STATEMENT OF CATHERINE CHASE, PRESIDENT
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ON

"INNOVATION IN SURFACE TRANSPORTATION"

SUBMITTED TO THE

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Introduction

Advocates for Highway and Auto Safety (Advocates) is a unique coalition of public health, safety, 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 works to prevent crashes, deaths and injuries through the advancement of safer vehicles, safer drivers and passengers, and safer roads and infrastructure.

Motor Vehicle Deaths Remain Unacceptably High

According to the federal government, each year motor vehicle crashes kill tens of thousands of people and injure millions more at a cost to society of over $800 billion.[1] According to the latest statistics from the National Highway Traffic Safety Administration (NHTSA), 37,461 people were killed on our nation's roads in 2016. This is an increase of over five percent from 2015,[2] and it follows a seven percent increase from 2014 to 2015.[3] Preliminary data from 2017 and the early months of 2018 unfortunately do not indicate meaningful declines in crash fatalities.[4]

Advocates Consistently Supports Innovation and Promotes Proven Technology to Save Lives and Prevent Injuries

Advocates has always enthusiastically championed innovative vehicle safety technology and for good reason; it is one of the most effective strategies for preventing deaths and injuries. NHTSA has estimated that since 1960, over 600,000 lives have been saved by motor vehicle safety technologies.[5] In 1991, Advocates led the coalition that supported bipartisan legislation that included airbag technology in the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991.[6] As a result, by 1997, every new car sold in the United States was equipped with a front seat airbag and the lives saved have been significant. Over the last decade airbags saved approximately 2,500 lives annually,[7] and have saved an estimated 47,625 lives since 1987, according to NHTSA.[8]

Advocates continued to build on this success by supporting additional lifesaving technologies as standard equipment in all vehicles in other legislation and regulatory proposals. These efforts include: tire pressure monitoring systems;[9] rear outboard 3-point seat belts;[10] electronic stability control;[11] rear seat belt reminder systems;[12] rearview cameras;[13] brake transmission interlocks;[14] seat belts on motorcoaches;[15] and, electronic logging devices for commercial motor vehicles (CMVs).[16] These safety advances have prevented countless crashes and saved hundreds of thousands of lives, and many have been accomplished because of bipartisan leadership of members of Congress.

Available and Inventive Safety Advancements Should be Deployed Now to Reduce Crashes

Crash Avoidance Systems and Advanced Driver Assistance Systems

Available crash avoidance systems, such as automatic emergency braking (AEB), are foundational to the development of autonomous vehicles (AVs) and should be made standard equipment on all new vehicles.[17] This system uses on-board sensors such as radar, cameras or lasers to detect an imminent crash, warns the driver and applies the brakes or increases the braking effort if the driver does not take sufficient action. Research performed by the Insurance Institute for Highway Safety (IIHS) has revealed that AEB decreases front-to-rear crashes that cause injuries by 56%.[18] Similarly, rear automatic braking can reduce backing crashes by 62%.[19] More advanced systems that would also be able to prevent or mitigate pedestrian and bicyclist collisions should also be considered. The already impressive safety benefits of AEB will be increased by implementing a federal performance standard and requiring that all new vehicles be equipped with this technology.

Additionally, advanced driver assistance systems (ADAS) such as lane departure warning (LDW) and blind spot detection (BSD) should also be fully implemented. IIHS research shows that LDW reduces single-vehicle, sideswipe and head-on crashes by more than 10% and injury crashes of the same types by more than 20%.[20] BSD reduced lane-change crashes with injuries by nearly a quarter and lane-change crashes by 14%.[21] On the road to fully autonomous vehicles, ADAS systems are the building blocks and should be included as standard equipment in all new vehicles.

Connected Vehicle Technology

Connected vehicle technologies allow a vehicle to send and receive communications with other vehicles (vehicle-to-vehicle (V2V)) and the infrastructure (vehicle-to-infrastructure (V2I)). These messages can relay information ranging from the relative location and direction of motion of other vehicles to warning messages that traffic lights are about to change or weather conditions are soon to be encountered. These systems will likely help fill in gaps in the performance of AVs. For instance, V2V communication can provide safety applications for ADAS such as Left Turn Assist (LTA) and Forward Collision Warning (FCW). LTA warns drivers to the presence of oncoming, opposite-direction traffic when attempting a left turn. FCW warns drivers of stopped, slowing or slower vehicles ahead. In a 2017 Notice of Proposed Rulemaking to require V2V technology, NHTSA noted that "[b]ecause of V2V's ability to provide vehicles with information beyond a vehicle's range of perception, V2V is the only source of information that supports applications like Intersection Movement Assist (IMA) and Left Turn Assist (LTA). These applications have the unique ability to address intersection crashes, which are among the most deadly crashes that drivers currently face in the U.S."[22] Advocates filed comments in support of requiring V2V because of the technology's ability to

help prevent serious crashes.[23] However, despite the identified safety benefits of V2V technology, this rule is languishing at the U.S. Department of Transportation (DOT).

