

Practical Uses of Bluetooth® Based Probe Data

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ITS Texas

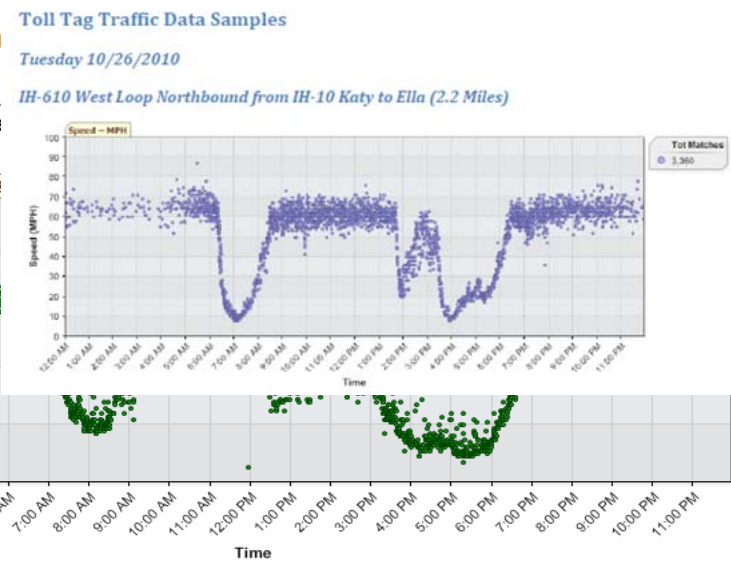
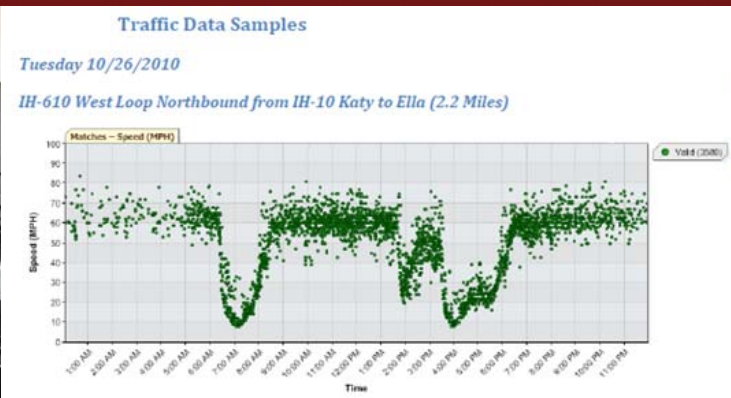
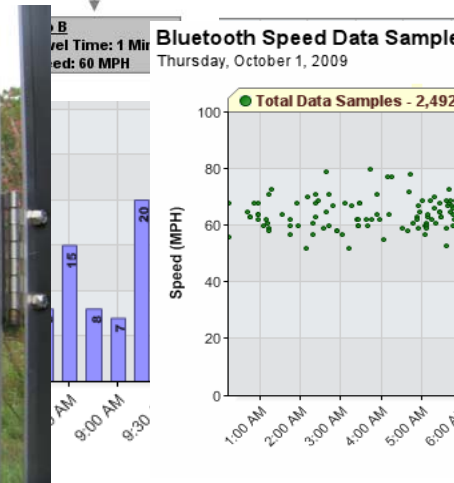
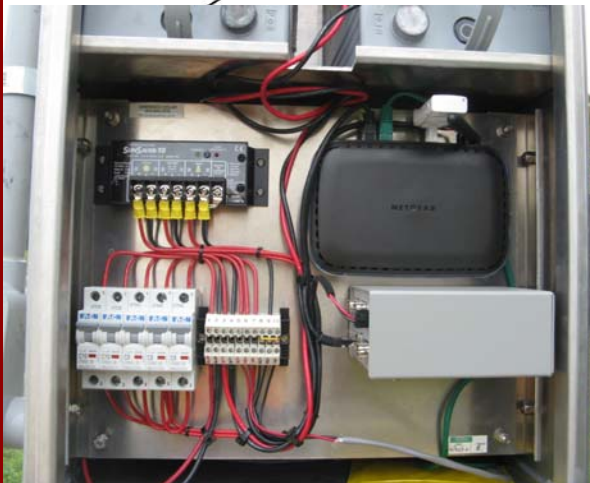
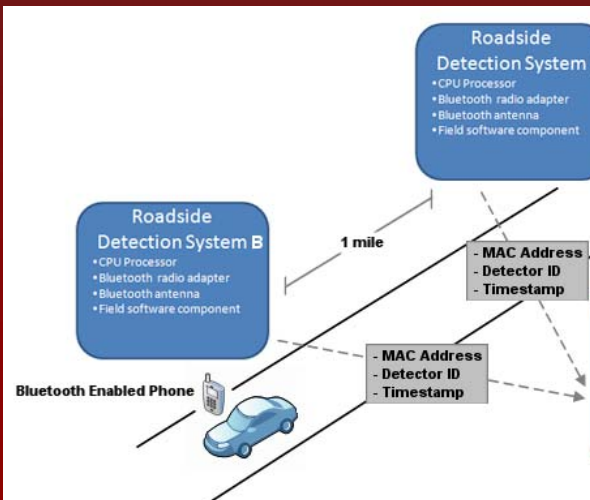
San Marcos, Texas

November 11, 2011

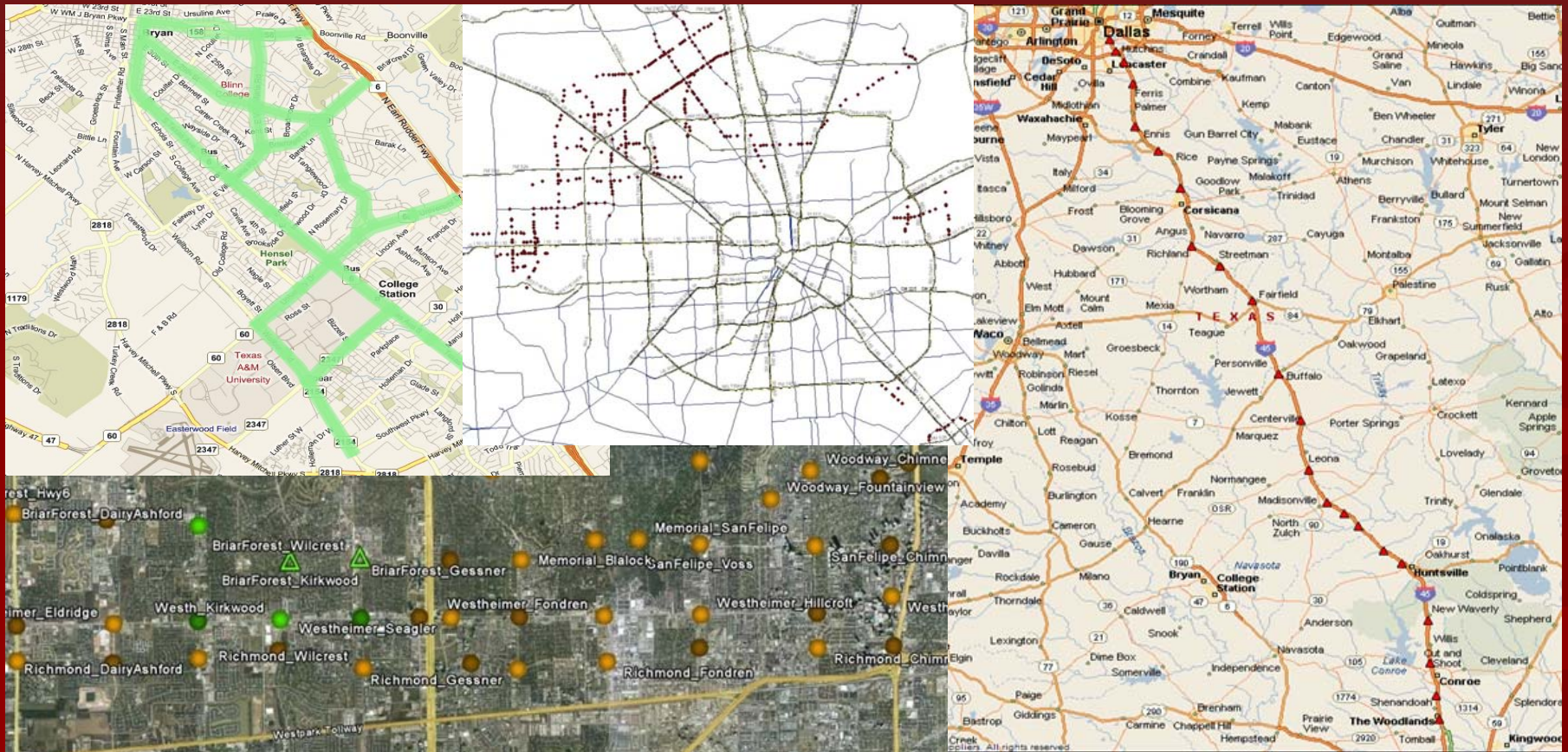
practical?

