

# **Use of the Vehicle Probe Project Data for Congestion Management Process Support**

**Presentation for the Webcast on the  
Use of Archive Data for  
Planning and Operations Performance Measures**

**Sponsored by the I-95 Corridor Coalition**

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# Presentation Outline

- Introduction
- Process of Applying the Data for Planning
- Applications of VPP Archive Data
  - Congestion Management Process
  - Other Activities
- Advantages and Caveats for VPP Archive Data
- Potential Future Uses

# Introduction

- Emerging private sector role in vehicle probe travel time and speed information
- Such information had been utilized by public agencies in management and operations, but rarely applied in MPO planning processes
- COG/TPB had an early opportunity to analyze VPP archive data for our planning activities
  - Examined the utility of VPP data in comparison to our existing sources of transportation systems performance data
  - Established ways to use VPP data in our processes

# Process of Applying the Data for Planning

- **Signed Data Use Agreement in June 2009**
  - VPP archive data available back to start date of July 1, 2008
- **Downloaded archived data (5-minute increments) through the I-95 Traffic Monitoring website <http://i95.inrix.com>**
- **Data processing**
  - Software: SAS<sup>®</sup> statistical analysis package
  - Hardware: Intel<sup>®</sup> Xeon<sup>™</sup> 3.20GHz CPU, 2GB RAM
  - File size: 7+ GB, 100+ million records in a year for the region; computing time several hours
- **Visualization**
  - Used Navteq<sup>®</sup>-provided translation table to match INRIX Traffic Message Channel (TMC)-coded data to our Navteq<sup>®</sup> GIS network
  - Created display maps that show directional data/performance measures
- **Processed data as needed for other applications (e.g. travel demand and air quality modeling)**

# COG/TPB Activities Utilizing VPP Archive Data

- Congestion Management Process (CMP)
  - The *2010 CMP Technical Report* is available at:  
[www.mwcog.org/cmp](http://www.mwcog.org/cmp)
- Air quality modeling input data (test case)
- Travel demand model calibration
- Future utilizations under consideration

# The Federal Congestion Management Process (CMP) Requirement

- Is a federally required integral part of the metropolitan planning process and MPO plans in major metropolitan areas
- The CMP is to define and identify congestion within a region, corridors, or project areas, and to develop and select appropriate strategies to reduce congestion or mitigate the impacts of congestion
- No single occupant vehicle (SOV) capacity expanding project can receive federal funds unless it is part of the regional CMP
- The CMP must include:
  - Methods to monitor and evaluate system performance
  - Data collection
  - Objectives and performance measures
  - Identification and evaluation of the anticipated performance and expected benefits of Congestion Management strategies, including both demand management (e.g. promoting carpooling) and supply management (e.g., traffic operational improvements)
  - Assessment of the effectiveness of previously implemented strategies

