



November 5, 2021

Advice Letter - 0001

(Cruise LLC PSG 00390807)

PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Consumer Protection and Enforcement Division

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**SUBJECT: Cruise Application for Driverless Deployment Permit - Tier 3
Advice Letter**

I. PURPOSE

In compliance with Decision (D.) 20-11-046 and consistent with General Order (“GO”) 96-B, Cruise LLC (“Cruise”) hereby respectfully submits to the California Public Utilities Commission (“Commission or CPUC”) Cruise’s application for a Driverless Deployment permit in the form of a Tier 3 Advice Letter to participate in the Commission’s Phase I Driverless Autonomous Vehicle (“AV”) Deployment Program (“Driverless Deployment Program”) under Cruise’s Charter-Party Carrier Class “P” Permit. Cruise’s Passenger Safety Plan (“PSP”) is included as **Attachment 1** to this Tier 3 Advice Letter.

II. BACKGROUND

In D.18-05-043, the Commission authorized a pilot test program for autonomous vehicle passenger service with drivers and a pilot program for driverless autonomous vehicle passenger service.¹ Cruise received approvals to participate in both pilot programs on February 29, 2020 and June 4, 2021, respectively.

In D.20-11-046 (“Decision”), the Commission created two new autonomous vehicle programs that authorized fare collection, one for drivered autonomous vehicles and the other for driverless autonomous vehicles (“deployment programs”).² The Decision establishes four goals that apply to the new deployment programs: (1) Protect passenger safety; (2) Expand the benefits of AV

¹ Decision Authorizing a Pilot Test Program for Autonomous Vehicle Passenger Service With Drivers and Addressing in Part Issues Raised in the Petitions for Modification of General Motors, LLC/GM Cruise, LLC, Lyft, Inc., and Rasier-CA, LLC/UATC, LLC for Purposes of a Pilot Test Program for Driverless Autonomous Vehicle Passenger Service, D.18-05-043 (Cal. P.U.C. May 31, 2018).

² Decision Authorizing Deployment of Drivered and Driverless Autonomous Vehicle Passenger Service, D.20-11-046 at p. 2 (Cal. P.U.C. Nov. 19, 2020), as modified by Order Modifying Certain Holdings of Decision 20-11-046 and Denying Rehearing of the Decision, as Modified, D.21-05-017 (Cal. P.U.C. May 6, 2021) (“D.20-11-046”).

technologies to all Californians, including people with disabilities; (3) Improve transportation options for all, particularly for disadvantaged communities and low-income communities; and (4) Reduce greenhouse gas emissions, criteria air pollutants, and toxic air contaminants, particularly in disadvantaged communities.³ Cruise is committed to all of these goals and our Driverless Deployment Program participation will not only meet, but advance, them.

Cruise is an all-electric self-driving technology company founded in San Francisco in 2013 with a mission to build the world's most advanced AV to safely connect people to the places, things and experiences they care about. We believe that our all-electric AV fleets can improve current transportation systems by offering an AV service for passengers that connects, supports, and strengthens the communities we serve in a safer, more inclusive, and more sustainable way. Cruise's technology has been developed through many years of safe operation, millions of miles of on-road testing, extensive closed course testing, and advanced simulation testing. These efforts have culminated in Cruise's readiness for the Driverless Deployment Program. As Cruise's Passenger Safety Plan demonstrates, Cruise's safety focus goes beyond the safety of our AVs -- Cruise has also designed and implemented policies and procedures to minimize risk for all passengers and residents in the areas we serve, including people with disabilities.

Cruise recognizes the importance of engaging the communities we serve to continue to earn trust. We must continue to be deliberate in our approach in communities that historically have been most impacted by environmental injustice and transportation inequity. Cruise for Good - our ongoing social impact program launched in 2021 to allocate at least 1% of Cruise's zero-emission AV fleet in service of low-income and disadvantaged communities in San Francisco and beyond - reflects these values.⁴ Cruise for Good builds on our "Stand with San Francisco" initiative, launched in April 2020 in the midst of the pandemic. Recognizing the acute needs of those experiencing hunger in our communities, Cruise partnered with the San Francisco-Marín Food Bank and SF New Deal to redeploy our AV fleet to support these local food banks in delivering meals and groceries to food insecure households across San Francisco.⁵ Through these partnerships, Cruise has delivered over 1.8 million meals. More than 80% of these deliveries have been to households in zip codes below the San Francisco poverty line.⁶ And through our zero emission fleet, powered by 100% clean renewable energy, these deliveries have also contributed to San Francisco's and California's climate goals. To date, Cruise's deliveries have offset over 85 metric tons of CO₂ emissions that would have otherwise been emitted if these deliveries had been made in gas-powered cars. We also are proud of FutureWorks, a program we have created to provide career support to communities and individuals who are historically underrepresented in tech. In partnership with community organizations, FutureWorks provides educational and skill-building activities to the community

³ *Id.*

⁴ For more details, see Cruise, Community, <https://www.getcruise.com/community>.

⁵ See Robert Grant, Cruise's Self-Driving Fleet Makes 50,000 Contactless Deliveries & Counting, Medium (July 12, 2020), <https://medium.com/cruise/cruise-self-driving-fleet-deliveries-2f83442cf9f3>.

⁶ Cruise calculates its low-income zip-code deliveries based on zip-code median household income results from the U.S. Census Bureau American Community Survey (using the most recent year available with zip-level income data) and compares it to the U.S. Department of Housing and Urban Development's Median Household Income Calculator to approximate the city's "Low Income" line.

including career panels, interview training, and networking - such as partnership events with HumanMade.

In addition to advancing the Commission's established goals, the following information demonstrates Cruise has met the requirements set forth in the Decision and General Order 157-E.⁷

III. PROPOSED SCOPE OF AV SERVICE

Cruise's Driverless Deployment Program will begin with a limited scope, starting with up to thirty of Cruise's AVs that will provide non-pooled rides for members of the public. This program will be limited in geography, in daily hours of operation, and by certain weather conditions in parameters set by Cruise's Operational Design Domain ("ODD") that has been approved by the California Department of Motor Vehicles ("DMV").⁸

IV. COMPLIANCE WITH D.20-11-046

A. PASSENGER SAFETY PLAN

The Decision requires a Passenger Safety Plan ("PSP") that describes policies and procedures to minimize risk for all passengers in driverless vehicles.⁹ Below are the PSP components set forth in Ordering Paragraphs (OP) 8-10 of the Decision that are applicable to Cruise's proposed AV service,¹⁰ and the relevant section of Cruise's PSP that addresses each component:

- Minimize safety risks to passengers traveling in a ride operated without a driver in the vehicle [PSP, Section 4.6];
- Respond to unsafe scenarios outside and within the vehicle, such as hostile individuals [PSP, Section 6];
- Educate and orient passengers about the technology, experience, and safety procedures [PSP, Section 4];
- Ensure customers can safely identify, enter, and exit the AV they requested [PSP, Section 4.4];
- Enable passengers to contact the AV service provider during the ride and ensure the passengers receive a timely and complete response [PSP, Section 5];
- Collect, respond to, and retain any passenger comments and complaints [PSP, Section 5.4];

⁷ Cruise has grouped the requirements set forth in D.20-11-046 and General Order 157-E by topic to streamline the discussion and avoid repetition.

⁸ An "ODD" is the specific operating domain(s) in which an automated function or system is designed to properly operate, including but not limited to geographic area, roadway type, speed range, environmental conditions (weather, daytime/nighttime, etc.) and other domain constraints. See Cal. Code Regs. tit. 13, § 227.02(j) (2021).

⁹ D.20-11-046 at pp. 136-37, OP 8-10, as modified by D.21-05-017.

¹⁰ Ordering paragraph 8 of D.20-11-046 provides that a PSP must detail how an applicant will minimize safety risks to passengers traveling in a shared driverless ride, including prevention and response to assaults and harassments. See D.20-11-046 at pp.136-37, OP 8, as modified by D.21-05-017. As set forth in Section III of this advice letter, Cruise will not be offering driverless pooled rides during the initial phase of its Driverless Deployment Program. See *also* **Attachment 1** (PSP) at Section 2.2.

- Ensure the safety measures described above are accessible to and apply to all passengers, including those with limited mobility, vision impairments, or other disabilities [PSP, Sections 2.3 and 4-6];
- Anticipated response time to passenger requests to contact the AV service provider [PSP, Section 5.1]; and
- Written COVID-19 Emergency Plan as required by Resolution TL-19131 [PSP, Section 3 and PSP Exhibit A].

Cruise’s PSP (**Attachment 1**) thoroughly describes the policies and procedures to minimize safety risk to passengers in our driverless AVs and fully meets the requirements set forth in the Decision.

B. DMV DEPLOYMENT PERMIT

The Decision states that permit-holders participating in the Driverless Deployment Program shall, among other things, “[h]old a California Department of Motor Vehicles Autonomous Vehicle Deployment Permit and certify that the entity is in compliance with all Department of Motor Vehicles regulations”¹¹ and “[m]aintain insurance for the Autonomous Vehicle offered for Driverless Autonomous Vehicle Passenger Service in compliance with Department of Motor Vehicles regulations.”¹² On September 30, 2021, Cruise received approval of its DMV Autonomous Vehicle Deployment Permit. See **Attachment 2** for the DMV approval letter and **Attachment 3** for Cruise’s Certification of Compliance.¹³

C. THIRTY DAYS OF OPERATIONS FOLLOWING RECEIPT OF DMV DEPLOYMENT PERMIT

The Decision also requires that Cruise “[a]ttest that one of the entity’s vehicles that represents the vehicle and technology characterizing the fleet to be offered for the service for a minimum of 30 days on roads in California following the entity’s receipt of the Department of Motor Vehicles Autonomous Vehicle Deployment Permit.”¹⁴ At least one Cruise vehicle that is representative of the AV fleet and of the technology that Cruise plans to use in the Driverless Deployment Program has been operating for a minimum of 30 days following the grant of the DMV Autonomous Vehicle Deployment Permit. See **Attachment 4** for Attestation of 30 Days of Operations.

D. EXPANDED DATA REPORTING PLAN

The Decision requires permit-holders participating in the Driverless Deployment Program to “[t]ransmit to the Commission quarterly reports of data about the operation of their vehicles providing Driverless AV Passenger Service.”¹⁵ Since 2019, Cruise has been submitting quarterly

¹¹ *Id.* at p. 129, OP 7b, as modified by D.21-05-017.

¹² *Id.* at p. 129, OP 7c, as modified by D.21-05-017.

¹³ Cruise has provided its compliance with the insurance requirements in its application for TCP authority.

¹⁴ D.20-11-046 at p. 129-30, OP 7f, as modified by D.21-05-017.

¹⁵ *Id.* at p. 131, OP 7m, as modified by D.21-05-017.

reports to the Commission. Cruise will continue to provide quarterly reports as required by D.20-11-046 and will seek confidential treatment pursuant to General Order 66-D, as appropriate.

E. TRANSMIT ALL DMV REPORTS TO THE COMMISSION

The Decision requires permit-holders participating in the Driverless Deployment Program to simultaneously transmit to the Commission “all reports required by Department of Motor Vehicles regulations.”¹⁶ Accordingly, Cruise has provided and will continue to provide to the Commission the following reports:

- Process in the event of a collision;¹⁷
- Law enforcement interaction plan;¹⁸
- Disclosure to the passenger regarding collection and use of personal information;
- Collision reporting; and
- Annual Autonomous Vehicle disengagement reports.

F. NOTICE TO PASSENGERS AND PASSENGER CONSENT

Consistent with the Decision,¹⁹ Cruise’s PSP addresses Cruise’s plan for providing notice to the passenger that they are receiving Driverless Autonomous Vehicle Passenger Service and how the passenger can affirmatively consent to or decline the service.²⁰

G. PHOTO OF THE VEHICLE TO PASSENGER

The Decision requires Cruise to provide a photo of the AV that will provide the service to the passenger.²¹ In Section 4.1 of the PSP, Cruise has included examples of the photo of the AV that will provide the service and that will be provided to the passenger.²²

V. COMPLIANCE WITH GENERAL ORDER 157-E

The Commission’s Driverless Deployment Program authorizes entities that hold a Transportation Charter-Party Carrier permit (Class “P” permit or a Class “A” certificate) to add autonomous vehicles to their passenger carrier equipment statement and provide AV service to passengers. Specifically, Transportation Charter-Party Carrier permit-holders participating in the Driverless Deployment Program must “[h]old and comply with all standard terms and conditions of the California Public Utilities Commission’s Transportation Charter-Party Carrier permit; including ensuring that remote operators comply with all terms and conditions applicable to

¹⁶ *Id.* at p. 130, OP 7g, as modified by D.21-05-017.

¹⁷ Cruise also describes its process in the event of a collision in its PSP. See **Attachment 1** (PSP) at Section 6, Incident Response, and Exhibit C.

¹⁸ Cruise also has attached its Law Enforcement Interaction Plan to its PSP. See **Attachment 1** (PSP) at Exhibit C. See also Cruise Resources for First Responders (updated Sept. 30, 2021), <https://www.getcruise.com/firstresponders>.

¹⁹ D.20-11-046 at p. 130, OP 7h, as modified by D.21-05-017.

²⁰ See **Attachment 1** (PSP) at Sections 2.2 and 4.

²¹ D.20-11-046, at p. 130, OP 7i, as modified by D.21-05-017.

²² See **Attachment 1** (PSP) at Section 4.1.

drivers.”²³ General Order (GO) 157-E contains the rules and regulations governing the operations of Transportation Charter Party Carriers of passengers.

Cruise has maintained its Transportation Charter-Party Carrier Class P permit and is in compliance with its terms and conditions and General Order 157-E, with the exception of the exemption detailed in Section VI. Below is a high level summary demonstrating Cruise’s compliance with GO 157-E:

A. General Requirements and Restrictions

1. Prearranged Transportation: Cruise will provide passenger service only on a prearranged basis and will maintain waybill information required by Rule 3.01.
2. Operations at Airports: Cruise will not conduct any operations on the property of or into any airport unless such operations are authorized by both this Commission and the airport authority involved.

B. Vehicle Requirements

1. Current Equipment Statement: Cruise’s equipment list of all vehicles (owned or leased) in use under its Class P permit is up to date. Please also refer to Section VI below.
2. Vehicle Inspections: Cruise conducts vehicle inspections and maintenance consistent with the requirements of the TCP permit.
3. Vehicle Inspection Records: Cruise maintains records demonstrating that every vehicle used in its operations complies with the 19-point vehicle inspection requirement. These records are maintained for a period of three years.

C. Driver Requirements

1. Employer Pull Notice Program: Cruise’s remote operators do not perform dynamic driving tasks. However, consistent with Cruise’s Drivered Pilot Permit, Cruise will continue its participation in the Department of Motor Vehicles’ Employer Pull Notice Program.

D. Records and Inspections: Cruise maintains all charter-party records, as described in Rule 6.01, for a period of three years and will afford representatives of the Commission “all reasonable opportunity and facilities” to inspect such records.

E. Complaints

1. Requirement to Answer Complaints: Cruise will respond within 15 days to any written complaint concerning transportation services provided and inquiries from Commission staff regarding complaints and provide copies of any requested correspondence and records.
2. Communications Between Passengers and Remote Operators: Cruise will record all communications from passengers in the AVs with the remote operator while Driverless AV Passenger Service is being provided

²³ *Id.* at pp. 129-30, OP 7, as modified by D.21-05-017.

and retain the recording for one year from the date of the recording. The recordings will be provided to the Commission upon request.

F. **Transportation of Minors:** The Driverless Deployment Program will not permit the transport of unaccompanied minors.

VI. EXEMPTION REQUEST

Pursuant to GO 157-E, Rule 8.01, Cruise will be submitting a request for an exemption to the requirement that TCP holders maintain an equipment list of vehicles owned or leased for use in the Driverless Deployment Program concurrently with its Driverless Deployment Application.²⁴ Similar to the exemption requests approved by the CPUC Consumer Protection and Enforcement Division for Cruise's pilot programs, Cruise seeks to list vehicles owned by General Motors Company LLC ("GM") on its equipment list. GM has a controlling interest in Cruise. Cruise will satisfy all other vehicle requirements under GO 157-E. Cruise will manage the Driverless Deployment Program and has authority to manage or direct the use of any equipment made a part of the Program. Should the Commission grant this exemption, the Driverless Deployment Program operations will be functionally equivalent under GO 157-E.

VII. EFFECTIVE DATE

Pursuant to General Order (GO) 96-B, Section 5.1 and Ordering Paragraphs 11 and 18 of D.20-11-046, as modified by D.21-05-017, this advice letter is submitted with a Tier 3 designation. Cruise requests that this Tier 3 advice letter become effective upon Commission approval.

VIII. PROTESTS AND RESPONSES

According to GO 96-B, Section 7.4, "Any person (including individuals, groups, or organizations) may protest or respond to an advice letter" within 20 days of the submission date of the advice letter. Pursuant to GO 96-B, Section 3.11, "The protest shall contain the following information: specification of the advice letter protested; grounds for the protest [*see GO 96-B, Section 7.4.6*]; supporting factual information or legal argument; name, telephone number, postal address, and (where appropriate) e-mail address of the protestant; and statement that the protest was sent to the utility [*Cruise*] no later than the day on which the protest was submitted to the reviewing Industry Division [*CPED*]." Protests and responses must be submitted to:

The CPUC Consumer Protection and Enforcement Division:

DOUGLAS ITO
California Public Utilities Commission
Consumer Protection and Enforcement Division
505 Van Ness Avenue
San Francisco, CA 94102-3214
douglas.ito@cpuc.ca.gov

²⁴ CPUC General Order 157-E, Rule 4.01. See also D.20-11-046 at p. 10 and Form PL-664-AV.

and to AVPrograms@cpuc.ca.gov.

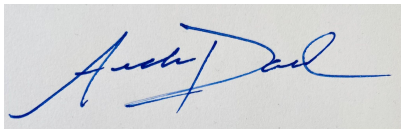
The protests and responses shall also be sent on the same date it is delivered to the Commission to Cruise via email to:

PRASHANTHI RAMAN at prashanthi.raman@getcruise.com
AICHI DANIEL at aichi.daniel@getcruise.com
Cruise LLC
333 Brannan St.
San Francisco, CA 94107

IX. SERVICE

As directed by D.20-11-046, and in accordance with GO 96-B, a copy of this advice letter is being sent electronically to the parties on “all of the Transportation Network Company rulemakings service lists,”²⁵ which are the attached service lists for R.12-12-011 and R.19-02-012. For address changes to any of the service lists, please contact the Commission’s Process Office at (415) 703-2021 or at Process_Office@cpuc.ca.gov.

