SELF-DRIVING BOOKS
HOW OUR STANDARD PRACTICES WILL CHANGE IN THE AGE OF CONNECTED & AUTOMATED VEHICLES

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Introduction

- Vehicle manufacturers are designing CAV systems to function in our existing transportation infrastructure.
- It will be a long time until we have a fully connected or automated fleet.
- Even longer until we can guarantee that all vehicles are properly maintained.
- Some standards will change in response to CAVs.
- Focus on value of investments for all road users.
Autonomous Vehicles

The Vision...

...The Reality
Will we ever have 100% penetration?
What Problem are YOU trying to SOLVE?
What will **you** do differently with the CAV DATA?
Design Standards

Past
Consistency (not safety)

Present
Design for *humans*
- Sight Distance
- Accelerations (Lat. & Long.)
- Start-up loss time
- Yellow & All-Red Clearance

Future
Design for *vehicles*
Highway Capacity Manual (HCM) is data-driven

Headway Loss Time
Perception-Reaction Time
Capacity Merges & Weaves
HCM: Reliability

What will you DO with the CAV data?

USDOT CV Pilot Deployments

- Work Zone Warnings
- Spot Weather Impact Warnings
- Back of Queue Warning (Bottleneck)
- Pedestrian in Crosswalk Warnings
- Distress Notifications
- Intelligent Traffic Signal Systems
Highway Safety Manual (HSM)

Today

Historical Crash Data

Tomorrow

Simulation

- Test more scenarios
- Test new scenarios
- Consider different penetration rates
- Gather more behavioral information
Automated Vehicles today…

- Rely on sensors (camera, radar, lidar)
- Are designed to operate in our current conditions
- Struggle with **non-standard** or **inconsistent** conditions:
  - Poor pavement markings
  - Temporary Traffic Control
MUTCD

Do we need to change the material, placement, color, width, length of pavement markings?

• Agency investments depend on:
  – Which **sensors** CAVs use:
    • DSRC vs. 5G
    • RADAR, LIDAR, camera, mapping
  – Which **operational domains**
    • Physical, weather, time of day, urban/rural

Focus on maintenance & standardization
Policy & Infrastructure Challenges

• Hard to write policy for system that doesn’t exist

• CAV challenges:
  – Adverse weather or non-standard conditions
  – Unconnected vehicles & road users

• OEMs will figure out V2V & V2I

Who will figure out how to communicate with bikes & peds?
Making Changes

• We need…
  – To **collect** historical data on CAVs
  – To **identify** which vehicle is the CAV

• We can’t forget…
  – All road users
  – Bottlenecks reduce managed lanes capacity

• We expect…
  – Some nudging of HCM averages

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*Do we need new data collection methods?*
What can agencies do today?

- Maintain what you have today
- Upgrade signal controllers and communications
- Upgrade electronic toll collection
- Increase pavement and marking maintenance budget
- Know your land use goals
- Design for all road users
- Focus on safety

Focus on the value of our investments
What can agencies do today?

- Start **pilot testing** new systems
  - **Upgrade** current capabilities (hardware, software)
  - **Train staff** (maintenance and operations)
  - **Educate** decision makers (funding support)
  - **Share** data/findings with community

What will you **DO differently** with the CAV data?
“It’s supposed to be hard. If it wasn’t hard, everyone would do it. The hard is what makes it great!”
- Jimmy Dugan

Thank you

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