

Memorandum

Date : December 7, 2018

To : National Highway Traffic Safety Administration,
Department of Transportation
1200 New Jersey Avenue SE West Building
Washington, DC 20590

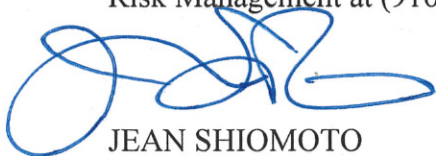
From : Jean Shiimoto, Director
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Subject : Pilot Program for Collaborative Research on Motor Vehicles with High or Full Driving Automation

The California Department of Motor Vehicles (DMV) fully supports the testing of autonomous technologies and looks forward to working with NHTSA and local jurisdictions to promote safe operation of autonomous technologies on public roadways.

Attached are DMV's comments for the Pilot Program for Collaborative Research on Motor Vehicles with High or Full Driving Automation [Docket No. NHTSA-2018-0092].

If you have any questions, please contact Bernard Soriano, Deputy Director, Enterprise Risk Management at (916) 657-7262



JEAN SHIOMOTO
Director

Attachment

cc: Bernard Soriano, Deputy Director, Enterprise Risk Management

California Department of Motor Vehicles Comments on NHTSA Pilot Program for Collaborative Research on Motor Vehicles with High or Full Driving Automation

The California Department of Motor Vehicles (CA DMV) supports the concept of a national automated vehicle pilot program, coordinated by the National Highway Traffic Safety Administration (NHTSA). A nationwide pilot program would provide an opportunity for manufacturers and developers, state/federal regulators, state/local law enforcement, and transportation agencies to promote information-sharing, expand the body of research regarding automated vehicles, and advance policy conversations regarding the safe testing and deployment of automated vehicles.

We encourage NHTSA to approach the development of any such pilot program with a few foundational elements in mind:

- *Division of Federal/State Responsibilities* – We appreciate NHTSA’s acknowledgement of the critical public safety role that States play through traditional functions such as licensing drivers, registering vehicles, creating and enforcing traffic laws, and traffic management. The pilot program should be operated in a manner that complements and reaffirms these essential State functions.
- *Coordination with Existing Requirements for Testing of AVs* – As required by California state law, the DMV has adopted regulations that set specific parameters for testing and deployment of automated vehicles on California roadways. To promote safe, reasonable, and transparent oversight of testing, any future NHTSA pilot program should work in concert with any existing State requirements related to testing of automated vehicles, such as test driver licensing and training, vehicle registration, insurance, permitting, reporting of collision data, and interaction with law enforcement and first responders.
- *Collaboration, Communication, and Transparency* – Because a national pilot will ultimately be executed in state jurisdictions, NHTSA should maintain ongoing and frequent communications with the officials and the public in those jurisdictions throughout the planning, development, and implementation of any pilot projects. Data collected during the pilots should also be made available to States to further inform state-level activities related to automated vehicles.

Please see below for additional responses to selected questions from the advance notice of proposed rulemaking. We appreciate the opportunity to provide these comments and look forward to working with NHTSA on the development of the potential pilot program.

Question 1. What potential factors should be considered in designing the structure of a pilot program that would enable the Agency to facilitate, monitor and learn from on-road research through the safe testing and eventual deployment of vehicles with high and full driving automation and associated equipment?

- The CA DMV recommends:
 - NHTSA consider jurisdictional differences in Operational Design Domain (ODD) and determine what empirical data will be necessary to develop a set of minimum reporting standards to promote technology-neutral testing while respecting jurisdictions' regulations.
 - Real-time data reporting that follows a minimum standard of reporting definitions and requirements (i.e. what constitutes a disengagement, minimum amount of information when reporting collisions—weather, traffic, ODD, etc.).
 - Regardless of the level of autonomy, it is critical that manufacturers and developers provide information to law enforcement and first responders on how to safely interact with automated vehicles as they are tested and operated on public roads.

Question 2. If NHTSA were to create a pilot program, how long would there be a need for such a program? What number of vehicles should be involved? Should NHTSA encourage the conducting of research projects in multiple locations with different weather conditions, topographical features, traffic densities, etc.?

- The CA DMV cannot say with absolute certainty what timeframe and number of vehicles would be effective for a national pilot program. Assuming a set of minimum standards for data collection, reporting, and safety measurements, the sample size of automated fleets will likely be relatively small compared to the national conventional vehicle fleets.
- To gain a better understanding of how these vehicles will operate within the unique ODDs of multiple jurisdictions, the CA DMV encourages that research projects incorporate as many vehicles as possible and in a range of ODDs and locations.

Question 3. What specific difficulties should be addressed in designing a national vehicle pilot program for vehicles with high and full driving automation either through the exemption request process relevant for FMVSS or more broadly related to other areas of NHTSA and/or other authorities?

