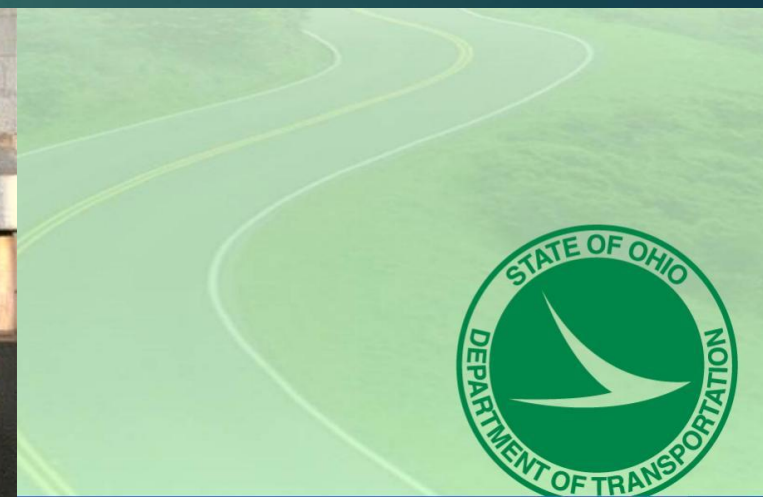


# Use of Time of Arrival at Work Data (CTPP Pt.2) for DTA (and Other Sub-Daily) Travel Demand Models

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FOR THE TRB CENSUS DATA CONFERENCE, 11-15-17



# Census may change some questions after pushback from public

BY D'VERA COHN ([HTTP://WWW.PEWRESEARCH.ORG/AUTHOR/DCOHN/](http://www.pewresearch.org/author/dcohn/))

The U.S. Census Bureau is considering whether to drop some questions that it has used for decades from its largest household survey of Americans. First under review are four of the touchiest topics: Plumbing, commuting, income and disability.

## Approach

We will review all topics on the questionnaire

Phase I (May): We will place our *initial* focus on four high-profile t

Plumbing: 8a, 8b, 8c and 8d

Disability: 17a, 17b, 18a, 18b, 18c and 19

Journey to Work: 30, 31, 32, 33 and 34

Income: 47a, 47b, 47c, 47d, 47e, 47f, 47g, 47h and 48

Phase II (June): We will begin to review the remaining topics on the questionnaire

## Project Timeline

- Request agencies identify Point of Contact (POC) : Mar 2014

## Congressional Interaction

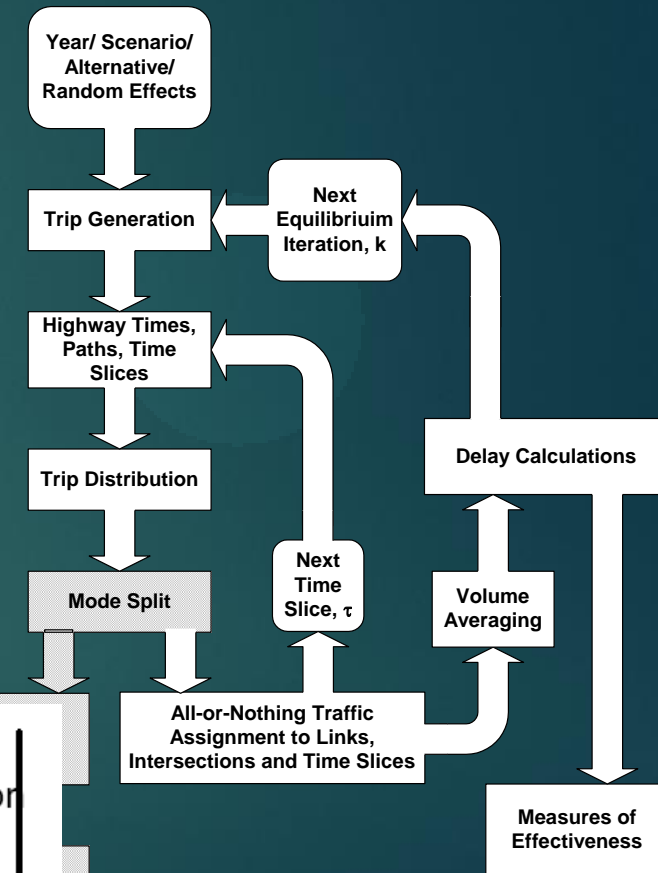
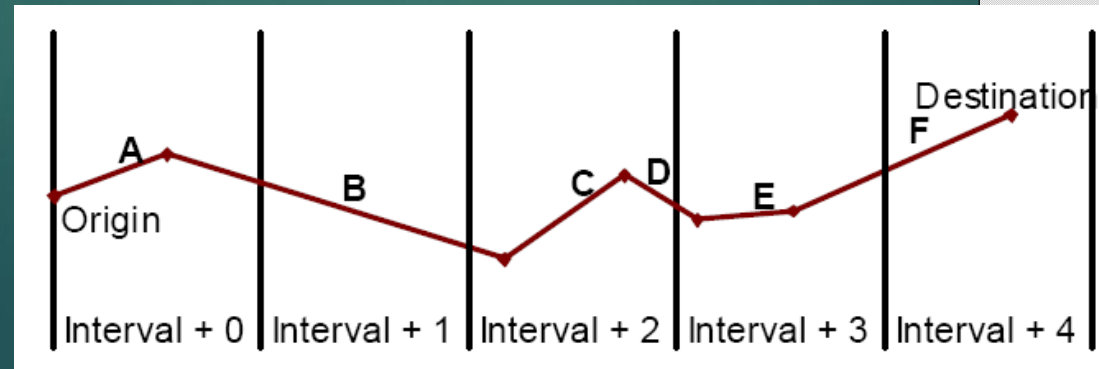
- I have met with 108 Congressional offices this past year
  - All receive complaints from constituents about the ACS.
  - Most are surprised to learn that approximately 8,000 addresses within their district are part of the ACS each year.
  - Most are impressed at the high response rates in their district (95-99%).
  - Many understand the value of ACS data and use it for policy making and speeches.
  - All express strong appreciation at having a “go to” Census person for difficult constituent situations.
- There is a strongly-felt reservation about a mandatory survey
  - HR 1078 would make the ACS voluntary and has 52 co-sponsors (in the last Congress there were 70).
  - I discuss the impact of a voluntary ACS on smaller population areas, particularly rural areas, referencing Statistic Canada’s recent experience in 2011, as well as the Census Bureau’s 2003 study regarding impact of a voluntary ACS.