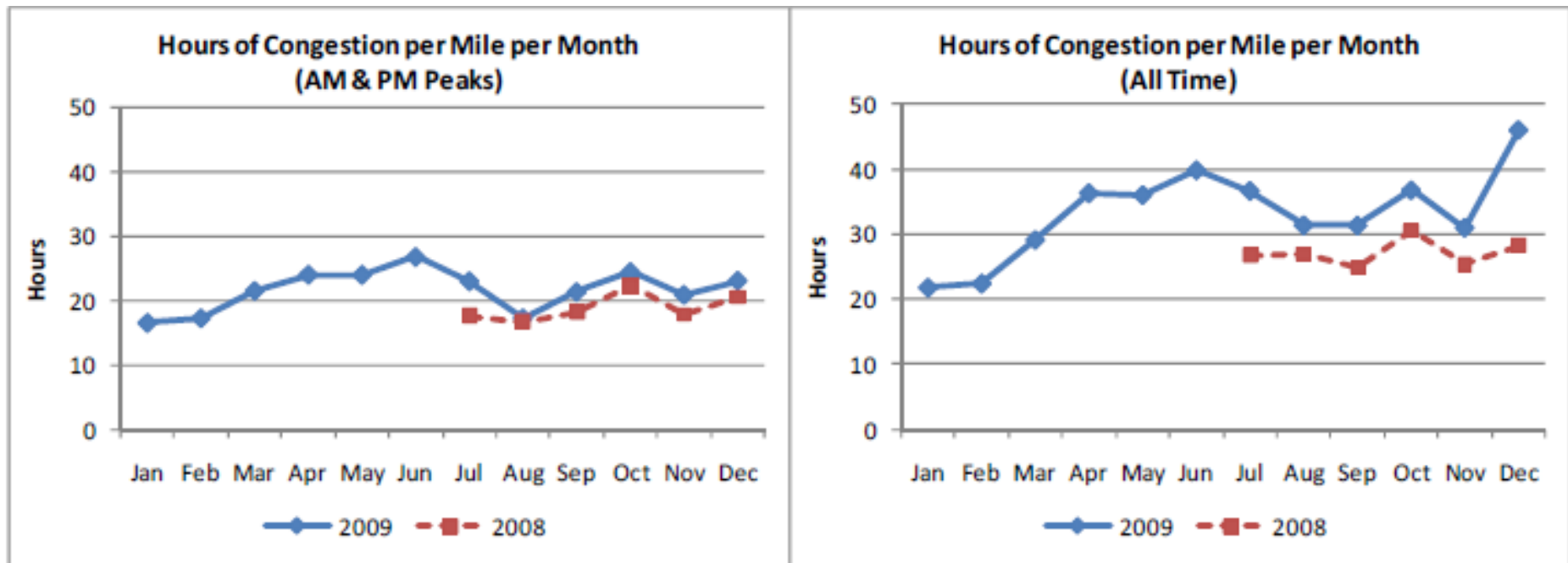
# Other Data Sources We Have Been Using for the CMP

- Photo-based aerial monitoring of freeways
- Floating-car-based travel speed monitoring on arterial highways (limited samples)
- Compilation of data from DOTs' permanent count stations
