TRAVEL MODEL UPDATES













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OVERVIEW

- SDE
- OMS
- Cube7
- Statewide
- 3C CAV/Telecommute Enhancements

SDE-SIMULATION DEMAND ESTIMATION

- Developed to allow standardized and (fairly) rapid creation of simulation ready (disaggregating model volumes temporally and spatially to the level needed) traffic volumes, mostly using ODME
- Model review phase can also be used stand alone to guide refinements to travel models for any project level analysis
- Modular nature means other components can be mixed and matched as well (for example regional ODME step could be used to refine model-wide volumes without the various subarea focusing steps in the process)
- We held training for this in February 2022, but the manual is purposefully very detailed so any modeler can pick it up and follow it

OMS

- All OMS models up to 2010 base year
- Soon time to think about 2021(ish) base year
- Focus has been on cleaning up the documentation and a new set of training slides reflecting the differences in OMS10 (I previously did training at MUG on those differences, those slides as well as the original slides and docs are delivered with the model, the new docs and slides will be transmitted when complete)
- There are no plans to update OMS anymore (the OMS10 revisions were correcting issues discovered in the original implementation and now it is perfect) ☺
- Though, we may want or need to convert its scripts from Voyager to Python at some point after adoption of Cube 7

CUBE7

- Speaking of which…
- Cube7 will have a native Python scripting environment and my guess is Voyager scripts will be phase out
- Also the network editing environment in Cube7 will be completely different so new network coding training will be coming (but it should look familiar to people familiar with GIS editing)
- Plan would be to start conversion on the training model, then move to OMS, then the more complex models (3C/SWM)
- On the other hand, see next regarding SWM plans, perhaps instead of Cube…

STATEWIDE MODEL

- Current focus is on documentation and updating the way the user interacts with the model's socio-economic inputs
- Completed a basic users guide which tells you how to get and set up the model for running and how to run scenarios involving only highway network changes
- Also introduces user to its unique feedback mechanisms and shows 3 ways to run

