

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE

STATE OF CALIFORNIA

Order Instituting Rulemaking on Regulations
Relating to Passenger Carriers, Ridesharing,
And New Online Enabled Transportation
Services

R.12-12-011

**OPENING COMMENTS OF THE SAN FRANCISCO MUNICIPAL TRANSPORTATION AGENCY AND SAN
FRANCISCO COUNTY TRANSPORTATION AUTHORITY ON ALJ RULING ORDERING PARTIES TO
COMMENT ON QUESTIONS REGARDING CPUC REGULATION OF AUTONOMOUS VEHICLES**

QUESTIONS 2-8

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In response to the December 19, 2019 Administrative Law Judge Ruling Ordering Parties to Comment on Questions Regarding the Commission’s Regulation of Autonomous Vehicles (the “ALJ Ruling”), the San Francisco Municipal Transportation Agency (“SFMTA”) and the San Francisco County Transportation Authority (“SFCTA”) submit these joint Opening Comments on Questions Two through Eight. Because our comments do not follow the order for the questions set forth in the ALJ Ruling, Exhibit A provides a brief overview of our answers for the Commission’s convenience.

I. INTRODUCTION

The automated driving industry offers an exciting vision for a better future. Every company working on the challenge of driving automation hopes to achieve a revolution in traffic safety.¹ Some companies also articulate a goal to reduce greenhouse gas emissions (GHG)² or end traffic congestion.³ Still others envision expanding mobility for people with a disability in the United States who have difficulty accessing transportation.⁴

¹ See, e.g., Waymo’s mission includes saving thousands of lives now lost to traffic crashes. Waymo Safety Report: On the Way to Fully Self Driving, accessed on February 1, 2020.

² See, e.g. Zoox goal to “connect people and places in wonderful ways, while at the same time. . . . reducing harmful greenhouse gas emissions.” Safety Innovation at Zoox, accessed on February 1, 2020.

³ GM Cruise states the mission to “bring our vision of a world of *zero crashes, zero emissions* and *zero congestion* to life.” General Motors 2018 Self Driving Safety Report, accessed on February 1, 2020.

⁴ “Aurora Driver” will “expand access for the 11 million people with a disability in the US who have difficulty accessing transportation.” Aurora Innovation: The New Era of Mobility, p13. Accessed on February 1, 2020. US DOT reports suggest that this is a significant undercount. According to Travel Patterns of American Adults with Disabilities, Author: Stephen Brumbaugh, US DOT Bureau of Transportation Statistics Publication Date: September 2018 URL: <https://www.bts.gov/sites/bts.dot.gov/files/docs/explore-topics-and-geography/topics/passenger-travel/222466/travel-patterns-american-adults-disabilities-11-26-19.pdf>, 25.5 million Americans have self-reported travel-limiting disabilities (8.5% of the

This vision aligns with many State of California goals that have been established by statute, regulations adopted under statutory mandate, and a number of state agencies acting through Constitutional or statutory jurisdiction -- including the Commission. The question of whether automated driving will fulfill this vision -- or will instead create a series of new problems in need of solutions -- will be answered by public policy choices.⁵ If AV Passenger Services are not explicitly expected to support California transportation, climate and equity policies and public investments, there is great risk they will instead undermine them. We believe a fair and competitive market for sustainably deployed AV Passenger Service may help us address San Francisco transportation challenges, and we welcome partnership with the industry and with the Commission to achieve transportation solutions through automated driving.

As the primary permitting authority for passenger service in California, the Commission should ensure that AV Passenger Services support state transportation policies and corresponding taxpayer investments. Under the Commission's pilot test program as it was enacted by Decision 18-05-043, AV Passenger Service providers who have obtained a permit can use public streets to test the basic safety engineering of their automated driving systems and their interaction with passengers and other aspects of service involving loading and unloading passengers. The industry argues that they must be able to charge for this service in

population). 3.6 million Americans with travel-limiting disabilities do not leave their homes because they are disabled or housebound.

⁵ Federal, State, and Local Governance of Automated Vehicles, UC Davis Institute of Transportation Studies & Policy Institute for Energy, Environment and the Economy, 2018. https://policyinstitute.ucdavis.edu/wp-content/uploads/AV-Governance_IssuePaper_1218.pdf

order to evaluate the commercial viability of different product approaches, and the SFMTA and SFCTA do not dispute the value that permittees would gain from testing interactions with passengers in a context that involves charging for service. However, during the pilot stage, evaluation of these commercial considerations must also consider how different product features will impact the overall transportation network and the state’s environmental and equity goals. **The Commission should encourage AV Passenger Service permit applicants to collaborate with public agencies to test service models during the pilot phase.** The goal of these collaborations should be to test, demonstrate, and validate methods for commercially successful deployment of AV Passenger Services that also supports and enhances achievement of the State of California’s goals. The SFMTA and SFCTA see many opportunities for such demonstrations, but they likely cannot be effectively achieved without public agency collaboration.

At the current stage of industry development – where there are fewer than 500 vehicles equipped with automated driving systems testing on California roads and companies are testing basic road readiness in a small number of communities reflecting different driving environments”⁶ -- it is still too premature to set clear and uniform statewide performance standards and indicators for deployment of AV Passenger Services along virtually any dimension. But that does not mean the Commission cannot take meaningful steps to outline a path to deployment of AV Passenger Services. It is reasonable for the industry to want clarity

⁶ This figure comes from disengagement reports posted by the DMV in early 2019. The underlying reports can no longer be directly accessed on the DMV website. New reports are expected shortly reflecting the period December, 2018 through November, 2019. <https://www.wired.com/story/new-robo-car-report-card-not-what-it-seems/>

about ultimate goals for deployment of AV Passenger Services so that development investments can be directed toward those goals without fear that they will be moved significantly.

In other words, **we agree with the industry that it is a high priority for the Commission to articulate expected outcomes or goals *now* for the AV Passenger Service deployment phase** – even if specific and uniform methods to assess performance in relation to those goals will take more time to develop. In many subjects, state goals are well established and can be easily adapted to guide deployment of AV Passenger Service.

II. Path to Deployment: CPUC Permitting Should Establish a Path to Deployment That Creates Incentives for Driving Automation Permittees to Meet Public Purpose Goals in Collaboration with Other Public Agencies.⁷

Questions 2 through 2.12.1 all address whether and how the Commission should incorporate a variety of goals into its AV Regulatory Framework. The SFMTA and SFCTA believe that regulating emerging transportation technologies is most effective in developing a fair competitive market that starts with a statement of desired outcomes and allows different companies to demonstrate different methods for reaching those outcomes in a technology neutral manner. We recommend that the Commission adopt goals consistent with or derived from goals previously enacted by the Legislature, peer agencies with complementary jurisdiction, and the Commission itself. We offer the following as proposed goals that address many of the key risks and opportunities arising from AV Passenger Service. (The statutory or

⁷ Question 2 of the ALJ Ruling poses a series of questions related to Commission goals – including questions about *how* the Commission should incorporate certain goals into its regulatory framework. This section addresses the general question of how the Commission should use goals in regulating AV passenger services. The specific subject matter of particular goals, such as safety (Question 2.1), accessibility (2.2, 2.3, 2.4, 2.5, 2.6) equity and environmental justice (2.7) and climate (2.10, 2.11) are addressed in Section 3: Proposed AV Passenger Service Goals.

other support for each goal and risks to be managed with respect to each goal are discussed in Section 3: Proposed AV Passenger Service Goals):

1. Street Safety Goal: AV Passenger Service should improve safety for all road users
2. Personal Safety Goal: AV Passenger Service should ensure personal safety for all passengers, especially vulnerable passengers
3. Environmental Goal: AV Passenger Service should reduce GHG and air quality hazards in California
4. Objective 1: AV Passenger Service should help reach the California goal of reducing vehicle miles travelled (VMT) by 15% compared to 2050 expected levels and should support rather than supplant more efficient modes, including high capacity transit, walking, and biking (as appropriate to location and trip length)
5. Objective 2: AV Passenger Service should help reach California's EV adoption targets
6. Equity Goal 1: AV Passenger Service should provide equivalent service to people with disabilities, including people using wheelchairs
7. Equity Goal 2: AV Passenger Service should prevent negative impacts on disadvantaged communities and improve transportation options for all, giving priority to disadvantaged communities with unmet transportation needs

We have framed these goals in terms of what a permit applicant should demonstrate to receive a full deployment permit. We do not expect any AV Passenger Service company to meet these goals at this time.⁸ As summarized in Attachment B and discussed further below, the pilot permit program should provide the opportunity for the industry to evaluate product

⁸ With one exception, we propose that achievement of these goals be expected only at the deployment stage. As to street safety, we propose that an applicant must demonstrate the capacity of their automated driving system to drive more safely than human drivers before receiving a driverless testing permit. This is necessary to manage risks to the public arising from driverless vehicles testing on public streets. See Exhibit B for summary of proposed goals and path to deployment.

features and services and how, working with public entities, they can identify strategies for achieving California’s public purpose goals when they are ready to seek a deployment permit.

Since the adoption of goals enables future regulations to be *outcome driven*, we recommend that the Commission explore new and more flexible regulatory tools to guide the award of interim permits under the Drivered Pilot Program and the Driverless Pilot Program.

We recommend that more flexible tools should:

- Provide for expert review of applications proposing driverless testing or deployment (to validate achievement of the Street Safety Goal) by a Committee of Independent Experts (COI);⁹
- Provide for public review of AV Passenger Service Plans submitted with permit applications with respect to the other proposed goals;¹⁰
- Create a “regulatory sandbox” that gives permit applicants an opportunity to build a record in collaboration with public entities demonstrating and validating how different

⁹ In other words, we believe the Commission needs to rely on more than mere attestations by applicants. Rather, the Commission should expect applicants to submit a showing – using a method of the applicant’s choosing – that its driving system operates more safely than human drivers.

¹⁰ Given the importance of public confidence in the safe integration of automated driving on public roads, Commission consideration of permit applications should not be a purely administrative process obscured from public view. Rather, AV Passenger Service Permits should have least the level of public input afforded to applicants for some Passenger Stage Corporation permits such as airport shuttles. As to street safety, public review should be focused on the findings of the Committee of Independent Experts. As to other goals, pilot permits should be considered based on a goal by goal showing submitted by the applicant in a Passenger Service Plan.

service models or features may support the Commission’s public goals (“Sandbox Pilot Testing”);¹¹

- Authorize applicants to charge or otherwise receive compensation for providing service under a drivered or driverless pilot permit where:
 - The applicant submits a Service Plan addressing some or all of the Commission goals;
 - The applicant submits a signed letter of intent from a public agency collaborator outlining key terms for Sandbox Pilot Testing that will seek to test, demonstrate or validate an applicant’s method(s) for meeting one or more Commission goals;
 - The applicant and public agency collaborator (separately or together) commit to providing a report to the Commission on Sandbox Pilot Testing outcomes.

Regulating emerging technologies with legacy tools is challenging in many sectors.¹² For example, where innovation proceeds at very high speed, it can be almost impossible for regulators to keep up with the pace of change. Where new technologies are significantly driven by artificial intelligence, important policy choices are hidden within a black box of invisible algorithms. As reflected in many recent commentaries, human biases can be easily baked into those algorithms that lie beyond public view and can produce technology that reinforces

¹¹ The US DOT has used sandboxes to encourage collaborative testing of emerging mobility services and strategies such as the FTA’s Mobility on Demand Sandbox Program. See also the recommendations offered in Deloitte Insight - Regulating the Future of Mobility; Balancing Innovation and the Public Good in Autonomous Vehicles, Shared Mobility, and Beyond, p. 17

¹² See a discussion of these challenges in Deloitte Insight - Future of Regulation: Principles for Regulating Emerging Technology.

human biases.¹³ The regulation of automated driving raises these concerns; however, automated driving is such a complex technical problem that the technology remains in the developmental phase. The Commission has time to structure regulations in an iterative manner that helps create a level playing field for permittees while also protecting the public interest. As a result, the SFMTA and SFCTA offer a conceptual path to deployment that:

- 1) is *outcome based*;
- 2) address the *greatest risks* from which the public is not already protected;
- 3) is structured to *facilitate collaboration* between state and local jurisdictions that have different knowledge, jurisdiction and expertise (as well as between the private and public sectors); and
- 4) allows for *public/private experimentation* during the industry's developmental period to assess how AV passenger services will interact with and affect existing transportation patterns and infrastructure.

The benefit of **outcome-based regulation** is that it allows innovators to explore different methods for achieving public goals without inhibiting innovation through burdensome prescriptive details and without calling for information that can legitimately be claimed as trade secret. While ultimately it is important to identify key performance indicators (KPIs) to measure achievement of outcomes, with some exceptions discussed below, we think it is premature to identify KPIs at this time. Sandbox Pilot Testing will provide a foundation for

¹³ "We Teach A.I. Systems Everything, Including Our Biases," The New York Times, November 11, 2019, accessed at: <https://www.nytimes.com/2019/11/11/technology/artificial-intelligence-bias.html>

future identification of KPIs. **Regulations focused on the greatest risks** related to public goals can reduce the burden of regulation by tailoring it to particular environments. For example, there is significant risk that AV Passenger Services will increase rather than reduce GHG and VMT. Strategies to avoid this risk are necessarily context dependent. Strategies in locations with a network of frequent transit services may be profoundly different from strategies in locations that have little transit availability. Risk based regulation will allow AV Passenger Service companies to experiment with different tools appropriate to different places and use cases for AV Passenger Service.

Facilitating collaboration between the Commission and other public entities, and between AV Passenger Services applicants and cities – who are currently their key target market -- is essential to success. As Deloitte recommends:

“Introduce innovations with a systems perspective in a measured way, and carefully track impact. Regulatory sandboxes can be an important tool in that effort, especially in cities. Transportation systems are often highly complex, with difficult-to-perceive dependencies across modes. Changes—from introducing a new fleet of shared self-driving cars to something more prosaic such as adjusting subway signaling—can create unanticipated and unwanted ripple effects. Authorities should start with a system mindset that considers the entire transportation network, focused on the mobility challenges they are trying to solve. While deploying the latest app or mode of transport can be tempting, resist doing so for its own sake. Then, by introducing new mobility services into select areas in a controlled way, regulators and companies can gain critical insight about how those services interact with existing transportation patterns and infrastructure.¹⁴ (internal citations omitted)

¹⁴ Deloitte Insights [Regulating the Future of Mobility; Balancing Innovation and the Public Good in Autonomous Vehicles, Shared Mobility, and Beyond](#) at page 14; Pankratz, D.; Nuttal, K.; Eggers, W.; Turley. M.; December 20, 2018.