## ACS Respondent Interaction

- Most people have never heard of the American Community Survey
  - They remember the last decennial census
  - They have never heard of the ACS and assume it is a scam
- Some have had a bad experience with an interviewer
  - Repeated contact attempts by phone and in person
  - Weekend and evening contacts
- Some have exceptionally strong and expressive political views
  - The Feds telling citizens they will be fined if they don’t answer a 35 minute survey
- Some are worried about identity theft
  - Income questions
  - Time one leaves home for work and work address
- Some questions are really hard to answer
  - Interest and dividends earnings
  - Type of Internet access
- Many just can’t fathom that we don’t already have this information

# “DTA-based” travel modeling in a nutshell . . .

- ▶ Similar to “4-step process,” except that full day is broken into time intervals with variable trip start times within intervals
- ▶ Travel paths can change “mid-trip” with spillover across intervals.
- ▶ Accounts for time-dependent network/traffic management & “traveler attributes.”
- ▶ Saturation flows dynamic & set to lower initial values in off-peak periods based on driver/purpose characteristics.
- ▶ Deterministic (HCM operational) intersection controls . . . .
- ▶ Trip assignment to time interval link-by-link based on the point in time that the link’s “A-node” is reached



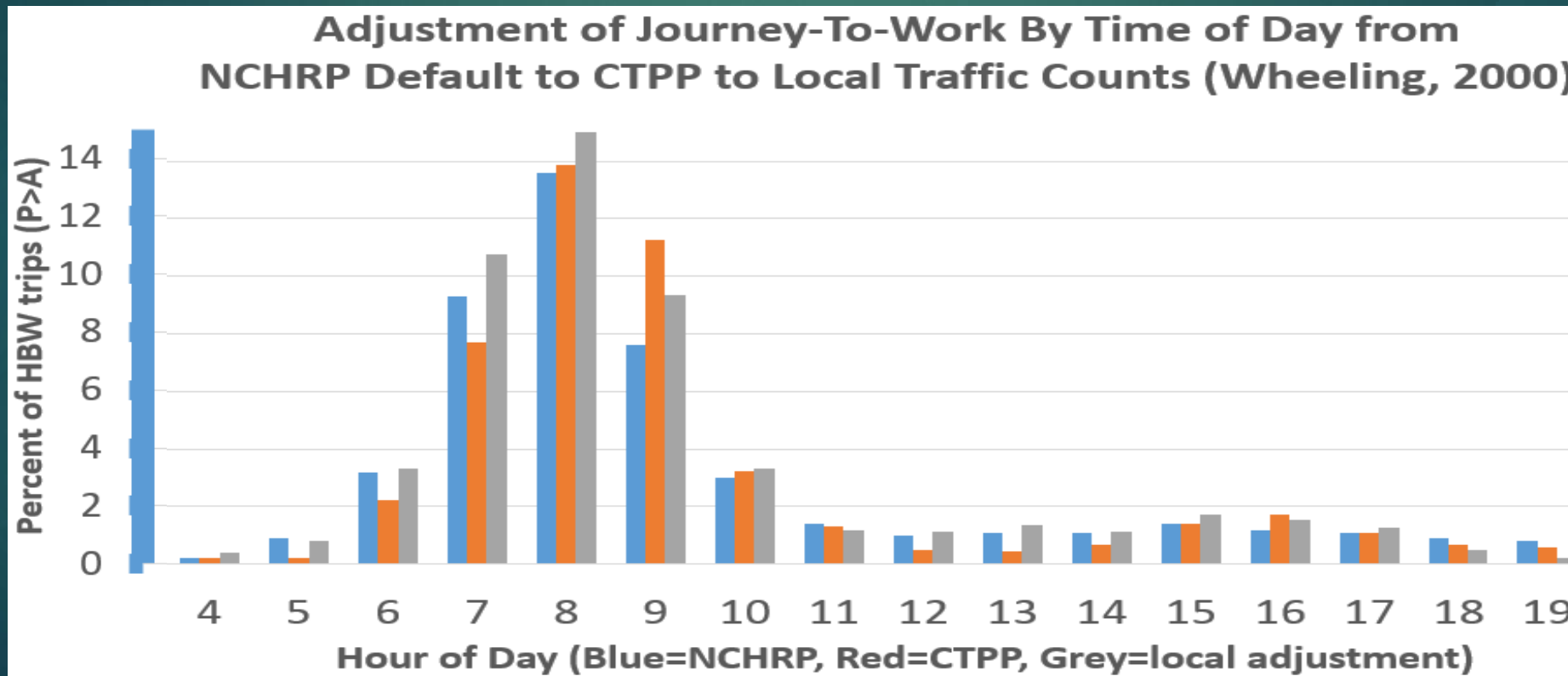
# How was this data used initially? (Area-wide)

- ▶ A “default” set of trip percentages by hour of day (and direction) has always been part of the series of NCHRP reports on Transferable Parameters for travel models (table from latest report shown at right).