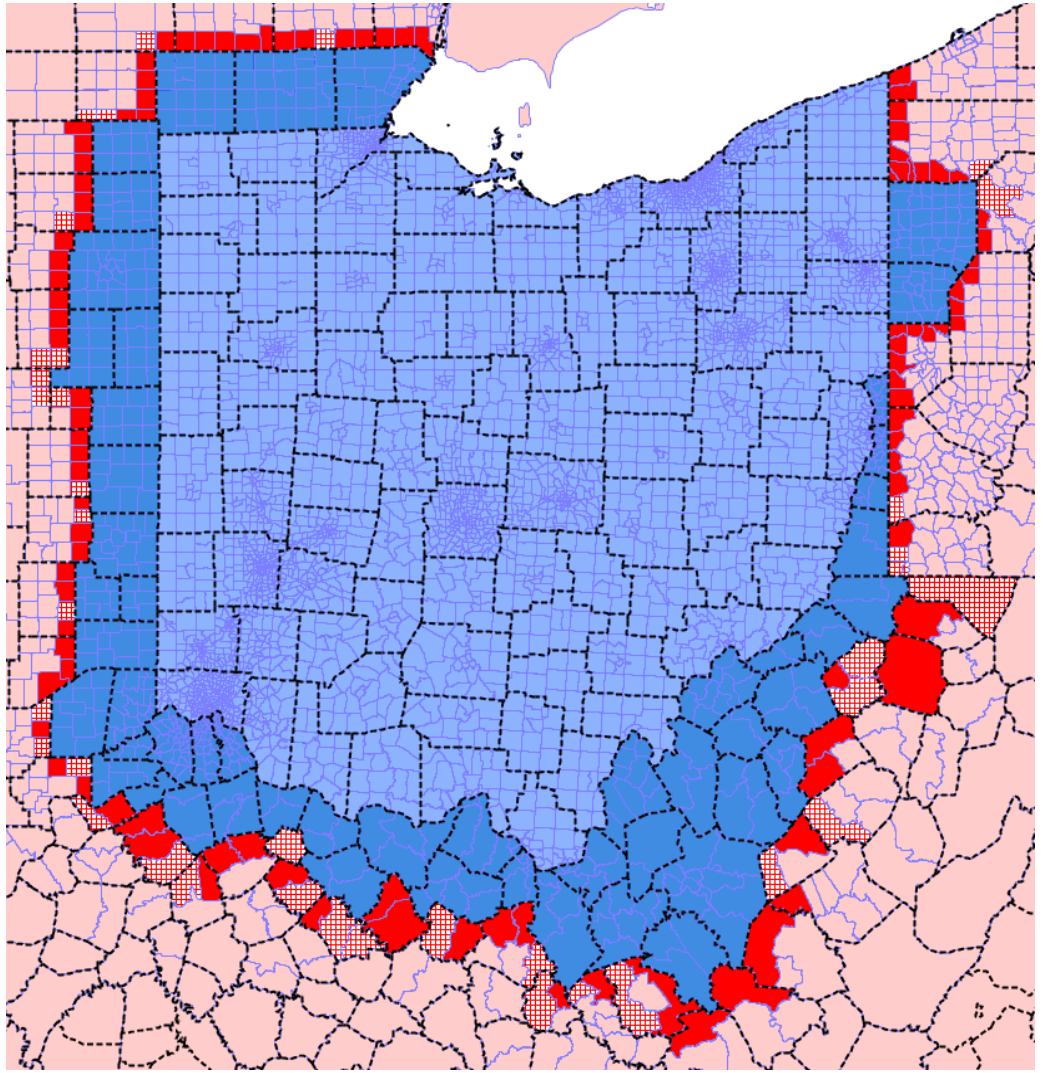
Contents

STATEWIDE MODEL

- There will be an advanced guide that covers generating scenarios involving changes to the SE/landuse inputs, however, this is being changed now
- Because the model runs through time in 5 year increments and each run uses various data (including travel cost information) from the prior year's run and because the model then internally generates much of its SE data (households/employment) based upon that, it can be challenging (or impossible) for the user to intervene in that data to generate future "what if" scenarios
- We have completed phase 1 (which was just to figure out how to fix it) of a process to adjust how the model consumes SE data so the user has more control, this includes:

STATEWIDE MODEL

- Changing the economic engine to directly use Tredis (currently uses stand alone Tredis generated data that is no longer supportable)
- Changing formats of household and employment files to include more variables and to include a unified set of data on both internal and external zones
- Changing how those files related to the model's control totals (from DSA and Tredis)
- Changing external models to use a unified and user modifiable set of SE data and sized terms (think cordon counts)



STATEWIDE MODEL

- Changing the way the model pivots off previous year data to respect user interventions