- Because a national vehicle pilot will ultimately be executed in state jurisdictions, NHTSA should maintain ongoing and frequent communications with those jurisdictions about new developments with the pilot fleet and testing participants. This should include notifications of approved exemptions and approved testing participants, sharing of reported data, formal information sharing summits, and protocols to keep an active partnership between federal and state-level stakeholders.
- The Department recommends NHTSA consider working with jurisdictions to develop uniformity and consistency in minimum standards for:
 - Determining testing parameters and conditions of pilot program participation.

- Measuring and evaluating the effectiveness of pilot program.
- Creating a standard of what data should be collected and developing a structure that allows jurisdictional access for additional independent analysis (open data clause).

Question 6. What vehicle design elements might replace existing required safety equipment and/or otherwise enhance vehicle safety under reasonably anticipated operating conditions?

- Automated vehicles are of nascent technology and demonstrate levels of advanced equipment that may replace current standard safety equipment, such as mirrors. Other elements that might replace existing required safety equipment, especially with driverless vehicles, is the need for the standard instrument cluster location or indicators on the vehicle dash as well as warning devices.
- Respectively, with the increase in automated technology in vehicles, it will be necessary to identify vehicle design elements that are specific to the operation of automated vehicles. For example, minimum standards on how to identify a vehicle as automated and operating in automated mode may require new adoption in the FMVSS or other design standards.
- For a national pilot, in the spirit of transparency and promoting trust in the technology and participants in the pilot, the CA DMV recommend NHTSA make the Voluntary Safety Self-Assessment (VSSA) mandatory for participation.

Question 8. How should the Operational Design Domains of individual vehicle models be defined and reinforced and how should Federal, State and local authorities work together to ensure that they are observed?

- NHTSA should work in collaboration with manufacturers and developers to define the intended ODD of pilot programs and the capabilities and limitations of pilot vehicles. Developing a minimum standard of testing parameters, vehicle classification, and participant business models as well as criteria for participation in the pilot will help identify which vehicles are eligible for specific ODDs.
- It will be critical to include the jurisdictions in which these pilots will operate in the planning, design, and execution of any pilot projects.
- To ensure that ODDs are observed, NHTSA should require that pilot vehicles are designed to be incapable of operating in automated mode in areas outside of the defined operational design domain.
- In addition, information should be provided to law enforcement and first responders within pilot jurisdictions on the defined ODD of the vehicle and how to safely interact with the vehicles during enforcement stops, emergencies, and other situations.
- As a condition of participation, NHTSA should require that pilot vehicles comply with state and local rules related to automated vehicles, including, but not limited to, requirements related to test driver licensing and training, vehicle registration, insurance, permitting, reporting of collision data, and interaction with law enforcement and first

responders. Additionally, pilot vehicles should be required to comply with each jurisdiction's traffic laws, rules of the road and other laws related to the operation of motor vehicles.

- As mentioned before, incorporating real-time sharing of data and hosting informational summits, as well as formalized two-way communication between state and federal stakeholders, can lend jurisdictional support to the national pilot and provide important data for future jurisdictional regulatory development.

Question 9. What type and amount of data should participants be expected to share with NHTSA and/or with the public for the safe testing of vehicles with high and full driving automation and how frequently should the sharing occur?

- For a national pilot, creating structure and requiring a minimum standard of the data format should be considered in order to share the information across jurisdictions. Participants in the program should be expected to adhere to these minimum standards and definitions to understand safety-critical situations occurring during testing, including:
 - Disengagements
 - Collisions
 - Incidents resulting in property damage, injury, or death
 - Near-miss reporting
- Such reporting could provide insights into causal factors of safety-critical incidents, driver interaction, behavior and interaction with other road users, weather and road conditions, and vehicle status and location of the incident.
- Many of the data elements identified in Question 15 are also likely to be of interest to jurisdictions and the public and will provide a more comprehensive picture of pilot outcomes. We encourage NHTSA to make these data points available to interested parties.
- In addition, NHTSA may wish to consider collecting data regarding the experiences of the test drivers of the AV and any passengers. Collecting information regarding human factors, experiences and reactions to the automated technology, and future use of automated vehicles could be utilized to help build trust for automated vehicles and inform the activities of local transportation authorities.

Question 10. In the design of a pilot program, how should NHTSA address the following issues—

- a. confidential business information?
- b. privacy?
- c. data storage and transmission?
- d. data retention and reporting?
- e. other elements necessary for testing and deployment?

