

**This is Not a Test ... :**  
**The I-95 Corridor Coalition's Groundbreaking  
Vehicle Probe Project and How It Is Helping in  
Performance Measurement**



**TRB NATMEC: Improving Data Collection, Analysis and Use**  
Rick Schuman, VP, Public Sector  
INRIX

June 24, 2010

# Agenda

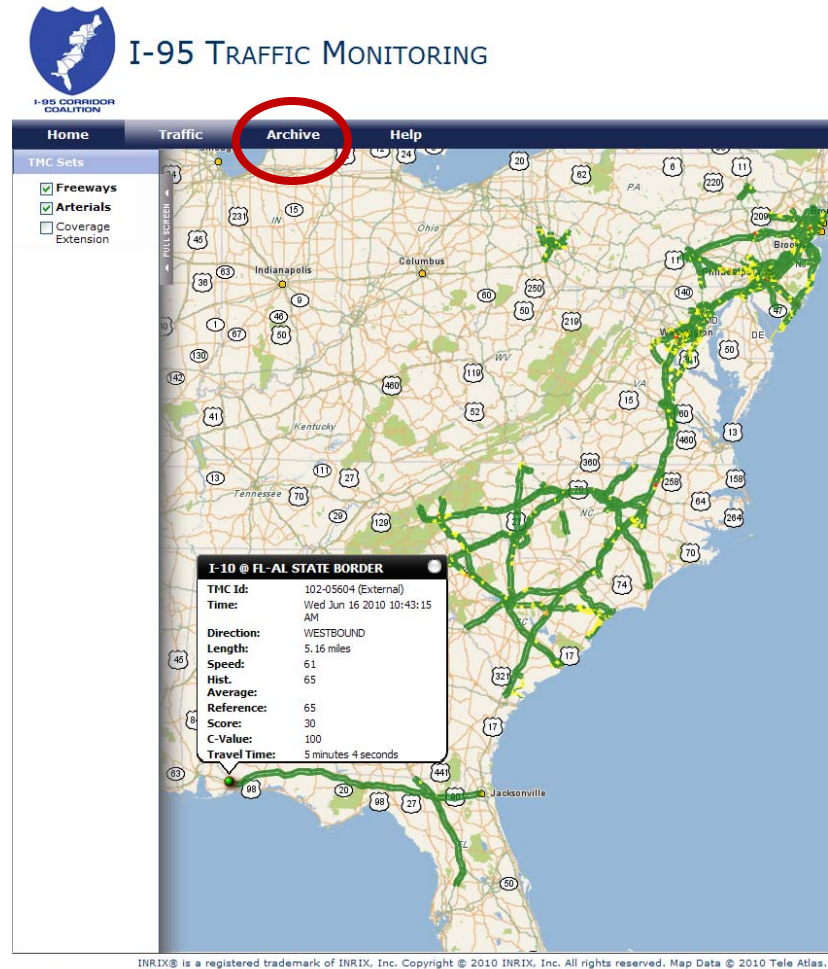
- What's Happening Today
- What's Possible

# Vehicle Probe Project “Archives”

- Contractual Requirement
  - INRIX supported “5 minute” archive
  - All contracted road coverage, since July 2008
- U of Maryland Data Warehouse
  - Storing “1 minute” data since March 2009
  - Stored “2 minute” data Oct 2008 to March 2009
- Agency archives
  - Agencies have option to store real-time data too

# 5 Minute Archive

- Accessible through “monitoring site”
- Site updates every minute
- Every 5<sup>th</sup> minute snapshot saved and stored for retrieval
- Current data available in 24-48 hours
- All parameters stored
- 10,000+ Road Segments



# 5 Minute Archive (2)

I-95 TRAFFIC MONITORING

Home Traffic **Archive** Help

### I-95 Corridor Coalition Archive Retrieval

Input Archive Retrieval Parameters

Select Data Set: **DE-freeways**

Time Zone: EST

Start Date: 6/10/2010 17:00:00

End Date: 6/10/2010 17:30:00

\*All archive results are in coordinated universal time (UTC)

Request Date (UTC)	Request ID	Data Set	Expiry Date (UTC)	Status
6/16/2010 2:49:39 PM	13032	DE-freeways (6/10/2010 10:00:00 PM - 6/10/2010 10:30:00 PM)	6/19/2010 2:49:39 PM	requested

- ALL\_I95\_ARTERIALS (Use post 4/27/10)
- ALL\_I95\_FREEWAYS (Use post 4/27/10)
- ALLofI95 (Use post 4/27/10)
- DE-ALL
- DE-arterials
- DE-freeways**
- Florida
- Maryland-ALL
- Maryland-Arterials
- Maryland-Freeways
- NC-Arterials
- NC-Freeways
- NewJersey-ALL
- NewJersey-Arterials
- NewJersey-Freeways
- PA-ALL
- PA-Arterials
- PA-Freeways
- PA511
- PA511+FWY
- South Carolina ALL
- South Carolina Arterials
- South Carolina Freeways
- Virginia-ALL
- Virginia-Arterials
- Virginia-Freeways

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# 5 Minute Archive (3)

I-95 TRAFFIC MONITORING

I-95 CORRIDOR COALITION

Home Traffic Archive Help

**I-95 Corridor Coalition Archive Retrieval**

Input Archive Retrieval Parameters

Select Data Set: ALL\_I95\_ARTERIALS (Use post 4/27/10)

Time Zone: EST

Start Date: [ ]

End Date: [ ]

Submit

\*All archive results are in coordinated universal time (UTC)

Request Date (UTC)	Request ID	Data Set	Expiry Date (UTC)	Status
6/16/2010 2:49:39 PM	13032	DE-freeways (6/10/2010 10:00:00 PM - 6/10/2010 10:30:00 PM)	6/19/2010 2:49:39 PM	completed