Option 1

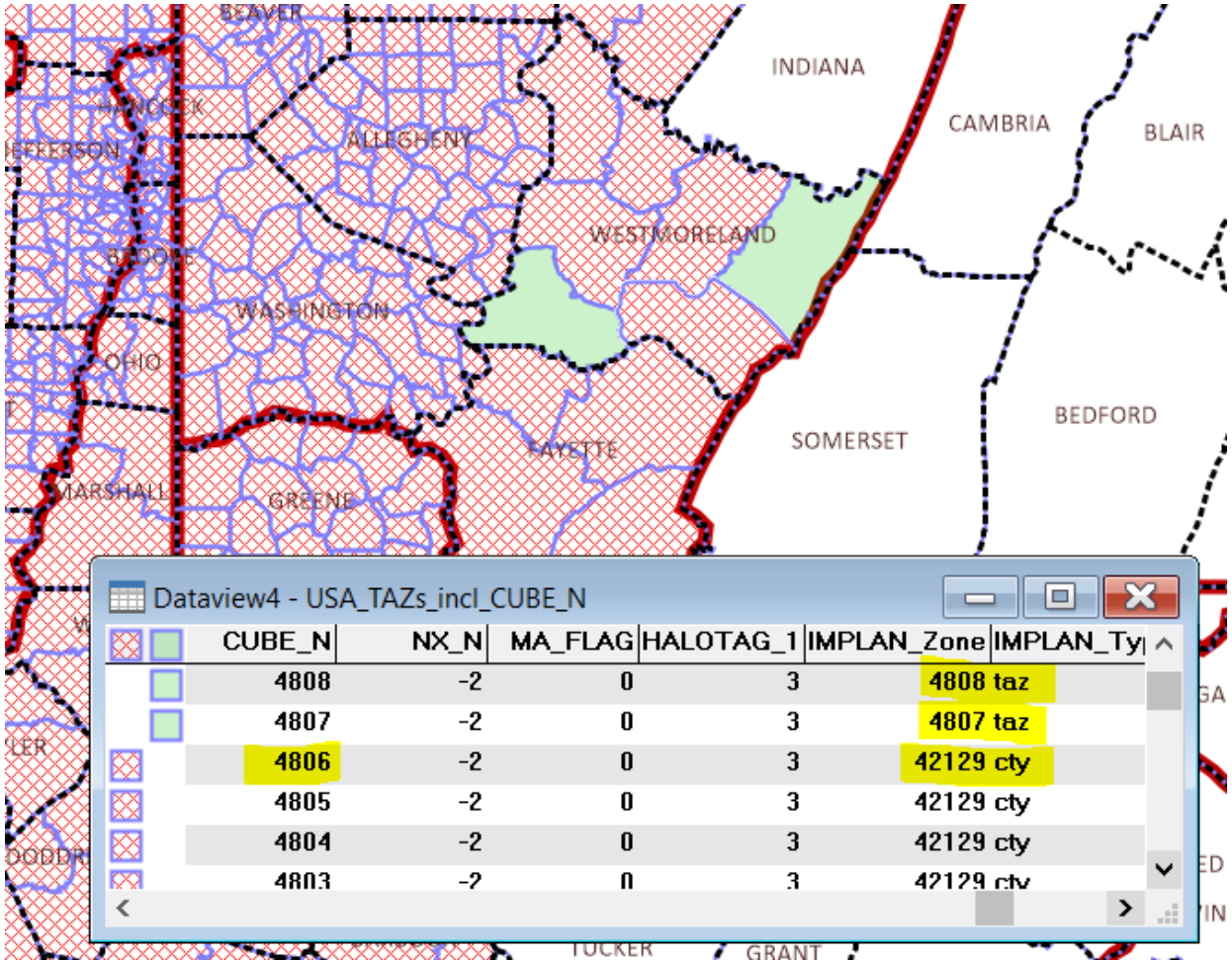
Zone	2015 Raw	2015 Rolled	2015 Override	2020 Raw	2020 Rolled
1	22	12	100	105	95
2	10	6	6	13	9
3	15	25	25	35	45
4	103	98	98	91	86
Total	**150**	**141**	**229**	**244**	**235**

Option 2

Zone	2015 Raw	2015 Override	2015 Rolled	2020 Raw	2020 Rolled
1	22	100	12	25	103
2	10	6	6	20	16
3	15	25	25	8	18
4	103	98	98	107	102
Total	**150**	**229**	**141**	**160**	**239**

STATEWIDE MODEL

- Fix some minor inconsistencies and bugs found during the investigations



CUBE_N	NX_N	MA_FLAG	HALOTAG_1	IMPLAN_Zone	IMPLAN_Ty
4808	-2	0	3	4808 taz	
4807	-2	0	3	4807 taz	
4806	-2	0	3	42129 cty	
4805	-2	0	3	42129 cty	
4804	-2	0	3	42129 cty	
4803	-2	0	3	42129 cty	