Additional Safety Technologies

It is generally predicted that highly autonomous vehicles, Society of Automotive Engineers (SAE) Level 4 and 5, will not be available for the next 10-20 years.[24] We should not accept or be complacent about the fact that absent a change in current circumstances, more than 500,000 people will be killed and more than 36 million more will be injured in crashes over the next 15 years. The following are some available and emerging technologies that hold promise for curbing preventable deaths and injuries.

- ***Headlights:*** Approximately half of traffic fatalities occur in the dark or at dawn or dusk, and the proportion of pedestrians killed in low light conditions is even greater.[25] According to IIHS, there are few vehicles equipped with adequate headlights. Properly aimed, adaptive and high-beam assist headlights all may be effective at improving nighttime visibility.[26] Adequate illumination provides drivers extra time to see road conditions, including pedestrians, bicyclists and wheelchair users, and to react to avoid a crash or lessen its severity. This is especially critical as more than 70% of pedestrians are killed at a non-intersection.[27]
- ***Rear Seat Belt Reminders:*** The majority of passengers in the rear seats of vehicles are children and teens, and studies have shown that seat belt usage by teens is among one of the lowest segments of society.[28] Congress required NHTSA to issue a final rule requiring rear seat belt reminders in all new motor vehicles by October 2015 as part of the Moving Ahead for Progress in the 21st Century (MAP-21) Act.[29] NHTSA has failed to initiate the rulemaking. As transportation network companies become even more

prevalent and AVs are deployed, passengers may more frequently ride in rear seats and it is crucial that they be properly restrained.[30]

- ***Smart Roads and Intersections:*** A number of localities and states have been utilizing systems to make roads and intersections "smarter" with the goal of reducing congestion and improving safety. For example, in Colorado, it has been reported that the state is testing "smart roads" that are equipped with sensors that can monitor wear and tear, inform drivers to traffic and alert first responders when a crash occurs.[31] As 40% of crashes happen at intersections,[32] advances such as adaptive traffic signals that can improve flow of traffic and interactions with other road users like bicyclists and pedestrians may offer significant potential benefits.[33] Moreover, according to IIHS more than 800 people died in crashes involving red light running in 2016, an increase of 17% since 2012.[34] IIHS research has demonstrated that red light cameras prevent crashes. A 2001 IIHS study found that the average annual rate of fatal red light running crashes decreased by 35% in large cities that implemented a camera enforcement program.[35] Conversely, in states that ended automated enforcement, IIHS found that the fatal red-light-running crash rate was 30% higher than had the cameras remained active.[36] The performance of such systems will likely be further improved with the deployment of V2V, V2I and V2X (vehicle-to-everything).

The Emerging Technology of Autonomous Vehicles Requires Sensible Safeguards

Advocates believes that AVs have the potential to make significant and lasting reductions in the number of deaths and injuries that occur each year on our Nation's roads. However, deploying AVs before they can be safely operated on public roads and without commonsense government

oversight and industry accountability is not only reckless and ill-advised, but it will also substantially reduce public confidence in this new technology, which is currently weak.

Experts and Industry Agree that the Widespread Deployment of Autonomous Vehicles is Decades Away

Legislation including the House-passed SELF DRIVE Act (H.R. 3388) and the pending Senate AV START Act (S. 1885) is being rushed through Congress to facilitate the large-scale sale of experimental AV technology.[37] The speed at which this legislation is being advanced is not aligned with the reality that AVs are a long way from being ready for prime time.

