

# Connected / Automated Vehicles (CAV) Traffic Forecasting Perspective

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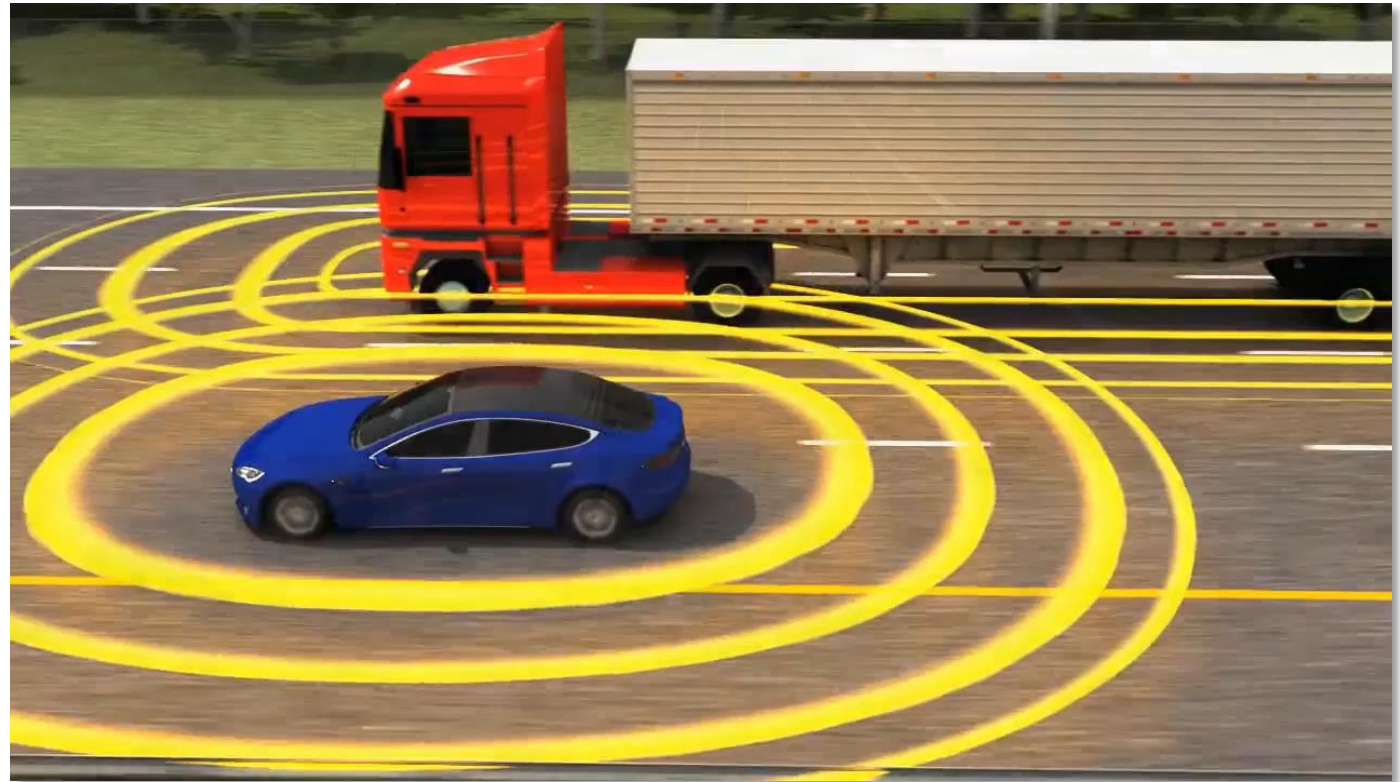
**AECOM**

