Memphis MPO
METROPOLITAN PLANNING ORGANIZATION

Strengthening Regional Transportation

Practical Planning For Autonomous Vehicles

About Me

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- Transportation Planner at the Memphis MPO
- Worked on “Envisioning Florida’s Future: Transportation and Land Use in an Automated Vehicle World” at Florida State University

1.

Introduction to AVs

Where we are and where we're going

Why pursue Autonomous Vehicles?

37,461 traffic deaths

In 2016 alone. 39% caused by alcohol, distraction, or drowsiness

1 in 7

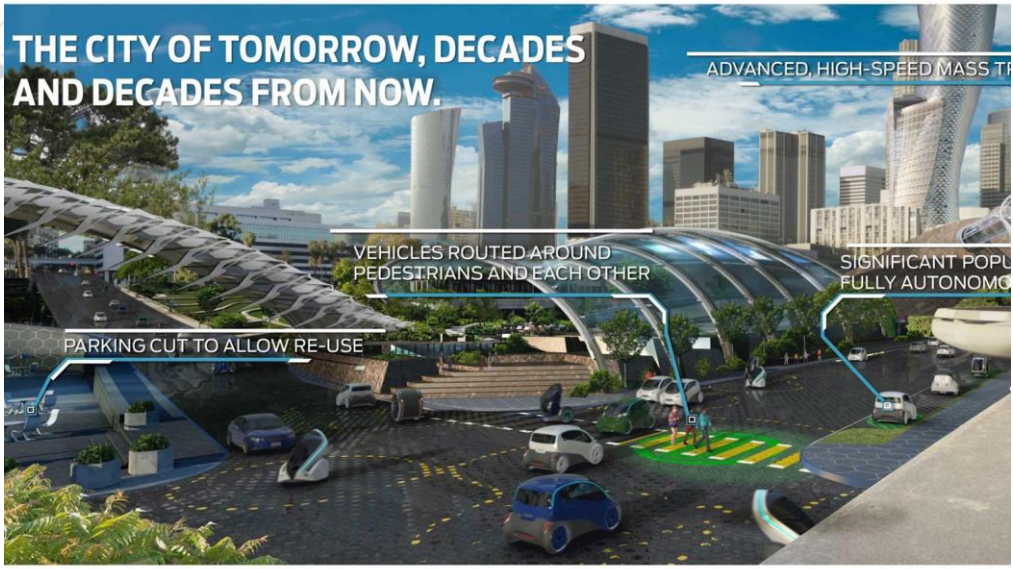
American adults do not have a Driver's License

84 Billion hours

Spent driving per year

Misconception:

Planning for autonomous vehicles is **speculative**, won't matter for **decades**, and can't really start until we have all the **details**



The Future (20+ years away)

The Present

Reality:

AVs are being introduced to our streets **right now**. Cities must **plan for innovation** or risk missing a critical window

Limits of Scope

What we will talk about

- Current state of tech
- What's happening in the next 5 years or so
- State & federal rules
- Best practices and policy guidance

And what we won't

- AV adoption rates 20 or 40 years out
- Long term implications
- Impacts on freight, employment, & economy

AV Services Launching Now

Autonomous shuttles land in downtown Detroit

They'll start out shuttling employees from parking garages to the office.

BY **ANDREW KROK** / JUNE 26, 2018 9:46 AM PDT

Waymo expanding Chandler operations ahead of launch of Arizona public ride service

Ryan Randazzo, Arizona Republic Published 5:00 a.m. MT Aug. 21, 2018 | **Updated 11:24 a.m. MT Aug. 21, 2018**

Arlington Partners with Drive.ai to Offer Autonomous Public Transit in Entertainment District

Arlington will be the first Texas city to offer on-street autonomous public transportation to residents and visitors

Published at 2:29 PM CDT on Aug 22, 2018 | Updated at 2:37 PM CDT on Aug 22, 2018

The world's largest retirement community is the perfect place to test self-driving taxis

By Karen Hao · January 15, 2018

And More!

AUGUST 31, 2018

DRIVERLESS CARS LAND

Nuro and Kroger Begin Testing Autonomous Grocery Delivery Service in Arizona

BUSINESS NEWS AUGUST 21, 2018 / 8:05 AM / A MONTH AGO

Lyft surpasses 5,000 self-driving rides with Aptiv fleet

Drive.ai launches on-demand self-driving pilot in Frisco

There's no missing these autonomous vans, that's for sure.

