.6
10	Freeway	110+04169	I-66	FAIRFAX DR/EXIT 71	SYCAMORE ST/EXIT 69	ARLINGTON	WESTBOUND	1.5
11	Freeway	110P04169	I-66	SYCAMORE ST/EXIT 69	SYCAMORE ST/EXIT 69	ARLINGTON	WESTBOUND	0.3
12	Freeway	110+04170	I-66	SYCAMORE ST/EXIT 69	US-29/VA-237/EXIT 69	ARLINGTON	WESTBOUND	0.3
13	Freeway	110P04170	I-66	US-29/VA-237/EXIT 69	US-29/VA-237/EXIT 69	ARLINGTON	WESTBOUND	0.4
14	Freeway	110P04171	I-66	US-29/VA-237/EXIT 69	25TH ST	ARLINGTON	WESTBOUND	0.2
15	Freeway	110+04172	I-66	25TH ST	WESTMORELAND ST/EXIT 68	ARLINGTON	WESTBOUND	0.0
16	Freeway	110P04172	I-66	WESTMORELAND ST/EXIT 68	WESTMORELAND ST/EXIT 68	ARLINGTON	WESTBOUND	0.0
17	Freeway	110+04173	I-66	WESTMORELAND ST/EXIT 68	VA-267/EXIT 67	FAIRFAX	WESTBOUND	1.2
18	Freeway	110-04157	I-95	FRANCONIA RD/EXIT 169	VA-7900/EXIT 169	FAIRFAX	SOUTHBOUND	0.6
19	Freeway	110N04157	I-95	VA-7900/EXIT 169	VA-7900/EXIT 169	FAIRFAX	SOUTHBOUND	0.0
20	Freeway	110-04156	I-95	VA-7900/EXIT 169	BACKLICK RD/EXIT 167	FAIRFAX	SOUTHBOUND	0.5
21	Freeway	110-04155	I-95	BACKLICK RD/EXIT 167	VA-7100/EXIT 166	FAIRFAX	SOUTHBOUND	1.2
22	Freeway	110N04155	I-95	VA-7100/EXIT 166	VA-7100/EXIT 166	FAIRFAX	SOUTHBOUND	0.6

**Table 1**  
**Traffic Message Channel segments picked for validation in Virginia (Cont'd)**

<b>No.</b>	<b>TYPE</b>	<b>TMC</b>	<b>HIGHWAY</b>	<b>STARTING AT</b>	<b>ENDING AT</b>	<b>COUNTY</b>	<b>DIRECTION</b>	<b>LENGTH (mile)</b>
23	Freeway	110-04668	I-95 HOV	FRANCONIA RD/EXIT 169	VA-7900/EXIT 169	FAIRFAX	SOUTHBOUND	0.6
24	Freeway	110N04668	I-95 HOV	VA-7900/EXIT 169	VA-7900/EXIT 169	FAIRFAX	SOUTHBOUND	0.3
25	Freeway	110-04667	I-95 HOV	VA-7900/EXIT 169	BACKLICK RD/EXIT 167	FAIRFAX	SOUTHBOUND	0.8
26	Freeway	110N04667	I-95 HOV	BACKLICK RD/EXIT 167	BACKLICK RD/EXIT 167	FAIRFAX	SOUTHBOUND	0.8
27	Freeway	110-04666	I-95 HOV	BACKLICK RD/EXIT 167	VA-7100/EXIT 166	FAIRFAX	SOUTHBOUND	0.2
28	Freeway	110P04155	I-95	VA-7100/EXIT 166	VA-7100/EXIT 166	FAIRFAX	NORTHBOUND	0.5
29	Freeway	110+04156	I-95	VA-7100/EXIT 166	BACKLICK RD/EXIT 167	FAIRFAX	NORTHBOUND	1.2
30	Freeway	110+04157	I-95	BACKLICK RD/EXIT 167	VA-7900/EXIT 169	FAIRFAX	NORTHBOUND	0.6
31	Freeway	110P04157	I-95	VA-7900/EXIT 169	VA-7900/EXIT 169	FAIRFAX	NORTHBOUND	0.0
32	Freeway	110+04158	I-95	VA-7900/EXIT 169	FRANCONIA RD/EXIT 169	FAIRFAX	NORTHBOUND	0.6
33	Freeway	110+04667	I-95 HOV	VA-7100/EXIT 166	BACKLICK RD/EXIT 167	FAIRFAX	NORTHBOUND	0.2
34	Freeway	110P04667	I-95 HOV	BACKLICK RD/EXIT 167	BACKLICK RD/EXIT 167	FAIRFAX	NORTHBOUND	0.8
35	Freeway	110+04668	I-95 HOV	BACKLICK RD/EXIT 167	VA-7900/EXIT 169	FAIRFAX	NORTHBOUND	0.8
36	Freeway	110P04668	I-95 HOV	VA-7900/EXIT 169	VA-7900/EXIT 169	FAIRFAX	NORTHBOUND	0.3
37	Freeway	110+04669	I-95 HOV	VA-7900/EXIT 169	FRANCONIA RD/EXIT 169	FAIRFAX	NORTHBOUND	0.6
<b>SUBTOTAL</b>								<b>19.0</b>
38	Arterial	110+09532	US-1	OPITZ BLVD	VA-123/GORDON BLVD	PRINCE WILLIAM	NORTHBOUND	2.3
39	Arterial	110-09531	US-1	VA-123/GORDON BLVD	OPITZ BLVD	PRINCE WILLIAM	SOUTHBOUND	2.3
40	Arterial	110+10063	VA-234	HOADLY RD	PURCELL RD	PRINCE WILLIAM	NORTHBOUND	2.2
41	Arterial	110-10062	VA-234	PURCELL RD	HOADLY RD	PRINCE WILLIAM	SOUTHBOUND	2.2
<b>SUBTOTAL</b>								<b>9.0</b>
<b>TOTAL</b>								<b>28.0</b>