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Done

11:02 AM

CSV File Output

TmcCode	TimeUTC	DTK	Speed	ReferenceSpeed	AverageSpeed	Score	TravelTimeMinutes	C_Value
103+04101	6/10/2010 22:00	4965000	47	63	63	30	4.65	2
103+04101	6/10/2010 22:05	4965005	44	63	63	30	4.97	4
103+04101	6/10/2010 22:10	4965010	57	63	63	30	3.84	100
103+04101	6/10/2010 22:15	4965015	51	63	63	30	4.29	65
103+04101	6/10/2010 22:20	4965020	49	63	63	30	4.46	83
103+04101	6/10/2010 22:25	4965025	37	63	63	30	5.91	100
103+04101	6/10/2010 22:30	4965030	44	63	63	30	4.97	100
103+04102	6/10/2010 22:00	4965000	7	62	61	30	4.99	100
103+04102	6/10/2010 22:05	4965005	7	62	61	30	4.99	100
103+04102	6/10/2010 22:10	4965010	5	62	61	30	6.99	100
103+04102	6/10/2010 22:15	4965015	6	62	62	30	5.83	100
103+04102	6/10/2010 22:20	4965020	6	62	62	30	5.83	99
103+04102	6/10/2010 22:25	4965025	8	62	62	30	4.37	100
103+04102	6/10/2010 22:30	4965030	6	62	62	30	5.83	100
103+04103	6/10/2010 22:00	4965000	6	61	59	30	4.24	100
103+04103	6/10/2010 22:05	4965005	6	61	59	30	4.24	100
103+04103	6/10/2010 22:10	4965010	9	61	59	30	2.83	100
103+04103	6/10/2010 22:15	4965015	7	61	59	30	3.63	100
103+04103	6/10/2010 22:20	4965020	7	61	59	30	3.63	100
103+04103	6/10/2010 22:25	4965025	6	61	59	30	4.24	100
103+04103	6/10/2010 22:30	4965030	14	61	59	30	1.82	100

Less than 15 mins later

# Some Uses to Date

- Metropolitan Washington COG
  - Congestion Management Process (CMP) support
- North Carolina DOT
  - Performance Dashboard

# MWCOG CMP

The screenshot shows a web browser window displaying the MWCOG website. The page title is "Metropolitan Washington Council of Governments" and the sub-page is "Transportation". The main content area is titled "Transportation" and lists various documents under the heading "Travel Management Subcommittee - Documents". A red arrow points to the document "Item 2 - CMP Technical Report 2010.DRAFT.2010-04-23". The page also includes a navigation menu on the left and a sidebar on the right with various links and information.

[http://www.mwco.org/transportation/committee/documents.asp?COMMITTEE\\_ID=45](http://www.mwco.org/transportation/committee/documents.asp?COMMITTEE_ID=45)

The cover page is titled "2010 CONGESTION MANAGEMENT PROCESS (CMP) TECHNICAL REPORT" and is marked as a "DRAFT" dated "April 23, 2010". It is prepared by the "National Capital Region Transportation Planning Board" and the "Metropolitan Washington Council of Governments". The page includes a list of sponsors and a note that the material does not necessarily reflect the views of the sponsoring agencies.

**Note: In Final Draft Stage**



# 2009 Travel Time Index (AM/PM Peaks)

Figure D2: Travel Time Index: 2009 Workday AM Peak (6:00-10:00 AM) for the I-95 Corridor Coalition Covered Highways

