

AASHTO FAST ACT REAUTHORIZATION

1: Connected and Automated Vehicles

INTRODUCTION AND BACKGROUND

The potential of Connected and Automated Vehicle (CAV) technologies to save lives, enhance mobility, and serve as the platform of a new generation of transportation management systems is vast. While there is tremendous potential in significantly improving transportation mobility and accessibility for people with CAVs, the top priority for AASHTO and the state DOTs is the safety associated with the implementation of the technologies. Safety has been, and will remain, at the forefront of AASHTO's policy goals as state DOTs have the primary responsibility for the safe and efficient movement of people and goods on our nation's highways and streets.

Ultimately, it is in the best interest of society that vehicles equipped with CAV technologies be introduced as quickly as possible to realize the saving of lives and improving the quality of life, and a collaborative approach on the challenges will help avoid pitfalls on a much-needed deployment pathway. The traditional division of responsibilities for vehicle safety, under purview of the federal government, and safe operation of vehicles through licensing and registration under purview of the state government has worked well and needs to be maintained in the future. However, the advent of automated vehicles is blurring the role of the vehicle and the operator subject to traditional jurisdictional lines and requires a new collaborative approach to what lies ahead.

The transformative nature of CAVs is just now coming into focus. There are still many questions to be answered from both a policy and technological perspective. While current media attention appears to focus on automated vehicles, AASHTO believes the future includes both connected and automated vehicles. AASHTO's member DOTs believe that establishing a strong foundation for CAVs requires robust connectedness for vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication.

SPECIFIC POLICY ISSUES AND RECOMMENDATIONS

ISSUE #1 Deploying CAV Technologies in the Safest Manner Possible is Paramount

- *Current Federal Policy:* None
- *Issue:* Safety is the most important consideration for AASHTO and state DOTs respecting highway infrastructure and the emerging deployment of CAVs. It is estimated that over 90 percent of fatal vehicle crashes are a result of human error some of which could be mitigated through CAV technologies. These new technologies have the potential to decrease crashes and fatalities significantly and positively influence the safety of not only vehicle occupants, but also highway maintenance and construction workers, bicyclists, and pedestrians. While the prospect for safety improvement is exciting, we are also acutely aware that this is truly innovative technology and there are still uncertainties surrounding it. However, any slowdown in the deployment of CAV technologies will result in a substantial setback in our nation's efforts to reduce the number of traffic crashes that result in death or injury.
- *Recommendations:*
 - AASHTO continues its commitment to safety as a top priority for the transportation industry and strongly believes that connected and automated vehicles have the potential to further reduce motor vehicle crashes and traffic related fatalities.

- The demonstration of connected and automated vehicles must continue and provide the data and examples necessary to establish the safety benefits of this technology. Initial data generated by automobile manufacturers, technology developers, research organizations, and public agencies must be shared and the results transparent to the public and decision makers.
- Any proposed laws, regulations, or guidance by federal or state governments should not pick winners or losers of technology but remain neutral and open to innovation and changes.
- Government regulators and lawmakers should revise or remove outdated safety related laws, regulations and guidance as data demonstrates a technology's ability to provide an equivalent or higher level of safety than current regulations support or incorporate.

ISSUE #2: The Future of Transportation Includes Connected and Automated Vehicles

- *Current Federal Policy:* None
- *Issue:* While there has been significant focus on autonomous vehicles (AV) and the benefits they may bring, there has been less attention on a future that includes connected vehicles (CV). As infrastructure owners and operators, State DOTs believe that establishing a strong foundation for AVs requires ensuring robust connectedness for vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication. The overwhelming support for the development and deployment of CAV systems is evident in the significant commitment that state and local agencies have already made in leading, supporting, and fostering the testing and deployment these new technologies. To date, 33 locations in the US are deploying connected vehicle (CV) technologies under sponsorship of USDOT and seventeen locations are deploying the technologies without sponsorship from USDOT. Combined, this represents 72,000 vehicles on the road and 65,000 devices installed on the infrastructure.