*October 30, 2018*

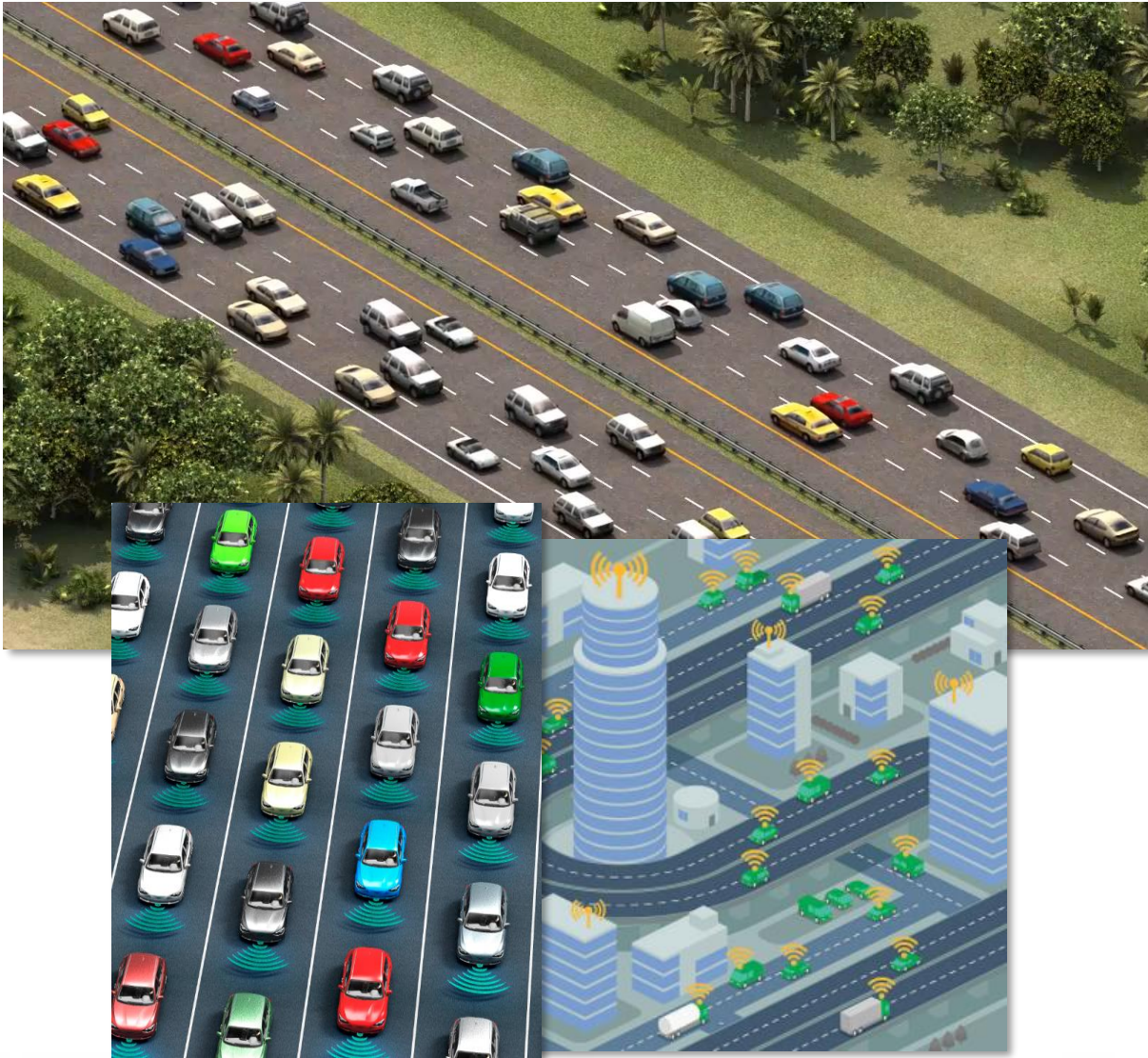


# Overview

- Background for Modeling CAVs
- CAV Transportation Impacts
  - Transportation Supply Side
  - Transportation Demand Side
- Modeling Approach
- Future Applications



# Background for Modeling CAVs



- Part of future transportation network
  - Not about if, but when
  - Potential disruptor





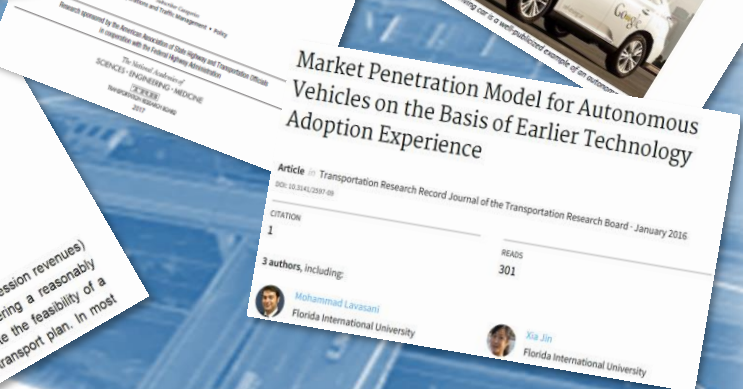
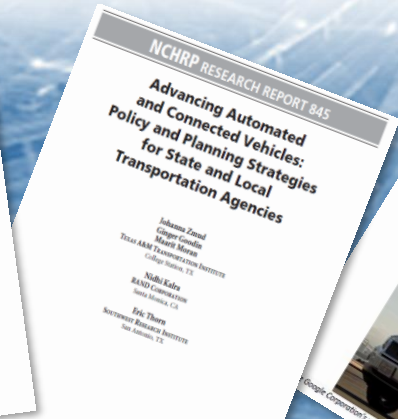
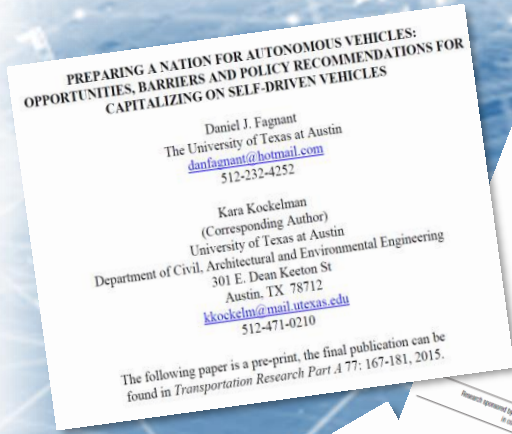
# Background for Modeling CAVs

- Traffic modeling is data dependent
  - Lack of actual data for CAVs
- New modeling paradigm
- Need consistent methodology
  - Long-term projects
- Another reference point



