



January 2, 2020

The Honorable Roger Wicker  
Chairman  
Senate Committee on Commerce, Science,  
and Transportation

The Honorable Maria Cantwell  
Ranking Member  
Senate Committee on Commerce, Science,  
and Transportation

The Honorable Frank Pallone, Jr.  
Chairman  
House Committee on Energy and Commerce

The Honorable Greg Walden  
Ranking Member  
House Committee on Energy and Commerce

The Honorable John Barrasso  
Chairman  
Senate Committee on Environment & Public  
Works

The Honorable Tom Carper  
Ranking Member  
Senate Committee on Environment & Public  
Works

The Honorable Peter DeFazio  
Chairman  
House Transportation & Infrastructure  
Committee

The Honorable Sam Graves  
Ranking Member  
House Transportation & Infrastructure  
Committee

**RE: Federal Automated Vehicle Legislation**

Dear Chairman Wicker, Ranking Member Cantwell, Chairman Pallone, Ranking Member Walden, Chairman Barrasso, Ranking Member Carper, Chairman DeFazio and Ranking Member Graves,

On behalf of the San Francisco Municipal Transportation Agency (SFMTA), we thank you for the opportunity to provide comments on recently released provisions of a proposed forthcoming automated vehicle bill. As a testing ground for automated driving systems (ADS) and a likely early deployment location, San Francisco is pleased to provide our input and feedback.

As discussed further below, in order to provide an evidence-based foundation on which to build public confidence in automated driving technology, federal legislation should provide for testing and deployment of automated driving in a controlled manner that enables public agencies with relevant jurisdiction at all levels of government to incrementally assess the



benefits and risks of driving automation and, based on that incremental assessment, establish guardrails to ensure that benefits to the general public substantially outweigh the risks and challenges.

The periodic release of separate sections of the proposed bill makes it difficult to assess the proposed language according to this or any other standard. We may have substantial additional comments on the sections already released and those that remain forthcoming once a full draft is available. Until that time, we address key concerns here and in the attached line edits on the definitions and safety standards sections.

### **Automated Driving in San Francisco**

San Francisco has the second highest population density in the nation, and we are a hub of private innovation. Our temperate weather, concentration of early adopters and ride-hail users, highly skilled labor force, and road complexity make San Francisco a challenging but attractive testing ground for the development of Highly Automated Vehicles (HAVs). As we understand it, the vehicles currently testing in San Francisco are conventional automobiles with human controls that comply with federal motor vehicle safety standards but have been equipped with an automated driving system. Companies that have chosen to test their ADS software here have reported that testing on San Francisco's urban streets allows them to improve their software by exposing it to large densities of road users and a high frequency of unusual driving situations. We estimate that more than 200 ADS equipped vehicles test with safety drivers on our streets each day, and we meet with these and other ADS companies regularly.

Based on our direct observations and discussions with industry leaders, HAVs are still under development. They will require considerable additional testing, validation and evaluation in this driving environment before they can operate safely and reliably on San Francisco roads without a human test driver. They are continuing to learn how to perceive differences in expected behavior among different human road users (i.e. construction workers, pedestrians, traffic control officers) and how to navigate our dense intersections without making sudden unexpected stops that can challenge other drivers. Meanwhile, partially automated vehicles are already on the market with features that could significantly reduce injury collisions. We hope both partially automated vehicles and highly automated vehicles (HAVs) will advance our Vision Zero goal to eliminate traffic related injuries and fatalities on our streets.

The SFMTA is a unique agency nationwide because, within a single organization, we have responsibility for delivering public transit service; designing, managing and operating city streets for multi-modal use; managing on and off-street parking facilities; enforcing parking and traffic laws, and regulating privately operated mobility services that are not regulated at



the state level. San Francisco's front row seat to private innovation combined with the broad powers of the SFMTA give us a unique perspective on both the potential benefits that driving automation may bring to urban roads and the challenges that need to be addressed to support public acceptance of driving automation.