Hour Ending	Home-Based Work		Home-Based Nonwork		Home-Based School		Home-Based Other		Nonhome-Based	All Trips
	From Home	To Home	From Home	To Home	From Home	To Home	From Home	To Home		
1:00 AM	0.1%	0.5%	0.0%	0.3%	0.0%	0.0%	0.0%	0.4%	0.2%	0.3%
2:00 AM	0.0%	0.2%	0.0%	0.2%	0.0%	0.0%	0.0%	0.2%	0.1%	0.1%
3:00 AM	0.0%	0.1%	0.0%	0.1%	0.0%	0.0%	0.0%	0.1%	0.1%	0.1%
4:00 AM	0.1%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
5:00 AM	1.5%	0.0%	0.2%	0.0%	0.0%	0.0%	0.2%	0.0%	0.4%	0.4%
6:00 AM	5.4%	0.0%	0.6%	0.1%	0.2%	0.0%	0.7%	0.1%	0.5%	1.4%
7:00 AM	11.7%	0.0%	1.9%	0.3%	4.0%	0.0%	1.7%	0.3%	1.6%	3.5%
8:00 AM	14.3%	0.1%	6.5%	1.0%	30.6%	0.1%	4.4%	1.1%	4.9%	7.7%
9:00 AM	7.5%	0.1%	4.6%	1.2%	12.8%	0.2%	3.9%	1.3%	5.1%	5.9%
10:00 AM	2.7%	0.3%	3.6%	1.4%	2.2%	0.4%	3.7%	1.5%	5.1%	4.7%
11:00 AM	1.3%	0.3%	3.2%	1.9%	1.2%	0.6%	3.4%	2.1%	6.5%	5.1%
Noon	1.0%	1.0%	2.7%	2.5%	1.0%	1.3%	2.8%	2.6%	9.4%	6.0%
1:00 PM	1.5%	1.8%	2.4%	3.1%	0.9%	2.5%	2.6%	3.1%	10.6%	6.8%
2:00 PM	1.7%	1.4%	2.7%	2.8%	0.5%	2.2%	2.8%	2.9%	8.7%	6.1%
3:00 PM	1.7%	2.7%	2.8%	4.0%	0.5%	8.8%	3.0%	3.5%	8.5%	6.9%
4:00 PM	1.1%	6.3%	2.6%	5.3%	0.7%	12.2%	2.8%	4.7%	9.2%	8.3%
5:00 PM	1.0%	8.9%	3.2%	4.8%	1.0%	4.5%	3.3%	4.9%	8.4%	8.4%
6:00 PM	0.5%	10.6%	3.7%	5.1%	1.3%	3.7%	3.9%	5.2%	7.4%	8.7%
7:00 PM	0.3%	4.4%	4.2%	4.1%	0.7%	1.5%	4.5%	4.3%	5.0%	6.7%
8:00 PM	0.2%	1.9%	2.3%	4.0%	0.1%	1.2%	2.5%	4.2%	3.8%	4.8%
9:00 PM	0.2%	1.2%	1.0%	4.0%	0.0%	1.1%	1.1%	4.3%	2.2%	3.5%
10:00 PM	0.2%	1.3%	0.5%	2.8%	0.2%	1.4%	0.5%	2.9%	1.4%	2.4%
11:00 PM	0.3%	1.3%	0.2%	1.4%	0.0%	0.6%	0.3%	1.5%	0.8%	1.4%
Midnight	0.2%	1.3%	0.2%	0.7%	0.0%	0.0%	0.2%	0.8%	0.3%	0.8%
<b>Total</b>	<b>54.4%</b>	<b>45.6%</b>	<b>49.0%</b>	<b>51.0%</b>	<b>57.7%</b>	<b>42.4%</b>	<b>48.2%</b>	<b>51.8%</b>	<b>100.0%</b>	<b>100.0%</b>

