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U.S. Department of Transportation  
1200 New Jersey Avenue SE  
West Building Ground Floor  
Room W12-140  
Washington, DC 20590-0001

**Re: Framework for Automated Driving System Safety (Docket No. NHTSA-2020-0106)**

The City of New York (NYC) appreciates the opportunity to provide comments concerning the issues that should be addressed within a safety framework for automated driving systems (ADSs). Given the scale of potential safety, mobility, economic, and environmental impacts of the deployment of ADSs in the nation's urban centers, NYC urges the United States Department of Transportation (U.S. DOT) to continue to engage with cities throughout the development of the safety framework and related efforts.

Consistent with many of our peer cities and traffic safety organizations, we advocate a cautious approach to ADS testing and deployment that creates needed federal safety and cybersecurity guardrails while empowering states and localities to shape operational rules and enforcement strategies appropriate to their context. NYC considers the creation of new ADS-specific safety and cybersecurity standards, the collection of critical safety and operational data from all ADSs operating on public roadways, and the protection of state and local authority to regulate mobility and operational traffic safety to be issues of the utmost importance.

This comment document discusses these priorities broadly, and then responds to a selection of questions from the ANPRM. Thank you for the consideration.

**Safety and Cybersecurity Standards**

Through its Vision Zero initiative, NYC has spent or committed roughly \$3 billion through Fiscal Year 2029 to make its surface transportation system safer for all users. These investments have yielded significant results: overall fatalities are down 18% and pedestrian fatalities are down 46% since 2013, and seven of the eight years since the program's launch have been the safest in New York City history, since recording began in 1910. Over the long term, safe, effective ADSs have the potential to contribute to our Vision Zero goal by curtailing speeding and distracted and impaired driving. However, without clear federal standards for minimum performance, large-scale ADS testing is likely to expose the public to undue risk, jeopardizing cities' traffic safety progress without providing meaningful additional transportation benefits.

The strategy for updating the federal regulatory regime to guide the safe deployment of ADSs must include the creation of mechanisms for the National Highway Traffic Safety Administration (NHTSA) to verify the ability of ADSs to safely and securely perform the dynamic driving task (DDT) within the prescribed operational design domain (ODD), as states currently do with human drivers. This type of verification goes beyond the scope of current Federal Motor Vehicle



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Safety Standards (FMVSSs), and, as the ANPRM notes, requires creative thinking and a phased approach.

To properly respond to this emerging technology, federal safety standards must eventually cover not only vehicle equipment performance, but more broadly the ability of the ADS to perform object and event detection and response functions, and to thwart unauthorized attempts to access vehicle systems, as highlighted in NHTSA's ADS policy guidance. These tests should include a vision test to verify the system's ability to recognize and predict the movement of pedestrians and cyclists at extremely high accuracy, as well as other checks to validate decision-making and maneuvering in complex environments. Failure to do so risks undermining public confidence in these potentially life-saving technologies, leading to unnecessary fatalities and injuries along the path to full-scale deployment, and compelling consumers to rely on the courts for protection after suffering injury or loss, rather than proactively preventing these harms in the first place. While it may not yet be feasible to develop the full suite of standards necessary to comprehensively assess the adequacy of ADSs' functionality, NHTSA could act now to develop preliminary threshold tests to establish a minimum level of operational proficiency within specified ODDs as a prerequisite for ADS testing on public roadways, even with safety drivers in the vehicle. These standards would be immeasurably valuable as cities and states evaluate the public safety considerations associated with companies seeking to initiate new testing and deployments within their jurisdictions. NYC requests that NHTSA take the lead in initiating this process.

NYC further recommends that the U.S. DOT take seriously the need for leadership in establishing cybersecurity standards. For ADSs to be able to safely operate, they must be secure against 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 methods of 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 to ADS, the adoption of digital security standards, as well as cybersecurity vulnerability and penetration testing techniques, become as important in safety assurance as adopting physical safety standards and crash tests.

Layered security architecture to protect all entry points to an ADS's electronic system (both physical and wireless) is a baseline. NYC 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.



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## State and Local Authority

Local transportation regulators and law enforcement know their transportation systems best, and must be able to implement and enforce rules, and collect and analyze data, to promote traffic safety and mobility.

NYC urges the U.S. DOT to develop a safety framework that is supportive of state and local authority over traffic rules and management. NYC believes that prohibiting states and local governments from regulating the performance of ADSs generally would affect their ability to adopt and enforce traffic laws against ADSs to ensure pedestrian safety and prevent crashes. The term “performance” has not been defined and the performance of ADSs differs from the performance of traditional motor vehicles.