We understand there to be four companies actively testing in San Francisco and we expect the number of companies and the number of test vehicles to grow in the coming year. Most of these companies hope to offer passenger service in a fleet of HAV ride-hail vehicles using a business model similar to that of transportation network companies (TNCs).

TNCs have met certain important transportation needs, but they have also posed new challenges to the San Francisco transportation network, and these challenges inform our thinking about HAV passenger service fleets. A 2019 Fehr and Peers report that analyzed TNC mileage as a share of all vehicle miles traveled (VMT) in six metropolitan cities found that TNCs made up 12.8% of all vehicle miles driven in San Francisco. This is by far the highest percentage of all cities in the study. (Boston had the second highest share of TNC VMT with 8%.) A significant portion of those miles reflect "deadhead" driving when there is no passenger in the vehicle. The San Francisco County Transportation Authority found that TNCs accounted for about half of the total increase in congestion in the City between 2010 and 2016, with growth in population and employment responsible for the other half. (See [TNCs and Congestion](#).) TNC driving has also contributed to significant street safety problems and has increased travel time for passengers on our high capacity transit vehicles.

Working closely with ADS companies, we hope HAVs can learn to safely and smoothly operate on San Francisco roads in a manner that complies with state and local traffic laws, reduces injury and fatal collisions, minimizes "deadhead" or unproductive driving, and avoids reducing the overall efficiency of our transportation network.

### **Comments on Draft Legislation**

First, we recognize and appreciate that the six sections released to date include significant improvements over previous draft legislation. We appreciate the requirements that the Secretary:

- 1) Develop a "Safety Priority Plan";
- 2) Initiate a rulemaking to guide OEM "Safety Assessment Certifications" based on test results, data and other manufacturer submissions;



- 3) Require OEMs to install driver engagement systems in partially automated vehicles and highly automated vehicles;
- 4) Develop Federal Motor Vehicle Safety Standards (FMVSS) addressing use of partial driving automation outside the operational design domain for which it was intended;
- 5) Update existing FMVSS to address methods for objective and practical determinations of compliance with FMVSS by dedicated HAVs;
- 6) Require exemption applications to incorporate a detailed analysis of how a vehicle promotes transportation access for individuals with disabilities; and
- 7) Establish a searchable database for motor vehicles that have been granted an exemption from FMVSS.

In addition, we were pleased to read that the Fiscal Year 2020 Transportation, Housing, and Urban Development (THUD) appropriations bill included \$5M to create a new “Highly Automated Systems Safety Center of Excellence.” However, we also have significant concerns about the texts, as discussed below.

### ***Pace of Growth in Relation to Safety Accountability***

The proposed text on *Motor Vehicle Safety Standards for Automated Vehicles* [PAT19A73] and *Relationship to other Law* [PAT19A78], when taken together, propose a circumstance in which it may take the federal government 10 years to enact federal regulations to assess, validate and set standards for the safety performance of a highly automated vehicles. Within the first four of those ten years after enactment, according to the language of the *Highly Automated Vehicle Exemptions* section [PAT 19934], each manufacturer who applies for an exemption from FMVSS may be authorized to put as many as 175,000 highly automated vehicles *without human controls* on public roads.

For a variety of reasons, California may continue to be one of only a handful of states with a significant volume of HAV testing on public roads for several years, and within California, a substantial share of current test driving occurs in San Francisco. Yet the number of vehicles testing regularly on public streets is under three hundred.

Under the proposed text, San Francisco could see dramatic growth in driving automation on City streets long before federal safety standards are adopted. If three manufacturers deployed a quarter of the potentially authorized 175,000 vehicles in California, and half of those vehicles were deployed in San Francisco, we would face the potential for growth from less than 300 HAVs to more than 6,000 HAVs in four years. Coincidentally, this is roughly equivalent to the number of TNC vehicles that we understand to currently operate in San Francisco during peak commute times. This volume of vehicles has had significant impacts on everyone who travels



on San Francisco Streets. We can't know how this volume of ride-hailing vehicles without human drivers could affect the San Francisco transportation network; however, it is reasonable to assume that the impacts could be very significant.