**Table 2**  
**TMC segment lengths and distances between sensor deployment locations in the state of Virginia**

SEGMENT TYPE	TMC	STANDARD TMC					SENSOR DEPLOYMENT			
		Endpoint (1)		Endpoint (2)		Length (mile)	Endpoint (1)		Endpoint (2)	
		Lat	Long	Lat	Long		Lat	Long	Lat	Long
Freeway	110-04172	38.899562	-77.183077	38.892648	-77.167784	0.96	38.897650	-77.178020		
Freeway	110N04172	38.892648	-77.167784	38.891420	-77.166328	0.12				
Freeway	110-04171	38.891420	-77.166328	38.890173	-77.164856	0.12				
Freeway	110N04171	38.890173	-77.164856	38.889890	-77.164520	0.03				
Freeway	110-04170	38.891420	-77.166328	38.890173	-77.164856	0.12				
Freeway	110N04170	38.890173	-77.164856	38.887729	-77.161668	0.24				
Freeway	110-04169	38.887729	-77.161668	38.885622	-77.156357	0.32			38.885880	-77.156960
Freeway	110N04169	38.885622	-77.156357	38.884063	-77.151665	0.27	38.885880	-77.156960		
Freeway	110-04168	38.884063	-77.151665	38.880721	-77.123998	1.58			38.880040	-77.124520
Freeway	110+04169	38.880546	-77.124902	38.884091	-77.150625	1.46	38.879560	-77.131420		
Freeway	110P04169	38.884091	-77.150625	38.886009	-77.156365	0.34			38.885630	-77.154650
Freeway	110+04170	38.886009	-77.156365	38.887994	-77.161297	0.30	38.885630	-77.154650		
Freeway	110P04170	38.887994	-77.161297	38.891799	-77.166050	0.37				
Freeway	110P04171	38.889904	-77.163878	38.891799	-77.166050	0.18				
Freeway	110+04172	38.891799	-77.166050	38.892021	-77.166318	0.02				
Freeway	110P04172	38.892021	-77.166318	38.892227	-77.166565	0.02				
Freeway	110+04173	38.892227	-77.166565	38.900900	-77.185618	1.20			38.901540	-77.188860
Freeway	110-04157	38.778706	-77.181001	38.769744	-77.183017	0.63	38.778120	-77.181390		
Freeway	110N04157	38.769744	-77.183017	38.769289	-77.183070	0.03				
Freeway	110-04156	38.769289	-77.183070	38.762268	-77.183531	0.49			38.765670	-77.184650
Freeway	110-04155	38.762268	-77.183531	38.745601	-77.187166	1.17	38.765670	-77.184650		

**Table 2**  
**TMC segment lengths and distances between sensor deployment locations in the state of Virginia (Cont'd)**