# CAV Transportation Impacts

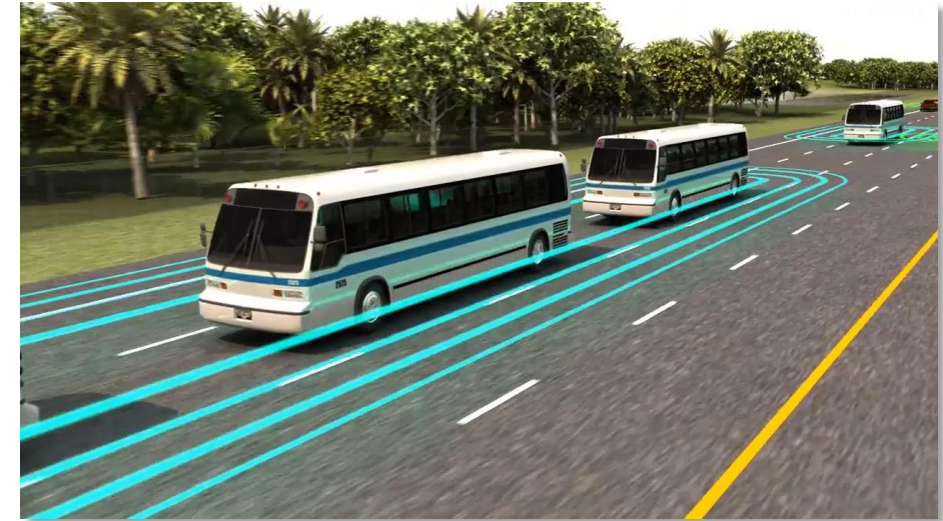
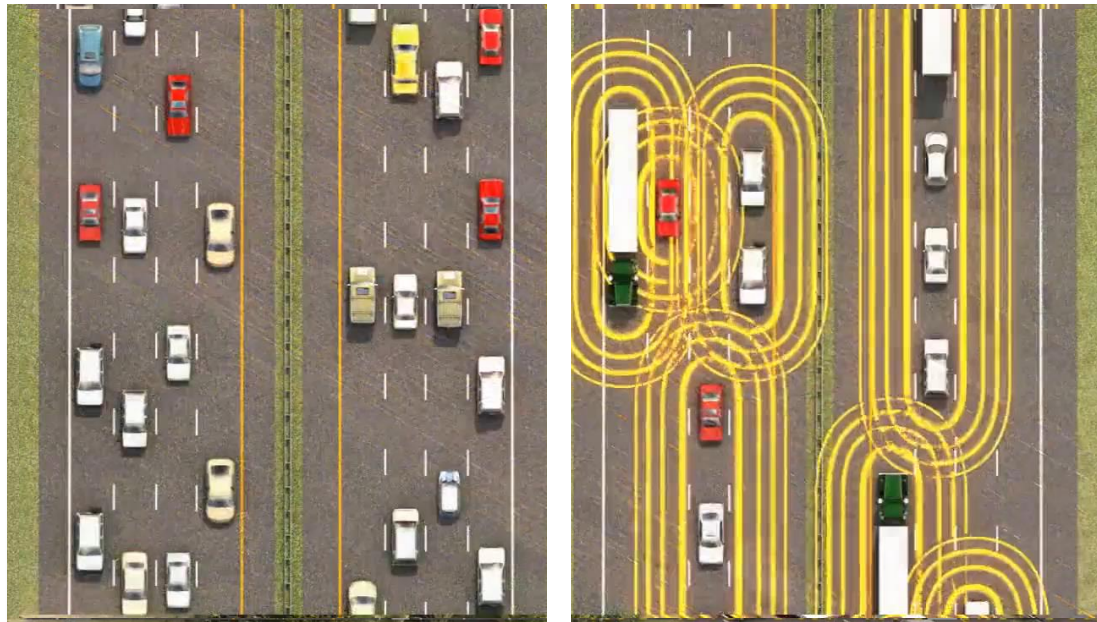
- Hot topic in transportation
- Substantial research
- Transportation Supply
  - Available network capacity
- Transportation Demand
  - Number of trips on network
- No consensus
  - Magnitude
  - Effect
  - Timing





# Transportation Supply

- Increased roadway capacity
  - Shorter gaps between vehicles
  - Mixed traffic conditions
  - Perfect driver
- Vehicle platooning
- Reduced right-of-way needs



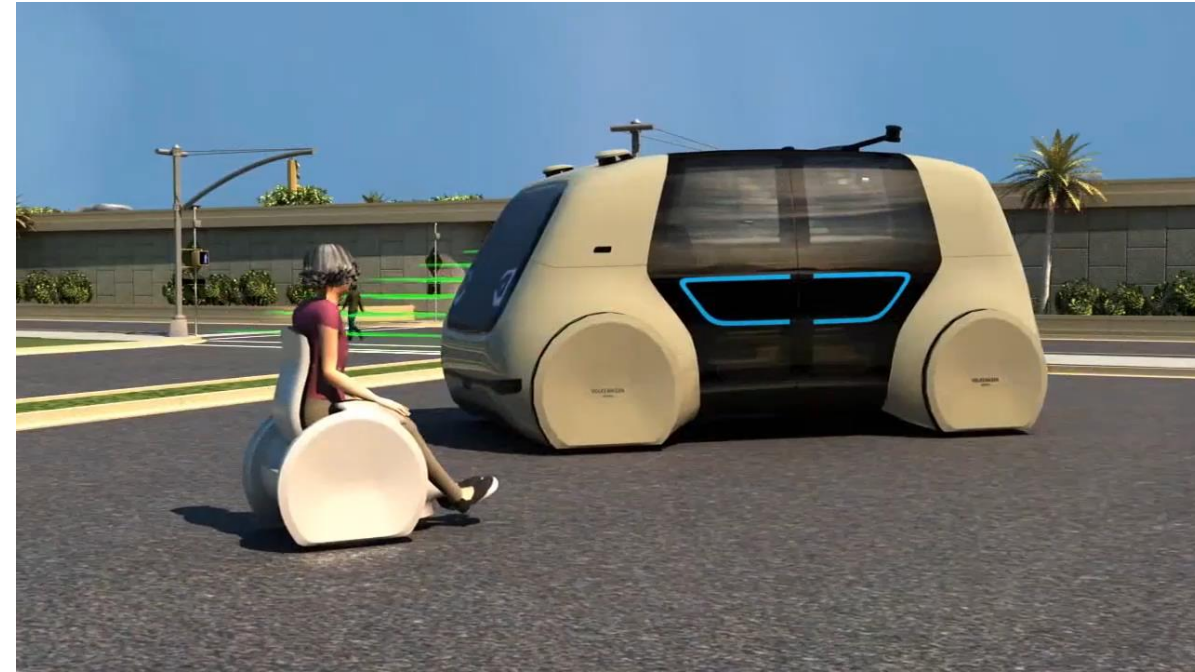


- **Land use**
  - Where people live and work
- **Trip production**
  - Number and types of trips
- **Trip distribution**
  - Trip lengths
- **Mode choice**
  - New modes
- **Assignment**
  - Route choice