1. of or pertaining to practice or action: practical mathematics.
2. consisting of, involving, or resulting from practice or action: a practical application of a rule.
3. of, pertaining to, or concerned with ordinary activities, business, or work: practical affairs.
4. adapted or designed for actual use; useful: practical instructions.
5. engaged or experienced in actual practice or work: a practical politician.

This is NOT about how *Bluetooth* works



..... or where it is installed



..... or what it costs

BUT

about what we have seen with

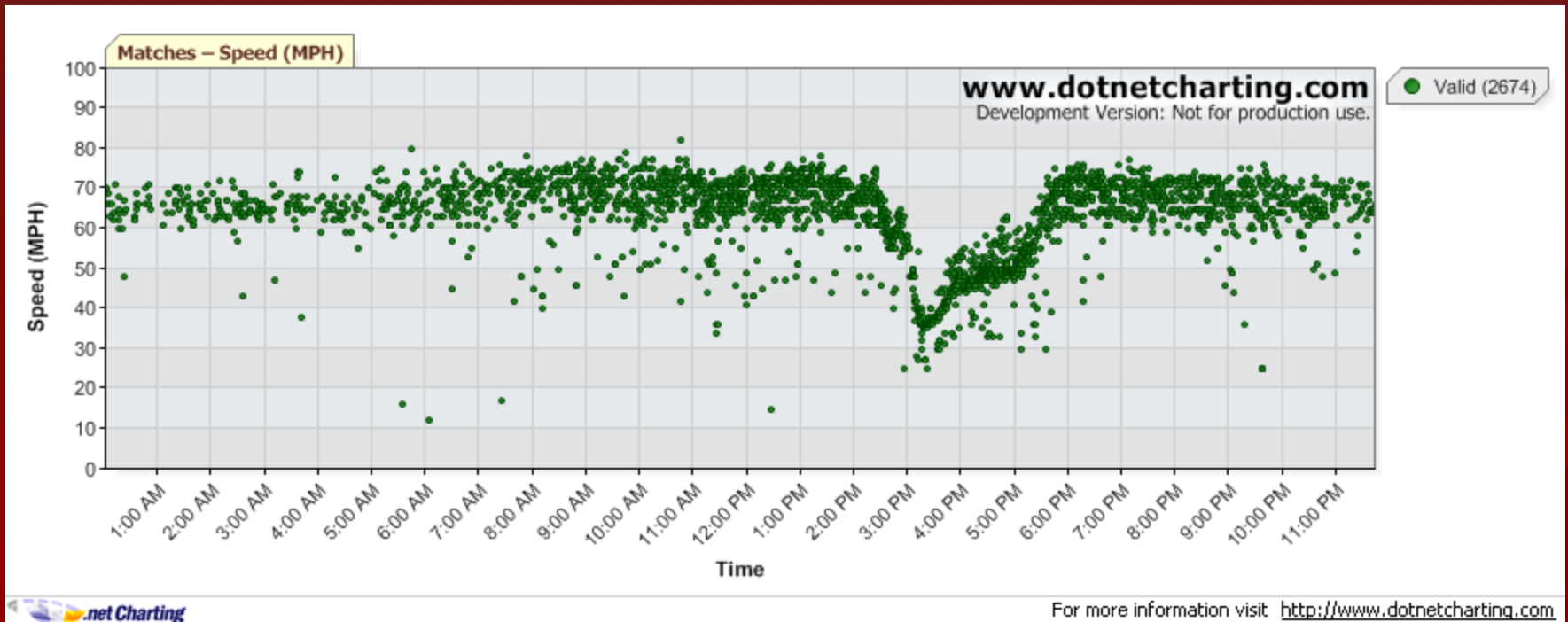
the Texas Installations

How do the “long” segments perform?

- For the I-35 installations between Georgetown & Hillsboro, segment lengths range from 13 to 40 miles
- Can *Bluetooth* still pick up slow speeds and produce useful observations?
 - Note: More sensors to be installed soon to reduce segment lengths

