I-95 Corridor Coalition
Vehicle Probe Project:
HERE, INRIX and TOMTOM
Data Validation

Report for Maryland (#11)
Baltimore Harbor and Fort McHenry Tunnels, I-95 Express lanes

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Data Collected: March 29 to April 10, 2017
Report Date: October 2017

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Executive Summary

Wireless re-identification traffic monitoring (WRTM) data is collected to validate data from Vehicle Probe Project. WRTM data includes Bluetooth, Wi-Fi and other wireless traffic monitoring devices that collect signals emitted by in-vehicle electronic equipment. The specific device type used for each validation, will be determined based upon applicability and will be defined in the report. Specifications used for comparison include the Average Absolute Speed Error (AASE) and the Speed Error Bias (SEB).

- Bluetooth re-identification sensors were deployed at the beginning and ending points of 10 different segments along the I-895 Baltimore Harbor Tunnel, I-95 Express lanes and Fort McHenry Tunnel.
- Selected segments for I-895 Tunnel corridor stretch from Exit 9 to Exit 10.
- I-95 Express lanes segments covers the range from Exit 61 to E Joppa Road.
- Fort McHenry Tunnel segment include the stretch between Exit 55 to Exit 56.
- (Refer to Figures 1-3 below for overview map snapshots and approximate sensor locations).
- Travel time data was collected for both directions along the corridors, between March 29 and April 10, 2017.
- The dataset collected represents approximately 2,630 hours of observations along 10 freeway segments, totaling approximately 26 miles.
- The total number of effective five-minute travel time samples observed was 31,557.
- 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.

ES Table 1 provides a summary description of the study corridor.

ES Table 1– I-895 Baltimore Harbor Tunnel, I-95 Express lanes and Fort McHenry Tunnel Description

Corridor Name	Number of Lanes	AADT	Speed Limit
I-895 Tunnel	2 lanes per direction	80,460	50 *mph*
I-95 Express	1 to 3 lanes per direction	134,400	*65 mph*
I-95 Tunnel	2 lanes per bore (4 bores)	118,800	Variable up to 55 *mph*

ES Tables 2, 3 and 4 below summarize the results of the comparison between the WRTM reference data and the probe data from each vendor for freeway segments during the above noted time period.

ES Table 2- HERE Freeway Evaluation Summary for Maryland					
Speed Bin	**Average Absolute Speed Error (<10mph)**		**Speed Error Bias (<5mph)**		Number of 5 Minute Samples
	Comparison with SEM Band	Comparison with Mean	Comparison with SEM Band	Comparison with Mean	
0-30 MPH	4.5	6.4	-0.3	-0.5	233
30-45 MPH	3	5.7	-0.9	-0.2	523
45-60 MPH	3.7	7.9	-3.6	-7.5	2514
>60 MPH	8.3	13.9	-8.3	-13.9	3181
All Speeds	5.9	10.7	-5.6	-9.8	6451
Based upon data collected from March 29, through April 10, 2017 across 26 miles of roadway.					

- For the HERE data as shown in ES Table 2, the average absolute speed error (AASE) was within specification because all speed bins fell below the required maximum value of <10 mph.
- The Speed Error Bias (SEB) was within specifications when compared with the Standard Error of the Mean (SEM) Band for all categories except for the >60 MPH speed bin. The error bias for >60 mph was -8.3 where specifications require a +/- 5mph variation. The value for all speeds is -5.6
- It is important to note that for this report, data from HERE was only available for the Fort McHenry Tunnel (two segments) and the results are based on the analysis of a partial data submission.

ES Table 3- INRIX Freeway Evaluation Summary for Maryland					
Speed Bin	**Average Absolute Speed Error (<10mph)**		**Speed Error Bias (<5mph)**		Number of 5 Minute Samples
	Comparison with SEM Band	Comparison with Mean	Comparison with SEM Band	Comparison with Mean	
0-30 MPH	7.1	8.3	-0.3	0	974
30-45 MPH	5.6	8.1	2.8	3.7	2047
45-60 MPH	4.4	7.5	1.4	2.3	9756
>60 MPH	2.4	5.4	-1.9	-3.6	18780
All Speeds	3.4	6.3	-0.5	-1.2	31557
Based upon data collected from March 29, through April 10, 2017 across 26 miles of roadway.					