# Transportation Demand

- Mobility independence
  - Induced trips by seniors, elderly, children, etc.
- Zero occupancy vehicles
- Auto ownership
- Mode shifts (ride-sharing)
- Longer commutes/trips



Business Professionals



Elderly & Infirm



Parents with Children



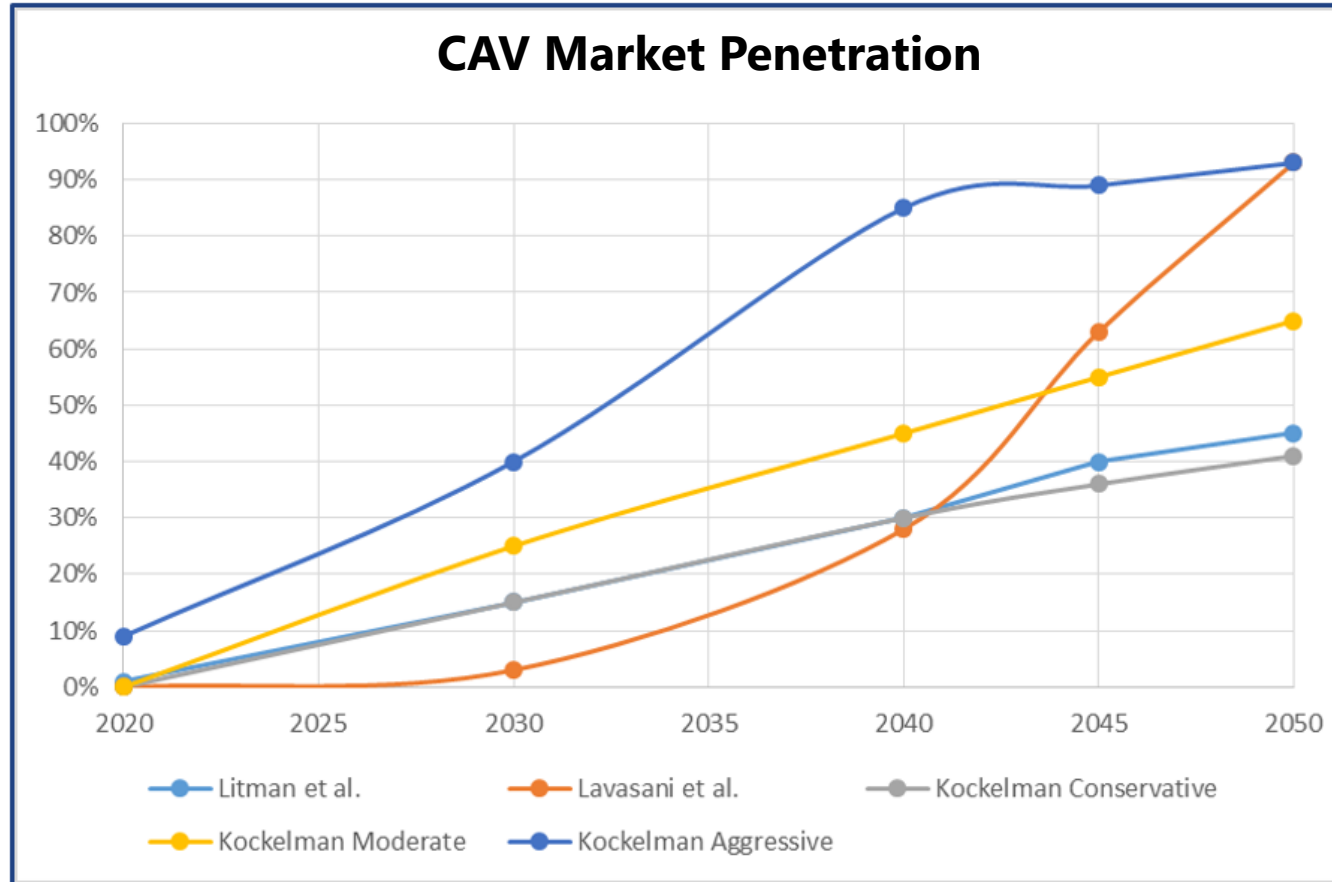
People with Disabilities



Teenagers



# Fleet Adoption Timeline



- **Market Penetration is overriding input**
  - Determines other assumptions
- **Estimates vary**
  - Year and magnitude
- **Factors**
  - Vehicle capabilities
  - Price
  - Retrofitting existing vehicles
- **Adoption rate will drive design**
- **Non-uniform impacts**
  - Transportation supply
  - Transportation demand