From Prairie Dell to Temple (17 miles) - Individual MAC Address Matches

Friday – October 7, 2011

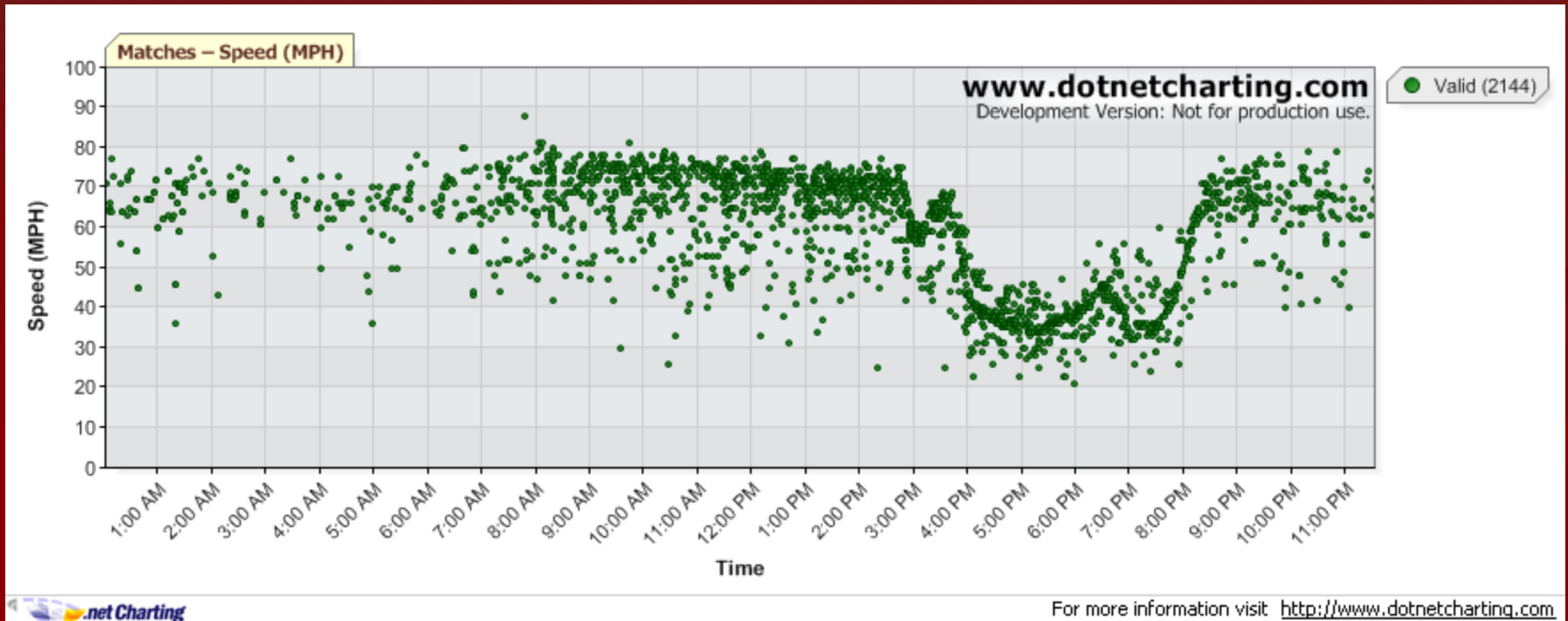


**** 17 miles @ 70 mph vs. 35 mph ≈ 14 minutes delay per trip**

**** 17 miles @ 70 mph vs. 50 mph ≈ 5 minutes delay per trip**

From Bellmead to Hillsboro (31 miles) - Individual MAC Address Matches

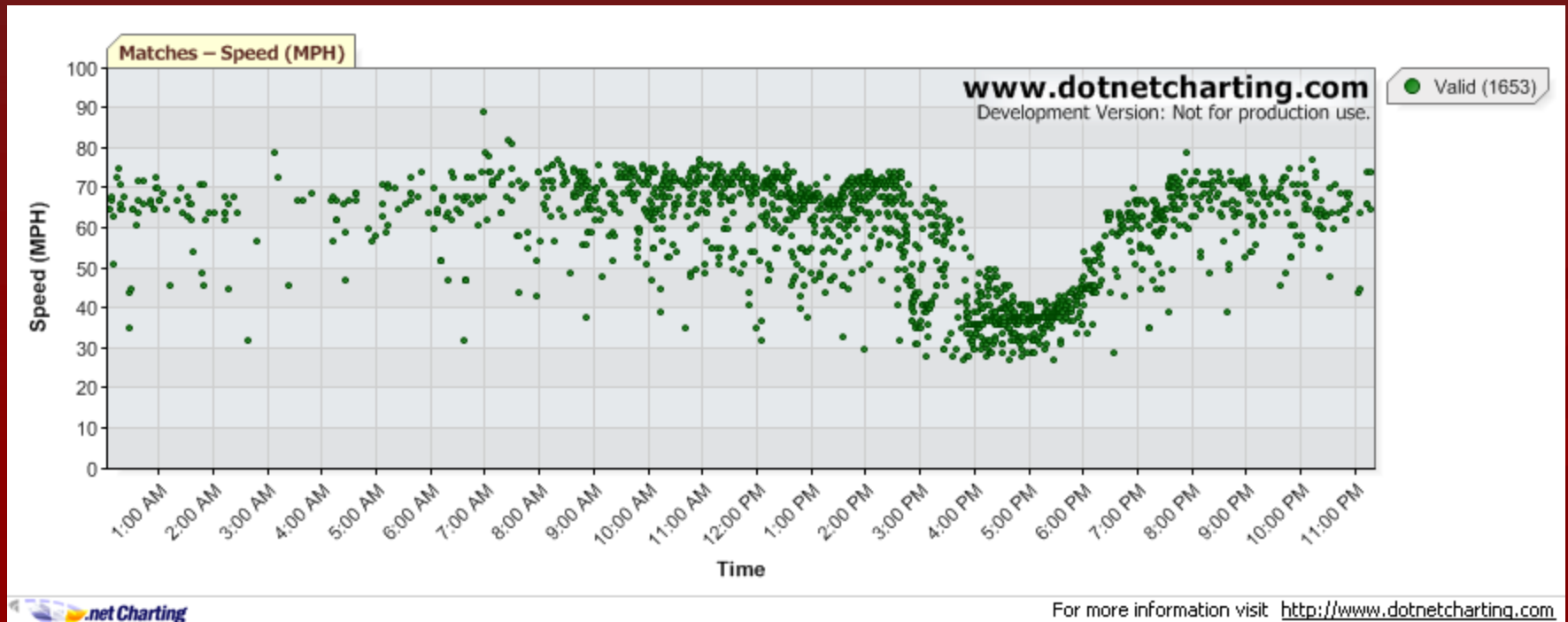
Sunday – November 6, 2011



**** 31 miles @ 70 mph vs. 35 mph ≈ 26 minutes delay per trip**

From Temple to Bellmead (40 miles) - Individual MAC Address Matches

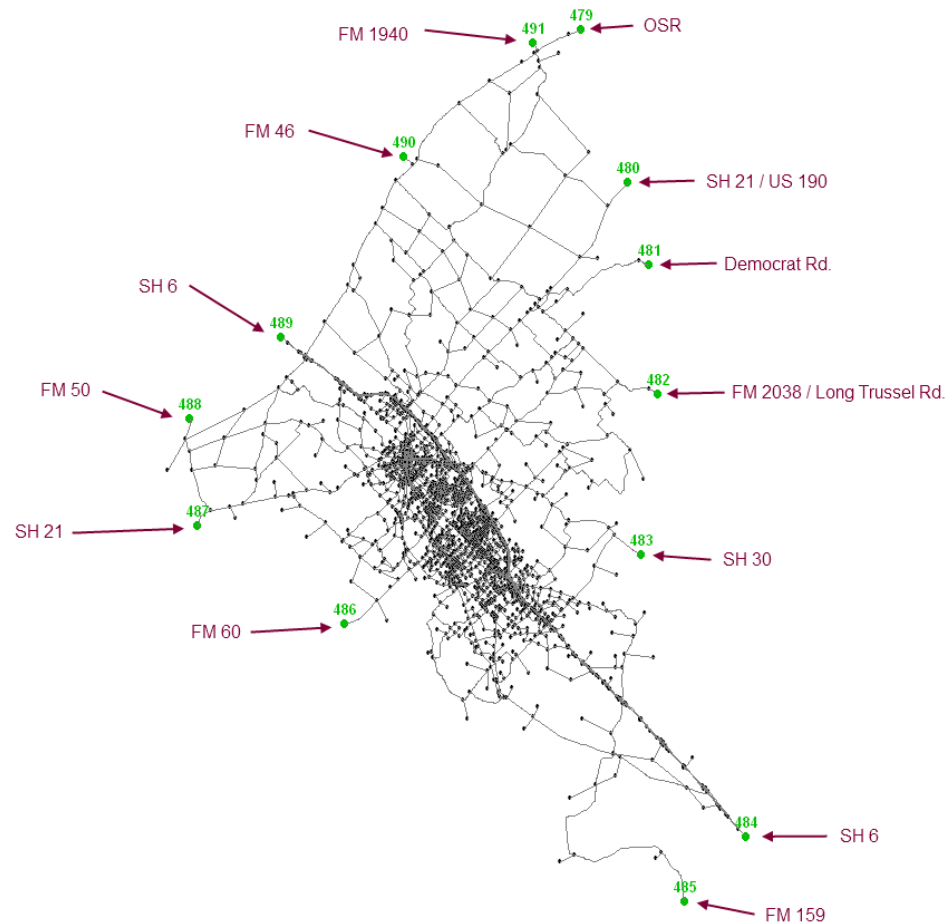
Sunday – October 30, 2011



**** 40 miles @ 70 mph vs. 40 mph \approx 26 minutes delay per trip**

Can Bluetooth determine O-D patterns?