This potential growth of HAVs with no human controls (given the volume of FMVSS exemptions authorized in the proposed text) is in addition to potentially unlimited growth in testing or deployment of vehicles operated by an automated driving system that retain human controls and do not need FMVSS exemptions. Rapid growth in automated driving in vehicles with and without human controls will make it extremely challenging to monitor, recognize, and analyze HAV impacts and work with both companies and regulators to address problems and concerns as they arise. In the early stages, we think public confidence in driving automation is best served by a pace of growth that allows for thoughtful response, and we urge Congress to provide for incremental, rather than exponential, growth.

### ***Relationship to Other Law***

During an initial period of potentially rapid growth, the draft legislation proposes to make an extraordinary change that could affect state and local authority to respond to problems that may arise from growth in automated driving. Under current law, state and local governments are generally preempted from regulating an issue that is addressed in federal motor vehicle safety standards, except to the extent a state or local regulation is identical to a federal regulation. Generally, state and local governments must yield where the federal government has adopted a specific motor vehicle safety standard, but they remain otherwise free to regulate motor vehicle operations, performance and safety as they find necessary to address state and local concerns. The federal preemption language in the current Motor Vehicle Safety Act poses no threat to the wide range of regulatory powers commonly exercised by state and local governments with respect to motor vehicles.

By contrast, while recognizing that it may take the federal government *ten years* to adopt safety standards for highly automated vehicles, the proposed sections suggest that state and local governments will be immediately prohibited from regulating the "design, construction or performance" of highly automated vehicles. As discussed in other state and local comments, there remains tremendous ambiguity about what is meant by 'performance.' Many state and local powers could be construed as regulating performance and thus being preempted. Only a handful of those powers are specifically enumerated and protected in the proposed "preservations of authority", and the language regarding preserved authority is full of ambiguity. The preemption and preservation language, taken as a whole, generates significant risk of potential industry challenges to legitimate exercise of state and local power to protect the public.



The recent National Transportation Safety Board (NTSB) recommendations arising from investigation of the Uber ATG collision in Tempe, Arizona that killed Elaine Hertzberg include the recommendation that in the absence of federal safety standards and assessment protocols for automated driving systems, states can improve the safety of testing by implementing a thorough application and review process before granting testing permits. Federal legislation must not interfere with state efforts to follow this recommendation.

**Separately and together, local, state and federal governments must have the capacity to address the many “unknown unknowns” that may arise from testing and deployment of this revolutionary technology.** A vague and ambiguous but immediate prohibition on potential state and local action to respond to issues and problems that may arise from HAV operations is unacceptable.

We appreciate that differences among state and local laws pose significant challenge to the driving automation industry. We are committed to working with colleagues from other cities and states to promote consistent approaches that can facilitate the development of automated driving technology that is actually demonstrated to improve road safety. As to differences that remain, while we have not offered line edits to the proposed text, we welcome further discussion with committee staff and other stakeholders about alternative approaches to this challenge.

### ***Federal Safety Accountability Methods***

San Francisco streets are documented to be especially challenging for automated driving. According to the Voluntary Safety Self - Assessment filed with NHTSA by GM/Cruise, vehicles testing in San Francisco predict an average of 32 times as many “possible interactions” per thousand miles of driving as those testing in Phoenix. Possible interactions reflect the number of other roadway users and objects in a test vehicle’s path for which the system must accurately perceive, identify, *classify*, and predict paths and plan and execute a safe response. The NTSB’s recent findings from the Elaine Hertzberg fatality illustrated the critical importance of each of these steps. The NTSB found that the vehicle’s automated driving system did not accurately classify Ms. Hertzberg in the seconds leading up to the crash and thus failed to accurately predict her path so the vehicle could safely avoid her. This occurred in a driving environment that is far simpler than the driving environment found on San Francisco streets.