Agencies that set policy for access to curbs and enforce expectations for loading and unloading passengers, or that provide transit services directly, are in the best position to support the industry in testing, demonstrating and validating – and informing the Commission about -- methods for measuring competency in these areas. Pilots arising from collaboration between applicants and public entities that play a role in the operation and maintenance of a California transportation network – including congestion management agencies, transit agencies, cities, counties, and regional transportation agencies -- offer the greatest opportunity to assess the impacts AV passenger service may have in a particular community and how they may demonstrate success in achieving state transportation goals.

In other words, a more transparent and nimble regulatory approach that features and relies on Sandbox Pilot Testing is good for all parties. For AV companies, it builds trust and good will with public agencies and the general public and provides an opportunity to test how product design and pricing can support California and local transportation goals – while simultaneously creating an opportunity to build a record supporting an ultimate deployment application. For the Commission, it uses interested peer public agencies to crowdsource the question of how driving automation can support, rather than undermine state transportation goals. While the industry may see such an approach as slowing down deployment, we are confident that it would instead be an example of speeding up by slowing down.

III. Proposed Passenger Service Goals: The Following Proposed Commission Goals Would Be Consistent with Existing State Policies and Address Significant Areas of Public Risk from Autonomous Vehicle Passenger Service

Before addressing goals for Autonomous Vehicle Passenger Service and the risks the Commission should consider in relation to those goals, we want to observe that many risks related to automated driving may be *far more acute* with respect to automated passenger vehicles that may be for personally owned and used only for private transportation needs. We are not unaware of those risks. We focus on risks arising from AV Passenger Service because those lie within the Commission’s jurisdiction.

A. Street Safety Goal: Automated Driving Passenger Service Should Improve Safety for All Road Users

As outlined above, the industry universally articulates a vision to improve road safety. Based on myriad public statements by industry leaders, we assume the industry would endorse this goal.¹⁵

“At Aurora, we’ve made a commitment: We won’t deploy our self-driving vehicle on public roads without human safety drivers until our technology is safer than a human driver.” – Chris Urmson, Aurora¹⁶

¹⁵ This goal is consistent with the vision identified in the California Office of Traffic Safety Highway Safety Plan for 2019 submitted to the US DOT, National Highway Traffic Safety Administration: “We believe that saving lives on California roadways calls for more than just a reduction in fatalities. Our vision is to eliminate traffic fatalities altogether.” <https://www.ots.ca.gov/wp-content/uploads/sites/67/2019/06/2019-Highway-Safety-Plan-HSP.pdf>

¹⁶ Medium Post “Putting Safety into Practice: Aurora’s Safety Approach”, Chris Urmson, October 2, 2019, accessed at: <https://medium.com/aurora-blog/putting-safety-into-practice-auroras-safety-approach-5297de2d8276>

“Autonomous vehicles must be “much safer” than human drivers before they are deployed on U.S. roads” Former NHTSA Chief and Zoox Chief Safety Innovation Office Mark Rosekind¹⁷

Where there may be less agreement is how we can and should determine when an automated driver is better than human drivers. Who can and should determine this? According to what standards? How much better a driver should an automated driver be? The fact that there are no good answers to these questions – certainly none that reflect any industry, academic or regulatory consensus of any kind – illustrates that the industry remains in a developmental phase not yet ready for commercial deployment at scale. At a minimum, before authorizing a company to offer passenger service in automated driving system-equipped vehicles without a safety driver, we recommend that the Commission require an applicant to submit a showing that demonstrates how the applicant has reached that conclusion itself. At least one industry leader appears to agree that the burden is on automated driving companies to demonstrate to regulators that they have reached this goal:

*I believe that in order for an AV operator to deploy AVs at scale in a ridesharing fleet, **the general public and regulators deserve hard, empirical evidence that an AV has performance that is super-human (better than the average human driver) so that the deployment of the AV technology has a positive overall impact on automotive safety and public health.** This requires a) data on the true performance of human drivers and*

¹⁷ “Top U.S. Vehicle Safety Regulator Stands by Self-Driving Cars,” Reuters, July 20, 2016, accessed at <https://www.reuters.com/article/autos-selfdriving-idUSL1N1A61SH>

AVs in a given environment and b) an objective, apples-to-apples comparison with statistically significant results. Kyle Vogt, Cruise¹⁸

We agree. And in the absence of federal automated driving regulations or performance embraced by a significant body of stakeholders, **we suggest that the Commission convene an Expert Safety Committee of disinterested consultants to assess the showing made by any applicant who seeks authority to test passenger service on a driverless basis.**¹⁹ This showing must address risks to both passengers and other road users – including especially vulnerable road users such as cyclists and pedestrians. And, because public confidence in driving automation must be earned, **we urge the Commission to have the Expert Safety Committee release a public report explaining its review of a company’s showing** without releasing trade secret information.

As to most transportation services the Commission regulates, regulations build upon an extensive and detailed framework of existing federal regulations. Virtually all passenger vehicles on public roads used in conventional passenger services have been certified to comply with federal motor vehicle standards or have been explicitly exempted from a limited number of standards for particular purposes (including, for example, vehicles that are modified to make them wheelchair accessible). But there are no federal safety standards at all that govern the

¹⁸ Kyle Vogt, “The Disengagement Myth” January 17, 2020. Medium, <https://medium.com/cruise/the-disengagement-myth-1b5cbdf8e239> The issue of “apples to apples comparison” is complex and warrants significant attention but is beyond the scope of these comments.

¹⁹ As to some elements of the evaluation of a driverless permit application, the Expert Safety Committee should include traffic engineering experts and public health experts who work on traffic safety in the relevant jurisdiction(s).

task of automated driving. Furthermore, as discussed above, while there are a number of academics, industry groups and other experts seeking to identify methods for assessment of safety performance for automated driving – including potentially methods for third party independent assessment²⁰ – the California DMV and California CPUC are the only regulators prospectively protecting the public from any unique safety risks to passengers and to other roadway users, including cyclists and pedestrians, that arise from automated driving on California roads. Many of the unique safety risks are very significantly mitigated by the presence of safety drivers, to the extent they are well chosen and supervised.

The NTSB report issued in November of 2019 evaluating the Tempe Arizona fatality identified several risks from driving automation software that, in that tragic case, were not mitigated by the presence of a safety driver. The NTSB found that the automated driving system-equipped vehicle that killed Ms. Hertzberg did not accurately classify her as a pedestrian and thus failed to accurately predict her path and avoid her. Even though the

²⁰ Underwriter’s Laboratories is working on UL 4600 a standard that offers a checklist against which AV designers can argue the safety case for their design elements; an industry group named Safety First for Automated Driving published a white paper on how to build, test, and operate a safe automated vehicle; an industry group named Automated Vehicle Safety Consortium is developing a series of safety principles for SAE Level 4 and 5 automated driving systems focusing on testing before and during operation of AVs on public roads; data collection, protection and sharing; and interactions between AVs and other road users; IEEE Standards Association (IEEE-SA) is drafting an Industry Connection Activity on the “assessment of standardization gaps for safe automated driving. Intel is leading a working group, IEEE P2864, to develop a Formal Model for Safety Considerations in Automated Vehicle Decision Making; IEEE P2851 is developing a standard for a data format for safety analysis and verification for applications such as automated driving and robotics; IEEE P1228 will address AV software safety through the vehicle’s life cycle.

vehicle perceived her in plenty of time to stop, classification and prediction failures contributed to her death.

This collision occurred on a virtually empty suburban roadway. By contrast, one company has reported that vehicles testing in San Francisco encounter 32 times as many “potential interactions” per thousand miles of driving as they encounter on suburban Arizona roads.²¹ We understand this to mean that there are 32 times as many vulnerable road users in or near the road on San Francisco streets for which an automated driving system must detect, recognize, classify, and predict a path in order to avoid collision. We are proactively conveying our concerns about safety as well as our priorities to companies known to be testing in our jurisdiction. Companies daring to test on San Francisco streets appear to be doing well with this challenge, however, the existing public reports submitted by companies (i.e. VSSAs and DMV report) raise significant questions the Commission should pursue.

Decision 18-05-043 requires applicants for the Drivered AV Passenger Service Pilot to submit “public versions of the annual AV disengagement reports required by the DMV regulations.”²² Reportable disengagements are those where driving in autonomous mode is

²¹ General Motors. 2018 Self-Driving Safety Report, pg. 19.

<https://www.gm.com/content/dam/company/docs/us/en/gmcom/gmsafetyreport.pdf>

²² It appears that Decision 18-05-043 requires applicants for a drivered passenger service pilot permit to submit disengagement reports but does not require their submittal for driverless service. We find this puzzling, as it is precisely the point at which an applicant seeks to remove human drivers from vehicles that the record demonstrated by reported disengagements is most important. Perhaps disengagements were intended to be covered by the following requirement on page 54: “Transmit simultaneously to the Commission all reports required by the DMV regulations, including the process in the event of a collision, law enforcement interaction plan, collision reporting, disclosure to the passenger regarding collection and use of personal information, and annual AV operations reports...”

deactivated when “a failure of the autonomous technology is detected or when the safe operation of the vehicle requires that the autonomous vehicle test driver disengage the autonomous mode and take immediate manual control of the vehicle, or in the case of driverless vehicles, when the safety of the vehicle, the occupants of the vehicle, or the public requires that the autonomous technology be deactivated.”²³ One industry leader recently stated “that disengagement reports are erroneously used by the media and others to compare technology from different AV companies or as a proxy for commercial readiness.”²⁴ We agree that disengagement reports are of limited value for comparing companies and that any given disengagement may represent an event that posed no risk to the public.

However, the challenge for the Commission is that existing reports do not provide *enough information* to assess important risks. For example, disengagement reports frequently cite perception errors but are not required to, and generally do not, identify *what exactly has not been accurately perceived*. Before authorizing driverless testing of AV Passenger Service on urban roads, the Commission should have confidence that a given ADS-equipped vehicle is consistently able to accurately perceive, classify and predict the behavior of human beings in the roadway, whether those human beings are walking and/or using a mobility device of any kind. An ADS equipped vehicle should be able to consistently and accurately perceive individuals who are two feet tall, seven feet tall, wearing a costume, carrying a pizza box or any other object, etc., and the Commission should have confidence that disengagements do not

²³ 13 CCR § 227.50

²⁴ Kyle Vogt, “The Disengagement Myth” January 17, 2020. <https://medium.com/cruise/the-disengagement-myth-1b5cbdf8e239>

reflect any failure to perceive the direction given by traffic control devices, human beings directing traffic in the roadway, or sirens or other communications issued by public safety officers or vehicles. Most importantly, as the industry commentator cited above noted, “we need to understand what the AV would have done after the disengagement in the absence of any human intervention.”²⁵ Another emerging area of concern and risk that many countries, states and jurisdictions are evaluating pertains to cyber-security breaches. These are all questions that should be considered by the Commission, informed by an Expert Safety Committee.

Local governments are appropriately concerned about compliance with all state and local traffic laws. We are hopeful that driving automation systems operated by fleet-based AV Passenger Services permittees on dense urban roads²⁶ will demonstrate a high rate of compliance with local speed limits and avoid the human driving errors that have been shown to be most dangerous on urban streets (excessive speed, failure to yield while turning, failure to stop at sign or at light, failure to yield right of way to pedestrian)²⁷; however, this capacity must be proven. And even with respect to fleet-based AV Passenger Service permittees, we have less confidence in compliance with state and local laws related to stopping for passenger loading and unloading. Unlawful pick up and drop activities can cause serious safety hazards by forcing pedestrians, people on bicycles, buses, emergency response vehicles, and other passenger

²⁵ Id.

²⁶ There is greater cause for concern about speed compliance on highways. We do not intend to address highway speed compliance here.

²⁷ For San Francisco experience, see <https://sfgov.org/scorecards/transportation/percentage-citations-top-five-causes-collisions>.

vehicles to maneuver into adjacent and oncoming travel lanes, increasing the likelihood of collisions. A recent SFMTA report that analyzed bicycle crashes in San Francisco between 2011 and 2015, found that curbside parking contributed to 310 bicycle crashes; these crashes generated 11 percent of all reported cyclist injuries.²⁸ Along one busy corridor that has a marked bicycle lane, almost half of the approximately 107 collisions involving a bicyclists and vehicle between 2012 and 2016 involved loading or unloading of passengers.²⁹ Given this demonstrated safety risk, the Expert Safety Committee should consider passenger loading and unloading safety in its assessment. For this element of Commission review of street safety, local engineering, enforcement and public health officials should participate in the Commission’s Committee of Independent Experts.

B. Personal Safety Goal: Automated driving passenger service should ensure personal safety for all passengers, especially vulnerable passengers

Question 6.2 asks whether the Commission should impose any requirements to ensure the safety of all passengers on the chartering by more than one party without a driver in the vehicle? As stated in our comments to the Commission submitted on January 21st in response to Question 1, the AV Passenger Service program should address the risk of victimization for both drivers and passengers in AV service with and without a driver. The risks of victimization during Drivered Pilot service are very similar to the risks that arise in other forms of passenger service, including taxis and TNCs. New risks of passenger victimization arise in Driverless Pilot service, including, *but not limited to* risks where passengers do not know each other. As

²⁸ See SFMTA 2019 Bike Program Report, Bicycle Crash Analysis, pg.2.

²⁹ Valencia Bikeway Improvements Workshop Materials, San Francisco Municipal Transportation Agency, July 2018.

discussed in our January 21st comments, we recommend that the Commission eliminate restrictions on ride-sharing but consider additional accountability measures. Specifically, we proposed that the Commission:

1. solicit Passenger Safety Plans from permit applicants;
2. make the Passenger Safety Plans available for public review and comment;
3. authorize permittees whose Passenger Safety Plans demonstrate conscientious efforts to confront risks that can be reasonably anticipated to test those efforts;
4. impose permit conditions reflecting feasible and prudent modifications that may arise from the public review process;
5. require publicly available reporting of pilot phase results; and
6. develop any required additional regulations after careful evaluation of pilot results.

