STATEMENT OF CATHERINE CHASE
PRESIDENT
ADVOCATES FOR HIGHWAY AND AUTO SAFETY

ON

"THE ROAD AHEAD FOR AUTOMATED VEHICLES"

SUBMITTED TO THE

UNITED STATES HOUSE OF REPRESENTATIVES
COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE
SUBCOMMITTEE ON HIGHWAYS AND TRANSIT

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Overview of Testimony

- Advocates for Highway and Auto Safety (Advocates) believes automated technology has the potential to be transformative in reducing our nation's mounting roadway death and injury toll. However, we are deeply concerned about the future of automated, or autonomous, vehicles (AVs) including trucks and buses. The lack of comprehensive federal performance standards, strong government oversight, adequate consumer information, and effective industry accountability imperils all road users who are currently unknowing and unwitting participants in the testing of experimental autonomous technology on public roadways.
- These inadequacies also have led to a great deal of confusion about AVs, advanced driver assistance systems (ADAS) and partial automation convenience features. In turn, the confusion has led to misuse and over-reliance on some technologies which have resulted in preventable fatalities and injuries. NHTSA issued Standing General Order 2021-01 to collect information from automakers about what is happening now with cars with ADAS and automated driving systems (ADS). It is incumbent upon NHTSA to release all this information to the public immediately.
- The issuance of minimum performance standards for verified ADAS technologies must occur with expediency. These systems have been proven to significantly reduce or mitigate crashes caused by many factors including impaired, distracted and drowsy driving. We cannot and must not wait for the future of AVs to reduce crashes, deaths and injuries.
- Advocates commends this Subcommittee and the full Committee for including safety advances in the Infrastructure Investment and Jobs Act (IIJA) including issuance of a final rule for automatic emergency braking (AEB) for large trucks within two years and a final rule for commercial motor vehicle (CMV) rear guards to prevent underride within two years. These and other directives must be a floor, not a ceiling, for what the U.S. Department of Transportation (DOT) issues.
- The tragic bridge collapse in Pittsburgh last week is the most immediate example of why our infrastructure must be maintained, improved and upgraded. Adoption of a Safe System Approach, which includes road safety infrastructure upgrades, reducing speeds, post-crash management, and vehicle safety advances, was included in the IIJA and must be implemented throughout the nation.
- To ensure the safe development and deployment of AVs, including autonomous CMVs (ACMVs), commonsense protections and regulations must be put in place, including Advocates' AV Tenets. Additional safeguards are needed for ACMVs (starting on p. 13). We urge this Subcommittee to continue its safety leadership role by considering and advancing these recommendations to improve the safety of all road users and the integrity of our nation's surface infrastructure.

Introduction

Advocates for Highway and Auto Safety (Advocates) is a coalition of public health, safety, law enforcement and consumer organizations, insurers and insurance agents that promotes highway and auto safety through the adoption of federal and state laws, policies and regulations. Advocates is unique both in its board composition and its mission of advancing safer vehicles, safer motorists and road users, and safer infrastructure. We are deeply concerned about the future of automated, or autonomous, vehicles (AVs). Currently there are no federal performance standards for AVs, advanced driver assistance systems (ADAS), or partial automation convenience features. Understandably, there is a great deal of confusion among the public about these different categories. In an actual AV, the car is taking over the entire driving task, unlike ADAS and convenience features where a driver always must be engaged in the driving task. There are no AVs available to consumers at this time. ADAS include safety features presently offered in some vehicles such as automatic emergency braking (AEB), lane departure warning (LDW) and blind spot detection (BSD). The highly respected Insurance Institute for Highway Safety (IIHS) has found real-world significant crash rate reductions in vehicles with these technologies. Conversely, partial automation convenience features, such as adaptive cruise control (ACC) and lane centering used together, have not been proven to improve vehicle safety. According to IIHS President David Harkey, "[T]here is no evidence that [partial automation systems] make driving safer…In fact, the opposite may be the case if systems lack adequate safeguards."[1] Misuse of and overreliance on some technologies already have led to numerous fatal crashes.[2] The lack of strong government oversight, effective regulations, and industry accountability must change. Automated technology has the potential to be transformative in reducing our nation's mounting highway death and injury toll. This Subcommittee and Congress

can lead the way to accomplish this goal with targeted legislative directives requiring regulatory and industry actions to address identified problems.

Motor Vehicle Crashes are a Public Health Crisis which Demand Immediate Action

According to the National Highway Traffic Safety Administration (NHTSA), 38,680 people were killed in 2020[3] and an estimated 2.74 million more were injured in traffic crashes in 2019.[4] Recent data shows a deadly upward trend in traffic fatalities with projected increases in 2020 and the first half of 2021, despite a decrease in vehicle miles traveled during that period.[5] It is anticipated that figures for the rest of 2021, which the U.S. Department of Transportation (DOT) is expected to release soon, will show additional increases.[6] NHTSA currently values each life lost in a crash at $11.6 million.[7] Crashes, injuries, and fatalities occurring each year impose a financial burden of $1 trillion in total costs to society in 2021 when adjusted for inflation -- $292 billion of which are direct economic costs.[8] This amounts to a "crash tax" on every person living in the U.S. of nearly $900.[9] In 2018, crashes alone cost employers $72.2 billion.[10]

Fatal truck crashes contribute to this preventable toll and occur at an alarmingly high rate. In 2020, nearly 5,000 people were killed in crashes involving a large truck.[11] Since 2009, the number of fatalities in large truck crashes has increased by 45 percent.[12] Additionally, 159,000 people were injured in crashes involving a large truck in 2019, and injuries of large truck occupants increased by 18 percent since 2018.[13] The cost to society from crashes involving commercial motor vehicles (CMVs) was estimated to be $143 billion in 2018, the latest year for which data is available.[14] When adjusted solely for inflation, this figure amounts to over $150 billion.[15] According to the U.S. Department of Labor, truck driving is one of the most dangerous occupations in the United States.[16]

On the Potential Path to AVs, Proven Vehicle Safety Technologies Save Lives

Before the pandemic, the motor vehicle crash death and injury toll already was extremely high, averaging 36,739 fatalities and 2.7 million injuries over the five-year span of 2015 to 2019.[17] The recent uptick has brought a renewed national focus on these preventable tragedies. Fortunately, inexpensive and lifesaving solutions are readily available. What is lacking is implementation. This includes the U.S. DOT issuing minimum performance standards for proven and available safety technologies with urgency. The NHTSA has estimated that between 1960 and 2012, over 600,000 lives were saved by motor vehicle safety technologies.[18]

Advocates always has championed proven vehicle safety technologies to save lives. Advocates led the coalition that supported enactment of the bipartisan Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991[19] which included a mandate for front seat airbags as standard equipment. As a result, by 1997, every new car sold in the United States was equipped with this technology and the lives saved have been significant. Airbags have saved an estimated 50,457 lives from 1987 to 2017, according to NHTSA.[20] Advocates continued to support proven lifesaving technologies as standard equipment in new vehicles in other federal legislation and regulatory proposals. These efforts include: tire pressure monitoring systems;[21] rear outboard 3-point safety belts;[22] electronic stability control;[23] rear safety belt reminder systems;[24] brake transmission interlocks;[25] safety belts on motorcoaches;[26] rear-view cameras;[27] ADAS;[28] impaired driving prevention technology;[29] enhanced vehicle hood and bumpers to better protect vulnerable road users;[30] and, advanced head lamps.[31]

Additionally, Advocates has relentlessly championed technology to improve CMV safety and address persistent problems such as truck driver fatigue, a well-known and well-documented problem in the motor carrier industry. In fact, the National Transportation Safety Board (NTSB) repeatedly has cited fatigue as a major contributor to truck crashes.[32] Advocates sought the

installation of electronic logging devices (ELDs) to record drivers' hours of service (HOS) to increase compliance and thereby reduce driver fatigue and fatigue related crashes.

Immediate Actions Must be Undertaken to Prevent Crashes and Save Lives

It is a transformational time in surface transportation innovation with the availability of new safety technologies, known as ADAS, to prevent or mitigate crashes caused by numerous factors including distracted, impaired and drowsy driving, and protect drivers, vehicle occupants and other road users. These safety systems, such as AEB and LDW, stand in stark contrast to some partial automation driver convenience features, such as adaptative cruise control and lane centering used together which allow operators to remove their hands from the steering wheel or other dangerous actions. While AV technology continues to be developed, ADAS are available to immediately improve public safety. As NHTSA has stated, "[t]he prevalence of automotive crashes in the United States underscores the urgency to develop and deploy lifesaving technologies that can dramatically decrease the number of fatalities and injuries on our Nation's roadways."[33] The NTSB has included increasing implementation of collision avoidance technologies in its Most Wanted Lists of Transportation Safety Improvements since 2016.[34] The IIHS has found that:

- AEB can decrease front-to-rear crashes with injuries by 56 percent;
- LDW can reduce single-vehicle, sideswipe and head-on injury crashes by over 20 percent;
- BSD can diminish injury crashes involving lane changes by 23 percent;
- Rear AEB can reduce backing crashes by 78 percent when combined with rearview camera and parking sensors;
- Rear cross-traffic alert can reduce backing crashes by 22 percent; and,[35]
- Equipping large trucks with forward collision warning and AEB could eliminate more than two out of five crashes in which a large truck rear-ends another vehicle.[36]

However, the widespread use of these technologies and realizing their significant lifesaving benefits are hampered by their limited availability to consumers. Often AEB is sold as part of an additional, expensive trim package along with other non-safety features, or included as standard equipment in high end models or vehicles. This practice hinders mass dissemination and safety equity by providing access only to those who can afford an upcharge of thousands of dollars. Additionally, segments of the trucking industry have opposed requiring AEB in small to medium-sized trucks.