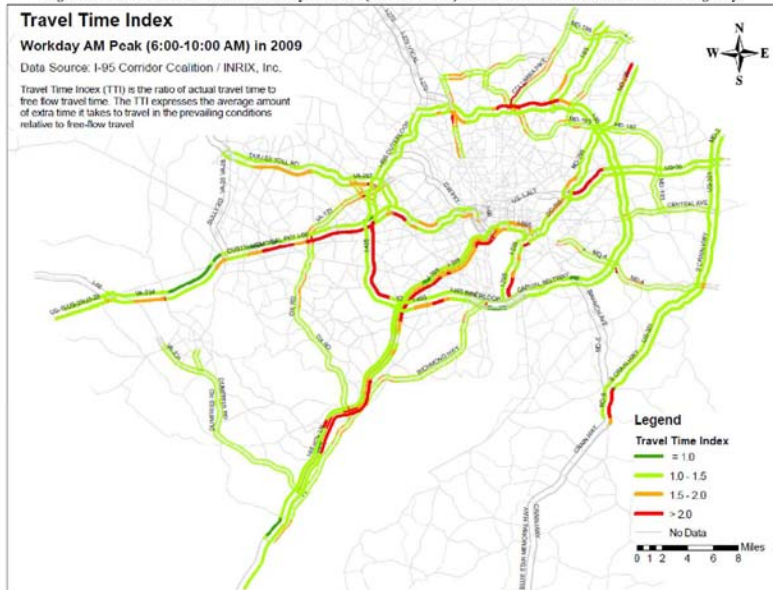
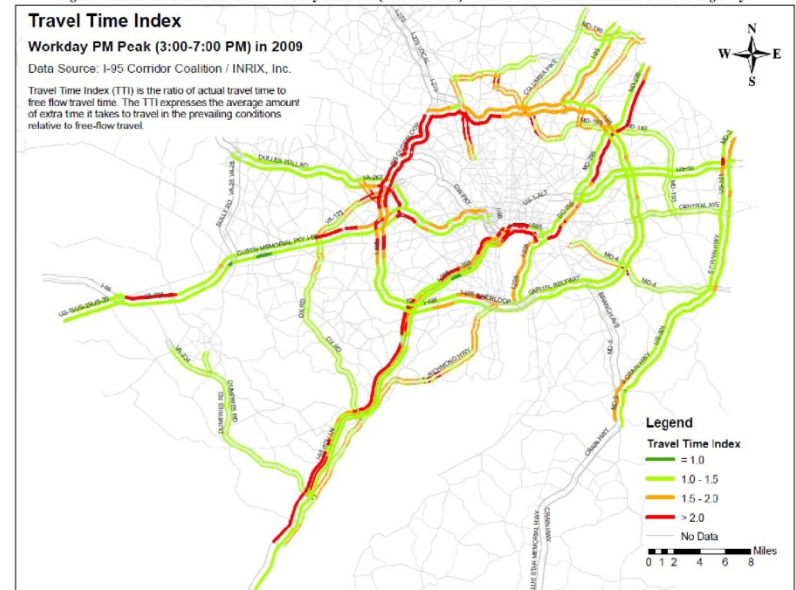
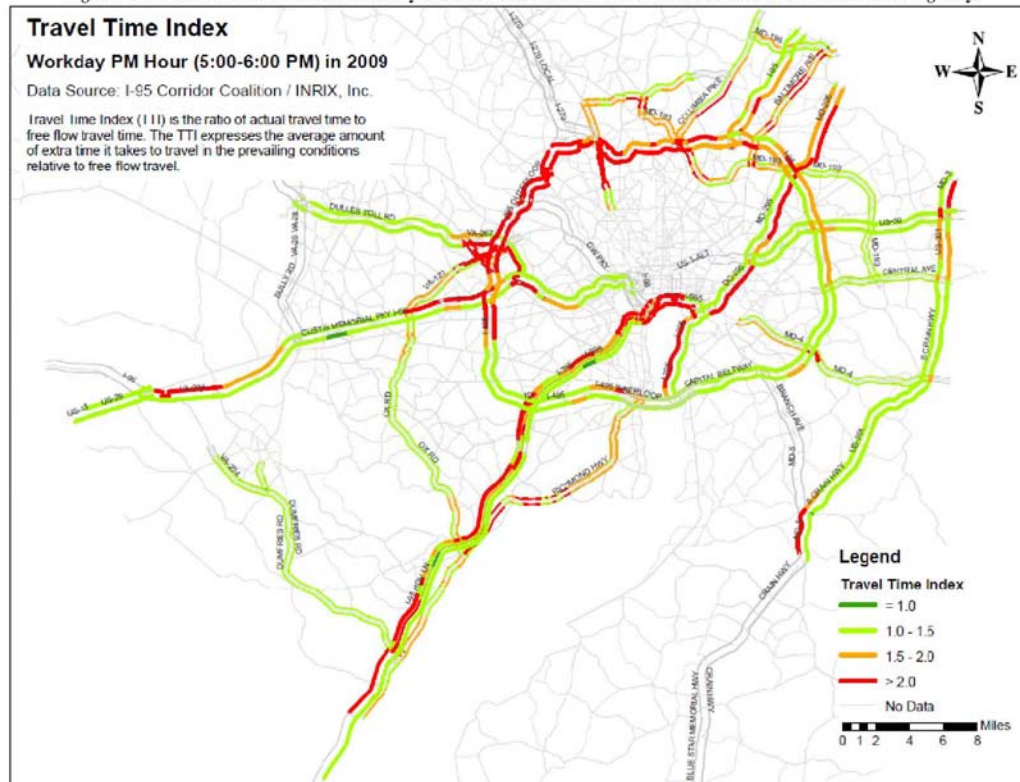


Figure D3: Travel Time Index: 2009 Workday PM Peak (3:00-7:00 PM) for the I-95 Corridor Coalition Covered Highways



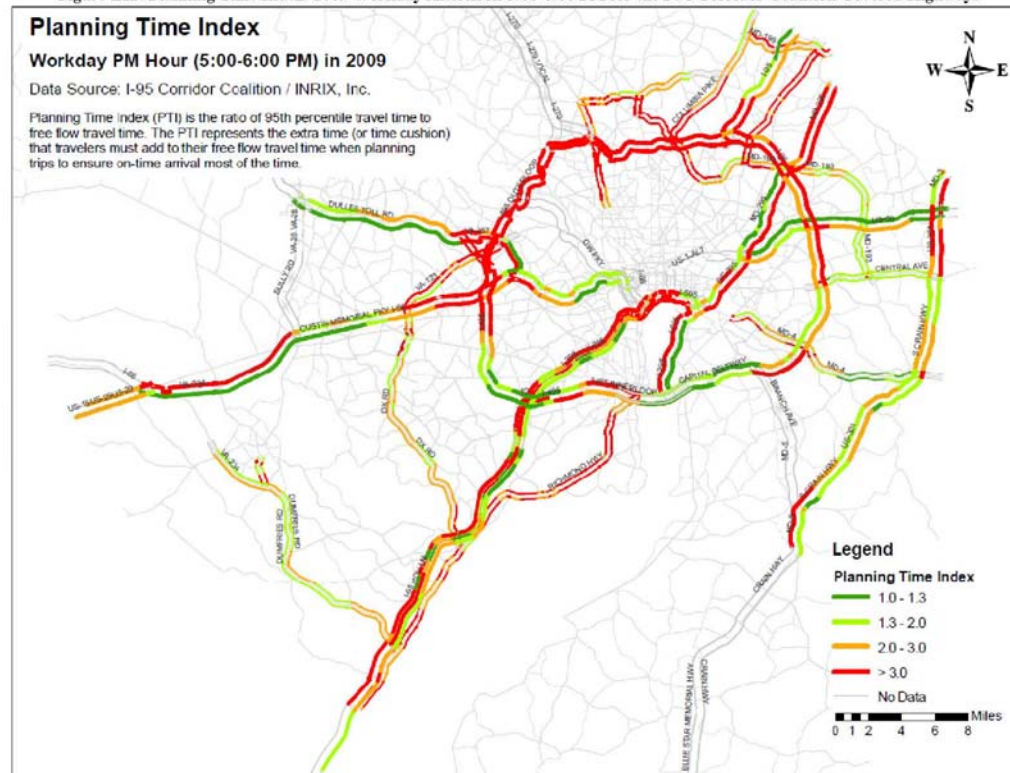
# 2009 Travel Time Index (5-6 PM)