SEGMENT TYPE	TMC	STANDARD TMC					SENSOR DEPLOYMENT			
		Endpoint (1)		Endpoint (2)		Length (mile)	Endpoint (1)		Endpoint (2)	
		Lat	Long	Lat	Long		Lat	Long	Lat	Long
Freeway	110N04155	38.745601	-77.187166	38.737369	-77.192405	0.64			38.737260	-77.192640
Freeway	110-04668	38.778671	-77.180758	38.769881	-77.182777	0.62	38.779090	-77.180690		
Freeway	110N04668	38.769881	-77.182777	38.765233	-77.183083	0.32				
Freeway	110-04667	38.765233	-77.183083	38.754304	-77.183975	0.76				
Freeway	110N04667	38.754304	-77.183975	38.743542	-77.187973	0.78				
Freeway	110-04666	38.743542	-77.187973	38.740450	-77.189868	0.24			38.739690	-77.190510
Freeway	110P04155	38.73657	-77.19244	38.74352	-77.18765	0.55	38.735020	-77.193550		
Freeway	110+04156	38.74352	-77.18765	38.76085	-77.18303	1.23				
Freeway	110+04157	38.76085	-77.18303	38.76974	-77.1825	0.61				
Freeway	110P04157	38.76974	-77.1825	38.77005	-77.18246	0.02				
Freeway	110+04158	38.77005	-77.18246	38.77846	-77.17965	0.60			38.777780	-77.179630
Freeway	110+04667	38.74045	-77.18987	38.74354	-77.18797	0.24	38.739690	-77.190510		
Freeway	110P04667	38.743542	-77.187973	38.754304	-77.183975	0.78				
Freeway	110+04668	38.754304	-77.183975	38.765233	-77.183083	0.76				
Freeway	110P04668	38.765233	-77.183083	38.769881	-77.182777	0.32				
Freeway	110+04669	38.769881	-77.182777	38.778671	-77.180758	0.62			38.779090	-77.180690
<b>SUBTOTAL</b>						<b>19.0</b>				
Arterial	110+09532	38.634703	-77.270942	38.661684	-77.247021	2.32	38.634200	-77.271170	38.661430	-77.247150
Arterial	110-09531	38.661735	-77.247085	38.634703	-77.270942	2.32	38.661430	-77.247150	38.634200	-77.271170
Arterial	110+10063	38.658599	-77.440598	38.689042	-77.440867	2.16	38.658520	-77.441020	38.688930	-77.441310
Arterial	110-10062	38.689017	-77.441148	38.658656	-77.440817	2.15	38.688930	-77.441310	38.658520	-77.441020
<b>SUBTOTAL</b>						<b>8.9</b>				
<b>TOTAL</b>						<b>27.9</b>				

**Table 3**  
**Path segments identified for validation in Virginia**

Type	Validation Segment	STANDARD SEGMENTS INCLUDED						STARTING AT	ENDING AT	LENGTH (MILE)		
		TMC(1)	TMC(2)	TMC(3)	TMC(4)	TMC(5)	TMC(6)			Standard	Deployment	Error (%)
Freeway	VA06-0001	110-04172	110N04172	110-04171	110N04170	110-04169		VA-267/EXIT 67	SYCAMORE ST/EXIT 69	1.8	1.42	-19.4%
Freeway	VA06-0002	110N04169	110-04168					SYCAMORE ST/EXIT 69	FAIRFAX DR/EXIT 71	1.9	1.85	-0.2%
Freeway	VA06-0003	110+04169	110P04169					FAIRFAX DR/EXIT 71	SYCAMORE ST/EXIT 69	1.8	1.34	-25.6%
Freeway	VA06-0008	110P04156	110+04157	110P04157	110+04158	110P04158		VA-7100/EXIT 166	BACKLICK RD/EXIT 167	3.2	3.09	-2.5%
Arterial	110+09532	110+09532						OPITZ BLVD	VA-123/GORDON BLVD	2.3	2.33	0.5%
Arterial	110-09531	110-09531						VA-123/GORDON BLVD	OPITZ BLVD	2.2	2.33	8.1%
Arterial	110+10063	110+10063						HOADLY RD	PURCELL RD	2.3	2.15	-7.5%
Arterial	110-10062	110-10062						PURCELL RD	HOADLY RD	2.1	2.15	0.0%
<b>TOTAL</b>										<b>17.5</b>	<b>16.7</b>	<b>-5.0%</b>