Moreover, there are currently no minimum safety standards to ensure the technologies perform as expected and needed. When consumers walk into auto showrooms to purchase a vehicle, a major expenditure for most families, they expect the assurances of minimum safety standards to protect them, as has been the case since the first federal vehicle safety regulation issued in 1966.[37] Also, consumers are keeping cars longer. In 2021, the average of age of vehicles operated on roads in the U.S. was 12 years.[38] As such, without federal regulations requiring ADAS as standard equipment, it will take far longer for these safety systems to be prevalent on our roadways. The current void of regulations for ADAS renders all road users vulnerable to needless dangers, including bicyclists, pedestrians and others.[39]

Advocates commends this Subcommittee and the full Committee on Transportation and Infrastructure for including numerous provisions in the Infrastructure Investment and Jobs Act (IIJA), signed into law last November, that will improve safety and strengthen our nation's infrastructure. The law requires the U.S. DOT to issue a final rule within two years for AEB in large CMVs and the issuance of a Federal Motor Carrier Safety Regulation (FMCSR) to require drivers use AEB.[40] We urge the U.S. DOT to meet the statutory deadline for this standard and not delay regulatory action. However, this directive must be expanded to include all CMVs. Based on new truck sales data, limiting the installation of AEB to Class 7 and 8 trucks will potentially

exclude over half a million Class 3-6 trucks every year. These vehicles travel on local streets and through neighborhoods everyday making millions of deliveries. Equipping these trucks with AEB will make neighborhood streets safer for pedestrians, bicyclists, children, older adults, people in wheelchairs and other vulnerable road users. Advocates also has consistently supported the use of speed limiting devices for CMVs because high speed crashes involving large trucks have the potential to be far deadlier than those that occur at lower speeds.[41]

We also commend the Subcommittee and full Committee for the inclusion of upgrading the performance standard for rear underride guards.[42] This is long overdue as testing by IIHS has found that the largest trailer manufacturers far exceed the current federal standard.[43] Moreover technology is currently available that can prevent a passenger vehicle from traveling underneath the rear or side of a trailer and significantly increase the chances of survival. The NTSB has recommended rear, side, and front underride protection.[44] In 2017, IIHS performed its first tests of a side underride guard designed for an automobile.[45] The device bent but did not allow the car to go underneath the trailer, enabling the car's airbags and safety belt to properly restrain the test dummy in the driver seat. As such, U.S. DOT should require the installation of comprehensive underride protection (side and front) for the entire CMV.

In addition, the legislation provides funding opportunities for states and localities to implement a Safe System Approach that seeks to prevent traffic fatalities by minimizing roadway conflicts and reducing crash forces when they do occur. This is accomplished through measures such as reducing speeds, road safety infrastructure improvements and better post-crash management. Additional provisions in the IIJA that will improve public safety include requiring the establishment of a safe routes to school program for children, research focusing on vulnerable road users (VRUs), and measures to address multiple substance-impaired driving. Lastly, the IIJA includes directives to the U.S. DOT to conduct research on the impacts of automated,

connected and platooned vehicles on infrastructure including wear on roadway pavements as well as a report to Congress on the existing and future impacts of AVs to transportation infrastructure, mobility, the environment, and safety. This information will be critical in determining future policies for this developmental technology.

In the short term, there are immediate surface infrastructure vulnerabilities which demand immediate attention. Just last week, at least ten people were injured when a well-travelled 52-year-old bridge collapsed in Pittsburgh. The most recent inspection report for the bridge noted that it was in "poor" condition.[46] This was not the first time a major artery has failed in a major city in the U.S. In 2007, a bridge in Minneapolis collapsed killing 13 and injuring 145 travelers after the span had been deemed "structurally deficient."[47] Overweight trucks disproportionately damage America's crumbling infrastructure and threaten public safety. Yet, certain special interests continue to advocate for weakening federal limits on the weight and size of CMVs. Often these provisions are tucked into must pass spending bills evading public debate and the jurisdiction of this committee. Federal weight and size limits are essential to protecting truck drivers, the traveling public, and our nation's roads and bridges. According to the 2021 Infrastructure Report Card from the American Society of Civil Engineers, America's roads receive a grade of "D" and our bridges were given a "C."[48] Nearly 40 percent of our 615,000 bridges in the National Bridge Inventory are 50 years or older, and one out of 11 is structurally deficient.[49]

We urge the U.S. DOT to move swiftly to implement the IIJA, including issuing the mandated standards immediately, and to view the safety requirements as a "floor" rather than a "ceiling" for what must be achieved. Critical to the success of the National Roadway Safety Strategy (NRSS), released by the U.S. DOT last week, will be swift implementation of Congressional mandates and other identified solutions which have been proven to prevent crashes and save lives.

Experimental Autonomous Technology Remains Unproven

While the benefits of ADAS, like AEB, are clear, the same is not so for several partial automation technologies for both cars and trucks which are lacking independent supportive evidence or data. Moreover, several fatal crashes involving cars equipped with automated driving systems (ADS) or varying levels of driving automation have been subject to investigation by the NTSB and NHTSA.[50] These investigations have and will continue to identify safety deficiencies, determine contributing causes, and recommend government and industry actions to prevent future deadly incidents.

Advocates urges this Subcommittee to consider critical information from our nation's preeminent crash investigators to inform any policies related to AVs. Further, since January 2018, NHTSA's Office of Defects Investigation has identified at least eleven crashes in which a Tesla vehicle operating under its "Autopilot System" or Traffic Aware Cruise Control collided with vehicles at crash scenes where first responder vehicles lights and other control measures such as flares and cones were in place. This investigation must be a priority for NHTSA because of the serious safety implications associated with these troubling and recurring incidents. Findings from all these investigations should be publicly released and incorporated as applicable into any future legislation or regulation pertaining to AVs.

It is encouraging that NHTSA has recently taken several essential steps to address the substantial safety concerns associated with vehicles equipped with ADAS and ADS. Advocates supports NHTSA obtaining invaluable data involving vehicles equipped with Level 2 ADAS and ADS through Standing General Order 2021-01 (General Order) and the agency's recent announcement that it intends to expand the General Order to include additional crashes including those involving VRUs.[51] The agency indicates that it believes the frequency of crashes equipped with these systems will increase.[52] The General Order will assist NHTSA in properly assessing the

on-road performance and safety of these technologies. This unique information can help the agency identify common problems or systematic issues with certain vehicles and/or equipment.[53] Moreover, the reporting requirements of the General Order are properly tailored so that the agency can collect the appropriate data necessary as they are limited to crashes involving fatalities, injuries requiring transportation to a hospital, substantial damage to the vehicle, airbag deployment or an incident involving a vulnerable road user. The agency recently indicated that it has received four months of data from manufacturers.[54] During his nomination hearing before the Senate Committee on Commerce, Science, and Transportation in December 2021, Dr. Steven Cliff, nominee for NHTSA Administrator, affirmed the agency's intent to make the data public in the very near future.[55] We urge NHTSA to release all the data obtained from the General Order to the public in an understandable format as soon as possible.

The IIHS also has performed invaluable research on the Level 2 ADAS marketed as a convenience feature intended for highway driving for passenger motor vehicles. They have determined that if a manufacturer does place partial automation convenience systems in a vehicle, it should have essential safeguards to help prevent misuse that can result in dangerous situations such as failure to pay attention to the driving task.[56] These include driver monitoring systems to help ensure driver engagement with alerts to the driver that rapidly escalate in urgency and timing. In addition, emergency interventions such as slowing or stopping the vehicle are needed when driver disengagement with the driving task is detected, and the driver fails to respond appropriately. Additional safety protocols prohibiting a driver from using the system while unbuckled or when crash avoidance systems are disabled are critical. Consumer Reports (CR) has announced it will be awarding points for partially automated driving systems, but only if they have adequate driver monitoring systems.[57] This year IIHS expects to be issuing ratings on the performance of the safeguards that partial automation employs to help drivers stay

focused on the roads including escalating alerts and appropriate emergency procedures.[58] CR plans to factor in the IIHS ratings once available.

Ensuring the Safe Development of Autonomous Technology

Development of AVs must be undertaken without jeopardizing public safety. The following commonsense safeguards are necessary to ensure those in and around AVs are protected. This also will help bolster consumer confidence in the technology.