In fact, a number of auto industry executives have publicly stated that fully autonomous vehicles are still likely decades away. For example, Ford Motor Co. CEO Bill Ford, Jr. commented, "There's been a lot of over-promising and I think a lot of misinformation that's been out there. It's really important that we get it right, rather than get it quickly."[38] Toyota Research Institute CEO Gill Pratt stated, "It's a mistake to say that the finish line is coming up very soon. Things are changing rapidly, but this will be a long journey."[39] And, Nissan's Senior Vice President of Connected Vehicles and Mobility Services Ogi Redzic remarked, "Say a 2021 target is the example. What they may be saying is in a little, geofenced area with certain speed and conditions. If you ask generic statements, like 'when will all cars be driverless?', well of course we are talking about the very distant future."[40] The primacy of the technology was also underscored by a recent report by IIHS.[41] The report stated, a "production autonomous vehicle that can go anywhere, anytime isn't available at your local car dealer and won't be for quite some time. We aren't there yet."[42]

The Public is Deeply Skeptical about the Safety of Autonomous Vehicles

Numerous public opinion polls show strong public skepticism and reticence about AVs.[43] Those doubts are warranted based on the recent crashes as well as the past conduct of some automakers. Over the last few years, certain automakers have hidden from the American public and regulators safety defects which have led to numerous unacceptable and unnecessary deaths and injuries and the recall of tens of millions of vehicles.[44] Consumer acceptance of AV technology is integral to its success and to fully realizing the lifesaving potential of AVs. Right now, families know that when they go into auto showrooms to buy a new car, the federal government has protections in place to ensure their safety. Similar oversight and regulation are needed for AVs to both assure and safeguard consumers, especially when considering the recent auto industry history of defects and cover-ups.[45]

To provide some examples of the numerous recent surveys:

- A recent Allianz Global Assistance survey found that 57% of Americans are not very or not at all interested in utilizing self-driving or autonomous vehicles - up from 47% in 2017. When asked why they had a lack of interest, 71% of respondents cited safety concerns - up from 65% in 2017.[46]
- In July of 2018, Advocates commissioned an independent public opinion poll[47] that showed intense apprehension regarding the widespread deployment of AVs with 69% expressing concern about safety; this figure was up from 64% when a similar question was asked in January 2018.[48]
- In a May 2018 poll commissioned by the American Automobile Association (AAA), 73% of American drivers said they would be too afraid to ride in a fully self-driving vehicle, up from 63% in late 2017.[49]

- A Reuters/Ipsos poll found that 67% of Americans were uncomfortable with the idea of riding in self-driving cars.[50]
- A May 2018 Public Policy Polling/Consumer Watchdog poll revealed that 80% of respondents agreed that federal and state governments should regulate driverless vehicles for the safety of riders, pedestrians and other drivers.[51]

Clearly, the public needs assurances that they will be safe in and around AVs, yet the legislation falls short of establishing safeguards to achieve confidence.

The Safe Operation of Autonomous Vehicle Systems Has Yet to be Proved

The artificial urgency to deploy immature AVs is disconnected from public opinion as well as the reality that serious and fatal crashes have revealed significant flaws in this still developing technology. On May 7, 2016, in Williston, Florida, a Tesla Model S on "Autopilot" struck and passed beneath a semitrailer killing the driver.[52] On January 22, 2018, in Culver City, California, another Tesla Model S operating on "Autopilot" collided with a parked fire truck that was responding to the scene of a separate crash.[53] Remarkably, neither the Tesla driver nor any first responders were injured.[54] On March 18, 2018, in Tempe, Arizona, an Uber test vehicle operating on self-driving mode struck and killed a pedestrian walking a bicycle.[55] Then, just a few days later on March 23, 2018, in Mountain View, California, a Tesla Model X operating on "Autopilot" collided with a safety barrier resulting in the death of the driver.[56] According to the National Transportation Safety Board (NTSB) preliminary report on the crash, the vehicle was being operated under "Autopilot", had moved out of the lane of travel on its own and accelerated to 70 miles-per-hour (MPH) before colliding with the barrier.[57] The collision and subsequent intense fire closed the freeway for at least five hours.[58] On May 29, 2018, a Tesla Model S

operating on "Autopilot" struck a parked police vehicle in Laguna Beach, California.[59] Late last month on August 25, 2018, in San Jose, California, a Tesla Model S collided with a fire truck that was stopped in the far right lane with its emergency lights activated. The NTSB has investigated or is investigating all of these crashes except the last two.[60] Several of these crashes demonstrate that you do not have to purchase or even chose to ride in an AV to be put at risk.