Figure D12: Travel Time Index: 2009 Workday Afternoon 5:00-6:00 PM for the I-95 Corridor Coalition Covered Highways



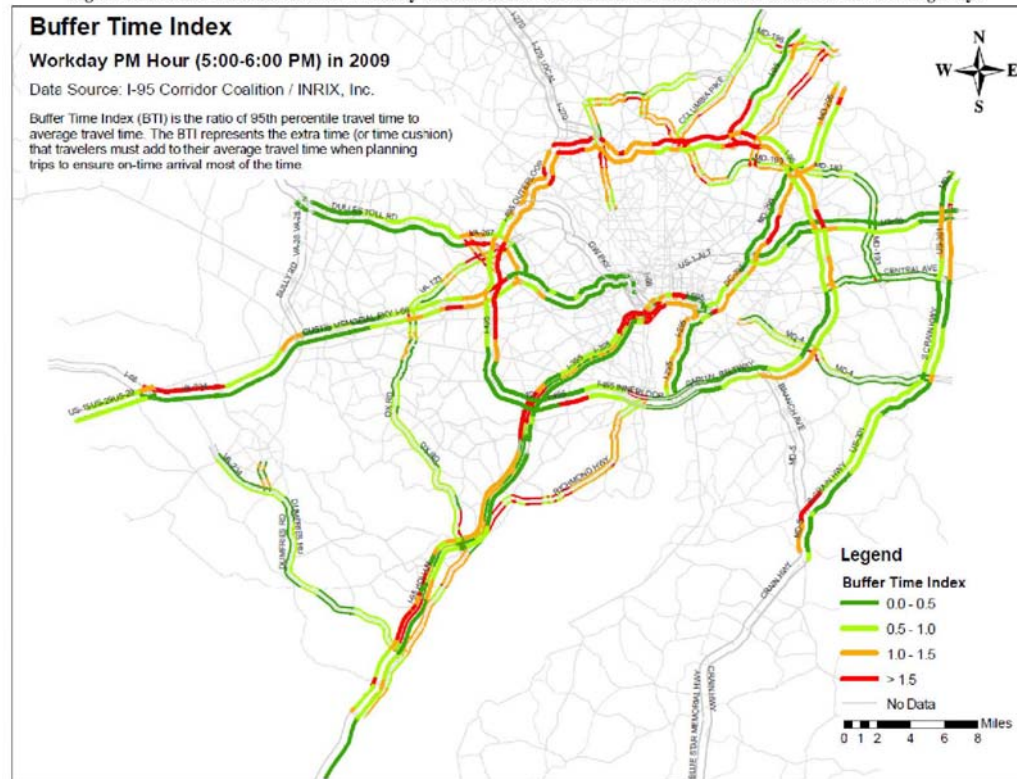
# 2009 Planning Time Index (5-6 PM)

Figure E12: Planning Time Index: 2009 Workday Afternoon 5:00-6:00 PM for the I-95 Corridor Coalition Covered Highways



# 2009 Buffer Time Index (5-6 PM)

Figure F12: Buffer Time Index: 2009 Workday Afternoon 5:00-6:00 PM for the I-95 Corridor Coalition Covered Highways



# PMs by Month, Day, Hour, etc.

Figure 20: Travel Time Index in 2008 and 2009 for the I-95 Corridor Coalition Covered Freeways

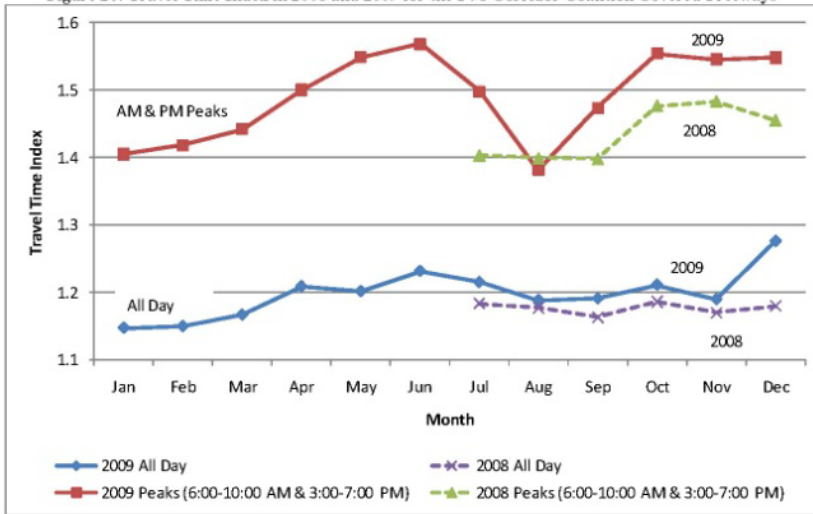


Figure 22 : Comparison of Travel Time Index in December 2008 and 2009 for the I-95 Corridor Coalition Covered Freeways