“Performance” has traditionally related only to the “actual equipment” in an automobile and, as a result, NHTSA has the sole authority to regulate performance. However, the term “performance” as it relates to motor vehicles or ADSs has not been defined in any statutes, regulations, or guidelines. Instead, “performance” is referenced in the definitions of “motor vehicle safety” and “motor vehicle standard” within Chapter 301 of the United States Code.

U.S. DOT has the sole statutory authority to prescribe safety standards, to which manufacturers of motor vehicles and items of motor vehicle equipment must conform and certify compliance. Consequently, NHTSA has been delegated the authority to regulate the safety design and performance aspects of motor vehicles and motor vehicle equipment, and states continue to be responsible for regulating the human driver and vehicle operations, and enacting and enforcing traffic laws and regulations.

Because the ADS is considered the driver in an automated vehicle, there are circumstances in which states and localities must regulate the in-use “performance” of the ADS as the driver, rather than the equipment. Also, NHTSA has recognized that states have the authority to regulate a vehicle’s in-use performance (through safety inspection laws), so long as such regulations do not conflict with applicable FMVSSs. From U.S. DOT’s Automated Driving Systems Guidance, “A Vision for Safety” (Sept. 2017):

“States have a general responsibility to reduce traffic crashes and the resulting deaths, injuries, and property damage for all road users in their jurisdictions. States use this authority to establish and maintain highway safety programs addressing: driver education and testing; licensing; pedestrian safety; law enforcement; vehicle registration and inspection; traffic control; highway design and maintenance; crash prevention, investigation, and recordkeeping; and emergency services. This includes any legal components States may wish to consider upon drafting legislation on automated driving systems.”

In light of the above, NYC contends that states and localities must be permitted to regulate certain aspects of the in-use “performance” of ADSs, which relate to ADSs performance as a driver, rather than to only the equipment. Such regulations do not conflict with FMVSSs or NHTSA’s other authority.



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## **Access to Data**

Robust data on current ADS operations throughout the country is key to informing NHTSA's regulatory approach, and to state and local decision-making about regulation of ADSs in their jurisdictions. NHTSA is uniquely situated to gather and interpret this data: as a first step to any safety framework, the agency should immediately mandate comprehensive data reporting from all companies testing or operating ADSs (Society of Automotive Engineers levels 3 and above) on public roadways, or seeking to do so within a specified timetable.

It is critical to establish protocols that allow ADS safety data to be shared with states and cities. Some data, when appropriate, should also be shared publicly. While NYC recognizes that testing data is precious to each company and some may pertain to intellectual property, providing for a robust level of transparency and disclosure of safety and other performance data will be essential for establishing public confidence and in creating a safety culture akin to what we have developed in the U.S. aviation sector.

Currently there are no federal regulatory mandates requiring ADS data sharing between manufacturers and states and localities or between the federal, state and local governments. Notably, some manufacturers have been unwilling to enter data sharing agreements with cities, as NYC has experienced firsthand. Ultimately, the lack of regulatory mandates and industry participation concerning data sharing leaves cities unable to evaluate the results of ADS deployment in relation to safety or externalities like congestion. And it leaves cities unsure that the technology is ready for the unique challenges of dense urban areas, especially in light of the tragic and disturbing pedestrian fatality that occurred during testing in Tempe, Arizona.

The wealth of crash, travel demand, and traffic congestion data that ADSs will collect have the potential to inform municipal transportation agencies on how they can better design safer and more efficient streets. For example, operational data from for-hire vehicle (FHV) services, including Uber and Lyft, has proven invaluable to NYC in improving safety by ensuring operators do not drive more than 12 hours a day; the same data has enabled us to measure the contribution of FHVs to congestion. Data sharing will help us to improve traffic safety, reduce congestion, and improve the efficiency of traffic operations and infrastructure management.

## **Voluntary Safety Self-Assessments**

As with data sharing on safety and other testing outcomes, NHTSA's Voluntary Safety Self-Assessments (VSSAs) must be mandatory. These documents are likely the best vehicle for requiring manufacturers to make the case for why they believe their vehicles are safe; based on submissions to date, however, it seems that NHTSA may need to take a more active hand in shaping and standardizing the type and quality of the argumentation that companies submit. Further, U.S. DOT must be able to reject inadequate VSSAs and limit operation until the issues have been resolved. The existing VSSAs run the gamut from moderately informative to little more than marketing material. In all cases, the utility of these reports as currently constituted, without any corresponding enforcement ability, is questionable.