Adoption of Basic AV Tenets Will Guarantee Safety and Public Acceptance

Advocates spearheaded the compilation of the "AV Tenets," policy positions which should be a foundational part of any AV policy.[59] This comprehensive approach is based on expert analysis, real world experience, and public opinion and is supported by 60 stakeholders representing safety, consumer, public health, labor, bicyclists, pedestrians, individuals with disabilities, smart growth, and others. It has four main, commonsense categories including: 1) prioritizing safety of all road users; 2) guaranteeing accessibility and equity for all individuals including those with disabilities; 3) preserving consumer and worker rights; and, 4) ensuring local control and sustainable transportation. Many promises have been touted about AVs bringing reductions in motor vehicle crashes and resultant deaths and injuries, lowering traffic congestion and vehicle emissions, expanding mobility and accessibility, improving efficiency, and creating more equitable transportation options and opportunities. As Secretary Buttigieg recently acknowledged, these outcomes are far from certain.[60] The AV Tenets will be necessary to help realize these goals as well as mitigate potential negative consequences. Among the numerous recommendations in the AV Tenets, requiring that AVs meet minimum standards, including for cybersecurity, and that operations are subject to adequate oversight, including a comprehensive database accessible by vehicle identification number (VIN) with basic safety information, will be critical to putting safety first with regards to this burgeoning technology.

Vigilant Oversight of Autonomous Commercial Motor Vehicles (ACMVs) is Essential

The emergence of experimental ACMVs and their interactions with conventional motor vehicles, trucks and buses and all road users for the foreseeable future demand an enhanced level of federal and state oversight to ensure public safety. It is imperative that CMVs, including those with ADS, be regulated by U.S. DOT with enforceable safety standards and subject to adequate oversight. The potential for an 80,000 pound truck equipped with unregulated and inadequately tested technology on public roads is a very real and dangerous scenario if these vehicles are only subject to voluntary guidelines. In addition, automated passenger carrying CMVs which have the potential to carry as many as 53 passengers will need additional comprehensive federal rules specific to this mode of travel.

At a minimum, ACMVs must be subject to the following essential provisions:

- In the near term, rulemakings must be promulgated for elements of ACMVs that require performance standards including but not limited to the ADS, human machine interface, sensors, privacy, software and cybersecurity. ACMVs must also be subject to a "vision test" to guarantee they properly detect and respond to other vehicles, all people and objects in the operating environment. Also, a standard to ensure ACMVs do not go outside of their operational design domain (ODD) should be issued. Standards for ACMVs must be required to be issued by specific deadlines, with a compliance date, set by Congress before deployment.
- Drivers operating an ACMV must have an additional endorsement or equivalent certification on their commercial driver's license (CDL) to ensure they have been properly trained to monitor and understand the ODD of the vehicle and, if need be, to operate an ACMV. This training must include a minimum number of hours of behind-the-wheel training.

- Each manufacturer of an ACMV must be required to submit a safety assessment report that details the safety performance of automated driving systems and automated vehicles. Manufacturers must be required to promptly report to NHTSA all crashes involving ACMVs causing fatalities, injuries and property damage.
- ACMVs that do not comply with Federal Motor Vehicle Safety Standards (FMVSS) must not be introduced into commerce nor be subject to large-scale exemptions from such.
- Any safety defect involving the ACMV must be remedied before the ACMV is permitted to return to operation. The potential for defects to infect an entire fleet of vehicles is heightened because of the connected nature of AV technology. Therefore, manufacturers must be required to promptly determine if a defect affects an entire fleet. Those defects which are fleet-wide must result in notice to all such owners and an immediate suspension of operation of the entire fleet until the defect is remedied.
- The U.S. DOT Secretary must be required to establish a database for ACMVs that includes such information as the vehicle's identification number; manufacturer, make, model and trim information; the level of automation of each automated driving system with which the vehicle is equipped; the ODD of each automated driving system; and the FMVSS, if any, from which the vehicle has been exempted.
- For the foreseeable future, regardless of their level of automation, ACMVs must have an operator with a valid CDL in the vehicle at all times. Drivers will need to be alert to oversee not only the standard operations of the truck but also the ADS. Therefore, the Secretary must issue a mandatory safety standard for driver engagement. In addition, critical safety regulations administered by FMCSA such as those that apply to driver HOS, licensing requirements, entry level training and medical qualifications must not be weakened.

- Motor carriers using ACMVs must be required to apply for additional operating authority.
- FMCSA must consider the additional measures that will be needed to ensure that ACMVs respond to state and local law enforcement authorities and requirements, and what measures must be taken to properly evaluate an ACMV during roadside inspections. In particular, the safety impacts on passenger vehicle traffic of several large ACMVs platooning on bridges, roads and highways must be assessed.
- NHTSA must be given imminent hazard authority to protect against potentially widespread catastrophic defects with ACMVs, and criminal penalties to ensure manufacturers do not willfully and knowingly put defective ACMVs into the marketplace.
- NHTSA and FMCSA must be given additional resources, funding and personnel, in order to meet demands being placed on the agency due to the advent of AV technology.

Without these necessary safety protections, mandated by Congress to assure they are adopted with prescribed deadlines, commercial drivers and those with whom they share the road are at risk. Allowing technology to be deployed without rigorous testing, vigilant oversight, and comprehensive safety standards is a direct and unacceptable threat to the motoring public which is exacerbated by the sheer size and weights of large CMVs.

ACMVs Will Impact our Nation's Infrastructure

The Need for Improved Roadway Design: The design of our roads -- from the asphalt, to the signage, to the lighting, to the speed limit -- is largely based on the history of human performance behind the wheel and the capability of the vehicles. The introduction of AVs including ACMVs stands to essentially require a re-write of many of these guidelines for road design and use in the future. However, in the near term, there will need to be an evaluation of how standards for design can be enhanced to accommodate both human and machine "drivers." Both human and machine "drivers" would benefit from improved lane marking as well as

establishing standards for pavement resurfacing to ensure that repair seams and color differences do not confuse AV systems. Establishing uniform standards for signage color, lighting, contrast, letter size, and other roadway features will likely benefit the performance of AVs and will also reap similar advantages for human drivers in the interim. Many of the current manuals' guidelines and recommendations are almost always open to engineering interpretation. With the advent of ACMVs, more emphasis must be placed on consistency, and consideration must be given to the effects variations can have on autonomous driving technology. While a human driver can see a unique situation and interpret those circumstances fairly well, an ACMV may not be able to do the same. Research has already shown that minor distortion of a sign can cause havoc for AVs, causing stop signs to be interpreted as speed limit signs, a confusion which can have serious, and potentially fatal, results.[61] Clearly, new rules are required if ACMVs are allowed on our roadways.

Roadway deterioration and delayed repair, which are common occurrences on existing infrastructure, will have a negative impact on AV operation. In addition, how ACMVs utilize and navigate weigh stations, roadside inspections and truck stops must be considered. Every driver has experienced road signs or markings that have been damaged, intentionally altered or blocked by objects. This could lead to misinterpretation of roadway and highway cues and result in stopped or misdirected ACMVs that will present additional hazards. These findings and similar research illustrate that not only standards for roadway design can be critical to performance, but also that road design improvements alone may not suffice to ensure the safe operation of AVs. Combining standards for design with infrastructure improvements like vehicle-to-infrastructure (V2I) technology, backed by standards for such, would provide additional awareness for human drivers and unambiguous inputs for machine "drivers."

Industry Hype v. Reality: The AV industry often has claimed that the introduction of these vehicles will reduce congestion, improve environmental quality, and advance transportation efficiency.[62] However, many of these claims may amount to nothing more than aspirational goals. Instead, AVs may bring about so-called "hyper-commuters" who work from their vehicles on long commutes to enable living further from offices and/or city centers. Significant consideration must be given to how AV driving could change wear patterns on roadways. Heavy trucks already are accelerating the damage on our roads and highways. The lower variance of an AV's, including ACMVs, position within a lane could lead to accelerated wear in lanes, and condensed convoys of automated trucks, commonly known as platooning, could place further strain on roads and bridges. All these concerns must be evaluated to consider operational constraints for AVs before further damage is inflicted upon our nation's roads and bridges which are already weakened and in dire need of fortification and updating, as mentioned above. For example, the spacing between ACMVs in a platoon could have wide-ranging implications. If these large vehicles travel too closely together, their combined weight load could place severe stress on a bridge. In addition, lengthy platoons which consist of many ACMVs could be difficult to pass and affect merging and exiting from roadways.

Taking into consideration the long-term ramifications, the budgetary constraints, and the necessary coordination among a diverse group of stakeholders when it comes to planning and implementing infrastructure projects at any level, research is needed now more than ever on the impact of AVs on our roads. In addition, further research is also required to examine the differing infrastructure upgrades that will be required for urban, suburban and rural regions. More analysis and deliberation must be given to this complex issue before AVs, particularly ACMVs, can be deployed.

Voluntary Agreements are Inadequate, Ineffective and Impossible to Enforce

To date, the approach of pursuing voluntary industry agreements, sometimes with government agency involvement, consistently has been demonstrated to be insufficient to ensure public safety. For example, the first edition of the AV Guidelines issued by U.S. DOT in 2016 encouraged the submission of voluntary safety self-assessment (VSSA) reports and the subsequent three editions have not altered this process.[63] Despite the fact that approximately 80 entities are testing AV technology,[64] just under 30 reports have been filed with U.S. DOT since the first voluntary guidelines were released in 2016.[65] Thus far, the U.S. DOT has failed to implement standard requirements for the information to be provided in the VSSA. Consequently, manufacturers are submitting incomplete, uninformative and sometimes outdated glossy, marketing-style brochures with little, if any, substantive or relevant information from which to ascertain critical and reliable information about safety and performance.