# Initial adjustments (area-wide for sample MPO)

- I have historically used the Time of Arrival figures from the Census to provide the initial local area update of the NCHRP-based table (Home-Based Work – From Home), and then used local traffic count data (both area-wide and location-specific) to provide final adjustments. (Both the CTPP's figures and the local traffic counts can be used to make zone-specific adjustments as well as region-wide average values.)



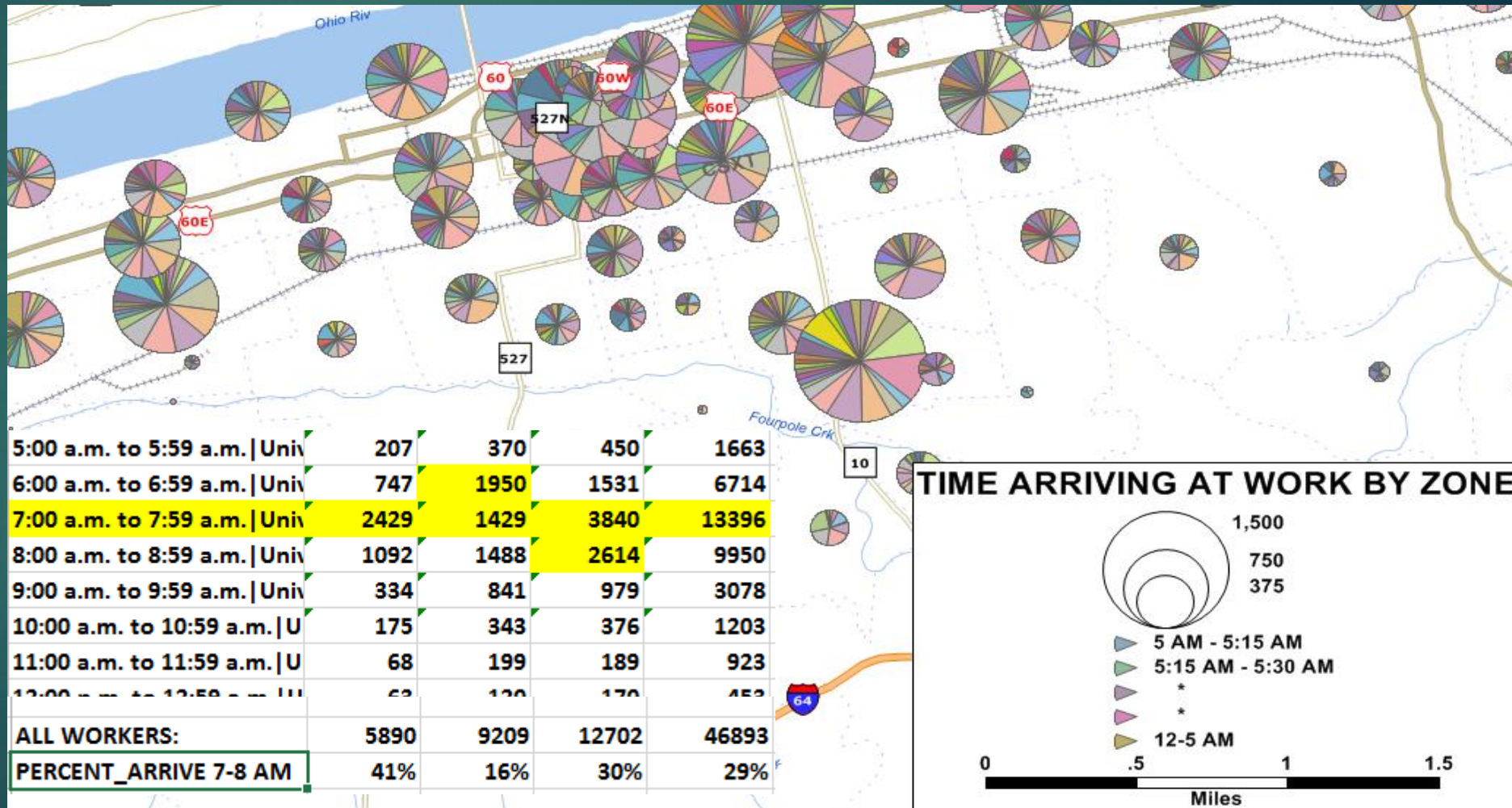
# Area-wide adjustments numerically (for several other MPOs)