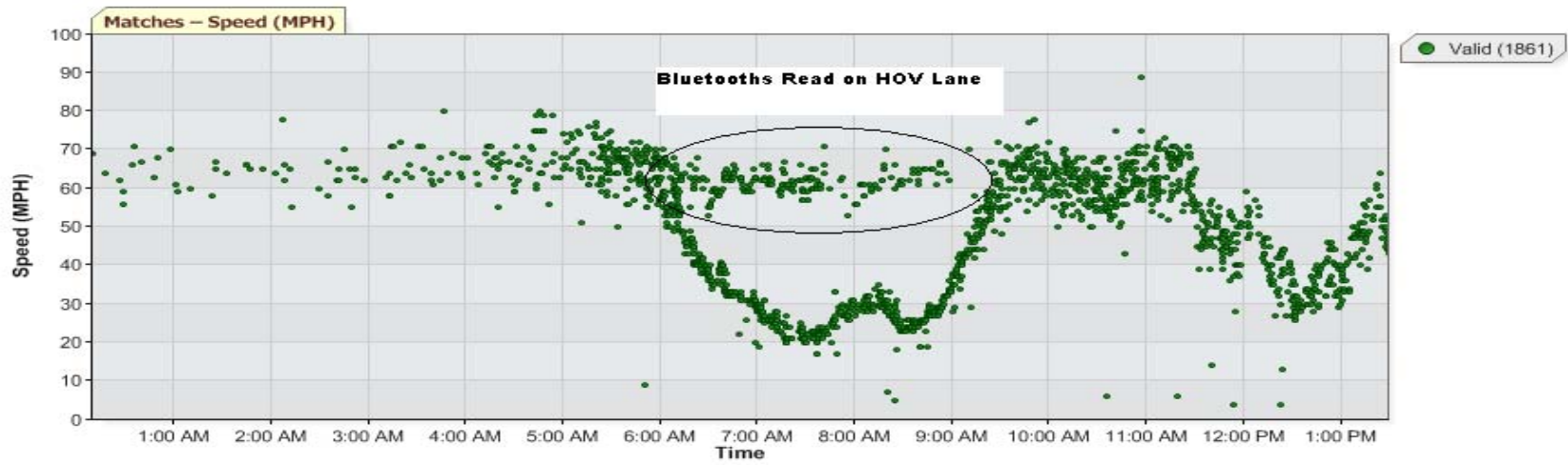
August 2011 -- Brazos County study



Can *Bluetooth* determine O-D patterns?

- YES, provides comparable results – but must consider:
 - ✓ Need same day traffic counts to expand numbers
 - ✓ Does not provide detailed information like interviews or mail outs
 - ❖ Trip purpose
 - ❖ Passengers in vehicle
 - ❖ Commercial vs. Non-Commercial vehicles
 - ✓ Watch for multiple *Bluetooth* devices detected in a single vehicle
 - ✓ Consider time constraints between stations

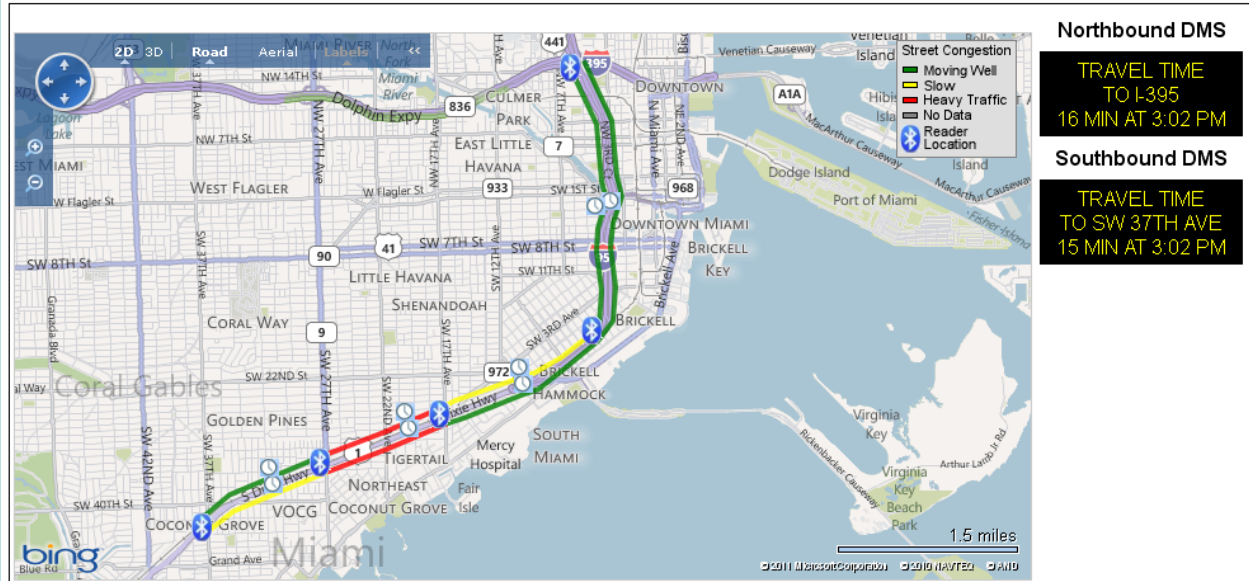
How Does HOV Lane impact *Bluetooth*?



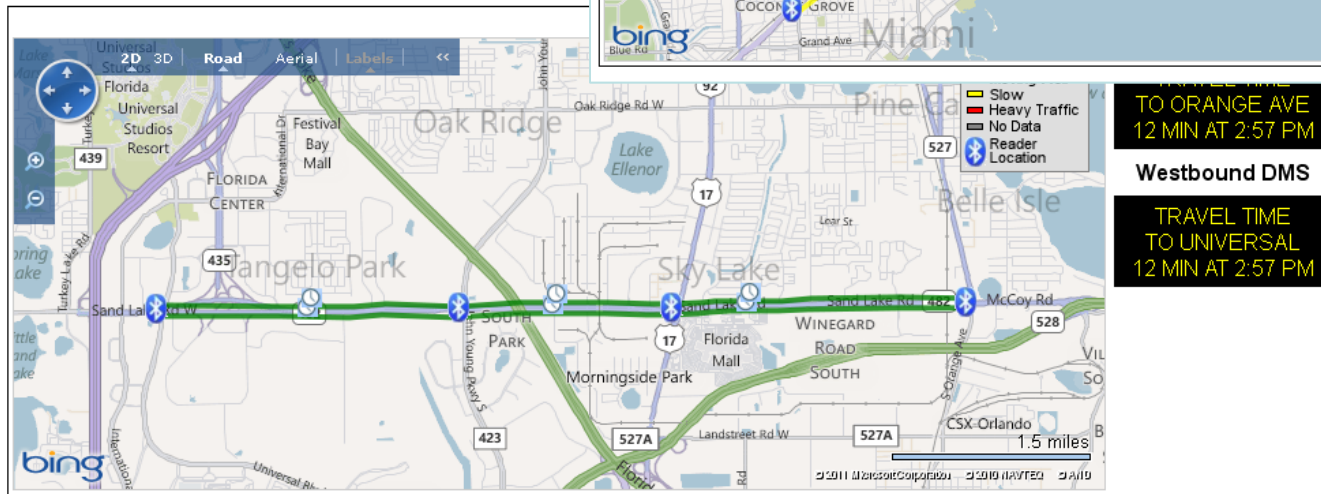
Bluetooth Demonstrations in Florida

[Matches](#)
[Reads](#)
[Match Sample Rates](#)
[Live Traffic Map - Orlando](#)
[Live Traffic Map - Miami](#)
[Export Data](#)
[Live Data Feed](#)

