

TRUCK COUNTS (MANUAL AND AUTOMATIC RECORDER STATIONS) AND TRUCK SPEEDS USING BLUETOOTH TECHNOLOGY

RESULTS

C. Patrick Zilliacus
Transportation Engineer

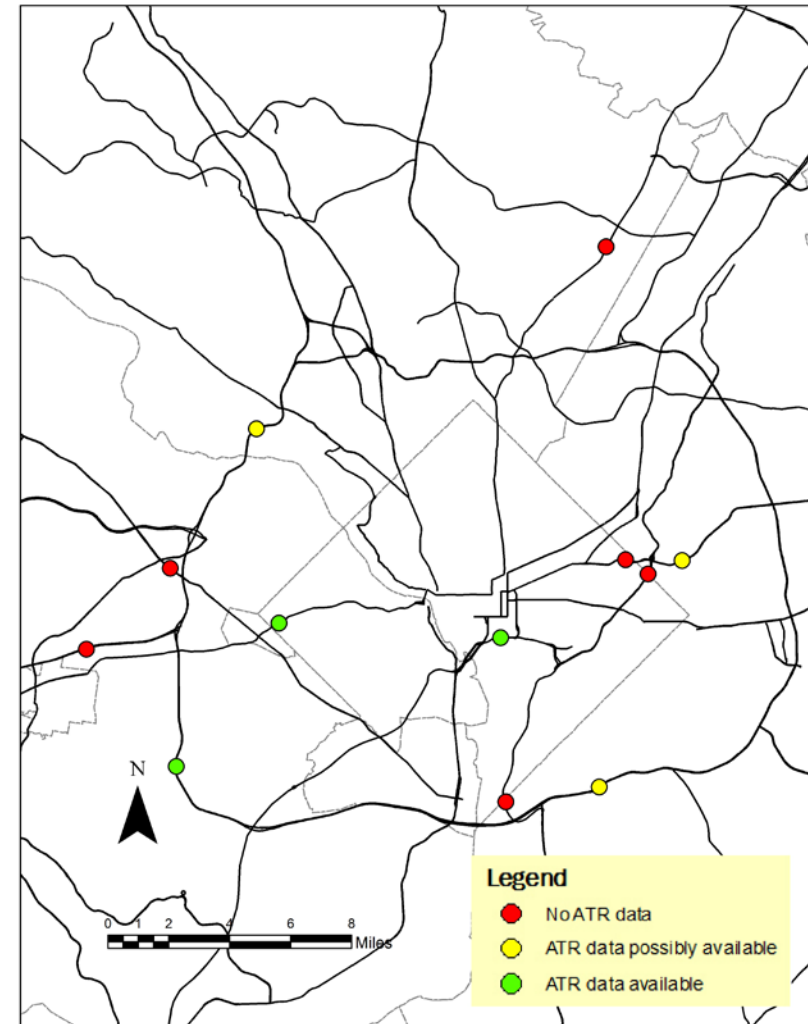
Freight Subcommittee
November 3, 2016



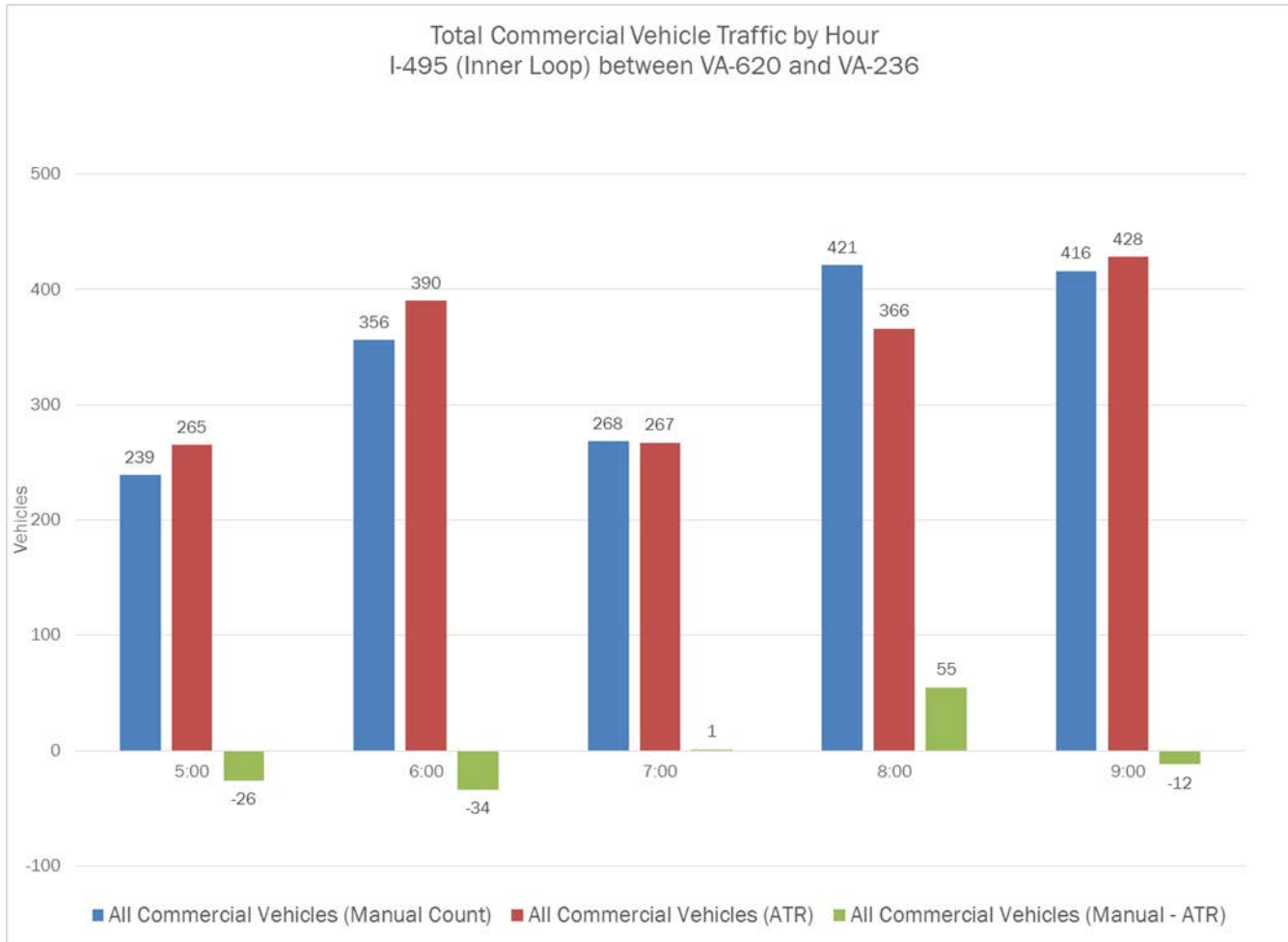
National Capital Region
Transportation Planning Board