NCHRP							OVERALL	HOUR OF DAY				
HB-WORK		HB-SCHOOL		HB-OTHER		NON-HOME BASED						
A>P	P>A	A>P	P>A	A>P	P>A	EACH WAY						
5.4%	0.0%	0.2%	0.0%	0.7%	0.1%	0.5%	1.6%	5-6 AM				
11.7%	0.0%	4.0%	0.0%	1.7%	0.3%	1.6%	4.0%	6-7 AM				
14.3%	0.1%	30.6%	0.1%	4.4%	1.1%	4.9%	9.3%	7-8 AM				
7.5%	0.1%	12.8%	0.2%	3.9%	1.3%	5.1%	6.3%	8-9 AM				
1.27	1.27	0.53	0.53	2.63	2.63	1.81						
FROM CTPP									FROM TRAFFIC COUNTS:			
MPO#1 CTPP							NCHRP					
HB-WORK		HB-SCHOOL		HB-OTHER		NON-HOME BASED			MPO #1	MPO #2	MPO #3	
A>P	P>A	A>P	P>A	A>P	P>A	EACH WAY						
2.4%	0.0%	0.2%	0.0%	0.7%	0.1%	0.5%	1.0%	5-6 AM	2.1%	1.7%	2.6%	
8.4%	0.0%	4.0%	0.0%	1.7%	0.3%	1.6%	3.4%	6-7 AM	4.2%	3.9%	4.5%	
15.1%	0.1%	30.6%	0.1%	4.4%	1.1%	4.9%	9.5%	7-8 AM	6.2%	5.8%	6.6%	
12.3%	0.1%	12.8%	0.2%	3.9%	1.3%	5.1%	7.3%	8-9 AM	5.6%	5.5%	5.9%	

- ▶ Adjustment #3 – zone-specific hour-of-day rates from CTPP (proportionally)
- ▶ Adjustment #4 – any adjustments for site-specific traffic counts