AWAM Bluetooth Demonstration - Miami

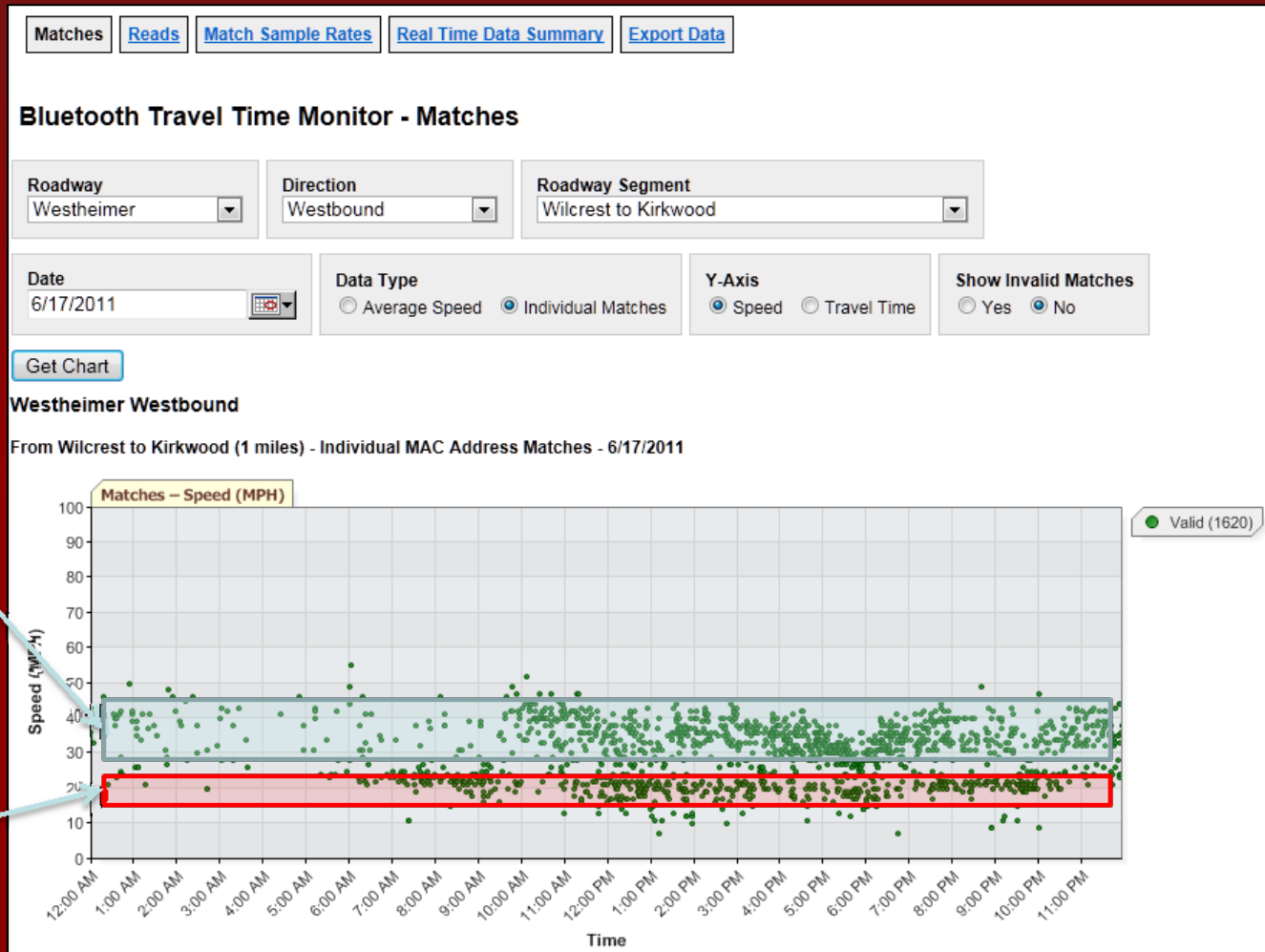


AWAM Bluetooth Demonstration - Orlando



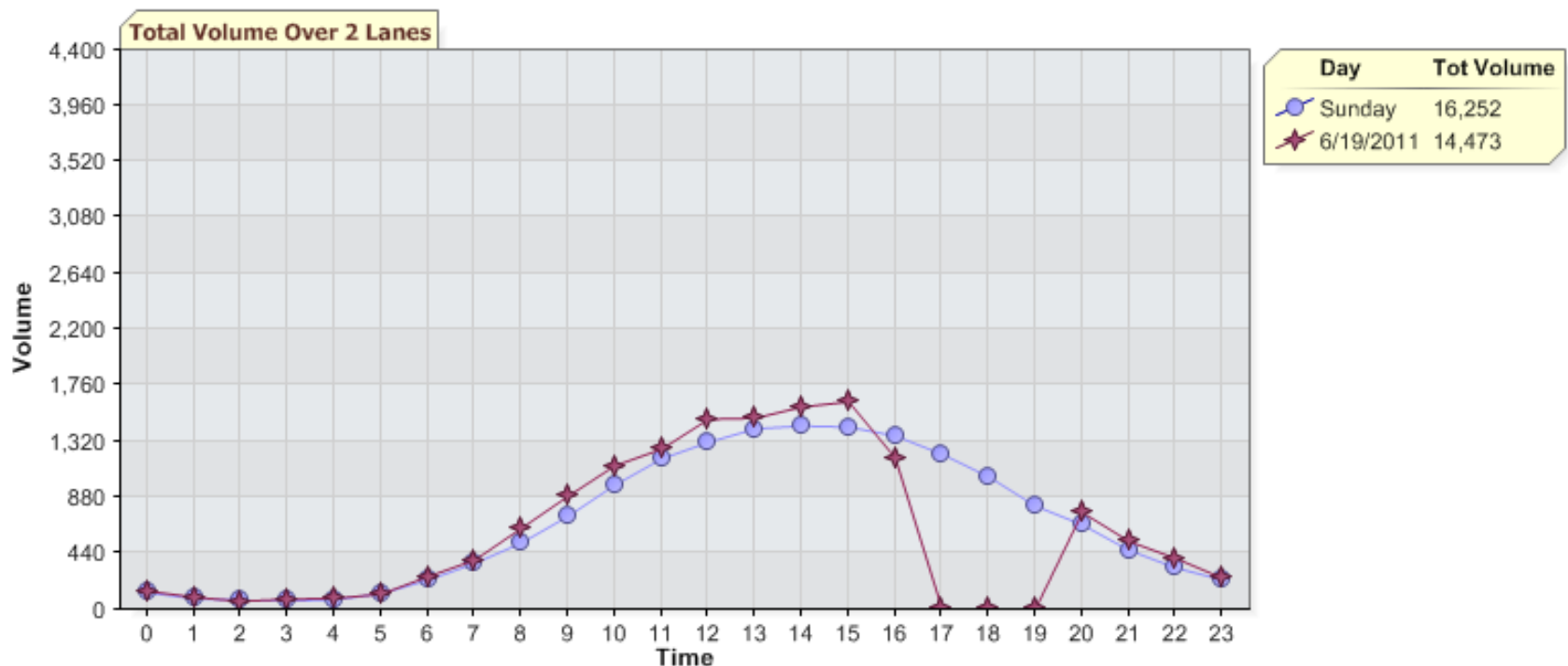
West Houston Deployment

Example Arterial Data (3 traffic signals between readers)