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## Consultation with Local Governments

Local governments and transportation authorities have unique expertise and long-term visions for achieving safe, affordable, equitable, and sustainable urban transportation. They must have a seat at the table to help inform important federal decisions about new mobility options.

We request that NHTSA engage with cities directly, and create more opportunities to share best practices across all levels of government. The bulk of the U.S. population lives and travels in urban areas and local transportation officials have deep expertise, particularly in on-the-ground infrastructure operations and maintenance. We request that a representative swath of cities be included in this process formally on an ongoing basis.

## ANPRM Questions and Responses

### A. Questions About a Safety Framework

*Question 1.* Describe your conception of a Federal safety framework for ADS that encompasses the process and engineering measures described in this document and explain your rationale for its design.

At this stage of ADS development, it would be prohibitively challenging for NHTSA to develop the full set of FMVSS that will eventually be necessary to govern ADS safety. Instead the agency should adopt regulatory and guidance mechanisms that allow it to effectively monitor the progress of the technological development and the safety processes being used in the industry; continue to conduct research to identify the most effective methods of testing ADS safety; and create basic, minimum guardrails to mitigate the most extreme risks to public safety as on road testing continues and expands. The purpose of the guardrails would be to create a baseline level of protection for the public, in order to stop bad actors from deploying dramatically underdeveloped systems on public roadways, rather than to comprehensively assess vehicle readiness for all scenarios they may encounter. At present, without a national framework for assessing baseline safety performance of ADS, companies are free to approach state and local officials in locations where they want to test, and present relatively unverifiable cases for the safety of their vehicles. Even the most robust local transportation departments are ill-equipped to rigorously evaluate the safety of a given company's product, and, in the absence of a federal process, rely on heuristics. This vacuum of regulatory action and expertise exposes the public to unnecessary risk. To address this, NHTSA could effectively wield its regulatory power and technical expertise to set minimum expectations for ADSs testing on public roadways. NYC also believes that the safety assurance processes and measures outlined in the ANPRM would yield considerable safety benefits as part of a federal safety framework, but does not have the automotive engineering expertise to comment on them in detail.

NYC proposes that as the first step to advancing a safety framework, NHTSA immediately implement mandatory data and process reporting mechanisms to gather more robust information about ADS safety outcomes and viable testing methods. These requirements would



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leave it to manufacturers to make the safety case for their vehicles, through mandatory, thorough vehicle safety self-assessments.

NHTSA would then draw from the safety case submissions and the expertise it has developed over the last several years to evaluate different methods for measuring ADS proficiency, to support development of standardized testing procedures in the future. The most immediate priority would be to develop a track-based testing method to evaluate minimum operational proficiency in crash avoidance, particularly focusing on a vehicle's ability to detect and anticipate the movements of other road users and plan appropriately. As stated earlier, the purpose of this set of performance standards would be to set a floor for acceptable operating proficiency for ADSs activated on public roadways, even with test drivers present. Supplementary tests to evaluate the adequacy of specific primary functional categories would also be appropriate. For instance, NYC suggests that NHTSA develop a "vision test" that evaluates an ADS's ability to detect and correctly identify various types of street users in different ODDs. Finally, NYC requests that NHTSA include minimum cybersecurity standards, as described above under "Safety and Cybersecurity Standards," as a hacked vehicle presents many of the same public safety risks as an under-developed ADS.

*Question 4.* How would your framework assist NHTSA in engaging with ADS development in a manner that helps address safety, but without unnecessarily hampering innovation?

As NHTSA identified in the ANPRM, it is important to proceed with strategies that are appropriate for the current level of ADS development. The most effective way to continue to enable innovation while increasing the transparency and safety assurance of the industry is to require robust reporting and data sharing regarding companies' approaches to safety assurance, and the internal engineering methods they rely on to determine their products' level of safety. UL 4600 and the "safety case" concept described in the ANPRM provide a strong framework for reporting requirements at this stage. The agency has clearly determined that it is valuable to collect this information from companies seeking ADS-related FMVSS exemptions and importing non-compliant vehicles. However, these two categories only represent a subset of the total ADS development and testing activity in the United States, and do not necessarily select for the greatest safety risk: many companies are modifying standard, FMVSS-compliant vehicles to develop and test ADSs, allowing them to skirt the enhanced reporting process regardless of the comparative safety of their ADS or the scale of their deployment. Untethering reporting requirements from the exemption and importation processes would close the current gaps, and support innovation by eliminating the current disincentive (extra reporting requirements) to novel vehicle designs.