**Table 4**  
**Data quality measures for freeway segments greater than one mile in Virginia**

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	6.3	7.7	6.7	8.7	818
30-45	3.9	6.0	4.6	7.3	1332
45-60	0.3	2.2	1.0	4.0	3714
60+	-1.7	1.8	-3.4	3.8	2916

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

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	15%	68%	0%	61%	818
30-45	11%	55%	0%	46%	1332
45-60	41%	86%	0%	72%	3714
60+	40%	90%	0%	74%	2916

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

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	
VA06-0001	1.8	1.4	0-30	2.9	4.5	3.2	5.5	590
			30-45	2.3	7.0	2.5	9.0	96
			45-60	-3.1	3.9	-3.4	5.7	385
			60+	-3.0	3.1	-5.3	5.5	1113
VA06-0002	1.9	1.9	0-30	18.9	19.8	19.5	20.6	67
			30-45	3.9	4.9	4.6	5.9	687
			45-60	0.8	1.6	1.7	3.3	1255
			60+	-0.9	1.3	-2.3	3.4	220
VA06-0003	1.8	1.3	0-30	16.1	17.0	17.0	18.3	129
			30-45	4.2	7.6	5.0	9.5	476
			45-60	0.2	3.0	1.1	5.0	1271
			60+	-1.0	1.3	-2.6	3.4	121
VA06-0008	3.2	3.1	0-30	2.3	2.5	3.1	3.6	32
			30-45	3.7	3.8	4.6	5.0	73
			45-60	1.1	1.2	2.0	2.5	803
			60+	-0.9	1.0	-2.2	2.7	1462

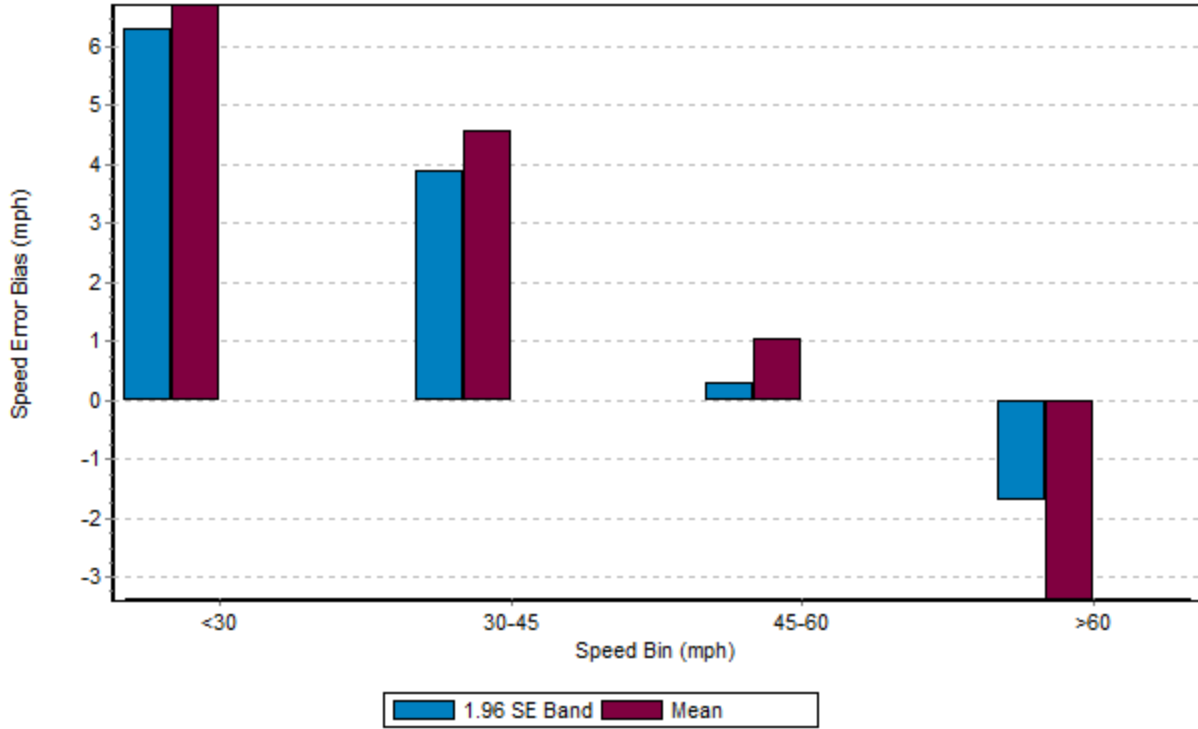
\*Results in the specified row may not be reliable due to small number of observations