Many of these CV deployments involve state transportation agencies and AASHTO is working and supporting the states in many different ways. For example, AASHTO is supporting a national traffic signal phasing and timing (SPaT) challenge, which is challenging state and local public sector transportation infrastructure owners and operators to achieve deployment of dedicated short-range communications (DSRC) 5.9 GHz infrastructure with SPaT broadcasts in at least one corridor or network (approximately 20 signalized intersections) in each of the 50 states by January 2020. As of August 30, 2018, at least 26 states have committed to the challenge. More than 200 signals are broadcasting SPaT and more than 2,000 additional signals are planned. States and local transportation agencies have invested millions of dollars in DSRC, and they do not want that investment to be a waste. However, there is little federal direction regarding communications between V2V and V2I communication. Some States are unsure if they should invest in DSRC or 5G, or both for V2I communications, which slows the advancement of this technology. Nationwide interoperability, including further deployment of DSRC, is essential.

- *Recommendations:*
 - AASHTO supports integrating Connected Vehicle technologies with the development and deployment of Autonomous Vehicles to maximize public safety.
 - AASHTO urges USDOT to ensure that its effort to establish a nationwide standard for V2V safety communications continues unimpeded such that other connected vehicle applications can be developed and deployed.
 - AASHTO believes the transportation industry must use every tool available, including DSRC, to make our vehicles, highways and roads safer. The DSRC spectrum is the only viable technology available now and U.S. DOT should support its use for connected vehicle applications. Also, DSRC should be protected solely for V2X uses and not allow it to be used for sharing with other uses.

- AASHTO also recognizes that the future is uncertain with regard to technological innovation. The industry must remain flexible with regard to technical approaches and standards development. While DSRC is the only viable technology available now to support V2X applications, any standards development that occurs now should not impede technological innovation in the future.
- A universal, seamless approach to security management and CV communication is essential for the widespread deployment of connected vehicles. The Federal government should quickly lead this development through standardization and appropriate research and technology demonstration programs. This will help state better understand when and how to make investments that they consider appropriate.

ISSUE #3: Any New Laws or Regulations Must Maintain the Current Federal-State Regulatory Paradigm and Any Changes Should be Done Collaboratively with the States

- *Current Federal Policy:* 49 CFR Part 571: *Federal Motor Vehicle Safety Standards*
- *Issue:* Historically, the regulation concerning the design, construction, and performance of a motor vehicle is a Federal obligation that has been under the oversight of the National Highway Traffic Safety Administration through the Federal Motor Vehicle Safety Standards (FMVSS). The licensing of motor vehicle operators, registration of vehicles, and enforcement of traffic laws have been the domain of states. In other words, the federal role is focused on *what can be sold* through the establishment of safety standards, emissions standards and consumer protection. The state and local role is focused on *who* can operate and *where, when and how* vehicles are used.
 The development of automated driving systems (ADS) has the potential to disrupt this separation of design versus operation whereby motor vehicles are no longer driven by a person but by the ADS (i.e., artificial intelligence) and important questions about design, regulation, and certification of complex computer systems must be addressed. Already, there are bills in both the House and Senate that would potentially preempt state law by focusing, in part, on the performance of an ADS and affecting the *how* aspect of vehicles which is currently under the domain of states.
- *Recommendation:*
 - AASHTO recommends that the current federal-state regulatory paradigm remain intact when it comes to developing any new federal law, regulation or guidance. In addressing this and many other questions, states should be able to maintain their traditional oversight of vehicle operations and enforcement of traffic laws.
 - As technical and policy developments occur and lessons are gained, any regulations and laws needed to rebalance this separation of roles should be done collaboratively with the states (through AAMVA and AASHTO) to assure the safe deployment of CAVs.

ISSUE #4: State Laws Concerning the Operation of Connected and Automated Vehicles Need to be Uniform and Consistent

- *Current Federal Policy:* None
- *Issue:* Each state sets laws and regulations for the licensing, registration and insuring of vehicles, and states have honored registrations and licenses from other states through harmonization of minimum requirements. As states begin to grapple with how to approach AVs, some are instituting restrictions on their operation, requiring special license plates or limiting their operation to specific areas, while others are treating AVs as a standard motor vehicle, allowing operation anywhere under any safe condition. As the technology advances faster than the ability of state regulatory agencies or legislatures to respond, those laws and regulations may end up hindering technological advancements or encouraging companies to operate in states that offer friendlier regulatory environments. Thus, a patchwork system for the operation of AVs could slow nationwide

deployment, leading to the uneven accrual of benefits across the states.