STATEWIDE MODEL

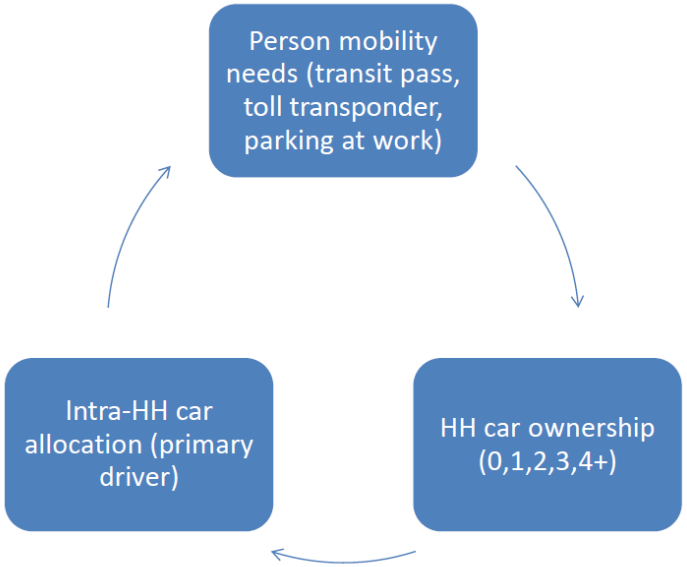
- After these steps are complete, future plans call for:
- Incorporate 35,000 zone system using MPO networks/zones for the native traffic assignment methodology to resolve zone size problems which cause unstable assignment results and provide better project level resolution
- Replace DCOM with a more advanced short distance freight/commercial vehicle/warehousing model that interacts with the new establishment synthesizer and the long-distance freight (ACOM) model
- Update ACOM to FAF5 and improve the FAF disaggregation to take advantage of establishment size from the synthesizer and to incorporate a distance decay function (like gravity model) in the disaggregation
- Replace or recode passenger models with newer software
- Add additional reporting capabilities

3C CAV/TELECOMMUTE ENHANCEMENTS

- 3C Model updates