In addition to the tragic crashes that have already happened involving autonomous systems, data accumulated from the limited miles traveled also paints an alarming picture. In 2016, the latest year for which final data is available, on average a person was killed in a traffic collision every 84.7 million miles traveled on U.S. roads.[61] Before the fatal crash in Arizona, Uber had reportedly logged two million autonomous miles as of the end of 2017 and was predicted to accrue another one million miles over the next 100 days.[62] Based on a simple evaluation of this data, the autonomous Uber had one fatality in three million miles; that is a fatality rate 28 times that of human drivers. This analysis highlights just how little proof there is that these systems are safe. While it must be stated that the Uber crash is a single data point and may not be necessarily indicative of future performance statistically, if we are going to ignore this data point, then AV manufacturers must likewise stop touting the millions of miles their AVs have driven as evidence of their safety, as they are currently doing in voluntary safety self-assessments filed with NHTSA.[63] Moreover, these numbers pale in comparison to the more than three *trillion* miles traveled by human drivers on U.S. roads each year.[64] The fact is that the industry has yet to prove the safety of these systems and has yet to even agree upon a metric or method for comparing the safety of these systems, yet they are pushing to allow these vehicles into showrooms and onto the roads.

Similar misdirection about safety performance data has been used in response to recent crashes involving AVs. After the 2016 fatal Tesla crash in Florida, the NHTSA Office of Defects and Investigation (ODI) issued a report which included an analysis of data supplied by Tesla that showed "that the Tesla vehicles crash rate dropped by almost 40 percent after Autosteer [a feature of the Autopilot system] installation."[65] However, included in the ODI report was a key footnote that the crash rates reported were "for all miles travelled before and after Autopilot installation and are not limited to *actual Autopilot use*" (emphasis added).[66] Despite this clear statement by NHTSA, Tesla has mischaracterized the ODI analysis in response to subsequent fatal crashes involving vehicles operating under the "Autopilot" system.[67] NHTSA has since clarified again that the effectiveness of the "Autopilot" system was not evaluated in its prior investigation, refuting the claims by Tesla.[68] Moreover, Tesla was removed as a party to the NTSB investigation of the second fatal crash involving one of its vehicles shortly after a March blog post once again made this same claim.[69]

These types of details matter when it comes to AVs, particularly when evaluating claims that are made to support their introduction. Some members of the industry assert that waiting for AV technology to be perfect would be "the enemy of the good."[70] In some cases, they point to a report of the same title by the Rand Corporation (RAND) to bolster this argument.[71] In fact, the RAND report concluded that allowing the deployment of AVs, which have a safety performance that is just 10 percent better than that of the average human driver, would save more lives than waiting for a perfectly safe AV.[72] However, the underpinning of this statement, which is being widely missed in the use of this report, is that these vehicles are in fact demonstrably better, even in some minute amount, than human drivers -- this is a fact which has yet to be proved. Again, the industry and regulators have not even agreed upon the proper metrics for evaluating the

safety performance of an AV, let alone requirements for operation which would assure that these vehicles are ten percent, one percent, or even a tenth of a percent better than the average human driver.

Minimum Performance Standards Have Both Immediate and Long Term Benefits for Nascent Safety Technologies

Advocates has always supported the introduction of safety technologies once its benefits have been identified and verified. Often additional advantages arise out of the widespread implementation of the base technology. For example, Advocates evaluated an abundance of research and data demonstrating that installing a rearview camera in passenger vehicles would help to prevent backover crashes and resultant deaths and injuries, often to young children and disabled persons.[73] Advocates, together with others in the safety community especially KidsAndCars.org and the remarkable families of backover victims, then fought for a decade in total to obtain a rearview camera requirement for all new vehicles, which took effect on May 1, 2018. The IIHS conducted research, published in their November 17, 2016 *Status Report*, demonstrating additional benefits of rearview cameras such as reducing property damage crashes during backing and assistance with backing maneuvers such as parking.[74] The report noted that drivers 70 and older gained the biggest benefit from the technology as their backing crash rate fell by 40 percent.[75] Furthermore, if a video sensor stream was required, including additional driver assistance technologies such automatic rear braking, parking guidance and automated parking assistance, even more advantages could be realized.

Similarly, Advocates supported equipping vehicles with anti-lock braking systems (ABS), which helps a driver to maintain control of the vehicle when braking on slippery surfaces. ABS has also resulted in wide ranging benefits. In fact, ABS is the base technology for electronic stability

control (ESC) which helps to prevent rollover and loss of control crashes and is attributed to having saved more than 7,000 lives since 2011.[76] The applications which are in ABS and ESC are also an underlying technology for AVs. A significant component of both of these safety successes is a federal standard that ensures these technologies have a specific level of performance so that consumers can have confidence in the technology as well as familiarity with a new feature of their vehicle. Federal standards also pave the way to build public acceptance and use of these technologies which magnifies the safety benefits. Effective government oversight and performance standards are vital to the success of new safety technologies placed into motor vehicles.

