HYUNDAI MOTOR GROUP

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April 1, 2021

Dr. Steven Cliff
Acting Administrator
National Highway Traffic Safety Administration
1200 New Jersey Avenue S.E.
West Building Ground Floor, Room W12-140
Washington, DC 20590-0001

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

Dear Acting Administrator Cliff:

On behalf of Hyundai Motor Group ("Hyundai"), Hyundai America Technical Center, Inc. submits the attached comments on the National Highway Traffic Safety Administration's (NHTSA) December 3, 2020, Advance Notice of Proposed Rulemaking (ANPRM) requesting comment on the establishment of a Framework for Automated Driving System Safety. We appreciate the opportunity to express our views on this important matter.

In addition to the comments provided herein, Hyundai supports those submitted to this docket by the Alliance for Automotive Innovation. Hyundai looks forward to working with NHTSA as the agency charts a path forward for automated driving system safety.

For questions related to these comments, please contact Edward Thai (734) 337-2500.

Sincerely,

< *Signed April 1, 2021* >

Deborah Bakker, Director
Regulation & Certification Department

Enclosure

Comments of
Hyundai Motor Group
on the
NHTSA ANPRM Regarding the Establishment of a Framework for Automated Driving System Safety

Docket ID Number: NHTSA-2020-0106

April 1, 2021

NHTSA's ANPRM is an important step in developing a national framework within which developers of Automated Driving Systems ("ADS") can design future vehicles that will have the potential to achieve historic improvements in safety, efficiency, and transportation access. The ANPRM focuses on policy measures such as regulations and guidance documents relating to the design and operation of automated driving systems (i.e., a policy framework). We support and join in the comments of the Alliance for Automotive Innovation that address these matters.

In Hyundai's comments, we focus on the need to establish a process within the Department of Transportation (DOT) for providing the necessary resources for ADS developers that will form the foundation for ADS safety (i.e., a resource framework) in the near term. These near-term actions can greatly expedite ADS deployment. The requested resources include supporting infrastructure and the information needed for ADS development and operation. The resource needs for ADS development are immense, just in terms of the ability to fully understand the driving environment and translate that information for use in digital systems. There are a number of actions that NHTSA and DOT could take to support the development of ADS in order to maximize the benefits of automated driving. Without this support, there is a risk that ADS operation will be limited to function in unnecessarily narrow operational design domains, reducing the benefits of the technology.

A. Highway design criteria and vehicle operation considerations

Highway design criteria and driving performance regulations involve a wide range of federal, state, and local restrictions. Federal Highway Administration regulations and guidance generally provide road design and traffic control device specifications, though subject to various exceptions. Beyond that, state and local "rules of the road" establish requirements for the safe operation of vehicles. However, state and local rules can vary, making the ADS designer's task challenging. Additionally, more detailed rules establish location-specific maximum vehicle speed limits, vehicle operating restrictions, and parking restrictions. Changes to these rules over time makes the task of processing this information even more complex. The scope of this task, including the resources needed to stay current, could lead to manufacturers creating more limited operational zones for their automated driving systems.

Steps that DOT and NHTSA could take to help system developers in this area includes:

i. **Harmonization** – DOT should lead efforts to minimize differences in highway designs, traffic control device specifications, and local traffic laws. Federal design standards should be applied

on a uniform, national basis, while minimizing exceptions from those standards. Current design criteria should be modified as necessary and highway maintenance (e.g., lane markings) should be upgraded to accommodate automated driving. DOT is best positioned to harmonize road and traffic device design criteria and provide critical resources for system designers. The same principles should be applied to traffic laws, such as through an updated Uniform Vehicle Code and Model Traffic Ordinance.