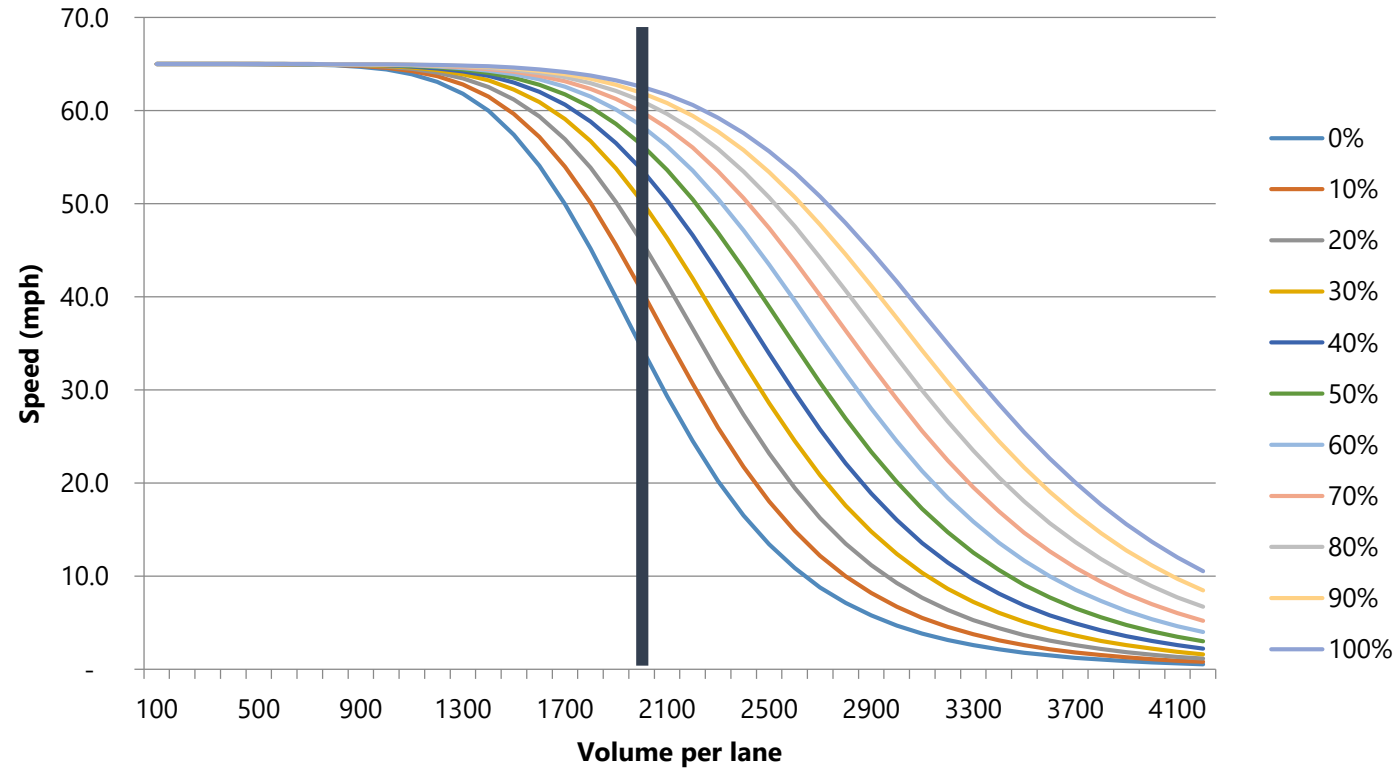
# Modeling Approach

- **Network flexibility**
- **Model variables**
  - Transportation supply
  - Transportation demand
- **Control Inputs**
  - Highway network
  - Land use
  - Value of time
  - Trip lengths
- **Sensitivity analysis**



# Modeling Approach: Transportation Supply

## Congested Speed by CAV Percentage



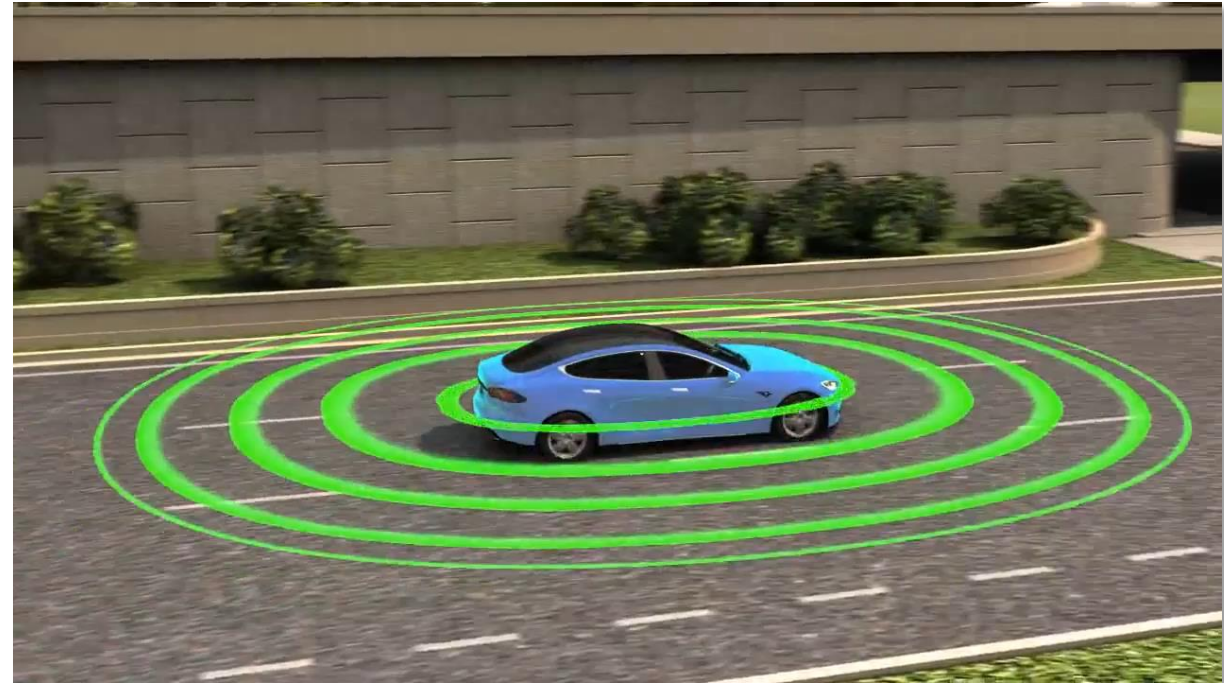
BPR Volume Delay Curve

- Increase capacity with higher CAV adoption
- Impact will vary by facility type
- Dependent on the percentage of CAVs on roadway link
- Focus on shorter gaps
- Facility preference