- Conducted studies and scenario tests to determine potential long-term impacts of CAVs and Covid19
- Governor's Office inquired whether we actually needed to continue funding roads at current level given these changes
- We were ready with answers, next slides show what I gave them

CAV/TNC SENSITIVITY ADDED TO LARGE URBAN MODELS

- In Demand Models CAVs change:
  - Cars become available at any location at any time
  - Travel time becomes useful for work or leisure activities
  - Older adults, youth, disabled can make independent car trips
  - Empty repositioning trips made by CAVs
  - Availability of cheap, driverless taxi/TNC
- These changes are incorporated in Cleveland/Akron, Columbus, Cincinnati/Dayton
- Could extend to smaller areas later



CAV CAN ALSO INCREASE ROADWAY CAPACITY

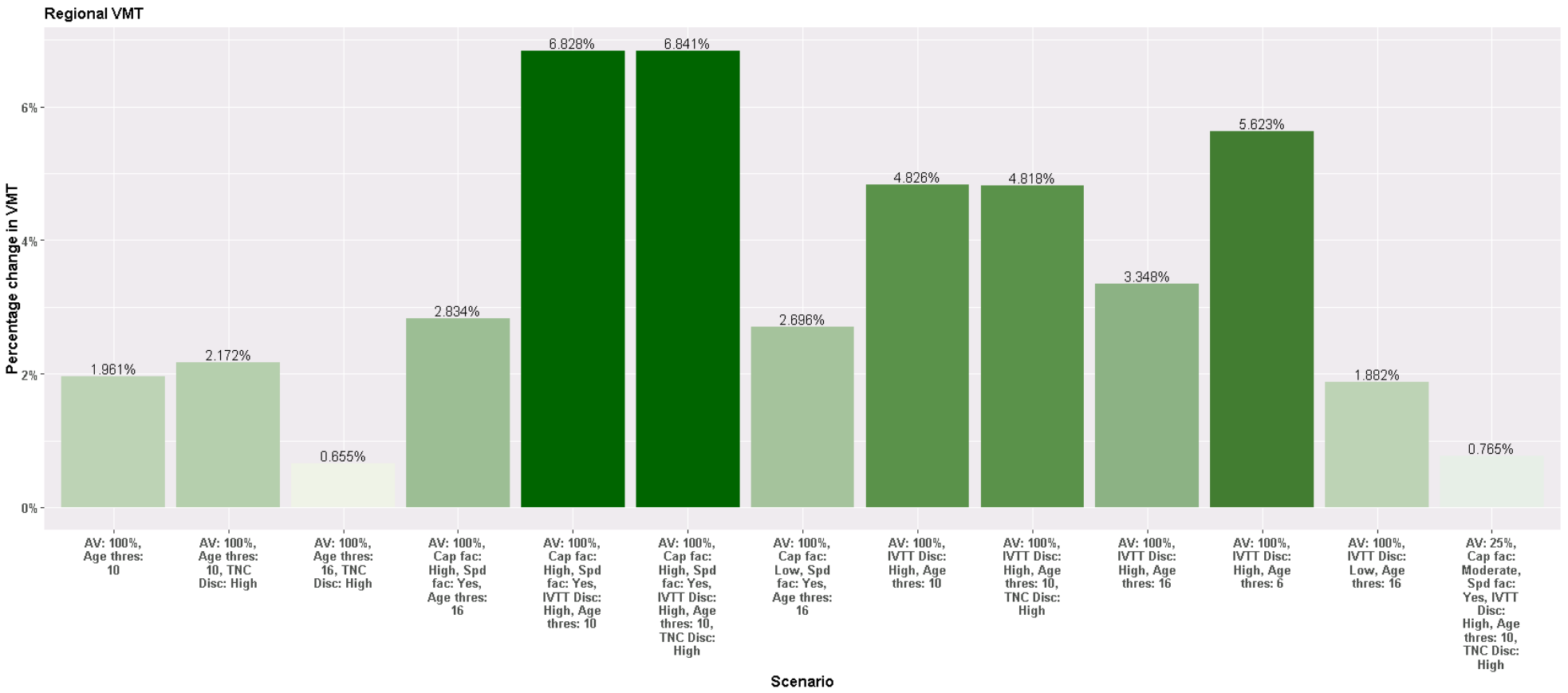
- New Highway Capacity Manual CAV Factors