Federal safety performance expectations must reflect the challenge of automated driving in dense, urban environments like San Francisco. Automated driving companies must *demonstrate* that they can fulfill the promise of improved safety in all driving environments where they hope to operate – including the Operational Design Domain of congested urban streets with a high concentration of vulnerable road users.



Federal AV legislation should provide for two critical forms of information to support evaluation of automated driving performance: (1) mandatory event data recorders for partially automated vehicles and vehicles with an ADS, and (2) a national ADS incident database.

**First, the legislation must provide specific guidance for immediate updating of the event data recorder (EDR) requirements for every vehicle equipped with a partially automated driving system or an automated driving system.** EDRs should be mandatory on all vehicles with a partial or automated driving system; a voluntary standard that explicitly excludes valuable information such as audio and video data is not sufficient. *The EDR on an HAV should be required to retain all relevant information from all sensors supporting automated driving functions for a specified period before a collision or other safety incident.* Congress should prescribe minimum standards for EDRs on HAVS that address what they must accomplish, when the regulations must be finalized, and when they will be effective.

**Second, Congress should direct NHTSA to develop a publicly available national incident database that collects safety incident information from all vehicles testing ADS on public roads.** This would ensure that government gathers sufficient information to measure the safety performance of ALL automated driving systems tested on public roads – whether in conventional vehicles equipped with an ADS or in vehicles that have received an exemption from one or more Federal Motor Vehicle Standards and whether in vehicles supervised by human safety driver, or vehicles in which there is no human safety driver. This database will facilitate research on ADS safety performance and inform the proposed NHTSA safety self-certification requirements and safety standards.

In addition to these foundational information gathering tools, consistent with recent NTSB recommendations following the fatal ADS collision in Arizona, **the Secretary should establish a process to evaluate and make publicly available the content of Safety Self-Assessment reports and determine whether vehicles with ADS are safe enough to test on public roads. Through report evaluation, NHTSA should determine whether manufacturers incorporate appropriate safeguards for testing in vehicles with ADS.**

As addressed in our line edits in the Section on Updated and New Motor Vehicle Safety Standards for Automated Vehicles (PAT 19A73), many driving assistance systems on the market today show great promise for significantly improving road safety. **This legislation should require NHTSA to move promptly to develop standards for the most promising collision warning and collision intervention features and make them standard equipment on all vehicles sold in the United States.**

At the same time, over-reliance on driver assistance features creates tremendous hazards and can also pose significant challenges for state and local law enforcement. A recent incident in





the Bay Area demonstrated the extraordinary resourcefulness of the California Highway Patrol, but this resource intensive effort required to guide a single vehicle off the highway cannot be allowed to become the norm. (See [A Sleeping Tesla Driver Highlights Autopilot's Biggest Flaw](#)).

**Congress should require NHTSA to move promptly to develop standards to require driver engagement systems *that ensure drivers maintain the level of awareness and engagement necessary to safely operate a motor vehicle and that take appropriate fallback actions to protect public safety in the absence of such awareness and engagement.*** It is not enough to simply, as the draft text suggests, alert human drivers when they are not demonstrating adequate awareness and engagement. Because vehicles raising these hazards are on the road today, these standards need immediate attention.

Furthermore, **driver engagement systems must be required for any highly automated vehicles *that could ever be operated by a human driver (i.e., all HAVs that are not Dedicated HAVs).*** The current text limits their application to vehicles with Level 3 features, but vehicles could be marketed that have features with Level 4 capability but retain human controls so they can be operated with or without a human driver. If there is reason for driver engagement standards to be different as between partially automated vehicles and highly automated vehicles, the legislation should establish an earlier date for completion of the standards to mandate driver engagement systems in partially automated vehicles because these vehicles are already on the market and being operated on public roads.