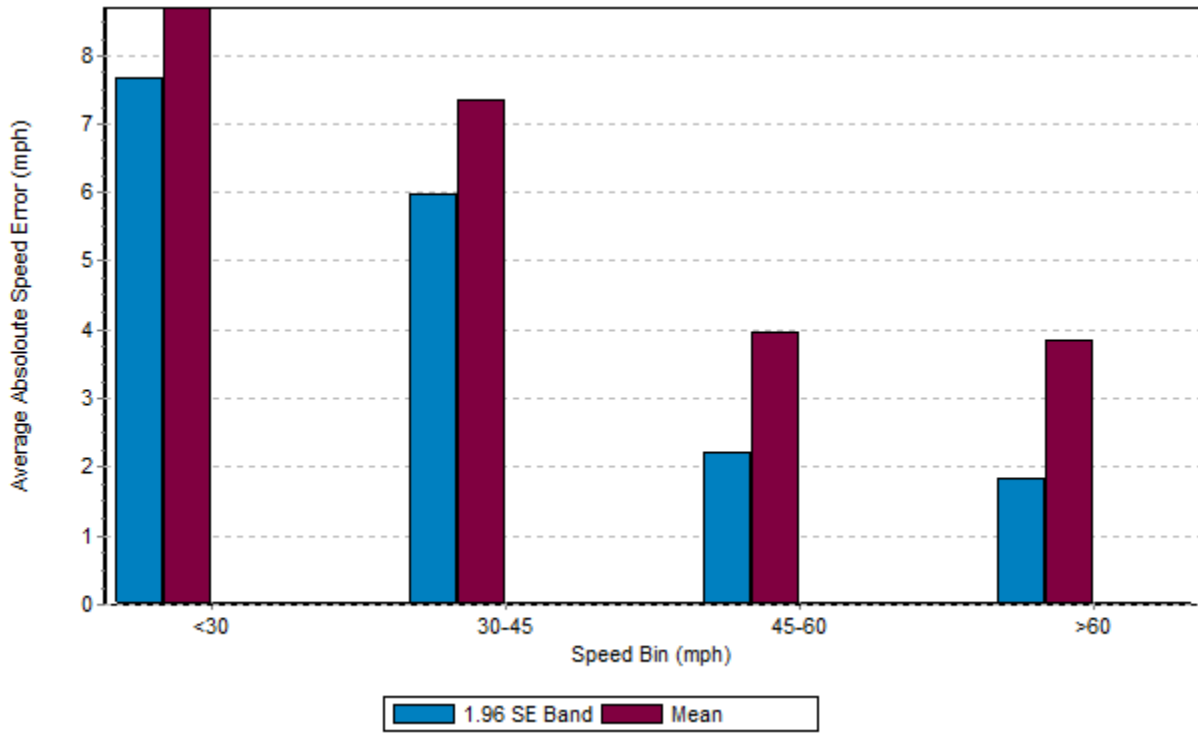
**Table 7**  
**Observations meeting data quality criteria for individual freeway validation segments greater than one mile in the state of Virginia**

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	
VA06-0001	0-30	106	18%	457	77%	0	0%	412	70%	590
	30-45	17	18%	42	44%	0	0%	35	36%	96
	45-60	181	47%	289	75%	0	0%	257	67%	385
	60+	331	30%	896	81%	0	0%	617	55%	1113
VA06-0002	0-30	4	6%	23	34%	0	0%	22	33%	67
	30-45	69	10%	397	58%	0	0%	337	49%	687
	45-60	526	42%	1139	91%	0	0%	990	79%	1255
	60+	100	45%	210	95%	0	0%	178	81%	220
VA06-0003	0-30	10	8%	51	40%	0	0%	41	32%	129
	30-45	52	11%	242	51%	0	0%	191	40%	476
	45-60	418	33%	998	79%	0	0%	736	58%	1271
	60+	64	53%	109	90%	0	0%	92	76%	121
VA06-0008	0-30	5	16%	27	84%	0	0%	24	75%	32
	30-45	4	5%	51	70%	0	0%	46	63%	73
	45-60	398	50%	760	95%	1	0%	701	87%	803
	60+	673	46%	1420	97%	0	0%	1274	87%	1462

\*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 Virginia**



**Figure 3**  
**Average absolute speed error for freeway segments greater than one mile in Virginia**