Respectfully submitted,



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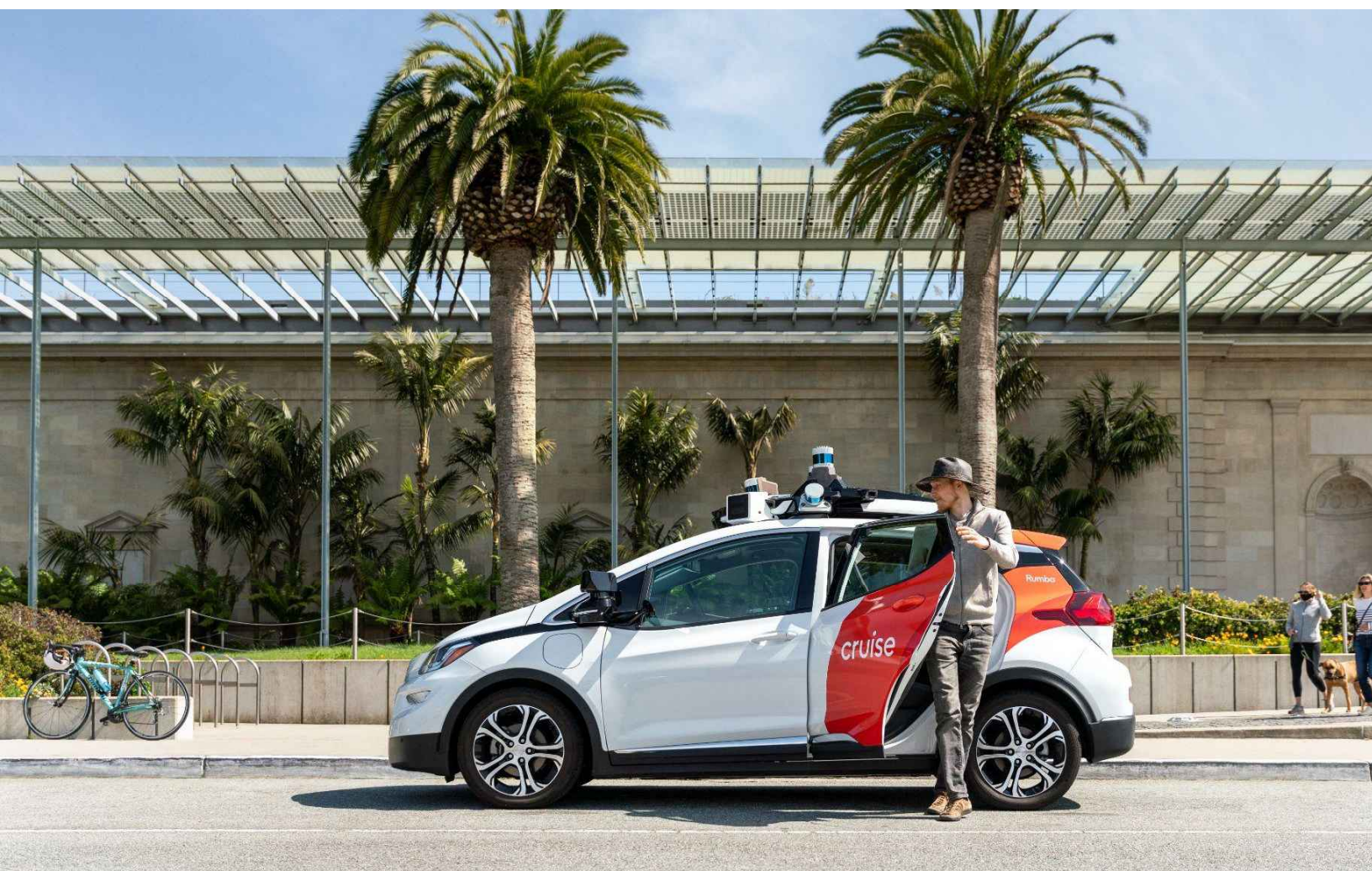
²⁵ D.20-11-046, at p.139, OP 18, as modified by D.21-05-017.

ATTACHMENT 1

cruise

Passenger Safety Plan

November 2021



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1. Introduction

Cruise LLC (“Cruise”) was founded on the premise that the status quo of transportation is not sufficiently safe. That is why safety is the driving force behind everything we do — from our purpose-built vehicle designs to our self-driving system to protecting our passengers. Cruise’s mission is to provide passengers with a safe, reliable, all-electric, renewable energy-powered, self-driving transportation option that can connect people to the places and experiences they care about.

Safety has been Cruise’s guiding principle since Cruise was founded in 2013, and safety will continue to guide Cruise as we expand our self-driving service. At Cruise, safety is not just about complying with the vehicle code or a single static metric. Rather, Cruise takes a holistic and comprehensive approach to safety. Consistent with Decision 20-11-046 of the California Public Utilities Commission (“CPUC”) and Ordering Paragraphs 8-10,¹ this Passenger Safety Plan (“PSP”) reflects that extensive approach and describes in detail how Cruise will protect the safety, health, and well-being of our passengers. Contributors to this PSP include individuals with comprehensive safety experience from the automotive industry as well as other relevant industries, such as transportation, technology, electric utilities, aerospace, accessibility, defense, and law enforcement. Additionally, these contributors have subject matter expertise across vehicle safety, human factors and systems engineering, fleet operations, ride-hail service product development, and ride-hail customer service and incident response. Once our commercial service launches, we will continually improve by incorporating feedback from our passengers, industry regulators, and our valued community stakeholders.

2. Cruise Autonomous Vehicle Passenger Service

2.1. Scope of Deployment

Cruise’s CPUC Driverless Autonomous Vehicle Deployment Program (“Driverless Deployment Program”) will begin with a limited scope, starting with up to thirty of our all-electric autonomous vehicles (“AVs”) providing non-pooled rides for members of the public. This program will be limited in geography, in daily hours of operation, and by certain weather conditions in parameters set by Cruise’s California Department of Motor Vehicles (“DMV”)-approved Operational Design Domain (“ODD”).² Cruise’s DMV testing and participation in the Commission’s passenger service pilot have informed the scope of this initial deployment by helping define the ODD conditions that are currently optimal for Cruise’s initial passenger service.

Cruise’s self-driving system is designed to ensure that our AVs do not operate in autonomous mode outside of their ODD. The AVs in our Driverless Deployment Program will provide service to

¹ Decision Authorizing Deployment of Drivered and Driverless Autonomous Vehicle Passenger Service, D.20-11-046 at p. 136, OP 8-10 (Cal. P.U.C. Nov. 19, 2020), as modified by Order Modifying Certain Holdings of Decision 20-11-046 and Denying Rehearing of the Decision, as Modified, D.21-05-017 (Cal. P.U.C. May 6, 2021) (“D.20-11-046”).

² An “ODD” is the specific operating domain(s) in which an automated function or system is designed to properly operate, including but not limited to geographic area, roadway type, speed range, environmental conditions (weather, daytime/nighttime, etc.) and other domain constraints. See Cal. Code Regs. tit. 13, § 227.02(j) (2021). See also Appendix 8.1 for Cruise’s current ODD, approved by the California DMV. Cruise’s California DMV-approved ODD is subject to change pursuant to DMV regulations, including section 228.10 of Title 13 of the California Code of Regulations. However, ODD expansion will not materially affect Cruise’s operations as outlined in this PSP.

passengers only in the designated ODD and will avoid streets closed to through traffic during the pandemic, which have been mapped in detail. Roadway features like traffic lights, stop signs, lane merges, and markings are embedded in on-board maps and detected in real-time by the AV's sensors so they can be obeyed. Cruise also keeps its on-board map up-to-date so that our AVs maintain current information about the road.

2.2. Initial service and no pooled rides

Passengers in Cruise's Driverless Deployment Program will be required to agree to Cruise's Customer Agreement before creating an account to use Cruise's service. We also will provide Cruise Community Rules to every passenger. The Cruise Community Rules cover our expectations for passenger conduct and safety behaviors when using our service. Examples of Community Rules include the following:

- Only bring items into the AV that can be safely and securely stowed during operation of the AV.
- Do not bring illegal substances, hazardous materials, highly flammable materials, or any kind of weapon into the AV.
- Safely enter and exit our AVs - watch out for other passengers, pedestrians, cyclists, and other road users.

Violation(s) of the Customer Agreement or the Cruise Community Rules will be grounds for suspension or termination of a passenger's account and their ability to use our service.

Initially, Cruise will offer a limited service to members of the public. Cruise will not, however, offer driverless pooled rides during the initial phase of the Driverless Deployment Program. We may update our approach in this PSP when we seek Commission approval to launch driverless pooled rides in the future. Any change in approach will be informed by our learnings during this initial deployment and engagement with interested stakeholders.

Consistent with Decision 20-11-046, Cruise also will prohibit the transport of unaccompanied minors in any AV passenger service in California.³ Cruise's Customer Agreement requires users to certify that they are at least 18 years old before creating an account. Under the Customer Agreement, individuals under the age of 18 are not allowed to create an account or hail rides and account holders are not allowed to permit a minor to ride without being accompanied by someone over the age of 18. Violation of the Customer Agreement's restrictions on the use of Cruise's service by unaccompanied minors may result in the suspension or termination of a passenger's account and their ability to use our service. In addition, where a minor accompanies an adult passenger, the adult passenger will be able to access instructions in the mobile app describing how to properly install child seats, if appropriate. The Cruise AV also will have anti-tampering features, including physical barriers, outlined in Section 4.4 below, that will prevent minors and other passengers from interfering with any vehicle controls when accompanying adult passengers.

2.3. Accessibility

³ See D.20-11-046 at p. 36.

2.3.1. Accessible safety measures

Cruise understands the need for accessible design and how accessibility can benefit the safety of all passengers, including those with disabilities. Our Driverless Deployment Program will comply with our legal accessibility obligations, including accommodations for service animals accommodations, and other means of supporting access. In addition, to help us achieve the goal of designing and building an accessible service, we have developed strong relationships with organizations and advocates across the disability community to hear from a broad range of voices and perspectives. We have conducted research with partners from the National Federation of the Blind and California's Lighthouse for the Blind to understand existing challenges in ride-hailing, such as locating the Cruise AV at pickup and understanding route progression during a ride. This research has been instrumental to our efforts to build and operate an accessible ride-hail service that minimizes safety risks to passengers traveling in a driverless vehicle.

We have incorporated a number of accessibility features, detailed below, that are designed to support passengers using our service who are hearing or visually impaired. We have built these features into the Cruise mobile application ("app") (available on passengers' personal devices), into the in-vehicle passenger experience, and into the manner and means by which passengers can communicate with Cruise Customer Support.

Passengers in our Driverless Deployment Program will be able to hail a Cruise AV through a mobile app that is compatible with iOS VoiceOver. iOS Voiceover provides blind and low vision users with auditory feedback even if they cannot see the mobile app screen. When passengers request a Cruise AV, the mobile app will provide an estimated wait time. Passengers who use iOS Voiceover will be able to receive this information audibly and will be able to anticipate the AV's arrival even if they cannot visually track its movements in the mobile app.

Once the Cruise AV arrives, passengers will be able to locate their respective AV through the mobile app's audio-based navigation systems. This feature benefits all passengers. It also is particularly helpful for blind and low vision users based on our learnings from the National Federation of the Blind and California's Lighthouse for the Blind. In addition, because we learned in user studies that blind and low vision passengers often prefer using their mobile phones with iOS VoiceOver rather than less familiar interfaces, like hard buttons or in-vehicle touchscreens, passengers will be able to start rides and end rides through the mobile app (in addition to using the in-vehicle touchscreens to start rides, and tactile button to end rides as shown below).



Figure 1: In-vehicle tactile communications buttons (provided as example, actual may vary)

Once passengers begin their ride, they will be able to use both in-vehicle visual and audio-based features to receive updates on their ride. Each Cruise AV will have two in-vehicle touchscreens in the back of the vehicle that are accessible to passengers. These in-vehicle touchscreens will have a map navigation feature that passengers can use to monitor ride progress. This visual map navigation will help support deaf and hard of hearing passengers to monitor progress to their destination. Likewise, audible alerts will provide blind and low vision passengers real-time updates about their ride, such as an audible alert when the ride has ended.

The Cruise AV will have a two-way voice communications link accessible through a communications button (“two-way communications link” or “communications button”) with a tactile feature designed to support blind and low vision passengers. Passengers will be able to contact Customer Support through the in-vehicle communications button. Passengers who are deaf or hard of hearing also will be able to contact Customer Support through the mobile app, which will provide immediate live chat support.

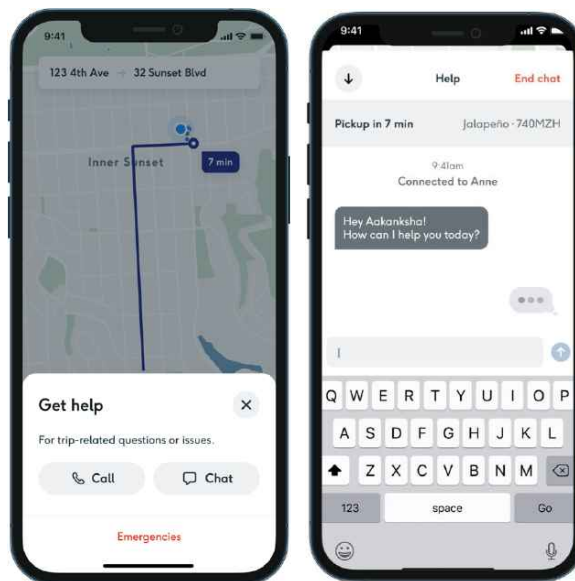


Figure 2: In-app customer support (provided as example, actual may vary)

Cruise is committed to continuing to engage with organizations and advocates from across the disability community to build on our research and user testing. To ensure we are collecting information from a broad range of stakeholders, we have created a feedback system, discussed in Section 5.4, that will allow us to collect, investigate, and respond to any passenger comments and complaints and help us improve our service. As our technology matures, we will continue to evolve our accessibility features.

2.3.2. Wheelchair Accessible Vehicles (“WAVs”)

Cruise will initially provide its passenger service in the Cruise AV, a fully integrated self-driving car built upon the all-electric Chevrolet Bolt, a vehicle platform with a five-star safety rating in the

National Highway Traffic Safety Administration’s New Car Assessment Program (“NCAP”).⁴ The Cruise AV can securely fit a foldable wheelchair on the rear floor or backseat with one passenger. The rear floor and backseat can also accommodate similar sized foldable walkers and foldable scooters, in addition to other smaller assistive devices such as crutches and canes.

Ultimately, Cruise will provide rides in our purpose-built vehicle, the Origin, that is specifically designed for our autonomous ride-hailing service. Cruise is exploring a wheelchair accessible version of the Origin.⁵ We are currently working closely with the disability community and have engaged in user testing of early prototypes.



Figure 3: Rendering of wheelchair accessible version of Origin (provided as example; actual may vary)

3. COVID-19 Response Plan for Ride-Hail Services

Consistent with CPUC [Resolution TL 19131](#), effective on August 6, 2020, Cruise implemented comprehensive and robust health and safety protocols and best practices from the Center for Disease Control (“CDC”), as well as guidance and orders from the California Department of Public

⁴ See Press Release, National Highway Traffic Safety Administration, National Highway Traffic Safety Administration issues statement about New Car Assessment Program’s highest rating (Oct. 9, 2018), <https://www.nhtsa.gov/press-releases/national-highway-traffic-safety-administration-issues-statement-about-new-car>. Vehicle safety ratings are available on the National Highway Traffic Safety Administration’s website at <https://www.nhtsa.gov/ratings>.

⁵ See Sam Abuelsamid, *Cruise CEO Shows Off Locker Module and Wheelchair Accessible Origin Robotaxi*, Forbes (Oct. 6, 2021, 4:58 PM), <https://www.forbes.com/sites/samabuelsamid/2021/10/06/cruise-ceo-shows-off-locker-module-and-wheelchair-accessible-origin-robotaxi/?sh=26a725be1c78>.

Health (“CDPH”). In addition, since the beginning of the pandemic, Cruise has and continues to comply with the California Governor’s executive orders, orders of California’s State Public Health Officer, and the City and County of San Francisco’s Department of Public Health orders. Pursuant to Ordering Paragraph 4 of Resolution TL 19131, “all requirements to follow the CDC’s COVID-19 guidelines and the CDPH Guidance shall be suspended when all jurisdictions attain Stage 4 of the CDPH’s Pandemic Roadmap or the local equivalent.” As of June 15, 2021, California Governor Gavin Newsom lifted the executive orders issued to address the pandemic, including termination of the Stay-at-Home Order and the Blueprint for a Safer Economy, to allow California to move forward with reopening fully and safely.⁶ Although the requirements of Resolution TL 19131 are suspended, Cruise has attached its [COVID-19 Response Plan for Ride-Hail](#) as Exhibit A for the Commission’s reference in acknowledgment that the pandemic and its impact remain a concern for all of us.

4. Passenger Education

4.1. Passenger onboarding and education

The Cruise AV is a fully integrated self-driving car built upon the award-winning, all-electric Chevrolet Bolt, but with a signature difference: a suite of components customized for self-driving. Some of these components are immediately visible to passengers, while others are not, but all ensure optimal safety. For instance, an array of highly visible external sensors that enable the Cruise AV to gather information about its environment and inform the system’s driving decisions are immediately apparent to most passengers and passersby. Conversely, the computer that comprises the “brain” of the self-driving system is contained in the trunk of the AV and is not visible to passengers or passersby. Regardless of visibility, the diversity of these components are the basis for how the Cruise AV perceives, operates, and makes decisions.

Many passengers will experience a fully driverless ride for the first time when they participate in Cruise’s Driverless Deployment Program. We are invested in making sure that every ride is safe and easy-to-understand for passengers from the start. Prior to initiating a ride, passengers will have access to educational onboarding materials through many communication channels, including the mobile app and email, that will address ride safety. These onboarding materials will help passengers understand what to expect during their ride, including support options available and how to use them. The following sections discuss the types of educational materials, with illustrative images, that passengers will receive.

⁶ See Exec. Order N-07-21, Exec. Dep’t State of California (Jun. 11, 2021), <https://www.gov.ca.gov/wp-content/uploads/2021/06/6.11.21-EO-N-07-21-signed.pdf>.

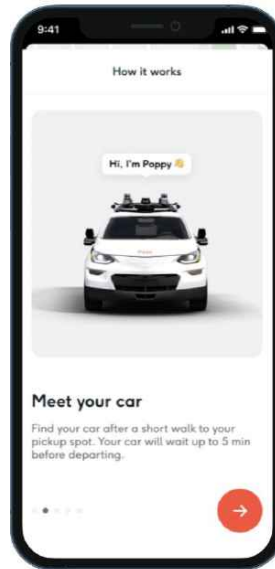


Figure 4: In-app onboarding (provided as example; actual may vary)

Cruise also has designed a passenger experience with in-vehicle contextual cues that provide guidance in real-time about what is happening during the ride and expectations for passengers. As detailed in Section 4.3, these contextual cues include guidance ranging from buckling seat belts to closing doors before the ride begins. These cues make rides more safe, accessible, and intuitive for passengers.