- Compilation of ad hoc traffic counts (tube counts) as available from our member agencies
- Cordon-based monitoring (by the MPO)
- Other special studies (by the MPO)
- All the above data sources are limited geographically and/or temporally

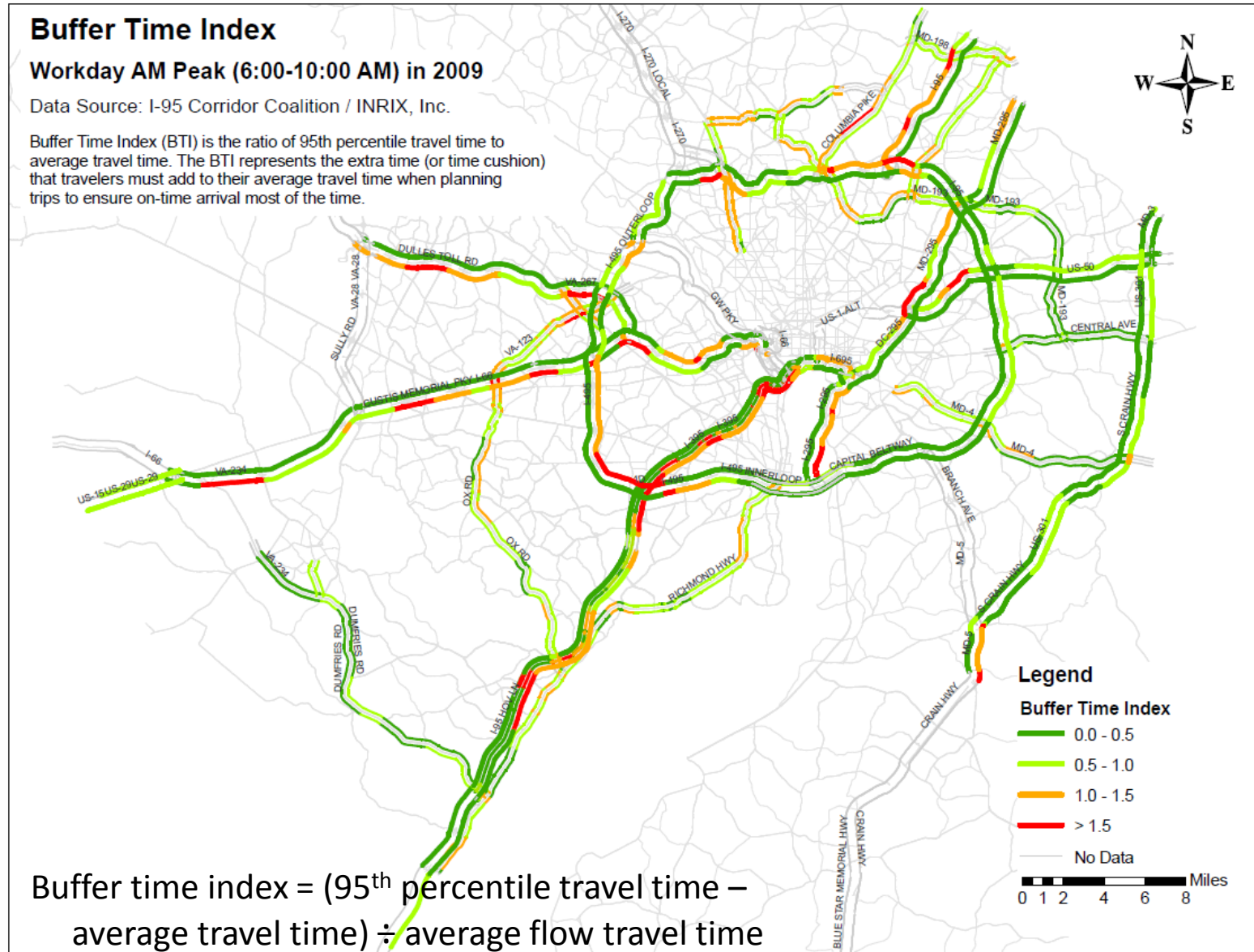
# VPP Archive Data Enabled Expanded Use of Congestion Performance Measures