Truck Counting Stations

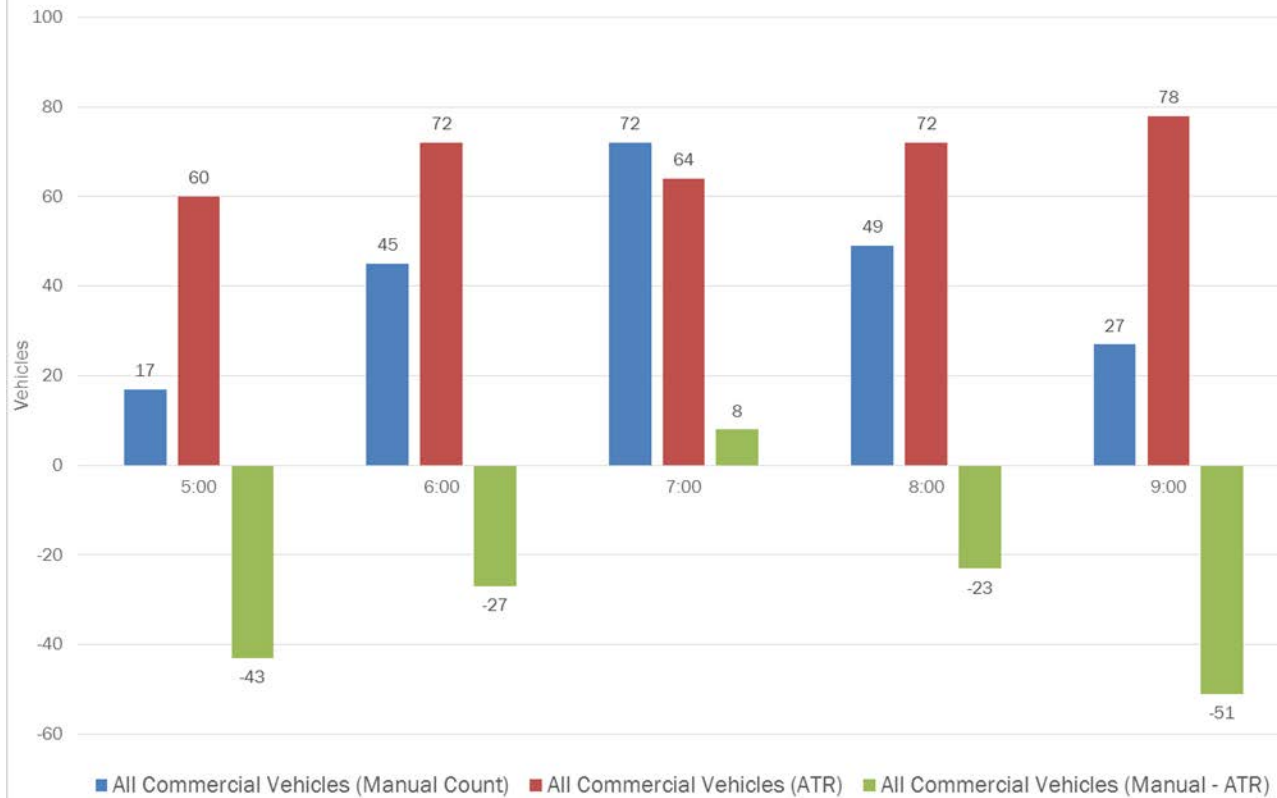
- Roadside classification counts were performed at a series of count stations around the region.
- The list of count stations was informed by a detailed map of automatic traffic recorder (ATR) stations obtained from the Federal Highway Administration (FHWA). Counts performed by experienced field data collection staff.
- Intention was to compare roadside counts and ATR counts.