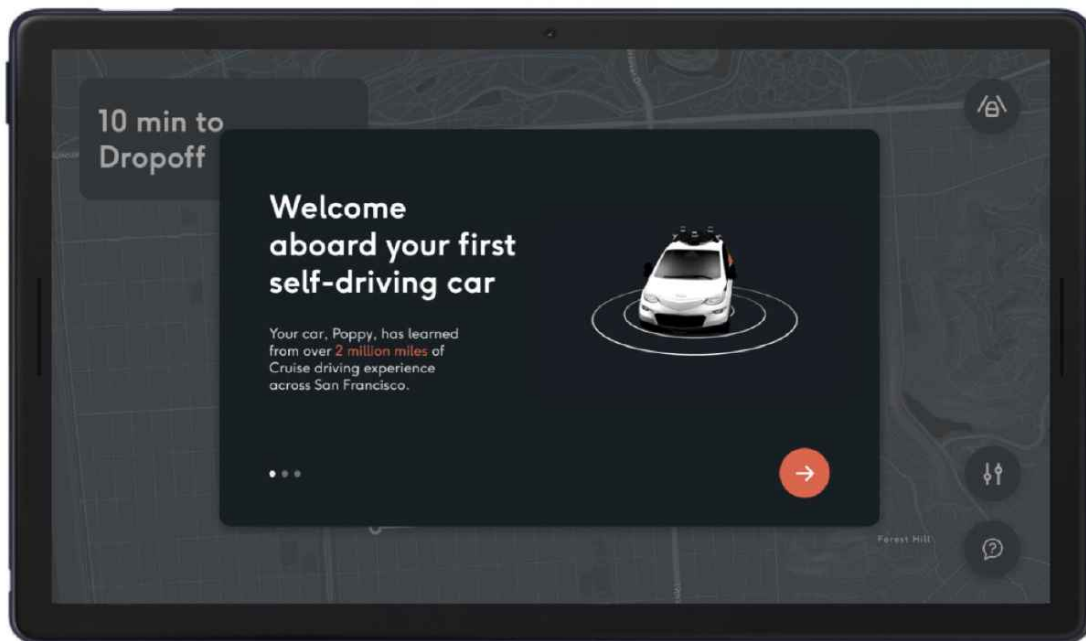


Figure 5: In-vehicle screen onboarding (provided as example; actual may vary)

4.2. Understanding Cruise’s autonomous vehicle technology

Before taking a ride, Cruise will provide passengers with onboarding materials that explain the technical basics of how our AVs safely navigate San Francisco. The passenger onboarding materials have been developed from our [Safety Report](#), included as Exhibit B, which Cruise previously shared with the California DMV and National Highway Traffic Safety Administration.⁷

For example, to contextualize the experience, passengers will learn how the Cruise AV is engineered to operate safely on its own — with no human driver. Passengers will learn that they should not assume, nor will they be asked to assume, the role of a driver or take operational control of the Cruise AV at any point during a ride. The onboarding materials also will make clear that passengers will remain passengers at all times and are not responsible for the Cruise AV’s operations in any capacity. Further, passengers will be educated on how Cruise’s self-driving system works by rapidly synthesizing information collected by the sensors to inform driving behavior through perception (understanding the environment), prediction and planning (evaluating possible safe paths or trajectories for the vehicle given the environment), and controls (the driving maneuver). These learnings are important to educate passengers who have not yet been exposed to self-driving technology and enable them to have a more integrated and informed understanding of what a ride might entail.

Prior to taking their first ride, passengers will be made aware that they are being offered driverless autonomous service and will need to provide affirmative consent to receive such service by affirmatively accepting the Customer Agreement in the mobile app, as illustrated below in Figure 6.

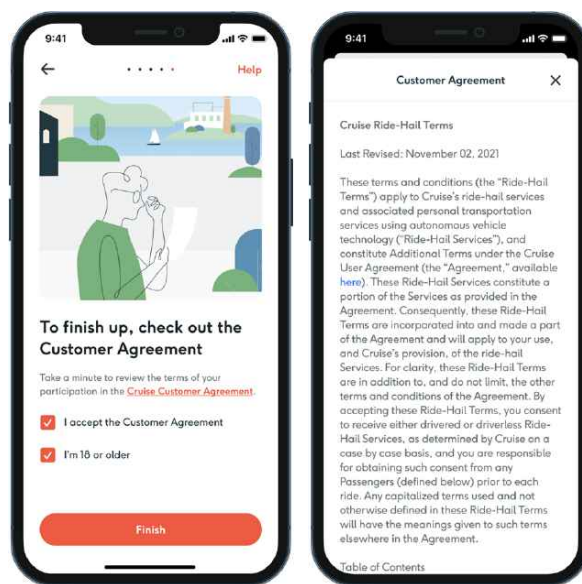


Figure 6: Customer Agreement acceptance flow for driverless ride-hail service (provided as example; actual may vary)

⁷ The 2018 Self-Driving Safety Report is available also at <https://www.gm.com/content/dam/company/docs/us/en/gmcom/gmsafetyreport.pdf>.

4.3. The passenger experience and safety

Prior to their first ride, passengers will gain access to the Cruise mobile app. The mobile app will guide passengers on how to properly hail, identify, confirm, and enter the Cruise AV.

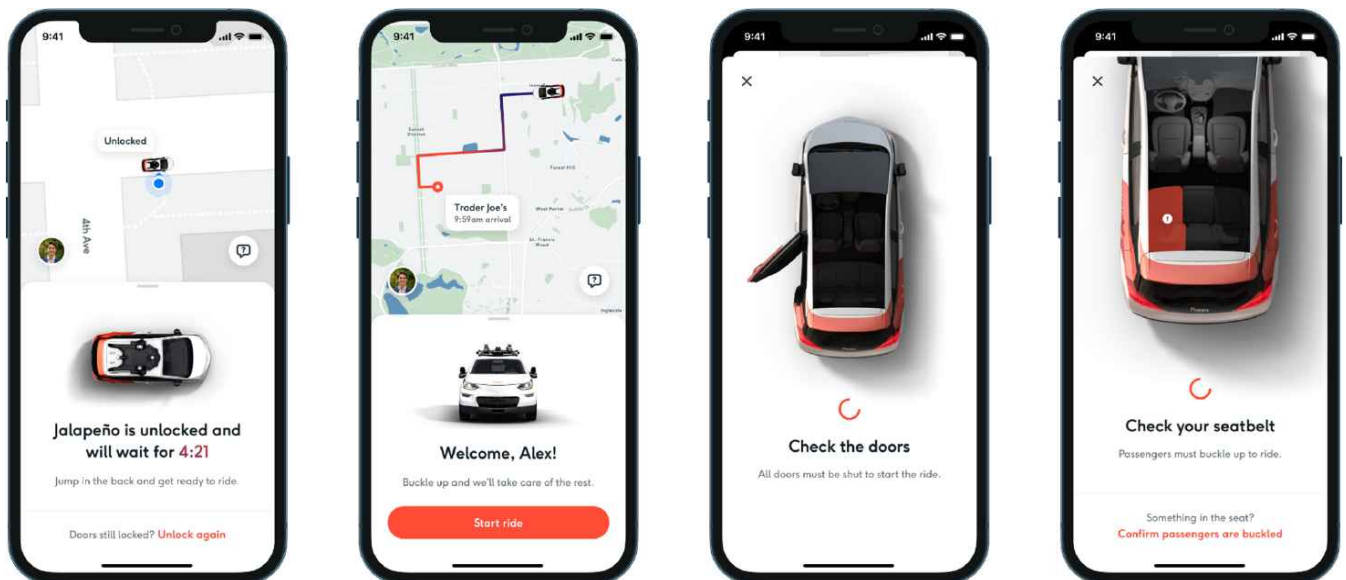


Figure 7: In-app contextual cues (provided as example; actual may vary)

During the ride, in-vehicle contextual cues will help passengers understand what is happening throughout the ride. For example, the mobile app and in-vehicle touchscreens will display to passengers the route and estimated time of arrival, reminders to check doors and buckle seat belts (as illustrated above), and guidance on how to safely exit the vehicle upon arriving at their destination with consideration for other road users.

At any time during the ride, passengers also will be able to contact Customer Support by pressing the in-vehicle communications button in the Cruise AV or through the mobile app using its live chat or phone support function. In addition, passengers may send a written message to Customer Support through the mobile app at any time before, after, or during the ride.

Cruise also will provide passengers with helpful reminders to guide them on how to complete their ride. We have intentionally designed these reminders to be easy-to-understand for passengers to increase their comfort and awareness of how to engage with a driverless vehicle. For example, prior to pickup, Cruise will send passengers a reminder to unlock the doors using the mobile app on their phone. In addition, if passengers were to start the ride without buckling their seat belts or closing doors, Cruise provides an audible and visual alert on the in-vehicle touchscreens to passengers to close the doors and buckle up.

During the ride, a passenger will be able to change their destination using the mobile app. As illustrated in Figure 8 below, passengers will tap an “Edit” button and can type in a new destination to make this change.

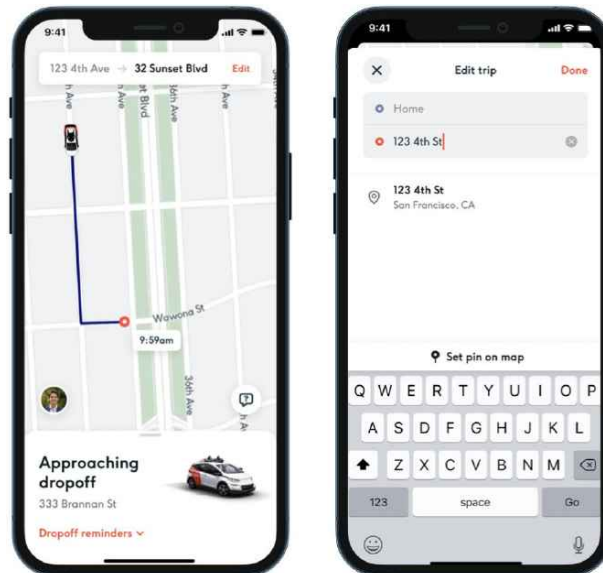


Figure 8: Change destination feature (provided as example; actual may vary)

If a passenger feels the need, they will also be able to request to end the ride prior to reaching their destination using an in-vehicle button or through the mobile app. If the Cruise AV encounters a roadblock, such as an unexpected street closure, or is otherwise directed by law enforcement personnel to avoid a particular area, the Cruise AV will adjust its route and Cruise will inform the passenger of any changes to the route through the in-vehicle touchscreens.

If the Cruise AV is unable to continue the ride at any time, Customer Support will automatically initiate a call to the passenger. Passengers will also be able to initiate a call through the in-vehicle two-way communications button or live chat with Customer Support at any time during a ride.

Finally, passengers will receive an audible notification and a notification on the in-vehicle touchscreens that the ride has ended. There also will be audible and visual reminders to remind the passenger to exit safely.

One of Cruise's foundational pillars is to provide excellent passenger service from day one of our service. As with any service, we want to learn and improve our service over time. As such, Cruise also has developed an efficient in-app feedback system to ensure we are integrating passenger feedback and experiences to improve our service. For example, passengers provide structured feedback, including a ride rating, after every ride, as depicted in Figure 15 in Section 5.4 below.

4.4. Passenger safe ingress and egress

Each Cruise AV is distinguished by orange branding and the Cruise emblem visible on the exterior of the vehicle. Each vehicle has a unique vehicle name that is displayed on the front hood, rear hatch, and the right and left rear quarter panels.



Figure 9: Cruise AV branding and unique vehicle name (provided as example; actual may vary)

After connecting to the Cruise AV through the Cruise mobile app, passengers will be able to find their designated Cruise AV through a user interface in the mobile app that will display the precise location of the passenger's specific vehicle, the vehicle's name, and its estimated time of arrival. If there is insufficient space for the vehicle to stop at pick up, the Cruise AV will select a nearby area with adequate space to stop to pick up the passenger. The mobile app will convey this change to the passenger while they are waiting.

The Cruise AV name displayed in the mobile app should match the name on the vehicle assigned to each passenger for their ride. Passengers will be able to confirm the name before entering the Cruise AV by looking for the name on the Cruise AV (as shown in the two images above). Passengers also will be able to use the mobile app to call Customer Support to confirm the vehicle or receive audible way-finding cues to access the Cruise AV. Passengers will be able to unlock their assigned vehicle only through the mobile app, which will prevent a passenger from entering the wrong vehicle and ensure the correct person enters the AV. If a passenger does not unlock the

Cruise AV after it arrives, the Cruise AV will briefly unlock shortly before the AV departs. This will allow a passenger whose phone has stopped working or loses service to enter the Cruise AV. However, the passenger will be required to enter a verification code (the last four digits of the passenger's phone number) on the in-vehicle touchscreen after entering the vehicle to start the ride.

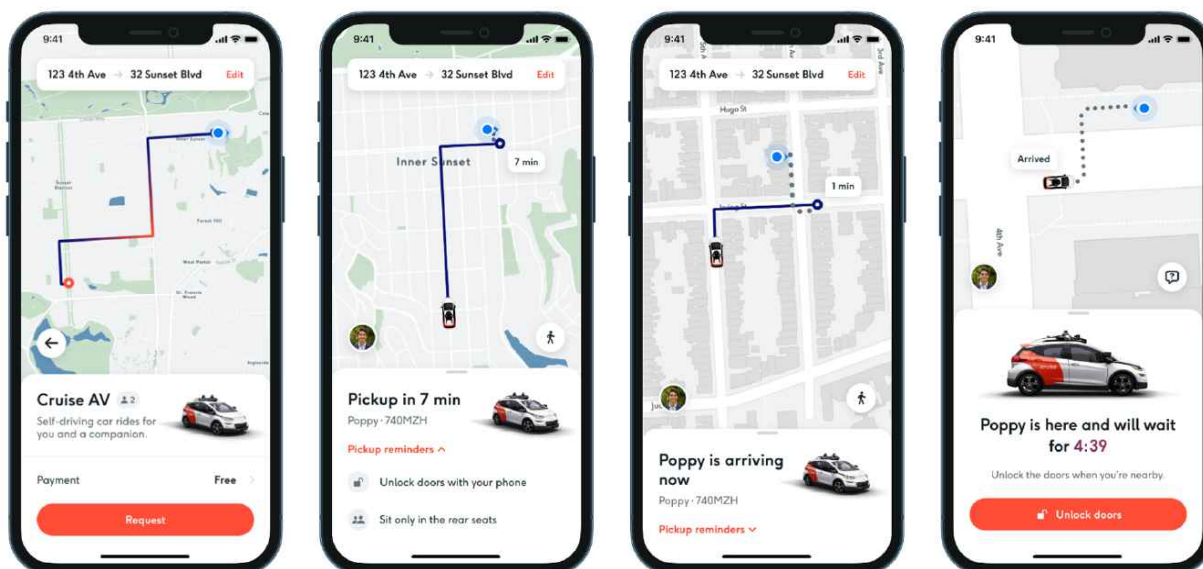


Figure 10: In-app ride-hailing experience (provided as example; actual may vary)

Once the Cruise AV arrives, only authorized passengers will be able to start the ride through the mobile app or in-vehicle touchscreens. For the initial phase of our service, passengers will be able to ride only in the backseats. The Cruise AV front doors will be locked by default, and passengers will not be able to unlock those front doors. In the unlikely event a passenger is able to open the front car doors to enter the driver or front passenger seat, the Cruise AV will give an audio in-vehicle warning and a visual warning through the in-vehicle touchscreens. In any such instance in which a passenger (or anyone else) is detected in the front seats, the ride will not start, and the Cruise AV will not operate until an Incident Expert (described below) authorizes the Cruise AV to continue. In addition, a label on the Cruise AV steering wheel will warn against attempting interactions with the driver controls (e.g., steering wheel and pedals), and a physical barrier will be in place to separate backseat passengers from driver controls in the front seat.

We also have automatic tamper detection mechanisms and fallback stopping maneuvers programmed in the event of any critical AV tampering. For example, these mechanisms include physical barriers between the front and rear seat and tamper protection covers and warning labels to dissuade passengers from accessing unauthorized interfaces. In the event a minor accompanies an adult passenger for a ride, such mechanisms are an additional safeguard to prevent them from tampering with AV controls. For example, if a passenger attempts to exit while the Cruise AV is still in motion, the Cruise AV will detect the vehicle door opening during a ride and will respond by coming to an immediate but controlled stop to maximize passenger safety.

4.5. Safe arrival and exiting

When the Cruise AV is approaching its destination, there will be an audio in-vehicle reminder, a notification visible on the in-vehicle touchscreens and a notification in the mobile app informing the passenger of the end of ride. The passenger also will be reminded to exit safely, with consideration for other road users (see Figure 11 below).

If the Cruise AV stops due to a problem and has not arrived at the passenger's destination (for example, if it stops due to a detected weather condition that prevents the Cruise AV from continuing), the Cruise AV will inform the passenger of the AV's status. Customer Support also will automatically connect to the passenger through the two-way communications button to assist the passenger on next steps, as further described below in Section 5.

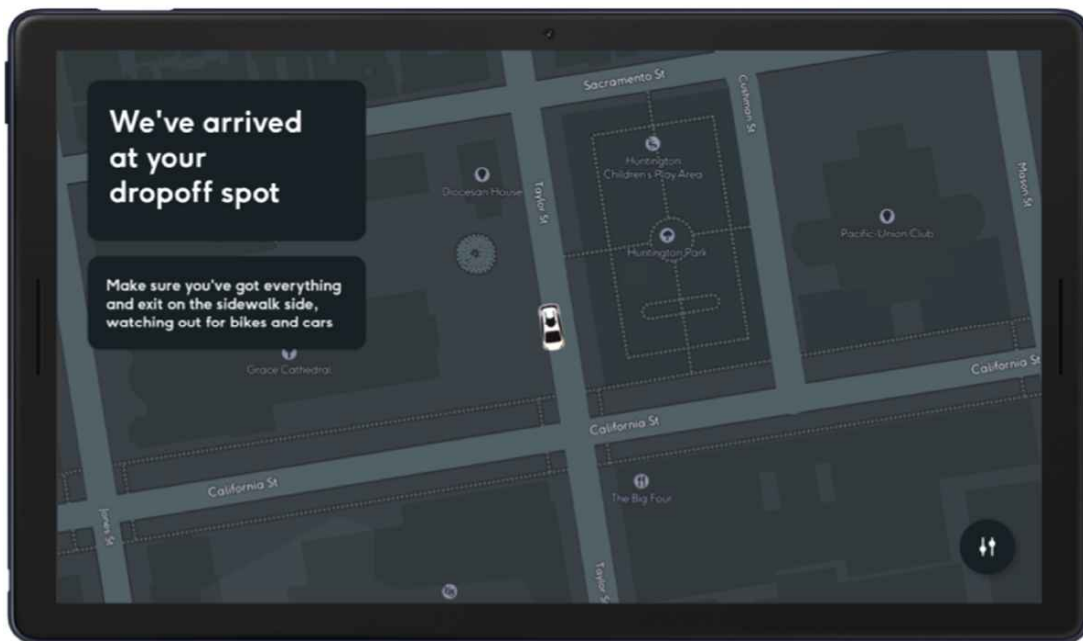


Figure 11: In-vehicle end-of-ride notification (provided as example; actual may vary)

In the event a passenger arrives at their final destination and there is an external threat, such as a hostile individual or some other safety hazard, the passenger will have the option not to exit the vehicle immediately. The passenger will be able to contact Customer Support and request that the doors of the Cruise AV remain locked or change their destination to avoid the safety concern in their immediate vicinity.

4.6. Minimizing safety risks to passengers

4.6.1. Minimal Risk Condition

The Cruise AV meets the description of a Level 4 automated driving system under SAE International's *Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-*

*Road Motor Vehicles.*⁸ The Cruise AV's self-driving system is designed to perform the entire dynamic driving task within a defined ODD and has the capability to achieve a Minimal Risk Condition (MRC)⁹ without any expectation that a human driver will intervene. If a Cruise AV is in a situation where it has exited its ODD or experiences a system failure, by design, the Cruise AV will achieve a MRC at a safe location.