In September 2020, the U.S. DOT announced a new voluntary plan, the Automated Vehicle Transparency and Engagement for Safe Testing (AV TEST) Initiative.[66] It also focuses on the voluntary submission of information from AV manufacturers and operators, as well as state and local authorities. Similar to the VSSAs, the lack of a mandate and standard for submissions provides little if any value to assist in seriously evaluating or comparing the AV testing taking place across the country.[67] This initiative is an oversight mirage leaving all road consumers uninformed and at risk.

Another example of the ineffectiveness and failures of voluntary agreements is the March 2016 agreement among 20 automakers to install AEB in most new light vehicles as standard equipment by 2023. As of December 2021, two manufacturers, which account for nearly a third of the U.S. auto market, demonstrate this lackluster response to the detriment of public safety. Only 58 percent of General Motors vehicles and 43 percent of Fiat Chrysler vehicles were sold with AEB

between September 1, 2020 through August 31, 2021. Moreover, the performance requirements in the agreement are exceptionally weak and consequently can result in these systems not performing as needed. This underscores the urgency for the U.S. DOT to issue a minimum performance standard for AEB in all new vehicles, and it undermines the public confidence in the potential of these promising safety systems to prevent death and injury on the highway.

The latest example of ineffectual voluntary agreements is the September 2019 announcement by the auto industry to equip cars with inadequate technology to prevent hot car deaths of children by 2025. Once again, this type of a pact unnecessarily prolongs the timeline to get equipment into new cars and fails to ensure the system meets a minimum performance standard.[68] In fact, General Motors announced it would equip its new cars with technology that "can detect motion as subtle as the breathing of an infant sleeping in a rear-facing child safety seat" in 2001 with the intent to begin rollout in 2004.[69] Yet, this technology was never installed. Meanwhile, children continue to needlessly die or tragically sustain serious injuries in hot cars. The IIJA took a step forward by directing the U.S. DOT to issue a rule on reminder technology within two years, but it is imperative that the final rule require the system *detect* the presence of an occupant in the entire passenger compartment. If not, ineffective systems, which are currently on the market, will give a false promise of preventing child deaths, but in reality not solve this tragic problem.

The common thread among all these voluntary initiatives is that at any time, any or all automakers can decide to no longer comply with the agreement or partially comply in whatever capacity they desire without any ramifications, underscoring the importance and benefit of regulatory action by U.S. DOT. They also allow auto manufacturers to continue upcharging, sometimes far in excess of the cost to the auto manufacturers who benefit financially from keeping systems voluntary rather than mandatory.

Dispelling Misleading Claims about AVs

Some proponents of ACMVs claim that they will relieve supply chain issues by addressing the so called "driver shortage" within the trucking industry by eliminating the need for human drivers and allowing for the more efficient movement of goods through the constant operation of trucks. However, harsh and unsafe working conditions for interstate truck drivers have created a retention crisis, not a driver shortage. In fact, the U.S. Department of Labor has determined that "the labor market for truck drivers works about as well as the labor markets for other blue-collar occupations" and "a deeper look [at the truck industry labor market] does not find evidence of a secular shortage."[70] According to industry data, driver turnover at some carriers is near 90 percent.[71] In addition, states issue more than 450,000 new CDLs each year, demonstrating that there are candidates to fill vacancies.[72]

The supply chain issues currently facing the nation are complex and will not be solved by the introduction of ACMVs, which will not be ready for prime time in the near future. This technology still faces significant operational challenges such as responding to all participants in the transportation ecosystem including traffic control officers and vulnerable road users as well as differing weather conditions. In fact, much of the testing of AVs is taking place in warm areas of the country that do not experience varied weather conditions including those that occur during treacherous winters. Moreover, the constant operation of trucks raises serious questions as to the ability to properly service vehicles continuously in use. Even without this potential new regime, 21 percent of CMVs were placed out of service in 2021 for maintenance issues.[73] In addition, many of the issues with the physical condition of the truck that would be identified by a human driver during a pre- or post-trip inspection as well problems during a trip such as the shift of a load or other emergencies noted by a human driver may not be identified or corrected under this type of use. Furthermore, adding an autonomous driving system into passenger carrying vehicles

such as buses does not negate the need for a driver. Human interaction remains essential. Beyond the operational task, these professional drivers have a myriad of other responsibilities including assisting individuals with disabilities on and off the bus safely, managing emergency situations and the delivery of medical care, and coordinating safe transportation for all people. Supporters of ACMVs also contend that placing autonomous systems in a CMV is not as daunting a task as with passenger vehicles because CMVs operate largely on highways, an easier environment for the technology to master. Operating a CMV on a congested highway at a high rate of speed is a complicated task in a dangerous environment as evidenced by the fact that a quarter of fatal crashes involving CMVs occur on highways.[74] Lastly, supporters of ACMVs also claim that the technology will eliminate most crashes citing a statistic accredited to NHTSA which indicates that 94 percent of crashes are due to human error or the fault of the driver.[75] However, the agency has noted in the same report which includes this data point that "[t]he critical reason is the immediate reason for the critical pre-crash event and is often the last failure in the causal chain of events leading up to the crash. Although the critical reason is an important part of the description of events leading up to the crash, *it is not intended to be interpreted as the cause of the crash nor as the assignment of the fault to the driver, vehicle, or environment*" (emphasis added).[76] This statistic was recently rebuked by NTSB Chair Jennifer Homendy who stated, " At the same time it relieves everybody else of responsibility they have for improving safety, including DOT… You can't simultaneously say we're focused on a 'safe system' approach - making sure everybody who shares responsibility for road safety is taking action to eliminate fatalities and serious injuries…- and have a 94% number out there, which is not accurate."[77] There are often multiple causes of a crash and replacing human error in the operation of a vehicle, when it does occur, with unproven technology is not a sensible solution to reducing the death toll on our nation's roads. The fact remains that there is scant independently

verifiable data that ACMVs can operate safely on any road or help to address any of the nation's longstanding supply chain issues.

Some proponents of advancing the deployment of AVs contend the U.S. is at risk of falling behind other nations unless it takes steps to merely promote rather than regulate ACMVs. However, this fear-inducing claim is inaccurate In fact, the United States is ranked fourth in the KPMG 2020 Autonomous Vehicles Readiness Index while Japan is ranked 11th, Germany is 14th and China is 20th.[78]

Other countries in fact are taking a more calculated, careful and cautious approach.

- Germany requires a human to be behind the wheel of a driverless car in order to take back control and has other important elements including requirements for vehicle data recording.[79]
- In the United Kingdom, testing has largely been limited to a handful of cities, and the government has proposed and published a detailed code of practice for testing AVs.[80]
- In Canada, several provinces prohibit certain types of AVs from being sold to the public.[81]
- In Asia, Japan has allowed on-road testing with a driver behind the wheel and is currently working on regulatory and legal schemes for controlling the commercial introduction of AVs, but even so has not begun to address the highest levels of automation.[82]
- In China, all AV operations remain experimental.[83]

In sum, no country is selling fully automated vehicles to the public and by many accounts, none will be for a significant time in the future.[84] The U.S. is not behind other countries in allowing them to go to market, but we are behind in establishing and enforcing comprehensive safeguards to ensure that this process happens without jeopardizing or diminishing public safety. Congress can change this predicament by directing the U.S. DOT to issue minimum performance standards and exercise sufficient oversight.

Conclusion

Since our founding in 1989, Advocates has supported and worked to advance in federal legislation and government rulemaking the safe and equitable development and requirements for proven technologies to reduce crashes and save lives on our nation's roads. AVs may, in the distant future, as many renown industry and public officials have explained, bring about meaningful societal benefits and improvements to public safety but it will require implementing and enforcing mandatory comprehensive safeguards to ensure AV technology is developed without putting the public at risk. Until the time that is demonstrated and supported by minimum government standards to ensure ongoing safe performance and reliability, adequate consumer information, and deterrents to industry transgressions, public officials should focus on requiring the installation of available, advanced safety technologies in all new vehicles and improving our compromised infrastructure to successfully mitigate and reduce the ongoing crisis of fatalities and injuries on our roads.

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[1] IIHS, IIHS creates safeguard ratings for partial automation (Jan. 20, 2022).

[2] Collision Between Vehicle Controlled by Developmental Automated Driving System and Pedestrian Tempe, Arizona, March 18, 2018, Accident Report NTSB/HAR-19/03 (Nov. 19, 2019); NHTSA Office of Defects Investigation Preliminary Evaluation PE21-020.

[3] National Center for Statistics and Analysis. (2021, May). Early estimate of motor vehicle traffic fatalities in 2020 (Crash Stats Brief Statistical Summary. Report No. DOT HS 813 115). National Highway Traffic Safety Administration.

[4] National Center for Statistics and Analysis. (2021, August). Traffic safety facts 2019: A compilation of motor vehicle crash data (Report No. DOT HS 813 141). National Highway Traffic Safety Administration.