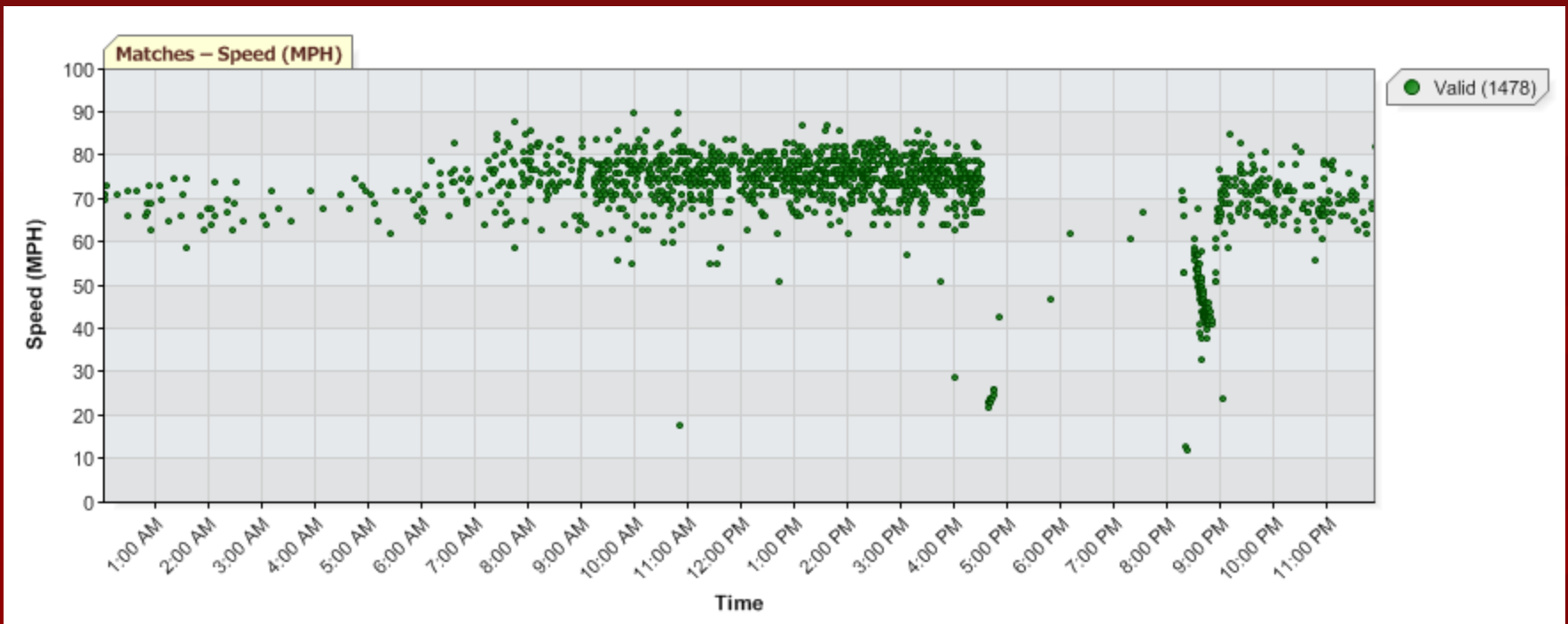
I-45 Closure in Walker County due to Wildfire Smoke

IH-45 North Northbound at SH-75 in Huntsville - 60 Minute Summary



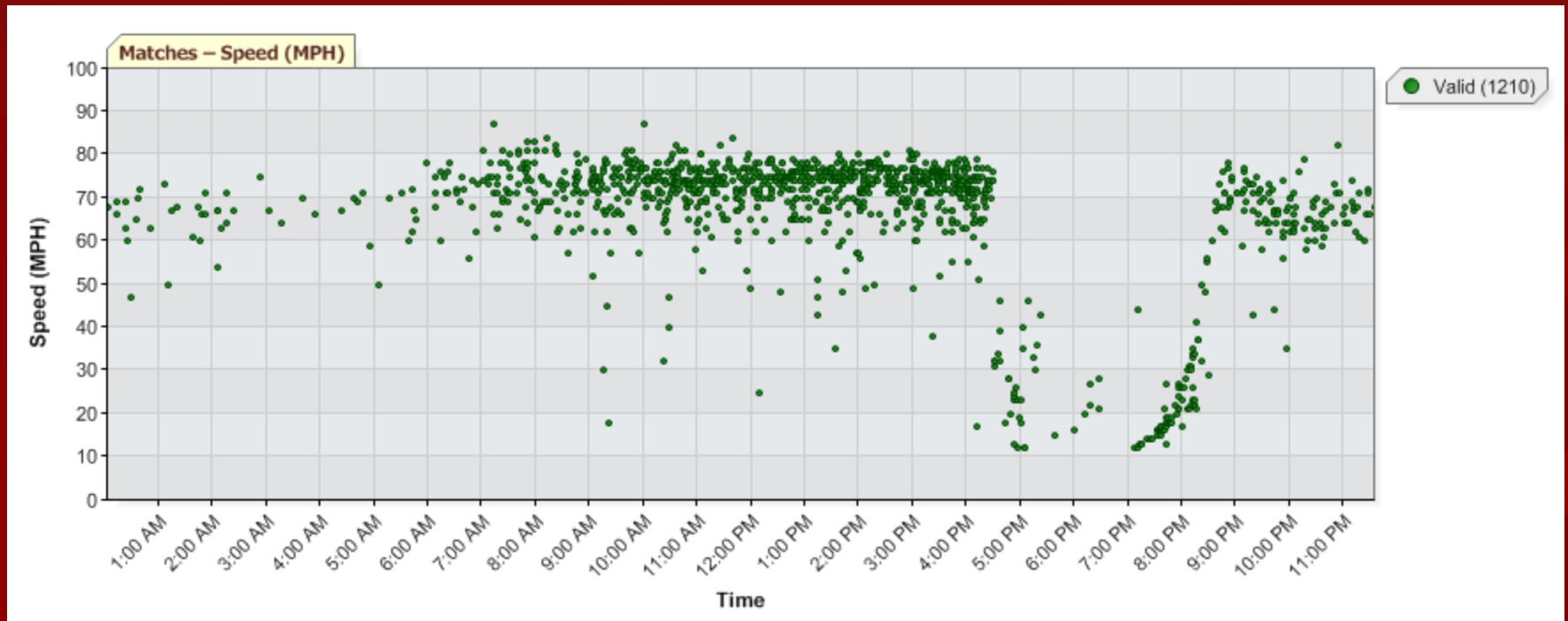
I-45 Closure in Walker County due to Wildfire Smoke

From SH-75 (Huntsville) to Walker County Rest Area (5.3 miles) - Individual MAC Address Matches