### ***Federal Motor Vehicle Safety Standards Exemptions***

As discussed above, we have grave concerns about the large number of exempt vehicles – potentially without any human controls – proposed to be authorized by this text. Exemption caps that are expressed on a nationwide manufacturer basis disregard a key concern of local governments – the potential for a dramatic increase in the concentration of ADS-equipped vehicles on public roads before safety standards have been developed and before OEMs have demonstrated the capacity to meet those standards and improve on the performance of human driving. **To the extent large caps are retained, we recommend that they be broken down according to deployment geography to prevent concentration in any one or small number of locations – as well as to allow for development of public information about ADS performance in different Operational Design Domains (ODDs). State and local governments should be involved in administering a regional approach to exemption caps.**





### ***HAV Advisory Council***

A HAV Advisory Council may be useful and appropriate to convene to support consideration of a specific issue area; however, an Advisory Council is not a substitute for a mandate to develop automated driving safety standards.

If an HAV Advisory Council is convened to consider general matters that impact the public interest, **both State and local governments should be represented on the Advisory Council.** State and local governments play significantly different roles and have specialized areas of expertise. For example, the California Highway Patrol's experience responding to incidents involving partially automated vehicles on highways and the SFMTA's observations of HAV interactions with transit vehicles or with particular street designs are very different. While the two agencies' experience vary, they are equally important in advancing public knowledge and understanding of this developing technology. Both state and local expertise are essential to safe and successful testing and deployment of Automated Driving Systems and to public acceptance of these systems.

**Public transit agencies should also be represented on an HAV Advisory Council since they could be profoundly affected by Automated Driving Systems – even where they are deployed only in passenger vehicles.** ADS-equipped passenger vehicles sharing the road with transit vehicles must understand the unique behaviors of each vehicle type and their passengers. For example, passengers on cable cars board and alight on all sides of the cable car and often in the middle of the traffic lane, whereas passengers can only alight through doors that open on one side of Muni Light Rail Vehicles. In addition, an ADS-equipped passenger vehicle carrying a single passenger should not slow down transit vehicles moving large volumes of people by driving or stopping in a bus lane or by waiting for long intervals at an intersection to process its surroundings. These examples illustrate that transit agencies are important informants regarding HAV performance.

Finally, while the draft text calls for inclusion of "disability organizations," it is essential that any HAV Advisory Council include organizations representing people who need wheelchair accessible vehicles, as well as organizations that may focus on other specific disabilities.

### ***Funding for Federal, State, and Local Governments to Support Safe Testing***

Although funding is not addressed in the draft legislative text, **Congress should ensure that NHTSA, the NTSB, and other US DOT operating divisions, including FHWA, FTA, and FMCSA receive adequate funding to closely monitor and analyze information collected from vehicles testing ADS on public roads to understand how the safety performance of ADS compares with the safety of vehicles driven by humans and develop data-**



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Jeffrey Tumlin, Director of Transportation

**driven safety standards.** This includes vehicles operated by human drivers who are supported by key ADAS collision warning and collision intervention systems such as pedestrian and bicycle detection and automated emergency braking. The \$5 million that was recently announced in the 2019 spending bill (H.R. 1865) to create the “Highly Automated Systems Safety Center of Excellence” is a good first step.

Congress should additionally allocate resources to state and local governments to support collaborative research with NHTSA in localities with different Operational Design Domains.

### **Conclusion**

We thank you for the opportunity to comment on this foundational draft legislation regarding Automated Driving Systems. We will continue to work with companies testing driving automation in San Francisco in hopes that collaboration will help ensure that automated driving reduces injury and fatal collisions on our streets and enhances mobility and independence for populations who most need it. We look forward to reviewing the entire legislative proposal to provide more comprehensive and nuanced comments in the future.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Jeffrey P. Tumlin'.

Jeffrey P. Tumlin  
Director of Transportation