- **Travel time index**
  - Actual travel time ÷ free flow travel time
  - Good for indicating the intensity of congestion
- **Planning time index**
  - 95<sup>th</sup> percentile travel time ÷ free flow travel time
  - Good for indicating the total travel time needed to ensure on-time arrival
- **Buffer time index**
  - (95th percentile travel time – average travel time) ÷ average flow travel time
  - Indicates the extra travel time needed to ensure on-time arrival
- Maps, monthly variation, and daily variation were also analyzed
- Traffic congestion “snapshots” (e.g., impacts of a major traffic incident)

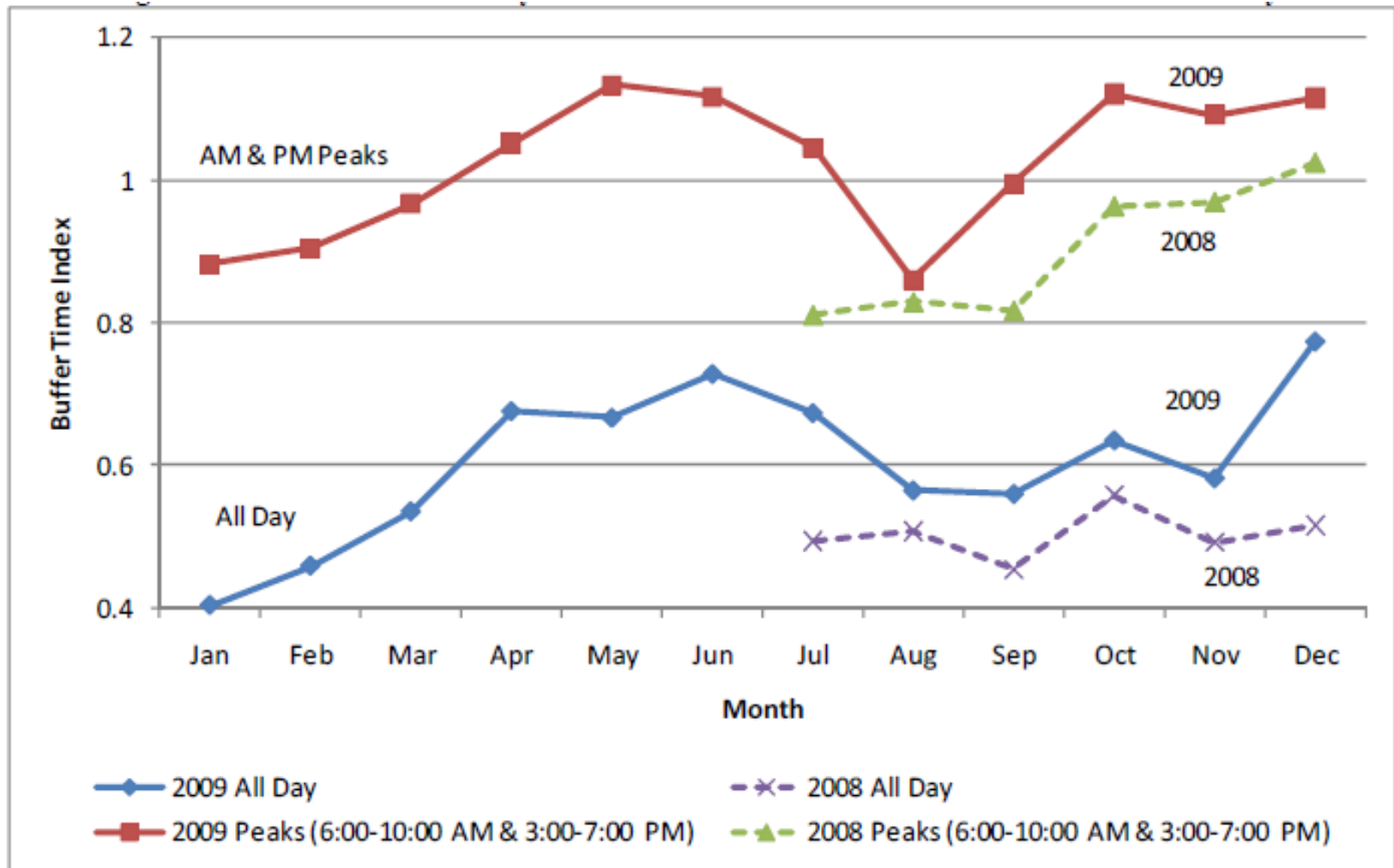
# Hours of Congestion Sample Graphics



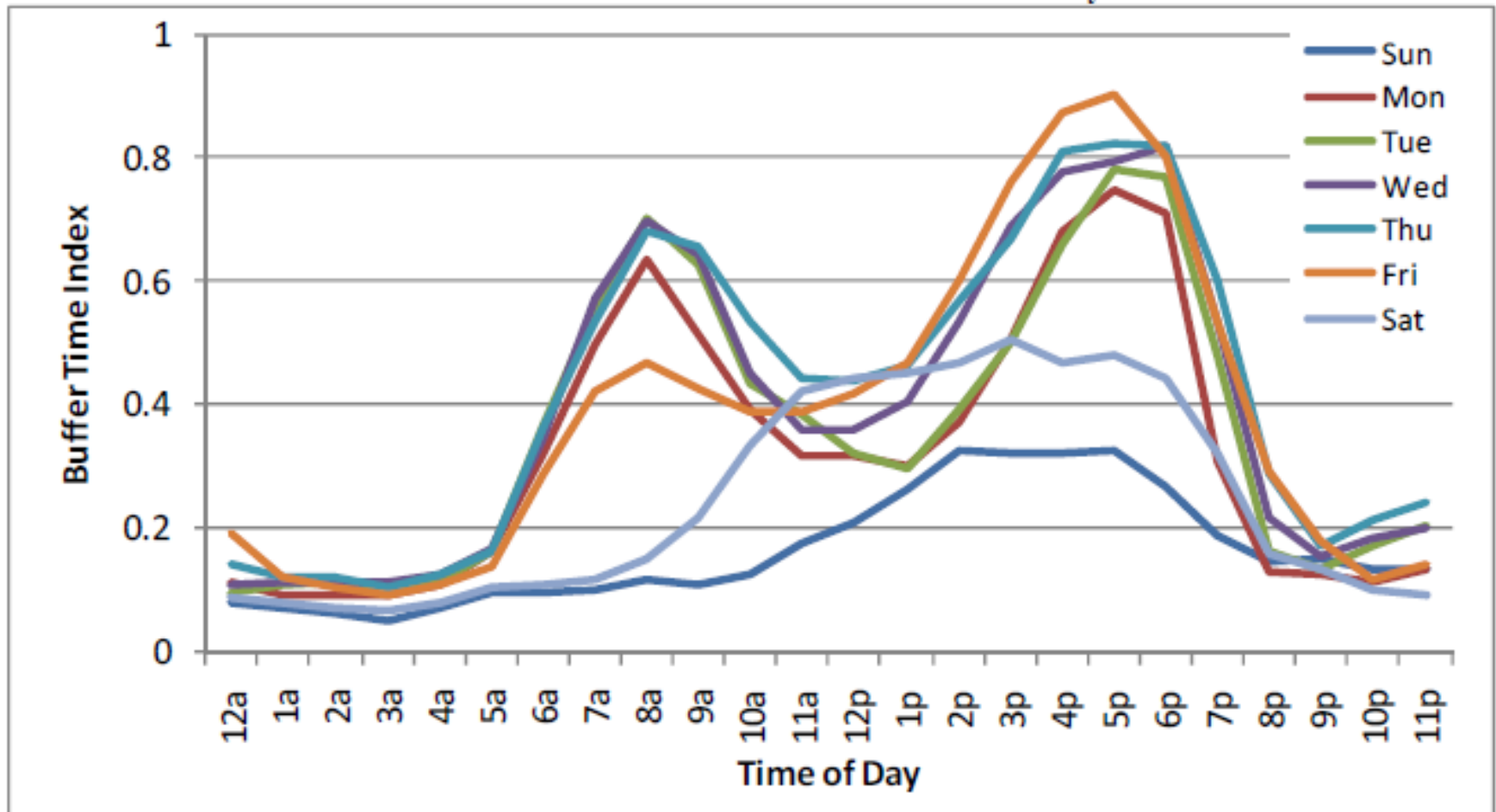
# Buffer Time Index Sample Map



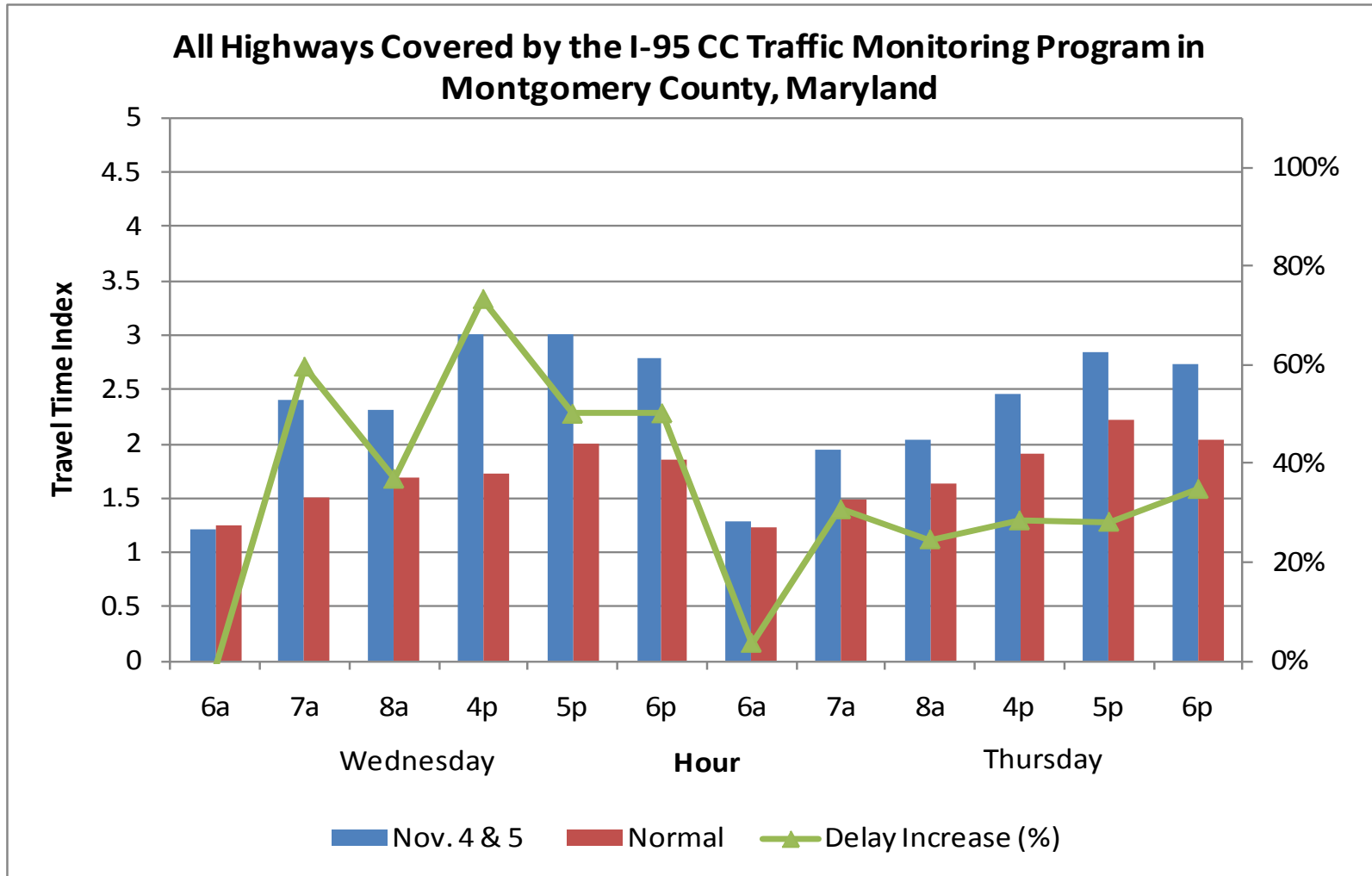
# Monthly Variation of Buffer Time Index