BY ANDREW KROK / AUGUST 1, 2018 8:04 AM PDT

Udelv Demos Autonomous Delivery Van, Launches On-Road Testing

January 31, 2018 by John O'Dell

*What exactly does the phrase “**autonomous**” vehicle mean?*

SAE Levels

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE) AUTOMATION LEVELS

0	1	2	3	4	5
No Automation	**Driver Assistance**	**Partial Automation**	**Conditional Automation**	**High Automation**	**Full Automation**
Zero autonomy; the driver performs all driving tasks.	Vehicle is controlled by the driver, but some driving assist features may be included in the vehicle design.	Vehicle has combined automated functions, like acceleration and steering, but the driver must remain engaged with the driving task and monitor the environment at all times.	Driver is a necessity, but is not required to monitor the environment. The driver must be ready to take control of the vehicle at all times with notice.	The vehicle is capable of performing all driving functions under certain conditions. The driver may have the option to control the vehicle.	The vehicle is capable of performing all driving functions under all conditions. The driver may have the option to control the vehicle.
The Present Day		**The Catch:** Requires constant monitoring	**The Catch:** Humans are bad at surprise driving	**The Catch:** "Certain Conditions"	**The Catch:** Hasn't been invented yet

Shared Autonomous Vehicles

- Combines AV tech with mobility on demand services like Uber & Lyft
- Requires Level 4 + automation capable of completing entire trips
- Has potential to revolutionize accessibility and land use

Connected Vehicles

- Technology allowing vehicles to exchange information with other devices
- Allows for safer and more efficient, and traffic through information sharing

Can be combined or separate from AV technology

- **V2V:** Vehicle to Vehicle
- **V2I:** Vehicle to Infrastructure
- **V2X:** Vehicle to Everything

Timeline

(Early Stages)

2005

DARPA Grand Challenge 1: 15 AVs fail to finish empty desert course

2007

DARPA Grand Challenge 3: 6 AVs successfully navigate a dynamic urban environment

2009

Google begins AV development

2012

Nevada, Florida, California permit AV testing on public roads

Timeline
(Last Four Years)

Google carries first passenger with no human backup, in Austin

Oct. 2015

Tesla publicly releases Autopilot software as over-the-air update.