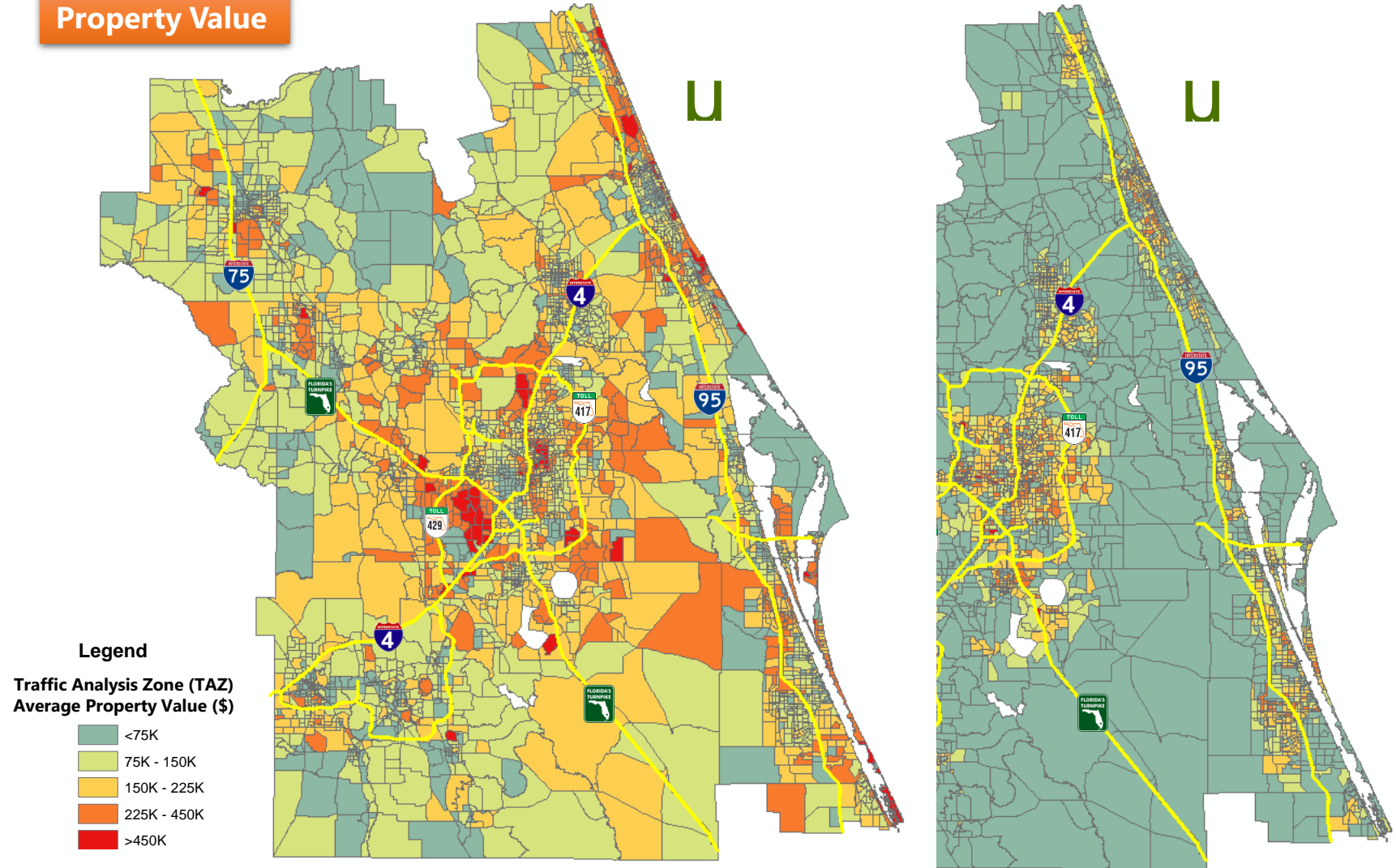
# Modeling Approach: Transportation Demand

- CAV ownership and use
- Initial CAV adoption in certain areas
  - Urban areas
  - Affluent areas
  - Similar to other technology adoption trends
- Followed by widespread adoption
  - Safety benefits
  - Transportation benefits
- New trips