[5] Traffic Safety Facts: Crash Stats; Early Estimates of Motor Vehicle Traffic Fatalities for the First half (January – June) of 2021, NHTSA, Oct. 2021, DOT HS 813 199.

[6] U.S. DOT, U.S. Transportation Secretary Pete Buttigieg Announces Comprehensive National Roadway Safety Strategy (Jan. 27, 2022).

[7] John Putnam, US DOT Deputy General Counsel, Guidance on the Treatment of the Economic Value of a Statistical Life (VSL) in U.S. Department of Transportation Analyses – 2021 Update.

[8] Economic costs include lost productivity, medical costs, legal and court costs, emergency service costs, insurance administration costs, congestion costs, property damage, and workplace losses.

[9] As of January 2021, when costs are adjusted for inflation only and population estimates are brought current. See: "The Economic and Societal Impact of Motor Vehicle Crashes, 2010," NHTSA (2015).

[10] Cost of Motor Vehicle Crashes to Employers 2019, Network of Employers for Traffic Safety, March 2021.

[11] Traffic Safety Facts: Crash Stats; Early Estimates of Motor Vehicle Traffic Fatalities and Fatality Rate by Sub-Categories in 2020, NHTSA, Jun. 2021, DOT HS 813 118.

[12] *Id*. and Traffic Safety Facts 2018: A Compilations of Motor Vehicle Crash Data, NHTSA, Nov. 2020, DOT HS 812 981. Note, the 45 percent figure represents the overall change in the number of fatalities in large truck involved crashes from 2009 to 2020. However, between 2015 and 2016 there was a change in data collection at U.S. DOT that could affect this calculation. From 2009 to 2015 the number of fatalities in truck involved crashes increased by 21 percent and between 2016 to 2020, it increased by 5 percent.
[13] Traffic Safety Facts: Research Note; Overview of Motor Vehicle Crashes in 2019, NHTSA, Dec. 2020, DOT HS 813 060.
[14] 2020 Pocket Guide to Large Truck and Bus Statistics, FMCSA, Oct. 2020, RRA-20-004.
[15] CPI Inflation Calculator, BLS, available at https://www.bls.gov/data/inflation_calculator.htm.
[16] U.S. Department of Labor, Bureau of Labor Statistics, National Census of Fatal Occupational Injuries in 2020, USDL-21-2145 (Dec. 16, 2021).
[17] National Center for Statistics and Analysis. (2021, August). Traffic safety facts 2019: A compilation of motor vehicle crash data (Report No. DOT HS 813 141). National Highway Traffic Safety Administration.
[18] Lives Saved by Vehicle Safety Technologies and Associated Federal Motor Vehicle Safety Standards, 1960 to 2012, DOT HS 812 069 (NHTSA, 2015); See also, NHTSA AV Policy, Executive Summary, p. 5 endnote 1.
[19] Pub. L. 102-240 (Dec. 18, 1991).
[20] Traffic Safety Facts 2018, A Compilation of Motor Vehicle Crash Data, DOT HS 812 981, NHTSA (Nov. 2020).
[21] Transportation Recall Enhancement, Accountability, and Documentation (TREAD) Act, Pub. L. 106-414 (Nov. 1, 2000).
[22] Anton's Law, Pub. L. 107-318 (Dec. 4, 2002).
[23] Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), Pub. L. 109-59 (Aug. 10, 2005).
[24] *Id.*
[25] *Id.*
[26] Moving Ahead for Progress in the 21st Century (MAP-21) Act, Pub. L. 112-141 (Jan. 3, 2012).
[27] Cameron Gulbransen Kids Transportation Safety Act of 2007, Pub. L. 110-189 (Feb. 28, 2008).
[28] Infrastructure Investment and Jobs Act, Pub. L. 117-58 (Nov. 15, 2021).
[29] *Id.*
[30] *Id.*
[31] *Id.*
[32] National Transportation Safety Board, 2016 Most Wanted List, accessed at ntsb.gov/safety/mwl/Documents/MWL2016_Brochure_web.pdf
[33] 85 FR 39976 (Jul. 2, 2020).
[34] NTSB Most Wanted List Archives, https://ntsb.gov/safety/mwl/Pages/mwl_archive.aspx.
[35] IIHS, Real world benefits of crash avoidance technologies, available at: https://www.iihs.org/media/259e5bbd-f859-42a7-bd54-3888f7a2d3ef/e9boUQ/Topics/ADVANCED%20DRIVER%20ASSISTANCE/IIHS-real-world-CA-benefits.pdf.
[36] IIHS, Study shows front crash prevention works for large trucks too, available at: https://www.iihs.org/news/detail/study-shows-front-crash-prevention-works-for-large-trucks-too
[37] National Traffic and Motor Vehicle Safety Act of 1966, Pub. L. 89-563 (Sep. 1966).
[38] Robert Ferris, Cars on American roads keep getting older, CNBC (Sep. 28, 2021).
[39] Note some ADAS may not be appropriate for certain CMV operations.
[40] Pub. L. 117-58 (Nov. 15, 2021).
[41] Docket: FMCSA-2014-0083, Comment ID: FMCSA-2014-0083-4459.
[42] Pub.L. 117–58 (2021). A list of all such provisions is attached as Appendix A.
[43] IIHS, Topics. Large Trucks, Underride.
[44] NTSB Safety Recommendations H-10-12, H-10-13, H-14-03, H-14-02, H-14-04.
[45] IIHS, Side guard on semitrailer prevents underride in 40 mph test (Aug. 29, 2017).
[46] Campbell Robertson and Amanda Holpuch, Pittsburgh Bridge Collapses Hours Before Biden Infrastructure Visit, N,Y, Times (Jan. 28, 2022).
[47] David Schaper, 10 Years After Bridge Collapse, America Is Still Crumbling, National Public Radio (Aug. 1, 2017).
[48] 2021 Infrastructure Report Card – Bridges, American Society of Civil Engineers (ASCE); 2021 Infrastructure Report Card – Roads, ASCE.
[49] 2021 Infrastructure Report Card – Bridges (ASCE).
[50] The list of crashes and failures involving vehicles equipped with autonomous driving systems identified by Advocates is attached as Appendix B.

[51] 86 FR 54287, 54288; 87 FR 4099 (Jan. 26, 2022.
[52] *Id.*
[53] *Id.*
[54] Jessica Wehrman, Highway safety nominee faces grilling over driverless vehicles, Roll Call (Dec. 16, 2021).
[55] Nominations Hearing, Before U.S. Senate Committee on Commerce, Science, and Transportation, 117 Cong (Dec. 16, 2021).
[56] IIHS, IIHS creates safeguard ratings for partial automation (Jan. 20, 2022).
[57] Keith Barry, Driver Monitoring Systems by Ford and GM Are Only Ones to Earn Points in CR's Tests, Consumer Reports (Jan. 20, 2022).
[58] IIHS, IIHS creates safeguard ratings for partial automation (Jan. 20, 2022).
[59] A summary of the AV Tenets is attached as Appendix C.
[60] Nilay Patel and Andrew J. Hawkins, Pete Buttigieg is Racing to Keep Up with Self Driving Cars. The Verge (Jan. 6, 2022).
[61] Evtimov, Ivan & Eykholt, Kevin & Fernandes, Earlence & Kohno, Tadayoshi & Li, Bo & Prakash, Atul & Rahmati, Amir & Song, Dawn. (2017). Robust Physical-World Attacks on Machine Learning Models.
[62] Self-Driving Coalition For Safe Streets, FAQs.
[63] U.S. DOT, Federal Automated Vehicles Policy (Sept. 2016); Automated Driving Systems: A Vision for Safety 2.0 (Sep. 12, 2017); Preparing for the Future of Transportation: Automated Vehicles 3.0 (Oct. 4, 2018); Ensuring American Leadership in Automated Vehicle Technologies: Automated Vehicles 4.0 (Jan. 8, 2020).
[64] Brookings Institution, Autonomous cars: Science, technology, and policy (Jul. 25, 2019).
[65] NHTSA, Safety Self-Assessments, available at: https://www.nhtsa.gov/automated-driving-systems/voluntary-safety-self-assessment.
[66] 85 FR 39975 (Jul. 2, 2020).
[67] Docket No.: NHTSA-2020-0070, Comment: NHTSA-2020-0070-0016 (Aug. 31, 2020).
[68] Members of Congress, Safety Advocates and Grieving Parents Call for Technology Solutions to End Hot Car Tragedies as Fatalities Continue, Jul. 28, 2020, available at https://conta.cc/30Sdt2w.
[69] General Motors News Release, "General Motors Announces Important New Technology to Help Save Children Trapped in Hot Cars," (April 26, 2001).
[70] United States Department of Labor, Bureau of Labor Statistics, Is the U.S. labor market for truck drivers broken? (Mar. 2019).
[71] American Trucking Associations, Fourth Quarter Truck Driver Turnover Rate Shows Muddled Picture (Mar. 12, 2021).
[72] Greg Rosalsky, Is There Really A Truck Driver Shortage?, National Public Radio (May 25, 2021).
[73] FMCSA's Motor Carrier Management Information System (MCMIS) data snapshot as of 12/31/2021. Available at: https://ai.fmcsa.dot.gov/SafetyProgram/RoadsideInspections.aspx
[74] U.S. DOT, Large Truck and Bus Crash Facts 2019, Table 5, Report FMCSA-RRA-20-055 (Oct. 2021).
[75] Singh, S. (2015, February). Critical reasons for crashes investigated in the National Motor Vehicle Crash Causation Survey. (Traffic Safety Facts Crash•Stats. Report No. DOT HS 812 115). Washington, DC: National Highway Traffic Safety Administration.
[76] *Id.*
[77] Hope Yen and Tom Krisher, NTSB chief to fed agency: Stop using misleading statistics, Associated Press (Jan. 18, 2022).
[78] KPMG, 2020 Autonomous Vehicles Readiness Index.
[79] Dentons, Global Guide to Autonomous Vehicles 2020.
[80] *Id.*
[81] *Id.*
[82] Kyodo, JiJi, Cabinet paves way for self-driving vehicles on Japan's roads next year with new rules, The Japan Times (Sep. 20, 2019).
[83] Dentons, Global Guide to Autonomous Vehicles 2020.
[84] Lawrence Ulrich, Driverless Still a Long Way From Humanless, N.Y. Times (Jun. 20, 2019); Level 5 possible but "way in the future", says VW-Ford AV boss, Motoring (Jun. 29, 2019).