It is reasonable to anticipate that some strategies for protecting the personal safety of passengers during shared rides may raise significant questions about personal privacy, civil liberties, and impacts on equitable access to service. These issues should be evaluated in the review of Passenger Safety Plans, development of permit conditions, and evaluation of pilot results.

In addition, we recommend that the Passenger Safety Plan make explicit how the entity seeking a permit will protect the safety of vulnerable users, including older adults, women (who

are disproportionately the subject of sexual assault),³⁰ people with disabilities, and rural passengers.

C. Environmental Goal: Automated driving passenger service should reduce GHG and air quality hazards in California³¹

Question 2.12 asks whether the Commission should incorporate goals from key climate legislation into its AV regulatory framework. If so, the ALJ Ruling calls for specific comment on SB 32, AB 32, SB 350, SB 1014, and SB 375. As discussed below, **the Commission should rely on and incorporate into environmental goals SB 32, AB 32, SB 1014 SB 350, and SB 375.**

The California Global Warming Solutions Act of 2006, AB 32, gave the California Air Resources Board (CARB) responsibility for monitoring and regulating sources of emissions of greenhouse gases (GHG) that cause global warming in order to reduce them. AB 32 required CARB to prepare and approve a “scoping plan” for achieving the maximum technologically feasible and cost-effective reductions in GHG emissions; CARB is required to regularly update the scoping plan. In 2016, the Legislature passed SB 32, which codifies a GHG emissions reduction target of 40 percent below 1990 levels by 2030. SB 375, the Sustainable Communities and Climate Protection Act, directs CARB to set regional targets for the reduction of GHG emissions to help meet the overall state goals established by SB 32. CARB has

³⁰ “Sexual Assault Statistics.” National Sexual Violence Resource Center. <https://www.nsvrc.org/node/4737>

³¹ This goal is consistent with the Automated Vehicle Principles for Healthy and Sustainable Communities developed by the California Multi-Agency Workgroup on AV Deployment for Healthy and Sustainable Communities. http://opr.ca.gov/docs/20181115-California_Automated_Vehicle_Principles_for_Healthy_and_Sustainable_Communities.pdf

established regional targets for GHG reductions from passenger vehicle use.³² SB 375 requires Metropolitan Planning Organizations (MPOs) to develop Sustainable Communities Strategies to meet these goals, which in turn are built from plans and strategies developed by County Congestion Management Agencies (CMAs) like the San Francisco County Transportation Authority. **The Commission should consider these duties of local and regional transportation planning agencies as a basis for adopting incentives for AV Passenger Service permittees to collaborate with public agencies in “Sandbox Pilot Testing.” Such agencies may include MPOs, CMAs, cities, counties and transit agencies.**

Environmental Objective 1: AV Passenger Service should help reach the California goal of reducing vehicle miles traveled (VMT) by 15 percent compared to 2050 expected levels and should support rather than supplant more efficient modes, including high capacity transit, walking, and biking (as appropriate to location and trip length) and use of vehicles that move more people using less space

The most recent CARB Scoping Plan was issued in 2017.³³ The scoping plan provides that by 2050, California must reduce VMT from light duty vehicles by 15 percent compared with expected levels in order to meet the State’s GHG reduction goals.³⁴ As noted in the CARB Progress Report, “academic research using various approaches are converging on the finding that, deployed without the appropriate policy framework ahead of their arrival, AVs are likely to significantly increase driving—particularly if they are personally owned.”³⁵ A Commission

³² “Regional Plan Targets.” California Air Resources Board. <https://ww2.arb.ca.gov/our-work/programs/sustainable-communities-program/regional-plan-targets>

³³ California’s 2017 Climate Change Scoping Plan https://ww3.arb.ca.gov/cc/scopingplan/scoping_plan_2017.pdf

³⁴ Id, p. 78.

³⁵ [2018 Progress Report; California’s Sustainable Communities and Climate Protection Act](#), p.83 and sources cited therein.

Policy and Planning Division report titled Electrifying the Ride-Sourcing Sector in California reached the same conclusion.³⁶

The 2017 Scoping Plan calls for promoting “potential efficiency gains from automated transportation systems” and identifying policy priorities “to maximize sustainable outcomes from automated and connected vehicles (preferably ZEVs), including VMT reduction, coordination with transit, and shared mobility, and minimize(ing) any increase in VMT, fossil fuel use, and emissions from using automated transportation systems.” It calls further for “programs to maximize the use of alternatives to single-occupant vehicles, including bicycling, walking, transit use, and shared mobility options” as well as promoting “shared-use mobility, such as bike sharing, car sharing and ride-sourcing services to bridge the “first mile, last mile” gap between commuters’ transit stops and their destinations.” Finally, it calls for “developing pricing mechanisms such as road user/VMT-based pricing, congestion pricing, and parking pricing strategies.”³⁷ Pricing strategies may be especially helpful in congested urban areas to ensure equitable and sustainable environmental outcomes.

All of these strategies identified in the Climate Change Scoping Plan offer potential areas for collaboration and testing in Sandbox Pilot Testing. AV Passenger Services have the potential to play both beneficial and detrimental roles in these efforts. The goal as recommended would

³⁶ CPUC Planning and Policy Division, Electrifying the Ride-Sourcing Sector in California, Assessing the Opportunity, April 2018, p.22.
[https://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/About_Us/Organization/Divisions/Policy_and_Planning/PPD_Work/PPD_Work_Products_\(2014_forward\)/Electrifying%20the%20Ride%20Sourcing%20Sector.pdf](https://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/About_Us/Organization/Divisions/Policy_and_Planning/PPD_Work/PPD_Work_Products_(2014_forward)/Electrifying%20the%20Ride%20Sourcing%20Sector.pdf)

³⁷ California’s 2017 Climate Change Scoping Plan
https://ww3.arb.ca.gov/cc/scopingplan/scoping_plan_2017.pdf, pp. 76-81

align with existing state law and policy and allow different AV Passenger Service companies to test different initiatives as they may be relevant to different use cases in different locations – all without directing specific approaches. The SFMTA and SFCTA recommend that the Commission require applicants for an AV Passenger Pilot Permit to demonstrate a conscientious effort and reasonable methods to minimize VMT and mode shift from more efficient modes as well as efforts to increase access to high capacity transit. Prior to the Commission granting a deployment permit, the Commission should require an applicant to demonstrate that the applicant service plan will accomplish these efforts.

Environmental Objective 2: Automated Driving Passenger Service should help reach CA EV adoption targets

SB 350 establishes that, “It is the policy of the state and the intent of the Legislature to encourage transportation electrification as a means to achieve ambient air quality standards and the state’s climate goals.” Executive Order B-48-18, subsequently issued on January 26, 2018 established a goal of having 5 million ZEVs on California roads by 2030. The CPUC has done extensive work to provide infrastructure to support this goal in its transportation electrification proceedings. With the adoption of SB 1014, CARB was tasked with setting targets for use of ZEVs by TNCs and AVs by 2021. CARB’s recently estimated TNC baseline inventory found that TNC vehicles emit of approximately 50 percent more GHG emissions per passenger miles traveled than the average for all California passenger vehicles.³⁸ Since TNCs were heralded as a climate solution, this finding demonstrates the importance of the

³⁸ SB 1014 Clean Miles Standard 2018 Base-yea Emissions Inventory Report at p. 42, California Air Resources Board, December 2019.

Commission setting goals and enforcing them. According to SB 1014, the Commission not only can, but is required to incorporate goals established by CARB under the Clean Miles Standard into AV Passenger Service regulations as well as to implement and enforce annual targets starting in 2023.

As shown in Exhibit B, the SFMTA and SFCTA recommend that the Commission require an applicant for an AV Passenger Service test permit to demonstrate reasonable methods for how their fleet will contribute to achieving the state's ZEV goals and should demonstrate compliance with the Clean Miles Standard prior to deployment. In the event, the ZEV targets are not established when an entity seeks a deployment permit, they should demonstrate that a reasonable portion of their fleet is ZEV and the timeline for achieving 100% conversion.

D. Equity Goal 1: Automated Driving Passenger Service should provide equivalent service to people with disabilities, including people using wheelchairs³⁹

This section responds to Questions 2.2, 2.3, 2.4 and 2.5. In Question 2.2 the Commission asks how it should define accessibility and in Question 2.5 asks how it should incorporate accessibility goals into its regulatory framework. The Commission should define accessibility as equal access for people with disabilities and should establish a goal that ensures equivalent service is provided upon deployment. Otherwise it risks service that is deployed to improve options only for a subset of passengers with disabilities, such as those who are blind or low-vision, and not for all.

³⁹ This goal is consistent with the Automated Vehicle Principles for Healthy and Sustainable Communities developed by the California Multi-Agency Workgroup on AV Deployment for Healthy and Sustainable Communities. http://opr.ca.gov/docs/20181115-California_Automated_Vehicle_Principles_for_Healthy_and_Sustainable_Communities.pdf

First, the Commission can look to existing regulatory and statutory guidance to ensure AV passenger services are accessible. July 26, 2020 will mark the 30th anniversary of the Americans with Disabilities Act (ADA). The ADA established national policy that a person's physical or mental disabilities do not diminish her right to fully participate in all aspects of society free from discrimination. These protections apply to a wide range of public and private services, including transportation. They are also defined and protected by a range of complementary federal, state, and local laws. The CPUC should look to these laws in defining and crafting accessibility requirements.⁴⁰

Second, despite progress made since the passage of the ADA, people with disabilities still face barriers that limit their ability to safely, reliably, and affordably move as freely as people without disabilities.⁴¹ Access to transportation is essential for anyone to participate in public life, whether it is traveling to work, school, healthcare, or just spending time with those closest to us. Automated Driving Passenger Service promise many benefits that would significantly improve the opportunities afforded to people with disabilities and older adults, such as increased safety, expanded access to jobs, recreation, and healthcare and even a

⁴⁰ The Commission should turn to existing laws and standards, including but not limited to the Americans with Disabilities Act of 1990 (ADA), as amended; the California Disabled Persons Act; Sections 504 and 508 of the Rehabilitation Act of 1973; the Telecommunications Act; the Web Content Accessibility Guidelines; and any guidelines established by the US Access Board.

⁴¹ An issue brief, published by the U.S. Department of Transportation's Bureau of Transportation Statistics in September 2018, found that regardless of age, people with disabilities make fewer trips per day on average than people without disabilities, that many people with disabilities reduce their day-to-day travel because of their disabilities, and only one in five people age 18 to 64 work full or part-time if they have travel-limiting disabilities.⁴¹

significant reduction in the transportation cost burden on many households.⁴² However, reporting from current permittees indicates a focus only on meeting the needs of riders who are blind or low vision and deployment timelines fail to mention the testing or introduction of accessible vehicles in fleets. Without requiring and meaningfully incorporating accessibility⁴³ for a broad range of people with disabilities from the start, the CPUC risks permitting a service that improves transportation options only for a subset of passengers with disabilities, such as those who are blind or low vision. Recent history also demonstrates that a new service lacking accessibility requirements can literally leave many at the curb while existing accessible services become unavailable in the market.⁴⁴

Finally, while seizing the opportunity presented by this transformative technology would certainly serve the interests of people with disabilities – improving access to work opportunities and the opportunity to increase participation in all aspects of human society -- it would also

⁴² In a Medium post, GM Cruise CEO Dan Ammann says the average San Franciscan household driving themselves or using ridesharing, will, on average, see up to \$5,000 back in their pocket every year. <https://medium.com/cruise/the-cruise-origin-story-b6e9ad4b47e5>, accessed on February 9, 2020.

⁴³ The National Center for Mobility Management offers its own definition specifically in the context of AVs: “Accessibility refers to the ease with which people with differing physical, sensory, and cognitive abilities can 1) access physical equipment for entering, using, and exiting AVs; 2) use communication interfaces to obtain information about available AVs and summon, cancel, and pay for an AV service as well as quickly and reliably communicate with the AV and its central control system while the vehicle is in operation, particularly in the event of an emergency.”

⁴⁴ The SF Examiner covered a report, written by SFMTA, on TNCs and Disabled Access. The article, titled "Report: Uber and Lyft’s rise tanked wheelchair access to taxis" highlighted the fact that "In 2013 there were roughly 1,400 monthly subsidized wheelchair-ramp taxi rides [in San Francisco], but by 2018 that number dropped to roughly 500 monthly requests." <https://www.sfexaminer.com/the-city/report-uber-and-lyfts-rise-tanked-wheelchair-access-to-taxis/>, accessed on February 5, 2020.

serve the public at large. “Universal design” is a framework for designing products, services, and environments so that they are usable by all people, without the need for adaptation or specialized design. In many contexts, application of “universal design” principles to serve people with disabilities stimulate technological innovation and growth that create new opportunities for all. Curb ramps were introduced on public streets to serve the needs of people in wheelchairs; today, they are a ubiquitous feature of our sidewalks expected and appreciated by all, from a parent pushing a stroller to the postal worker wheeling their pushcart full of mail. Automated door openers were introduced to facilitate entry and exit by people in wheelchairs. Today, each of us carrying a heavy or awkward load greets the sight of such an opener with relief. Similarly, low floor buses equipped with ramps, which were introduced after a decades long battle by disability advocates, serve a much broader range of riders, improving both access and transit operations. New technologies created with and for people with disabilities have the secondary benefit of creating new opportunities for everyone.

In addition to driving innovation, incorporating accessibility at the outset is both more effective and more cost-efficient. We have long known that retrofitting a vehicle after-market to ensure it is accessible is costly. A recent study completed as part of the Michigan Mobility Challenge on the West Michigan University Campus found that after-market modifications to autonomous shuttles are no different. Modifications made to a shuttle resulted in significant consequences to vehicle performance.⁴⁵ We should not accept after-market losses of

⁴⁵ The pilot found modifications made to a non-accessible vehicle decreased performance by nearly 45% in operating range and operating time and the vehicle had less maneuverability due to a 28% increase in turning radius.

functionality and efficiency. Instead, automated vehicles should be born accessible. None of us can fully anticipate how application of universal design principles in this context will improve life for all of us. Accessibility in the Commission's AV Regulatory Framework should be a priority so that service to people with disabilities is not delayed any longer than what is offered to the general public.