- The testing program could be crafted to require reporting of data associated with vehicle safety, performance, and testing outcomes without requiring manufacturers to describe trade secret or technological data pertaining to the specific design and function of the automated vehicle.
- If testing is to be conducted on public roadways, data recording and storage would need to be standardized for law enforcement to access and read effectively as needed for the purposes of an investigation or other public safety purposes.
- All data collected for the program, whether it be strictly for the program or publicly divulged, should be both thorough and timely.

Question 11. In the design of a pilot program, what role should be played by—

a. The 12 safety elements listed in A Vision for Safety?

- The 12 safety elements should be a minimum standard foundation for the framework of a mandatory safety self assessments for pilot participants.

b. The elements listed below,

i. – v. The CA DMV does not have a comment at this time.

vi. Consumer education?

- In the spirit of transparency and promoting public awareness and acceptance, consumer education will be critical to the pilot program. NHTSA should collaborate with pilot participants, jurisdictions, and other stakeholders to ensure the public is informed of testing being conducted in their area.

vii. Post deployment Agency monitoring, updating, maintenance, and recalibration?

- The CA DMV supports continued agency monitoring post deployment and welcomes NHTSA guidance on how best to support these efforts at a state-level.

c. Are there any other elements that should be considered?

- Element 12, Federal, State, and Local Laws. It is critical that responsibility for setting the “rules of the road” and other requirements related to licensing, registration, and operation of vehicles (including automated driving systems) continue to be a state-level policy decision.

Question 12. Are there any additional critical areas to consider in the design of a safe pilot program for the testing and deployment of vehicles with high and full driving automation?

- Other than the aforementioned comments, the CA DMV strongly encourages jurisdictional input in the development and design of a national pilot. We also encourage NHTSA to exercise its authority in developing mandatory minimum standards and structure around the participation, reporting design elements, and accountability of manufacturers participating in the pilot program. The Department welcomes and

encourages NHTSA to take advantage of the resources state and other jurisdictional stakeholders can offer in partnering to support the development and launch of the pilot program.

Question 13. Which of the following matters should NHTSA consider requiring parties that wish to participate in the pilot program to address in their applications?

- a. “Safety case” for vehicles to be used in the pilot program (*e.g.*, system safety analysis (including functional safety analysis), demonstration of safety capability based on objective performance criteria, testable scenarios and test procedures, adherence to NHTSA’s existing voluntary guidance, including the submission of a voluntary safety self-assessment, and third party review of those materials).
 - CA DMV encourages NHTSA to make safety cases, or VSSA, mandatory for participants in the pilot program and make available on the NHTSA VSSA Index.
- b. Description of research goals, methods, objectives, and expected results.
 - The CA DMV does not have a comment at this time.
- c. Test design (*e.g.*, route complexity, weather and related road surface conditions, illumination and institutional review board assessment).
 - The CA DMV does not have a comment at this time.
- d. Considerations for other road users (*e.g.*, impacts on vulnerable road users and proximity of such persons to the vehicle).
 - See Q11.
- e. Reporting of data, *e.g.*, reporting of crashes/incidents to NHTSA within 24 hours of their occurrence.
 - The CA DMV recommends real-time, or as close to real-time data reporting to all jurisdictions involved in incident occurrences with an index available nationally for the public and other participating jurisdictions.
 - In addition to the timeliness of data reporting and sharing, the quality and consistency of the data to provide meaningful inference to the risk and causal factors is equally important. The CA DMV encourages NHTSA to develop a set of standards in which to test ADS ability to respond to safety critical situations.
 - Given that the pilot is launched to determine the best way to safely integrate automated vehicles into a mixed fleet, provide guidance to jurisdictions for future regulatory development, and offer critical data to jurisdictional municipalities for infrastructure development, the data collected should be highly consumable by stakeholders.

- f. Recognition that participation does not negate the Agency’s investigative or enforcement authority, *e.g.*, independent of any exemptions that the Agency might issue to program participants and independent of any terms that the Agency might establish on those exemptions, the Agency could conduct defect investigations and order recalls of any defective vehicles involved in the pilot program. Further, the Agency could investigate the causes of crashes of vehicles involved in the program.
- The CA DMV fully supports the Agency’s investigative or enforcement authority as it relates to defects and vehicle safety. As appropriate, NHTSA should involve state and local law enforcement in the investigation of any safety-critical incidents occurring within their jurisdictions.
- g. Adherence to recognized practices for standardizing the gathering and reporting of certain types of data in order to make possible the combining of data from different sources and the making of statistically stronger findings.
- h. For which types of data would standardization be necessary in order to make such findings and why?
- i. To what extent would standardization be necessary for those types?
- To answer G, H, and I:
 - The CA DMV encourages adopting a standard and shared taxonomy for reporting and recording technology failures and other safety critical system incidents.
- j. Occupant/non-occupant protection from injury in the event of a crash (crashworthiness).
- See Q 11
- k. Assuring safety of software updates.
- CA DMV does not have a comment at this time.
- l. – m.
- See Q 11

Question 15. What value would there be in NHTSA’s obtaining one or more of the following potential categories of data from the participants in the pilot program? Are there other categories of data that should be considered? How should these categories of data be defined?

