March 31, 2021

RE: Framework for Automated Driving Safety
Docket No. NHTSA-2020-0106

James C. Owens
Deputy Administrator, National Highway Traffic Safety Administration
Docket Management Facility, M–30
U.S. Department of Transportation
West Building, Ground Floor, Room W12–140
1200 New Jersey Avenue SE Washington, DC 20590.

Dear Deputy Administrator Owens,

First and foremost, I would like to thank you for drawing upon the public in anticipation of this Proposed Framework. Over the past decade, the need for well-defined AV regulation has quickly become a matter of national concern;[1] the manner in which we do that will significantly impact the safety and development of our roads, particularly for pedestrians and other non-motorized road users.[2] My comment is framed as a response to Questions 1-5 as posed in § V.A. of the ANPRM, titled "Questions About a Safety Framework."

I would like to begin by responding to § IV.B.5 of the ANPRM, for which feedback has been requested regarding various regulatory approaches. In part (a), titled "FMVSS Requiring Obstacle Course-Based Validation in Variable Scenarios and Conditions," the NHTSA addresses the limitations of obstacle-course-based test regimes due to the wide and innumerable spectrum of field crash scenarios. It touches upon the various testing processes used by developers to train their ADS competency. In response to Question 1 of § V.A., in conjunction with this obstacle

[1] *See* Mercedes Streeter, *NHTSA Has A Lot of Catch-Up Ahead*, JALOPNIK (Feb. 4, 2021, 8:00 PM), https://jalopnik.com/nhtsa-has-a-lot-of-catch-up-ahead-1846201331 (last visited Mar. 31, 2021).

[2] *See, e.g.*, Angie Schmitt, *Autonomous Car Industry's Frightening Vision for Cities*, STREETSBLOG USA (AUG. 2, 2019), https://usa.streetsblog.org/2019/08/02/autonomous-car-industrys-frightening-vision-for-cities/ (last visited Mar. 31, 2021).

course, I would like to explore the possibility of requiring ADS developers and/or states to submit data from field testing to ensure rigorous testing of a wide-variety of scenarios–more than could be reasonably covered by a single test. ADS developers have a robust iterative process that exposes the ADS to as many variables as reasonably possible through simulations,[3] closed-course testing,[4] and on-road testing.[5] Through nearly two million miles of recorded autonomous test miles,[6] ADS developers have collected validation and verification tools for a vast array of variables that a standard obstacle course test could not reasonably emulate.[7] In response to Question 3 and Question 5 of § V.A., in supplement to administering a baseline performance-based obstacle-course test, please consider drafting an encompassing checklist of driving and crash scenarios for which ADS developers shall submit data to the FMVSS to satisfy requisite safety standards. In particular, ADS developers should verify and validate variables regarding the safety of pedestrian and other non-motorized road-users. The list may be non-exhaustive and updated regularly to accommodate changes in technology and road-usage over time. Establishing these standards will create uniform validation methods, enhance the practice of efficient testing

[3] *See, e.g.*, Sven Hallerbach et al., *Simulation-Based Identification of Critical Scenarios for Cooperative and Automated Vehicles*, SAE INTL. J OF CONNECTED AND AUTOMATED VEHICLES, 2018, AT 93, 93-106.

[4] See e.g. *Mcity*, UNIVERSITY OF MICHIGAN, https://mcity.umich.edu (last visited Mar. 31, 2021).

[5] See e.g. *Autonomous Vehicles*, CALIFORNIA DEPARTMENT OF MOTOR VEHICLES, https://www.dmv.ca.gov/portal/vehicle-industry-services/autonomous-vehicles/ (last visited Mar. 31, 2021).

[6] *See* Niall McCarthy, *The Self-Driving Car Companies Going the Distance*, STATISTA, https://www.statista.com/chart/17144/test-miles-and-reportable-miles-per-disengagement/ (last visited Mar. 31, 2021) (providing an overview of total autonomous miles driven by major ADS companies based on data from the California DMV). *See also Disengagement Reports*, CALIFORNIA DEPARTMENT OF MOTOR VEHICLES, https://www.dmv.ca.gov/portal/vehicle-industry-services/autonomous-vehicles/disengagement-reports/ (last visited Mar. 31, 2021).

[7] See e.g. *Safety*, WAYMO, https://waymo.com/safety/ (last visited Mar 31, 2021) (providing a Safety Report overviewing Waymo's "processes for the safe testing and deployment" of ADS, as well as two technical whitepapers and a study that provide details and data regarding their testing methodologies).

procedures, and ensure that ADS developers are properly prepared to prioritize the safety of pedestrian and non-motorized road-users.

In furtherance of the collection of ADS data, this would also assist the adherence of ADS to defensive driving models as described in the subsequent section, § IV.B.5(b), regarding the validation of defensive and risk-minimizing driving models. US pedestrian fatalities are at their highest level in nearly three decades and account for 16% of total traffic fatalities.[8] Thus, in response to Question 2 of § V.A., to combat this growing issue, the aforementioned checklist and other sources of validation should be drafted to prioritize the safety of pedestrians.[9] This means that ADS developers should thoroughly validate automatic braking, yield at a higher-threshold of deference, and drive at lower speeds, particularly in hot-spot areas where pedestrian injury and death are prevalent.[10]

In further consideration of Question 2 of § V.A., I would like to advocate for ADS developers to verify and validate a high level of defensive decision-making for different pedestrian age groups. For example, children and the elderly engage in very different predictive behaviors.[11] Children–for which motor vehicles are now the leading killer of[12]–are lower to the

[8] Robert J. Schneider et al., *United States Fatal Pedestrian Crash Hot Spot Locations and Characteristics*, 14 J. OF TRANSPORT & LAND USE 1, 1-2 (2021) (identifying factors lead to the creation "hot spot" corridors for pedestrian death, and discussing a systemic approach to improving pedestrian safety).