- For the INRIX data shown in ES Table 3, the average absolute speed error (AASE) was within the maximum specification of <10 mph in all speed bins.
- The Speed Error Bias (SEB) was within specifications for all speed bins when compared with the Standard Error of the Mean (SEM) Band.

ES Table 4- TOMTOM Freeway Evaluation Summary for Maryland					
Speed Bin	**Average Absolute Speed Error (<10mph)**		**Speed Error Bias (<5mph)**		Number of 5 Minute Samples
	Comparison with SEM Band	Comparison with Mean	Comparison with SEM Band	Comparison with Mean	
0-30 MPH	3.7	5	1.3	1.5	974
30-45 MPH	3.4	5.6	-2.5	-3.5	2047
45-60 MPH	6.4	10	-4	-5.6	9756
>60 MPH	7.7	11.4	-7.7	-11.1	18780
All Speeds	6.9	10.4	-5.9	-8.5	31557
Based upon data collected from March 29, through April 10, 2017 across 26 miles of roadway.					

- For the TomTom data as shown in ES Table 4, the average absolute speed error (AASE) was within specification because all speed bins fell below the required maximum value of <10 mph.
- The Speed Error Bias (SEB) was within specifications when compared with the Standard Error of the Mean (SEM) Band for all categories except for the >60 MPH speed bin. The error bias was -7.7 where specifications require a +/- 5mph variation. The value for all speeds is -5.9.

This report is the first that looks at tunnels when validating probe data. As the program moves to look beyond freeway and arterial validation, it will be starting to focus more on special facilities for future studies.

Deviation of SEB in >60 MPH speed bin from +/- 5mph range in ES Tables 2 and 4 may be attributed to weakness or absence of GPS signal in tunnels. There is a need to understand how probe data is captured and processed in tunnels, double decker bridges and other facilities where GPS signal from the satellite is obstructed. The expectation is that validation requests for tunnels will become more frequent.

Methodology

Corridor Description and Data Collection

Travel time samples were collected along 10 freeway segments with the assistance of Maryland Department of Transportation (MDOT) personnel. Freeway segments studied were located on the I-895 Baltimore Harbor Tunnel corridor from Exit 9 to Exit 10, I-95 Express corridor from Exit 61 to E Joppa Road, and I-95 Fort McHenry Tunnel corridor between Exit 55 and Exit 56. Travel time data was collected for both directions along I-895 and I-95 freeway segments between March 29 and April 10, 2017. Segments locations were chosen with a high-likelihood of observing recurrent and non-recurrent congestion during peak and off-peak periods.

Figure 1 to 3 present overview snapshots of the placement of sensors for the collection of data on I-895 Baltimore Harbor Tunnel, I-95 Express lanes and I-95 Fort McHenry Tunnel corridors in Maryland. Markers shows the start point and endpoint of freeway segments selected for analysis.

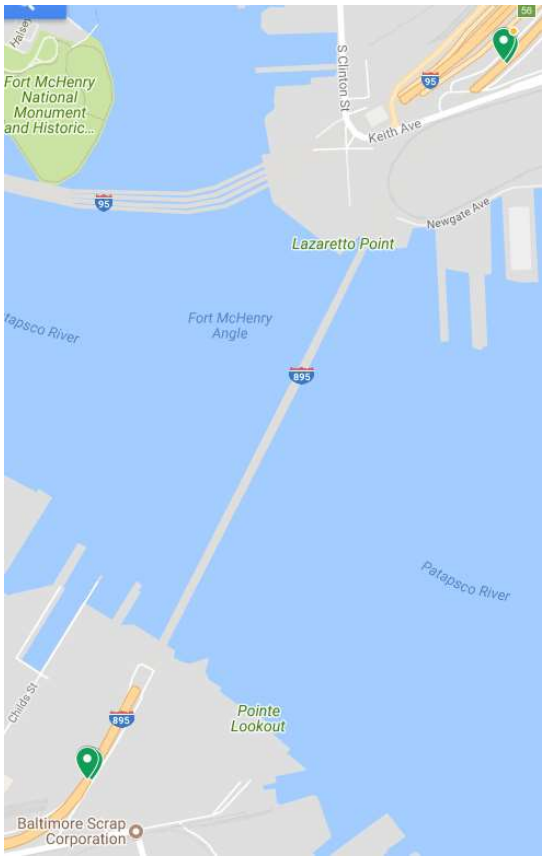

Figure 1- Locations of all segments selected on I-895 Baltimore Harbor Tunnel for analysis in Maryland