AV Passenger Service permit requirements should define and evaluate accessible services in a manner that clearly and effectively moves AV Passenger Service to equivalency at deployment. As shown in Exhibit B, the Commission should establish accessibility as a goal that must be achieved by the time of deployment. Question 2.6 asks whether the AV Regulatory Framework should define and evaluate accessible service in a manner similar to the proceeding in Rulemaking 19-02-012. For many reasons, including the fact that the rulemaking is ongoing and static benchmarks are yet to be adopted, SFMTA and the SFCTA strongly urge the Commission not to define and evaluate accessible service for Automated Driving Passenger Services in the same or similar manner.

First, the TNC Access for All proceeding focuses mainly on wheelchair accessible services, and it is not just wheelchair users who may face barriers to using autonomous vehicles in passenger service. Second, to the extent the Commission is asking whether wheelchair users should expect AV Passenger Service "to have response times for 80 percent of WAV trips requested within a time established by the commission for that geographic area," the answer is no. The TNC Access for all Act created this discretionary benchmark only as a mechanism to release TNCs of the obligation of having to collect an Access fee on every TNC trip. It was not

established as a benchmark for what is considered accessible service, especially in the context of Automated Driving Passenger Service.

Instead, the Commission should provide for truly equivalent demand responsive service, as defined in 49 CFR Part 37. The ADA states that demand responsive is equivalent if the service available to individuals with disabilities, including individuals who use wheelchairs, is provided in the most integrated setting appropriate to the needs of the individual and is equivalent to the service provided other individuals with respect to the following service characteristics: (1) Schedules/headways (if the system is fixed route); (2) Response time; (b) Fares; (c) Geographic area of service; (d) Hours and days of service; (e) Availability of information; (f) Reservations capability (if the system is demand responsive); (g) Any constraints on capacity or service availability; and (h) Restrictions priorities based on trip purpose (if the system is demand responsive). According to all existing guidance, the benchmarks established by the TNC Access for All Proceeding do not reflect what has commonly been accepted as equivalent service.

Third, while the Legislature's intent of the TNC Access for All Act "that California be a national leader in the deployment and adoption of on-demand transportation options for people with disabilities" holds, the TNC Access for All Act only addresses minimum standards for service provided in conventional automobiles that are required by state law and Commission regulations to be "personally owned." By contrast, automated vehicles are a transformative technology. Multiple AV Passenger Services Companies are re-designing vehicles without conventional human controls. This creates additional cabin space for other uses – space that can be used to accommodate a person that uses a mobility device that cannot

be stored. San Francisco echoes and reiterates the comments of members of the Commission's AV Accessibility Working group, including the American Association of People with Disabilities and the Disability Rights Education and Defense Fund that, at the deployment stage, the goal should be that automated vehicle passenger services are born accessible. Automated Driving Passenger Service can and should be built to standards that provide for true equality for people with disabilities. The Commission should seize this opportunity to ensure this and that, at the deployment stage, Automated Driving Passenger Service eliminates discrimination against people with disabilities, including passengers who need wheelchair accessible vehicles.

As described in Exhibit B, the SFMTA and SFCTA propose that the Commission require an Accessibility Chapter as part of an applicant's Proposed Service Plan and make them available for public review and comment. The Accessibility Chapter should demonstrate knowledge of barriers to service for those with physical, sensory, or mental disabilities, including barriers to wheelchair users who cannot transfer, identify planned accessibility features under consideration, and describe institutional capacity to receive and incorporate feedback from potential passengers with disabilities. In addition, we recommend that the Accessibility Chapter make explicit how safety drivers are trained to support passengers with disabilities. The showing required for a Driverless Pilot Permit would be similar, although it should also demonstrate that any communication channels created in compliance with DMV and CPUC requirements are accessible to passengers with a disability during routine and emergency operations. By the time an applicant submits a service plan for deployment, the Accessibility Chapter should demonstrate that the applicant will provide equivalent service to people with disabilities, including wheelchair users who cannot transfer, that all personnel, including

remote operators, are trained to provide service to people with disabilities, and describe institutional capacity to continue receiving and incorporating feedback from disabled passengers and responding to complaints of discrimination or abuse.

E. Equity Goal 2: Automated Driving Passenger Service should prevent negative impacts on disadvantaged communities and improve transportation options for all, giving priority to disadvantaged communities with unmet transportation needs

Question 2.7 asks whether the Commission should incorporate equity and environmental-justice related goals into its AV Regulatory Framework and, if so, how. The Commission, which adopted an Environmental and Social Justice Action Plan (ESJ Action Plan) in 2019, has committed to incorporating environmental and social justice in all of its programs.⁴⁶ The ESJ Action Plan specifically commits the Commission to promoting high-quality transportation services in communities with less reliable access to those services.⁴⁷ The ESJ Action Plan also reinforces that these goals are shared at the statewide level and acknowledges that, “California has adopted numerous and far reaching environmental justice statutes directing the CPUC to incorporate environmental and social justice objectives into its various programs.” The regulation of automated vehicles should be no different. Further, the fact that industry vision statements mentioned in the Introduction pay little attention to the potential impacts of Automated Driving Passenger Service on disadvantaged communities or the need for

⁴⁶ In February 2019, after months of development and public consultation, CPUC adopted an Environmental and Social Justice Action Plan (ESJ Action Plan) to serve as a roadmap to expand public inclusion in Commission decision-making and improve services to targeted communities across California. CPUC Environmental and Social Justice (ESJ) Action Plan https://www.cpuc.ca.gov/uploadedFiles/CPUCWebsite/Content/UtilitiesIndustries/Energy/EnergyPrograms/Infrastructure/DC/Env%20and%20Social%20Justice%20ActionPlan_%202019-02-21.docx.pdf

⁴⁷ Goal 3 of the ESJ Action Plan states the Commission will work to facilitate improved access to a range of high-quality services to all communities, especially disadvantaged communities.

service that improves transportation options for unmet needs in these communities itself demonstrates the importance of the Commission adopting a goal addressing impacts and opportunities. There is a significant risk that these issues will go without industry attention if the Commission does not communicate any expectations for service equity.

Automated Driving Passenger Services provided in vehicles that are electric and shared present the opportunity to address transportation problems for people and communities most in need. However, historical disenfranchisement, disinvestment, and disproportionate exposure to pollution continue to impact the collective health, wealth, mobility and security of disadvantaged communities in California. The Commission has acknowledged that “some populations in California face higher barriers in accessing safe and affordable utility and transport service” and that it “has a responsibility to serve Californians in a way that helps address those inequities.”⁴⁸ At present, there is insufficient understanding of how Automated Driving Passenger Service would either relieve or exacerbate existing burdens on these communities. If Automated Driving Passenger Service is to meet the Commission’s goals, particularly in defined disadvantaged and targeted communities,⁴⁹ then the path to deployment

⁴⁸ CPUC Environmental and Social Justice (ESJ) Action Plan homepage
<https://www.cpuc.ca.gov/CPUCNewsDetail.aspx?id=6442461331>

⁴⁹ ESJ Action Plan communities are identified as those where residents are: Predominantly communities of color or low-income; Underrepresented in the policy setting or decision-making process; Subject to a disproportionate impact from one or more environmental hazards; and Likely to experience disparate implementation of environmental regulations and socioeconomic investments in their communities. On the ground, targeted communities typically include but are not limited to: Disadvantaged Communities, located in the most environmentally burdened California census tracts, as determined by the 25 percent highest scores (75th percentile) when using Cal EPA's CalEnviroScreen tool; All Tribal lands; Low-income households (Household incomes below 80 percent of the area median income); and Low-income census tracts (Census

for Automated Driving Passenger Service must ensure the economic, social, and environmental benefits of services are distributed without prejudice or discrimination. To achieve this, Automated Driving Passenger Service companies will need to design, test and evaluate services, along with local partners, with an explicit lens on equity. Without this requirement, the Commission risks exacerbating existing burdens on disadvantaged communities and Automated Driving Passenger Service will fail to provide high quality service to all.

To incorporate this goal into the AV Regulatory Framework, the Commission can look to another existing avenue – the Commission and California Energy Commission’s (CEC) Disadvantaged Communities Advisory Group (DACAG) – for guidance.⁵⁰ The DACAG established an Equity Framework, included as Appendix D of the ESJ Action Plan, to “be applied across all climate related policies, bills, proceedings, requests for proposals, etc.” The Framework, applied to Automated Driving Passenger Service, can be used to guide companies as they move forward in identifying and addressing both negative and positive impacts on disadvantaged communities. The Framework provides guidance on Health and Safety, Access and Education, Financial Benefits, and Consumer Protection. Applicants’ Proposed Service Plans should include a Service Equity Chapter that applies the Framework, identifies impacts on disadvantage communities, plans for preventing negative impacts, and documents how Automated Driving Passenger Service AV will create transportation options for unmet needs. Prior to the

tracts where aggregated household incomes are less than 80 percent of area or state median income).

⁵⁰ Senate Bill (SB) 350, the Clean Energy and Pollution Reduction Act of 2015, requires that the CPUC and the CEC create a DACAG to provide advice on programs proposed to achieve clean energy and pollution reduction.

Commission granting a deployment permit, the Service Equity Chapter (as may be updated to reflect findings from drivered or driverless sandbox pilot testing or otherwise) should demonstrate that service prevents new burdens on disadvantaged communities and creates new transportation options for disadvantaged communities.

IV. Need for New Regulatory Category: The Commission Should Create a New Regulatory Category for Charter-Party Carriers Who Seek to Offer Pre-Arranged Passenger Service for Compensation in Vehicles Equipped with an Automated Driving System

Question 5.1 asks whether the Commission “should designate a new regulatory category, such as Autonomous Vehicle Carrier, to authorize a person or entity to provide prearranged passenger transportation service using AVs operated without a driver in the vehicle?” Question 5.2 asks which requirements of Charter-Party Carriers or TNC permit holders “under the Charter-Party Carriers Act and all applicable Commission decisions, rules and orders” should the Commission adopt to authorize . . . prearranged passenger service. . . using AVs operated without a driver in the vehicle.

We support creation of a new regulatory category for pre-arranged passenger service in vehicles equipped with automated driving systems. Our discussion here uses terms defined in the Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles dated June, 2018.⁵¹ This new category should be defined by the *business goal*

⁵¹ The SAE Taxonomy was developed to provide functional descriptions that are descriptive rather than normative and that are useful across disciplines, including engineering, law, media and public discourse. This edition of the Taxonomy has been adopted for use by USDOT, and USDOT recommends that state legislatures use the Taxonomy as "Different use and interpretations of terminology regarding automated vehicles can be confusing for the public, State and local agencies, and industry" (1). However, it is more recent than the version of the Taxonomy referred to in DMV regulations. The most recent SAE Taxonomy reflects the understanding that a vehicle equipped with a driving automation system may be an “ADS

of being able to offer passenger service without a human driver. The new category should establish requirements governing both *testing* and *deployment* of automated driving passenger service, including testing in vehicles that retain a safety operator and vehicles that test or deploy passenger service without a safety operator.

The goal of the driving automation industry is to develop the combination of software and hardware necessary to enable operation of a motor vehicle without a human operator. The industry may build such vehicles for use in passenger service that *retain human controls* so the vehicle can be operated either by a human driver or by an automated driving system. The industry may also ultimately offer vehicles for use in passenger service that have *no human controls* and can thus be operated only by an automated driving system. In each case, the defining feature of the vehicle is its *ability* to operate without a human driver, and the defining feature of the service is being able to provide service without a human driver. This capacity of the vehicle and goal for the service should define the regulatory category – not the intervening presence of human controls or human drivers while the technology and business model remain under development.

There are numerous reasons why a new regulatory category is called for. First, while it is true that the two large national TNCs see delivery of passenger service in automated vehicles as a potential path toward profitability, TNCs are not leaders in automated driving. More

Equipped Dual Mode Vehicle” that retains human controls (See Section 3.12) or an “ADS Dedicated Vehicle” (See Section 3.3) which is designed to operate exclusively by a “Level 4 or Level 5” Automated Driving System (See Section 3.2). The source for reference (1) in the text can be found here: <https://www.transportation.gov/sites/dot.gov/files/docs/policy-initiatives/automated-vehicles/320711/preparing-future-transportation-automated-vehicle-30.pdf>, p. 20.

importantly, there are fundamental differences between the risks to the public that Commission regulations must manage arising from delivery of passenger service in conventional vehicles (under any business model) and in vehicles with automated driving systems. The defining characteristic of the operating model for TNCs is the network-based system in which a centralized online-enabled platform engages with a network of *drivers* operating *personally-owned* vehicles, which are not owned or maintained by the TNC. The Commission's core regulatory requirements for TNCs, including driving record checks and criminal background checks, zero-tolerance drug and alcohol policies, and insurance requirements are all premised on the vehicles being operated and maintained by human drivers licensed through California's existing driver licensing system. Similarly, the vehicle inspection requirements assume that vehicles used in TCP and TNC service are conventional passenger vehicles that comply with all federal motor vehicle safety standards, are available on the retail automobile market, and are subject to the National Highway Safety Administration's New Car Assessment Program.⁵²

By contrast, the risks to the public – both passengers and other road users -- that Commission regulations must manage for purposes of passenger service tested or deployed in vehicles with automated driving systems are hardly addressed by the 19-point vehicle inspection requirement applicable to both TCPs and TNCs. They are not the least addressed by inspection every 50,000 miles or every 12 months. Professional mechanics licensed by the

⁵² New Car Assessment Program (NCAP) Safety Labeling, 49 CFR Part 575, accessed at https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/fmvss/StarsOnCars_FR.pdf

California Bureau of Automotive Repair are not trained to and could not identify failing components or systems needing repair.

Rather, AVs are specialized, experimental vehicles that are not available on any retail market and have not been inspected by NHTSA's NCAP program.⁵³ Their safety depends on the quality and frequent updating of 3D maps documenting the expected driving environment in excruciating detail, on the selection of a complex array of sensors and engineering software that is responsible for monitoring the static driving environment to perceive changes and the dynamic driving environment to detect, recognize, and classify all objects in or entering the roadway, to predict the path of all such objects and to respond where necessary to avoid collision by controlling the lateral and longitudinal motion of the vehicle. (In other words, to perform all elements of the 'dynamic driving task'. See SAE 3.13.)