Proportion of CAVs in Traffic Stream	Adjusted Segment Capacity		
	2,400 pc/h/ln	2,100 pc/h/ln	1,800 pc/h/ln
0	1.00	1.00	1.00
20	1.02	1.02	1.15
40	1.07	1.10	1.27
60	1.13	1.25	1.40
80	1.22	1.37	1.60
100	1.33	1.52	1.78

Notes: CAV = connected and automated vehicle, defined here as a vehicle with an operating cooperative adaptive cruise control system.

CAV SCENARIO TRAVEL DEMAND TESTING

- 7% VMT Increase Worst Case in Our Study

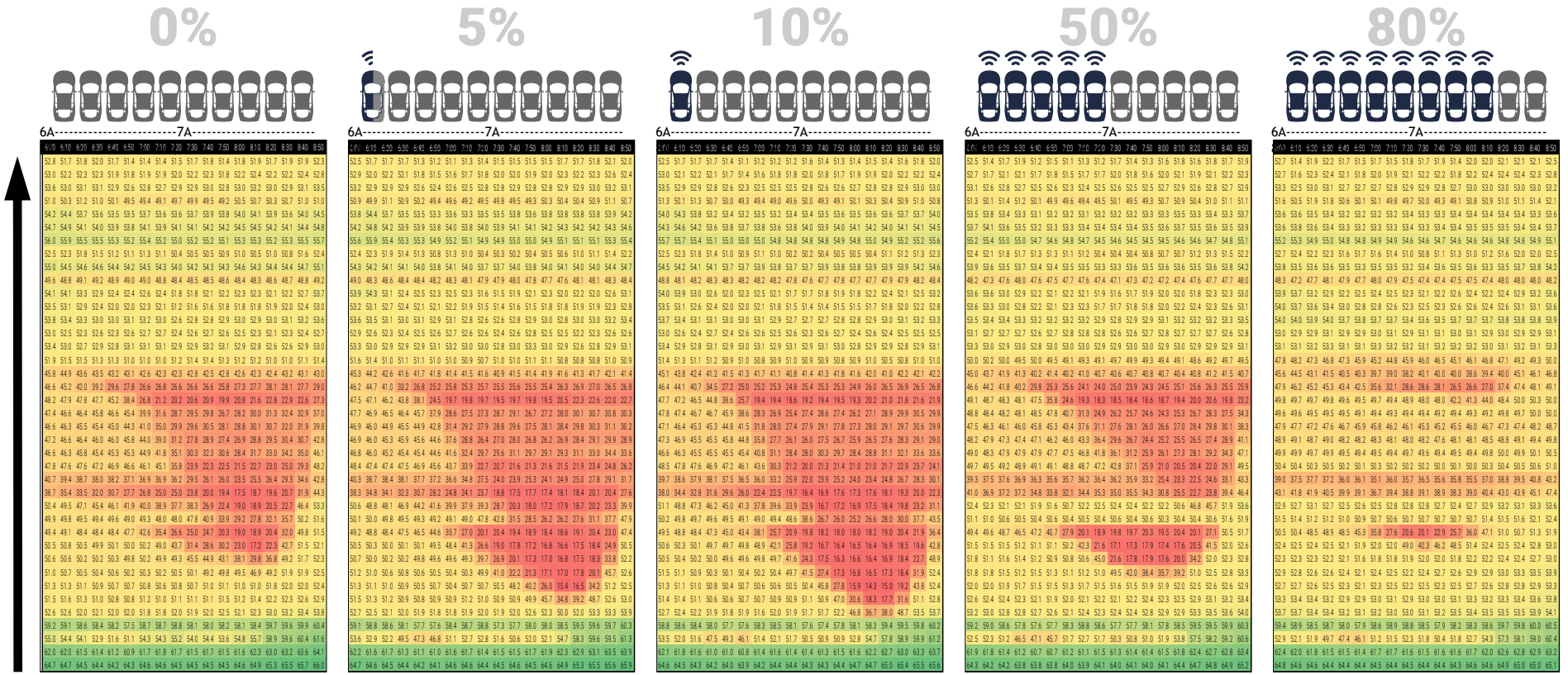


CAV TRAFFIC SIMULATION STUDY

- CAV is expected to have a large impact on traffic flow, decreasing vehicle spacing, increasing speed and decreasing human error
- A study simulating individual vehicles was conducted using travel demand produced by the enhanced demand models and results from field tests of CAV vehicles to understand these impacts
- Studied 3 locations:
  - Cincinnati IR75, focus on CAV car operations
  - Ohio Turnpike, focus on CAV truck operations
  - Marysville, full system analysis and interaction with travel demand changes