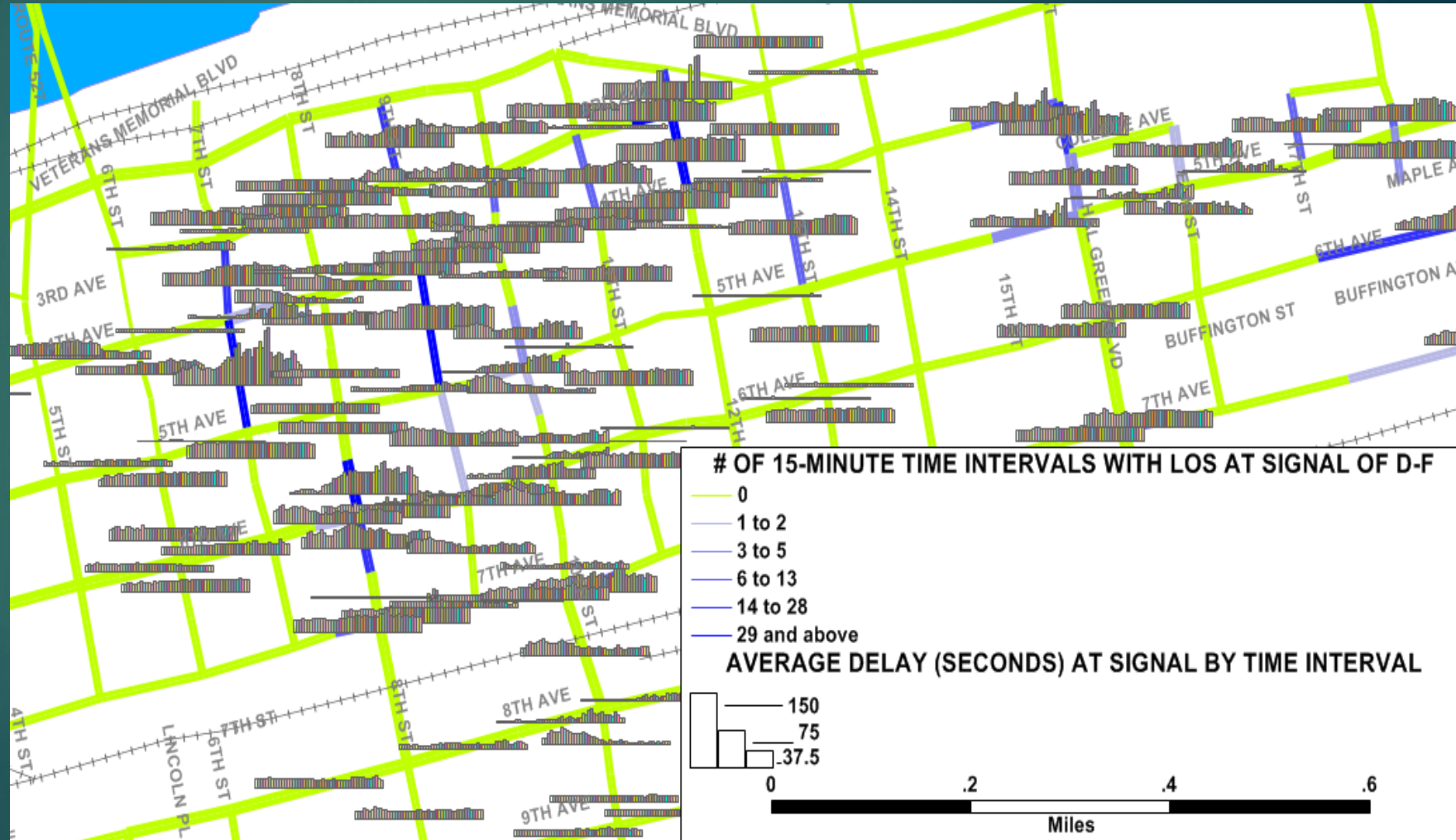
# How are the differences in time of arrival to work at the traffic zone level being used?

- ▶ The map at right shows time of arrival at work by zone in (mostly) 15 and 60 minute time intervals.
- ▶ These distributions are used to place zones into different “groups” for hourly rates for work-related trip purposes. (Based on the number of workers arriving in that zone in the area-wide peak hour compared to the average rate.)