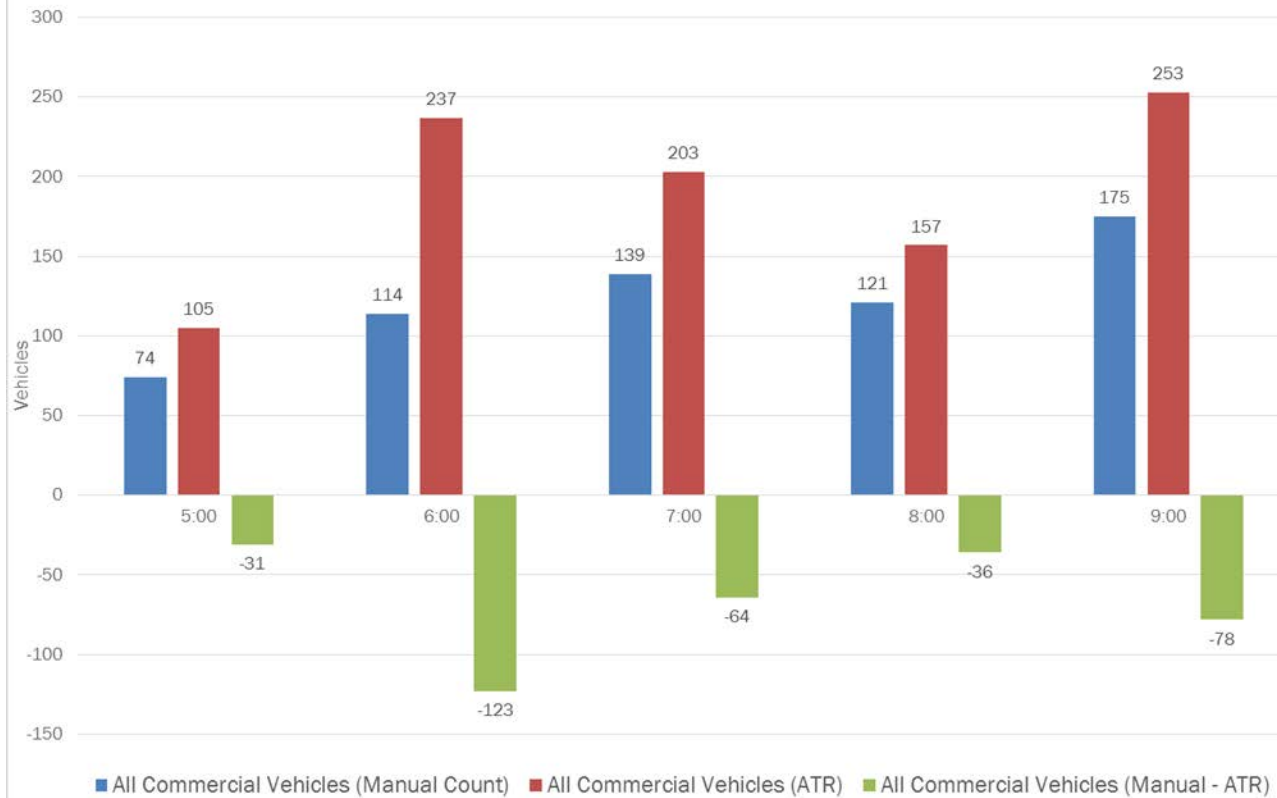
- No ATR data was available at most of the stations
- So opportunities for analysis were very limited



Total Commercial Vehicle Traffic by Hour
 U.S. 29 (Lee Highway) north of VA-237 (Washington Boulevard)