Sophisticated diagnostics are integrated into the Cruise AV's hardware and software systems that will initiate the appropriate dynamic driving task to bring the vehicle safely to a MRC in the event of any single or multi-point failure in any hardware or software system. Additionally, the Cruise AV has redundant hardware and software systems that support the safe execution of achieving a MRC in the presence of a system failure.

The maneuver performed to achieve a MRC depends on residual AV performance and urgency of the response. The current range of potential maneuvers includes a pullover at the nearest available safe stopping location and a controlled stop in lane, and the range of potential maneuvers will expand over time. The Cruise AV will avoid pulling over in front of certain spots, such as fire stations or ambulance loading areas. In most MRC scenarios, the Cruise AV will prioritize moving out of high risk areas, such as intersections, before it achieves a MRC. The Cruise AV will always activate hazard lights once a MRC is achieved.

4.6.2. Operational Design Domain and avoidance areas

Cruise's ODD will be the ODD set forth in Cruise's DMV Deployment permit. It will include a geofenced area within the City and County of San Francisco.¹⁰ The Cruise AV will operate at a maximum speed of 30 miles per hour on local and arterial roads. Certain roadway types will be excluded, such as bridges, tunnels, and roundabouts. Cruise's initial ODD does not contain any active heavy rail crossings, and streets with light rail are excluded from AV routable streets. The Cruise AV also is designed to avoid dedicated transit lanes in compliance with the California Vehicle Code and San Francisco traffic laws. We will not extend our ODD into areas with active heavy rail crossings and streets with light rail unless and until we determine through supervised testing and simulations that we can do so in compliance with all applicable laws and safety requirements.

Cruise will initially not operate driverless passenger service in heavy rain or heavy fog as we continue to improve our technology in these conditions. In addition, Cruise may further restrict its driverless operations to evaluate various aspects of its system.

For example, Cruise may opt to limit its driverless operations during:

⁸ See SAE International, Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles, J3016_202104 (Apr. 30, 2021), https://www.sae.org/standards/content/j3016_202104/.

⁹ An MRC is a low-risk operating condition that an autonomous vehicle automatically resorts to when either the automated driving system fails or when the human driver fails to respond appropriately to a request to take over the dynamic driving task. See Cal. Code Regs. tit. 13, § 227.02(i).

¹⁰ Cruise's ODD is subject to change pursuant to DMV regulations, including section 228.10 of Title 13 of the California Code of Regulations.

- Certain environmental conditions.
- Certain times of day.
- Certain routes.

Cruise can dynamically respond to conditions in the ODD, like parades, San Francisco Slow Street designations, or roadway closures due to an emergency scenario. Cruise responds to these situations by restricting its operations until the situation ends. The benefit of a 24/7 fleet-managed system is that if one AV experiences a temporary or new roadway closure or issue, Cruise can transmit the information to the entire fleet to ensure that area is avoided.

In addition to minimizing safety risks through the AV design and ODD, Cruise also has developed robust Customer Support and Incident Response functions to minimize safety risks to passengers. Those functions are discussed below.

4.6.3. Passenger Health Issues

If a passenger is alert and experiencing a health issue, the passenger can contact Customer Support either through the mobile app or the two-way communications buttons described in Section 5.2. Depending on the severity of the health issue, the passenger can request that the Cruise AV pull over at the nearest safe location, change the Cruise AV's destination to a medical provider, or request the dispatch of first responders to the Cruise AV.

If a passenger is unable to proactively alert Cruise regarding a health issue (e.g. heart attack, cognitive inability, intoxication), Cruise has implemented safeguards to assist the passenger in such situations. In situations where a passenger does not press the "Start" ride button after entering the Cruise AV, presses the two-way communications button but fails to respond to Customer Support, or does not exit the Cruise AV in a timely manner at the end of the ride, Cruise will follow an escalation protocol. In these scenarios, Customer Support first will attempt to communicate with the passenger. If the passenger is unresponsive, Customer Support will escalate the issue to our Incident Expert team and OnStar. An Onstar Advisor will attempt to engage with the passenger and dispatch first responders if needed while an Incident Expert will request Field Support to be dispatched to the Cruise AV. Throughout the escalation, the two-way communication link will always remain active between Cruise and the passenger.

5. Contacting Cruise

5.1. Response times to passenger requests

During the ride, as discussed earlier, passengers will have multiple ways to contact Cruise based on their individual preference. Cruise has teams available to assist passengers 24/7 through the two-way communications button inside the vehicle or through the mobile app on their personal devices. Passengers can expect their requests during a ride to be handled immediately. In addition, the Cruise AV is equipped with OnStar functionality, which includes Automatic Crash Response for low or high speed collisions. For more than 20 years, OnStar has offered peace of mind for any emergency that may arise. As discussed below in Section 5.5, in the event of an emergency, Cruise

and OnStar teams, trained in incident response, are available within seconds and can contact public safety and first responders as needed.

A passenger can provide post-ride feedback, questions, or concerns to Cruise through the mobile app for an associated ride or to offer broader written feedback. Parties who are not yet mobile app users can also reach out to Cruise through email at support@getcruise.com. Passengers should expect an immediate response to feedback delivered through phone call or in mobile app chat during the course of a ride. For post-ride feedback delivered through email or the mobile app, passengers should expect a response within 24 hours. As our passenger service grows, we intend to maintain the same response turnaround times through appropriate staffing.

5.2. Passenger contact and communications

Cruise Ride Communications: As discussed above and further below, Cruise will communicate with passengers throughout their ride through in-vehicle audio communications, the in-vehicle touchscreens, and the mobile app on passengers' personal devices, providing safety notifications and ride updates.

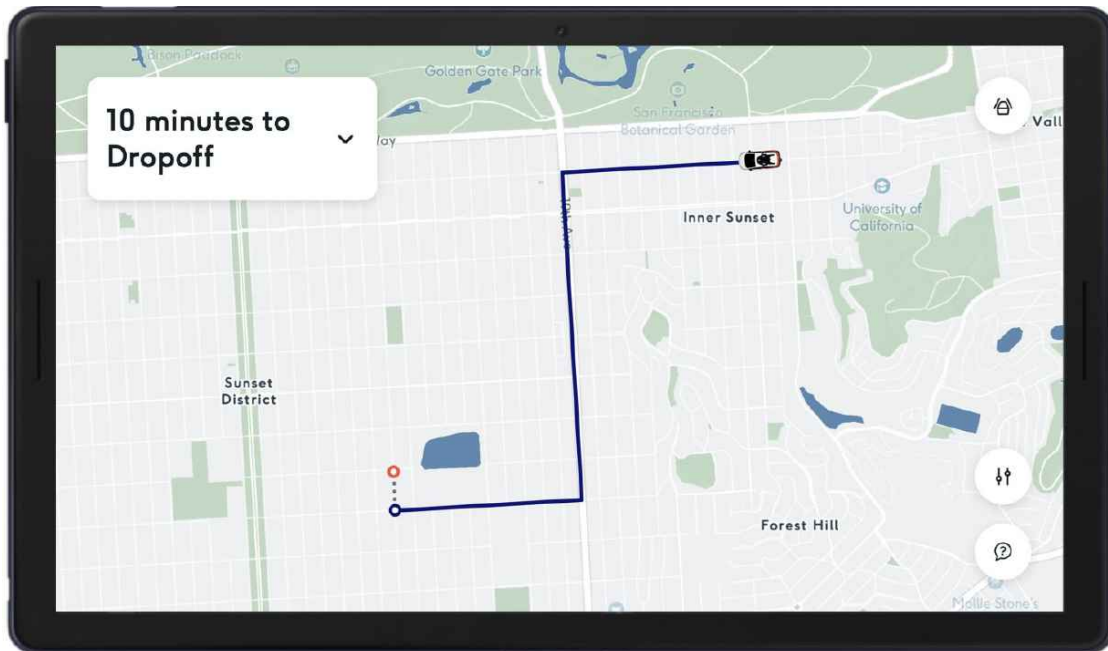


Figure 12: In-vehicle touchscreen ride progress tracking (provided as example; actual may vary)

In-Vehicle Two-Way Communications Link: Each Cruise AV is equipped with a two-way audio communications link inside the vehicle through a clearly marked button above the passenger seats. Cruise's response time from the two-way communications link is immediate.



Figure 13: In-vehicle two-way communications buttons (provided as example; actual may vary)

In-App Customer Support: Passengers can initiate a voice call to Customer Support by pressing the in-vehicle communications button or calling directly through the mobile app on their personal devices. Customer Support triages calls by escalating high severity incidents to the Incident Expert team. Passengers will also be able to use the live chat feature in their mobile app to receive immediate assistance or send a written message to Customer Support through the mobile app and Cruise will respond within 24 hours.

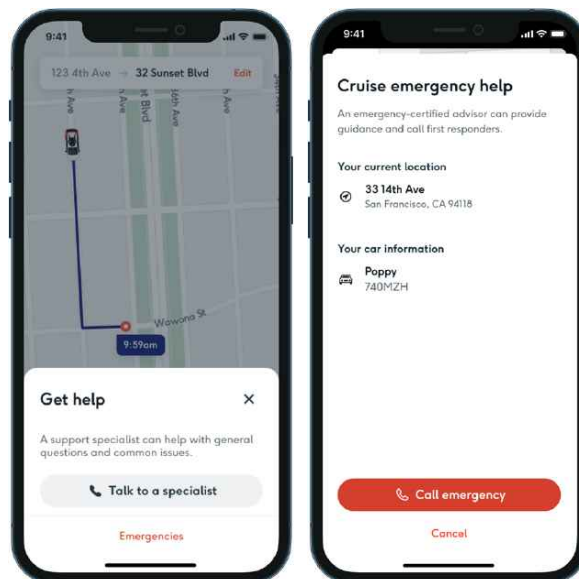


Figure 14: In-app customer support and emergency help (provided as example; actual may vary)

Cruise is alerted to potential incidents by both automated and human review processes monitoring the vehicle at all times. For example, in the event of a collision, unwanted public interaction, or law enforcement traffic stop, Cruise will respond promptly whether or not the passenger initiates a call through the two-way communications link or their personal devices. In addition, Cruise's Incident Experts monitor and review every active detected incident.

If a passenger contacts Customer Support regarding a lost item, Cruise will summon the Cruise AV to its facilities, retrieve the item, and place it in a secure location. Cruise will then communicate to the passenger regarding the place and time where the passenger can retrieve the lost item. We are building towards being able to send the AV back to the passenger's drop-off location so they can directly retrieve any items left in the vehicle.

5.3. Accessible Customer Support

As discussed above, passengers will receive onboarding materials that explain how to use the in-vehicle button that provides a two-way communications link to Customer Support. The two-way communications link is accessed through a clearly marked, tactile button that is designed for use by blind and low vision passengers. Passengers also will be able to access Customer Support through the mobile app on their personal devices.

Live chat will be available through the mobile app to provide accessible support to deaf and hard of hearing passengers.

Based on its research in partnership with the disability community, Cruise has learned that passengers value customization. For example, Cruise has heard repeatedly from blind and low vision individuals that their phone is their device of greatest comfort. As a result, customer support settings in Cruise's mobile app include preferences for support. Cruise also intends to use insights and feedback from passengers during the initial phase of our service to continue improving user experience and confirm which options are the preferred modes of communication.

5.4. Feedback

Feedback is extremely important to our company at all times of our development, and even more so as we begin our initial passenger service. Cruise has collected and will continue to collect passenger and public feedback through our support channels and in-app ratings request after each ride. The support channels through which passengers can contact Cruise are discussed above. Other road users and the general public can submit comments or complaints to Cruise by emailing community@getcruise.com.

We currently classify comments and complaints into the following general categories: mobile app (i.e. software, pricing or payment issues), pickup (i.e. wait time, location, identification issues, safety, accessibility), route, comfort, in-car display (i.e. issues relating to announcements or visual displays, accessibility), and drop off (i.e. location, arrival time, safety). A comment or complaint may track across multiple categories. For example, a comment about an accessibility feature or safety may relate to both the mobile app and a pickup experience. We have chosen this taxonomy because it allows us to monitor the frequency and types of comments that are most likely to arise in the context of ride-hailing and continuously enhance the passenger experience, and we will adjust

the taxonomy over time as we identify adjustments that help us to better meet those goals. When we receive complaints, we escalate concerns to the relevant internal teams responsible for the associated AV behavior or product feature, take action to remediate any identified issues, and track resolution of such issues.

If passengers provide information or feedback by sending a message to Customer Support from the mobile app, Cruise will respond within 24 hours. Information will be retained for a period of three years in compliance with General Order 157-E. Recorded communications during the ride from the passenger in the vehicle with Customer Support, Incident Experts, and OnStar Emergency Response¹¹ will be retained for a period of one year.¹²

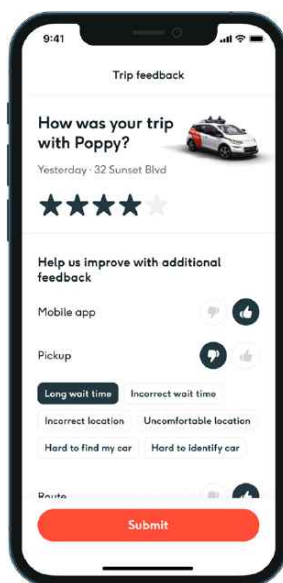


Figure 15: In-app passenger feedback collection (provided as example; actual may vary)

5.5. Cruise teams supporting passenger safety

Teams across Cruise work together closely so that passengers are safe, supported, and protected should any circumstance interfere with their ride, or if they have any questions along the way. Cruise has more options available to support passengers than they may have experienced in traditional ride-hailing.

Cruise's robust passenger support operation consists of five teams dedicated to ensuring the safety, health, wellbeing, and comfort of our passengers:

¹¹ Customer Support, Incident Experts, and OnStar Emergency Response are the only teams that remotely communicate with Cruise passengers and fulfill the role of a "remote operator" for purposes of the CPUC's requirement that each AV permit-holder "[r]ecord all communications from the passenger in the vehicle with the remote operator while Driverless Autonomous Vehicle Passenger Service was being provided and retain the recording for one year from the date of the recording." See D. 20-11-046, at Ordering Paragraph 7(l).

¹² See D.20-11-046, at Ordering Paragraph 7(l). The confidentiality of the recordings will be governed by General Order 66-D. *Id.*

- Remote Assistance: Supports the Cruise AV when it needs help as further described below. Remote Assistance does not interact with passengers directly, nor does Remote Assistance perform dynamic driving tasks.
- Customer Support: Interacts with the passenger through two-way communications link, in-app live chat and messaging, phone, and email; escalates to OnStar and Incident Experts during live support interactions when necessary.
- Incident Expert: Interacts with passengers through two-way communications link during incidents and assesses potential emergencies and escalates to OnStar as needed; navigates the Cruise AV through particularly challenging situations.
- OnStar Emergency Response: Dispatches First Responders to scene when there is an emergency requiring police or medical help.
- Field Support: Serves as the on-scene response unit to provide direct, in-person support to passengers or to interact with third parties and public safety officials when necessary.

Although not all teams will interact with passengers directly, all play a crucial support role in ensuring the highest level of passenger safety. All of Cruise's teams supporting passenger safety undergo rigorous, specialized training and continued education for their specific functions and roles. Below is a more detailed description of the function of each of these five teams.

5.5.1. General support for Cruise passengers

Remote Assistance: Remote Assistance is a team of Remote Assistance Advisors that will not communicate with passengers or perform dynamic driving tasks. Rather, Remote Assistance will continuously and proactively monitor a queue that Cruise AVs join if they are in need of assistance. Remote Assistance Advisors can also access an interface to monitor video feeds from the Cruise AV's externally-facing cameras and the Cruise AV's lidar map. If the Cruise AV is unable to navigate the environment independently due to unforeseen circumstances (e.g., road blockages), within a matter of seconds, the Cruise AV initiates a call to Remote Assistance and is automatically matched with a Remote Assistance Advisor. The Remote Assistance Advisor assists the Cruise AV to determine how to proceed. The Remote Assistance Advisor can see what the Cruise AV sees and can help confirm the Cruise AV's classification of the object and/or assist the Cruise AV to navigate around the unexpected situation. More complex scenarios that require simultaneous passenger and AV support are managed by Incident Experts.

Each member of the Remote Assistance team is required to have a valid driver's license, complete rigorous training, and is responsible for responding to any issues that arise concerning Cruise vehicles in real-time. Remote Assistance Advisors receive one week of classroom training, two hours of training on General Motors' closed course in Michigan, and 10 weeks of shadowing experience. They also must pass certification exams in all assistance types before beginning to support Cruise AVs on public roads. Remote Assistance Advisors will be shadowed by more experienced Remote Assistance Advisors until they demonstrate the highest level of proficiency and accuracy to safely assist Cruise AVs without being shadowed. In addition, their sessions will continue to be internally audited by Cruise and they will receive weekly coaching on an ongoing basis regardless of tenure.

Customer Support: The Customer Support team consists of Customer Support Advisors who will handle communications with passengers. They also will escalate emergency situations to OnStar

Emergency Response and the Incident Expert, as discussed below. Passengers will be able to reach a Customer Support Advisor for voice support through the two-way communications link in the Cruise AV. Passengers also will be able to reach a Customer Support Advisor through the phone support function using their personal devices or the live chat, messaging, and email support in the mobile app. Customer Support will have visibility into the state of the Cruise AV and be able to guide the passenger through self-help within the mobile app to update their ride or account details as needed. In addition, Customer Support may control Cruise AV in-vehicle cabin settings, such as locking and unlocking doors, rolling down windows, honking the horn, or turning on hazard lights.

Below is an illustration of the Customer Support channels:

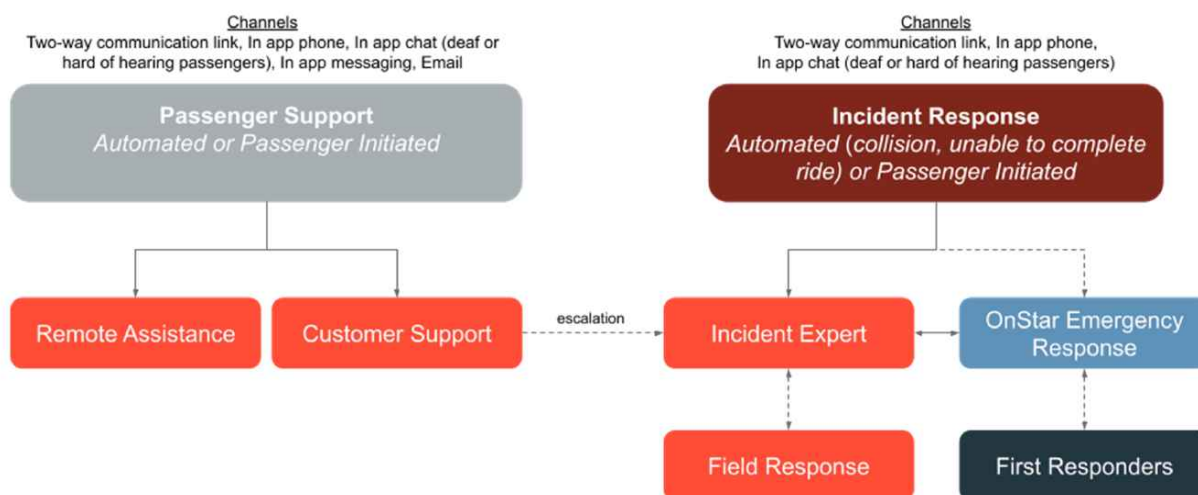


Figure 16: Customer Support channels

Customer Support Advisors undergo one week of classroom training and remain in trainee status for two months, during which time their communications with passengers are thoroughly reviewed for quality assurance and to identify training opportunities. Their communications are regularly audited and they receive performance coaching on an ongoing basis.