# The end product for this application?

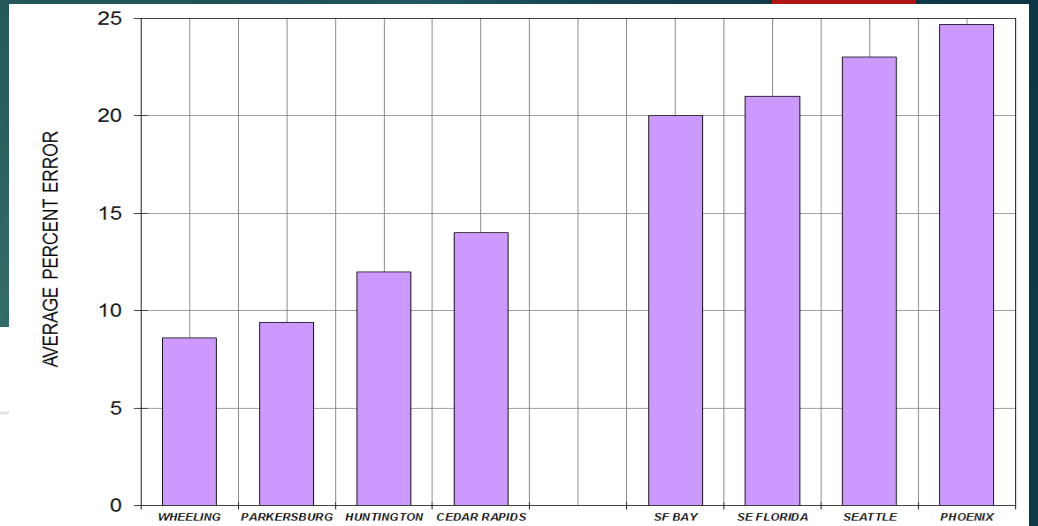
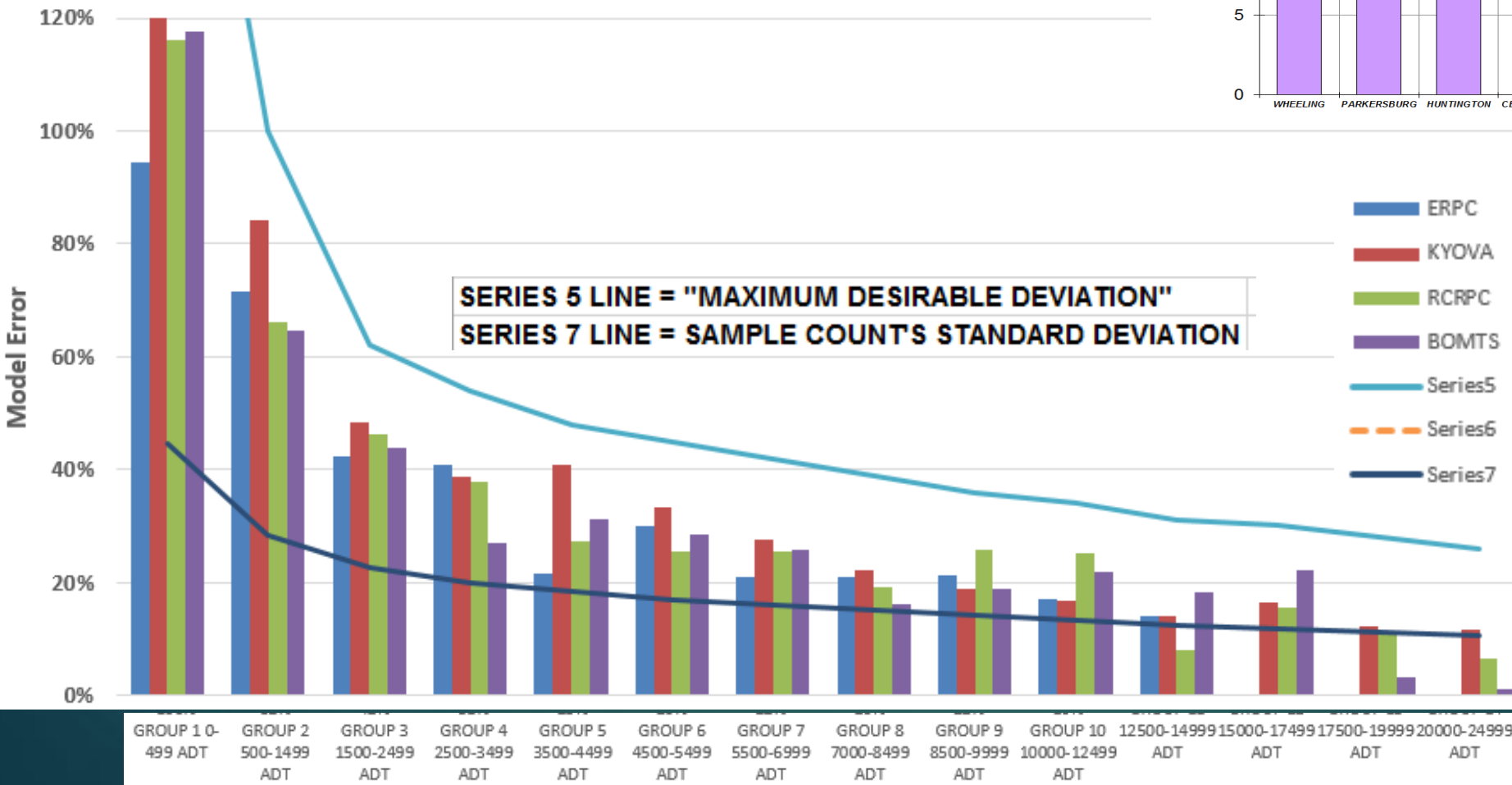
- ▶ Estimation for planning purposes how the duration as well as the extent of congestion within the region could change in the future, as land use changes and/or capacity or operations-level projects may (or may not) get implemented to manage this.