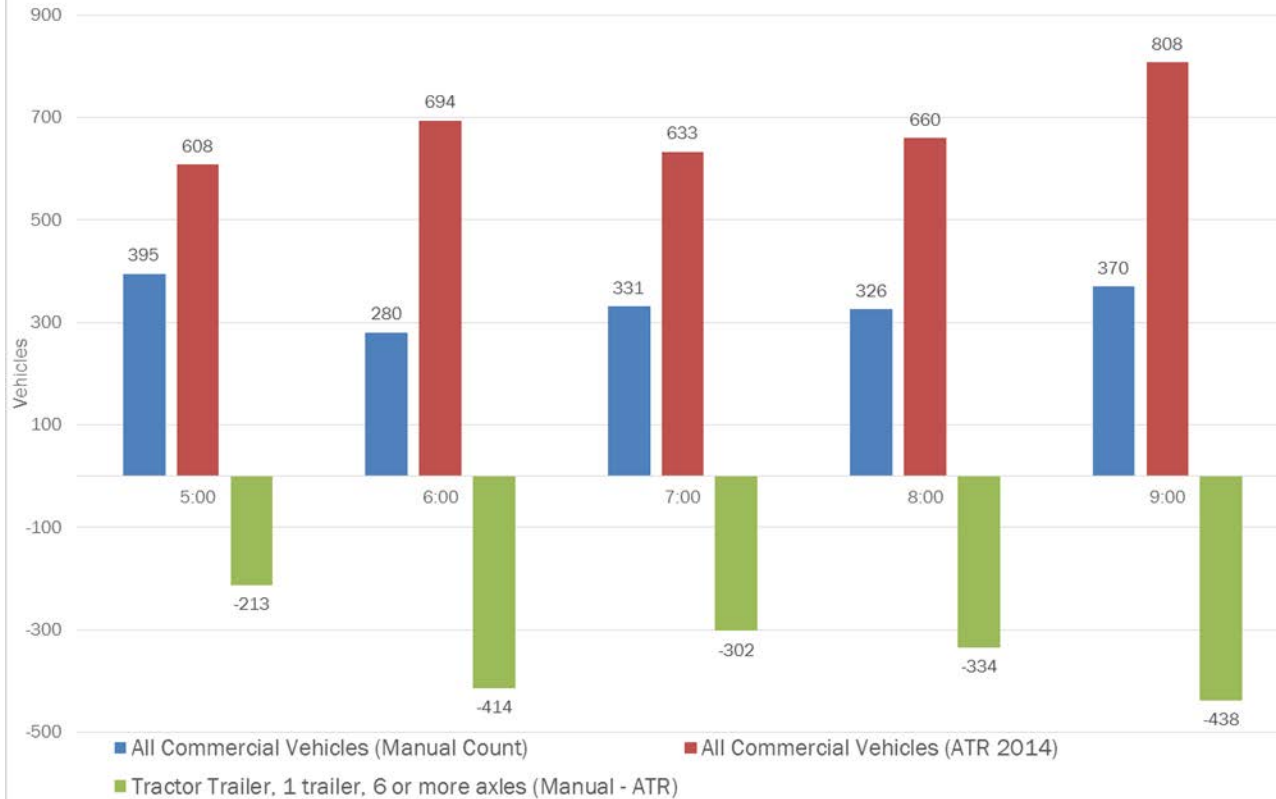


Total Commercial Vehicle Traffic by Hour
I-395 (Southwest Freeway) northbound at Maine Avenue, S.W.



ATR Data from 2014

Total Commercial Vehicle Traffic by Hour
I-495 (Outer Loop) at Carderock



Conclusions (truck counts)

- Doing manual counts of trucks and buses as a way to check automatic traffic recorder data seems like a useful exercise
- However, most of the ATR devices were found to be either out of service, or only doing counts of traffic (not classification counts), so any counts in the future should include verification in advance that the ATR is up and running
- Classification of buses appears to be a problem at ATR stations, with buses over-counted at the stations in Virginia and Maryland, but undercounted at the one station in the District of Columbia



Conclusions (truck counts, continued)

- Data for all stations counted are available in the technical memorandum

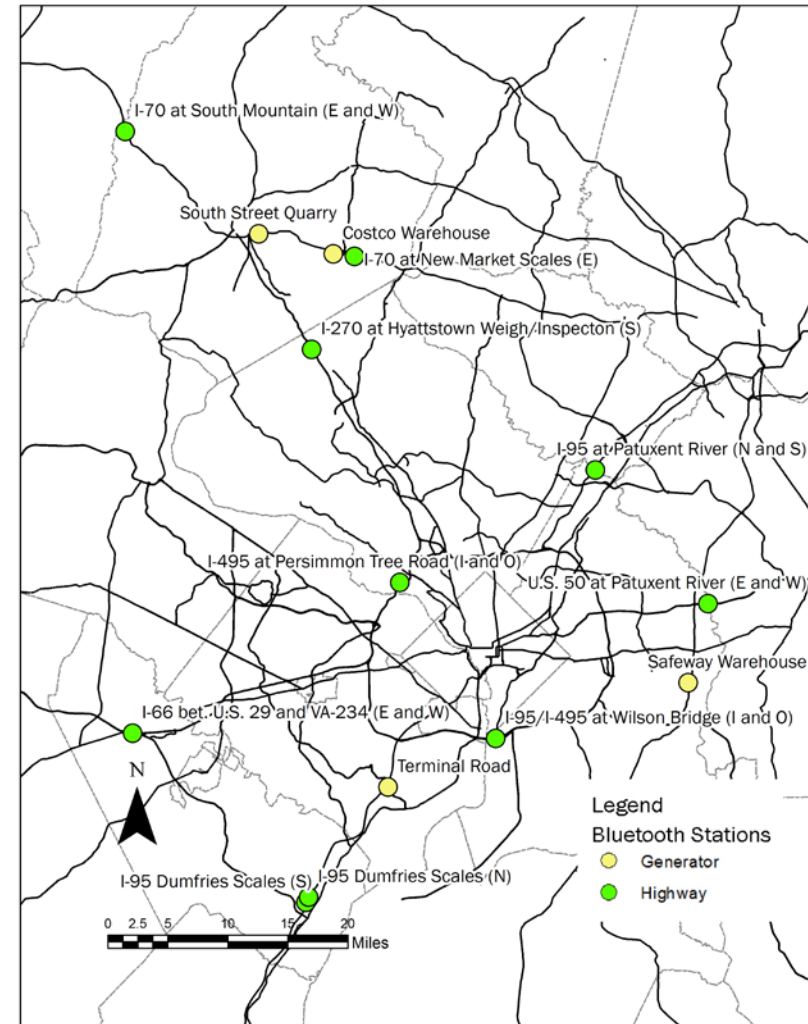


Truck Speeds Background

- Intended as a “proof of concept” low-budget effort
- An earlier version of this presentation was given to the Systems Performance, Operations and Technology (SPOTS) Subcommittee (formerly MOITS) and the Travel Forecasting Subcommittee
- Consultant (RSG) lead on data collection
- Deployed about 13 Bluetooth detectors around the region and left them out for a week
- Some monitoring stations (with large volumes of truck traffic) were given two detectors
- Devices were then taken down and brought to the office
- A network between stations was developed to determine miles between stations - care was taken to use legal truck routes only

Bluetooth Monitoring Stations

- Most detectors were roadside (green dots), four were at truck trip generators (yellow dots)
- Detectors linked to RSG's office by cellular devices to assure data capture
- Initial screening by RSG, then TPB staff added screening and analysis
 - Records with clearly invalid average speeds (greater than 75 mph or less than 5 mph (peak commute periods) or 15 mph (other times) were removed