First AV Fatality in Florida

2016

2017

Waymo launches trial service in Chandler, AZ

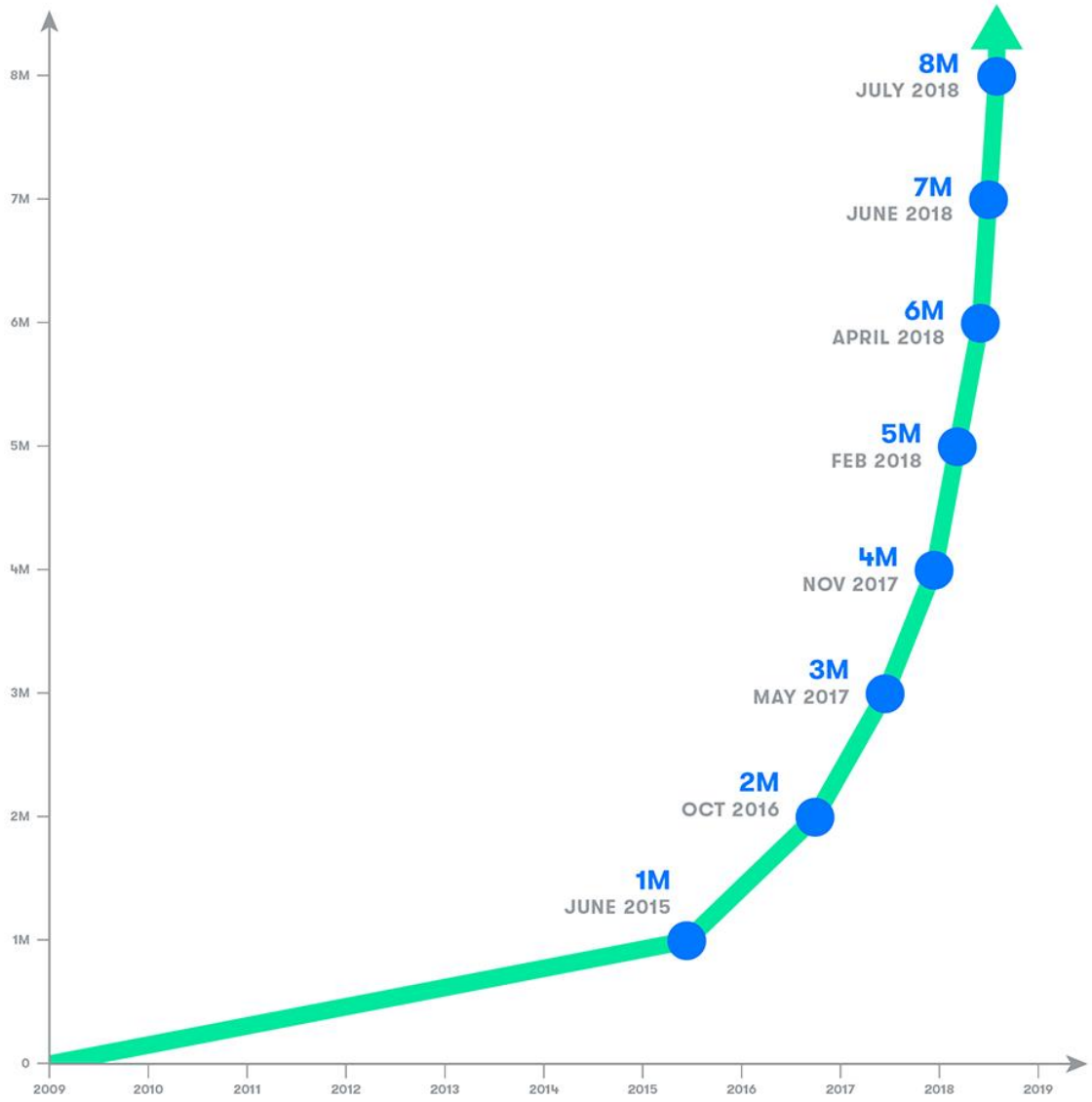
36 States have AV laws or regulations

2018

2018

8+ US cities with shared AV trials or AV shuttles

Exponential Growth



WAYMO

8,000,000+

MILES AND COUNTING

What's Next?

- **Major leaps scheduled for next two to three years**
- Many traditional auto manufacturers committed to releasing Level 3 vehicles by 2020 or 2021
- First for-profit Shared AV pilots planned for 2019 and 2020 in a handful of cities worldwide

2.