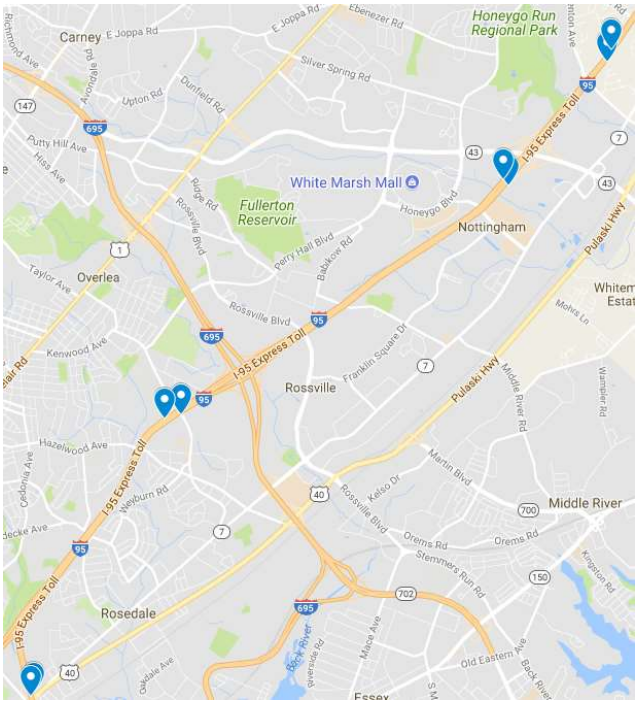

Figure 2- Locations of all segments selected on I-95 Express lanes for analysis in Maryland

Figure 3- Locations of all segments selected on I-95 Fort McHenry Tunnel for analysis in Maryland

TMC segments selected for validation in Maryland

Table 1 presents the data collection segments from Maryland. As a whole, these segments cover a total length of 26 freeway 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, in most cases, one mile or greater for freeways. When appropriate, consecutive TMC segments are combined to form a data collection segment longer than one mile. The results of the validation performed on 10 directional freeway 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 WRTM sensors were deployed along the I-895 Baltimore Harbor Tunnel, I-95 Fort McHenry Tunnel and I-95 Express lanes in Maryland 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 WRTM sensor covers both data collection segments.

An algorithm was developed and documented in a separate report[1] 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 probe data feeds for individual data collection segments are provided in this separate report. This algorithm finds an equivalent probe travel time (and therefore travel speed) corresponding to each sample WRTM travel time observation on the test segment of interest.

[1] Ali Haghani, Masoud Hamedi, 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 Maryland

Segment (Map Link)	DESCRIPTION					Deployment	
	Highway Direction	Starting at Ending at	Lane (Min) Lane (Max)	AADT (Min) AADT (Max)	Access Points Speed Limit	Begin Lat/Lon End Lat/Lon	Length (mile)
Freeway							
A1	I-95 EXP	Pulaski Hwy	1	98,375	2	39.305200 -76.530600	3.16
MD11-0001	Northbound	Kenwood Ave	3	134,075	65	39.345900 -76.506800	
A2	I-95 EXP	Kenwood Ave	2	143,925	1	39.345900 -76.506800	3.56
MD11-0002	Northbound	MD-43/Exit 67	2	151,725	65	39.375300 -76.452400	
A3	I-95 EXP	MD-43/Exit 67	0(merged)	143,925	0	39.375300 -76.452400	1.44
MD11-0003	Northbound	E Joppa Road	2	151,725	65	39.391107 -76.435854	
A4	I-95 EXP	E Joppa Road	1	143,925	2	39.392742 -76.435219	1.39
MD11-0004	Southbound	MD-43/Exit 67	3	151,725	55	39.375900 -76.452900	
A5	I-95 EXP	MD-43/Exit 67	2	143,925	1	39.375900 -76.452900	3.62
MD11-0005	Southbound	Kenwood Ave	3	151,725	55	39.345100 -76.509500	
A6	I-95 EXP	Kenwood Ave	0(merged)	98,375	3	39.346230 -76.507730	3.18
MD11-0006	Southbound	Pulaski Hwy	2	134,075	55	39.305700 -76.530900	
A7	I-895 Tunnel	Childs St	2	77,235	0	39.243210 -76.578500	1.76
MD11-0007	Northbound	S Newkirk St	2	84,281	50	39.264900 -76.562160	
A8	I-895 Tunnel	S Newkirk St	2	77,235	0	39.265100 -76.562370	1.74
MD11-0008	Southbound	Childs St	2	84,281	50	39.243350 -76.578680	
A9	I-95 Tunnel	Exit 55 South	2	116,575	0	39.265770 -76.596320	2.2
MD11-0009	Northbound	Fort McHenry Tunnel Toll Plaza	2	121,020	55	39.268230 -76.559700	
A10	I-95 Tunnel	Fort McHenry Tunnel Toll Plaza	2	116,575	0	39.266500 -76.562400	2.17
MD11-0010	Southbound	Exit 55 South	2	121,020	55	39.267300 -76.605000	