Incident Expert: Incident Experts are specially trained to remotely manage and triage various situations. Passengers will be connected with an Incident Expert in situations such as the following: (a) the passenger requests to end their ride early and the Incident Expert checks to make sure the passenger is not experiencing some kind of emergency, (b) the Cruise AV detects a possible collision, or (c) the Cruise AV detects that an emergency vehicle is attempting to pull over the Cruise AV. Incident Experts can communicate directly with passengers through the two-way communications link in the Cruise AV while simultaneously viewing the state and location of the Cruise AV. When necessary, they can change the autonomous state of the vehicle or direct the vehicle with navigation, such as instructing the vehicle to pull over to the side of the road (similar to Remote Assistance Advisors, Incident Experts do not perform the dynamic driving task). Similar to Customer Support, Incident Experts also may control Cruise AV in-vehicle cabin settings like locking and unlocking doors, rolling down windows, honking the horn, or turning on hazard lights. If

a passenger first reports an emergency to Customer Support, then a Customer Support Advisor will escalate to the Incident Expert as needed. In some cases of a confirmed collision or a passenger-reported emergency, an Incident Expert will conference in OnStar Emergency Response to facilitate a three-way call with the passenger.

To qualify as an Incident Expert, the Incident Expert must:

- Complete all of the same training that Remote Assistance experts receive (e.g., classroom training, closed course training, shadow training, certification).
- Reach the highest level of Remote Assistance training before becoming an Incident Expert. This training takes a minimum of 3 months and also requires meeting extremely high safety-based performance thresholds.
- Complete one week classroom training on handling emergency situations and hazardous driving scenarios and pass multiple certification exams on the topics covered.
- Complete an additional one week of shadowing and closed course training.
- Complete one month of shadowing by a more senior Incident Expert.

5.5.2. Incident Response

As discussed in Section 5.5.1, in the event of an emergency, Cruise's Incident Experts are available on-demand to our passengers for immediate assistance and are responsive to a broad range of scenarios, including medical emergencies. OnStar Emergency Response and Field Support also are available to support passengers and respond to incidents. Cruise's Incident Experts and OnStar Emergency Responders are highly trained and work with first responders as necessary to prioritize the safety of passengers and to maximize efficiency and response times.

OnStar Emergency Response: A passenger can be connected with OnStar Emergency Response in one of two ways. First, if the passenger reaches out to Customer Support and alerts them to an emergency requiring medical response or law enforcement, Customer Support can escalate the call to Incident Expert and Onstar Emergency Response simultaneously. In the event that Customer Support escalates to Incident Experts, Incident Experts can also conference in Onstar Emergency Response with the passenger. Second, OnStar's Automatic Crash Response can automatically initiate contact with a Cruise Incident Expert and a trained OnStar Emergency Response Advisor, who will notify 9-1-1 dispatch without relying on passenger action.

Field Support: In any situation where the Cruise AV is unable to continue autonomously, Cruise has the ability to dispatch a Field Support team, which consists of two Field Support representatives. Field Support provides another layer of safety for passengers as remote teams can conduct a handoff to the Field Support team seamlessly. Field Support can provide direct, in-person assistance to any passenger to ensure full resolution of any ride interruption, including information exchange with a third-party in the event of a collision. Field Support also can work with public safety officials who may be on the scene and can facilitate retrieval of a disabled Cruise AV, including towing.

6. Incident Response

6.1. Public safety

Cruise works closely with public safety officials and has conducted training and demonstrations that have provided guidance and walk-throughs to show how first responders and law enforcement can safely interact with the Cruise AV. Public safety officials, including those in San Francisco, are equipped with contact information on how to reach Cruise in emergency and non-emergency situations through the [Driverless Deployment Program Guidance for First Responders](#), which has been approved by the California DMV and the California Highway Patrol and is available through a link on Cruise's Resources for First Responders public webpage.¹³ Public safety officials also are familiar with our vehicles and the associated technologies. As a result of our continued collaboration, we are confident that we can coordinate with first responders effectively and efficiently in any emergency situation to provide a safe service for our passengers in our initial deployment ODD and as we expand.

6.2. Passenger-reported incidents

The safety of our passengers and those sharing the road with Cruise AVs are of utmost importance to Cruise. Cruise is prepared to support our passengers through any possible or perceived threat to their safety, health, or well-being. In the event that a passenger's safety could be compromised due to external factors like a collision, hostile individual, regional emergency, or personal factors like a passenger health emergency, Cruise's teams are prepared to respond in real-time. Concurrently, passengers have multiple pathways inside the vehicle or through the mobile app to communicate that an incident is occurring. In addition, Cruise will initiate communications automatically with passengers when Cruise detects these events.

This passenger communication will allow Cruise to:

- Determine the best response to the incident, which could include requesting assistance of first responders through OnStar.
- Remotely direct the vehicle to take a different path or safely achieve MRC.
- Send out a Field Support team to provide in-person, direct support to address passenger needs.
- End the ride at the passenger's request.

6.3. Fleet monitoring and learning

Cruise continuously monitors its driverless fleet while it is in operation. Cruise uses a suite of internal tools to oversee its fleet of AVs, including information about each Cruise AV on the road, such as current location, operating condition, and passenger state.

¹³ See Cruise, Cruise Resources for First Responders (updated Sept. 30, 2021), <https://www.getcruise.com/firstresponders>. A copy of the Driverless Deployment Program Guidance for First Responders also is attached as Exhibit C.

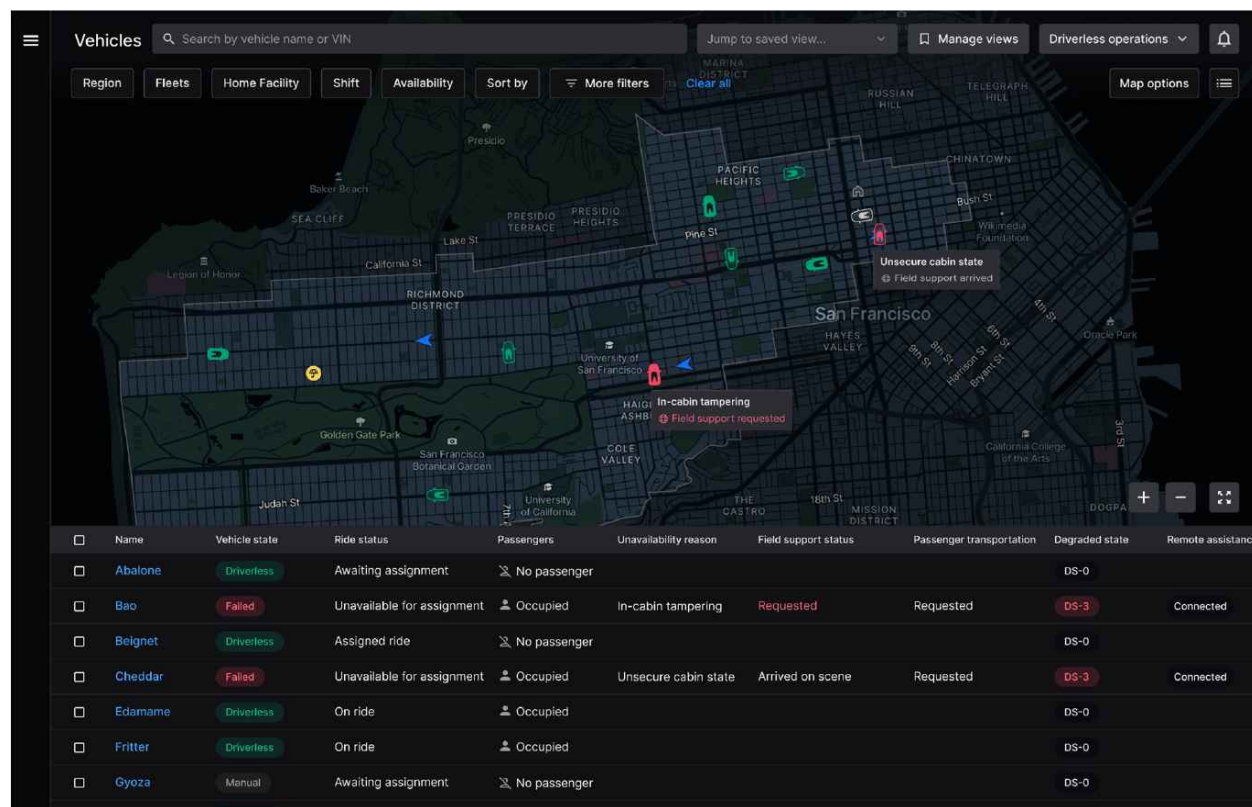


Figure 17: Example of Cruise internal fleet monitoring tool

In traditional driving, each new driver has a learning curve and individual experience matters (e.g. teenage drivers are more likely to get in crashes than older, more experienced drivers¹⁴). Moreover, there are no learnings from driver to driver. In contrast, Cruise's fleet operates by fleet learning. For example, if one car detects that a road is closed, that information can be shared with the fleet. Or if there's a dangerous road hazard, a single car can notify the fleet to avoid a potentially unsafe situation. As a result, the combined learning accrued minute-by-minute across Cruise's entire fleet allows each Cruise AV to continually improve from the experience of every other Cruise vehicle, enabling continuing safety improvements over time.

6.4. Unsafe scenarios

Cruise has thoughtfully designed an integrated system of automated monitoring and response to passenger feedback to appropriately detect and respond to unsafe scenarios outside the vehicle. As discussed above, we seek to support passengers at all phases of their journey and may be reached immediately at any time of day if a passenger has a safety concern. When safety scenarios occur, we have well-trained Customer Support, Incident Expert, and OnStar teams to provide passenger support, in addition to a Field Support team that can be dispatched to passengers, as

¹⁴ National Highway Traffic Safety Administration. (2020, October). *2018 Data: Young Drivers*. NHTSA. <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812968>.

discussed in Section 5.5. As stated in Section 2.2., during its initial phase of its Driverless Deployment Program, Cruise will not be providing driverless pooled rides.

In the case of a hostile individual outside the Cruise AV, we follow a protocol honed through millions of miles of San Francisco driving:

- If possible, take safe evasive action to attempt to remove the Cruise AV and passenger from the situation.
- If necessary (likely due to continued escalation or passenger request), escalate to OnStar Emergency Response including notifying local emergency responders to scene if needed.

Our Crisis Management Team (“CMT”) also proactively prepares for emergency preparedness and incident response. CMT mobilization is tailored based on the nature of the situation but can include representatives from our safety, security, engineering, operations, legal, government affairs, communications, people, and other teams. To date, this capability has been used to coordinate response to COVID-19, civil unrest, wildfires and other contingency situations. We also conduct regular preparedness exercises for our readiness to respond to safety-related incidents. These exercises range from “tabletop” discussions in which key responders walk through a response to hypothetical crisis situations to full-scale exercises designed to simulate a real event as closely as possible.

If a natural disaster occurs, such as a fire or earthquake, we have protocols in place to respond quickly and ensure passengers receive support to safely navigate the situation. In the event a fire occurs, our team will place an avoidance area in the AV map to prevent vehicles from entering the area. If a Cruise AV is already present in the area of the fire, we will summon the AV out of the area. If summoning the vehicle cannot safely occur, an Incident Expert will coordinate with OnStar to dispatch emergency responders to the Cruise AV. If an earthquake occurs, Cruise will ground individual AVs or the entire fleet depending on the severity of the event. If it is not possible to safely recall all AVs or dispatch Field Support, Cruise Incident Experts will coordinate with OnStar to dispatch emergency responders to the scene.

We are also aware that unsafe scenarios can occur in the absence of hostility or regional disasters due to the dynamic nature of city streets. As noted previously, prior to taking their first ride, passengers will receive the Cruise Community Rules that remind them to watch for other road users when exiting the Cruise AV. In addition, as noted in Section 4.3 and illustrated in Figure 11, when passengers exit the Cruise AV, they will receive guidance on how to safely exit the vehicle upon arriving at their destination with consideration for other road users. As the Cruise AV navigates city streets, it will communicate its intent and actions to other road users through traditional methods used by human drivers, such as the turn signal to indicate an approaching turn, hazard lights to signal a stop, and horn to be used sparingly in emergency situations.

6.5. System failure

Redundancy is built into the Cruise AV design. However, should any issue arise with any part of the Cruise AV, or if a change is detected in the operating environment, the Cruise AV is designed to come to a stop at the nearest available safe stopping location and achieve a MRC.

Cruise Incident Experts will then reach out to passengers to provide guidance, assistance, and next steps, including reassurance that the Cruise AV will continue its operation, or dispatch a Field Support representative as necessary.

6.6. Collisions

The Cruise AV meets all federal crashworthiness standards.

As discussed above, the Cruise AV is based on the NCAP 5-Star safety-rated Chevrolet Bolt EV. Working with General Motors, we analyzed the vehicle's structural integrity to account for the addition of several new key systems to the vehicle (e.g., the sensor roof module, sensor cleaning and drying system, power backup system, and data management system). To best protect passengers, we:

- Engineered load paths to manage crash forces to protect the passenger space during frontal, side, rear and rollover crashes.
- Designed a battery housing structure to protect the internal battery space in a crash and minimize lithium battery fire risks for passengers and first responders.
- Installed vehicle floor reinforcements to distribute loads and maintain passenger space in a crash.

Together, Cruise and General Motors have completed robust and sufficient simulations and crash testing of the Cruise AV to show the effectiveness of the above requirements.

The air bags and seat belts in the Cruise AV meet Federal Motor Vehicle Safety Standards, including injury protection. Our all-electric self-driving vehicle also incorporates battery safety measures. In addition to the reinforced structure for the battery compartment, the Cruise AV is equipped with a crash-safety system that cuts power in the event of a collision, making it safer for first responders.

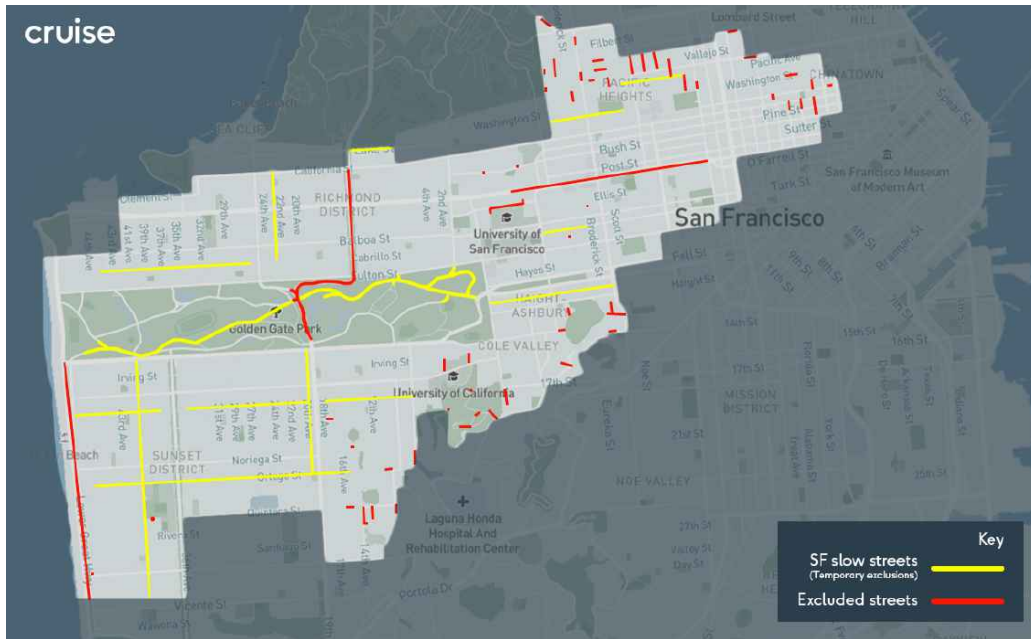
Cruise's requirements for post-crash behavior account for both physical safety and standard practices in the event of a crash. After a crash, the Cruise AV will enter a safe state MRC. The vehicle will automatically apply brakes to bring the vehicle to a complete stop in a controlled manner after the initial impact. Built-in sensors will automatically alert a Cruise Incident Expert when there is a collision. In the event of a high-severity collision, both a Cruise Incident Expert and an Onstar Emergency Response Advisor will be connected automatically through the Automatic Crash Response system to see if a passenger needs help and to communicate with first responders on the scene. For every collision, Cruise will also dispatch a Field Support team to the scene to provide passenger support and liaison with public safety officials and other third-parties that may be on the scene. If passengers do not respond, or none are present, the OnStar Emergency Response Advisor will communicate with the Incident Expert to gain situational awareness and communicate with local responders.

7. Conclusion

At Cruise, safety drives everything we do. We are committed to implementing best practices and improving over time with essential feedback from passengers to ensure that our all-electric Cruise AV passenger service can safely connect people to the places and experiences that they care about. Although Cruise's service will be limited initially, we believe it is an important incremental step in providing a safe all-electric self-driving service ultimately advancing the transportation landscape as we know it. We look forward to welcoming you aboard.

8. Appendix

8.1. Operational Design Domain



Initial Operational Design Domain from Cruise's DMV Deployment Application



Planned Future Operational Design Domain in San Francisco from Cruise's DMV Deployment Application

8.2. List of Figures

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Figure 3	Rendering of wheelchair accessible version of Origin
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Figure 15	In-app passenger feedback collection
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Figure 17	Example of Cruise internal fleet monitoring tool

8.3. List of Exhibits

Exhibit A	COVID-19 Response Plan for Ride-Hail
Exhibit B	Safety Report
Exhibit C	Driverless Deployment Program Guidance for First Responders

EXHIBIT A



COVID-19 Response Plan for Ride-hail in California

Purpose

Pursuant to California Public Utilities Commission (“CPUC”) Resolution TL-19131 effective August 17, 2020, Cruise LLC (“Cruise”) has created this COVID-19 Response Plan for its ride-hail services in California. This COVID-19 Response Plan for Ride-hail was developed based on best practices from the Center for Disease Control (“CDC”) as well as guidance and orders from the California Department of Public Health (“CDPH”) and San Francisco Department of Public Health and Cruise’s own learnings over the past year. The COVID-19 Response Plan for Ride-hail will be updated and scaled appropriately to reflect the current state of the COVID-19 pandemic and comply with all applicable public health requirements and laws.