For example, New York garnered attention with a debate over a state law that requires drivers to keep one hand on the steering wheel, which could limit the use of AVs based on the definition of “driver.” Also, many states have regulations prohibiting video screens from being visible to drivers as well as prohibitions against the consumption of alcohol by drivers and, in most states, passengers. These regulations are being questioned by the anticipated deployment of Level 5 (fully autonomous) AVs. One of the most glaring examples of a regulation that could hamstring future technology is the common requirement that drivers remain a reasonable distance behind other vehicles to allow for safe braking, also known as “following too closely” laws. Pennsylvania statutes include language requiring vehicles being driven in a caravan or motorcade to “allow sufficient space between each vehicle or combination of vehicles so as to enable any other vehicle to enter and occupy space without danger.” Even before Level 5 AVs are common on the roads, connected vehicle technology will allow for the safe platooning of vehicles; strictly applied, “following too closely” laws could prohibit the use of platooning on public roads, eliminating anticipated benefits to fuel efficiency and congestion.

- *Recommendation:*
 - State DOTs should commit to working with their sister agencies at the state level to ensure a unified national framework to facilitate the development, testing, and deployment of CAV technologies, including further harmonization of state-level traffic and vehicle rules affecting the operation of such technologies.
 - State DOTs should continue to work through the Autonomous Vehicle Best Practices Working Group, hosted by the American Association of Motor Vehicle Administrators (AAMVA) that is providing states and other stakeholders with a venue in which to gather, organize and share information about the testing, use and regulation of AVs.

ISSUE #5: State DOTs Need Additional Funding and Flexibility in Order to Deploy CAV Technologies and Accommodate CAV Vehicles

- *Current Federal Policy:* None
- *Issue:* States are struggling to find the fiscal resources to maintain the infrastructure as it exists today, so having to invest in new technology to retrofit existing roads, bridges and other infrastructure to accommodate CAVs will be difficult with current funding. Consequently, benefits will not accrue unless states can afford to make the necessary investments. There are a number of test bed and pilot connected vehicle programs taking place where we are learning a lot about the cost to deploy the CV hardware. As with all technology, costs can change rapidly as the new developments occur.

State DOTs know considerably less about the cost of ensuring automated vehicles are able to operate on the roadways. Currently, state DOTs (and other infrastructure owners) are uncertain, at least at a detailed level, which roadway characteristics are critically important to the safe and efficient operation of AVs: pavement condition, signage, detailed GPS base maps, or striping. We know some of the developers’ needs in a general way as industry has filed comments at U.S. DOT that signage and lane marking and striping are important. In fact, one state has responded to this concern by going from 4-inch to 6-inch stripes to help the technology developers with their sensors and lane departure warning systems. Other states, however, are not as willing to modify their lane striping widths because this is seen as a major investment. Further, there is uncertainty whether or under what circumstances replacing striping for purpose of AV deployment is a capital investment (eligible under FHWA programs) or a maintenance activity and not eligible for reimbursement.

- *Recommendation:*

- Congress is urged to grow federal surface transportation funding significantly above the current FAST Act funding levels and to make the deployment of connected and automated vehicle infrastructure needs eligible for funding beyond the historical aspect of funding only capital expenses to include maintenance activities critical or helpful to the proper and safe operation of CAVs.
- Flexibility is needed in the federal aid procurement rules to reflect that the CAV equipment is not the same as procurement for a more traditional construction project and that other considerations need to be made.
- State DOTs are committed to maintaining their assets in as good a condition as possible given the resources available to them. At this point, state DOTs do not know what, or if, minimum conditions are needed for ADS to operate effectively or what the minimum condition levels should be. The state DOTs look forward to working with other public and private sector partners in updating the practical meaning of state of good repair in a world of deployed CAVs.
- AASHTO recommends additional federal funding for building new testbeds and maintaining existing ones, with the industry and technology developers testing their hardware and applications on such testbeds. This will enable infrastructure owners and technology developers to better understand each other's requirements. That should lead to better standards and, ultimately, better infrastructure.