Appendix A

ADVOCATES FOR HIGHWAY & AUTO SAFETY

Vehicle Safety Provisions in the Infrastructure Investment and Jobs Act (Senate Amendment to H.R. 3684)

November 2021

- **Crash Avoidance Technology**
  ***Steps Forward for Safety*:** Directs the U.S. Department of Transportation (DOT) to issue final rules on minimum performance standards and requirements for proven crash avoidance technologies including forward collision warning (FCW), automatic emergency braking (AEB), lane departure warning (LDW), and lane keeping assist (LKA) for all new passenger motor vehicles. Directs the U.S. DOT to issue a final rule within two years for AEB in new large trucks and requires the issuance of a Federal Motor Carrier Safety Regulation (FMCSR) to require drivers use AEB. Requires research two years after enactment on equipping medium sized commercial motor vehicles (CMVs) with the technology.
  Safety Stalled: No date certain for rulemaking and compliance for crash avoidance technology for passenger vehicles. No compliance date for AEB requirement on large trucks. Fails to ensure crash avoidance technology will respond to pedestrians, bicyclists, and other vulnerable road users. Omits Class 3 – 6 trucks from AEB requirement despite the fact that some trucks are already equipped with them.

- **Impaired Driving Prevention Technology**
  Steps Forward for Safety: Directs the U.S. DOT to issue a final rule within three years requiring passenger motor vehicles be equipped with impaired driving prevention technology, further provides for three years from issuance of the final rule for compliance and a potential three additional years at the discretion of the Secretary.
  Safety Stalled: Opens the door to potential delay in rulemaking by allowing a report to Congress if a final rule isn't issued within ten years of enactment. The systems must be set at .08 percent blood alcohol concentration (BAC), as opposed to state legal limits which may be lower.

- **Vehicular Heatstroke (Hot Cars) Prevention Technology**
  Steps Forward for Safety: Directs the U.S. DOT to issue a final rule within two years requiring all new passenger motor vehicles weighing less than 10,000 pounds to be equipped with a system to alert the operator to check rear-designated seating positions after the vehicle engine or motor is deactivated by the operator. Provides an additional two years for compliance.
  Safety Stalled: Fails to require hot cars prevention technology that *detects* the presence of unattended children who may have entered independently or been left intentionally or unintentionally. The alert system is limited only to the rear seat although children have died or been injured in the front seat area.

- **Distracted Driving**
  Steps Forward for Safety: Directs the U.S. DOT to conduct research on driver monitoring systems within three years and report to Congress. The Secretary then must determine if one or more rulemakings is required. Adds new grant opportunity for states that ban distracted viewing. Improves transparency in grant determination process.
  Safety Stalled: No date certain for rulemaking and compliance for distracted driving prevention systems.

- **Seat Back Standard**
  Steps Forward for Safety: Directs the U.S. DOT to issue an Advanced Notice of Proposed Rulemaking (ANPRM) on whether to improve the seat back safety standard within two years of enactment. If the Secretary decides to issue a final rule, requires compliance within two years of issuance of the rule.

Safety Stalled: The Secretary has complete discretion for action. If s/he determines an update is needed, only requires an ANPRM, not a final rule. Therefore, there is no actual requirement that the seat back standard be updated.

- **Headlamps**
  Steps Forward for Safety: Directs the U.S. DOT to issue a final rule updating the headlamp standard (Federal Motor Vehicle Safety Standard (FMVSS) 108) and permitting adaptive headlamps within two years.
  Safety Stalled: No compliance date for improvements to headlamps.

- **Hood and Bumper Standards**
  Steps Forward for Safety: Directs the U.S. DOT to issue a notice for review and comment as well as a report on potential updates to hood and bumper standards within two years of enactment.
  Safety Stalled: No date certain for rulemaking and compliance for hood and bumper updates.

- **Keyless Ignitions**
  Steps Forward for Safety: Directs the U.S. DOT to issue a final rule within two years to mandate an automatic shutoff for vehicles with keyless ignition and combustion engines within a period as determined by the Secretary which, absent good cause to delay implementation, takes effect one year after final rule. The U.S. DOT is further directed to conduct a study on vehicle rollaways.
  Safety Stalled: Does not adequately address risks associated with keyless ignitions by failing to require a rulemaking on rollaway.

- **U.S. New Car Assessment Program (NCAP)**
  Steps Forward for Safety: Directs the U.S. DOT to complete the update of NCAP that was initiated in 2015 as well as publish a notice for public comment on consumer information on advanced crash avoidance technologies and vulnerable road user safety within one year. Requires U.S. DOT to issue a "roadmap" every four years on plans to update U.S. NCAP to keep pace with vehicle technology, subject to public comment and annual stakeholder engagement.
  Safety Stalled: Fails to ensure U.S. NCAP is comprehensively updated and addresses the safety of vulnerable road users.

- **Consumer Protections**
  Steps Forward for Safety: Establishes a grant program for states to inform consumers of vehicle safety recalls within two years of enactment. Requires original equipment manufacturers (OEMs) to report to the National Highway Traffic Safety Administration (NHTSA) on recall completion rates as well as directs the Government Accountability Office (GAO) to conduct studies related to recalls within two years of enactment. Requires U.S. DOT to conduct a study within 18 months to evaluate Early Warning Reporting (EWR) data and identify any improvements to enhance safety and report to Congress describing results including any recommendations for regulatory or legislative action.
  Safety Stalled: Fails to include deadline for U.S. DOT action to update EWR data.

- **Underride Protection**
  Steps Forward for Safety: Directs the U.S. DOT to update the rear guard standard to meet the Insurance Institute for Highway Safety (IIHS) crash protocols and be subject to annual inspection, as well as research side underride guards. Establishes an advisory committee on underride protection.
  Safety Stalled: Does not require side and front underride guards.

- **Limousine Safety**
  Steps Forward for Safety: Requires limousines to be equipped with safety belts and be subject to standards for seat strength and integrity. Directs the U.S. DOT to conduct research on FMVSS for side impact protection, roof crush resistance, and air bag systems within four years of enactment, followed by

rulemaking within two years of completion of the research. Requires U.S. DOT to conduct research on evacuation, followed by rulemaking within two years of completion of the research. Requires consumer information on most recent inspection to be prominently disclosed including on the website of the operator.

- **School Bus Safety**
  Steps Forward for Safety: Directs the U.S. DOT to review laws, safety measures, and technologies relating to school buses.
  Safety Stalled: Does not require vital improvements to school bus safety including requirements for seat belts, automatic emergency braking, fire suppression, and to curb school bus driver fatigue.

- **Funding Provisions**
  Steps Forward for Safety: Includes several provisions to enhance public roadway safety such as an incentive grant for a Safe System approach to roadway design and building to minimize conflicts between road users, especially between vehicles and vulnerable road users, to prevent fatalities. Allows federal funding to be used for automated enforcement systems in work and school zones. Improves transparency in determinations for the highway safety grant program awards to states to help combat dangerous behaviors such as impaired and distracted driving.
  Safety Stalled: Other changes to highway safety grant program requirements for distracted driving may weaken incentivization for state action to upgrade their traffic safety law.

Steps Backward for Safety –

- **Teen Truck Drivers:** Permits teen and young drivers under age 21 to drive in interstate commerce through a three-year pilot apprentice program that permits 3,000 participants at a time – amounting to potentially more than 25,000 per year. Requires U.S. DOT to report to Congress on data collected during the pilot program and conduct a driver compensation study.
- **Hours of Service (HOS) for Truck Drivers:** Provides HOS exemption for livestock haulers within 150 air miles of the destination (current law already allows for such exemption within 150 air miles of the source). Requires U.S. DOT to analyze cost and effectiveness of electronic logging devices (ELDs) which have already been shown to reduce driver violations of HOS rules, as well as report on processes used by the Federal Motor Carrier Safety Administration (FMCSA) to review logs and allow carriers to challenge violations relating to an ELD.
- **Truck Size and Weight:** Permits overweight trucks, which disproportionately damage infrastructure and threaten public safety, to operate on certain roadways in Kentucky, North Carolina and Oklahoma. Allows these states to retain operational laws that exceed federal weight limits after these roads become part of Interstate System.