Automated driving systems reflect numerous forms of redundancy to minimize errors in each of these elements, but every sensor and every line of code must be scrupulously maintained in order for any given vehicle to operate safely today, even where the same vehicle or identical vehicles operated safely and without human driver intervention yesterday. Where a human safety driver is present, she is the most important form of redundancy that protects passengers and other road users from errors or failures in the system where the automated driving system has not yet mastered all the skills necessary to operate safely within a given driving environment. With or without a human safety driver, it is quite possible that inspections

⁵³ Most current AV test vehicles are conventional vehicles that may have been subject to NCAP testing in their originally manufactured form; however, the modifications required to install an automated driving system have not been inspected; indeed, we are not aware that NHTSA has any protocol for how it would perform such an inspection.

and maintenance must be performed *every single day*, and that ongoing real-time monitoring of all system components is critical to maintaining any given vehicle safely in service on public roads. This may especially true with respect to cybersecurity risks.

In the future, when NHTSA has adopted safety standards to govern automated driving and methods to test the performance of automated driving systems, it may be appropriate for the Commission to consider establishing a consistent method for inspecting AVs to ensure that they operated in a state of good repair, ideally with some form of industry-standard third-party inspection protocol. However, given the nascent state of the industry and the lack of standardized requirements or procedures for AV inspection, it is premature for the Commission to dictate the details of the methods needed to perform inspections, or who might reasonably perform them.

Rather, at this stage of development, we recommend that the Commission manage the risks arising from testing passenger service in vehicles equipped with automated driving systems by requiring each permit applicant to include in its Passenger Safety Plan (Street Safety Chapter) a description of the company's vehicle inspection process for all AVs offering service on the platform, to be performed at the point each new vehicle comes into service and on a routine basis thereafter, at a frequency determined by the operator. The Plan should specify the nature of its planned inspection process at the point of permit application, subject to approval by the Commission. Such proposed procedures should not be treated as proprietary information or sealed by the Commission, as they bear directly on each operator's safety practices and should be public records for the purpose of consumer protection and open to public comment.

In conclusion, given that the most important risks to passengers and the public arising from TNC service and AV Passenger Service are so different, the Commission should adopt a new regulatory framework that governs all passenger service in vehicles with automated driving systems, whether at the drivered pilot, driverless pilot, or deployment stage.

F. Autonomous Vehicle Definition: Automated Vehicle Passenger Service Should Be Delivered Only in SAE Level 4 or 5 Vehicles in Which Passengers Have None of the Responsibilities of Drivers Under California Law and None of the Responsibilities of “Fall Back Ready Users” Under the SAE Taxonomy

Question 4.1 asks how the Commission should define “what constitutes an ‘autonomous vehicle’ used in prearranged passenger transportation service for-hire.” This question is closely related to what types of vehicles should be permitted to offer such service. California DMV regulations define an autonomous vehicle as follows: “(a)utonomous vehicle’ means any vehicle equipped with technology that is a combination of both hardware and software that has the capability of performing the dynamic driving task without the active physical control or monitoring of a natural person. . . . For the purposes of this article an “autonomous vehicle” meets the definition of levels 3, 4, or 5 of the SAE International’s Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles, Standard J3016 (SEP2016), which is hereby incorporated by reference.” First, we note that the most recent SAE Taxonomy that has been adopted and recommended by USDOT describes this term as a “deprecated term” because it is “functionally imprecise (and therefore misleading) and/or

because [it is] frequently misused by application to lower levels of driving automation (i.e., levels 1 and 2) in which the driving automation system does not perform the entire DDT.”⁵⁴

The most recent SAE Taxonomy instead embrace the term ADS-equipped Vehicle, which may include either an ADS Dedicated Vehicle (operating at Level 4 or 5 and without human controls; see SAE 3.3) or an ADS Equipped Dual Mode Vehicle (SAE Section 3.12) Notwithstanding the inclusion of Level 3 vehicles in DMV regulations, and recognizing the appealing simplicity of using terminology consistent with that chosen by the DMV, given the focus of the Commission on *passenger service*, we recommend that the Commission limit delivery of ADS Passenger Service to ADS-Equipped vehicles that operate at Level 4 or Level 5 autonomy (or are being tested with the goal of offering Level 4 service.)⁵⁵ The reason for this is simple – at Level 3, a user in the vehicle is expected to be available when the system requests that a human intervene.⁵⁶ Such a request would arise because the automated driving system is not capable of safely handling the demands of the driving environment.

Level 4 capability is necessary because it is neither safe nor equitable to expect that an AV passenger will be physically or cognitively capable of intervening to ensure the safe operation of the vehicle. One of the most appealing features of the potential future of AV passenger service is precisely the expectation that a passenger *has no responsibility* for the safe operation of the vehicle. Passengers may include individuals with disabilities or injuries,

⁵⁴ SAE Taxonomy, J016, Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles, Sections 7 and 7.2. Revised June 2018.

⁵⁵ While fallback ready user functions can be performed by a safety driver, the industry vision is to deliver service in vehicles that have no such safety driver; the intent is for safety drivers to be used only as an interim measure.

⁵⁶ *Id.*, Section 4.5.

children, older adults, and individuals who may be impaired by alcohol or other controlled substances. Riders may lack driving experience or knowledge of how to respond to the request of an AV for intervention. Any expectation of involvement of passengers in the task of driving would expose them and other road users to unacceptable risk. In other words, Commission regulations for ADS passenger should incorporate the common sense meaning of the term passenger – which has not been defined in the Charter Party Carrier Act or Commission regulations – as someone who has none of the responsibilities of a driver under California law and none of the responsibilities that a “fall back ready” user may have in a vehicle equipped with a Level 3 driving automation system.⁵⁷

While passengers should not be required to assume the role of fallback-ready users in any AV operating as a passenger carrier, we recommend that such vehicles be required to offer clearly visible information inside and outside the vehicle offering backup methods of contacting AV platforms, such as telephone numbers and web addresses where customer service is available. Such signage should also include a unique vehicle ID visible both inside and outside the vehicle, to assist platforms in identifying the vehicle about which a passenger or member of the public contacts them seeking assistance, as well as law enforcement officers and public officials responding to incidents, permit violations, or complaints regarding such vehicles.

⁵⁷ The SAE Taxonomy defines a passenger as “A user in a vehicle who has no role in the operation of that vehicle.” (Section 3.29.2). DMV regulations define a passenger as “an occupant of a vehicle who has no role in the operation of that vehicle when the autonomous technology is engaged. See 13 CCR 228.02(k). For purposes of CPUC passenger service regulations, we recommend the more limited SAE definition.

G. Personal Vehicle Definition: Automated Vehicle Passenger Service Should be Operated Only by a Fleet Manager Who is Accountable for all Vehicle Maintenance Necessary to Drive More Safely Than Good Human Drivers and for In-trip Customer Service and Liability

Question 4.3 asks whether the Commission should modify the definition of ‘personal vehicle’ pursuant to D.16-12-037 to include AVs used to provide prearranged passenger transportation service using online-enabled applications of platforms. As discussed above, we recommend that no change be made to D.16-12-037. **Instead, the Commission should establish a separate regulatory category for any passenger service delivered in vehicles with an automated driving system.** Further, in light of the exceptional maintenance activities that may be necessary to ensure the continued safe operation of vehicles equipped with automated driving systems, personally-owned AVs are not appropriate for operation as AV passenger carriers. AVs are a new technology with highly sophisticated hardware and software requiring vigilant professional maintenance, consistent cleaning, and constant monitoring. Such vehicles will present substantial liability risks and operating costs for their owners and operators, requiring robust financial stability. AV carriers must also be capable of providing real-time customer service to riders without gaps in availability, which would be beyond the capability of an individual personal AV owner. Even if personal AV owners offered their vehicles for rental through a technology platform that could meet such customer service needs on behalf of the owner, our concerns about the ability of such platforms to ensure an acceptable state of good repair for such vehicles would remain. **At this stage in the industry, when vehicles with Level 4 capability are not available on the retail market and require highly specialized, costly technical systems, maintenance, and monitoring, it is not appropriate for AVs with non-professional owners to be offered for commercial passenger carrier use.**

Also, given our previously-expressed view that AVs should be regulated by the Commission under a new category, we do not believe it is necessary for the Commission to modify D.13-09-045 to allow TNCs to own AVs or allow AVs leased or rented by TNCs from partnering entities on their online-enabled applications or platforms, as asked by question 4.3, nor is it necessary to modify the Commission's definition of personal vehicle. No AVs should be offered by companies under TNC operating authority. Instead, any companies wishing to offer AV passenger carrier service should obtain a permit under a new AV category created by the Commission, and use such authority for its AV operations, distinct from any other authorities (such as TCP or TNC) under which that company may also operate passenger carrier service in conventional vehicles.

V. Data Related Questions

Question 3.1 asks what information the Commission should require permittees to report, how often it should be reported, and if it should be available to the public under any conditions. Throughout the pilot stages and in deployment it will be essential for the Commission to receive qualitative and quantitative data on many aspects of AV Passenger Service to evaluate performance of permittees relative to the Commission's goals. Therefore, data requirements should be goal driven.

SFMTA and the SFCTA offer some specific guidance on collecting data on accessibility below. We reserve the opportunity to comment further on data requirements once the Commission establishes goals for testing and deployment of AV Passenger Service. At a high level, the Commission should consider data to quantify quality of driving outcomes both for people inside an AV and for people outside of the AV, including cyclists, pedestrians, transit riders, and others sharing the same public space. This will ensure that any safety or operational efficiency benefits or burdens will be properly accounted for all people that might be affected.

The Commission currently requires reporting on a quarterly basis. In addition to regular reporting, at certain times, the Commission may require more information to answer research or public policy question as they arise and should reserve the ability to do so. For example, the appropriate data to collect may depend on what is being tested in Sandbox Pilot Testing in any given time period or in any given geographic area.

We commend the Commission for requiring data during the current testing period to be made available publicly. In this nascent stage of the industry, it is imperative that lessons learned be shared widely across sectors to facilitate planning for and response to a rapidly changing landscape that impacts the safety and wellbeing of many people. We urge the Commission to continue making this data public. At this time, we have not identified or recommended many specific key performance indicators but believe the majority of the data can be made available to the Commission in a way that is devoid of personally identifying information, and therefore can be made available to the public. For any data that may implicate personal privacy, companies should make a showing to the Commission addressing why it cannot be available to the public. This also addresses the Commission's question in 3.2 on how data should be shared with government entities.

Question 3.3 asks whether and how the Commission should gather qualitative feedback. First, the Commission should continue facilitation of the AV Accessibility Working Group, especially to develop key performance indicators and reporting requirements on accessibility, but also to receive meaningful feedback from key representatives. Second, the Commission should provide a clear venue for pilot participants to submit feedback in order for Commission staff to investigate issues identified by participants that may be of broader importance. Finally, in the context of Sandbox Pilot Testing, incorporating qualitative feedback can be accomplished through collaboration between AV companies and the public entity, or with input from academic researchers.

Accessibility Data

Throughout the pilot stages and in deployment it will be essential for the Commission to receive qualitative and quantitative data on accessibility. At present, the Commission requires the following quantitative accessibility data on a quarterly basis:

- Total number of accessible rides requested per quarter that are fulfilled,
- Total number of accessible rides requested per quarter that are unfulfilled because of a lack of accessible vehicles,
- Total number of accessible rides requested per quarter that are declined by the driver.
- The Commission also requires that AV companies “Maintain a passenger carrier equipment list with the Commission of all vehicles in use that includes the manufacturer, model, year, vehicle identification number, seating capacity, whether the vehicle is leased or owned, **handicap accessible status**, and license plate number.”

We support the Commission requiring quarterly reporting on accessibility. However, the data submitted to date have not provided objective insights into whether companies are achieving the Commission’s directive that “those that are preparing to participate in full deployment...make progress in incorporating accessibility into the design and operation of AV passenger services.”⁵⁸

For example, while we initially understood an “accessible ride request” to mean a request for a wheelchair accessible vehicle, the term “accessible” has not actually been defined. As a result, some companies have developed their own subjective definitions and methodologies for reporting “accessible” rides that obfuscate their ability to eliminate any specific barriers, such as access for wheelchair users who cannot transfer from their mobility device. So, while we are not aware that any pilot permittee has deployed any AV Passenger Service in a wheelchair accessible vehicle, some have reported that they have not “denied” any accessible rides and) and have in fact completed hundreds of “accessible” rides. Neither the Commission nor the

⁵⁸ Decision 18-05-043, p.44.

public are able to discern from this reporting what disability barriers to service have been overcome.

To more objectively gather information on AV company efforts to successfully test and incorporate accessibility into their services, the Commission needs to establish guidance for companies on how to submit qualitative and quantitative reports that clearly describe their progress towards implementing solutions and their efficacy once implemented. The Commission should create this guidance with the help of the AV Accessibility Working Group, which is comprised of many experts, including people with disabilities. Many of the questions identified by the AV Accessibility Working Group, as documented in Exhibit C, will be helpful to more clearly define barriers and develop Key Performance Indicators (KPIs) for deployment. Some questions will best be answered with both quantitative and qualitative data, while others may only require quantitative data. Here we provide examples of both.

How will AVs provide equivalent service to wheelchair users?

Qualitative Data

- Narrative progress report and timeline for introducing wheelchair accessible vehicles into the fleet, or, if WAVs are already being tested, barriers that persist in providing equivalent service.

Quantitative Data

- For all permittees:
 - o number of wheelchair accessible vehicles in operation (wheelchair accessible = designed for riders unable to transfer out of their wheelchair)
- And, if a company has WAVs in operation:
 - o number of requests for wheelchair accessible vehicles
 - o number of requests completed
 - o number of requests denied (should be disaggregated based on reasons for denial, such as no vehicle available; rift/lamp malfunction; unable to safely pick-up or drop-off; unable to locate rider, etc.)

- If the fleet is not 100% wheelchair accessible:
 - Geographic coverage and response times for WAVs vs non-WAVs

How will communication devices and systems be accessible to people who are blind or low-vision?