Moreover, examples of the success of effective standards and oversight of automated systems fly over our heads every single day. According to the U.S. Bureau of Transportation Statistics, 741 million passengers traveled on domestic flights in 2017.[77] The tragic April 2018 death of a Southwest Airlines passenger was the first U.S. commercial airline fatality since 2009.[78] Over that same span of time (2010-2017), nearly 5.4 billion passengers travelled safely through our skies. The Federal Aviation Administration (FAA) estimates that airline pilots use automated systems 90 percent of the time while flying.[79] Meanwhile, on our roads from 2010 to 2017, crashes claimed the lives of approximately 275,000 road users.[80] The federal government, particularly the U.S. DOT, has experience in developing standards and implementing effective oversight of autonomous systems in transportation. While adaptation for governing AVs on roads will be required, this is not an entirely new concept. The U.S. DOT would do well to coordinate with other departments and its own agencies, and make the best use of its past research, current regulations, and the latest technologies to set standards ensuring the safe introduction of AVs and their interoperability in all fifty states.

Proper Government Oversight is Needed for the Safe Deployment of Autonomous Vehicles

Over fifty years ago, Congress passed the National Traffic and Motor Vehicle Safety Act of 1966 because of concerns about the death and injury toll on our highways.[81] The law required the federal government to establish minimum vehicle safety performance standards to protect the public against "unreasonable risk of accidents occurring as a result of the design, construction or performance of motor vehicles."[82] While motor vehicles have changed dramatically since that time and will continue to do so in the future, the underlying premise of this crucial law and NHTSA's safety mission have not.

Unfortunately, NHTSA has chosen to issue only "voluntary guidelines" for the development of AVs.[83] Voluntary guidelines are not enforceable because they are not legally binding, and, therefore, are inadequate to ensure safety and protect the public. Manufacturers may unilaterally choose to deviate from the guidelines or ignore them entirely at any time and for any reason including internal corporate priorities such as cost or marketing considerations.

Congressional Legislation on AVs Fails to Ensure Public Safety

Compounding NHTSA's inaction are the flawed House-passed SELF DRIVE Act and Senate-pending AV START Act – legislation which falls well short of the oversight and accountability necessary to ensure public safety. The legislation unnecessarily takes aim at the current federal regulatory scheme which has provided protection to those traveling on America's roads for decades.

Furthermore, for Congress to fully consider the public safety implications associated with the mass deployment of AVs, a final bill should not be enacted until the ongoing multiple investigations by the NTSB of the serious and fatal crashes involving vehicles equipped with

autonomous systems are completed. Our Nation's foremost investigatory body has highly regarded expertise and will issue recommendations that should help guide Congress as it sets our Nation's first AV policy which will likely set the stage for years.

We urge Congress to adopt the following reasonable improvements to the AV legislation, which will ensure public safety and industry accountability, while still allowing for the development and deployment of AVs:

- ***Reduce the Size and Scope of Exemptions:*** Both the House and Senate bills will allow potentially millions of vehicles to be deployed into the public domain that are exempt from existing critical Federal Motor Vehicle Safety Standards (FMVSS). Providing broad statutory exemptions from the FMVSS for AVs is both unnecessary and unwise. There is already a statutory process in place for manufacturers to seek an exemption from the FMVSS. Moreover, Section 24404 of the Fixing America's Surface Transportation (FAST) Act[84] permits auto manufacturers to test or evaluate an unlimited number of vehicles exempt from one or more of the FMVSS.[85] Additionally, the exemption provision in current law, 49 USC Section 30113(a), provides that manufacturers may receive an exemption from compliance with the FMVSS for the sale of 2,500 vehicles to be sold in the United States in any 12-month period. No evidence has been presented to show that the development and deployment of AVs requires wholesale exemptions for an untold number of AVs from federal safety standards that are essential to protecting public safety.
- ***Prohibit Crashworthiness and Occupant Protection Exemptions:*** Exemptions from crashworthiness or occupant protection standards which protect the vehicle's passengers must be prohibited. Such exemptions can diminish the level of occupant protection that

has been established through years of research under the existing regulations.[86] Prohibiting such exemptions will in no way inhibit the development of AV technology but will ensure that passengers of AVs are properly protected in a crash. The House bill only temporarily limits these types of exemptions and the Senate bill does not at all prohibit them.