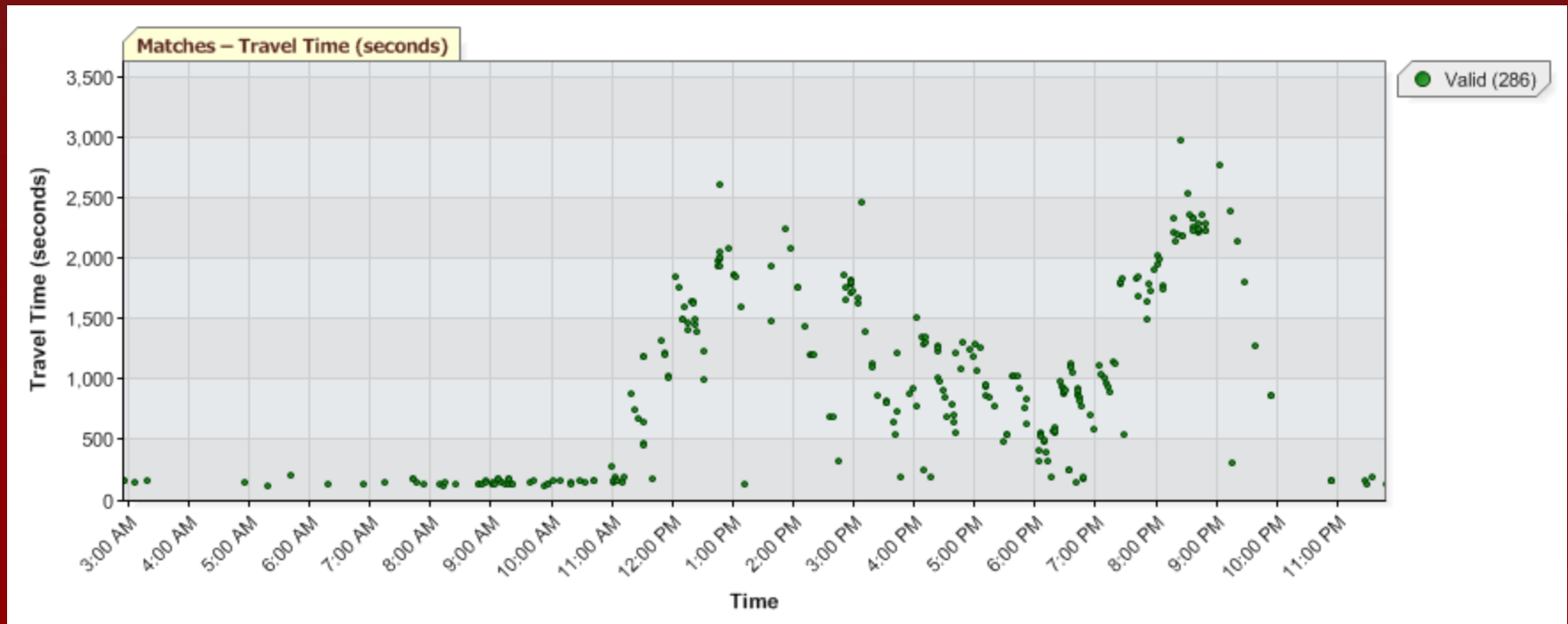
I-45 Closure in Walker County due to Wildfire Smoke

From New Waverly to SH-75 (Huntsville) to (17.1 miles) - Individual MAC Address Matches



SH 87 Approaching Bolivar - Galveston Ferry

SH 87 SB From 22nd to French Town (2.3 miles) - Individual MAC Address Matches
Saturday, April 23rd 2011



**** Excellent for travel times + speeds, still working on “wait time” estimations process**

Same Probe ID Read Multiple Times

Probe ID	Origin Location ID	Destination Location ID	Start Time	End Time	Speed MPH
SH-87_001	SH-87_FrenchTown	SH-87_GalvestonLanding	4/24/2011 6:57	4/24/2011 7:15	10
SH-87_001	SH-87_FrenchTown	SH-87_GalvestonLanding	4/24/2011 8:01	4/24/2011 8:19	10
SH-87_001	SH-87_FrenchTown	SH-87_GalvestonLanding	4/24/2011 9:02	4/24/2011 9:15	15
SH-87_001	SH-87_FrenchTown	SH-87_GalvestonLanding	4/24/2011 9:59	4/24/2011 10:18	9
SH-87_001	SH-87_GalvestonLanding	SH-87_FrenchTown	4/24/2011 10:26	4/24/2011 10:40	14
SH-87_001	SH-87_FrenchTown	SH-87_GalvestonLanding	4/24/2011 10:46	4/24/2011 11:06	9
SH-87_001	SH-87_GalvestonLanding	SH-87_FrenchTown	4/24/2011 11:19	4/24/2011 11:48	6
SH-87_001	SH-87_FrenchTown	SH-87_GalvestonLanding	4/24/2011 11:48	4/24/2011 12:06	11
SH-87_001	SH-87_GalvestonLanding	SH-87_FrenchTown	4/24/2011 12:18	4/24/2011 12:36	11
SH-87_001	SH-87_FrenchTown	SH-87_GalvestonLanding	4/24/2011 12:36	4/24/2011 13:00	8
SH-87_001	SH-87_GalvestonLanding	SH-87_FrenchTown	4/24/2011 13:14	4/24/2011 13:30	11
SH-87_001	SH-87_FrenchTown	SH-87_GalvestonLanding	4/24/2011 13:49	4/24/2011 14:04	12
SH-87_001	SH-87_GalvestonLanding	SH-87_FrenchTown	4/24/2011 14:17	4/24/2011 14:39	8
SH-87_001	SH-87_FrenchTown	SH-87_GalvestonLanding	4/24/2011 14:45	4/24/2011 14:59	13
SH-87_001	SH-87_FrenchTown	SH-87_GalvestonLanding	4/24/2011 15:41	4/24/2011 15:54	14
SH-87_001	SH-87_FrenchTown	SH-87_GalvestonLanding	4/24/2011 16:46	4/24/2011 17:00	14

I-10 Eastbound West of Brookshire

Crash damaged overhead sign & TxDOT had to remove structure
Monday, October 31st 2011 @ 10:50am



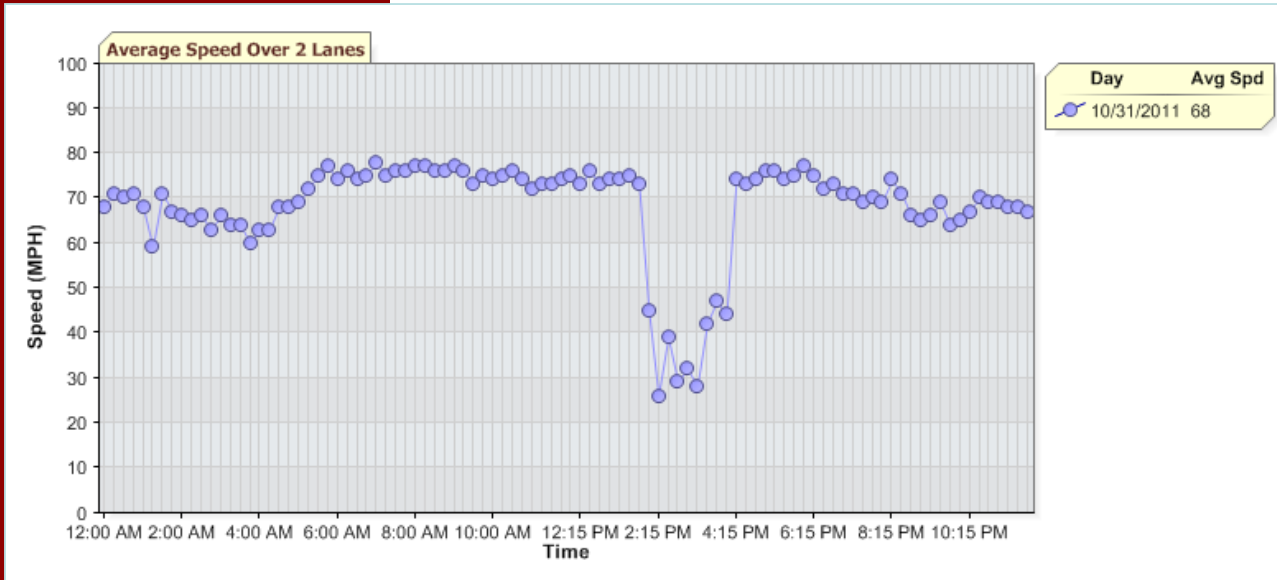
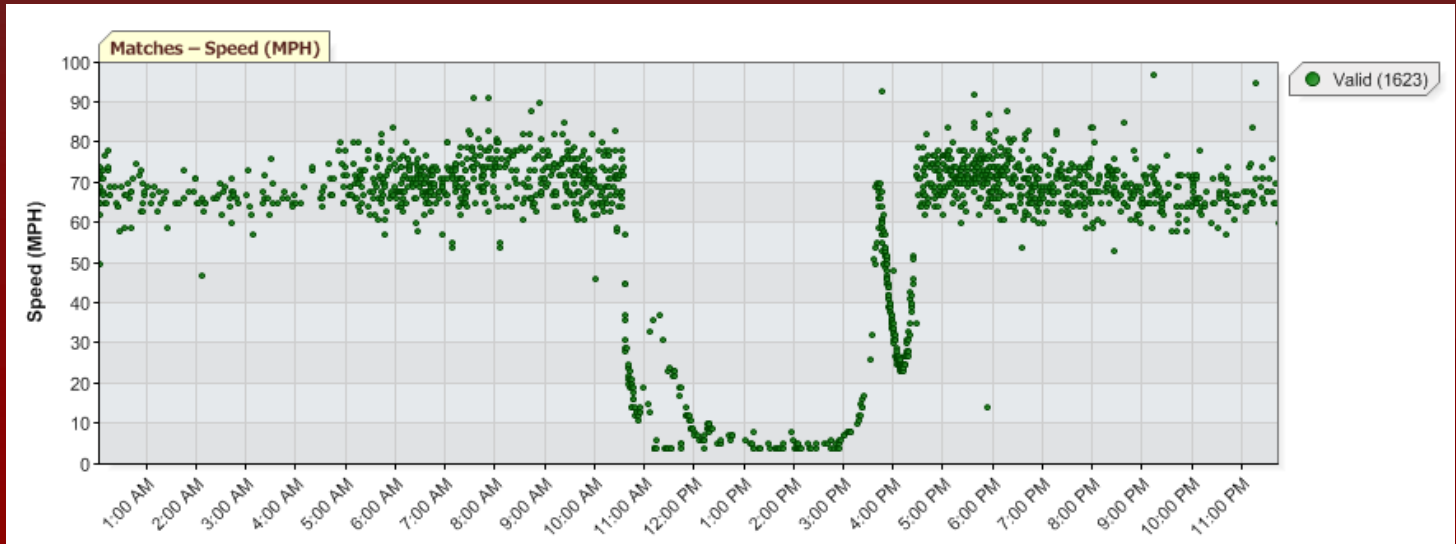
I-10 Eastbound West of Brookshire