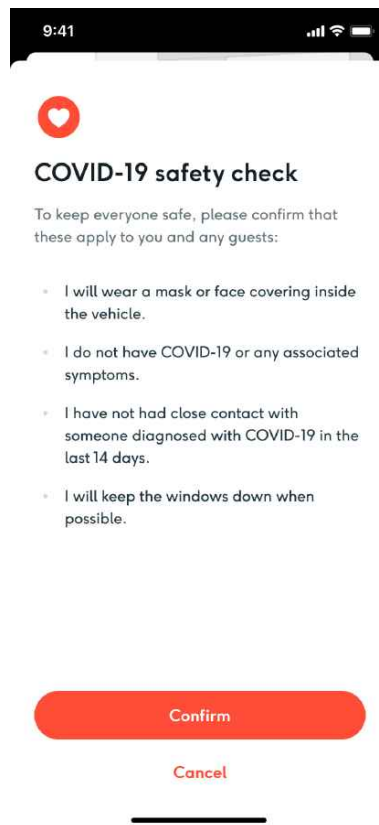
Symptom and Exposure Screening and Face Coverings

Cruise strongly discourages passengers from riding who have had a recent COVID-19 infection or who may be at higher risk for COVID-19. Risks include:

- **Symptoms that are new or not explained by other conditions:** fever, chills, sore throat, cough, shortness of breath/difficulty breathing, fatigue, loss of taste or smell, body aches, headache, diarrhea, runny or congested nose, nausea or vomiting.
- **Recent COVID-19 Infection:** In the past 10 days you have been diagnosed with COVID-19 or had a test confirming you have COVID-19.
- **Close contact:** If you’re not fully vaccinated and have had close contact with someone who has been diagnosed with COVID-19 in the past 14 days during their contagious period.
 - A close contact is anyone who has been within 6 feet of an infected person (laboratory-confirmed or a clinically compatible illness) for a cumulative total of 15 minutes or more over a 24-hour period. An infected person can spread SARS-CoV-2 starting from 2 days before they have any symptoms or, for asymptomatic infections, 2 days before the positive specimen collection date.
 - Individuals are considered “fully vaccinated” 14-days after their last dose of a two-dose vaccine series or 14 days after their first dose of a one-dose vaccine series.

Preventing and stopping the spread of possible COVID-19 cases relies on being prepared, acting promptly, and being proactive when it comes to assuring our methods are effective. Cruise has developed comprehensive protocols to ensure our workforce is safe. As part of that plan, we have rigorous procedures and technology in place to track and manage potential or confirmed COVID-19 cases, including contact tracing for Cruise personnel. Our onsite workforce undergoes COVID -19 symptom and exposure screening prior to their scheduled shifts. Thus, in the unlikely event that a Cruise team member needs to interact with a passenger, that team member will have received COVID -19 symptom and exposure screening.

All passengers will be asked to follow CDC guidelines and public health requirements, including guidelines on face coverings. Below is an illustrative example of the type of COVID-19 screening that Cruise will request of passengers prior to requesting a ride:



*In-app images are provided as an example and may vary.

Disinfection and Cleaning Practices

Cruise performs routine and non-routine disinfections of the AVs in accordance with current CDC and CDHP requirements. Products used for disinfection are [EPA Registered Antimicrobial Products for Use Against Novel Coronavirus SARS-CoV-2](#). Manufacturer instructions for concentration, application method, and contact time will be followed for all cleaning and disinfection products. Cruise provides its workforce with the appropriate training, instruction, and personal protection equipment (such as chemical resistant gloves and eye/face protection) to safely perform routine and non-routine disinfections throughout our fleet.

If a passenger reports that they have been diagnosed with COVID-19 and it has been less than 24 hours since the rider was inside the AV, Cruise will pull the AV out of service to perform a non-routine disinfection if the AV has not been disinfected following the ride as part of our routine cleaning protocols.

Hand sanitizer and disinfecting wipes will be available to passengers in each AV to encourage passengers to disinfect high touch areas they may touch inside the AV.

Ventilation

Ventilation is a key part of Cruise's layered strategy to prevent airborne spread of the COVID-19 virus. Cruise has increased its default airflow in the AVs to a complete air change every 1.5 minutes to reduce risk to our passengers. However, passengers have the ability to change these settings based on their preferences. Passengers will be encouraged to keep windows open (approximately 1 inch) unless it is not practical to do so.

EXHIBIT B



2018 SELF-DRIVING SAFETY REPORT

GENERAL MOTORS

CREATING NEW TECHNOLOGY TO BRING NEW BENEFITS

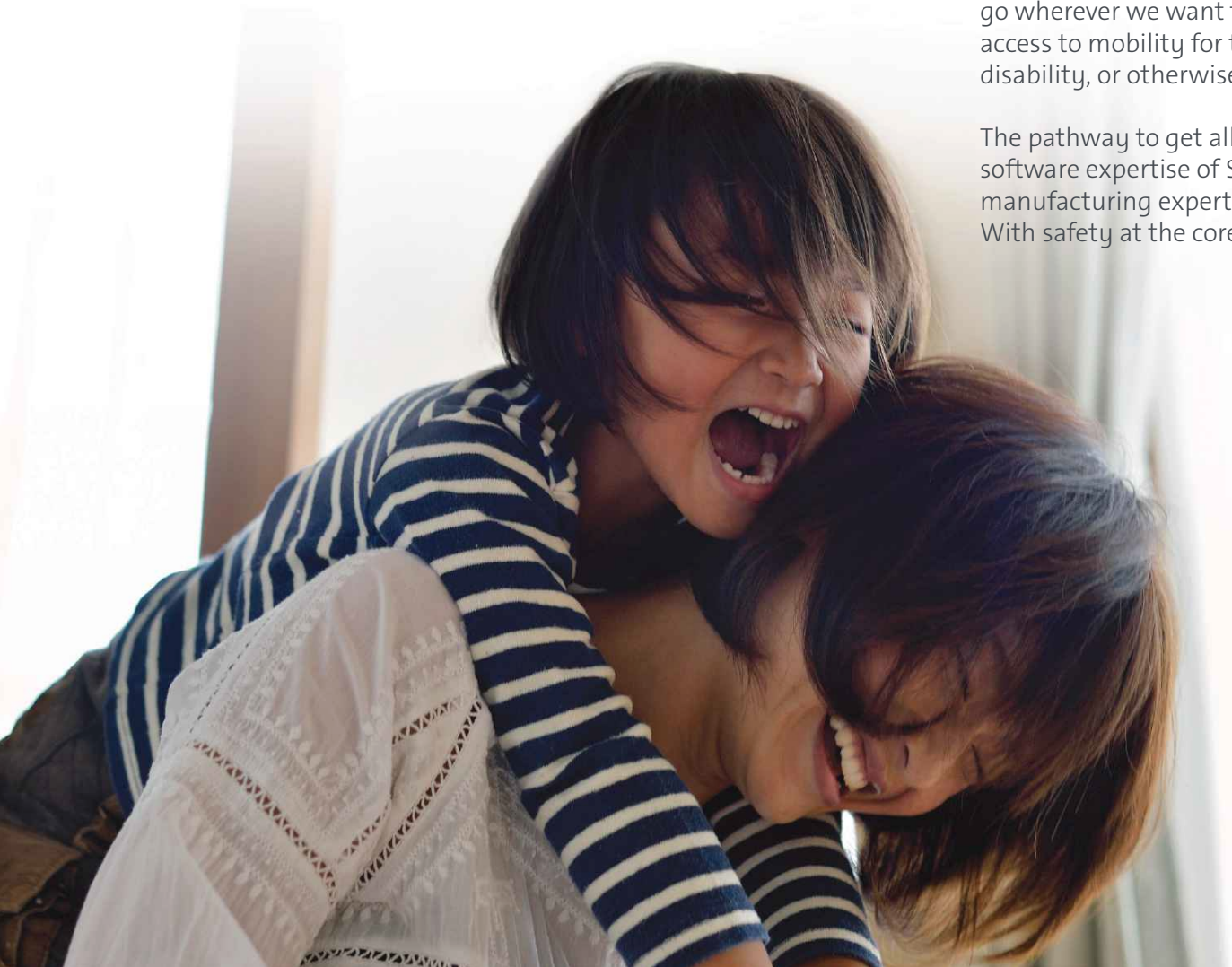
Imagine a world with no car crashes. Our self-driving vehicles aim to eliminate human driver error — the primary cause of 94 percent of crashes — leading to fewer injuries and fatalities.

Imagine widespread use of electric-only vehicles, reducing vehicle emissions. Our self-driving vehicles will all be electric, contributing to a better environment.

Imagine not sitting in traffic for what feels like half your life. And imagine a crowded city not filled with congested roads and parking lots and structures but with efficiently moving traffic and more space. Nearly one of three cars on city streets at any given time is simply looking for parking. Our technology will create better use of time and space. For everyone.

Imagine the peace of mind knowing that whatever our age, our stage of life or our physical capabilities we have the freedom to go wherever we want to go. Our self-driving vehicles will improve access to mobility for those who currently cannot drive due to age, disability, or otherwise.

The pathway to get all of us to this world requires integrating the software expertise of Silicon Valley with the systems safety and manufacturing expertise of Detroit and our teams around the world. With safety at the core, we are ready to take the next step.



OUR VISION

At General Motors, we envision a future with zero crashes, zero emissions and zero congestion:



Zero crashes to save lives

Each year close to 1.25 million people die in car crashes around the world, 40,000 in the United States alone. More than 2 million people are injured. Human error is a major contributing factor in 94 percent of these crashes.



Zero emissions to leave our children a healthier planet

Vehicles release almost 2 billion tons of carbon dioxide into the atmosphere every year.



Zero congestion to give our customers back their precious time

In the United States, commuters spend about a week of their lives in traffic each and every year. That's a week not spent with those we love, doing what we want to do and being where we want to be.

OUR MISSION

General Motors' mission is to bring our vision of a world of zero crashes, zero emissions and zero congestion to life. Safely developing and deploying electric self-driving vehicles at scale will dramatically change our world.



MEET THE CRUISE AV: OUR ZERO EMISSION SELF-DRIVING VEHICLE

You might think it looks like any other vehicle, but the Cruise AV was built from the start to operate safely on its own, with no driver. We engineered safety into the vehicle in every single step of design, development, manufacturing, testing and validation.

Our self-driving vehicle is the result of intensely focused development, and countless hours of real-world testing and validation. It doesn't drink and drive, doesn't text and drive, doesn't get upset, doesn't get tired, never gets distracted and doesn't produce any emissions.

With its advanced sensor systems, the Cruise AV has the capability to see the environment around it, in 360 degrees, day and night. It is designed to identify pedestrians in a crosswalk, or an object darting suddenly into its path, and to respond accordingly. It can maneuver through construction cones, yield to emergency vehicles and react to avoid collisions.

By integrating our self-driving system into the vehicle from the beginning, and through close coordination between the hardware and software teams, we have evaluated potential failure modes for all systems, and addressed them throughout development to ensure a safe and reliable product. This comprehensive, integrated approach to safety, combined with testing in one of the most complex environments in the world, allows us to safely take the next step — elimination of the steering wheel, pedals and other manual controls — from the vehicle.

Our Cruise AV has the potential to provide a level of safety far beyond the capabilities of humans. As our experience and iterative improvements continue, we will advance closer to our zero crashes vision.

HOW WE DESIGN A SAFE VEHICLE

General Motors is committed to safety in everything we do.

With safety top of mind, our self-driving vehicle development process started by analyzing the act of driving itself. We broke down every action necessary to safely navigate from point A to point B and determined how to execute each action in different locations and conditions. We then challenged prototype after prototype through simulation and real-world testing to develop and refine how each of the vehicle's systems work together to result in predictable, safe driving.

We have designed and built a self-driving car to safely operate among aggressive drivers, jaywalkers, bicyclists, delivery trucks, construction, unprotected left turns, 4-way stop signs and countless other factors that arise when driving in the city.

To define and handle all these real-world interactions safely, we combined the best of Detroit, Silicon Valley and our teams around the world to continuously improve performance and safety throughout design, development and deployment.

We combined the best of Detroit, Silicon Valley and our teams around the world.

We developed our vehicle in one of the most complex environments possible — San Francisco — to ensure that our vehicle can drive safely even in the most unpredictable circumstances and conditions. This challenge helped us put our safety systems through rigorous tests.



Our fleet is growing by the day, and each vehicle contributes to a shared knowledge base so that each vehicle can learn from the collective experiences of the entire fleet. If one car sees that a road is closed, the others automatically avoid it. Or if there's a dangerous road hazard, a single car can notify thousands of others to avoid a potentially unsafe situation. This fleet learning capability is just one of many advantages our vehicles have over human drivers. This combined data is used to improve each individual car's performance and safety.

Our iterative design process doesn't stop with initial launch; we will deploy our self-driving vehicles in GM-operated fleets, enabling continuous improvement into the future.

We're not only learning from what our test fleet does on the road, we're also learning from what doesn't happen. We combine data gathered from our extensive testing with comprehensive safety analyses to identify additional potential challenges we may not have experienced on the road. Then we determine how best to respond to those unseen challenges as well. It's all in the name of our zero crashes vision.

We believe that a safe self-driving car must be built from the ground up, seamlessly integrating the self-driving system into the vehicle. That's exactly what we did, starting with our all-electric Chevrolet Bolt EV, a vehicle platform designed as a gateway to the future of transportation.

A COMPUTER “BRAIN” BUILT FROM TECHNOLOGIES AND SYSTEMS

At the center of our vehicle’s self-driving capabilities are computers that perform the functions necessary to understand the world around the vehicle and make the driving decisions that safely transport passengers. No one technology makes this “brain” work. Instead, the computers use a combination of systems that work safely together, including:



HOW THE CRUISE AV OPERATES

Let's look at three of these elements — **Perception, Planning** and **Controls** — to showcase how the Cruise AV senses its environment and makes driving decisions.

Allows safe operation based upon both what the sensors “see,” as well as what may be hidden from view.

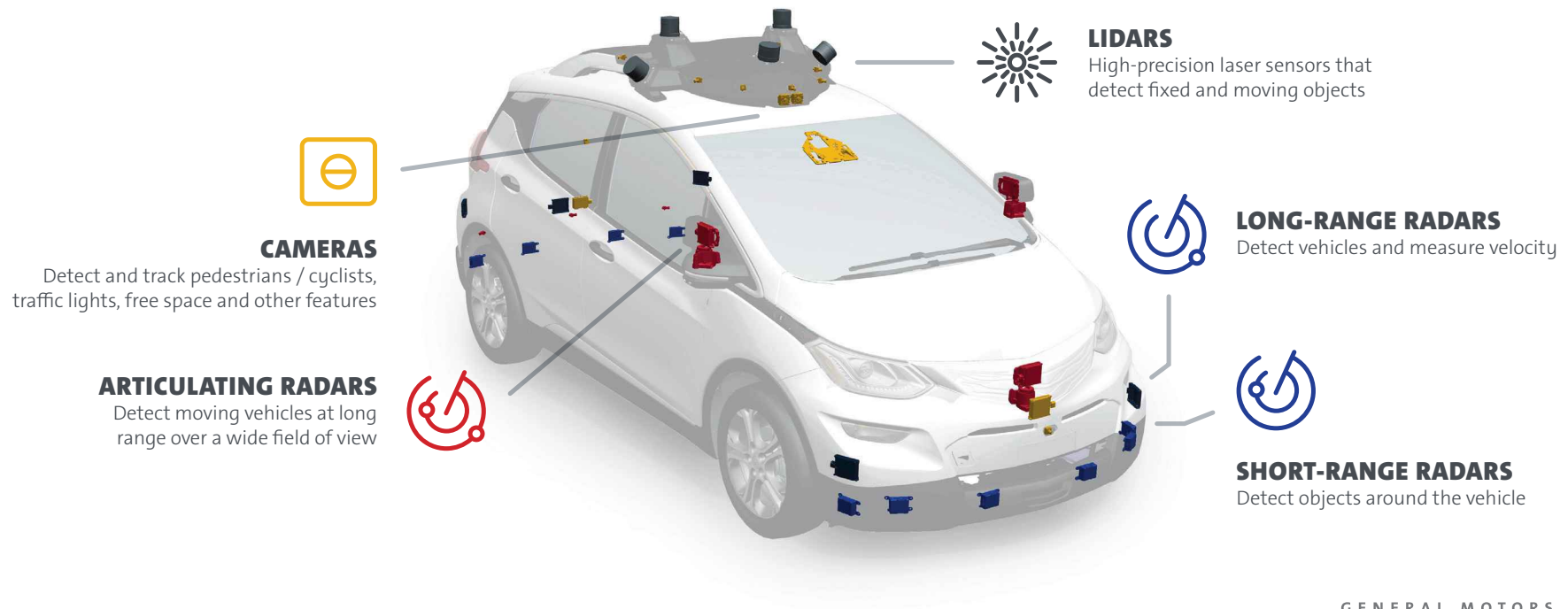
In our self-driving vehicle, **Perception** “sees” by using sensors to monitor its environment. The sensors feed information to the computer that combines the sensor data with high-definition map data to localize the vehicle. Perception detects and classifies

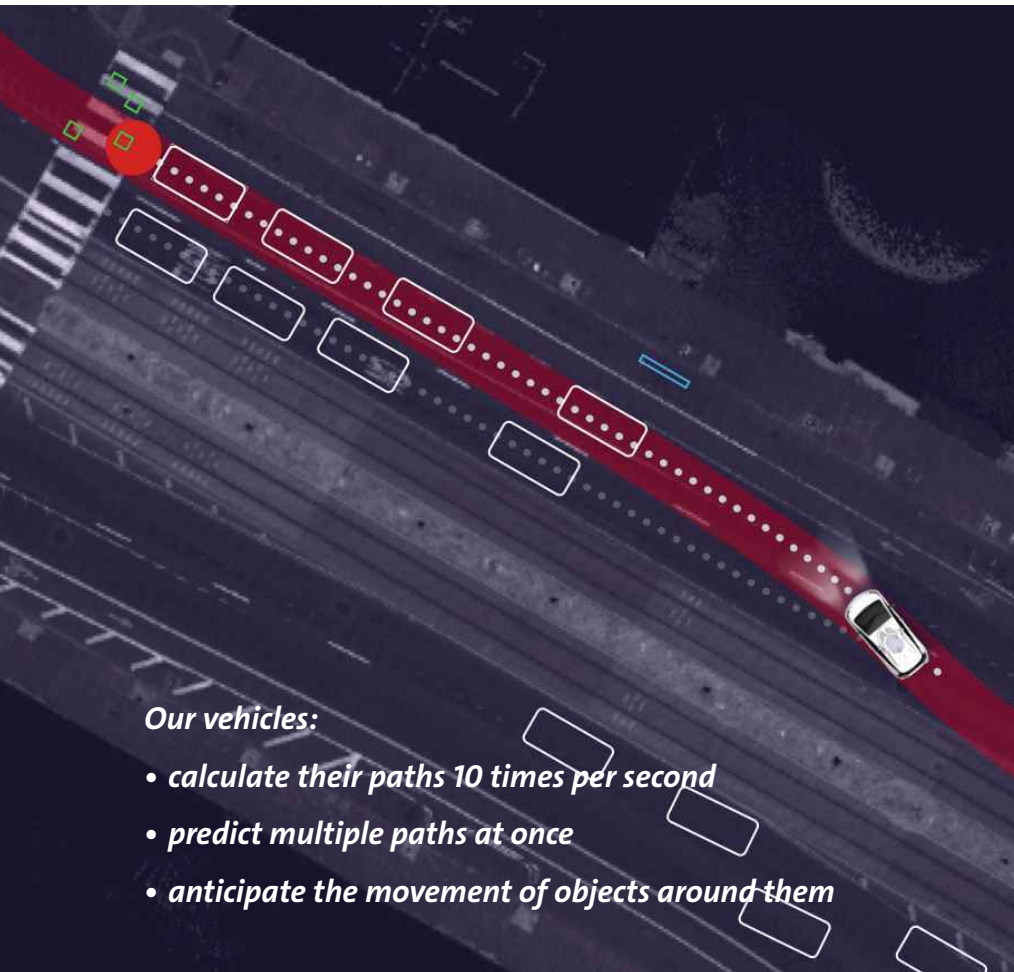
objects, determines their location and provides their speed and direction. It builds a three-dimensional model of the world that keeps track of important objects. Perception also predicts the objects' future motion — pedestrians and trucks have different predicted movements. Using the three-dimensional model and map data, Perception determines free, drivable space around the vehicle.

