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Rules Docket Clerk
National Highway Traffic Safety Administration
1200 New Jersey Avenue, SE
Washington, D.C. 20590

Docket Number NHTSA-2018-0092

Submitted via Federal eRulemaking Portal http://www.regulations.gov

The American Traffic Safety Services Association (ATSSA or the Association) is pleased to submit the following comments regarding a possible Pilot Program for Collaborative Research on Motor Vehicles With High or Full Driving Automation, Docket Number NHTSA-2018-0092. ATSSA is a 503(c)(6) trade association that represents the manufacturers and installers of roadway safety infrastructure devices as well as numerous public agencies on both the state and local levels.

ATSSA submits these comments within the context of the United States Department of Transportation's (USDOT or the Department) Connected and Automated Vehicle Policy 3.0 whereby the Department's policy is to avoid favoring one technology over another and to allow connected and automated vehicles (CAVs) to develop without burdensome regulatory requirements. *The Association supports an approach whereby CAVs would be required to meet certain safety and performance standards* while leaving the methodology to attain those standards up to the private market.

In its section on Background and Overview, NHTSA states that "this ANPRM focuses on the related question of how the Agency can best encourage and facilitate the necessary research to allow for the development and establishment, as needed, of standards for ADS vehicles, including vehicles that have unconventional designs, can operate in "dual modes" (one of which may involve unconventional designs), and can comply with the existing FMVSS."

In addition, under Section I, NHTSA's Safety Mission, Authority, and Programmatic Needs With Respect to ADS, the ANPR states, in part: "Its vehicle safety mission is to save lives and prevent injuries due to road traffic crashes through a variety of means. More specifically, the Agency carries out its vehicle safety mission by:

- *Collecting real world data on the safety of motor vehicles and items of motor vehicle equipment;*
- *Conducting safety research;*
- *Setting FMVSS for new motor vehicle equipment (to which manufacturers must certify compliance before sale or introduction into interstate commerce). (emphasis added)*

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NHTSA has posed numerous questions in the ANPR in order to obtain input for the potential development of an ADS Pilot Program. Many of those questions are best answered by manufacturers of CAVs and public agencies that own the roadways that might be used for "real world" pilot testing.

Therefore, ATSSA has limited its comments to a few select questions which it believes would have a substantial impact on the safety of all road users in a CAV or "mixed fleet" (of automated and human driven vehicles) environment.

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 development of vehicles with high and full driving automation and associated equipment?

One challenge is the inconsistent, non-uniform markings as well as application uniformity on permanent and temporary conditions (markings - intersections, ramps, lane transitions, etc., signing – horizontal curves, advisory speeds, lane control, etc., signals – position with respect to approach lane), maintenance (particularly with respect to markings), and to some extent, design (markings – contrast, width, retroreflectivity, signals - configuration).

One of the most important factors for CAV implementation will be the ability of the vehicle to operate within the confines or boundaries of our current infrastructure. This is commonly referred to as "lane keeping," but may also be thought of as the vehicle's "guidance system." There are several methodologies under development for lane-keeping purposes, including system "mapping" (currently limited to larger cities or metropolitan areas), GPS, and "reading" of lane markings. At this juncture, there are no standards for any of these methodologies. ATSSA suggests that a pilot program could collect data regarding the performance of CAVs in each of these areas. For example, it would be highly useful to have actual data regarding the extent to which CAVs can "read" the lane markings for guidance purposes and under what circumstances (e.g. level of deterioration of the markings) they are unable to do so. Collection of this data could be useful to the eventual development of a lane-marking standard for CAVs by the Federal Highway Administration (FHWA). Furthermore, this activity would be consistent with Secretary Elaine Chao's announcement at the release of USDOT CAV 3.0 that the Manual on Uniform Traffic Control Devices (MUTCD) would be scheduled for update in 2019, in part to begin to address the need for standardization of traffic control devices for a CAV environment.

Level 4 and 5 vehicles may not be solely dependent on signs and markings but will continue to use these assets for redundancies. Infrastructure changes must be done in a way that maintains a high level of design and safety that has been established for human drivers—while improving the performance of the technologies that provide ADS. If one method of keeping the car on the road fails (i.e.: it's snowing and the car can't see the pavement markings), another technology must be able to takeover (cloud based real-time mapping, in this case).

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.?

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There should be a focus on all types of roadway conditions as well as roadway classifications. This would include, but not be limited too urban, rural, suburban, central business districts, low and high vehicular volume, low and high pedestrian volume, low and high bicycle volume, various geometric conditions, and various climates.

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 process relevant for FMVSS or more broadly related to other areas of NHTSA and/or other authorities?

Although ATSSA is not aware of any specific data points regarding CAV performance in roadway work zones, it appears that there is general agreement that work zones pose a particular challenge for CAVs, especially in relation to their guidance systems. For example, it has been reported that CAVs sometimes have difficulty distinguishing between lane marking that have been removed due to the residual "shadow marking" and temporary markings installed for guidance in an active work zone. Again, while there is no specific data point, it has been observed that CAVs that use mapping systems for guidance may encounter a similar problem as work zones will be established after mapping is completed. Indeed, some work zones such as those for utility operations may be very short duration activities and may not be marked with temporary markings and will never be mapped. It is important that data be collected as input for future requirements for CAVs to ensure that both motorists and roadway workers are safe.