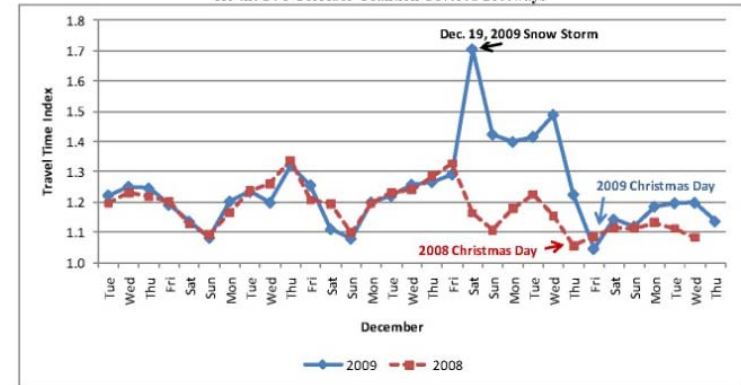
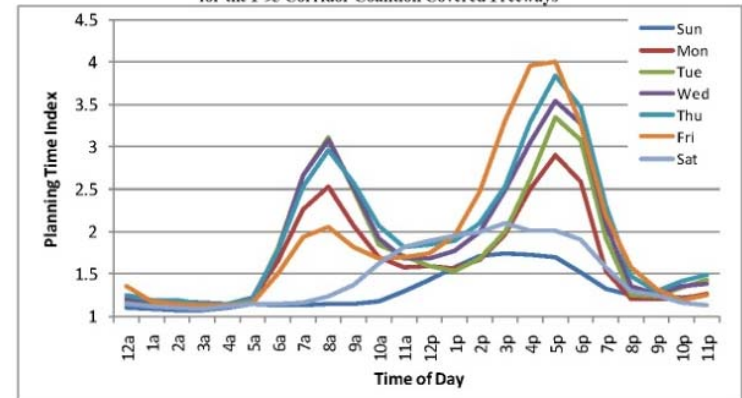


Figure 28: Planning Time Index by Time of Day and Day of Week (2009) for the I-95 Corridor Coalition Covered Freeways



# Bottlenecks, Hours of Congestion

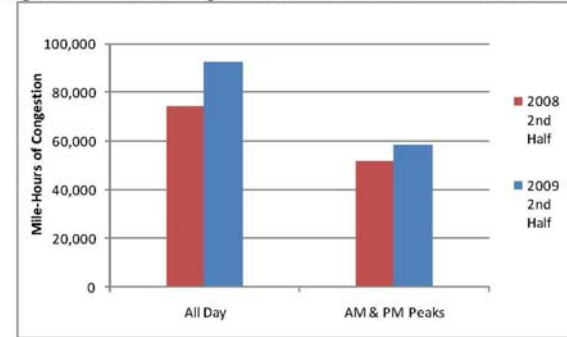
## TOP BOTTLENECKS

Based on the number of vehicles per lane per mile, the Spring 2008 Skycomp survey identified the top ten congested locations. Based on travel time index, the ratio of actual travel time over free flow travel time, and the number of congested hours, the I-95 Corridor Coalition/INRIX data also produced a list of the top ten bottlenecks. **Table 1** is the combination of the two lists. The results of the Skycomp and I-95 Corridor Coalition/INRIX efforts differ as would be expected, due to differing methodologies. The first three locations in the table are on both top-ten lists. The similarities and differences between the two efforts merit further study in the CMP.

**Table 1 Most Congested Locations**

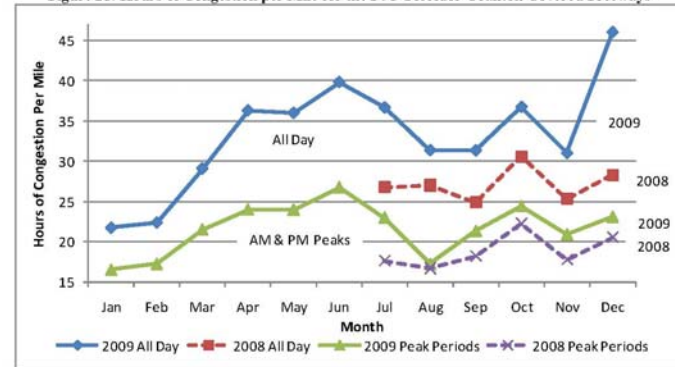
Road/Direction	Segment/Interchange	Rank	
		Skycomp Spring 2008 Suvery	INRIX 2009 Data
I-495 Inner Loop	MD-187 -- MD-355	5E	2
I-495 Outer Loop	MD-650 --US-29	4	10
I-66 EB	VA-267 -- Westmoreland St	5D	9
I-395 SB	6TH ST -- 12TH ST	1	17
I-395 NB	US-1 -- 12th St	5B	13
I-495 Inner Loop	VA-193 -- GW Pkwy	5A	21
I-95 NB	VA-644 -- I-495	5F	23
11th St Bridge WB	I-295 -- Southeast Fwy	2	N/A
I-395 NB	11th St -- Pennsylvania Ave	3	N/A
I-66 HOV EB	VA-243 -- I-495	5C	N/A
I-95 HOV SB	VA-234 -- I-95 Merge	N/A	1
I-95 SB	VA-234/Exit 152	N/A	3
I-95 NB	VA-3000 -- VA-642	N/A	4
I-66 WB	VA-234/Exit 44	N/A	5
MD-295 NB	I-495 -- Powder Mill Rd	N/A	6
I-95 SB	I-495 -- VA-7100/Exit 166	N/A	7
I-95 SB	US-1/Exit 161 -- VA-123/Exit 160	N/A	8

**Figure 24: Mile-Hours of Congestion for the I-95 Corridor Coalition Covered Freeways**



Dividing the number of mile-hours of congestion by the total length of the covered freeway segments, we obtain hours of congestion per mile. **Figure 25** shows the hours of congestion per mile in each month in the 18 months from July 2008 to December 2009. The variation pattern is similar to what was found in **Figure 20** (monthly travel time index) but with "All Day" had higher values since hours of congestion is an "absolute" measure of the extent of congestion.

