Road and Infrastructure Design

Subcommittee Meeting #1
February 25, 2019

ODOT Office of Innovation
Welcome and Introductions
Review of Scoping Results
Principles

• Ensure that automated vehicles can safely interact with roadway infrastructure
• Ensure safety of vulnerable road users, including pedestrians, bicyclists, motorcyclists, and others

AV/CV Changes to Infrastructure

• Infrastructure needs of both automated and conventional vehicles during transition
• Maintenance requirements and recognition
• Dedicated bandwidth for V2V, V2X
• High speed data communications infrastructure
• Security and control of interconnected infrastructure
• State role in standardization of signs, design, etc.
• Road design impact to insurance costs
• Need for statewide shared mobility rules and infrastructure

Infrastructure Funding

• How will transportation infrastructure funding need to shift?
• Who will pay for transportation infrastructure? How will revenues decrease?

Electric Vehicles

• AV environmental impacts
• Shared, autonomous, electric vehicle needs, including investment in EV charging
• How to design infrastructure for EVs and vehicles that use other fuel sources?

Repurposing Parking and ROW

• Parking – AV driven changes to design and requirements
• Repurpose street parking, etc., for storm water management
• Optimize capacity within the existing right of way (lane width and vehicle spacing)
• Consider right of way increases on all highways
• Address all design issues in the right of way
• Opportunity to solve congestion
State and Federal Roles in Infrastructure Design
State and Federal Roles in Infrastructure Design

- Many elements of infrastructure design standardized by federal government, AASHTO's Manual on Uniform Traffic Control Devices (MUTCD) governs signage, signals, markings.
- AASHTO Green Book governs geometric design of roadway.
- National guidance allows some flexibility in how states implement.
Manual on Uniform Traffic Control Devices

• MUTCD governs design of signs, signals, and pavement markings

• Administered by Federal Highway Administration (FHWA); developed with input from a national committee

• “3.0 AV Guidance” announced that FHWA will update 2009 MUTCD to address AVs
AASHTO Green Book

- American Association of State Highway Transportation Officials (AASHTO) publishes Green Book
- Green Book sets standards for road geometry
  - Local roads and streets
  - Collector roads and streets
  - Rural and urban arterials
  - Freeways
  - Intersections
  - Grade separations and interchanges
State Role in Infrastructure Design

• ODOT is responsible for state infrastructure:
  – Construction and maintenance of infrastructure
  – Road striping and signage
  – Operating signal systems on state infrastructure and in some local jurisdictions
  – Intelligent transportation systems

• Local jurisdictions are responsible for administering local infrastructure

• In the future, state and local jurisdictions could be responsible for connected vehicle roadside infrastructure
Background on National Efforts
Updates to the MUTCD

• “3.0 AV Guidance” announced that FHWA will update 2009 MUTCD to address automated vehicles

• Proposed changes expected to be released for comment Spring 2019

• National Committee met in January, meets again in June to discuss updates
SAE: Infrastructure Needs Related to Automated Driving

- Society of Automotive Engineers (SAE) convening committee on AV infrastructure needs

- Serves as forum for manufacturers / infrastructure operators to exchange information

- Will identify highway infrastructure elements to benefit all levels of AVs

- Kick-off call held 2/21, additional meetings scheduled through March
NCHRP 03-127: Cybersecurity of Traffic Management Systems

- National Cooperative Highway Research Project (NCHRP) has several projects related to connected/automated vehicles

- **Project 03-127** seeks to develop guidance for state and local transportation agencies to mitigate cyber attacks on traffic systems

- Literature review already available, project expected to conclude August 2019
NCHRP 20-102: Impacts of CAVs on State and Local Agencies

• 20-102 is the umbrella project for much of NCHRP’s CAV research

• $6.5 million in funding for research, 24 projects announced to date

• Several projects completed, some underway, others early in development
NCHRP 20-102(06): Road Markings for Machine Vision

- 20-102(06) is conducting research into how marking condition and weather affect machine vision

- Preliminary results suggest daytime wet conditions most challenging; nighttime conditions easier, little lighting impact

- Final report overdue, expected soon
NCHRP 20-102(15): Impacts of CAVs to Highway Infrastructure

- 20-102(15) will produce guidance on adapting roadway and ITS designs for CAVs
- Scenario analysis based on limitations of physical infrastructure and gaps in design, operations, maintenance, technology
- Final report due February 2020
NCHRP 20-102(21): Infrastructure Modifications to Improve Operational Domain of AVs

- 20-102(21) will investigate strategies for state and local agencies to improve the operational domain of AVs

- Strategies include I2V communications, signage, curbs and barriers, uniform and well-maintained traffic control devices

- Project currently under development, timeframe pending
NCHRP 20-102(24): Infrastructure Enablers for CAVs and Shared Mobility – Near-Term and Mid-Term

- 20-102(24) will develop near-term and mid-term recommendations for infrastructure changes to enable AVs

- Project currently in early stages of development

- Final scope and timeframe pending
NCHRP 03-126: Operational Standards for Highway Infrastructure

- 03-126 will standardize best practices for operating highway infrastructure

- Aims to produce a document similar to Green Book, but focused on Transportation System Management & Operations (TSMO)

- Problem statement expected March 2019
Additional National Initiatives to Track?
Revisions to Subcommittee Scope and Discussion of Final Product
Possible Final Product Goals

• Investigate and document any existing national guidance or national initiatives to develop guidance
• Identify what other states are doing related to this topic
• Develop short-term and long-term recommendations for road operators to prepare for AVs
• Identify potential funding implications of infrastructure changes
• Understand how agency data about infrastructure relates to this topics (e.g., sign inventory, no passing zones, no parking zones, etc.)
• Understand priority connected vehicle applications most important to AVs
Recap and Next Steps