ISSUE #6: CAVs Will Produce Significant Amounts of Data and There is a Data Governance Gap

- *Current Federal Policy:* None
- *Issue:* The data concerns of CAVs are complex and the needed laws, regulations, and guidance are simply not well known at this time. It is very likely that CAVs will collect and transmit massive amounts of data from an array of sensors and cameras. These data will become extremely valuable to many different players and actors. For example, AV data could include origin-destination and ridership data (for better planning) or the condition of pavements, signs, and road markings (for better asset management). Should such information become available to state and local transportation officials through AVs, the improved data quality would likely facilitate improved planning and decision making. The availability of such information from AVs also could reduce some state data collection costs, freeing up personnel and funds for other important uses. However, this data would likely be valuable and useful to others as well. The private sector would likely monetize it some way and would also be collecting it. Law enforcement could use the information as evidence of a crime that was committed near a vehicle.

Further, AASHTO has a number of concerns about the data being generated by CAVs specifically in a testing environment, which we are currently in:

- Who is this information intended to be shared with?
- Will state and local law enforcement agencies, state DOTs, and insurance companies have access?
- Will data sharing be the prerogative of the individual manufacturers, or will there be regulation about which entities have access?
- Who owns and controls this data: the vehicle owner, the manufacturer, or a government agency?

Without controls in place to regulate or monitor use of the data that CAVs are currently collecting and clarification over who "owns" the data that AVs generate, fears over invasions of privacy will likely increase. To complicate matters, most state agencies are subject to government records requests, which can become very burdensome if the data can be tied to specific instances. Data sharing should be evaluated carefully to determine which data is able to be shared with all entities.

- *Recommendation:*

- Continue to collaborate with industry to better understand data issues and develop consensus on future paths forward related to the collection, sharing, and use of data related to CAVs.
- Because the industry is in the preliminary testing phase of AVs operating on **public roadways**, AASHTO strongly recommends the broad sharing of information associated with crashes and near-misses occur so that collective learning can happen while still protecting proprietary information of the technology developers.
- The data for which events are shared includes non-crash data such as since “near miss” and disengagement events which can be as important as crash scenarios when assessing road conditions. Currently, the data recording is suggested to be limited to fatal crashes, personal injury crashes, and crashes involving towed vehicles.

ISSUE #7: The Deployment of CAVs Will Continue to Require a Collaborative Approach

- *Current Federal Policy:* NHTSA Automated Driving Systems 2.0 Policy Guidance
- *Issue:* In NHTSA’s *Automated Driving Systems 2.0: A Vision for Safety* they specifically state that “Collaboration is essential as our Nation embraces the many technological developments affecting our public roadways.” AASHTO agrees with this statement and looks forward to working collaboratively with NHTSA, local governments, and the private sector on the testing and deployment of connected and automated vehicles. For example, infrastructure owners and operators want more information from the automakers about what infrastructure elements they need in order to be successful. The advent of ADS and connected technology represents a new paradigm in the relationship between these two segments of the transportation community. We recognize that automakers work in a very competitive environment, and may be challenged to reach consensus on their needs. Similarly, road agencies range in size and capability and don't often speak with a uniform voice. However, if we are to provide infrastructure that supports these new technologies, both physical and digital infrastructure, clearer guidance from the automaker industry would be helpful.
- *Recommendation:*
 - Greatly expanded overall industry collaboration to include broader and active participation from the private sector as well as more public sector agencies. There are existing structures in place—such as the Cooperative Automated Transportation (CAT) Coalition, the Connected Vehicle Pooled Fund Study, and the Collision Avoidance Metrics Partnership—that bring together state and local DOT representatives, research partners, USDOT, auto industry, original equipment manufacturers, and technology vendors. In addition, we would like to see more engagement from non-traditional, original equipment manufacturers.
 - Establish a structured advisory and deployment coordination program between automakers, original equipment manufacturers and government that would support the development and deployment of vehicle and infrastructure innovation to support mobility, goods movement and safety. Utilize groups to design future federal funding requests and proposed federal policy changes within Congress.