**Figure 25: Hours of Congestion per Mile for the I-95 Corridor Coalition Covered Freeways**



# MWCOG View of VPP Data Value

- From Draft Executive Summary, “Recommendations for CMP Process”
  - “***Continue and enhance the use of continuous, probe-based congestion monitoring data.*** As a complementary data source to the Skycomp aerial survey, the I-95 Corridor Coalition – INRIX – University of Maryland partnership provides the CMP an innovative and profound data source for both congestion and reliability analyses.”

# NCDOT Performance Dashboard



<https://apps.dot.state.nc.us/dot/dashboard/>

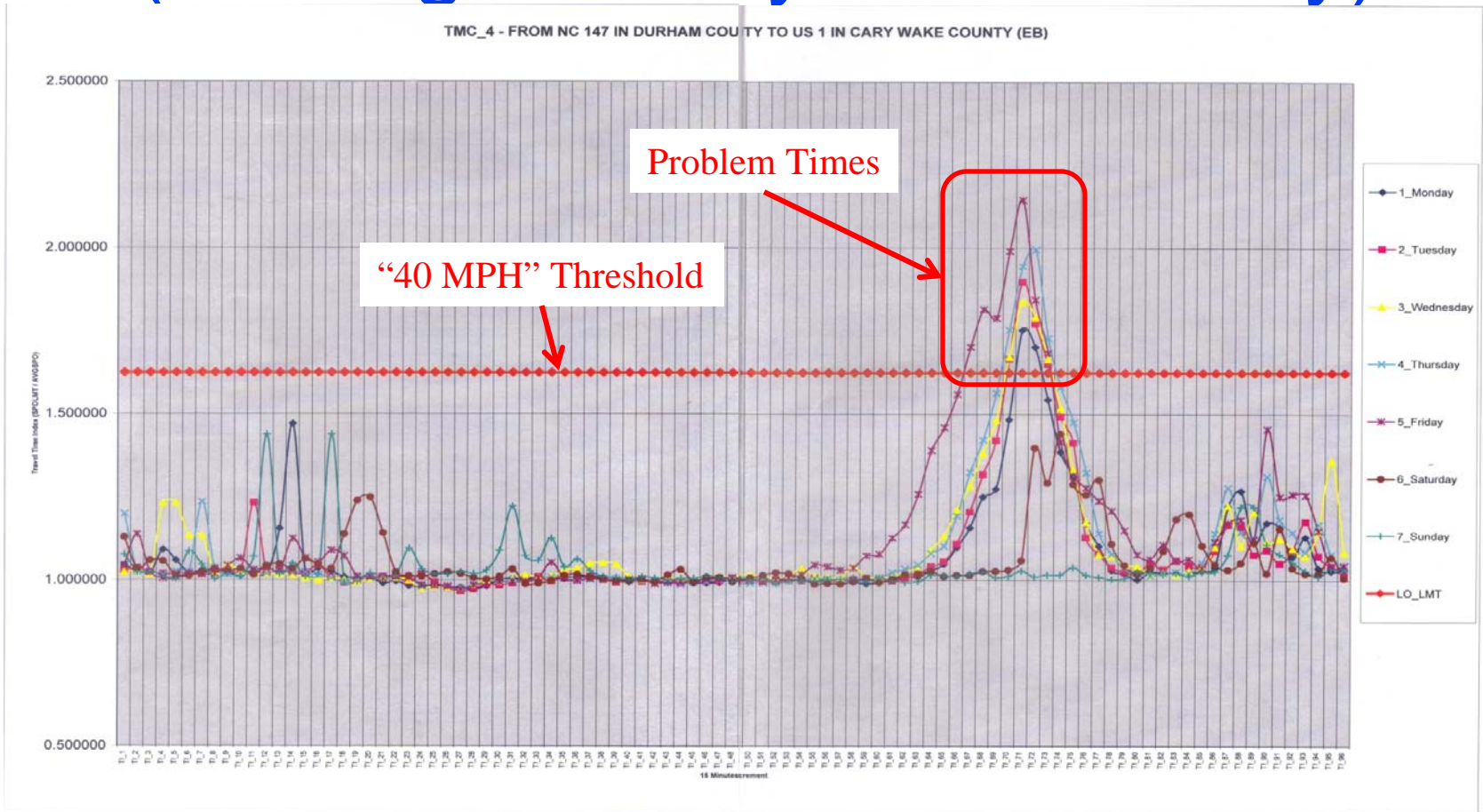


# VPP Support of NCDOT Dashboard

- Two areas:
  - Recurring congestion locations
  - Slowdown detection/duration
    - Where/when/how long below 40 MPH