Perception identifies other environmental uncertainties. For example, with knowledge of its location, Perception knows where it must look for moving objects. If its view is blocked, Perception will flag that area as unknown. If an object is hard to see because of rain or fog, or because it is hidden behind a truck, the computer brain knows that and adjusts its decision-making and performance accordingly.

This allows prudent decision-making and operation based upon both what the sensors “see,” as well as what may be hidden from view.

To perform Perception functions, the vehicle has five LiDARs, 16 cameras and 21 radars. Their combined data provides sensor diversity allowing Perception to see complex environments. Our LiDARs, radars





Our vehicles:

- **calculate their paths 10 times per second**
- **predict multiple paths at once**
- **anticipate the movement of objects around them**

and cameras all scan both long and short range with views 360 degrees around the vehicle. We start with LiDAR, which provides highly precise feedback using laser measurements for both fixed and moving objects. Radar is complementary to LiDAR because it uses electromagnetic pulse measurements and can see solid objects that have low light reflectivity. We use both LiDAR and radar inputs for measuring the speed of moving objects, allowing quick, confident determinations of speed. Cameras are also complementary to LiDAR because they measure the light intensity reflected off or emitted

from objects, providing rich detail of the object. We combine LiDAR and camera data for classifying and tracking objects, making high-confidence determinations more quickly. This helps, for example, identify pedestrians, vehicle types and road details such as lane lines, construction zones and signage. Our complementary set of long-range sensors track high-speed objects, such as oncoming vehicles, and the short-range sensors provide detail about moving objects near the vehicle such as pedestrians and bicycles.

With an understanding of space and time, the car plans its path

Within the computers' operations, **Planning** determines the desired vehicle behavior. It accounts for road rules and plans routes for the car to travel from trip origin to destination. It chooses routes to optimize efficiency and safety and to route the car only on streets within its capabilities.

Planning operations are based upon vehicle location, other road users' predicted actions, traffic controls, road markings, rules of the road and other external factors. Planning identifies multiple paths per second, and constantly chooses the best one to meet changing road conditions and events.

If something unexpected happens, Planning has multiple backup plans. For example, while preparing to change lanes to turn right at an intersection, another vehicle may aggressively cut into the destination lane, making the lane change unsafe. Planning would already have an alternative route planned; for example, the vehicle could go around the block instead of blocking its current lane while waiting for an opening to change lanes.

The **Controls** function implements the final path from Planning, converting its commands for the actuators that control the steering, throttle, brake and drive unit. We've designed the Controls function to give the self-driving system full vehicle maneuverability complete with stability, traction and anti-lock brake systems fully active.

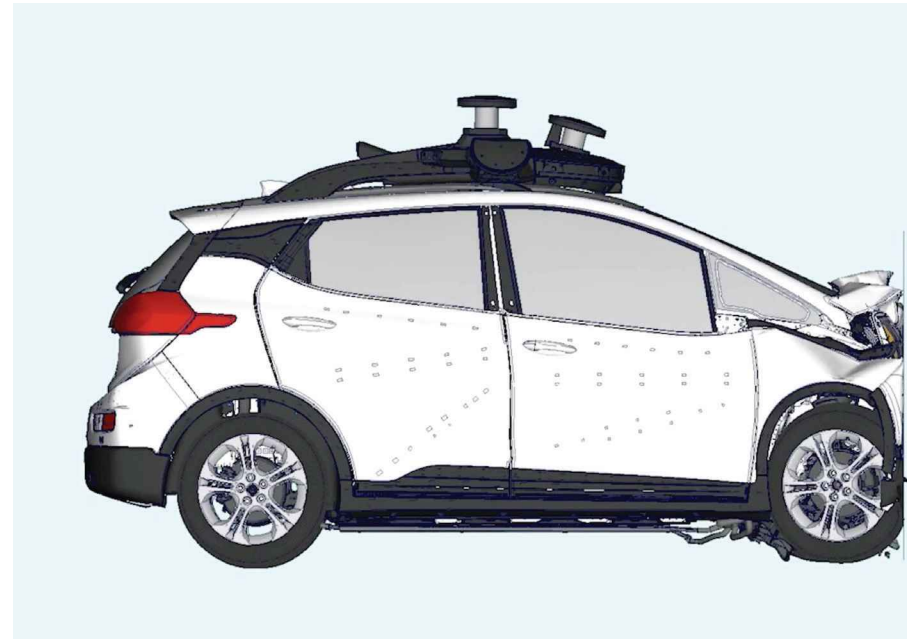
SAFETY AT EVERY STEP

As we create and refine the technology that drives the car, we apply our comprehensive System Safety program throughout the design, development and validation of all the vehicle's systems — mechanical, electrical and compute — and we prioritize safety every step of the way.

Our System Safety program incorporates proven processes from engineering standards organizations, 100-plus years of our own experience, from other industries such as aerospace, pharmaceutical and medical, and from the military and defense industries. Self-driving vehicles require system diversity, robustness and redundancies similar to strategies used for the most advanced fighter planes and deep-space satellites.

We focus on the capabilities of each system to give the vehicle's computers full control of acceleration, braking and steering, and the ability to make the right decisions to drive safely on the road. This also requires thoroughly analyzing each system to identify the safety risks and challenges, and to eliminate or safely manage each one.

Our System Safety process has two key components that work together to allow us to create a safe vehicle design: Safety through Iterative Design, and Safety through Comprehensive Risk Management and Deep Integration.

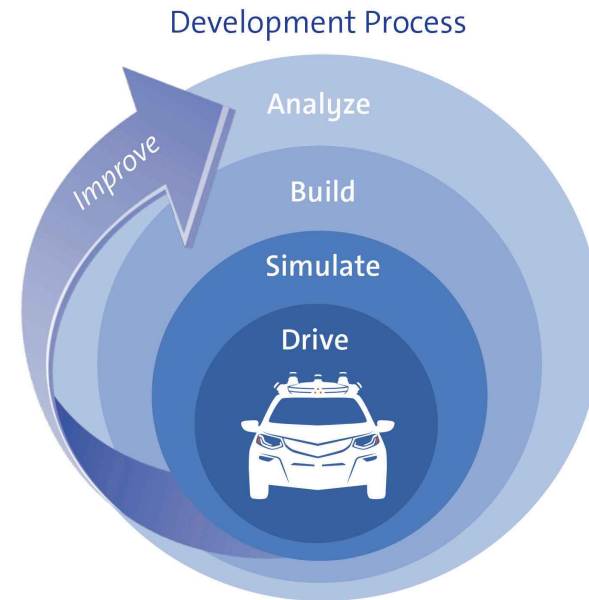
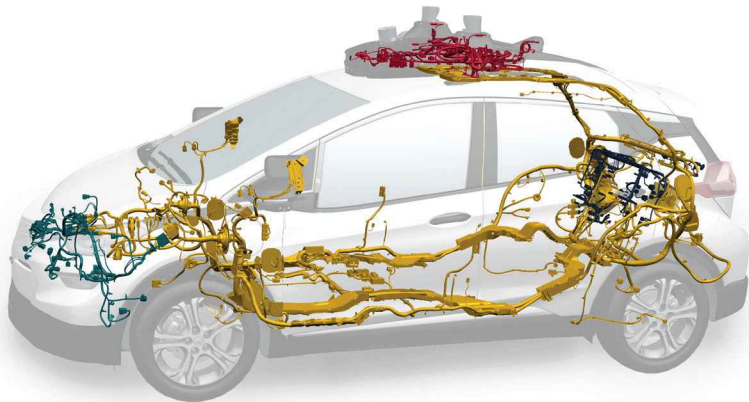


Safety through Iterative Design

Our design continuously improves with each iteration of the vehicle and its systems. For example, the Cruise AV is the fourth generation of our self-driving vehicle. Our teams design and create technologies and systems, test them in the field and in simulations, and then feed the results back into the design process. This way we incorporate learnings, especially safety data, into future generations so they will be even safer. We do this over and over again, leading to new technologies and systems at the heart of our self-driving vehicle. This iterative design process is strengthened by our Deep Integration, which makes the self-driving system an integral part of the vehicle from the outset. This integrated approach enabled us to build our vehicle with diverse technology and redundant vehicle functionality.

Safety through Comprehensive Risk Management and Deep Integration

We believe that a truly safe self-driving car cannot be built by simply adding a self-driving system onto an existing vehicle in a plug-and-play fashion. It must be built from the ground up, seamlessly integrating the self-driving system into the vehicle. The benefits of



iterative design and comprehensive risk management are grounded in the vehicle's deep integration.

Comprehensive Risk Management is a key component of our System Safety process. Throughout the design, development and testing processes, our Comprehensive Risk Management approach thoroughly identifies and addresses risks, and validates solutions to address them. This is a constant element of our Systems Safety process, which prioritizes elimination, not just mitigation, of safety risks wherever possible.

Our self-driving vehicles, including all the hardware and systems necessary for self-driving operation, meet all our standards for performance, crash protection, reliability, serviceability, security and safety. That rigorous process means we manufacture our self-driving vehicles with the same high-quality standards as the millions of vehicles we build for our customers around the world each year.

SYSTEMS DIVERSITY AND REDUNDANCY

An important result of our Comprehensive Risk Management and Deep Integration process is systems diversity and redundancy, which are key drivers of the safety of the Cruise AV.

Self-Driving Computer

The Cruise AV has two main computer systems operating simultaneously, so if the primary computer has a problem, the secondary system is there to take over.

Vehicle Localization

The vehicle's location is estimated by many different methods, which means that even if the localization information from one system becomes unavailable, the vehicle can use localization information generated by other sources, such as from LiDAR data or from our inertial tracking system.

Electrical Power

We have included redundant electrical power sources and power distribution for all important systems. Main power is provided through the high voltage electric vehicle battery. Should power from that battery fail, backup batteries will power all critical sensors, computers and actuators.

Signal Communications

Communications between computers, sensors and actuators have an alternate path if the primary fails.

Perception Sensors

Sensor diversity provides confidence that the self-driving system can detect, track and classify objects around it. Field of view overlaps enable 360-degree vision even if a sensor fails.

Redundant Collision Detection

Our vehicle includes a crash-imminent braking system calibrated to work as a backup to the self-driving system that can apply the brakes to stop the car if necessary.

Steering and Braking

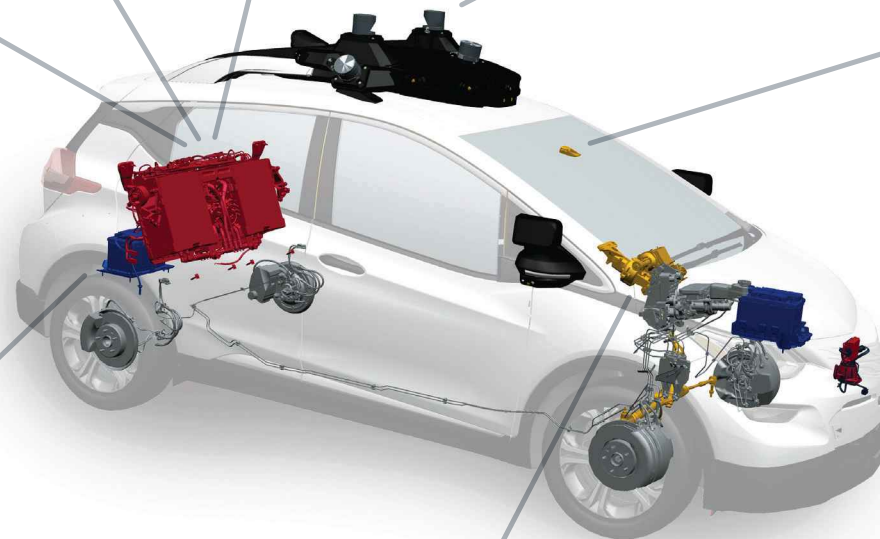
On our self-driving vehicles, the steering and braking systems have redundant motor actuators, electrical power and computer electronics so the vehicle can respond safely and keep performing during a failure.

System Robustness

All critical systems have been designed, tested and validated through intrusive testing, test track durability testing and extensive on-road mileage accumulation.

Integrated Vehicle Health Monitor

Keeps track of diagnostics for all self-driving systems in the vehicle and determines operating state of the vehicle.

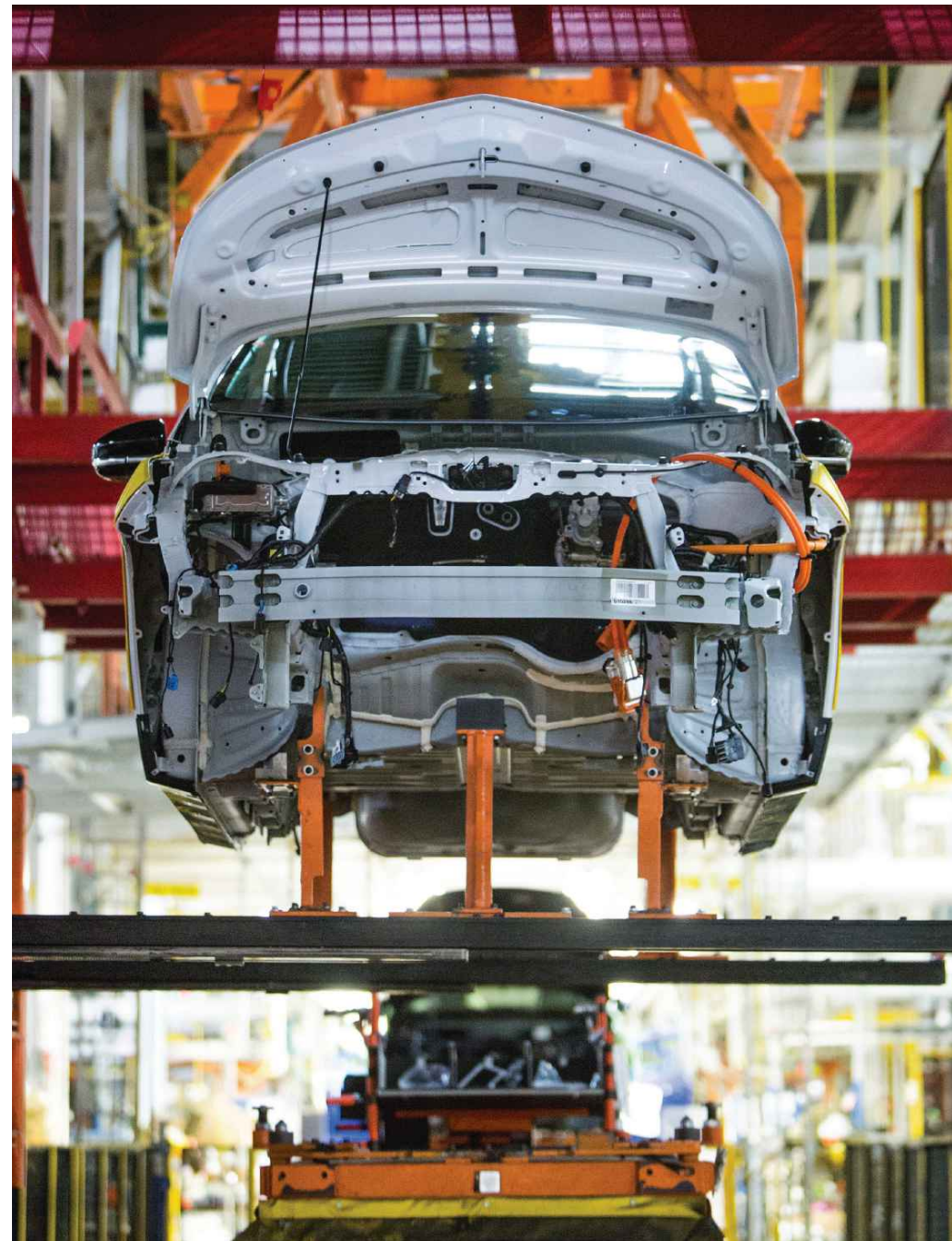


OUR PRODUCTION PROCESS SUPPORTS SAFETY

Our self-driving vehicles are built at our assembly plant in Orion Township, Michigan, which builds thousands of vehicles every year. Our employees there build our vehicles to established quality standards — we know that even the best self-driving vehicle will not gain customer trust or satisfaction if it is not built with quality. And our suppliers who manufacture other components make sure their quality meets our high standards.

Our assembly plants are state-of-the-art facilities. The Orion plant where we build our self-driving cars is a large facility, requiring the cooperation of more than 1,000 people and spanning the area of 75 football fields. There are hundreds of assembly vehicles on tracks that weave, rotate and climb through the facility, with equipment and processes that have been honed over decades.

This fully integrated AV manufacturing process is the best way to build safe and reliably performing self-driving vehicles.