Laws, Rules, and Guidelines

Getting into the concrete stuff

19

Federal Legislation

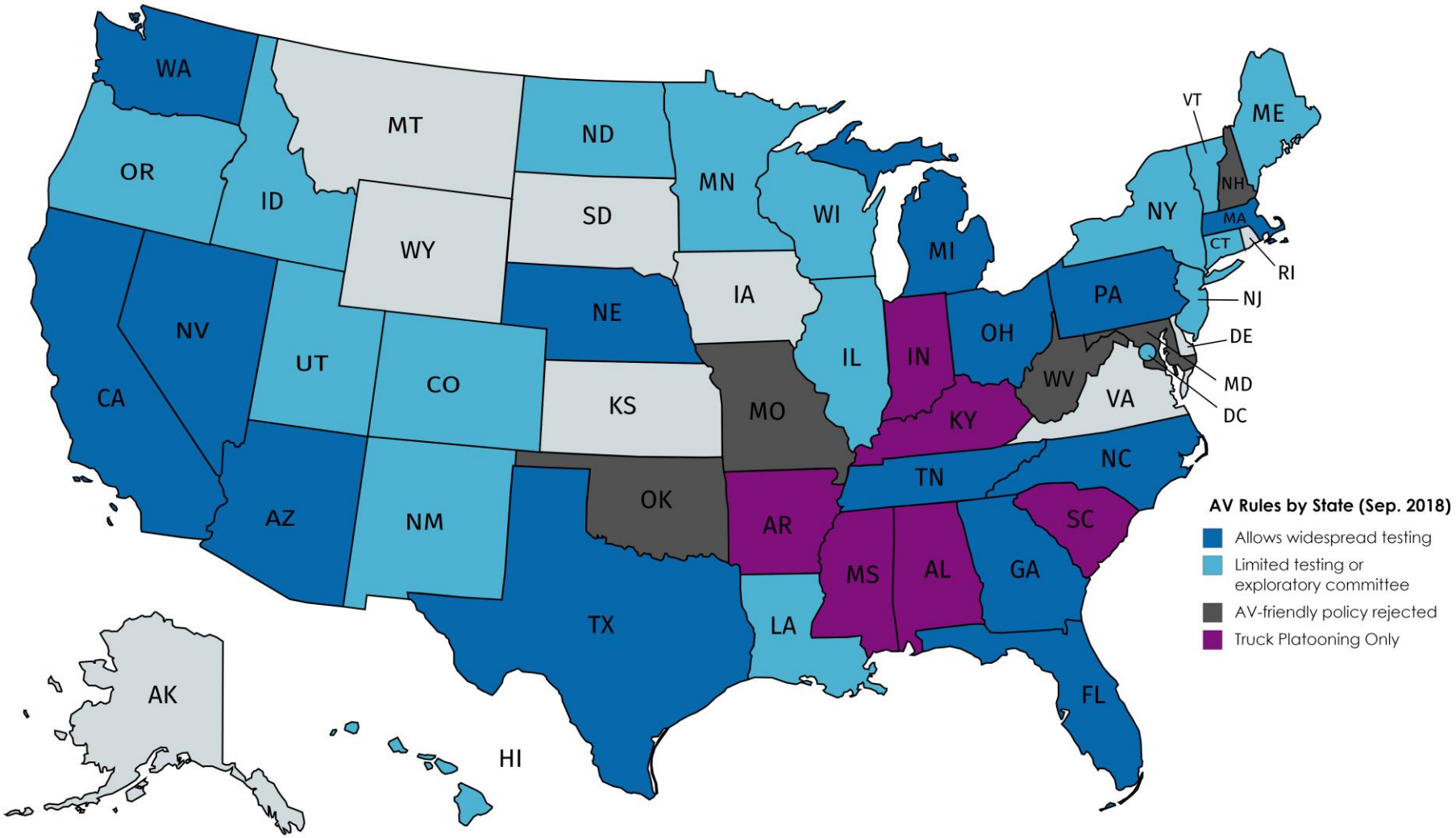
404 Not Found

The requested resource could not be found.

No laws or regulation of automated vehicles at the federal level

- House passed SELF DRIVE Act in July 2017
- AV START Act **stalled** in Senate since Oct. 2017

Regulations vary by State



Federal Guidance

AUTOMATED DRIVING SYSTEMS 2.0

ADS 2.0 (Sep. 2017)

- Sets equipment standards for manufacturers
- Models language for state legislation
- Updates 2016 policy and sets more lenient standard for manufacturers

AV 3.0

- Due out this year
- Builds on prior editions, but new focus on multi-modal implementation - including Auto, Bus, & Freight
- Continues drive to standardize legal landscape

What about Tennessee?

TN Autonomous Vehicles Act of 2017

- Allows manufacturers to initiate a "SAVE project" to make AVs available to the public
  - Must provide notice to state with area of testing, certification of readiness, and submit periodic safety reports
  - SAVE projects may be completely driverless, without a supervising employee

- "Manufacturer" means traditional automakers, not tech companies

TN Autonomous Vehicles Act of 2017

- Operating a privately owned vehicle without a driver remains illegal
- The manufacturer maintains legal liability for any traffic violations or damages
- Revises motor vehicle statutes to reflect the possibility of driverless cars

Local “ Preemption

“No political subdivision may by ordinance, resolution, or any other means prohibit or regulate within the jurisdictional boundaries of the political subdivision the use of an ADS-operated vehicle or SAVE project that is operating under the authority of this chapter and otherwise complies with all laws of the political subdivision.”