Data Cleaning and Analysis Procedures

- Illogical station pairs eliminated
- If an O-D pair had less than 5 records in a time period, then they were deleted
- Based on overnight speeds, free-flow speed was assumed to be about 58 MPH for all TTI and PTI calculations (computed after invalid and low-sample size records were deleted) Weekdays only
- Time periods: Overnight (12 Midnight to 6 AM); AM peak (6 AM to 9 AM); Midday (9 AM to 3 PM); PM peak (3 PM to 7 PM); Evening (7 PM to Midnight)



Resulting Data

- Truck traffic only – RSG identified trucks and marked records as such – we used truck weigh/inspection station exit points to our advantage (where available) after getting approval from weigh station managers
- About 24,000 truck trip records resulted
- This effort did not follow the trucks between monitoring stations, and it is possible that some of the trucks made stops for a break or a business appointment along the way, even after extreme outliers were removed

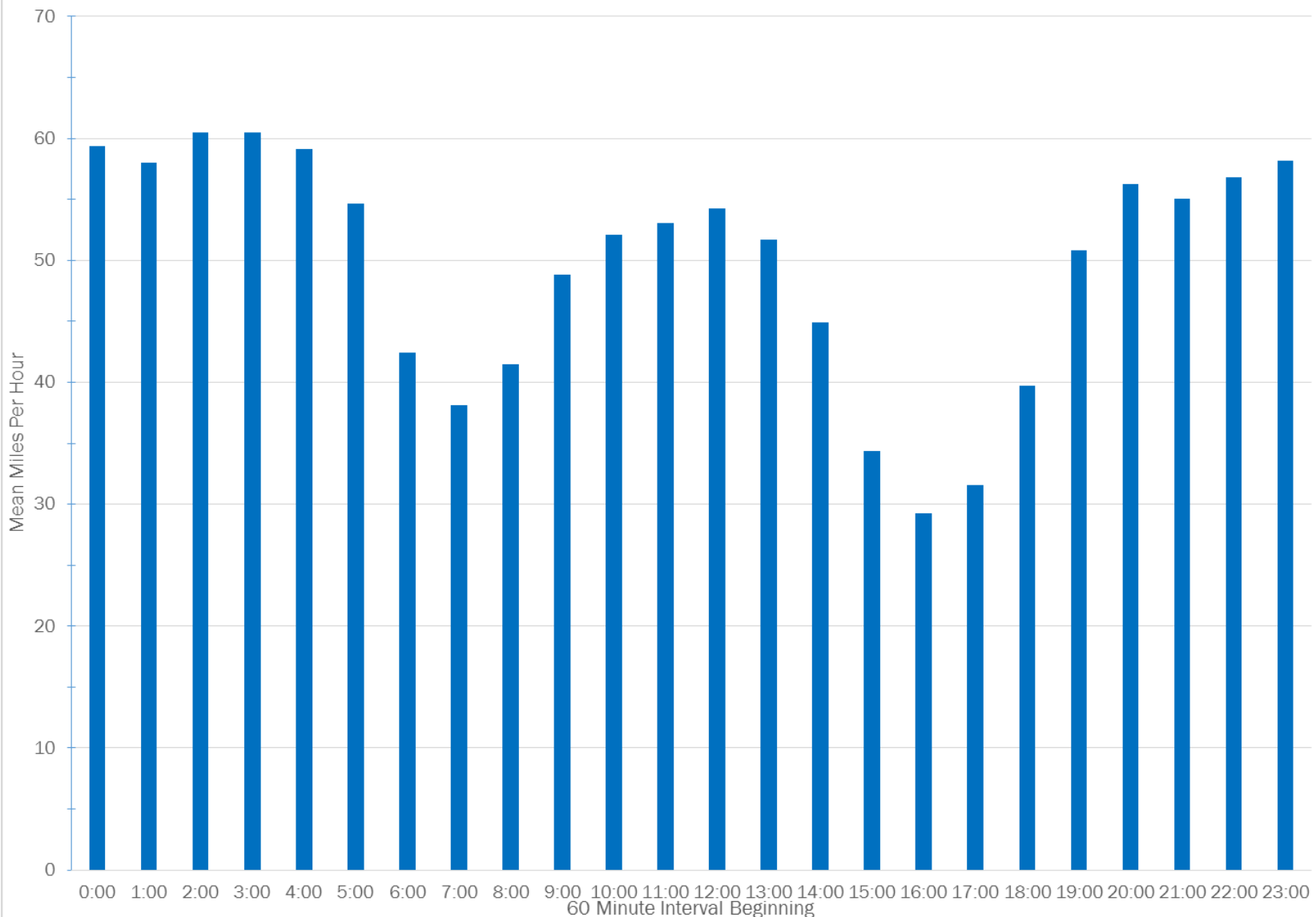


RESULTS: OBSERVED TRUCK SPEEDS AND TRAVEL TIMES



DRAFT DATA

Weekday Region-wide Arithmetic Mean Truck Speeds by Hour