Qualitative Data

- Narrative report on how voice control systems (and/or other solutions) are made available to riders who are blind or low-vision (in-vehicle, in-app, etc.)
- Narrative report on all available vehicle features, and which can be controlled through voice, or other solution
- Narrative report on testing of voice control systems, and/or other solutions

VI. Conclusion

SFMTA and the SFCTA appreciate the opportunity to participate in the common goal of ensuring that regulation of AV Passenger Services fosters a fair and competitive market that achieves goals established by the Commission and the Legislature that are also articulated by AV companies. Through a goal-driven, collaborative, and iterative process, the Commission, local and state agencies, and AV companies can all be held accountable to the promises we have made to the public to increase road safety, reduce transportation-related environmental harms, and improve transportation for all. We have provided a detailed proposal on how these goals can be incorporated into the Commission’s regulatory framework and ensure accountability. We anticipate extensive discussion on these topics and appreciate the Commission’s consideration in setting both a schedule and ongoing venue for the continued discussion of our proposal and others. Through a collaborative approach, all stakeholders can and should work and learn together to deploy this technology to serve the public good.

Dated: February 10, 2020

Respectfully submitted,

By: _____ /s/

Jeffrey P. Tumlin
Director of Transportation
San Francisco Municipal Transportation
Agency

By: _____ /s/

Tilly Chang
Executive Director
San Francisco County Transportation
Authority

EXHIBIT A

Exhibit A

Questions 2-8 - Brief Answers

2. Goals-Related Questions

Question 2.1. How should the Commission incorporate safety goals into its AV regulatory framework?

The Commission should first establish safety goals to guide its AV regulatory framework. The SFMTA and SFCTA recommend the following goals:

1. *Automated driving passenger service should improve safety for all road users.*
2. *Automated driving passenger service should ensure personal safety for all passengers, especially vulnerable passengers*

The Commission should incorporate these goals into its AV regulatory framework by requiring applicants to demonstrate a plan to meet these goals to obtain a test permit and to achieve these goals to obtain a deployment permit, as outlined in Exhibit B.

Question 2.2. How should the Commission define accessibility?

The Commission should define accessibility as equal access for people with disabilities; meaning persons with disabilities have the full and equal opportunity to access and use AV passenger service as do persons without disabilities. For further guidance on how to define disability and access for disabled persons, the Commission should turn to existing laws and standards, including but not limited to:

- California’s Disabled Persons Act
- Americans with Disabilities Act of 1990 (ADA), as amended
- Sections 504 and 508 of the Rehabilitation Act of 1973
- Section 255 of the Telecommunications Act of 1996
- Web Content Accessibility Guidelines; and
- Guidelines established by the US Access Board.

Question 2.3. Should the Commission clarify that accessibility applies to many demographics, including but not limited to people who are blind or low-vision; are hearing impaired; rely on comfort animals; use wheelchairs or have other physical limitations; or, are elderly?

Under the ADA, the term “disability” means a physical or mental impairment that substantially limits one or more major life activities of an individual, a record of such impairment, or being regarded as having such an impairment. This definition must be broadly interpreted, consistent with the ADA Amendments Act of 2008.

Question 2.4. Should the Commission ensure that the drivers of any manually-driven wheelchair accessible vehicles used in a commercial service are properly trained on the securement of wheelchairs and proper passenger restraint for AVs with a driver?

Yes. Appendix D to the ADA states that every transportation provider must be trained to proficiency on providing service to people with disabilities. Training must be appropriate to the duties of each employee. For example, a dispatcher must know how to use a TDD1 and enough about various disabilities to dispatch an appropriate vehicle. A driver must have training on, among other things, disability sensitivity, assistive technique, and how to operate lifts and securement devices properly.

Question 2.5. How should the Commission incorporate accessibility goals into its AV regulatory framework?

The Commission should first establish an accessibility goal to guide its AV regulatory framework. The SFMTA and SFCTA recommend the following goal:

Automated driving passenger service should provide equivalent service to people with disabilities, including people using wheelchairs.

The Commission should incorporate this goal into its AV regulatory framework by requiring applicants to demonstrate a plan to meet the goals to obtain a test permit and to achieve the goals to obtain a deployment permit, as outlined in Exhibit B.

Question 2.6. For the sake of the AV Regulatory Framework, should the Commission define and evaluate accessible service in a manner similar to the process established in Proceeding Rulemaking 19-02-012?

No. Rulemaking 19-02-012 addresses an industry that uses conventional automobiles that are personally owned. AV Passenger Service will be delivered by a nascent industry that is designing vehicles from the ground up. AV Passenger Services can and should be built to standards that provide for true equality for people with disabilities, including people in wheelchairs.

Question 2.7. Should the Commission incorporate equity and environmental-justice related goals into its AV regulatory framework? If so, how?

Yes. The Commission's Environmental and Social Justice Action Plan commits it to incorporating environmental and social justice in all of its programs and there is a significant risk that these issues will go without industry attention if the Commission does not communicate any expectations for service equity. The SFMTA and SFCTA recommend the following goal:

Automated Driving Passenger Service should avoid negative impacts on disadvantaged communities and improve transportation options for all, giving priority to disadvantaged communities with unmet transportation needs.

The Commission should incorporate this goal into its AV regulatory framework by requiring applicants to demonstrate a plan to meet this goal to obtain a test permit and to achieve this goal to obtain a deployment permit, as outlined in Exhibit B.

Question 2.8. Should the Commission incorporate goals related to city operations and planning into its AV regulatory framework? If so, how?

No. It is not the Commission's role to address City operations. However, the Commission should create incentives for the AV industry to work with local public agencies to implement service in a manner that is consistent with state goals, as they are implemented at the local level and should make industry data necessary for transportation planning available to cities, counties and regional planning organizations.

Question 2.9. Should the Commission evaluate AVs' impacts on congestion, traffic, curb use, and public transit? Why?

The Commission should adopt environmental goals (as outlined in answer to Question 2.10) as part of its AV Passenger Services regulatory framework and should consider how permit applicants plan to meet those goals in the requested service territory. The Commission should implement CARB regulations relevant to AV Passenger Service. The Commission should also create incentives for AV Passenger Service permit applicants to work with local governments to test and validate methods to meet adopted environmental goals and should solicit and consider input from local and regional agencies, as well as the general public, in reviewing such applications.

Question 2.10. How should the Commission incorporate goals related to environmental and climate impacts into its AV regulatory framework?

The Commission should first establish an environmental goal to guide its AV regulatory framework. The SFMTA and SFCTA recommend one goal with two underlying objectives:

Automated driving passenger service should reduce GHG and air quality hazards in California.

Objective 1: Automated Driving Passenger Service should help reach goal of reducing VMT by 15% compared to 2050 expected levels and should support rather than supplant more efficient modes, including high capacity transit, walking, and biking (as appropriate to location and trip length).

Objective 2: Automated Driving Passenger Service Should Help Reach CA EV Adoption Targets.

The Commission should incorporate this goal and objectives into its AV regulatory framework by requiring applicants to demonstrate a plan to meet this goal to obtain a test permit and to achieve this goal to obtain a deployment permit, as outlined in Exhibit B.

Question 2.11. Should the Commission establish fleet-level emissions requirements for AV companies that are coordinated with requirements established by Senate Bill (SB) 1014 (the Clean Miles Standard)?

The Commission should implement and enforce standards adopted by CARB under the Clean Miles Standard established by Senate Bill (SB) 1014.

Question 2.12. Should the Commission incorporate goals from key climate, transportation, and equity-related legislation into its AV regulatory framework? If so, how?

Yes, the Commission should rely on and incorporate SB 32, AB 32, SB 1014, SB 350, and SB 375 and is discussed further in Section 3 of our comments pertaining to the proposed Environmental Goal.

Question 2.13. Should the Commission measure the progress toward achieving each of these goals? If so, how?

Yes, the Commission should measure progress toward achieving each of these goals as outlined in Section 3 of our comments and in Exhibit B. As to most goals, the Commission should expect achievement at the deployment stage. As to the Street Safety goal, the Commission should expect a demonstration that AVs offering passenger service can drive more safely than human drivers before granting a driverless testing permit.

3. Data-Related Questions

3.1. In a new regulatory category, what information should the Commission require to be reported by a person or entity authorized to provide prearranged passenger transportation service using AVs operated without a driver in the vehicle to the Commission; how often (e.g. monthly, annually, per trip, etc.) should this information have to be reported to the Commission; and under what conditions, if any, should this information be made available to the public?

Throughout the pilot stages and in deployment it will be essential for the Commission to receive qualitative and quantitative data on many aspects of AV Passenger Service to evaluate performance of permittees relative to the Commission's goals. Therefore, data requirements should be goal driven. SFMTA and the SFCTA offer some specific guidance on collecting data on accessibility in Section 5 of our comments and reserve the opportunity to comment further on data requirements once the Commission establishes goals for testing and deployment of AV Passenger Service.

Question 3.2. How should the information be made available to interested government entities? For example, should such information be hosted by a third-party entity (e.g. university, research institution, etc.)?

To the greatest extent possible, consistent with the privacy rights of individuals and well-supported assertions of trade secrets, the Commission should make data about AV Passenger Services available to the public and should create an opportunity for public review of permit applications. There should be no need for third party hosting of service data. The Commission should adopt a Sandbox Pilot Testing program under which industry and public agency partners may collect data directly and report on findings to the Commission. The Commission should hold a workshop with interested government entities to determine how information should be

shared once the Commission establishes goals and data requirements. In Section 5 of our comments we discuss collecting data on accessibility and recommend that this data be public. For any data that may implicate personal privacy, companies should make a showing to the Commission addressing why it cannot be available to the public.

Question 3.3. Should the Commission gather and incorporate qualitative feedback, including, but not limited to, information such as rider experiences and community feedback, into its decision-making process? If so, how?

Yes. As noted in Exhibit B, the Commission should gather and incorporate qualitative feedback with respect to Street Safety, Passenger Safety, Accessibility, and Equity Goals. With respect to gathering feedback related to accessibility, the SFMTA and SFCTA respond to this in Section 5 of our comments.

4. Definition-Related Questions

4.1. How should the Commission define what constitutes an “autonomous vehicle” used in prearranged passenger transportation service for-hire?

As discussed in more detail in Section 4 of our comments, the most recent SAE Taxonomy embraces the term ADS-equipped vehicle and not “autonomous vehicles”, which may include either an ADS Dedicated Vehicle (operating at Level 4 or 5 and without human controls; see SAE 3.3) or an ADS Equipped Dual Mode Vehicle (SAE Section 3.12). Notwithstanding the inclusion of Level 3 vehicles in DMV regulations, and recognizing the appealing simplicity of using terminology consistent with that chosen by the DMV, given the focus of the Commission on passenger service, we recommend that the Commission limit delivery of ADS Passenger Service to ADS-Equipped vehicles that operate at Level 4 or Level 5 autonomy (or are being tested with the goal of offering Level 4 service.)

4.3. Should the Commission modify the definition of “personal vehicle” pursuant to D.16-12-037 to include AVs used to provide prearranged passenger transportation service using online-enabled applications or platforms?

As discussed in more detail in Section 4 of our comments, the SFMTA and SFCTA recommend that no change be made to D.16-12-037. Instead, the Commission should establish a separate regulatory category for AV Passenger Service. At this stage in the industry, when vehicles with Level 4 capability are not available on the retail market and require highly specialized, costly technical systems, maintenance, and monitoring, it is not appropriate for AVs with non-professional owners to be offered for commercial passenger carrier use.

5. Permit-Related Questions

5.1. Should the Commission designate a new regulatory category, such as Autonomous Vehicle Carrier, to authorize a person or entity to provide prearranged passenger transportation service using AVs operated without a driver in the vehicle?

Yes, we support creation of a new regulatory category for pre-arranged passenger service in vehicles equipped with automated driving systems. We address this in Section 4 of our comments.

5.2. In a new regulatory category, what requirements of Charter-Party Carriers or TNC permit-holders under the Charter-Party Carriers Act and all applicable Commission decisions, rules, and orders should the Commission also adopt in order to authorize a person or entity to provide prearranged passenger transportation service using AVs operated without a driver in the vehicle?

We address this in Section 4 of our comments. A new category should be defined by the business goal of being able to offer passenger service without a human driver. The new category should establish requirements governing both testing and deployment of automated driving passenger service, including testing in vehicles that retain a safety operator and vehicles that test or deploy passenger service without a safety operator.

5.3. Should the Commission prohibit or impose any requirements on prearranged passenger transportation service to, from, or within airports using AVs operated without a driver in the vehicle?

We support the San Francisco International Airport's response to this question in their written comments.

5.4. Should the Commission modify D.13-09-045 to allow TNCs to own AVs or allow AVs leased or rented by TNCs from partnering entities on their online-enabled applications or platforms?

We address this in Section 4 of our comments. We do not believe it is necessary for the Commission to modify D.13-09-045 to allow TNCs to own AVs or allow AVs leased or rented by TNCs from partnering entities on their online-enabled applications or platforms, nor is it necessary to modify the Commission's definition of personal vehicle. Autonomous vehicles should not be offered by companies under TNC operating authority. Instead, any companies wishing to offer AV passenger carrier service should obtain a permit under a new autonomous vehicle category created by the Commission, and use such authority for its AV operations, distinct from any other authorities (such as TCP or TNC) under which that company may also operate passenger carrier service in conventional vehicles.

6. Passenger Safety-Related Questions

6.2. Should the Commission impose any requirement to ensure the safety of all passengers on the chartering by more than one party (i.e. fare-splitting) of AVs operated without a driver in the vehicle?

Yes, we address this both in Section 3 of our comments pertaining to Passenger Safety goals as well as our comments submitted on January 21st in response to Question 1 of the ALG's order.

6.3. Should the Commission require that certain information, such as how to contact the person or entity authorized to provide prearranged passenger transportation service using AVs be made available to passengers inside an AV operated without a driver in the vehicle?

For the reasons discussed in Section 4, individual persons should not be authorized to provide AV Passenger Service. Yes, the Commission should require information inside the vehicle that enables a passenger to obtain immediate support. Methods for contacting passenger support should be accessible to people with a range of disabilities.

6.4. Should the Commission require certain unique identifying information be made available on each AV, operated without a driver in prearranged passenger transportation service, to enable passengers to easily identify the exact AV offered for that trip?