ADVOCATES FOR HIGHWAY & AUTO SAFETY

Appendix B

Crashes and Failures Involving Vehicles Equipped with Autonomous Driving Systems: Public Roads Serving as Proving Grounds and Endangering All Road Users

August 28, 2021, Orlando, FL, Tesla Model 3: A Tesla crashed into a parked police car and a Mercedes SUV. The patrol car's emergency lights were flashing, and the Tesla driver told police that "autopilot" was engaged at the time off the crash. The National Highway Traffic Safety Administration (NHTSA) is investigating the crash.

Photo Source: Florida Highway Patrol

May 15, 2021, Lake Stevens, WA, Tesla Model S: A Tesla ran into a Sheriff's patrol SUV that was parked on the side of a road with emergency lights flashing responding to previous crash. "Autopilot" was reportedly engaged at the time of the crash.

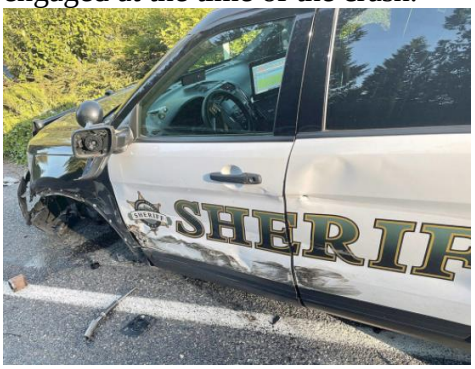


Photo Source: Snohomish County Sheriff's Office

May 5, 2021, Fontana CA, Tesla Model 3: A Tesla struck a previously overturned truck which was blocking two lanes on the highway. According to the California Highway Patrol, "Autopilot" was engaged at the time of the crash. The National Highway Traffic Safety Administration (NHTSA) is investigating the crash.

Photo Source: New York Daily News

April 17, 2021, The Woodlands, TX, Tesla Model S: A Tesla travelling at a "high rate of speed" around a curve went off the road about 100 feet and hit a tree. NHTSA and the National Transportation Safety Board (NTSB) are investigating the crash.

Photo Source: Reuters

March 17, 2021, Eaton County, MI, Tesla Model Y: A Tesla ran into a state patrol car parked on the side of the highway. The patrol car had emergency lights activated at the time. Michigan State Police said the driver was using "Autopilot" at the time of the crash. NHTSA is investigating.

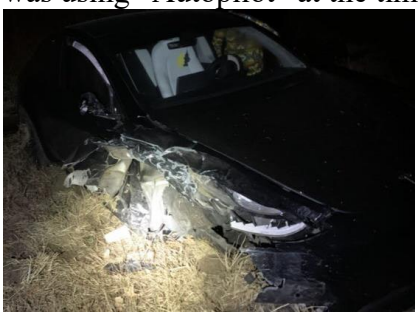


Photo Source: Michigan State Police

August 26, 2020, Zebulon, NC, Tesla Model S: A Tesla ran into a police cruiser parked on the side of the highway, causing the cruiser to collide with a state trooper's vehicle. According to media reports, police said the driver was watching a movie on his phone and that "Autopilot" was engaged when the crash happened.

Photo Source: WRAL-TV

December 29, 2019, Cloverdale, IN, Tesla Model 3: A Telsa collided with a firetruck killing the passenger in the Tesla. The use of "Autopilot" has not been determined. NHTSA is investigating.


Photo Source: Indiana State Police

December 29, 2019, Gardena, CA, Tesla Model S: A Tesla ran a red light and struck another vehicle killing the two occupants in the other vehicle. The use of "Autopilot" has not been determined. NHTSA is investigating.

Photo Source: Loudlabs

December 7, 2019, Norwalk, CT, Tesla Model 3: a Tesla slammed into a parked police cruiser and another vehicle. Media reports that the "Autopilot" was engaged at the time of the crash. NHTSA is investigating.


Photo Source: Connecticut State Police

March 1, 2019, Delray Beach, FL, Tesla Model 3: The driver was killed when his vehicle, operating on "Autopilot," crashed into the side of a truck tractor combination, traveling underneath the trailer. (NTSB Investigation HWY19FH008, brief completed)


Photo Source: NTSB

May 29, 2018, Laguna Beach, CA, Tesla Model S: A Tesla reportedly on "Autopilot" crashed into a parked Laguna Beach Police Department Vehicle. The driver suffered minor injuries.

Photo Source: LA Times

March 23, 2018, Mountain View, CA, Tesla Model X: While on "Autopilot", a Tesla struck a safety barrier, causing the death of the driver. (NTSB Investigation HWY18FH011, report completed)

Photo Source: Forbes

March 18, 2018, Tempe, AZ, Uber Self-Driving Test Vehicle: The Uber vehicle, which was operating on "self-driving mode," struck and killed a pedestrian walking a bicycle. (NTSB Investigation HWY18MH010, report completed)

Photo Source: NBC News

January 22, 2018, Culver City, CA, Tesla Model S: A Tesla, reportedly on "Autopilot," was traveling at 65mph when it crashed into the back of a parked firetruck that was responding to the scene of a separate crash. (NTSB Investigation HWY18FH004, brief issued)

Photo Source: Culver City Firefighters

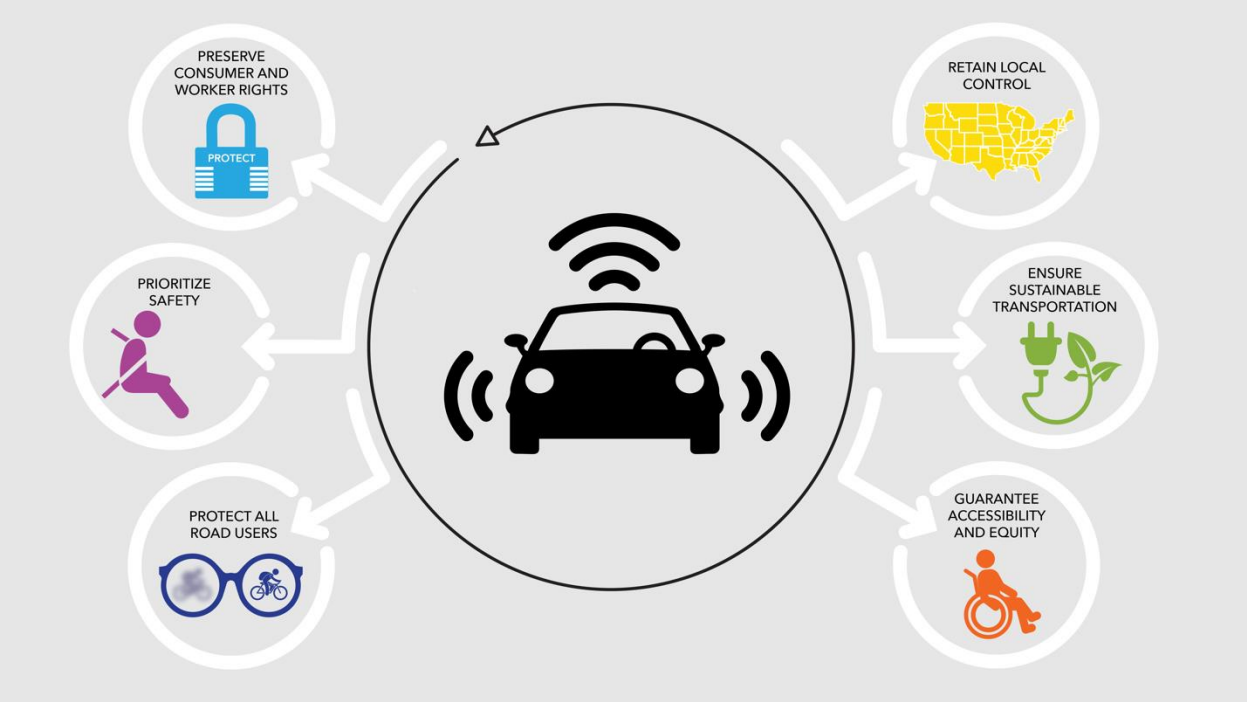
November 8, 2017, Las Vegas, NV, Driverless Shuttle Bus: A driverless shuttle was involved in a crash during its first day of service. There were no deaths or injuries. (NTSB Investigation HWY18FH001, brief issued)

Photo Source: Fox5 Vegas

May 7, 2016, Williston, FL, Tesla Model S: The driver was killed when his vehicle, operating on "Autopilot," crashed into the side of a truck tractor combination, traveling underneath the trailer. (NTSB Investigation HWY16FH018, report completed)

Photo Source: NTSB

Introduction to Autonomous Vehicle (AV) Tenets
By Advocates for Highway and Auto Safety
November 30, 2020



In 2019, more than 36,000 people were killed and millions more were injured in motor vehicle crashes. The National Highway Traffic Safety Administration (NHTSA) currently values each life lost in a crash at $9.6 million. Annually crashes impose a financial toll of over $800 billion in total costs to society and $242 billion in direct economic costs, equivalent to a "crash tax" of $784 on every American. Additionally, crashes cost employers $47.4 billion in direct crash-related expenses annually, based on 2013 data (Network of Employers for Traffic Safety (NETS)).