# Modeling Approach: Central Florida CAV TAZ Inputs

## Property Value

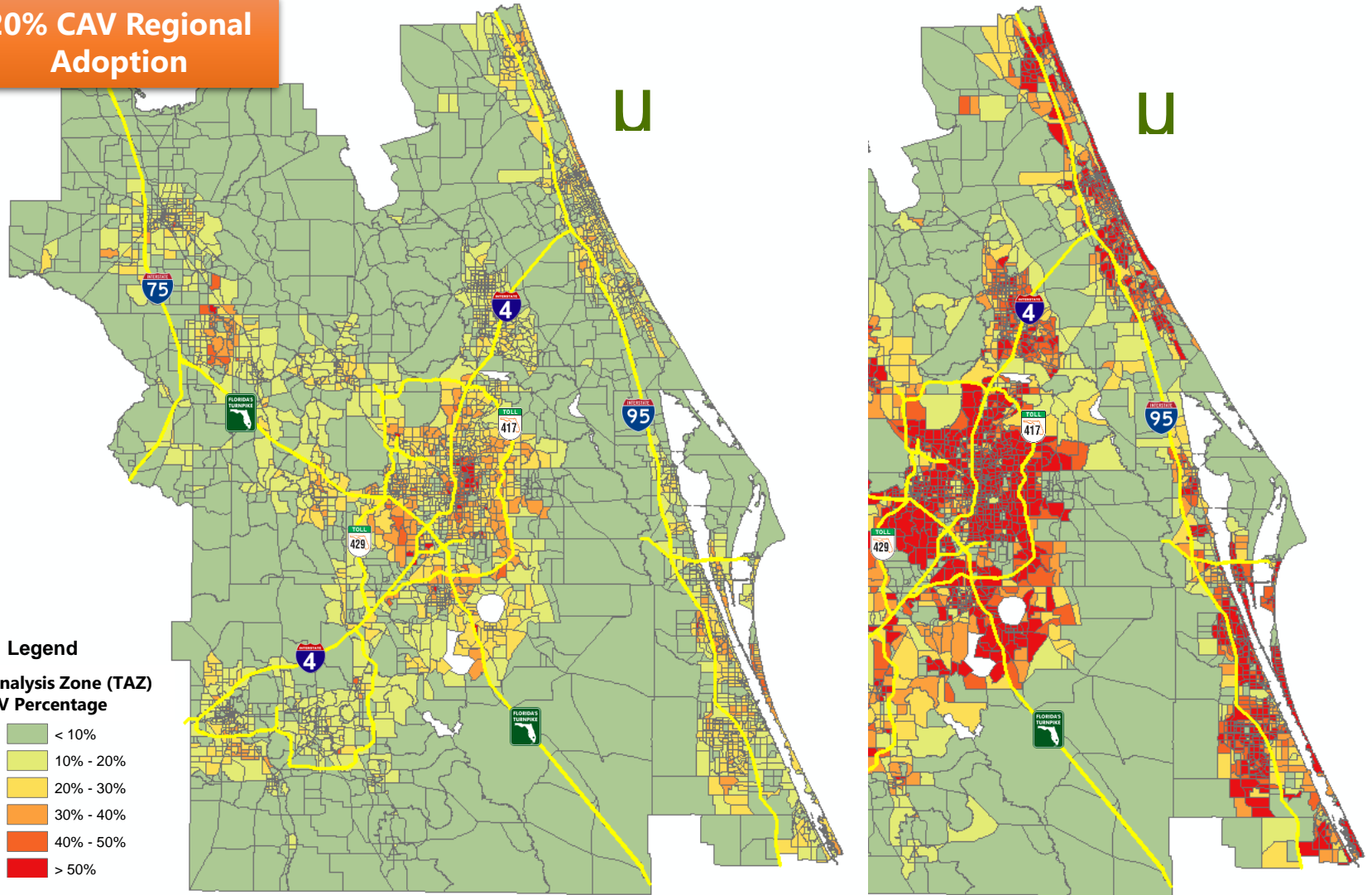
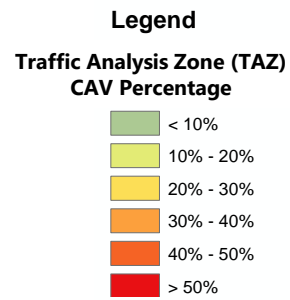


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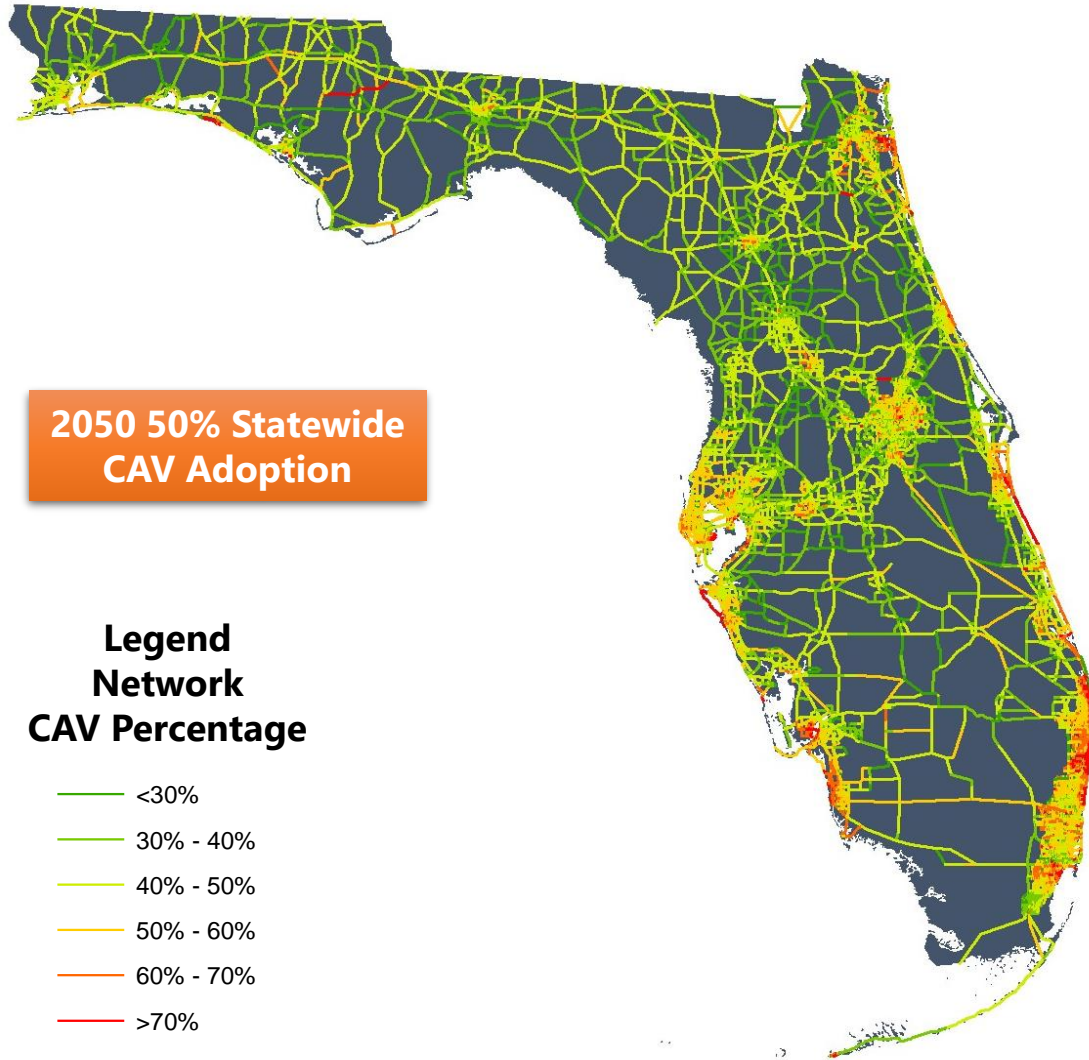
# Modeling Approach: Central Florida CAV Trips