- ***Maintain Current Law Restricting Manufacturers Ability to Turn Vehicle Systems Off:*** Federal law prohibits manufacturers from rendering safety systems, such as the steering wheel and brake pedals, inoperable. A provision in the Senate bill that would allow automakers to turn off safety systems while the AV is being driven by the computer could unnecessarily dilute safety at the discretion of the manufacturer and sets a precedent of Congress allowing manufacturers to unilaterally circumvent many of the existing safety standards.
- ***Require Sufficient Documentation in NHTSA Submission:*** Both bills require manufacturers of AVs and AV technology to file a submission with NHTSA that details the development of the technology and its expected performance in real world conditions. While Advocates supports the mandatory submission of such information, in the absence of a legislative directive that sufficient documentation and data be included, manufacturers are permitted to continue submitting slick marketing brochures such as those already released by four manufacturers.[87] Moreover, these submissions must be made available to the public as well as provide detailed information so that consumers, researchers and NHTSA are able to accurately evaluate the safety of the technology.
- ***Provide for Adequate Consumer Information:*** At a minimum, every manufacturer should be required to provide consumers with information about the capabilities, limitations and exemptions from safety standards for all vehicles sold in the U.S. at the

time of sale. This information should be made available to consumers from day one, even before NHTSA issues a rule. NHTSA should also be required to establish a public website with basic safety information about AVs for consumers and for use in safety research. This online database would be similar to the safercar.gov website that NHTSA maintains to inform the public about safety recalls applicable to their vehicle. This would enable consumers to enter their VIN to obtain relevant information about their AV such as the level of automation, any exemptions granted by NHTSA from the FMVSS, and the operational design domain which includes limitations and capabilities of each autonomous driving system with which a vehicle is equipped. Such a database will be an important tool for consumers who purchase AVs, whether first-hand or as a pre-owned vehicle, and will also allow NHTSA and other research groups to perform independent evaluation of the comparative safety performance of AV systems.

- ***Compel AVs to Capture Necessary Crash Data:*** The NTSB in their investigation of the fatal Tesla crash in Florida noted that event data recorders (EDRs) are not required nor would current standards mandate the capturing of data needed to evaluate the performance of AVs. It is currently not required that this critical safety data generated by AVs will be recorded, shared or even provided to NHTSA and the NTSB for crash investigations. The legislation should require all crashes involving AVs be reported immediately to NHTSA by manufacturers.
- ***Direct Final Rules for Minimum Performance Standards:***
    - ***Cybersecurity:*** A failure to adequately secure AV systems and to protect against cyber-attacks could endanger AV passengers, non-AV motorists, pedestrians, bicyclists and other vulnerable roadway users. It could also clog roads, stop the movement of goods and hinder the responses of emergency vehicles. The real

possibility of a malevolent computer hack impacting hundreds or thousands of AVs, perhaps whole model runs, makes strong cybersecurity protections a crucial element of AV design. Yet, the House and Senate legislation merely requires manufacturers to have a cybersecurity plan in place with no minimum standards of protection or effectiveness. Instead, NHTSA should be required to establish a minimum performance standard to ensure cybersecurity protections are required for AVs of all levels. Considering the recent record of high-profile cyber-attacks,[88] allowing manufacturers merely to have a cybersecurity plan is grossly inadequate to ensure that AVs are protected against potentially catastrophic cyber-attacks and breaches.[89]

- ***Driver Distraction:*** In AVs that require a human to take control from the AV system (Levels 2 and 3), the automated driving system must keep the driver engaged in the driving task. Research demonstrates that even for a driver who is alert and performing the dynamic driving task, there is a delay in reaction time between observing a safety problem and taking appropriate action.[90] For a driver who is disengaged from the driving task during autonomous operation of a vehicle, that delay will be longer because the driver must first be alerted to re-engage, understand the situation, and then take control of the vehicle before taking appropriate action. The failure of the automated driving system to keep the driver engaged in the driving task during the trip was identified as a problem by the NTSB Florida Tesla crash investigation. The NTSB found that the Tesla "Autopilot" facilitated the driver's inattention and overreliance on the system, which ultimately contributed to his death.[91] The "Autopilot" was active for 37 minutes of the 41 minute trip and the system detected hands on the steering wheel

only 7 times for a total of 25 seconds.[92] The NTSB also found that these problems are widespread across manufacturers with similar systems.[93] The House and Senate legislation fails to address this serious safety problem, yet technology to discern distraction and provide alerts is already available. NHTSA should be directed to establish a minimum performance standard to ensure driver engagement throughout the trip.