# Time of Day and Day of Week Variation of Buffer Time Index



# Congestion Impacts of the November 4 & 5, 2009 Montgomery County, Maryland Traffic Signal Malfunction



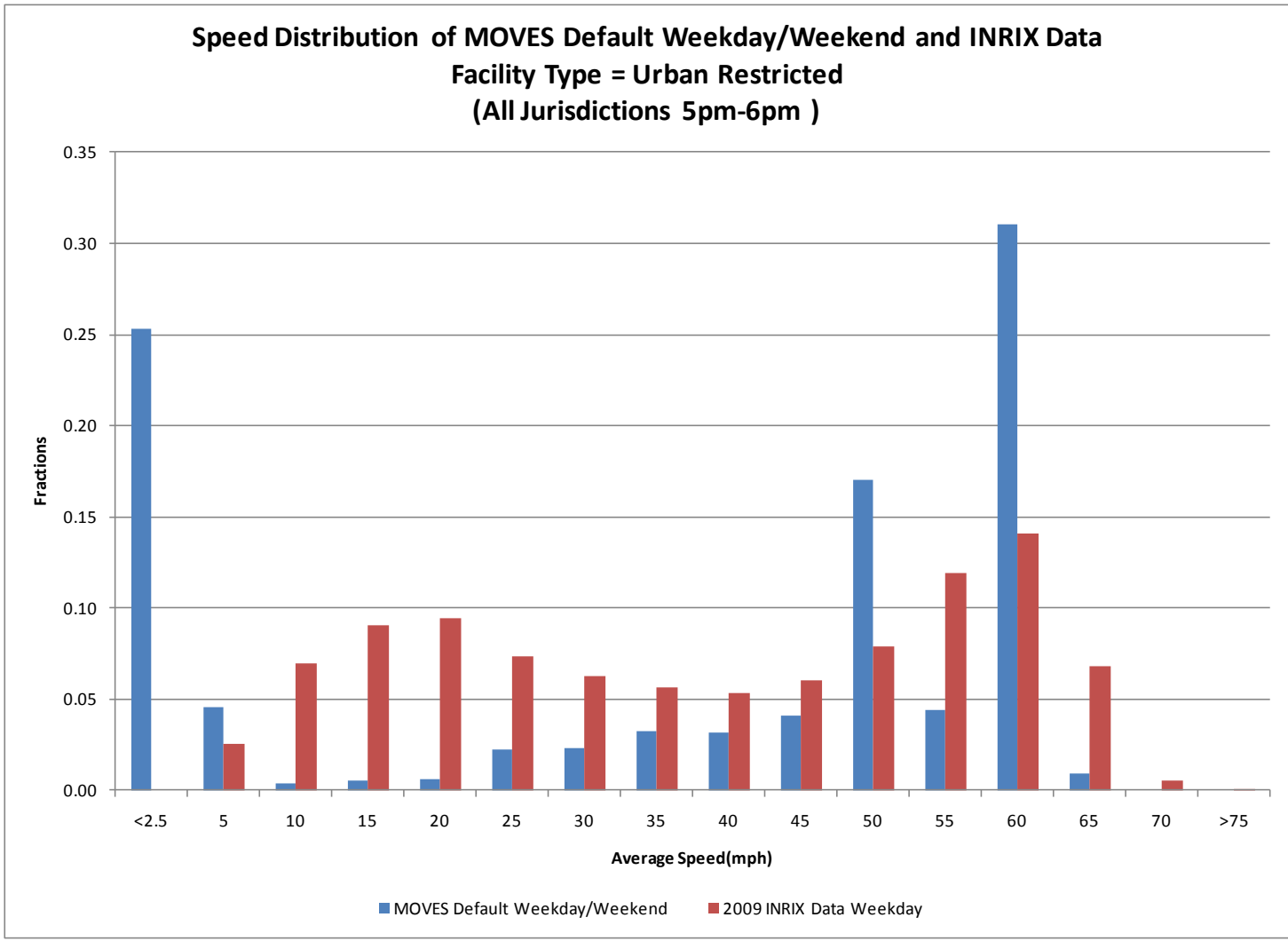
# Challenges in Using VPP Archive Data for the CMP