Similarly, setting minimum, outcome-oriented operational proficiency standards as a gate to on-road testing could protect the public and increase acceptance without slowing development or hampering innovation. To the extent that responsible ADS developers are already engaging in safety testing prior to testing and deployment on public roads, their own internal engineering measures should exceed in rigorosity the minimum standards that NHTSA would adopt. The primary function, then, of NHTSA standards at this stage would be to keep irresponsible



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developers from deploying under-prepared systems on public roadways.

*Question 6.* Do you agree or disagree with the core elements (*i.e.*, “sensing,” “perception,” “planning” and “control”) described in this document? Please explain why.

NYC agrees with the core elements that the document lays out. They combine into an intuitive and relatively comprehensive way of thinking about the different aspects of the dynamic driving task, and map well to both the human and ADS driving functions.

*Question 8.* At this early point in the development of ADS, how should NHTSA determine whether regulation is actually needed versus theoretically desirable? Can it be done effectively at this early stage and would it yield a safety outcome outweighing the associated risk of delaying or distorting paths of technological development in ways that might result in forgone safety benefits and/or increased costs?

Given the speculative nature of the benefits associated with fully developed ADSs, and the long road ahead before these systems are commercially viable at a scale that would meaningfully impact roadway safety, it would be extremely challenging to rigorously assess the costs of safety regulation. However, the occurrence of testing on public roadways creates an immediate additional safety risk. Disclosures to the California Department of Motor Vehicles regarding system disengagements and collisions, and the tragic death of a pedestrian in Tempe, Arizona, reveal that most, if not all, current ADSs are less competent drivers than the average human. Their presence on public roadways therefore constitutes an additional risk to the traveling public—one that is outside of the normal risk profile associated with walking, biking, and driving, and in most cases does not provide any immediate transportation benefit. It is therefore reasonable for NHTSA to adopt flexible, outcome-oriented, and possibly temporary standards to mitigate the most extreme new risks associated with ADS testing on public roads. These minimum standards would serve as a bridge to the more robust standards that NHTSA would develop as the industry progresses.

*Question 9.* If NHTSA were to develop standards before an ADS-equipped vehicle or an ADS that the Agency could test is widely available, how could NHTSA validate the appropriateness of its standards? How would such a standard impact future ADS development and design? How would such standards be consistent with NHTSA's legal obligations?

At this stage of development, standards should be entirely outcome based. They can remain technologically neutral, while identifying minimum levels of performance that ADSs must meet in order to begin on-road testing. These standards would represent the absolute minimum level of acceptable performance, even with safety drivers in the vehicle. NHTSA could either evaluate metrics used for beginner human drivers, or rely on enhanced reporting from manufacturers regarding their own internal performance metrics and safety validation methodologies to ascertain the appropriate metrics and thresholds for this minimum safety level. Development of



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these standards should focus on the limitations of safety drivers regarding attention, prudence, and response time.

*Question 10.* Which safety standards would be considered the most effective as improving safety and consumer confidence and should therefore be given priority over other possible standards? What about other administrative mechanisms available to NHTSA?

It is challenging to isolate any of the core functions identified in the ANPRM as the most important to improving safety, as a failure in any of them may lead to a failure of the entire system's crash avoidance.

*Question 12.* What types and quanta of evidence would be necessary for reliable demonstrations of the level of performance achieved for the core elements of ADS safety performance?

As described above, at this stage this question may be best informed by the processes developers are currently using. Requiring them to rigorously present the safety case for their systems, with critical engagement from NHTSA and third-party safety experts, would provide considerable insight into this issue.

*Question 13.* What types and amount of argumentation would be necessary for reliable and persuasive demonstrations of the level of performance achieved for the core functions of ADS safety performance?

Documentation may need to be relatively robust in order to sufficiently demonstrate the safety of a newly-developed system. However, responsible companies have been making this case internally in order to justify advancing their products through the stages of testing and deployment. Critical engagement with these processes and active, transparent communication between NHTSA and the developers should illuminate the appropriate level of argumentation.

### C. Questions About Administrative Mechanisms

*Questions 16 & 17.* Of the administrative mechanisms described in this document, which single mechanism or combination of mechanisms would best enable the Agency to carry out its safety mission, and why? If you believe that any of the mechanisms described in this document should not be considered, please explain why. Which mechanisms could be implemented in the near term or are the easiest and quickest to implement, and why?

Enhanced, mandatory data and safety process reporting is likely the most important and most implementable step at this stage, and will be most effective in supporting NHTSA's future regulatory actions and state and local decision-making.