- ***Electronics Systems:*** Motor vehicles and motor vehicle equipment are powered and run by highly complex electronic systems and will become even more so with the future deployment of autonomous driving systems. Interference from non-safety systems can affect the electronics that power safety systems if they share the same wiring and circuits. For example, in one reported instance a vehicle model lost power to its dashboard lights when an MP3 player was plugged in and used.[94] Similar to FAA requirements to protect the electronics and their functions in aircraft under any foreseeable operating condition,[95] NHTSA should require minimum performance standards for the electronics in all motor vehicles, particularly AVs. However, the House and Senate bills fail to direct NHTSA to develop and issue performance standards for the electronics systems of modern motor vehicles.
- ***AV "Vision Test":*** In order for an AV to properly interact with its surrounding environment, it must not only detect other vehicles and roadway infrastructure but also other participants using our Nation's transportation systems including pedestrians, bicyclists, wheelchair users, construction workers in work zones, first responders providing assistance after crashes, and law enforcement officers directing traffic. A failure to properly detect and react to any of these could have

tragic results. AVs and automated driving systems must be subject to objective testing to ensure that they properly detect other road users, as well as pavement markings and infrastructure, can correctly identify the type of object that has been detected, and can then also respond properly and safely. Therefore, the legislation should direct the Secretary of Transportation to conduct a rulemaking proceeding to require automated driving systems, including SAE Level 2 automated driving systems, to meet a minimum performance standard for detecting and reacting to the AV's driving environment.

- ***Safety and Accessibility for Underserved Communities, Especially People with Disabilities:*** According to the most recent U.S. Census, there are 56.7 million people with disabilities in the United States.[96] In a given year, about 3.6 million Americans miss at least one medical trip for lack of transportation. They are disproportionately female, older and of limited means.[97] Therefore, the long-term promise of AVs to improve access to mobility is significant. However, there is no requirement in either bill that AVs will be safe and accessible to all members of the disability community who have varying needs. In addition, there are a number of lawsuits pending against ridesharing companies in major metropolitan areas such as New York City, San Francisco and Washington D.C. for their failure to provide sufficient accessibility for wheelchair users.[98]
- ***Include Level 2 AVs:*** For all intents and purposes, the legislation fails to regulate SAE Level 2 AVs, which require a human driver to monitor their performance and be available to take over the driving task when necessary, like the Tesla vehicles which have been involved in several crashes. During a September 12, 2017, hearing on the 2016 crash conducted by the NTSB, deadly failures of Tesla's Level 2 "Autopilot" system

were readily identified.[99] The NTSB found that similar problems also exist in other Level 2 AVs across many manufacturers.[100] In the near term, Level 2 AVs will likely comprise a majority of the passenger vehicle AV fleet. Proper safeguards to curb Tesla-like failures must be put in place. Level 2 AVs should be subject to all safety critical provisions in the bills.

- ***Do Not Preempt State Action in the Absence of Federal Regulations:*** It is the statutory mission of NHTSA to regulate the design and performance of motor vehicles to ensure public safety which, in modern day terms, includes AVs and automated driving system technology. However, in the absence of comprehensive federal standards and regulations to govern the AV rules of the road, the states have every legal right, indeed a duty to their citizens, to fill the regulatory vacuum with state developed proposals and solutions for ensuring public safety. Both bills prohibit this state action.

U.S. DOT Requires Sufficient Funding and Authority to Properly Regulate Vehicle Safety

As emerging technologies are developed and deployed, the U.S. DOT is already facing and will continue to confront unique challenges which warrant additional tools and funding to protect against potentially catastrophic defects and failures. NHTSA should be granted imminent hazard authority to expedite the grounding of vehicles that the agency has identified as having a potentially dangerous, widespread problem or when it detects a cybersecurity threat that could lead to inordinate crashes, deaths and injuries. Additionally, because of the potential serious nature of software defects that could imperil safety in thousands of vehicles, the ability to levy enhanced penalties is essential. The unacceptable level of current motor vehicle crashes, fatalities and injuries combined with the demands being placed on NHTSA with regard to AV technology necessitates an increase in agency funding.

Today, 95 percent of transportation-related fatalities and 99 percent of transportation injuries involve motor vehicles on our streets and highways.[101] Yet, NHTSA receives only one percent of the overall DOT budget.[102] NHTSA will be required to take on new significant responsibilities under the driverless car legislation. In order to efficiently execute all of these tasks, an office dedicated to AV safety should be established within NHTSA. The protection of public safety should not be compromised and progress should not be slowed because the agency does not have adequate technical expertise, organization, resources and funding to oversee the development and deployment of AVs.