ii. **Compendium of state and local traffic laws and rules of the road** – In the absence of uniform rules, DOT should establish a compendium of state and local traffic rules. The compendium should be maintained in a digital format that can be readily processed. Updates reflecting changes in local laws and rules should be implemented on a timely basis. Federal support of road mapping–showing up-to-date information on such matters as speed limits, vehicle operating restrictions, and parking restrictions–would greatly support ADS design efforts.

iii. **Sign readability** – Uniform specifications for traffic signs and other traffic control devices should be designed (and revised–as necessary) to facilitate the machine readability of those items. Consistency in specifications for traffic control devices is essential.[1]

iv. **Defensive driving** – NHTSA's ANPRM suggests the possibility that a future safety standard might require that ADS be programmed consistent with a defensive driving model. The "defensive driving" model might be difficult to define in objective terms, so the use of guidance might be more appropriate to implement this concept. It would be helpful if the agency were to include in any such guidance examples of how to safely balance competing considerations. For example, how should ADS designers respond to a situation in which a vehicle is driving on a 2-lane road with double-line lane divider and approaches a bicyclist or pedestrian near the edge of the road surface (e.g., when is it permissible to cross a double-line?). Hyundai supports DOT and states collaborating to address these conflicts in the context of automated driving.

v. **Federal transportation legislation** – Hyundai recommends DOT to be a strong advocate for accommodating ADS in any new transportation legislation.

B. Guidance on ADS development - statistical methods

As pointed out in a Rand Corporation report[2], road testing on the order of billions of miles might be needed in order to provide statistically significant estimates of the reliability of automated vehicles. As noted in the report, testing on this scale is not practical: "developers of this technology and third-party testers cannot drive their way to safety." The report suggests several alternative methods to supplement

[1] We note that the Federal Highway Administration (FHWA) issued a proposed rule that includes changes to the Manual on Uniform Traffic Control Devices. See 85 Fed. Reg. 80898, December 14, 2020. The proposed changes include revisions that are intended to accommodate automated driving. We appreciate the issuance of this notice, and we are currently reviewing the proposed changes. We may comment on the FHWA notice separately.

[2] "Driving to Safety," Rand Corporation, (2016), https://www.rand.org/content/dam/rand/pubs/research_reports/RR1400/RR1478/RAND_RR1478.pdf .

real-world testing to assess safety including accelerated testing, virtual testing and simulations, mathematical modeling and analysis, scenario and behavior testing, pilot studies, and focused testing of hardware and software systems. NHTSA should compile best practices and standards on statistical and other methods to validate the performance of ADS. Such best practices and standards might address candidate metrics such as a mix of road types, weather, and day vs. night conditions, as well as best practices on statistical methods.

C. Developing and establishing a repository for best practices, guidance, and standards

NHTSA's Automated Vehicle Guidance 3.0, Appendix C, discusses the role that various technical standards can play in supporting the development of automated vehicles. As noted in the Appendix, "Standardization-related needs associated with surface vehicle automation are in various stages of identification, development, definition, and adoption." The agency states that it will continue to support development of voluntary technical standards relating to automated vehicles, including "cooperation and funding support to SDOs [standards development organizations], cooperation with industry and governmental partners, making Federal technical expertise available, and international coordination." Hyundai appreciates that commitment by NHTSA and we plan to work cooperatively in this effort.

Appendix C contains a listing of various technical standards that may have relevance to ADS development. As part of its effort to support ADS-related standards-development, NHTSA should establish and maintain an updated central, digital repository for available guidance, best practices and technical standards. The repository should include:

- NHTSA guidance documents;
- NHTSA Federal Register notices, including new regulations as developed;
- NHTSA research reports;
- Best practices from standards development organizations such as the Society of Automotive Engineers, the International Organization for Standardization (ISO), and Underwriters Laboratories; and
- European Union and other international standards and guidance.

This repository could be combined with the AV TEST Initiative announced by DOT on June 15, 2020. We recommend using the AV TEST Initiative platform for this purpose because it is currently in place and manufacturers and other technology developers are increasingly participating in the Initiative.