20% CAV Regional Adoption





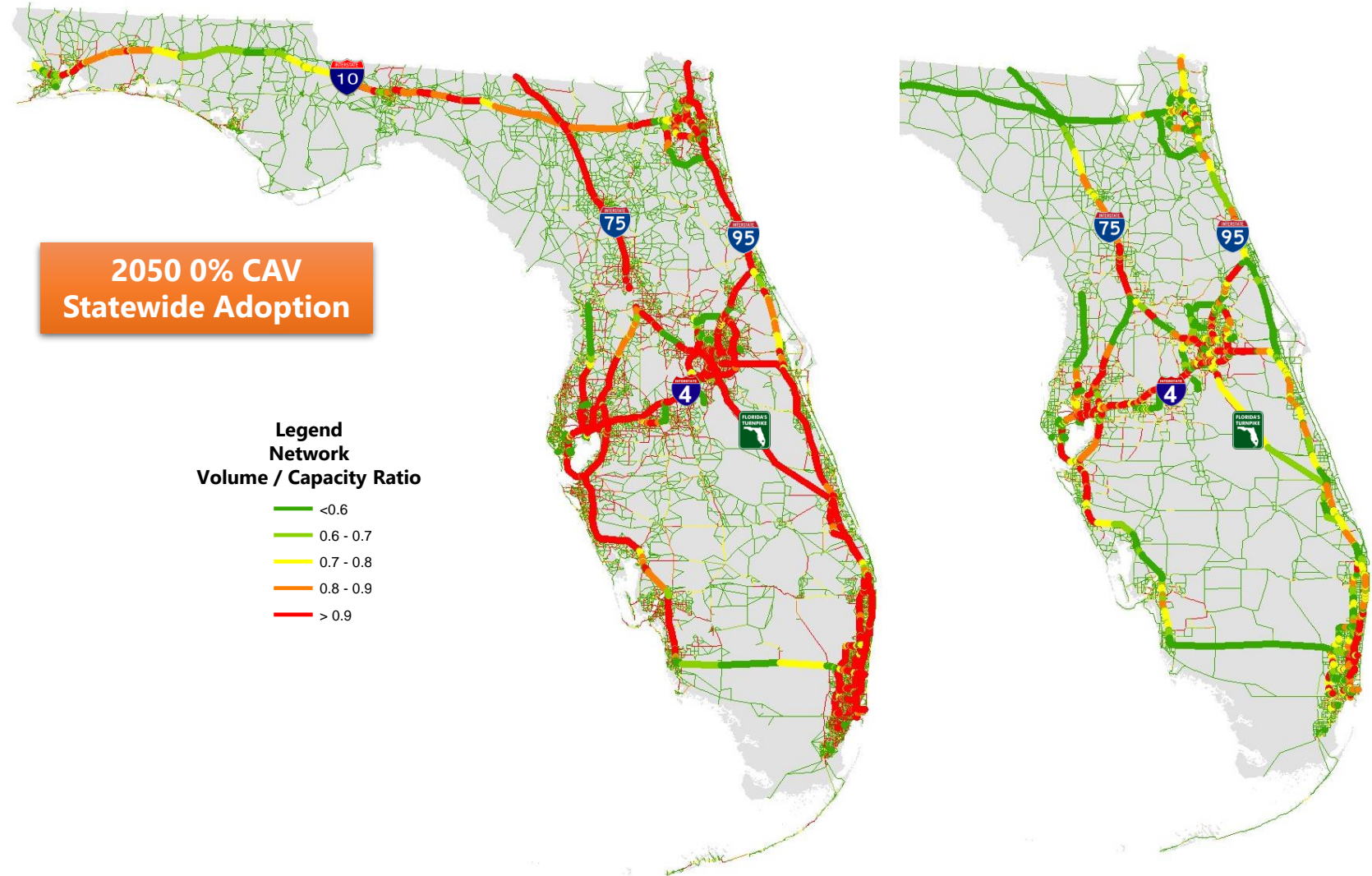
# Modeling Approach: 2050 Statewide Network



2050 Statewide Network Comparison			
	Non-CAV	50% CAV Adoption	Change
Vehicle Miles Traveled (VMT)	687,245,676	717,845,808	+4.5%
Vehicle Hours Traveled (VHT)	16,838,945	16,130,688	-4.2%
Average Network Speed (mph)	40.81	44.50	+9.0%
Average Network Volume/Capacity	0.54	0.42	-22.2%

- Non-Uniform CAV ownership
- Non-Uniform distribution of CAV trips
- Dynamic roadway impacts
- Overall network travel increases while delays decrease

# Modeling Approach: 2050 Network Congestion



# Future Applications

- **Analyze model results**
  - Compare with Non-CAV results
  - Identify trends and areas of impact
  - Long-term project traffic evaluation
- **Consider other variables**
  - Trip lengths
  - Land use changes
  - Parking
- **Other model years**
- **Other model types**





Questions?