Analysis of Freeways

Following sections summarizes the data quality measures obtained as a result of comparison between WRTM and all reported probe 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: 0-30 MPH, 30-45 MPH, 45-60 MPH, and > 60 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 WRTM 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 bins have proven to be the critical specification (and most difficult) to attain. It is important to consider that the weather ranged from rain to heavy rain during the data collection[2].

[2] The ground-truth data collected for this report as well as detailed daily comparison graphs for all segments are available for download upon request. Please email masoud@umd.edu for such inquiries.

Results

Analysis of Freeway Results for HERE Data

Table 2 shows the results of the comparison between the WRTM reference data and the HERE data. As stated before, the average absolute speed error (AASE) was within specification in all speed bins. Except for the >60 MPH speed bin, the Speed Error Bias (SEB) was within specifications for all speed bins when compared with the Standard Error of the Mean (SEM) Band. It must be noted that due to unexpected technical problems, HERE data was not available on Baltimore Harbor Tunnel and I-95 Express Lanes.

Table 2- HERE Data quality measures for freeway segments in Maryland

Speed Bin	Average Absolute Speed Error (<10mph)		Speed Error Bias (<5mph)		Number of 5 Minute Samples
	Comparison with SEM Band	Comparison with Mean	Comparison with SEM Band	Comparison with Mean	
0-30 MPH	4.5	6.4	-0.3	-0.5	233
30-45 MPH	3	5.7	-0.9	-0.2	523
45-60 MPH	3.7	7.9	-3.6	-7.5	2514
>60 MPH	8.3	13.9	-8.3	-13.9	3181
All Speeds	5.9	10.7	-5.6	-9.8	6451
Based upon data collected from March 29, through April 10, 2017 across 26 miles of roadway.					

Table 3 shows the percentage of the time the HERE data falls within 5 mph of the SEM band and the mean for each speed bin for all freeway data segments in this validation report.

Table 3- Percent observations meeting HERE data

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	
0-30	9%	64%	0%	45%	233
30-45	30%	73%	0%	46%	523
45-60	32%	68%	0%	28%	2514
60+	6%	28%	0%	3%	3181

Analysis of Freeway Results for INRIX Data

Table 4 shows the results of the comparison between the WRTM reference data and the INRIX data. As stated before, the average absolute speed error (AASE) was within specification in all speed bins. The Speed Error Bias (SEB) was within specifications for all speed bins when compared with the Standard Error of the Mean (SEM) Band.

Table 4- INRIX Data quality measures for freeway segments in Maryland

Speed Bin	Average Absolute Speed Error (<10mph)		Speed Error Bias (<5mph)		Number of 5 Minute Samples
	Comparison with SEM Band	Comparison with Mean	Comparison with SEM Band	Comparison with Mean	
0-30 MPH	7.1	8.3	-0.3	0	974
30-45 MPH	5.6	8.1	2.8	3.7	2047
45-60 MPH	4.4	7.5	1.4	2.3	9756
>60 MPH	2.4	5.4	-1.9	-3.6	18780
All Speeds	3.4	6.3	-0.5	-1.2	31557
Based upon data collected from March 29, through April 10, 2017 across 26 miles of roadway.					