Both non-uniform and "near uniform" devices may pose a significant problem. They can appear in non-approved situations where a contractor is trying to protect his work area with examples that have a wide range of non-compliance from unpainted wooden structures to battered barricades and signs. Non-uniform devices will require that ADS developers and programmers design their systems with more robust algorithms to determine the proper course of action when encountering a non-standard traffic control device. Potentially, the ADS may be strained to identify, classify and interpret the devices and act on that information. Additionally, there is currently a large variety of "uniform" devices used on the nation's roadways, including traffic cones of various sizes, drums, channelizers, stacker cones, vertical panels, and even barricade – all these devices will need to be understood by ADS when crossing state or jurisdictional lines.

Pedestrians and bicyclist may pose a problem and data needs to be collected on their interactions. Criterial or logic needs to be hard and fast on bike and peds. The logic has to be do not hit ped or bike as the number one priority.

Question 7. What types of performance measures should be considered to ensure safety while allowing for innovation of emerging technology in vehicles with high and full driving automation participating in a pilot program?

As a leader in the road safety industry, ATSSA was the very first membership association to support the nationwide Toward Zero Deaths (TZD) initiative. The TZD national strategy on highway safety calls for all stakeholders to champion the effort with deliberate action. With the notion that one death is too many, we all must move the message forward to bring down the number of annual deaths...to zero. Many organizational stakeholders, along with ATSSA, understand our vital role as a conduit for change. A collaborative effort is needed, through the public and private sector, to push the initiative in a way that evokes emotion and induces action.

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With this in mind, ATSSA feels that following should be considered as the minimum for safety performance measures:

1. Number of Fatalities
2. Rate of Fatalities per 100 million Vehicle Miles Traveled (VMT)
3. Number of Serious Injuries
4. Rate of Serious Injuries per 100 million VMT
5. Number of Non-motorized Fatalities and Non-motorized Serious Injuries
6. Close calls or near misses that may not register a crash.

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?

ATSSA's believes that Operational Design Domains during pilot programs should consider restricting vehicles operating in and around active work zones. Public agencies can not allow these vulnerable road users to incur additional risks posed by incomplete technologies. Federal, State and Local authorities should work together on vehicle data transmission to ensure these experiments are run as safely as possible.

NHTSA and FHWA need to closely coordinate on pilot projects and what is learned from them. This information should be given to those interested in what might be done to make the infrastructure work better for whatever technology is being used by AVs. This will enable design techniques to be developed and implemented that help things work better together.

There needs to be better standardization of the vehicle black boxes. Set standards for what data is to be collected and what type of down load cable and set up is needed and make this information available to local law enforcement. Additionally, the technology should have the ability to obey local, state and federal laws, for example by recognizing speed limits for all road types.

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?

ATSSA believes that any data that is relevant to the safe operation of CAVs in any circumstances should be shared with both NHTSA and the public. The Association has projected that we will have a mixed fleet of CAVs and human driven vehicles for the next several decades. Therefore, the interaction of CAVs and human driven vehicles should be a particular area of focus. Aggregated data that does not identify vehicles by type or manufacturer can be especially important to the future development of public information messages, and perhaps even driver training, as we go through this transition period.

When designing a pilot program, NHTSA should address the transmission of data from infrastructure and the vehicle. NHTSA must investigate how the vehicle synthesizes data from lane closures, road work, and other infrastructure components including signage and pavement markings. This information can be used to determine optimum integration between physical infrastructure and machine vision.

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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?

Presently, some CAV testing is done in a "protected environment" such as a test track specifically designed for this purpose, while others have been tested on public roads. Some of the public road tests have also resembled a "protected environment" in that roadway markings have been updated prior to the test or traffic has been detoured during the test. It will be important that considerable future testing is done under "real world" conditions. Again, these real-world conditions must have a mixed vehicle fleet as that is a likely scenario for decades to come and it will be important to determine: 1.) safe practices for automated and human driver interaction; and, 2.) the extent to which roadway safety infrastructure devices such as markings, signs, messaging devices etc. will need to be adapted to safely serve the mixed vehicle fleet. A specific example in this area would be that both human and automated drivers need to receive *the exact same message* when they encounter a roadway work zone so that their own safety as well as that of roadway workers is ensured.

Other additional items include:

- Pedestrians and bicyclist may pose a problem and data needs to be collected on their interactions.
- Use of audible sounds to notify pedestrian and bicyclists of any conflicts
- Use of alarms within vehicle to notify occupants of a failure.
- Number of times a vehicle malfunctions and safely navigates off the road, or hands control back to the human driver.

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?
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).
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).

All of the items addressed under Question 15 have a direct or indirect impact on safety, not only for the CAVs, but also for the human drivers who share the roadway. It will be of great importance to gather relevant data to: 1.) provide feedback to the manufacturers collectively to enhance the safety aspect of all CAVs (i.e. while some manufacturers *individual* data collection efforts may result in incremental improvements in safety, the *collective* data could result in more significant improvements in this area); 2.) provide information to roadway owners regarding infrastructure safety devices and how they function; 3.) provide information to the roadway safety industry so that improvements can be made to existing devices or new devices created to ensure safe V2I interaction; and, 4.) provide information to USDOT/FHWA for future potential rulemaking regarding infrastructure devices and practices to maximize safety benefits to all road users.

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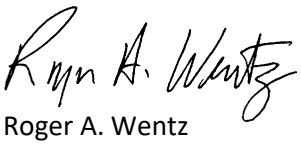
ATSSA thanks the National Highway Traffic Safety Administration for the opportunity to provide input to a potential pilot program. We and our members stand ready to assist and support USDOT/NHTSA/FHWA as CAVs become a reality.

Very truly yours,



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