Truck Platooning (SB 151)

- Allows for vehicle platoons using CV tech after filing an approved platooning plan with TDOT

- Freight truck platooning allows for significant fuel savings, and potentially safer and more efficient use of the road

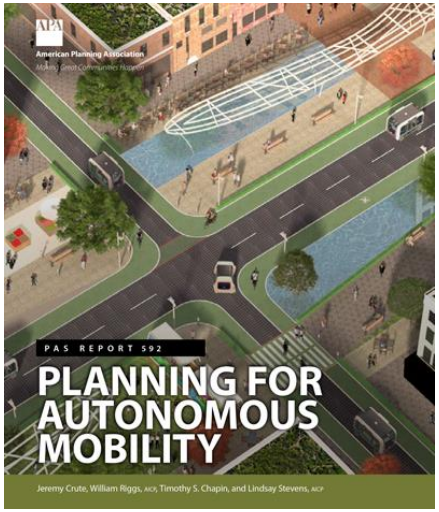
- TDOT ran its first platooning test run in the summer of 2018

3.

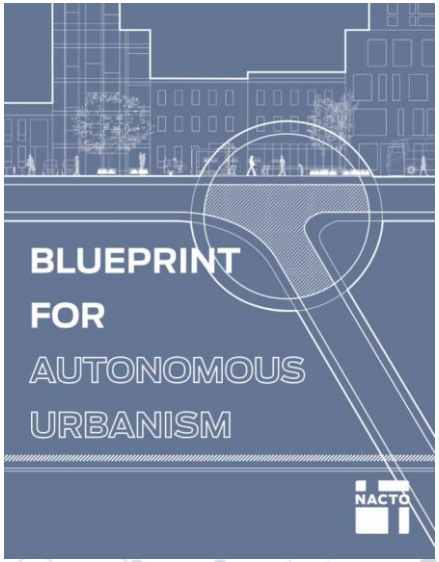
Best Practices in Planning and Research

Resources ARE out there

Planning for Autonomous Mobility,
APA Planning Advisory Series



Blueprint for Autonomous Urbanism,
NACTO

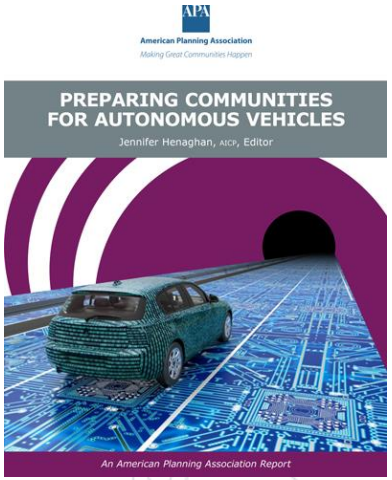


Resources ARE out there

Policy and Planning Strategies for State and Local Transportation Agencies, NCHRP

Autonomous Vehicle Implementation Predictions Implications for Transport Planning, Victoria Transport Institute

Preparing Communities for Autonomous Vehicles Transportation APA Planning Advisory Series



Preparing for New Mobility, Writing Effective Resolutions, Alta Planning + Design

Collected Best Practices

1. Start thinking about "Curb Appeal"

ZERIA
Rideshare
Pick-Up
Drop-Off
5 Minutes Max
NO PARKING
MON-THU 5PM-3AM
FRI 11AM-MON 3AM
Rideshare
Pick-Up/Drop-Off
5 Minutes Max
NO PARKING
Mon-Thr 5:00PM-3:00AM
Fri 11:00AM-Mon 3:00AM

2. **Data** matters

Data

- AVs produce TBs of data useful for municipal safety, planning, & operations
- AV companies will have little incentive to share
  - (like current TNCs)
- Cities produce their own data

*3. Prioritize people **walking** and **biking***

Prioritize People Walking and Biking

- Detecting and predicting human movement remains a struggle for AVs
- Cities should resist short-term pressure to control pedestrian behavior to hasten AV success
- Ultimately, AVs exist to make people's lives easier, not vice versa