Yes, we address this Section 4 of our comments. Vehicles should be required to offer clearly visible information inside and outside the vehicle offering backup methods of contacting AV platforms, such as telephone numbers and web addresses where customer service is available. Signage should include a unique vehicle ID visible both inside and outside the vehicle, to assist platforms in identifying the vehicle about which a passenger or member of the public contacts them seeking assistance, as well as law enforcement officers and public officials responding to incidents, permit violations, or complaints regarding such vehicles. All routine and emergency communication methods should be accessible to people with a range of disabilities.

6.5. Should the Commission require that a two-way communication link, between passengers and the person or entity authorized to provide prearranged passenger transportation service using AVs, be available and maintained at all times in each AV operated without a driver in the vehicle?

Yes, DMV regulations already require AV manufacturers to certify that their AVs have a communication link between the vehicle and the remote operator. The Commission should additionally require that a “remote operator” be a natural person who is physically situated in California and is immediately available to respond to passenger initiated communication. This link should be fully accessible to persons with disabilities in both routine and emergency operations.

8. Vehicle-Related Questions

8.2. Should the Commission modify D.16-04-041 to allow inspections of AVs performed by the manufacturers of AVs to fulfill the inspection requirements for vehicles used to provide prearranged passenger transportation service using online-enabled applications or platforms?

We address this in Section 4 and recommend that the Commission manage the risks arising from testing passenger service in vehicles equipped with automated driving systems by

requiring each permit applicants to design and implement its own vehicle inspection process for all AVs offering service on its platform, to be performed at the point each new vehicle comes into service and on a routine basis thereafter, at a frequency determined by the operator. Each operator should submit a detailed plan specifying the nature of its planned inspection process at the point of permit application, subject to approval by the Commission. Such proposed procedures should not be treated as proprietary information or sealed by the Commission, as they bear directly on each operator's safety practices and should be public records for the purpose of consumer protection and open to public comment.

EXHIBIT B

Exhibit B: Conceptual Proposal Responding to Question 2: How Commission Can Incorporate Public Goals in AV Passenger Service Path to Deployment and Authorize Limited Fare Collection

Street Safety Goal: Automated driving passenger service should improve safety for all road users		
Showing Required for Drivered Pilot Permit Risk to vulnerable road users from potential ADS failures is mitigated by safety driver	Showing Required for Driverless Pilot Permit Risk to vulnerable road users from potential ADS failures is not mitigated by safety driver.	Showing Required for Deployment Permit Risk to vulnerable road users from potential ADS failures is not mitigated by safety driver.
<ul style="list-style-type: none"> • <i>Applicant has and is in compliance with appropriate DMV permit</i> <p style="color: green; font-size: small; margin-top: 20px;">“SANDBOX” PILOT TESTING OPPORTUNITY: CPUC may approve fare collection or other compensation where applicant submits evidence of support from public agency to undertake collaborative assessment and verification relevant to the Street Safety Goal according to detailed terms approved by the collaboration partners</p>	<ul style="list-style-type: none"> • <i>Applicant has and is in compliance with appropriate DMV permit</i> • Applicant Submits Proposed Service Plan that includes chapter that makes showing that the ADS drives more safely than good human drivers, including method for: <ul style="list-style-type: none"> • ensuring local law compliance • achieving minimal risk condition in ODD • mitigation of risks to other ROW users reflected in disengagements and collisions in last 12 months • maintenance of ADS system components to support continued safe operation • Committee of Independent Experts (COI) convened by Commission reviews applicant showing and concludes that a reasonable case has been made that ADS can drive within ODD better than good human drivers and is likely to reduce known road safety risks, including to VRUs • Expert Committee report is available to public • Commission creates method for collecting feedback from pilot passengers & other street users and for sharing feedback with applicant and sandbox partner (if any) <p style="color: green; font-size: small; margin-top: 10px;">“SANDBOX” PILOT TESTING OPPORTUNITY: CPUC may approve fare collection or other compensation where applicant submits evidence of support from public agency to undertake collaborative assessment and verification relevant to the Street Safety Goal according to detailed terms approved by the collaboration partners</p>	<ul style="list-style-type: none"> • Applicant Submits Proposed Service Plan that includes chapter that makes showing that the ADS drives more safely than good human drivers, including method for: <ul style="list-style-type: none"> • ensuring local law compliance • achieving minimal risk condition in ODD • mitigation of risks to other ROW users reflected in disengagements and collisions in last 12 months • maintenance of ADS system components to support continued safe operation • Applicant showing is updated to reflect lessons learned from any sandbox collaborative pilot testing completed & passenger feedback • Applicant showing is updated to addresses any changes in safety risks or performance arising from increased scale • COI convened by Commission reviews applicant showing and concludes that a reasonable case has been made that ADS can drive within ODD better than good human drivers and is likely to reduce known road safety risks, including to VRUs • Expert Committee report is made available to the public • Permit authorizes commercial service on specified terms and conditions, including renewal period • Permit reflects or incorporates regulations subsequently adopted at federal or state level

Italics reflect existing DMV/CPUC regulations; Red highlights important risks to public; Green shows proposed conditions to authorize charging

Exhibit B: Conceptual Proposal Responding to Question 2: How Commission Can Incorporate Public Goals in AV Passenger Service Path to Deployment and Authorize Limited Fare Collection

Personal Safety Goal: Automated driving passenger service should ensure personal safety for all passengers, especially vulnerable passengers		
Showing Required for Drivered Pilot Permit <i>Risk of victimization is similar to other passenger services and may be addressed similarly</i>	Showing Required for Driverless Pilot Permit <i>New Risk of victimization may arise from absence of human in authority</i>	Showing Required for Deployment Permit <i>New Risk of victimization may arise from absence of human in authority</i>
<ul style="list-style-type: none"> • <i>Applicant complies with all existing requirements for driver background checks</i> • Applicant Proposed Service Plan includes Passenger Safety Chapter that demonstrates conscientious efforts and reasonable methods to minimize passenger safety risks that can be reasonably anticipated and to respond appropriately to reported incidents • CPUC makes Passenger safety plan available for public review and comment • CPUC accepts Passenger safety plan subject to any required amendments or conditions “SANDBOX” PILOT TESTING OPPORTUNITY: CPUC may approve fare collection or other compensation where applicant submits evidence of support from public agency to undertake collaborative assessment and verification of service details relevant to Passenger Safety Goal according to detailed terms approved by the collaboration partners 	<ul style="list-style-type: none"> • <i>Applicant also demonstrates compliance with DMV and CPUC requirements re 2 way communication channel between passengers and remote support</i> • <i>Passenger consent notice; vehicle photo</i> • <i>SUGGEST ELIMINATE fare splitting prohibition</i> • Applicant submits Passenger Safety Chapter • Passenger Safety Chapter demonstrates conscientious efforts and reasonable methods to minimize passenger safety risks that can be reasonably anticipated and to respond appropriately to reported incidents • CPUC makes Passenger safety plan available for public review and comment • CPUC accepts Passenger safety plan subject to any required amendments or conditions • Commission creates method for collecting and analyzing feedback from pilot passengers and for sharing feedback with applicant and sandbox partner (if any) “SANDBOX” PILOT TESTING OPPORTUNITY: CPUC may approve fare collection or other compensation where applicant submits evidence of support from public agency to undertake collaborative assessment and verification of service details relevant to Passenger Safety Goal according to detailed terms approved by the collaboration partners 	<ul style="list-style-type: none"> • <i>No current deployment requirements</i> • Applicant submits Passenger Safety Chapter (as may be updated to reflect findings from drivered or driverless sandbox pilot testing or otherwise) • Passenger Safety Chapter demonstrates conscientious efforts and reasonable methods to minimize passenger safety risks that can be reasonably anticipated and to respond appropriately to reported incidents • CPUC makes Passenger safety plan available for public review and comment • CPUC accepts Passenger Safety Chapter subject to any required amendments or conditions • Commission creates method for collecting feedback from pilot passengers and for sharing feedback with applicant and sandbox partner (if any) • Permit authorizes commercial service on specified terms and conditions, including renewal period • Permit reflects or incorporates regulations subsequently adopted at federal or state level

Italics reflect existing DMV/CPUC regulations; Red highlights important risks to public; Green shows proposed conditions to authorize charging

Exhibit B: Conceptual Proposal Responding to Question 2: How Commission Can Incorporate Public Goals in AV Passenger Service Path to Deployment and Authorize Limited Fare Collection

Environmental Goal: Automated driving passenger service should reduce GHG and air quality (AQ) hazards in California		
Environmental Objective 1: Automated Driving Passenger Service should help reach goal of reducing VMT by 15% compared to 2050 expected levels and should support rather than supplant more efficient modes, including high capacity transit, walking, and biking (as appropriate to location and trip length)		
Showing Required for Drivered Pilot Permit <i>Risk that companies do not test service models that have potential to reduce overall VMT.</i>	Showing Required for Driverless Pilot Permit <i>Risk that companies do not test service models that have potential to reduce overall VMT.</i>	Showing Required for Deployment Permit <i>Risk of service design that duplicates more efficient transportation modes, demonstrates low seat occupancy and increases overall VMT</i>
<ul style="list-style-type: none"> <i>No current requirements</i> Applicant Proposed Service Plan includes GHG A/Q Chapter Applicant GHG A/Q Chapter demonstrates conscientious efforts and reasonable methods to minimize VMT and mode shift from more efficient modes as well as efforts and methods to increase access to existing high capacity transit CPUC makes GHG A/Q Chapter available for public review and comment CPUC accepts GHG A/Q Chapter subject to any required amendments or conditions <p>“SANDBOX” PILOT TESTING OPPORTUNITY: CPUC may approve fare collection or other compensation where applicant submits evidence of support from public agency to undertake collaborative assessment and verification of service details relevant to Environmental Goal and Objective 1 according to detailed terms approved by the collaboration partners</p>	<ul style="list-style-type: none"> <i>No current requirements</i> Applicant Proposed Service Plan includes GHG A/Q Chapter Applicant submits GHG A/Q Chapter (as it may be updated to reflect findings from drivered sandbox pilot testing, or otherwise) that demonstrates conscientious efforts and reasonable methods to minimize VMT and mode shift from more efficient modes as well as efforts and methods to increase access to existing high capacity transit CPUC makes GHG/ AQ plan available for public review and comment CPUC accepts Passenger safety plan subject to any required amendments or conditions <p>“SANDBOX” PILOT TESTING OPPORTUNITY: CPUC may approve fare collection or other compensation where applicant submits evidence of support from public agency to undertake collaborative assessment and verification of service details relevant to Environmental Goal and Objective 1 according to detailed terms approved by the collaboration partners</p>	<ul style="list-style-type: none"> Applicant Proposed Service Plan includes GHG A/Q Chapter Applicant submits GHG A/Q Chapter (as it may be updated to reflect findings from drivered or driverless sandbox pilot testing, or otherwise) that demonstrates service plan will minimize VMT and mode shift from more efficient modes and/or will expand access to more efficient modes (and will comply with any Clean Miles Standard regulations that may be available by this time) CPUC makes GHG/ AQ plan available for public review and comment CPUC accepts Passenger safety plan subject to any required amendments or conditions <ul style="list-style-type: none"> Permit authorizes commercial service on specified terms and conditions, including renewal period Permit reflects or incorporates regulations subsequently adopted at federal or state level (by NHTSA, CPUC, CARB, etc., including, e.g. Clean Miles Standard)

Italics reflect existing DMV/CPUC regulations; Red highlights important risks to public; Green shows proposed conditions to authorize charging

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Environmental Goal: Automated driving passenger service should reduce GHG and air quality hazards in California.		
Environmental Objective 2: Automated Driving Passenger Service Should Help Reach CA EV Adoption Targets		
Showing Required for Drivered Pilot Permit <i>Risk: Companies are not testing vehicles that will increase ZEV use</i>	Showing Required for Driverless Pilot Permit <i>Risk: Companies are not testing vehicles that will increase ZEV use</i>	Showing Required for Deployment Permit <i>Companies deploy vehicles that do not increase ZEV use and/or comply with (forthcoming) Clean Miles Standard requirements</i>
<ul style="list-style-type: none"> • <i>No current requirements</i> • Applicant Proposed Service Plan includes GHG A/Q Chapter that demonstrates reasonable methods to contribute to achieving CA ZEV goals • CPUC makes GHG/AQ Plan available for public review and comment • CPUC accepts GHG/AQ Plan subject to any required amendments or conditions <p style="color: green; font-size: small;">“SANDBOX” PILOT TESTING OPPORTUNITY: CPUC may approve fare collection or other compensation where applicant submits evidence of support from public agency to undertake collaborative assessment and verification of service details relevant to Environmental Goal and Objective 1 according to detailed terms approved by the collaboration partners</p>	<ul style="list-style-type: none"> • <i>No current requirements</i> • Applicant Proposed Service Plan includes GHG A/Q Chapter (as it may be updated to reflect findings from drivered sandbox pilot testing, or otherwise) that demonstrates reasonable methods to contribute to achieving CA ZEV goals • CPUC makes GHG/AQ Plan available for public review and comment • CPUC accepts GHG/AQ Plan subject to any required amendments or conditions <p style="color: green; font-size: small;">“SANDBOX” PILOT TESTING OPPORTUNITY: CPUC may approve fare collection or other compensation where applicant submits evidence of support from public agency to undertake collaborative assessment and verification of service details relevant to Environmental Goal and Objective 1 according to detailed terms approved by the collaboration partners</p>	<ul style="list-style-type: none"> • Applicant Proposed Service Plan includes • GHG A/Q Chapter (as it may be updated to reflect findings from drivered or driverless sandbox pilot testing, or otherwise) that demonstrates compliance with CA ZEV goals (and will comply with any Clean Miles Standard regulations that may be available by this time) • CPUC makes GHG/AQ Plan available for public review and comment • CPUC accepts GHG/AQ Plan subject to any required amendments or conditions <ul style="list-style-type: none"> • Permit authorizes commercial service on specified terms and conditions, including renewal period • Permit reflects or incorporates regulations subsequently adopted at federal or state level (by NHTSA, CPUC, CARB, etc., including, e.g. Clean Miles Standard)