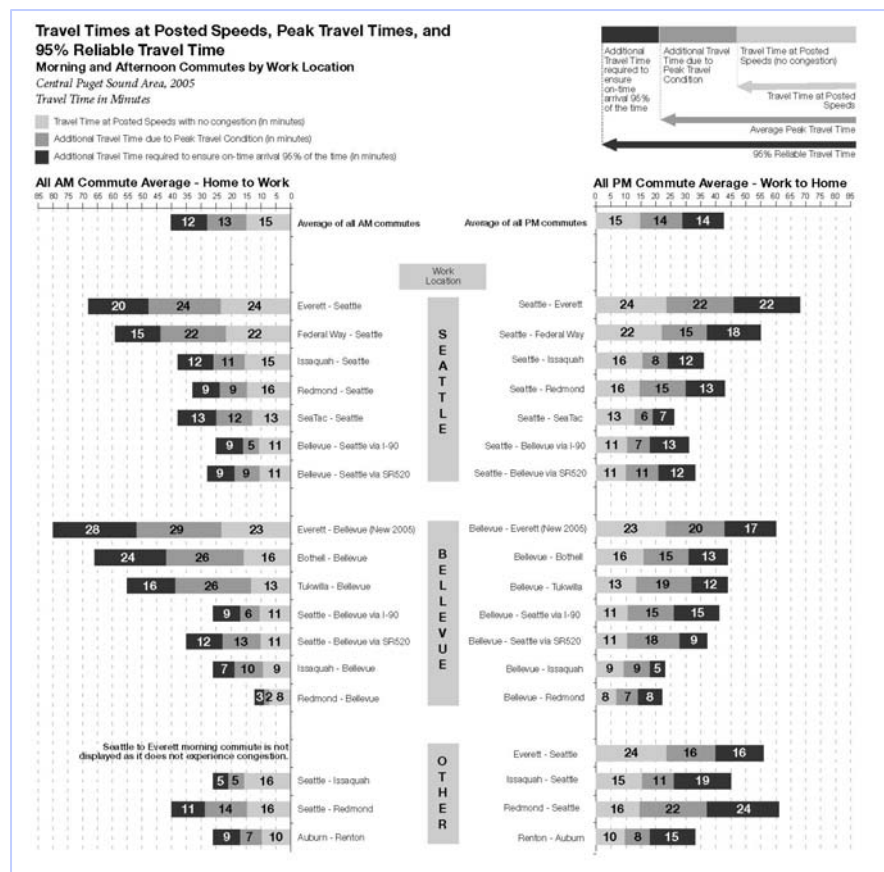


# Example I-40 Road Segment (Average TTI by Time of Day)



# What is Possible: Corridor Travel Times/Reliability

- State-of-the-Art:
  - WashDOT's Puget Sound analysis (right)
- Requires
  - Complete corridor coverage
  - Highly reliable data
- VPP data now provides possible input data in many states/regions
- MdSHA Travel Times on DMS illustrates potential
  - DMS corridor → commute corridor



# MD CHART DMS Software

Microsoft Internet Explorer

Comm Log Source Text Search:

Other (no info)  Add I/S O/S Search Adv.

[Recent Events](#) | [Back](#) | [Forward](#) | [Refresh](#) | [Center Rpt](#) | [Communications Log](#) | [Instant Messaging](#) | [Home Page](#) | [Map](#) | [Traffic Events](#) | [Help](#)

## Travel Routes (13)

[Set Columns](#) [Add Travel Route](#)

Name $\Delta$	Length	Trav Time	Trend	Speed	Toll Rate	Used By	Route / Dir	County	
		--Any--	--Any--	--Any--	--Any--		--Any--	--Any--	
<a href="#">DMS 3320 to I-495</a>	8.8 mi	11 min at 14:57	Up at	<b>Travel Time Hist</b> Eff. Time m:ss 14:57 11:23 14:55 10:49 14:52 10:21 14:50 10:34 14:48 11:01 14:46 10:49 14:43 10:59 14:41 10:42 14:39 9:16 14:36 9:00 14:34 9:00 14:32 9:00		DMS 3320	I-95 S	Prince George's County, MD	<a href="#">details</a> <a href="#">edit</a> <a href="#">remove</a>
<a href="#">DMS 4404 to I-395</a>	5.4 mi	6 min at 14:57	Flag at			DMS 4404	I-95 N	Baltimore County, MD	<a href="#">details</a> <a href="#">edit</a> <a href="#">remove</a>
<a href="#">DMS 7701 to I-695</a>	11.2 mi	11 min at 14:57	Flag at			DMS 7701	I-95 N	Baltimore County, MD Howard County, MD	<a href="#">details</a> <a href="#">edit</a> <a href="#">remove</a>
<a href="#">DMS 7702 to I-695</a>	6.1 mi	6 min at 14:57	Flag at			DMS 7702	I-95 N	Baltimore County, MD Howard County, MD	<a href="#">details</a> <a href="#">edit</a> <a href="#">remove</a>
<a href="#">DMS 7703 to I-495</a>	13.8 mi	17 min at 14:57	Up at			DMS 7703	I-95 S	Howard County, MD Prince George's County, MD	<a href="#">details</a> <a href="#">edit</a> <a href="#">remove</a>
<a href="#">DMS 7704 to I-495</a>	17.7 mi	20 min at 14:57	Up at			DMS 7704	I-95 S	Howard County, MD Prince George's County, MD	<a href="#">details</a> <a href="#">edit</a> <a href="#">remove</a>

I-95 SOUTH PRIOR TO MD 198  
Sign# 3320

TRAVEL TIME TO  
I-495 7 MI AHEAD  
7 - 8 MIN

# CHART SW Available from MdSHA

Microsoft Internet Explorer

Log Other (no info) Add US O/S Search Adv.