[9] *See Pedestrian Safety: NHTSA Needs to Decide Whether to Include Pedestrian Safety Tests in Its New Car Assessment Program*, U.S. GOVERNMENT ACCOUNTABILITY OFFICE, https://www.gao.gov/products/gao-20-419 (last visited Mar. 31, 2021).

[10] *Id.* at 7-19.

[11] Jennie Oxley et al., *Differences in Traffic Judgements Between Young and Old Adult Pedestrians*, 29 Accident Analysis & Prevention 839, 839-847 (1997).

[12] Gregory H. Shill, *Should Law Subsidize Driving?*, 95 N.Y.U. L. REV. 498 (2020) (discussing the myriad of ways in which US law has contributed to the dominance of the car and its ensuing public health crisis).

ground and can move quickly,[13] whereas the elderly–whom are over-represented in pedestrian-deaths–are more likely to experience "physical, sensory, perceptual, or cognitive" challenges.[14] ADS verification and validation standards should operate without assuming the behaviors of the average pedestrian, but by accounting for the behaviors of a wide-ranging spectrum of pedestrian types. These considerations can and should be implemented into ADS testing standards.

I understand that there may be administrative and compliance concerns regarding confidentiality and data reliability when requiring ADS developers to submit data to the FMVSS. Increased administrative burdens are a necessity when ensuring the safety and readiness of ADS, but may be offset by requiring ADS developers to conduct testing and satisfy safety standards through their own iterative processes. The data ADS developers collect through these processes is an invaluable resource for regulating and validating ADS, and should not be overlooked. Furthermore, programs such as the AV TEST Initiative exemplify state and ADS companies' willingness to voluntarily submit ADS testing data and information to the NHTSA.[15]

In response to Question 4 of § V.A., and more specifically in part (c) and (d) of § IV.B.5, I hope to frame my recommendations and considerations in a way that complies with A.V. 3.0. and minimizes the chances of creating new barriers to innovation, considering the lack of technological maturity. Creating robust systems to validate the safety of these ADS should not pose a barrier to innovation. In fact, regulations should be drafted in a way that encourages more rigorous testing, and ensures roadway safety for pedestrians and other non-motorized road-users. One consideration, however, is for ADS to be developed in a way that does not impede upon the

[13] DANGEROUS BY DESIGN 2021, https://smartgrowthamerica.org/dangerous-by-design/ (last visited Mar. 18, 2021).

[14] Oxley, *supra* note 8, at 839.

[15] *AV Test Initiative*, NHTSA, https://www.nhtsa.gov/automated-vehicles-safety/av-test-initiative-tracking-tool (last visited Mar. 31, 2021).

adoption of autonomous vehicles. In this respect, regulatory concerns should be drafted with the intent of preserving consumer incentives to adopt this safer technology.

Part (d) of § IV.B.5 describes the challenges of the NHTSA's practice of purchasing vehicles independently to assess baseline performance. In contrast to non-ADS equipped vehicles, ADS are inherently subject to performance verification through its entire development process.[16] Thus, to reinforce my response to Question 3 of § V.A., please consider exploring data collection as a method of validating the appropriateness of a proposed test procedure.

With regard to timing, I encourage the NHTSA to draft verification and validation standards with haste, but to frame these recommendations and considerations in a way that complies with A.V. 3.0. and minimizes the chances of creating new barriers to innovation. Six Amazon Mechanical Turk studies show that people paradoxically favor programming autonomous vehicles with utilitarian ideas–that is, to minimize overall harm and causalities–yet would themselves prefer to ride in AVs that protect passengers at all costs.[17] Thus, through consumer preference, ADS may be trained to prioritize passengers at the detriment–and possibly death–of pedestrians.[18] As ADS approach Level 5 autonomy, it is in the NHTSA's best interest to guide the development of these systems in a way that validates an ADS' ability to navigate the roads with a considerable deference for pedestrians and other non-motorized road-users. Notably, however, this should be balanced with the aforementioned consumer incentives, so that we do not postpone the adoption of AV vehicles. In other words, ADS should prioritize

[16] *See, e.g.*, WAYMO, *supra* note 5.

[17] Jean-François Bonnefon, et al., *The Social Dilemma of Autonomous Vehicles*, 352 SCIENCE 1573, 1573-1576 (2016).

[18] *See id.* at 1573.

pedestrians and other non-motorized users without impeding upon consumers' desires for AV vehicles to be safe for passengers as well.

Overall, the efficacy of the proposed ADS-specific FMVSS regimes are an encouraging and critical step in ensuring the safety of our pedestrians and non-motorized road users. In summary–as a response to Questions 1-5 as posed in § V.A. of the ANPRM–mandating the collection of material data from ADS developers, drafting a comprehensive checklist to enforce standardization, and demanding that ADS is validated to defensively protect pedestrians and non-motorized road users–particularly children and the elderly–serve to accommodate the continued innovation of ADS and promote the safe adoption of autonomous vehicles. Thank you for receiving and considering this comment.

Respectfully,

Ethan Chen
Third-Year Law Student at The University of Iowa College of Law