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Exhibit B: Conceptual Proposal Responding to Question 2: How Commission Can Incorporate Public Goals in AV Passenger Service Path to Deployment and Authorize Limited Fare Collection

Equity Goal 1: Automated Driving Passenger Service should provide equivalent service to people with disabilities, including people using wheelchairs.		
Showing Required for Drivered Pilot Permit <i>Risk that companies test solutions to only a subset of barriers for people with disabilities.</i>	Showing Required for Driverless Pilot Permit <i>Risk that companies test solutions to only a subset of barriers for people with disabilities.</i>	Showing Required for Deployment Permit <i>Risk that service is deployed to improve options only for a subset of passengers with disabilities, such as those who are blind or low vision.</i>
<ul style="list-style-type: none"> • <i>Use best efforts to reach out to advocates</i> • Applicant Proposed Service Plan includes Accessibility Chapter that demonstrates knowledge of barriers to with physical, sensory, or mental disabilities, including wheelchair users who cannot transfer, identifies planned accessibility features under consideration and institutional capacity to receive and incorporate feedback from potential passengers with disabilities • Chapter demonstrates that safety drivers are trained to support passengers with disabilities • CPUC makes Accessibility Chapter available for public review and comment • CPUC accepts Accessibility Chapter subject to any required amendments or conditions • Commission creates method for collecting and analyzing feedback from pilot passengers and for sharing feedback with applicant and sandbox partner (if any) <p style="color: green; font-size: small;">“SANDBOX” PILOT TESTING OPPORTUNITY: CPUC may approve fare collection or other compensation where applicant submits evidence of support from public agency to undertake collaborative assessment and verification of service details relevant to the Accessibility Goal according to detailed terms approved by the collaboration partners</p>	<ul style="list-style-type: none"> • <i>Use best efforts to reach out to advocates</i> • <i>Applicant demonstrates that communication channel created in compliance with DMV and CPUC requirements is accessible to passengers with a disability during routine and emergency operations</i> • Applicant Accessibility Chapter that demonstrates knowledge of barriers to with physical, sensory, or mental disabilities, including wheelchair users who cannot transfer, identifies planned accessibility features under consideration and institutional capacity to receive and incorporate feedback from potential passengers with disabilities • CPUC makes Accessibility Chapter available for public review and comment • CPUC accepts Accessibility Chapter subject to any required amendments or conditions • Commission creates method for collecting and analyzing feedback from pilot passengers and for sharing feedback with applicant and sandbox partner (if any) <p style="color: green; font-size: small;">“SANDBOX” PILOT TESTING OPPORTUNITY: CPUC may approve fare collection or other compensation where applicant submits evidence of support from public agency to undertake collaborative assessment and verification of service details relevant to the Accessibility Goal according to detailed terms approved by the collaboration partners</p>	<ul style="list-style-type: none"> • Applicant Accessibility Chapter demonstrates: <ul style="list-style-type: none"> • Ability to provide equivalent service to people with disabilities, including wheelchair users who cannot transfer • All personnel, including remote operators, are trained to provide service to people with disabilities • Institutional capacity to continue receiving and incorporating feedback from disabled passengers and responding to complaints of discrimination or abuse • CPUC makes Accessibility Chapter available for public review and comment • CPUC accepts Accessibility Chapter subject to any required amendments or conditions <p style="color: green; font-size: small;">Permit authorizes commercial service on specified terms and conditions, including renewal period</p> <p style="color: green; font-size: small;">Permit reflects or incorporates regulations subsequently adopted at federal or state level</p>

Italics reflect existing DMV/CPUC regulations; Red highlights important risks to public; Green shows proposed conditions to authorize charging

Exhibit B: Conceptual Proposal Responding to Question 2: How Commission Can Incorporate Public Goals in AV Passenger Service Path to Deployment and Authorize Limited Fare Collection

Equity Goal 2: Automated Driving Passenger Service should prevent negative impacts on disadvantaged communities and improve transportation options for all, giving priority to disadvantaged communities with unmet transportation needs.		
Showing Required for Drivered Pilot Permit <i>Risk that companies test service w/o considering burdens on or benefits to disadvantaged communities.</i>	Showing Required for Driverless Pilot Permit <i>Risk that companies test service w/o considering burdens on or benefits to disadvantaged communities.</i>	Showing Required for Deployment Permit <i>Risk that service is deployed that exacerbates burdens on and/or fails to improve transportation options for disadvantaged communities.</i>
<ul style="list-style-type: none"> • <i>No current requirements</i> • Applicant Proposed Service Plan includes Service Equity Chapter that identifies impacts on Disadvantaged Communities • Service Equity Chapter applies equity framework established by Disadvantaged Communities Advisory Group • Service Equity Chapter identifies plans for preventing negative impacts and creating transportation options for unmet needs • CPUC makes Service Equity Chapter available for public review and comment • CPUC accepts Service Equity Chapter subject to any required amendments or conditions • Commission creates method for collecting and analyzing feedback from pilot passengers and for sharing feedback with applicant and sandbox partner (if any) <p style="color: green; margin-top: 20px;"><i>“SANDBOX” PILOT TESTING OPPORTUNITY: CPUC may approve fare collection or other compensation where applicant submits evidence of support from public agency to undertake collaborative assessment and verification of service details relevant to the Service Equity Goal according to detailed terms approved by the collaboration partners</i></p>	<ul style="list-style-type: none"> • <i>No current requirements</i> • Applicant Proposed Service Plan includes Service Equity Chapter that identifies impacts on Disadvantaged Communities • Service Equity Chapter applies equity framework established by Disadvantaged Communities Advisory Group • Service Equity Chapter identifies plans for preventing negative impacts and creating transportation options for unmet needs • CPUC makes Service Equity Chapter available for public review and comment • CPUC accepts Service Equity Chapter subject to any required amendments or conditions • Commission creates method for collecting and analyzing feedback from pilot passengers and for sharing feedback with applicant and sandbox partner (if any) <p style="color: green; margin-top: 20px;"><i>“SANDBOX” PILOT TESTING OPPORTUNITY: CPUC may approve fare collection or other compensation where applicant submits evidence of support from public agency to undertake collaborative assessment and verification of service details relevant to the Service Equity Goal according to detailed terms approved by the collaboration partners</i></p>	<ul style="list-style-type: none"> • Service Equity Chapter (as may be updated to reflect findings from drivered or driverless sandbox pilot testing or otherwise) demonstrates that service prevents new burdens on Disadvantaged Communities and creates new transportation options for Disadvantaged Communities • CPUC makes Service Equity Chapter available for public review and comment • CPUC accepts Service Equity Chapter subject to any required amendments or conditions <p style="color: green; margin-top: 20px;"> <ul style="list-style-type: none"> • Permit authorizes commercial service on specified terms and conditions, including renewal period • Permit reflects or incorporates regulations subsequently adopted at federal or state level </p>

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EXHIBIT C

**CALIFORNIA PUBLIC UTILITIES COMMISSION
AUTONOMOUS VEHICLE ACCESSIBILITY WORKING GROUP
SUMMARY OF WRITTEN COMMENTS (11/19/2018)**

Accessibility Inside AVs (Vehicle Designs/Types)

- Given the wide range of wheelchair designs, how will riders using wheelchairs be secured in absence of a human operator? Additionally, what accommodations will be made for riders who can transfer from a wheelchair and will need assistance stowing the wheelchair or for riders using another mobility/assistive device (e.g. walkers, foldable wheelchairs, oxygen tanks, canes)? **(San Francisco Municipal Transportation Agency)**
- Should “on-board concierge-like” services within AVs to provide for human assistance to passengers be allowed or a certain percentage of these vehicles be required to offer these services? **(City of Los Angeles Department of Transportation)**
- How will controls inside and outside of the vehicle be accessible to people with a wide range of disabilities? These include but are not limited to controls that initiate opening/closing a door or trunk, deploying a ramp or lift, or adjusting a seat or headrest. **(San Francisco Municipal Transportation Agency)**
- How will communication devices and systems be accessible to people with a wide range of disabilities? This is inclusive of standard operational communications to and from passengers (e.g. information on what the vehicle is doing, changes in passenger plans or details, or requests for non-emergency support) as well as emergency communications for unexpected circumstances. **(San Francisco Municipal Transportation Agency)**
- What interior monitoring devices will be included in AVs, and what degree of control will passengers have over their use and purpose? **(San Francisco Municipal Transportation Agency)**
- How will independent and autonomous transfers into and out of AVs for the mobility impaired (including motorized wheelchair users) be accomplished? **(The Arc California)**

Accessibility in Arranging AV Passenger Service

- Should online-enabled applications/platforms be required, on an optional basis, to recognize disabilities and support needs, and have a higher level of support for persons with disabilities? If so, what would this look like and how would privacy issues be addressed? **(San Francisco Municipal Transportation Agency)**
- Will riders be able to arrange transportation without using an online-enabled application/platform? Are entities that arrange this transportation on a rider’s behalf regulated entities? **(San Francisco Municipal Transportation Agency)**

- Will there be an opportunity to provide feedback on service and operations regardless of ability, smartphone use, etc.? **(San Francisco Municipal Transportation Agency)**
- Will AV passenger service be provided regardless of whether a participant has a credit card or bank account? **(San Francisco Municipal Transportation Agency)**
- Will riders be able to request a ride for a companion who provides personal caregiving assistance at no additional cost? **(San Francisco Municipal Transportation Agency)**
- How people with intellectual disabilities and/or visual impairments know that they have the right vehicle? **(The Arc California)**
- How do we ensure the artificial intelligence behind AV technology/services do not build in racial and other biases (e.g., rejections, longer wait times) and safety (lower safety thresholds)? **(Professor Susan Shaheen, UC Berkeley)**

Relevant Research/Analysis on Accessibility in AVs

- What questions or concerns have existing research projects raised? **(San Francisco Municipal Transportation Agency)**
- What are established best practices, if any? **(San Francisco Municipal Transportation Agency)**
- What further research needs to be done to answer outstanding questions? **(San Francisco Municipal Transportation Agency)**
- Can the CPUC conduct research on the adequacy of existing wheelchair accessible vehicle (WAV) providers in certain parts of the state and identify historical WAV usage data? **(American Association of People with Disabilities)**
- What policies and or existing research have been suggested that would promote increased accessibility of AVs? **(Securing America's Future Energy)**
 - Study: [Self-Driving Cars: The Impact on People with Disabilities](#) “proposes a set of policies that promote increased accessibility of AVs with a need to accommodate the varying needs of the disability community. The paper also highlighted the importance of creating the right organizational structures to collect and distribute input from the disability community.” **(Securing America's Future Energy)**

Application of the Americans with Disabilities Act (ADA) to AV Passenger Service

- The Americans with Disabilities Act governs and limits the offering of transportation services and presumably, unless it is amended to address AVs, it would fall to operators to comply with the provisions of the ADA. How are provisions of the ADA being interpreted as they might apply to AVs? (**Professor Martin Wachs, UC Los Angeles**)

Roles of Stakeholder Organizations

- What additional stakeholders (such as seniors and deaf and hard of hearing communities) should be included in discussions concerning accessibility in AV transportation? (**Lyft, The Arc California**)
- How can awareness of the CPUC's AV pilot programs be increased to encourage use of these services for people with disabilities? How can we encourage partnerships to promote the AV use for disabilities applications? (**Securing America's Future Energy**)

Current Industry Progress on Accessible Design and Operation of AVs for Passenger Service

AV Interaction with Vulnerable Street Users and Accessible Vehicles

- How do AVs (accessible and non-accessible models) perceive and predict the behavior of people with disabilities? Will AVs recognize different travel speeds and gaits for persons using various mobility devices? (**San Francisco Municipal Transportation Agency**)
- How will AVs (accessible and non-accessible models) perceive and predict the behavior of vehicles serving people with disabilities including but not limited to paratransit vehicles, non-emergency medical transport, and any vehicle that needs to safely deploy or lift or ramp? (**San Francisco Municipal Transportation Agency**)
- Vehicle horns and hazard lights are examples of existing methods of how vehicles and vehicle operators communicate with other right of way users. Will AVs be required to use additional communication tools to compensate for the absence of a human operator and will these be standardized? In particular, how will AVs (accessible and non-accessible models) communicate with people with disabilities? Consistency is critical to ensure safety for the general population, but especially people with disabilities. (**San Francisco Municipal Transportation Agency**)

Testing and Operating Accessible Autonomous Vehicles

- Of the companies with DMV permits to test AVs on CA streets, which, if any, are using wheelchair accessible vehicles? If none, why? (**San Francisco Municipal Transportation Agency**)
- What level of accessible service will the CPUC require companies to provide once operational? (**San Francisco Municipal Transportation Agency**)
- When the companies move beyond pilot status, how will wheelchair users be served? (**American Association of People with Disabilities**)

- Are wheelchair accessible AVs being tested on public roads in any other state? If so, by what companies? If not, why not? (**San Francisco Municipal Transportation Agency**)
- What are the parameters for testing accessible AVs? When are manufacturers/service operators expected to test accessible models? Will they be required to test or be testing accessible AVs before operating general AV passenger service? (**San Francisco Municipal Transportation Agency**)
- What training would be required for people currently working as AV test drivers to support participation by passengers with disabilities in future testing of AV passenger service under CPUC rules? (**San Francisco Municipal Transportation Agency**)

Built Environment Design Challenges

- How can we support resolving design challenges around infrastructure (e.g. ensuring the ease of entry and exit of the vehicle and understanding whether infrastructure challenges hinder accessible passenger service)? (**Securing America's Future Energy**)

Incentives for Accessible AV Service

- Will the CPUC allow AV companies to access/participate in the fund established under Senate Bill 1376 (Hill, 2018) for WAV service by TNCs? (**American Association of People with Disabilities**)
- Can the CPUC provide incentive(s) to AV companies to serve wheelchair users? (**American Association of People with Disabilities**)
- Will pooled service (vs. non-pooled service) receive discounts, subsidies, etc. for lower-income populations, along with priority curbside and rights-of-way access? (**Professor Susan Shaheen, UC Berkeley**)

Data Reporting Requirements

- Are the current CPUC AV pilot program data reporting requirements appropriate and/or sufficient to increase accessibility? (**Securing America's Future Energy**)
- What are the desired outcomes from AV accessibility data reporting requirements? (**Securing America's Future Energy**)