Many promises have been made about autonomous vehicles (AVs) bringing meaningful and lasting reductions in motor vehicle crashes and resulting deaths and injuries, traffic congestion and vehicle emissions. Additionally, claims have been made that AVs will expand mobility and accessibility, improve efficiency, and create more equitable transportation options and opportunities. However, these potentials remain far from a near-term certainty or reality. Without commonsense safeguards the possibilities are imperiled at best and could be doomed at worst. Additionally, the absence of protections could result in adverse effects including safety risks for all people and vehicles on and around the roads, job displacement, degradation of current mobility options, infrastructure and environmental problems, marginalization of certain users, and others. Requiring that AVs meet minimum standards and that operations are subject to adequate oversight throughout development and deployment will save lives as well as costs for both the consumer and the manufacturer.

Moreover, on the path to AVs, proven solutions are currently available that can prevent or mitigate the exorbitant death and injury toll now while laying the foundation for AVs in the future. Available vehicle technologies, also known as advanced driver assistance systems (ADAS), should be standard equipment with minimum performance standards. Research performed by the Insurance Institute for Highway Safety (IIHS) has found that these systems can help to prevent and lessen the severity of crashes. For example, IIHS has determined that automatic emergency braking (AEB) can decrease front-to-rear crashes with injuries by 56 percent. In addition, the National Transportation Safety Board (NTSB) has included increasing implementation of collision avoidance technologies in its Most Wanted Lists of Transportation Safety Improvements since 2016.

It is a transformational time in transportation history. Yet, Benjamin Franklin's infamous quote from 1736, "An ounce of prevention is worth a pound of cure," aptly applies. We urge our Nation's leaders to use this document as the "GPS," the way to "guarantee public safety," as AV development and deployment moves forward.

Summary of Tenets of Autonomous Vehicle (AV) Legislation[1]

Prioritizing Safety of All Road Users

Safety Rulemakings: All levels of automated vehicles [2] must be subject to comprehensive and strong federal standards ensuring they are safe and save lives. The rulemakings must address known and foreseeable safety issues, many of which have been identified by the National Transportation Safety Board (NTSB) and others, including:

- ***Revising Federal Motor Vehicle Safety Standards:*** Any actions by the National Highway Traffic Safety Administration (NHTSA, Agency) to revise or repeal existing Federal Motor Vehicle Safety Standards (FMVSS) must be through a public rulemaking. Any revision must meet the safety need provided by current standards.
- ***Collision Avoidance Systems:*** Certain advanced safety technologies, which may be foundational technologies for AVs, already have proven to be effective at preventing and mitigating crashes across all on-road modes of transportation and must be standard equipment with federal minimum performance requirements. These include automatic emergency braking with pedestrian and cyclist detection, lane departure warning, and blind spot warning, among others.
- ***"Vision Test" for AVs:*** AVs must be subject to a "vision test" to guarantee it will operate on all roads and weather conditions as well as properly detect and respond to all vehicles, people and objects in the operating environment.
- ***Human-Machine Interface (HMI) for Driver Engagement:*** AVs must provide adequate alerts to capture the attention of the human driver with sufficient time to respond and assume the dynamic driving task for any level of vehicle automation that may require human intervention.
- ***Cybersecurity Standard:*** Vehicles must be subject to cybersecurity requirements to prevent hacking and to ensure mitigation and remediation of cybersecurity events.
- ***Electronics and Software Safety Standard:*** Vehicles must be subject to minimum performance requirements for the vehicle electronics and software that power and operate vehicle safety and driving automation systems individually and as interdependent components.
- ***Operational Design Domain (ODD):*** The NHTSA must issue federal standards to ensure safeguards for driving automation systems to limit their operation to the ODD in which they are capable of functioning safely.
- ***Functional Safety Standard:*** Requires a manufacturer to ensure the design, development, verification and validation of safety-related electronics or software demonstrates to NHTSA that an AV will perform reliably and safely under the conditions the vehicle is designed to encounter.
- ***Safe Fallback:*** Every driving automation system must be able to detect a malfunction, degraded state, or operation outside of ODD and safely transition to a condition which reduces the risk of a crash or physical injury.
- ***Crash Procedures Standard:*** Requires manufacturers to have procedures in place for when an AV is involved in a crash to ensure the safety of all occupants of the AV, other road users and emergency responders.
- ***Standard for Over-the-Air (OTA) Updates:*** Requires consumers be given timely and appropriate information on the details of the OTA update and ensures any needed training or tutorials are provided.

Safety and Performance Data: With the increasing number of vehicles with different automated technologies being tested and some being sold to the public, standardized data elements, recording, and access to safety event data are necessary for the proper oversight and analysis of the performance of the driving automation systems. Safety and performance data should be made available to relevant stakeholders with appropriate privacy protections.

[1] These tenets are limited to vehicles with a gross vehicle weight rating (GVWR) of 10,000 pounds or less unless otherwise noted; however, it is imperative that automated delivery vehicles (including those used on sidewalks and other non-roadways) and commercial motor vehicles be subject to comprehensive regulations, including rules regarding the presence of a licensed, qualified driver behind the wheel.

[2] Partially automated vehicles (SAE International Level 2) and conditional / highly automated vehicles (SAE International Levels 3, 4, 5).

Manufacturer Submissions to NHTSA: Any submission to NHTSA by AV manufacturers or developers must be mandatory, publicly available and include thorough and adequate data and documentation. Additionally, NHTSA must be directed to review and evaluate all submissions to assess whether an approach to automated driving system (ADS) development and testing includes appropriate safeguards for operation on public roads.

Proper Oversight of Testing: AV testing is already underway in many localities. Fundamental and commonsense safeguards must be instituted for testing on public roads including the establishment of independent institutional review boards (IRBs) to certify the safety of the protocols and procedures for testing of AVs on public roads.

Additional Resources and Enforcement Authorities for NHTSA: Ensuring NHTSA has adequate resources, funds, staff, and enforcement authority is essential for the Agency to successfully carry out its statutory mission and address the multiple challenges presented by the testing and deployment of self-driving technologies.

Guaranteeing Accessibility for All

Access for Individuals with Disabilities and Older Adults: Autonomous driving technology has the potential to increase access and mobility for everyone including older adults and individuals with disabilities, including those with sensory, cognitive, and physical disabilities, wheelchair users, and people with neurological conditions, who have varying needs as well as traditionally underserved communities. This goal must be realized with appropriate federal action.

Access for Underbanked Populations: Access to on-demand transport services is often predicated on the ability to make digital payments. AV-based transport services must consider a variety of ways in which payment for service can be made to ensure that this technology supports equitable access and the inclusion of all.

Equity: As new modes of transportation continue to grow and evolve, investment and development must include a process where all people can safely participate.

Accessibility, Passenger Safety, and Transportation Services: There must be clear plans to ensure the safe transportation for all people, in particular for those who currently require assistance to do so or are part of marginalized communities, in the implementation of these transportation services.

Preserving Consumer and Worker Rights

Consumer Information: Consumer information regarding AVs should be available at the point of sale, in the owner's manual, and in any OTA updates. The vehicle identification number (VIN) should be updated to reflect whether certain features were built into the vehicle, either as standard or optional equipment. NHTSA must establish a website accessible by VIN with basic safety information about the AV level, safety exemptions, and limitations and capabilities of the AV.

Privacy: All manufacturers of passenger motor vehicles, including AVs, should be required to comply with robust data privacy safeguards and policies. The ability of NHTSA, the NTSB, and local law enforcement to access critical safety performance data, while preserving the integrity of personal, private or identifying data, in a timely manner for research, crash investigation and other governmental purposes must be preserved.

Workforce Protections: Absent strong leadership, AV technology risks worsening severe inequalities already inherent in our society, predominantly for blue collar workers. Existing and foreseeable issues which stand to be greatly exacerbated by this technology must be addressed before this technology is broadly deployed on our roads. Similarly, unforeseeable issues throughout deployment will need to be resolved with input from stakeholders.

Whistleblower Protections: Employees or contractors who want to report safety defects to NHTSA should not be prevented from doing so as the result of a non-disclosure agreement (NDA).

Consumer and Worker Rights[3]**:** The well-established rights of consumers to seek accountability in a court of law for injuries suffered as a result of AVs must be preserved. Moreover, exploitative independent contractor relationships that shield AV companies from liability and deny workers basic workplace rights should be explicitly prevented.

Ensuring Local Control and Sustainable Transportation

Local, State and Federal Regulatory Roles: In keeping with existing law and practice, the federal government should prescribe regulations for the performance of these vehicles, leaving regulation of the operation of these vehicles to the states.

In-Depth Study of AV Impacts on Transportation Systems and Environment: DOT must undertake a comprehensive study to inform policymakers and the public about how these vehicles will impact our existing transportation systems and ensure effective mitigation of problems identified.

NOTE: **The AV Tenets outlined in this document do not constitute the entirety of each supporting organization's policy priorities related to AVs.**

[3] Advocates for Highway and Auto Safety does not take a position on this issue.