CAV SIMULATION STUDY SENSITIVITY TESTS

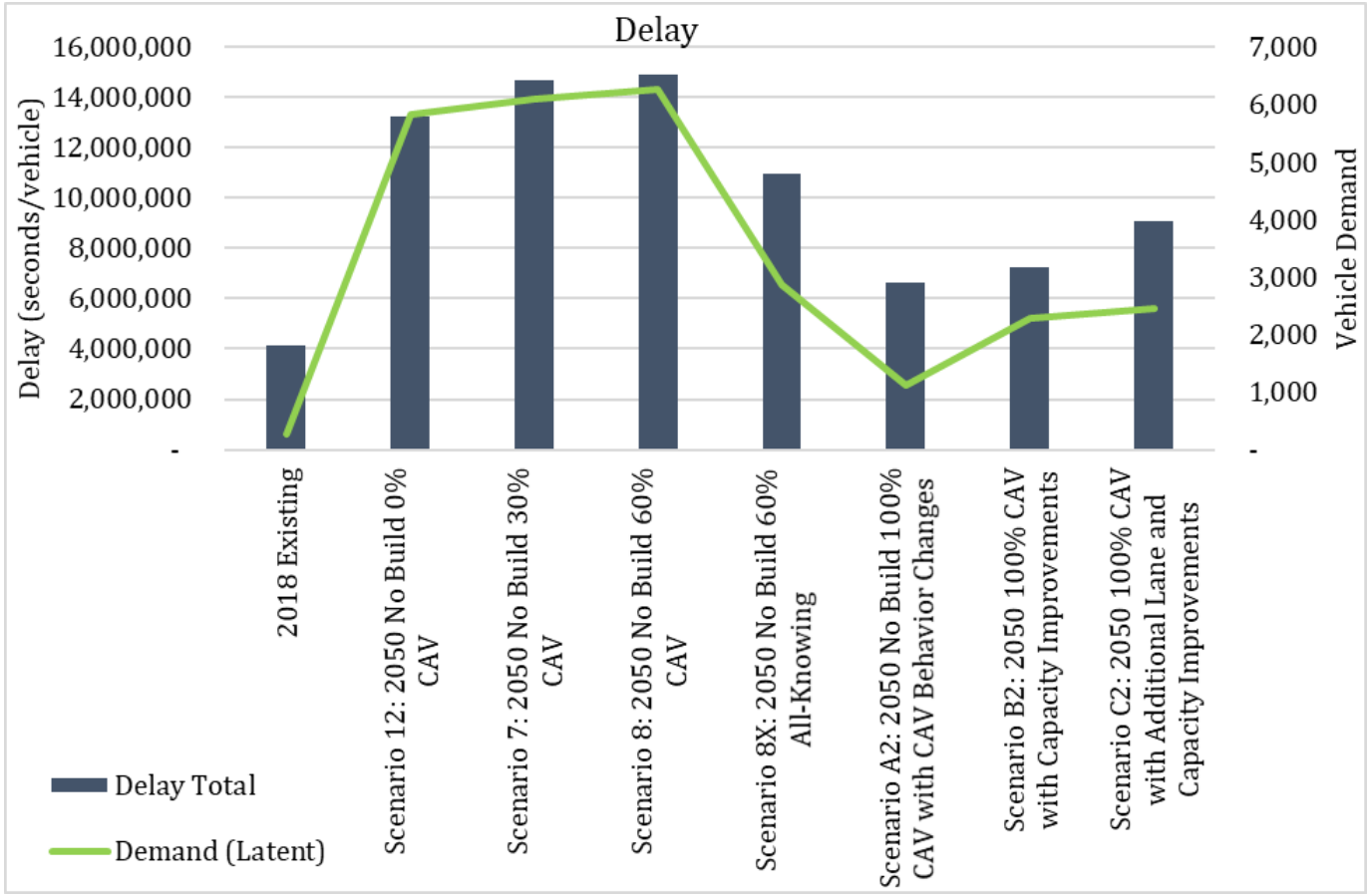
- Speed Heat Charts IR75 in Cincinnati – Red is Slower
- Slight Performance Loss at Low CAV Adoption, Substantial Gains at High



CAV SIMULATION STUDY SENSITIVITY TESTS

- Marysville Study Shows a 10% Increase in CAV Leads to a 1% increase in Travel
- At Moderate CAV Adoption Travel Increases Outweigh CAV Performance Gains But at High Adoption They Don't

- Figure shows at 60% CAV adoption there is a 15% increase in systemwide delay (S_8 vs S_12)
- Compare to a 15% reduction in delay if travel demand is held constant (S_8X vs S_12)
- While at 100% CAV adoption there is a 30% reduction in delay (S_C2 vs S_12) which increases to 45% if demand is held constant (S_B2 vs S_12)



TELECOMMUTING SCENARIO TESTING

- Added to travel models, Scen20 matches observed data, can test future impacts with other viable scenarios
- 28% Post-pandemic vs. 8% Pre-pandemic daily average

	Observed				Modeled			
	Pre-pandemic	4/20-10/20	11/20-5/21	Post-pandemic	Base	Scen15	Scen20	Scen30
0 days/wk	63	36	42	52	89	70	62	49
1 days/wk*	21	5	4	14	3	3	3	2
2 days/wk					1	2	2	2
3 days/wk					1	6	7	7
4 days/wk					1	8	13	20
5 days/wk					6	10	12	20
Average per day					8	21	28	41
2+ days/wk	16	46	45	34	9	26	34	49
Temporarily Unemployed	0	13	9	0				
Car Decrease**	0	-23	-14	-8	0	-6	-8	-13
Total Volume Decrease	0	-21	-12	-6	0	-4	-6	-10