Comparison of Radar Speed Data vs. Bluetooth Probe-Based Travel Time Data		
Time Start	Radar Site @ Weigh Station	Bluetooth Data -- Brazos River to FM 1489
	Avg Speed [mph]	Avg Speed [mph]
10:00am	74	67
10:15am	75	71
10:30am	76	60
10:45am	74	22
11:00am	72	14
11:15am	73	20
11:30am	73	18
11:45am	74	15
12:00pm	75	7
12:15pm	73	6
12:30pm	76	6
12:45pm	73	7
1:00pm	74	n/a
1:15pm	74	6
1:30pm	75	7
1:45pm	73	5
2:00pm	45	n/a
2:15pm	26	4
2:30pm	39	5
2:45pm	29	4
3:00pm	32	4
3:15pm	28	4
3:30pm	42	10
3:45pm	47	32
4:00pm	44	33
4:15pm	74	28
4:30pm	73	68
4:45pm	74	72

** Radar Sensor located 5-miles west of closure

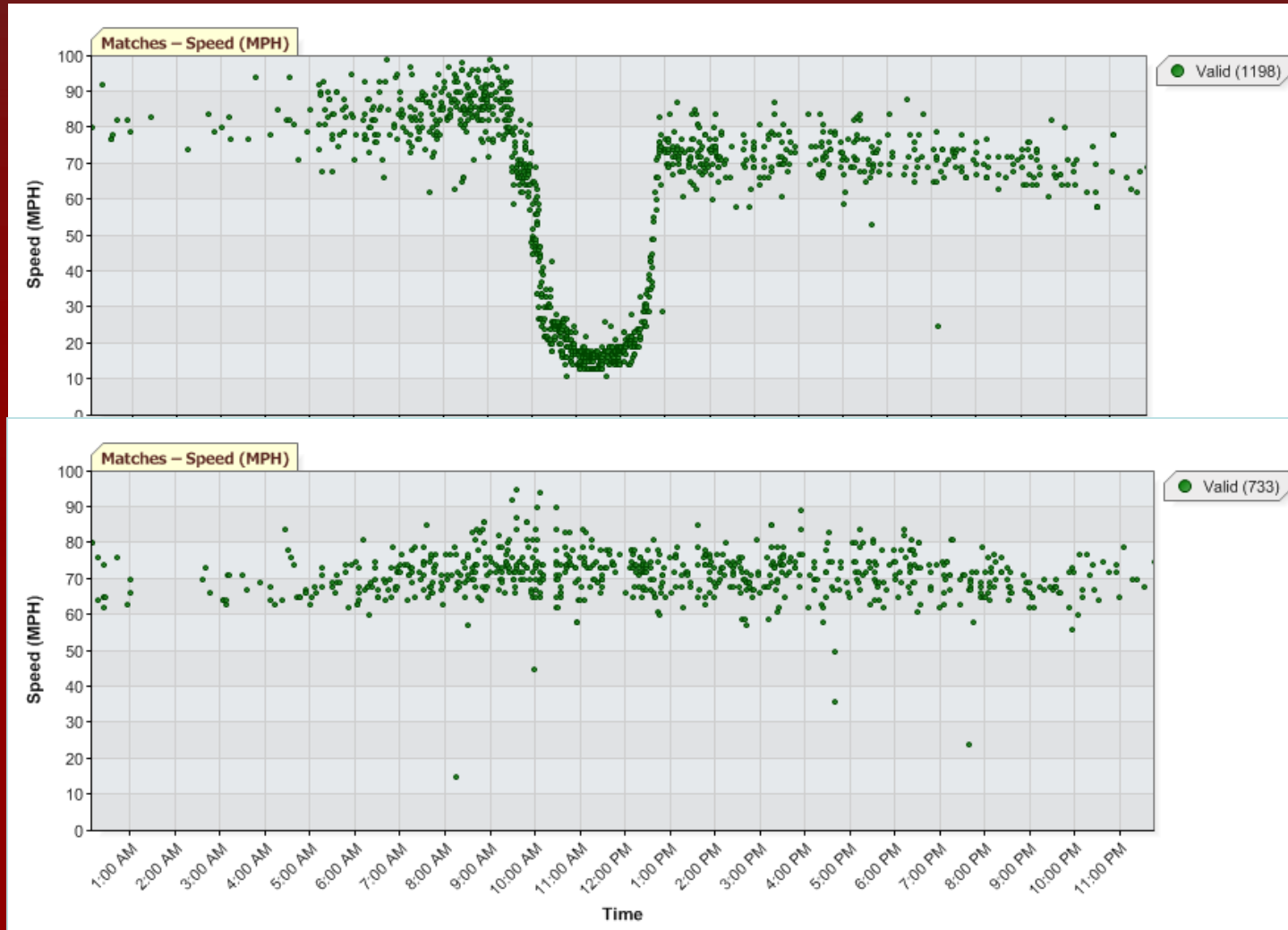
I-10 Eastbound West of Brookshire

From Brazos River to FM-1489 (4.2 miles) - Individual MAC Address Matches & TxDOT Radar Site



Are You Ready For Some Football??

US 290 Westbound – FM 1098 to Hempstead (4.5 miles) – 9/24 vs. 10/1



← 9-24 2:30 kick-off

← 10-1 no football

Questions ?

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