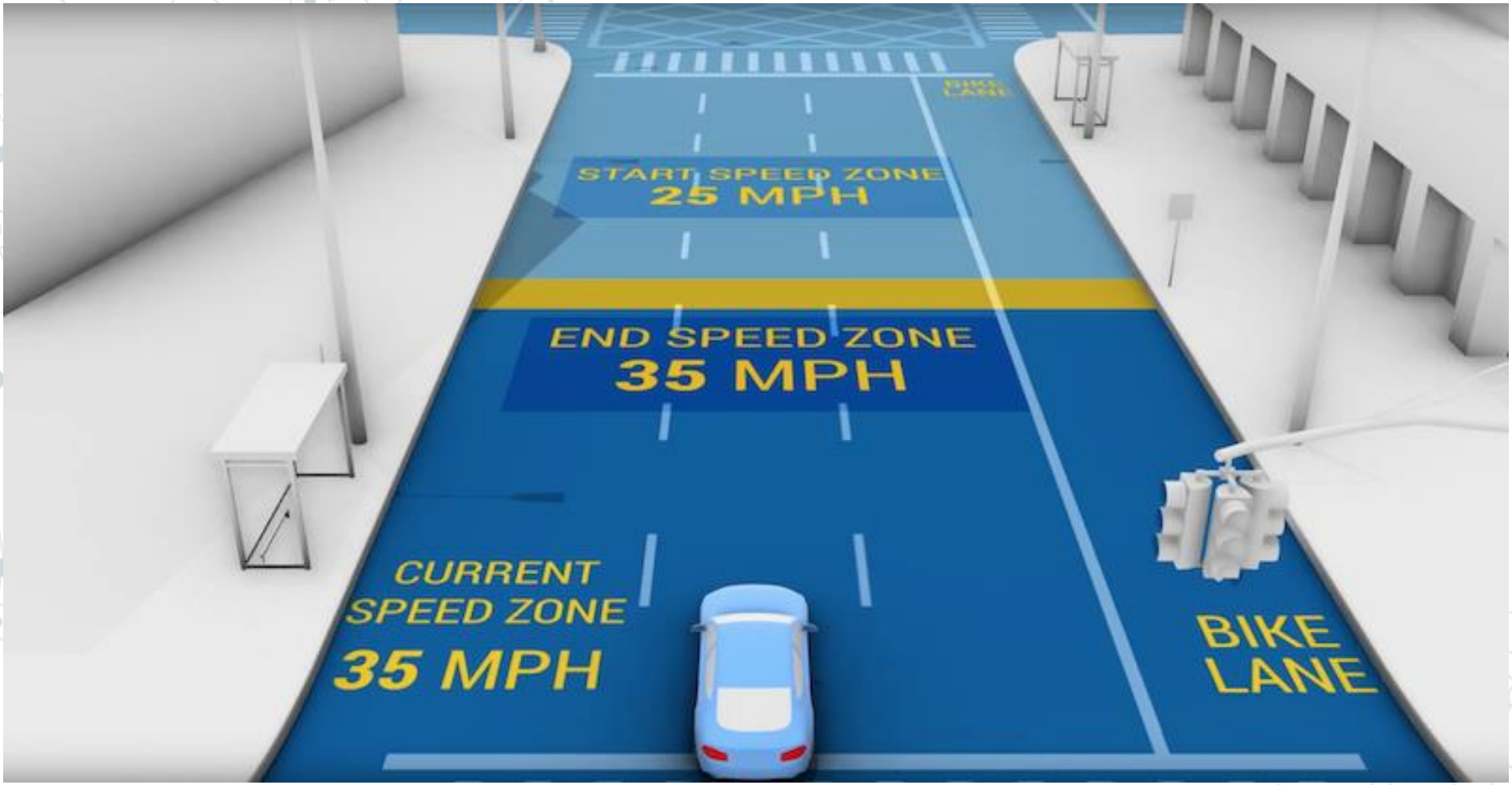
Proposals that rely on all pedestrians having smart devices a unsafe and inequitable

4. Infrastructure is king

Infrastructure

- AVs thrive with robust infrastructure, including smooth streets, well painted lanes and clear signage

- Applies to digital infrastructure as well
  - See the importance INRIX places on digitizing road rules



[Inrix Road Rules]

*5. Emphasize **transit** where feasible, and **shared** over SOV*

Transit/Shared Vehicles

- Both serve to reduce congestion and VMT, where autonomous vehicles alone will likely increase VMT
- Transit fills a major urban niche in cost and geometric efficiency
- Transit and Automation can be synergistic, not just competitive

*6. Deprioritize **Parking** over the long term*

Parking

- AVs will likely need little parking, and their first noticable effects may be reduced parking demand downtown

- Opportunities for reuse & redevelopment of parking facilities
  - New large parking garages may be built for repurposing

7. Embrace *Flexibility* and *Uncertainty*

Thanks!

Any questions?

You can contact me at:

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or

contact APA TN for these slides

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