Table 5 shows the percentage of the time the INRIX data falls within 5 mph of the SEM band and the mean for each speed bin for all freeway data segments in this validation report.

Table 5- Percent observations meeting INRIX data quality criteria for freeway segments in Maryland

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	
0-30	15%	44%	0%	36%	974
30-45	18%	56%	0%	36%	2047
45-60	35%	66%	0%	43%	9756
60+	46%	86%	0%	60%	18780

Analysis of Freeway Results for TOMTOM Data

Table 6 shows the results of the comparison between the WRTM reference data and the TOMTOM data. As stated before, the average absolute speed error (AASE) was within specification in all speed bins. Except for the >60 MPH speed bin, the Speed Error Bias (SEB) was within specifications for all speed bins when compared with the Standard Error of the Mean (SEM) Band.

Table 6- TOMTOM Data quality measures for freeway segments in Maryland

Speed Bin	Average Absolute Speed Error (<10mph)		Speed Error Bias (<5mph)		Number of 5 Minute Samples
	Comparison with SEM Band	Comparison with Mean	Comparison with SEM Band	Comparison with Mean	
0-30 MPH	3.7	5	1.3	1.5	974
30-45 MPH	3.4	5.6	-2.5	-3.5	2047
45-60 MPH	6.4	10	-4	-5.6	9756
>60 MPH	7.7	11.4	-7.7	-11.1	18780
All Speeds	6.9	10.4	-5.9	-8.5	31557
Based upon data collected from March 29, through April 10, 2017 across 26 miles of roadway.					

Table 7 shows the percentage of the time the TOMTOM data falls within 5 mph of the SEM band and the mean for each speed bin for all freeway data segments in this validation report.

Table 7- Percent observations meeting TOMTOM data quality criteria for freeway segments in Maryland

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	
0-30	26%	69%	0%	60%	974
30-45	33%	75%	0%	58%	2047
45-60	21%	52%	0%	27%	9756
60+	21%	52%	0%	27%	18780

Appendix

Table A.1 to A.3 presents detailed data for individual TMC segments in this validation for all three vendors. 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 A. 1
HERE data quality measures for individual freeway validation segments in the state of Maryland

Path	Standard TMC length	Sensor 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	
MD11-0009	2.17	2.9	0-30	-0.3	4.4	-0.7	6.0	190
			30-45	-0.5	3.3	-0.2	5.8	278
			45-60	-3.6	3.6	-7.7	8.1	1237
			60+	-8.1	8.1	-14.7	14.7	1472
MD11-0010	2.36	2.92	0-30	-0.5	4.8	0.7	8.4	43
			30-45	-1.3	2.7	-0.2	5.6	245
			45-60	-3.7	3.8	-7.2	7.7	1277
			60+	-8.4	8.4	-13.2	13.3	1709

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

Table A.2 presents detailed data for individual TMC segments for INRIX. 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 A. 2
INRIX data quality measures for individual freeway validation segments in the state of Maryland

Path	Standard TMC length	Sensor 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	
MD11-0001	3.17	3.16	0-30	2.0	2.0	3.7	6.6	12*
			30-45	-1.3	1.5	-4.2	7.0	9*
			45-60	1.8	2.0	4.3	4.7	336
			60+	0.3	0.7	0.9	2.6	2843
MD11-0002	3.55	3.56	0-30	-	-	-	-	-
			30-45	-0.7	0.7	-5.9	6.0	16*
			45-60	-1.3	1.5	-3.8	4.7	88
			60+	-2.7	2.7	-5.3	5.5	3176
MD11-0003	1.43	1.44	0-30	13.7	13.7	16.0	16.0	80
			30-45	6.1	7.1	8.2	10.0	43
			45-60	6.5	6.9	9.8	10.4	2367
			60+	2.5	2.9	5.4	6.0	652
MD11-0004	1.39	1.39	0-30	-	-	-	-	-
			30-45	-	-	-	-	-
			45-60	1.4	3.3	4.0	7.3	87
			60+	-0.6	1.1	-1.4	4.0	3272
MD11-0005	3.59	3.62	0-30	-	-	-	-	-
			30-45	1.8	2.0	0.9	5.0	15*
			45-60	0.6	1.0	2.2	3.3	281
			60+	-0.3	0.6	-1.2	2.9	3047
MD11-0006	3.18	3.18	0-30	1.8	1.8	3.1	3.2	48
			30-45	0.5	2.8	0.9	4.8	49
			45-60	-0.2	0.6	-0.7	2.3	807
			60+	-1.9	1.9	-4.3	4.5	2422
MD11-0007	1.75	1.76	0-30	-6.1	9.0	-6.6	9.9	443
			30-45	5.6	8.5	6.9	10.8	492
			45-60	4.3	5.9	6.4	9.0	1698
			60+	0.0	3.0	-1.1	7.9	102
MD11-0008	1.74	1.74	0-30	6.1	6.2	7.0	7.1	156
			30-45	4.1	4.9	5.7	7.0	878
			45-60	0.9	2.2	1.6	4.9	1471
			60+	-3.3	3.3	-9.6	9.6	16*
MD11-0009	2.17	2.9	0-30	0.9	2.2	1.1	3.6	192
			30-45	0.3	3.2	0.5	5.8	299
			45-60	-3.2	3.3	-5.7	6.8	1297
			60+	-7.6	7.6	-14.0	14.0	1491
MD11-0010	2.36	2.92	0-30	2.2	6.6	3.5	9.9	43
			30-45	-4.2	6.7	-4.8	10.2	246
			45-60	-4.9	5.6	-6.0	9.0	1324
			60+	-6.2	6.3	-10.0	10.5	1759