Recent Events | Back | Forward | Refresh | Center Rpt | Communications Log | Instant Messaging | Home Page | Map | Traffic Events | Help

## Travel Route Details: DMS 3320 to I-495

**Status**  
 Travel Time: 11 mins (at 14:59) [details](#)  
 Trend: Up (at 14:59)  
 Speed: 53 mph (at 14:59)  
 Toll Rate: N/A  
 Used By: [3320 RadioS NTCIP\\*](#)

**Actions**  
[Remove](#)  
[Back to Travel Route List](#)

**Link Status**

Ext Sys	Ext ID	Route	Link Name	Time	Travel Time	Trnd	Speed
INRIX	<a href="#">110-04263</a>	I-95 S	HOWARD/PRINCE GEORGE'S CO LINE (LAUREL) (WEST)	14:59	0:32 (30)	Flat	64 mph
INRIX	<a href="#">110-04262</a>	I-95 S	HWY 198/EXIT 33	14:59	1:03 (30)	Flat	61 mph
INRIX	<a href="#">110N04262</a>	I-95 S	HWY 198/EXIT 33	14:59	1:41 (30)	Up	44 mph
INRIX	<a href="#">110-04261</a>	I-95 S	HWY 212/EXIT 29	14:59	4:33 (30)	Up	40 mph
INRIX	<a href="#">110N04261</a>	I-95 S	HWY 212/EXIT 29	14:59	0:54 (30)	Flat	59 mph
INRIX	<a href="#">110-04260</a>	I-95 S	I 495/EXIT 27-25	14:59	0:47 (30)	Flat	61 mph
INRIX	<a href="#">110N04260</a>	I-95 S	I 495/EXIT 27-25	14:59	1:35 (30)	Flat	58 mph


**Link Travel Time History** [Summary \(click here to view actual\)](#)

Ext Sys	Ext ID	Route	Link Name	Now	14:55	14:50	14:45	14:40	14:35	14:30	14:25	14:20	14:15	14:10	14:05
INRIX	<a href="#">110-04263</a>	I-95 S	HOWARD/PRINCE GEORGE'S CO LINE (LAUREL) (WEST)	0:32 (30)	0:30 (30)	0:31 (30)	0:31 (30)	0:30 (30)	0:31 (30)						
INRIX	<a href="#">110-04262</a>	I-95 S	HWY 198/EXIT 33	1:03 (30)	1:02 (30)	1:04 (30)	1:00 (30)	0:57 (30)	0:58 (30)						
INRIX	<a href="#">110N04262</a>	I-95 S	HWY 198/EXIT 33	1:41 (30)	1:38 (30)	1:30 (30)	1:23 (30)	1:32 (30)	1:09 (30)						
INRIX	<a href="#">110-04261</a>	I-95 S	HWY 212/EXIT 29	4:33 (30)	4:41 (30)	4:42 (30)	5:16 (30)	3:25 (30)	3:27 (30)						
INRIX	<a href="#">110N04261</a>	I-95 S	HWY 212/EXIT 29	0:54 (30)	0:54 (30)	0:52 (30)	0:54 (30)	0:53 (30)	0:50 (30)						
INRIX	<a href="#">110-04260</a>	I-95 S	I 495/EXIT 27-25	0:47 (30)	0:51 (30)	0:49 (30)	0:46 (30)	0:48 (30)	0:47 (30)						
INRIX	<a href="#">110N04260</a>	I-95 S	I 495/EXIT 27-25	1:35 (30)	1:34 (30)	1:28 (30)	1:31 (30)	1:32 (30)	1:32 (30)						
Route History: (1 link is only partially included)				10:43 <a href="#">details</a>	10:49 <a href="#">details</a>	10:34 <a href="#">details</a>	10:59 <a href="#">details</a>	9:16 <a href="#">details</a>	9:00 <a href="#">[Min] details</a>						

**Link Configuration**

Ext Sys	Ext ID	Route	Name	Length	County	Dist From Prior	
INRIX	<a href="#">110-04263</a>	I-95 S	HOWARD/PRINCE GEORGE'S CO LINE (LAUREL) (WEST)	1.1 mi	Prince George's County, MD	N/A	<a href="#">settings</a> <a href="#">remove</a> move: <a href="#">down</a>
INRIX	<a href="#">110-04262</a>	I-95 S	HWY 198/EXIT 33	1.1 mi	Prince George's County, MD	0.0 mi	<a href="#">settings</a> <a href="#">remove</a> move: <a href="#">up</a> <a href="#">down</a>
INRIX	<a href="#">110N04262</a>	I-95 S	HWY 198/EXIT 33	1.2 mi	Prince George's County, MD	0.0 mi	<a href="#">settings</a> <a href="#">remove</a> move: <a href="#">up</a> <a href="#">down</a>
INRIX	<a href="#">110-04261</a>	I-95 S	HWY 212/EXIT 29	2.9 mi	Prince George's County, MD	0.0 mi	<a href="#">settings</a> <a href="#">remove</a> move: <a href="#">up</a> <a href="#">down</a>
INRIX	<a href="#">110N04261</a>	I-95 S	HWY 212/EXIT 29	0.8 mi	Prince George's County, MD	0.0 mi	<a href="#">settings</a> <a href="#">remove</a> move: <a href="#">up</a> <a href="#">down</a>
INRIX	<a href="#">110-04260</a>	I-95 S	I 495/EXIT 27-25	0.9 mi	Prince George's County, MD	0.0 mi	<a href="#">settings</a> <a href="#">remove</a> move: <a href="#">up</a> <a href="#">down</a>
INRIX	<a href="#">110N04260</a>	I-95 S	I 495/EXIT 27-25	1.5 mi	Prince George's County, MD	0.0 mi	<a href="#">settings</a> <a href="#">remove</a> move: <a href="#">up</a>

Route Travel Times Computed and Archived



# Closing Thoughts/Observations

- None of us know all possible applications of the data
  - Coalition working hard to share information (project and applications) broadly amongst member agencies
- When coverage is region wide/statewide, value really goes up
  - Can transition from pilot/research on small part of network to primary part of PM processes
- Traffic Flow PM is no longer limited to sensed roadways

# Thank You



**I-95 CORRIDOR  
COALITION**