- Visualization
  - Significant GIS development time (displaying bi-directional data, zooming)
  - Compatibility of VPP data (TMC format) with our GIS and travel demand model networks
- Reliability performance measures were new to our process
  - Reliability measures may not be as intuitive as are traditional measures of congestion magnitude (e.g., V/C ratio)
- Significant data processing time
- But overall it was worthwhile to us to obtain the detailed data and perform any analyses we wished
  - Did not have to rely on canned summaries or amalgamated geographic coverage

# VPP Archive Data for Air Quality Modeling

- Major MPOs must model air quality impacts of transportation plans
- Nationally the field is currently transitioning from EPA's MOBIL model to the new EPA-mandated MOVES model
- Metro areas can choose to use either national default values or specific local data as input to these models
  - E.g. COG/TPB has been using local vehicle registration data (lower % of polluting heavy-duty vehicles than national averages)
- The VPP archive data enabled us to examine use of local roadways speed data instead of national defaults
  - After examining the data, COG/TPB opted to stay with the national default values for now, but may revisit this decision in the future

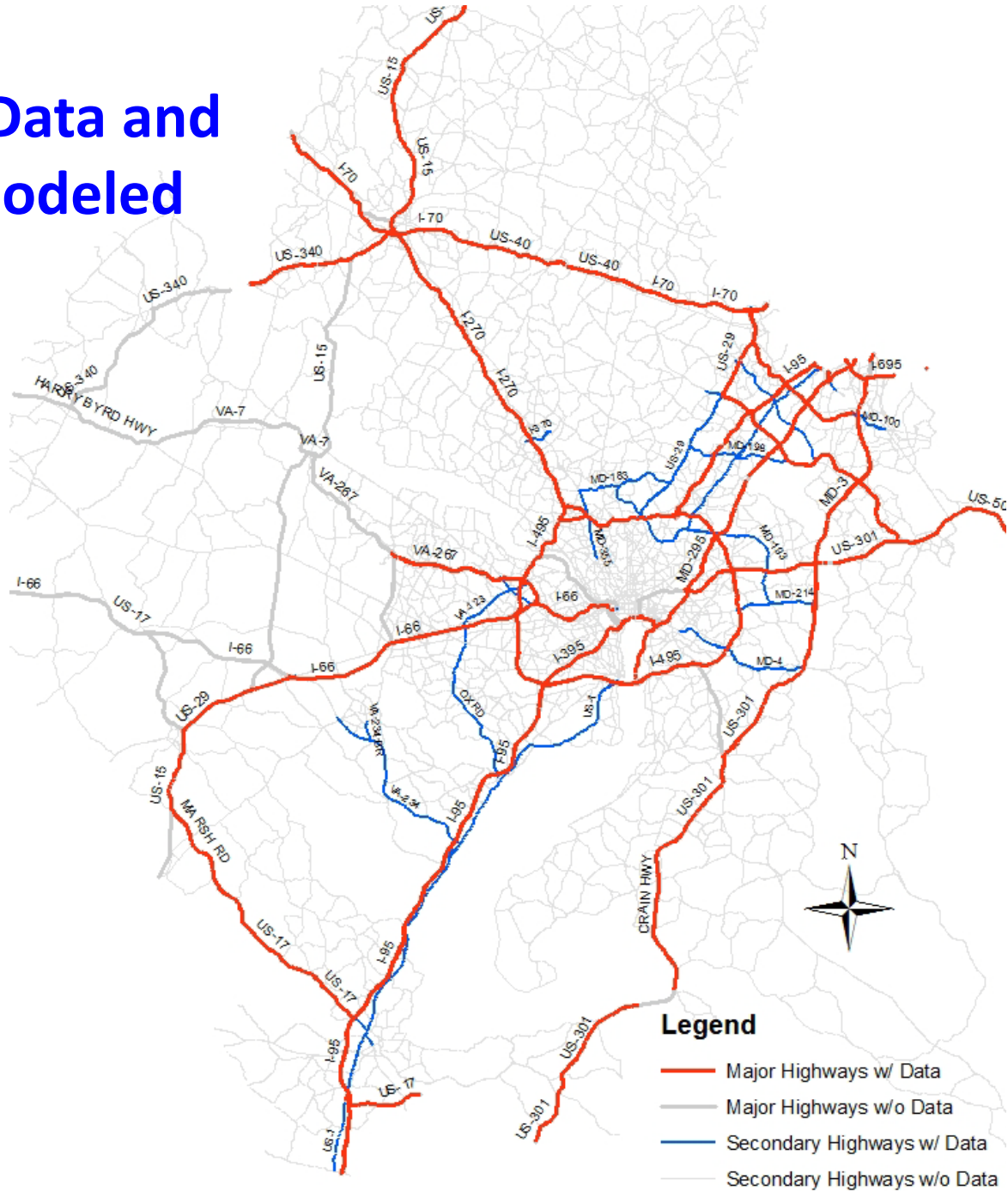
# Speed Distribution for Air Quality Modeling (MOVES – Test Case)



# Use of VPP Archive Data for Travel Demand Modeling Activities

- Robust empirical speed and travel time data for model calibration
  - Good geographic and temporal coverage
- Better capability to calibrate time-of-day models
- HOV/HOT evaluation (detail supports better analysis)
- Work is still in process – not yet in “production mode”

# VPP Archive Data and COG/TPB Modeled Area



# Advantages and Caveats of the Data

- **Advantages**

- Continuous monitoring (24/7/365)
- Probe-based speed data is superior to location-fixed detector speed data
- Complements other traffic data sources; enables more robust congestion analyses
- TMC format geo-referencing
- National comparability

- **Caveats**

- No traffic volumes
- Technical details regarding data collection and processing remain unrevealed
  - Must rely on the VPP verification process
- Current VPP coverage is limited (esp. arterials)
- Uncertainty of funding for future data purchases

# Potential Future COG/TPB Uses of Probe Data

- Expanded coverage
  - Beyond the current partial coverage
  - Arterials
    - Strong interest, few alternative data sources
    - Supplement (or supplant?) other data collection activities
- Quarterly congestion snapshots
- Time-of-day travel forecasting model enhancements
- Cross comparisons with other data sources
- HOV/HOT facilities analyses
- Special studies
- Overall the VPP is greatly beneficial to COG/TPB activities