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

Table A.3 presents detailed data for individual TMC segments for TomTom. 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 A. 3
TOMTOM data quality measures for individual freeway validation segments in the state of Maryland

Path	Standard TMC length	Sensor 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	
MD11-0001	3.17	3.16	0-30	0.6	0.8	-0.1	6.9	12*
			30-45	-0.9	1.5	-1.3	6.3	9*
			45-60	-0.6	0.6	-2.6	2.8	321
			60+	-5.4	5.4	-8.6	8.6	2754
MD11-0002	3.55	3.56	0-30	-	-	-	-	-
			30-45	-3.2	3.2	-9.4	9.4	16*
			45-60	-4.1	4.1	-7.4	7.6	86
			60+	-5.1	5.1	-8.2	8.2	3077
MD11-0003	1.43	1.44	0-30	12.1	12.1	14.4	14.4	80
			30-45	6.2	6.9	8.3	9.6	43
			45-60	4.7	5.2	8.0	8.6	2280
			60+	0.4	0.7	2.6	3.3	642
MD11-0004	1.39	1.39	0-30	-	-	-	-	-
			30-45	-	-	-	-	-
			45-60	-1.1	2.2	0.8	5.7	87
			60+	-2.6	2.6	-6.5	6.8	3179
MD11-0005	3.59	3.62	0-30	-	-	-	-	-
			30-45	-0.1	0.2	-2.1	3.0	15*
			45-60	0.4	0.6	2.3	3.0	280
			60+	-0.8	0.8	-2.7	3.1	2958
MD11-0006	3.18	3.18	0-30	0.1	0.7	-0.2	2.1	48
			30-45	-0.6	0.7	-1.6	2.4	49
			45-60	-9.4	9.4	-11.9	12.0	805
			60+	-16.7	16.7	-19.7	19.7	2335
MD11-0007	1.75	1.76	0-30	0.2	0.7	0.2	1.3	391
			30-45	-0.1	0.6	0.2	2.0	486
			45-60	-1.2	1.2	-3.7	3.9	1647
			60+	-6.1	6.1	-13.6	13.6	102
MD11-0008	1.74	1.74	0-30	4.8	6.4	5.6	7.5	147
			30-45	-3.4	3.7	-5.2	5.9	822
			45-60	-7.9	7.9	-11.8	11.8	1428
			60+	-13.8	13.8	-22.1	22.1	16*
MD11-0009	2.17	2.9	0-30	-4.6	4.6	-6.1	6.3	181
			30-45	-8.5	8.5	-11.5	11.5	269
			45-60	-16.5	16.5	-22.2	22.2	1230
			60+	-22.7	22.7	-29.5	29.5	1470
MD11-0010	2.36	2.92	0-30	6.4	6.5	8.9	9.4	43
			30-45	0.6	2.1	1.7	5.5	246
			45-60	-5.2	5.2	-8.4	9.0	1269
			60+	-15.4	15.4	-20.3	20.3	1690

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