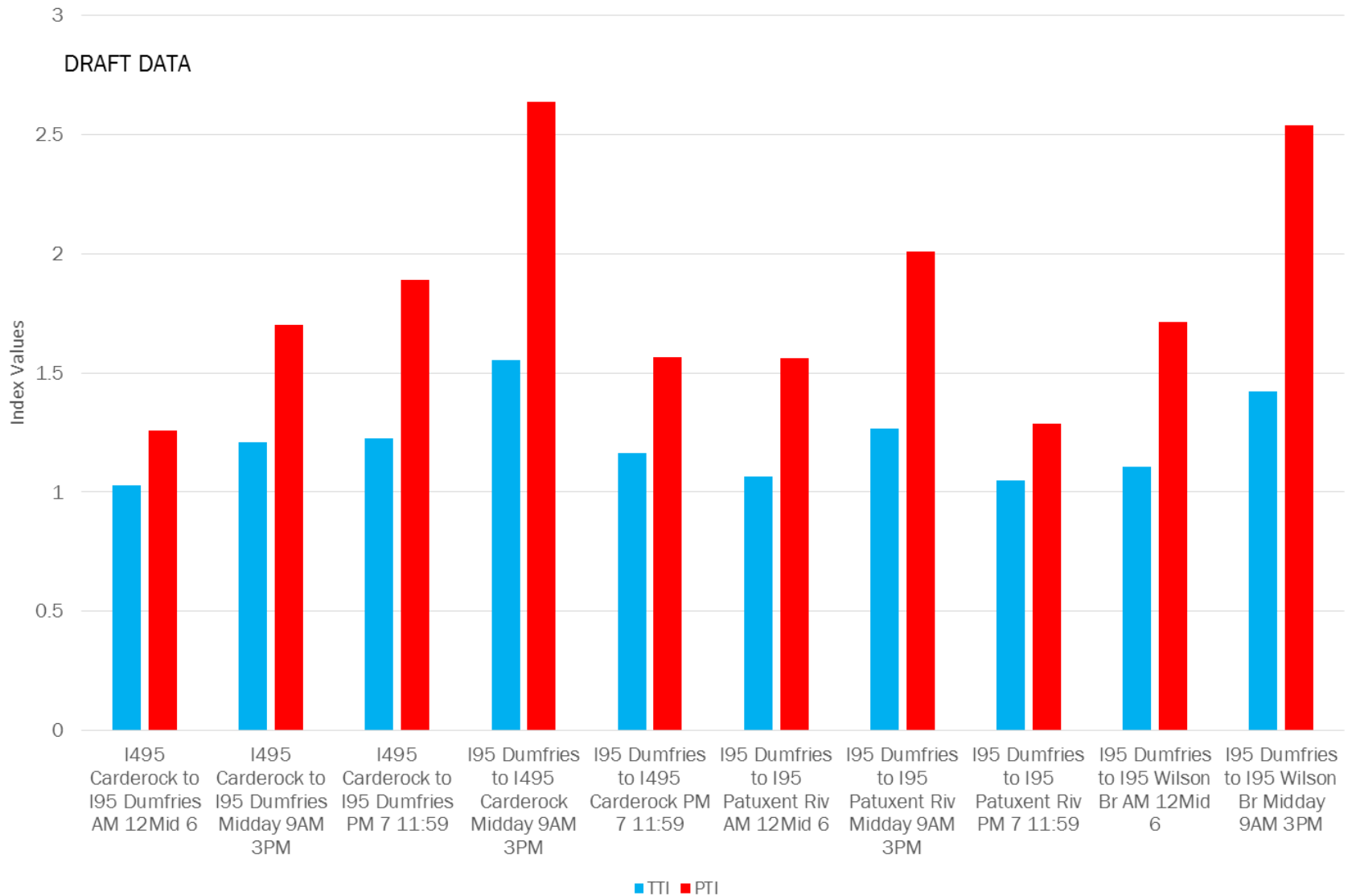


Travel Time Index and Planning Time Index

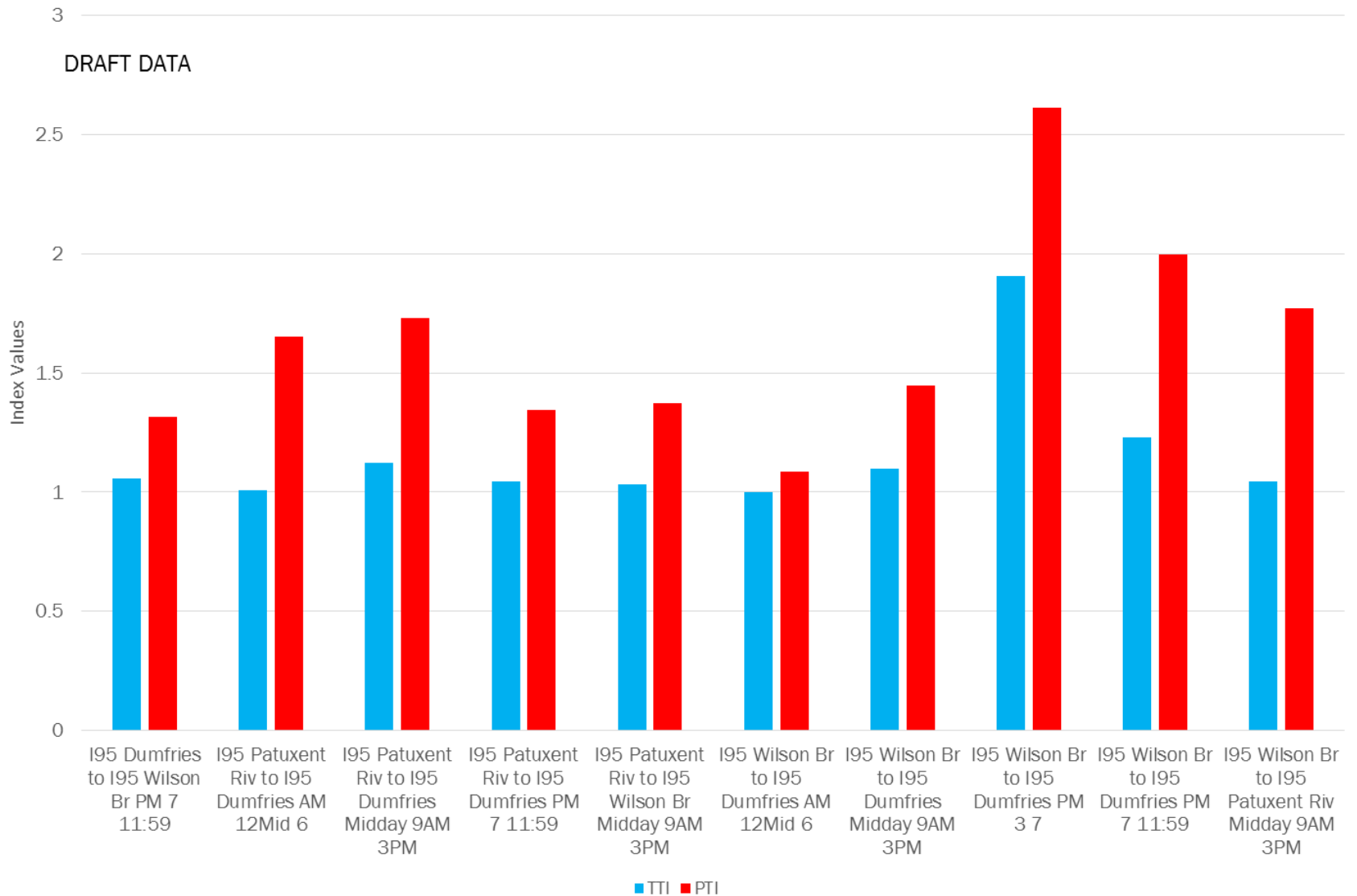
- Used as metrics to measure congestion
- Free-flow speed was just over 58 MPH (based on overnight travel times)
- Travel Time Index (TTI) never less than 1, computed by dividing mean travel time by free-flow travel time
- Planning Time Index (PTI) computed by dividing 95th percentile travel time by free-flow travel time



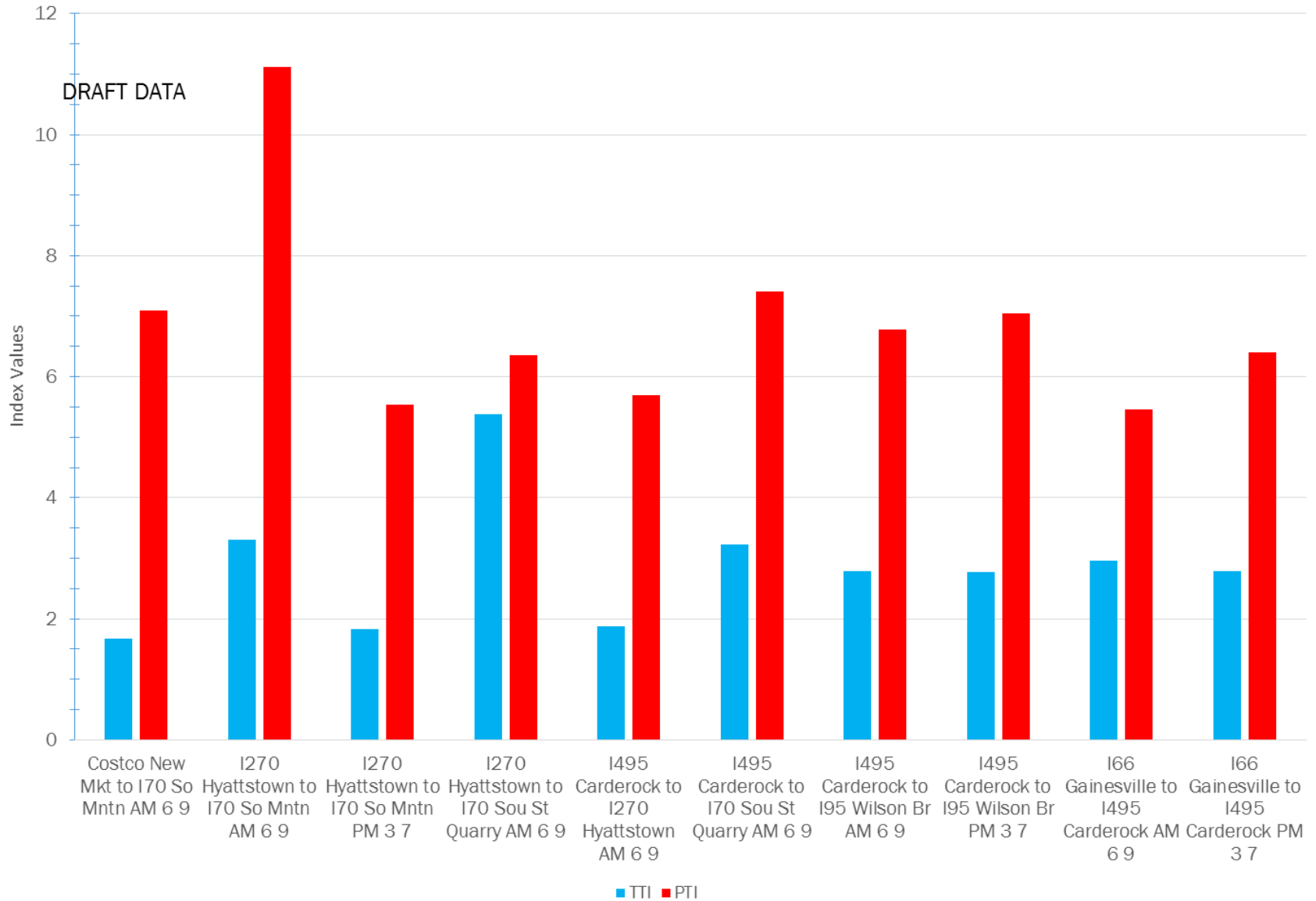
Truck Travel Time Index and Planning Time Index for routes with the highest number of input records (1 of 2)