*observed values include less than once a week but greater than never

**modeled values represent study area resident travel decrease excluding visitor travel

TELECOMMUTING SCENARIO TESTING

- Observed telecommute frequency taken from a national panel survey

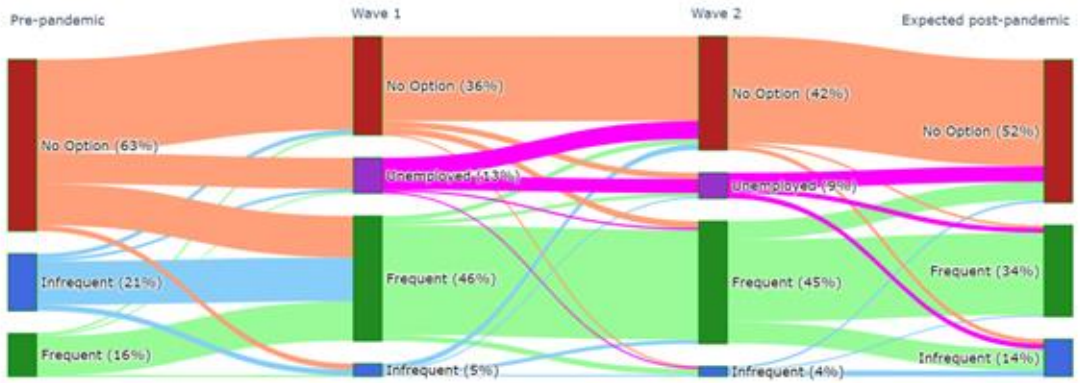
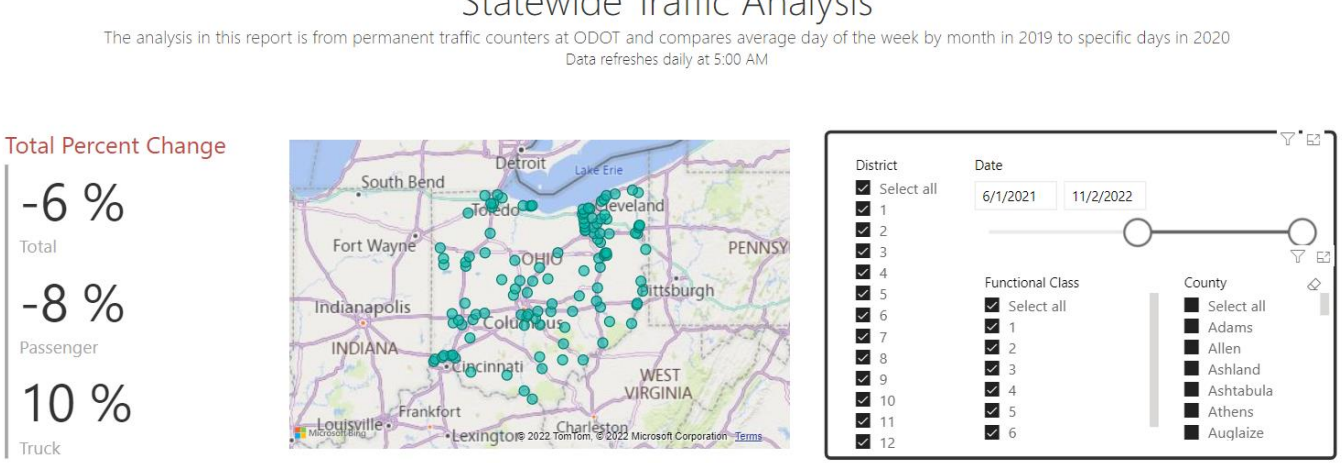


Fig. 2. Proportions and transitions of different levels of work from home from pre-pandemic to post-pandemic. Please note that "Frequent" refers to WFH more than once/week, and "Infrequent" refers to WFH once/week or less.

- Observed traffic counts from ODOT Dashboard



TELECOMMUTING SCENARIO TESTING

- Proposed long term daily telecommute frequency (28%) is consistent with current counts, pre-pandemic frequency of 8% means there was an expected 21% decrease (1-(.72/.92)) in work commute traffic.
- From prior slides: car traffic down 6% (AM Peak much larger decrease)
- Note that commute traffic is about 30% of daily and 60% of AM peak VMT thus 30% *21% implies a 6% drop in daily traffic
- We'll need new traffic surveys to verify the sources of observed traffic suppression

QUESTIONS

Last updated 11/18/2022