Many Significant Obstacles and Uncertainties Remain Regarding the Safe Deployment of Autonomous Vehicles

AVs will be operating on public roads, therefore ensuring that our Nation's infrastructure can accommodate the safe and successful deployment of AVs is essential. "Stand-alone" AVs (those that will not communicate with other vehicles or infrastructure) will be limited by the capability of the on-board sensors and therefore, will largely suffer from the same types of sensing limitations that afflict human drivers such as not being able to see around a corner or past a vehicle.

Claims made by the AV industry that the introduction of these vehicles will reduce congestion, improve environmental quality, and advance transportation efficiency may amount to nothing more than fanciful theories.[103] Instead, AVs may bring about so-called "hyper-commuters" who work from their vehicles on long commutes thereby making living further from offices and/or city centers more palatable. Likewise, the possibility of empty AVs adding substantial miles on the roads as they re-position autonomously after dropping off riders could undermine many of

the benefits claimed.[104] In fact, a recent study has demonstrated ridesharing services have increased congestion in some of America's largest cities.[105] And, New York City has placed a temporary cap on the new licenses for ride-hailing vehicles while the city conducts a study of the implications of these services. Moreover, AVs share many of the same characteristics, and will likely be used as, ridesharing services at least during their introduction.[106]

With the advent of AVs, more emphasis must be placed on consistency of road design, and consideration must be given to the effects variations can have on autonomous technology. While a human driver can see a unique situation and interpret those circumstances fairly well, an AV may not be able to do the same. Research has already shown that minor distortion of a sign can result in havoc for AVs, causing stop signs to be interpreted as speed limit signs, a confusion which can have serious and even potentially fatal results.[107] Additionally, roadway deterioration and delayed repair, which are common occurrences on existing infrastructure, will have a negative impact on AV operation.

Autonomous and Connected Trucks

The emergence of experimental autonomous commercial motor vehicles (ACMVs) and their interactions with conventional motor vehicles demand an enhanced level of federal and state oversight to ensure public safety. It is imperative that CMVs be regulated. For the foreseeable future, regardless of their level of automation, ACMVs must have an operator with a valid commercial driver's license in the vehicle at all times. In addition, important safety regulations administered by the Federal Motor Carrier Safety Administration (FMCSA) such as those that apply to driver hours-of-service, licensing requirements, entry level training and medical qualifications must not be weakened.

Advocates is also concerned with a number of issues presented by truck platooning. In order to achieve any efficiency benefits, the trucks in a platoon must operate much closer together than is current practice. This presents very real safety concerns. Issues such as vehicle maintenance may hamper the ability to execute these types of operations outside of controlled experiments. In real-world scenarios, realities of brake and tire maintenance as well as vehicle loading can all affect handling capability. Currently, one in five heavy vehicles inspected at the roadside are placed out of service for vehicle issues, a large number of which are related to brakes or tires.[108] Moreover, until the first vehicle in a platoon is operated by a verifiably safe automated driving system, the safety of the platoon relies on the lead human driver. There are also questions concerning the interaction of platoons with other road users, including the ability of other vehicles to pass a platoon safely or navigate between them to reach an exit or to enter a road safely.

Rural Considerations

There are many unique transportation characteristics present in rural America that will affect the performance of, and access to, emerging technologies. Necessary infrastructure such as broadband connectivity and up-to-date mapping may be limited. Maintenance of roadway markings, signs and pavement may vary. Unpaved roads in rural areas could increase sensor fouling which could degrade or prevent safe operation. More consideration must be given to this complex issue before AVs can be deployed on a large scale.

Conclusion

Every day on average 100 people are killed and 6,500 more are injured in motor vehicle crashes in the U.S. Advocates has consistently promoted proven technology to reduce this unacceptable death and injury toll. Available crash avoidance systems, such as automatic emergency braking (AEB), that have already been shown to have substantial public safety benefits should be required as standard equipment in all new vehicles. In addition, emerging technologies that hold promise for curbing preventable deaths and injuries should be fostered and advanced. Some of these innovative developments are the building blocks for autonomous technology which hold the potential to make significant and lasting reductions to this public health epidemic. However, AVs should not be prematurely deployed and sold before they can be safely operated on public roads and without commonsense government oversight in place. Serious and fatal crashes involving AVs which have already occurred reveal significant flaws in this still developing technology. In sum, the path to the safe and effective introduction of AVs requires government oversight, transparency and a comprehensive regulatory framework in all aspects from vehicle standards to infrastructure design.

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