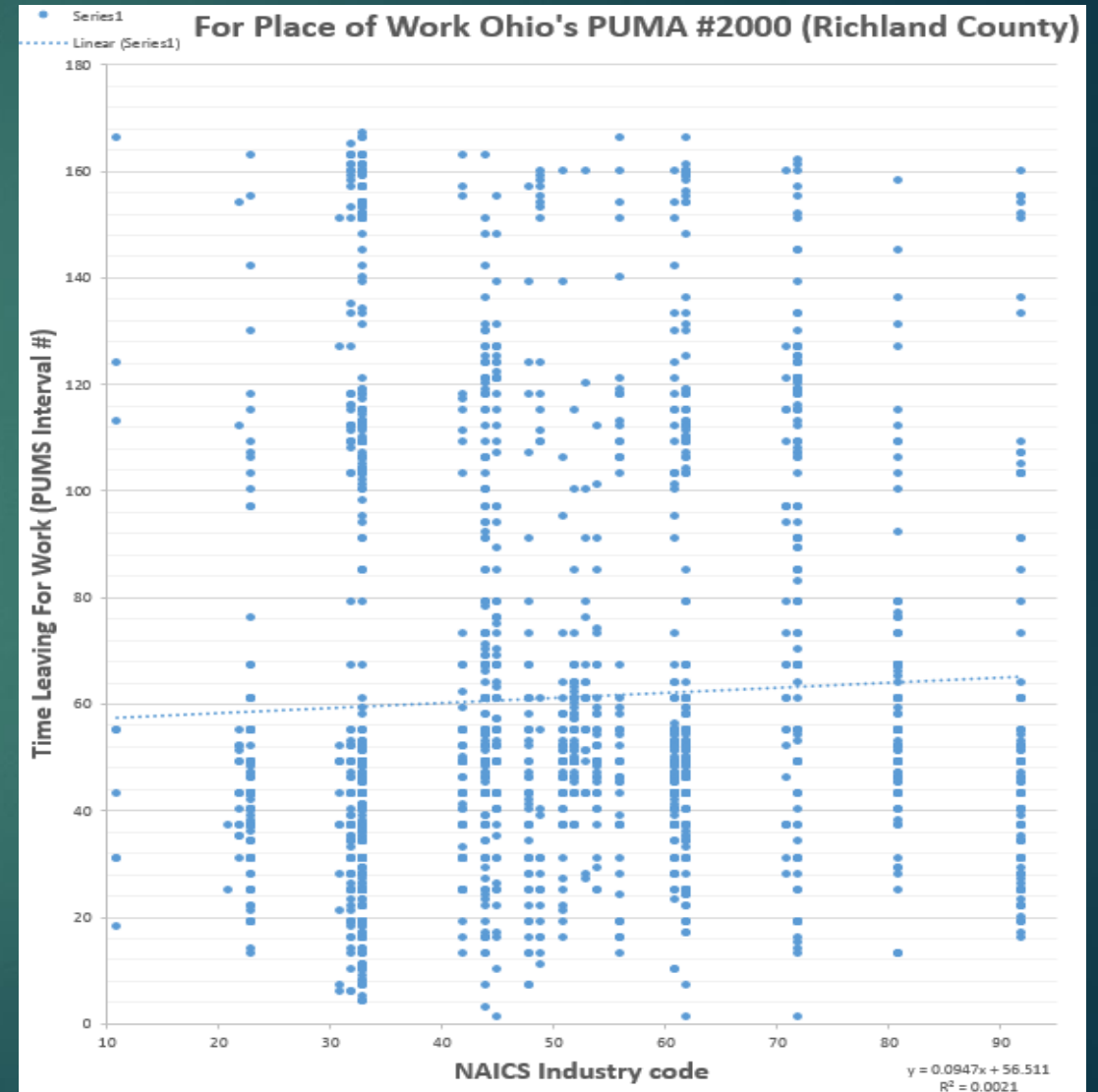
# Is it working?

MPO model error vs Various Standards



# Finally, what can PUMS data add?

- ▶ Estimate the percent of responses that are “imputed.” (In Ohio in 2000, 14% for Time Leaving for Work, 11% for Travel Time to Work, and 15 ½ % either one or the other of these questions.)
- ▶ “Global” cross-tabulations of data to see what else to try out. (Example: Time leaving for work vs self-reported industry? Correlated, but only slightly.)



# Questions?

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