- For all of the scenarios listed below in subsections a – k, the CA DMV feels this data is valuable for federal, jurisdictional, and public stakeholders to understand risk, ODD limitations, further ADS development, operating within a mixed fleet, public and vehicle safety, public acceptance, and impacts to infrastructure and transportation planning.

- a. Statistics on use (*e.g.*, for each functional class of roads, the number of miles, speed, hours of operation, climate/weather and related road surface conditions).

- b. Statistics and other information on outcome (e.g., type, number and cause of crashes or near misses, injuries, fatalities, disengagements, and transitions to fallback mechanisms, if appropriate).
 - c. Vehicle/scene/injury/roadway/traffic data and description for each crash or near miss (e.g., system status, pre-crash information, injury outcomes).
 - d. Sensor data from each crash or near miss (e.g., raw sensor data, perception system output, and control action).
 - e. Mobility performance impacts of vehicles with high and full driving automation, including string stability of multiple consecutive ADS vehicles and the effects of ADS on vehicle spacing, which could ultimately impact flow safety, and public acceptance.
 - f. Difficult scenarios (e.g., scenarios in which the system gave control back to an operator or transitioned to its safe state by, for example, disabling itself to a slow speed or stopped position).
 - g. Software updates (e.g., reasons for updates, extent to which updates are made to each vehicle for which the updates are intended, effects of updates).
 - h. Metrics that the manufacturer is tracking to identify and respond to progress (e.g., miles without a crash and software updates that increase the operating domain).
 - i. Information related to community, driver and pedestrian awareness, behavior, concerns and acceptance related to vehicles with high and full driving automation operation. For example, if vehicles with high and full driving automation operated only in limited defined geographic areas, might that affect the routing choices of vehicles without high and full driving automation? For another example, if vehicles with high and full driving automation are programmed to cede right of way to avoid collision with other vehicles and with pedestrians and cyclists, might some drivers of vehicles without such automation, pedestrians and cyclists take advantage of this fact and force vehicles with high and full driving automation to yield to them?
 - j. Metrics or information concerning the durability of the ADS equipment and calibration, and need for maintenance of the ADS.
 - k. Data from “control groups” that could serve as a useful baseline against which to compare the outcomes of the vehicle participating in the pilot program.
- l. If there are other categories of data that should be considered, please identify them and the purposes for which they would be useful to the Agency in carrying out its responsibilities under the Act.
- The CA DMV does not have a comment at this time.
- m. Given estimates that vehicles with high and full driving automation would generate terabytes of data per vehicle per day, how should the need for data be appropriately balanced with the burden on manufacturers of providing it and the ability of the Agency to absorb and use it effectively?
- The CA DMV does not have a comment at this time.

n. How would submission of a safety assurance letter help to promote public safety and build public confidence and acceptance?

- Submission of the VSSA or some equivalent process will provide greater transparency into how pilot participants are addressing safety and their approach to developing the technology. This would also provide States and the public with greater confidence that manufacturers are actively communicating and collaborating with U.S. DOT.

o. For all of the above categories of information, how should the Agency handle any concerns about confidential business information and privacy?

- The CA DMV does not have a comment at this time.

Question 16. How should the Agency analyze safety in deciding whether to grant such exemptions under each of the separate bases for exemptions in section 30113? Can the exemption process be used to facilitate safe and effective ADS development in an appropriate manner?

- The CA DMV supports U.S. DOT's balance of safety and innovation and leaves the determination for exemption processes to US DOT.

Question 22. If there are any obstacles other than the FMVSS to the testing and development of vehicles with high and full driving automation, please explain what those are and what could be done to relieve or lessen their burdens. To the extent any tension exists between a Federal pilot program and State or local law, how can NHTSA better partner with State and local authorities to advance our common interests in the safe and effective testing and deployment of ADS technology?

- The CA DMV fully supports the testing of automated technology as demonstrated by the California's Automated Vehicle Testing and Driverless Testing programs, and encourages frequent and continuous collaboration for future development of national and jurisdictional automated vehicle pilot programs.
- NHTSA can better partner with State and local authorities to advance common interests in the safe and effective testing and deployment of ADS technology by inviting collaboration in the testing structure and development of minimum safety standards for vehicles.
- It also critical that NHTSA recognize and reaffirm the important public safety role that States play through their traditional roles of licensing, registration, and traffic safety and enforcement. Such State functions can work as a complementary regulatory efforts to federal roles and responsibilities related to vehicle safety.