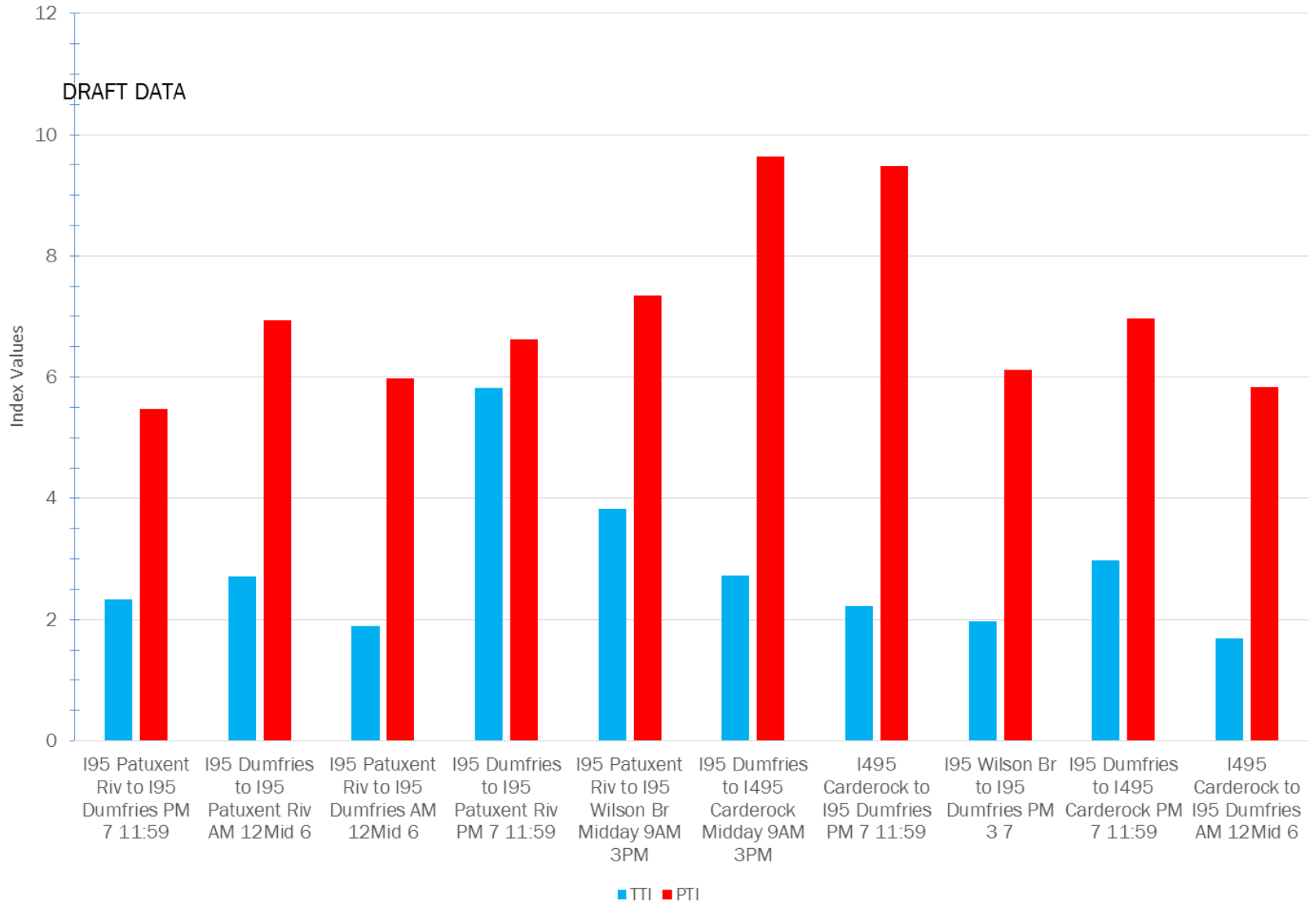
Truck Travel Time Index and Planning Time Index for routes with the highest number of input records (2 of 2)



Truck Travel Time Index and Planning Time Index 20 Highest PTI values (1 of 2)



Truck Travel Time Index and Planning Time Index 20 Highest PTI values (2 of 2)



Conclusions (Bluetooth Monitoring of truck speeds)

- Truck speeds, travel time index and planning time index vary by time of day, much like other highway traffic
- This is an approach appears to be a viable and relatively low-cost way to assess the speeds of truck traffic in the region, and it may inform the truck models development process
- Project could be repeated on a larger scale, perhaps in cooperation with neighboring regions, though it is possible that truck-only vehicle probe data will be even less expensive and easier to obtain in the future



C. Patrick Zilliacus
Transportation Engineer
(202) 962-3292
zill@mwcog.org

mwcog.org/tpb

Metropolitan Washington Council of Governments
777 North Capitol Street NE, Suite 300
Washington, DC 20002

