July 29, 2019

U.S. Department of Transportation
Via Electronic Submission

Re: Removing Regulatory Barriers for Vehicles with Automated Driving Systems (Docket No. NHTSA-2019-0036)

New York City thanks the National Highway Traffic Safety Administration (NHTSA) for the opportunity to comment on the strategies under consideration for amending Federal Motor Vehicle Safety Standards (FMVSSs) related to crash avoidance in order to facilitate the testing of Automated Driving Systems-Dedicated Vehicles (ADS-DVs) without human control equipment. It is clear that NHTSA is engaging in a thoughtful and nuanced exploration of the options and is duly prioritizing safety and objectivity in its assessment of potential approaches to changing these test procedures.

New York City believes, however, that the overarching approach of modifying existing test methods to enable automated driving system (ADS) compliance without addressing the host of new safety responsibilities and cybersecurity risks ADSs introduce is insufficient to protect public safety. The 100 series of the FMVSSs, addressing crash avoidance capabilities of vehicles sold in the United States, is particularly important to revisit when thinking about how to regulate the safety of ADSs. The standards in this series specify critical equipment and aspects of performance that have been proven to reduce the likelihood and severity of crashes. In assessing which aspects of FMVSSs need to change in response to ADSs, this is a good place to start: ADSs promise to make roadways safer primarily through improved crash avoidance. This category therefore represents the area whose regulation NHTSA must update most extensively.

In response to past NHTSA solicitations regarding removing regulatory barriers to ADSs, New York City has stressed the need to pair the agency's focus on enabling the testing and deployment of ADSs with equally thorough stakeholder engagement and experimentation. This combined focus is necessary to understand the additional safety measures that ADSs necessitate by assuming aspects of the dynamic driving task (DDT) currently performed by humans. In standard vehicles, an enormous number of functions critical to crash avoidance are performed by the human driver. These include recognition of pedestrians and cyclists moving in or adjacent to roadways and anticipation of their likely behavior to avoid collusions. It similarly includes recognition and response to slowing traffic ahead or to vehicles stopped in a moving lane as they engage in parallel parking or double parking. It includes recognition and appropriate response to temporary construction zones, traffic control officers, and roadway crashes.

Notably, the ability to perform these functions is validated through state driver license tests, and current crash avoidance standards do not address these functions directly because they were developed for human-operated vehicles. Instead, these standards focus on ensuring that safety

systems are designed and positioned in ways that make them easy for human drivers to understand and use effectively, and to mitigate the severity of crashes when drivers fail. Now, in the context of ADSs, the scope of these standards must expand to include the many crash avoidance functions that ADSs will perform in place of human drivers. NHTSA has made clear that these functions, the purview of state departments of motor vehicles when executed by humans, become NHTSA's regulatory responsibility when performed by ADSs.

While years of development and validation likely remain prior to large-scale ADS deployments, a range of function-specific advanced crash avoidance technologies, like intelligent speed assistance (ISA), automatic emergency braking for pedestrians and cyclists, and vulnerable road user detection and warnings, are ready to be made standard in new vehicles, with the potential to save tens of thousands of lives each year. These systems, available today, can help bridge the gap between traditional equipment-focused safety standards and the new performance-oriented crash avoidance standards that will be necessary to ensure safe ADS operation. NHTSA's leadership in integrating these technologies into the standard requirements for new vehicles will save lives, while preparing NHTSA for the future.

New York City therefore urges NHTSA, as it evaluates how to change FMVSSs related to crash avoidance to better address ADSs, to pursue two parallel actions to modernize crash avoidance standards:

1) In the near term, begin rulemakings to adopt crash avoidance FMVSSs mandating in new vehicles several proven, life-saving, and cost-effective driver assistance technologies that are currently available. These systems represent critical building blocks for ADSs, while providing substantial safety benefits.

2) Develop, test, and implement new performance-oriented crash avoidance standards to specify minimum acceptable performance thresholds for demonstrating an ADS's ability to perform the DDT within its operational design domain (ODD).

Driver Assistance Systems

New York City has enjoyed several years of consistent decline in traffic deaths as a result of the city's Vision Zero commitment to end roadway fatalities. More work, however, needs to be done: As of July 2, we have seen twice the number of cyclists killed compared to this time last year, and 50 percent more than in all of 2018. Deaths among motor vehicle occupants are up almost 60 percent compared to this time last year, and pedestrian fatalities are up four percent. While fatalities would undoubtedly be worse without the city's substantial investments in safe street redesigns, driver education, and enforcement, it is clear that much more is required across the transportation sector to protect all road users. Advances in vehicle safety technologies can and must be a part of the solution.

For inspiration, we need only look across the Atlantic. The European Commission (EC) has identified that in order to reap the full benefits of new mobility technologies, the government must take decisive action to incorporate proven advanced safety systems into standards governing vehicle design and construction. The EC's Third Mobility Package, introduced in 2018, focuses on technologies that make the mobility system safer and more efficient, and make European companies more competitive. Similar to the United States, in recent years Europe has experienced a reversal of progress in roadway safety, with fatality rates flat across the Union and increasing in some countries. In response, the EC has proposed legislation mandating several advanced safety features, such as overridable ISA, automatic emergency braking (AEB), and measures to detect and protect vulnerable road users.

The research undergirding these proposals is instructive, and can be easily applied to vehicles in the United States. An EC-commissioned benefit-cost analysis by the Transport Research Laboratory (TRL)[1] found that, compared to a do-nothing regulatory strategy that prioritized voluntary uptake of new safety technologies by automakers, regulations mandating these technologies in new vehicles would save between 23,000 and 25,000 lives over the study period (2021-2037). Moreover, these benefits come at an additional cost of only 300€-500€ per light-duty vehicle and 600€-1000€ per vehicle for buses and trucks.

Specifically, the study found that ISA could reduce deaths from speeding light-duty vehicles when the driver was unimpaired by 19 percent. Automatic emergency braking for pedestrians could reduce pedestrian fatalities from light-duty vehicle collisions by 24 percent, and for cyclists by 28 percent. Drowsiness and attention detection and advanced distraction recognition could reduce fatalities from light-duty vehicle crashes by 17 percent each. Backup cameras reduce pedestrian and cyclist fatalities from reversing light-duty vehicles by 41 percent. For trucks and buses, pedestrian and cyclist detection and warnings could reduce fatalities from crashes by 40 percent, while backup cameras could reduce fatalities from reversing trucks and buses by 33 percent. Each of these technologies alone offers significant safety improvements; together, they represent a transformation in roadway safety.

Voluntary guidelines and industry adoption cannot substitute for federal leadership. While the 2015 industry commitment from 20 automakers to voluntarily implement automatic emergency braking on all new vehicles by 2022 is commendable, it also makes clear that voluntary adoption of multiple life-saving technologies at once is unlikely to be a viable model moving forward. As the Insurance Institute for Highway Safety, who helped NHTSA broker the AEB commitment with automakers, reported in March 2019, automakers have achieved mixed results in terms of adoption. While Tesla, Mercedes-Benz, Volvo, Toyota, and Audi included AEB in the vast majority of vehicles produced in the year following September 1, 2017, and offered it in almost all new vehicles, General Motors, Fiat Chrysler, Ford, and Mitsubishi have lagged. In fact, those

[1] https://publications.europa.eu/en/publication-detail/-/publication/77990533-9144-11e7-b92d-01aa75ed71a1

manufacturers have included AEB in less than a quarter of vehicles sold, and, with the exception of Ford, offer it in no 2019 models.

Voluntary commitments may continue to support faster implementation timelines, but do not diminish the importance of acting now to ensure full uptake as soon as possible. NHSTA should draw on the extensive research already conducted and begin rulemakings for the suite of technologies the EC has proposed to mandate: ISA, AEB (including pedestrian- and cyclist-specific AEB), vulnerable road user detections and warnings, and distraction and drowsiness detection. Harmonizing these requirements between the U.S. and the EU would have the significant additional benefit of streamlining production for two of the world's largest auto markets, and keep American automakers competitive.

New ADS Crash Avoidance Standards

The existing Driver Assistance Systems like ISA and pedestrian and cyclist detection should also provide the regulatory building blocks for the creation of safety standards for ADSs' performance of the DDT. Just as the AEB or ISA function must be tested individually to verify satisfactory performance, ADS operation should be tested using the same metrics and minimum thresholds—a high rate of accurate pedestrian and cyclist detection from all angles, the application of the brakes in time to stop the vehicle prior to a collision, and the maintenance of safe and legal speeds. While it is clear that equipment-based standards are not yet appropriate given the rapid pace of change in this industry, baseline performance requirements that can be certified by automakers prior to large-scale testing on public roads would provide needed safety benchmarks to mitigate safety risks in ADS deployment. Applying the same thorough study and engagement process NHTSA has pursued for removing regulatory barriers to ADSs would undoubtedly yield significant advances in the agency's understanding of how to regulate ADS operation.

Of particular concern to New York City and many of our peer cities is the ability of ADSs to accurately detect all pedestrians and cyclists in the public right of way. This will remain a foundational performance requirement for ADSs operating on public roadways, no matter how the technologies evolve in the coming years. As a first step in developing the new package of performance-based safety standards, NHTSA should develop a "vision test" for ADSs: proposed requirements for the accuracy and reliability of the identification of vulnerable road users, and test procedures to validate these functions in a variety of representative ODDs. Such a test would be part of the due diligence prior to extensive on-road testing, supporting greater public confidence and weeding out under-developed systems. These requirements and tests would be the first in what will undoubtedly be a multi-decade process of defining new standards specifying the minimum performance thresholds to ensure ADSs' safe operation of the dynamic driving task.

Inherent in reliability of these systems to maintain road safety for all are cybersecurity considerations that could limit the visibility of one or more vehicles—or disengage critical functions altogether. Researchers from Georgia Institute of Technology have presented modeling to show how existing cyber hacks on human driven, internet-connected vehicles could be utilized to cripple surface transportation in Manhattan. NHTSA has to date been diligent in working with the automotive industry to promote a multi-layered approach to cybersecurity. As critical controls transition from human DDT to ADS, the criticality of moving beyond industry-government information sharing toward the adoption of digital security standards, as well as cybersecurity vulnerability and penetration testing techniques, become as inherent in safety assurance as adopting physical safety standards and crash tests.

Layered security architecture to protect all entry points to a vehicle's electronic system (both physical and wireless) is a baseline. New York City would suggest NHTSA adopt minimum encryption standards and identity validation methodology for vehicle-to-vehicle and vehicle-to-infrastructure communication. NHTSA should have vehicle manufacturers begin to explore and implement real-time intrusion detection and prevention measures to avoid the worst potential adverse effects of a successful hack. This should include a system for harnessing threat intelligence and the ability to update systems via secure channels for any potential vulnerability fixes identified.

Thank you for the opportunity to comment on this important topic.