OUR DEPLOYMENT WILL SUPPORT SAFETY AND CONTINUE RAPID IMPROVEMENT

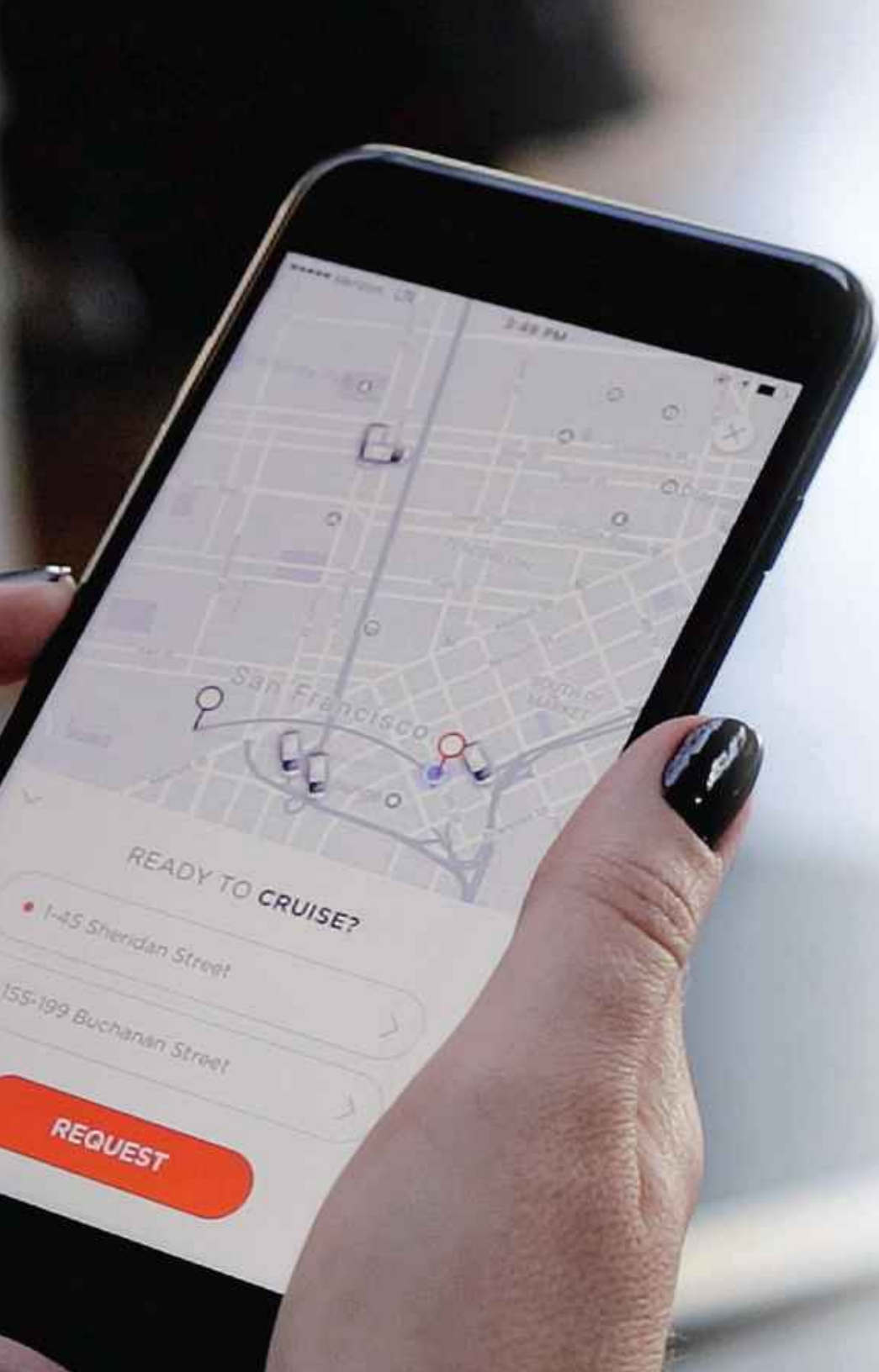
We believe that our self-driving vehicle represents a giant leap forward for advanced auto safety, toward our vision of a world of zero crashes. The first step toward achieving that goal is deploying these vehicles in a ride-share service to help the public become more familiar with this technology. This will allow any consumer — from the early adopter to the skeptic — to experience our self-driving vehicle technology firsthand. Many will also experience their first ride in an all-electric vehicle as well, and they'll see how well-suited electric vehicles are for self-driving ride-share.



In our controlled deployment, our self-driving vehicles will drive only in known geo-fenced boundaries, and only on roads for which we have developed high-definition map data. They will also drive only under known operational conditions and constraints that apply to the entire fleet. We will make sure they are serviced and maintained so that the vehicles' critical systems remain operational and support safe driving.

We will monitor the vehicles and collect data on their performance. As this data is used to identify opportunities for improvements in self-driving operation, we will update the software in all the vehicles — so the entire fleet will continue to get better, and so will future generations of our self-driving vehicles. When one car experiences something new, that data is sent back to the operations center and every other vehicle in our fleet learns from it.





THE RIDE

When we deploy our self-driving vehicles, customers will use a mobile app to request a ride, just like they use ride-sharing today. The only difference is that customers will control the experience — their customized climate control and radio station settings will be sent to the vehicle ahead of when they access their ride. Our fleet operations will send a vehicle to a customer's location for pickup and transport to the desired destination. Inside the vehicle, passengers will find touch screen tablets to access real-time status information about the ride. The tablets will also remind passengers to close all doors and fasten their seat belts.

Passengers will be able to communicate with remote support personnel with the press of a button. There's another button for passengers to press if they want to end a ride because of an emergency. Support personnel may also initiate contact with vehicle passengers in certain circumstances where assistance may be needed, or if a passenger forgets an item in the vehicle after the end of a ride. Once the ride is over, if passengers forget to close the doors, the vehicle can close them itself and move on to the next customer.

ELEMENTS OF SAFETY

As discussed below, our development of our self-driving vehicle, together with our intended deployment of these vehicles in GM-controlled ride-share fleets, fully addresses all 12 safety elements in NHTSA's voluntary guidance, Automated Driving Systems 2.0 – A Vision for Safety.





SYSTEM SAFETY

Robust design and validation processes based on a systems-engineering approach support the goal of designing self-driving operation free of unreasonable safety risks.

We engineer safety into the design, development and validation of our self-driving vehicle through rigorous application of System Safety processes.

Here is a summary of how the System Safety process works:

Designing a capable system and thoroughly analyzing safety performance

To build our self-driving vehicle, we design, develop and validate the comprehensive capabilities described previously in this report. During these processes, our System Safety process asks two questions that help develop safety performance. How does the vehicle maintain safe operation if a component or system breaks or malfunctions? And, even if nothing breaks or malfunctions, how does the vehicle establish safe-driving capabilities on the roads, and with the traffic and weather, that it will face? From the very beginning, we applied rigorous risk analyses to these questions, studying them from multiple angles and using a variety of tools to resolve them. We applied both top-down hazard assessment such as HAZOP and fault tree analysis, and bottom-up assessment such as design failure mode analysis. With this approach, we identified the risks of self-driving operation and developed requirements to address them.

Using the right engineering tools

As we implement requirements to address identified risks, we use a variety of System Safety engineering tools to track performance against those requirements. This process applies to all parts of the vehicle's self-driving system. Different types of mechanical and electrical components and systems require different kinds of analytical tools. And analyzing and tracking performance of the complex operations of self-driving software require tools different from those used to analyze mechanical and electrical components and systems.

Below we highlight some of those tools and how we use them:

- *Deductive analysis* includes a fault tree analysis (FTA), which connects potential hazards to their direct causes.
- *Inductive analysis* includes design and process failure mode and effects analysis (DFMEA/PFMEA), which is a step-by-step approach to identifying all possible hazards in a design.
- *Exploratory analysis* includes hazard and operability study (HAZOP), which identifies potential risks by analyzing the functions of a complex system.

- *Implementation into the product development process* includes using process hazard analysis at the concept stage to assess potential hazards, software HAZOP, system FTA and DFMEA during design, system functional interface analysis (SFIA) and DFMEA during requirements definition, and DFMEA during implementation phases.
- *Requirements Traceability Analysis* manages the relationships between engineered systems and the safety goals and attendant requirements.

Using these tools, we maintain a consistent approach of identifying risks, implementing solutions and verifying their effectiveness.

Applying the development processes to the self-driving vehicle

Following our proven engineering and development standards, along with applicable military standards for system safety, we focus on eliminating risks where possible. If we cannot eliminate them, we minimize them to maintain a safe state. And we include in our design requirements these two key safety performance thresholds: First, our vehicle will operate safely even if there is a single-point-, plausible dual-point-, or common-cause-malfunction; and second, our vehicle will demonstrate safe driving behavior in the defined driving environment through a statistically meaningful experience.

The first key safety performance threshold:

Our vehicle can keep operating properly even if there is a failure in a critical system (fail-operational functionality). Fail-operational functionality is enabled by the vehicle’s backup systems for all critical operations (system redundancy). We built redundancy into the self-driving vehicle’s computers, critical networks, critical actuators and critical actuator controllers. For example, if the vehicle’s main steering actuator fails, there is another steering actuator in a redundant system to take over, reducing the likelihood the vehicle will need to initiate a fallback safe-stop maneuver. And

in the unlikely event that both primary and backup systems fail, the vehicle can bring itself to a safe stop (fail-safe functionality).

The second key safety performance threshold:

We evaluate the operations of all critical self-driving functions. This analysis includes both qualitative and quantitative evaluation of those functions. This approach is called “safety of the intended function,” or SOTIF. Through this process, we establish that the computer’s brain will safely handle the unpredictable circumstances that it will face on public roads. For example, before we put the vehicle into driverless operation in a city that has six-way stops, our vehicle will have demonstrated its ability to navigate the six-way stops many times, in all expected traffic, lighting and weather conditions. This training, as well as closed course and simulation activities, addresses safety challenges associated with navigating six-way stops.

Manufacturing supports system safety

We use our “built-in quality” method to identify defects that may arise during manufacturing, just as we do with each of our other production vehicles. We have assembly line quality checks for the components we build, for the subsystems we build, and when assembling the vehicles. These checks help us find components not built to our specifications and eliminate possible defects.

System safety through city testing and proving safe driving through experience

In our on-road testing, we currently use a fleet of self-driving vehicles that each have a steering wheel, brake pedal and accelerator pedal. These vehicles are monitored by trained human drivers (Autonomous

Vehicle Trainer, or AVT). During on-road testing, the AVT can take over control from the self-driving system when necessary or appropriate

to be safe. Our vehicle’s data logger records the driver takeover events. We analyze data from the logger to assess the vehicle’s self-driving performance and to decide whether to update the software. When we update the software, we test it in simulations to confirm that it accounts for the conditions and circumstances leading to the takeover event and that it drives better than the previous software. We then test the updated software in our on-road testing program.

Testing in San Francisco allows us to develop the vehicle’s self-driving skills more comprehensively than testing in a suburban location alone. Cities like San Francisco contain more people, cars and cyclists that our self-driving vehicles must be aware of at any given time. This rich environment tests our object detection, prediction and response functions. Stacked predictions — such as predicting that

the car in front of our vehicle will brake because it is about to get cut off by a cyclist, or that a car making a left turn in front of us will yield to a pedestrian in a crosswalk — are not unusual. Similarly, stacked maneuvers — managing multiple road challenges together or in quick succession — are often necessary.

While we also test vehicles in Phoenix, our San Francisco vehicles predict an average of 32 times as many possible interactions as those in Phoenix. Thus, San Francisco challenges our self-driving system more because, as the number of objects increase, there are exponentially more possible interactions with objects that the self-driving system must consider.

Maneuver / Scenario	San Francisco	Phoenix Suburbs	Ratio
Left turn	1462	919	1.6:1
Lane change	772	143	5.4:1
Construction blocking lane	184	10	19.1:1
Pass using opposing lane	422	17	24.3:1
Construction navigation	152	4	39.4:1
Emergency vehicle	270	6	46.6:1

Per 1,000 miles of autonomous driving



OPERATIONAL DESIGN DOMAIN

The operational design domain (ODD) refers to the environment, including location, weather and speeds, in which the self-driving vehicle is designed to operate.

We will only deploy self-driving vehicles in environments where the vehicle can meet our performance thresholds. We determine the appropriate environments and conditions using our System Safety engineering process.

We rigorously test and validate our self-driving vehicles so that they have the skills and experience to navigate the environment safely. Through our test drives, we identify potential challenges in our proposed ODD. We then identify, track and implement solutions to those challenges. This process continuously improves the self-driving system's capabilities. We test and validate our self-driving vehicles in the wide variety of environmental conditions that the vehicle might face in its operational design domain — from driving scenarios the vehicle would face daily to the rare edge cases.

Our vehicle's ODD will include the streets in the cities where the vehicle will operate, and operation at all times of day and night, and in light-to-moderate inclement weather (e.g., fog or rain). The

vehicles will remain within designated, premapped areas. The vehicle's computers treat these mapped areas as a strict boundary, or geo-fence, for the vehicle. As a result, the vehicle will choose only routes that fall entirely within the mapped area — every turn, every trip. Within the mapped areas, the vehicles will be capable of complying with all applicable traffic laws.

When the vehicle detects rapid or abnormal changes in weather conditions, it will adjust how it operates to accommodate the weather and how other road users are behaving, such as when traffic slows during heavy rain. At all times, our fleet will communicate with a centralized fleet operations center. This helps our vehicles avoid locations and conditions outside of their ODD.

As our development and validation continues and proves safe performance, we will expand the ODD to new cities and a wider variety of weather and speed conditions.



OBJECT AND EVENT DETECTION AND RESPONSE

Object and Event Detection and Response (OEDR) refers to the self-driving system's detection of, and appropriate response to, conditions and circumstances relevant to the immediate driving task.

Through our System Safety and extensive validation processes, our vehicle has robust capabilities to detect and respond to the range of conditions and circumstances it may encounter.

When our vehicle sees and understands the space around the vehicle, it exercises object and event detection capabilities. And when our vehicle plans its path, it exercises object and event response capabilities. There is more to the story.

Our vehicle's OEDR capabilities include detecting the environment around the vehicle, understanding the surrounding space, tracking objects in that space, safely planning its driving path through that space, and executing crash-avoidance maneuvers.

Our rigorous on-road testing in dynamic, real-world environments allows the vehicle to gain experience detecting and responding to circumstances that even human drivers find challenging — such as adjusting to jaywalking pedestrians and turning cyclists. To validate the vehicle's operational and crash avoidance capabilities, we analyze how the vehicle detects and responds in normal on-road test drives as well as in staged and edge case scenarios. Because our self-driving vehicle was designed to be automated from day one, we could build

the vehicle to optimize how it detects and responds to conditions that arise. For example, we were able to optimize the number, type and location of sensors to enable the vehicle to perceive the environment with maximum clarity and precision. Our integrated design process also enables the vehicle to fully utilize its control system to respond to an event. For example, if another vehicle or person suddenly enters the lane in front of our vehicle, the vehicle can apply the full braking capability of the vehicle brake system to quickly stop the vehicle.

As discussed above, our self-driving vehicles use redundant systems to provide backup functionality. In a human-driven vehicle, if a system fails, we rely on an attentive human driver to serve as the backup. For example, if the power brakes fail in a conventional hydraulic brake system, the human can stop the vehicle by pressing the brake with more force than would normally be needed. In our self-driving vehicle, redundant systems provide the backup. For example, if the vehicle detects a potential crash and the primary brake actuator were to malfunction, the computers still have the ability to execute a crash avoidance maneuver by activating the backup brake actuator.



FALLBACK (MINIMAL RISK CONDITION)

Fallback is transition to a minimal risk condition (safe state) in the event of a problem with the self-driving system that prevents continued safe operation without the transition.

Our self-driving vehicles have features enabling transitions to safe states when necessary, including fail-operational functionality, system redundancy, fail-safe functionality and integrated diagnostics. The Cruise AV has diagnostics that continuously monitor the state of all critical self-driving systems as well as other vehicle systems necessary for safe operation.

The vehicle has two main sets of computers, one primary and one backup. They operate independently and simultaneously for self-driving decision-making. The vehicle includes separate and redundant networks to connect the computers, and a comprehensive set of diagnostic monitoring capabilities. Each set of computers has its own diagnostics, providing the ability for each computer to diagnose other computers and other parts of the self-driving system. In addition, critical functions such as steering and braking have separate and redundant controllers and actuators.

Should a malfunction occur, the diagnostics system determines whether the appropriate response is a fail-operational state or a

fail-safe state, and transitions the vehicle to the corresponding safe state. When required, the self-driving system will operate the vehicle at a reduced speed or pull to the side of the road and execute a safe stop, as appropriate. In all events, the vehicle's state is continuously transmitted to the computers within the self-driving system, and Planning uses that information to plan an appropriate path and action.

Consistent with our System Safety approach, our fallback measures account for residual risks that we identified through risk analyses. Following the principles of military systems safety standards to eliminate risks wherever possible, we designed our systems to withstand many conditions that would otherwise require fallback measures that would reduce performance.

A primary reason we applied robust redundancy is so that our vehicle's fallback state allows safe continued operation as often as possible. This is the best approach for our customers.



VALIDATION METHODS

Validation methods verify that the self-driving system appropriately minimizes risks during operation.

Our System Safety process supports robust validation of our vehicle's structural systems, functional systems, self-driving skills and self-driving performance through experience.

As we design and develop our vehicle, our System Safety process provides a comprehensive approach to identifying safety risks and their potential root causes. With that information, we identify the design requirements for our vehicle to meet our safety performance thresholds. During development, we track how those requirements addressed risks. And we validate the end result so that the self-driving system performs its defined functions and does so reliably.

Validation includes track testing, staged encounters, test cases and simulations to test our self-driving vehicle itself against a variety of objective tests and performance requirements. We also validate with on-road performance testing, where we are collecting millions of miles of test data to show on a statistically significant basis that our vehicle is a safe driver.

In addition to these efforts, we are performing extensive research regarding human driving behavior. Our research includes analysis of existing driver behavior studies and conducting new driver behavior studies to expand the existing data set. These studies help us define and analyze self-driving system performance requirements.

We are presently collecting self-driving vehicle on-road performance data, including miles driven, crashes and take-over events, to build a statistically significant analysis of the vehicle's performance for comparison to human drivers in the same relevant driving environment. Over the course of millions of miles of testing in the relevant operating domain, these comparisons will allow us to demonstrate the safety of the self-driving vehicle within the ODD.

Our combination of conventional system validation with SOTIF validation of self-driving capabilities thoroughly verifies system safety. Here are examples of how we implement both approaches.

Examples of our conventional validation processes include:

- Vehicle-, system-, subsystem- and component-level performance tests
- Requirements-based validation of system, subsystem and components
- Fault injection testing of safety-critical control input, outputs, computation and communication

- Validation of fail-over (transitioning to a secondary control path when the primary path malfunctions) and safe state transitions within the fault tolerant time interval
- Intrusive testing, such as electromagnetic interference and electromagnetic compatibility testing, as well as other environmental element exposure tests (includes temperature, humidity, RF, light energy)
- Durability tests
- Regression and simulation-based software validation

Examples of our SOTIF validation processes include:

- Systematic exposure of the self-driving system to performance requirements of the Operating Design Domain
- Identifying and iteratively testing driving scenarios and edge cases that challenge the self-driving system
- Exercising the Object and Event Detection and Response capabilities of the vehicle and its ability to identify environmental objects and situations that require a safe behavior response
- Evaluation of self-driving behavior against safe driving standards with both qualitative and quantitative criteria



HUMAN MACHINE INTERFACE

The human machine interface (HMI) is the interaction between the vehicle and persons inside and outside the vehicle.

We designed our HMI to be intuitive and helpful to customers riding in our vehicles. This is true whether or not customers are technology savvy or they need hearing or visual accommodations. As part of our approach, we identify and address challenges that could arise from the interaction of the vehicle with passengers, or with road users external to the vehicle.

Interfacing with vehicle occupants

Customers will begin their interaction with our self-driving vehicle before they get in the vehicle by using a mobile application to request a ride. Once inside the vehicle, the customers will use touch-screen tablets with an intuitive interface allowing riders to control the HVAC and radio, access general information about the vehicle, and receive real-time status information pertinent to the current ride. Before the ride begins, the tablets will provide helpful safety reminders, such as to close all doors and fasten seat belts.

With the press of a button, passengers can ask any questions they may have. The vehicles will also have OnStar Automatic Crash Response. With more than 20 years of connected vehicle experience, OnStar can respond effectively in the event of a crash. Built-in sensors can automatically alert an OnStar Advisor and predict the

severity of injuries. An Advisor is immediately connected into the vehicle to see if passengers need help, even if they can't ask for it. In addition, a push of the red OnStar emergency button gives passengers a priority connection to an OnStar Advisor who can direct emergency services to the vehicle's exact location and stay in communication with passengers until help arrives.

After customers enter the vehicle and meet all preconditions, such as closing the doors and pressing the begin ride button, the vehicle will start to move. At any point, a customer having an emergency may end the ride by making a stop request, and the vehicle will pull to the side of the road at the next available safe place. If the vehicle has a malfunction, it will provide explanatory information to the passengers, as well as offer communications with a remote operator.

Accessibility: The vehicles will accommodate hearing and visually impaired individuals so they can experience our self-driving vehicle services. These accommodations will be available in the mobile app and for the in-vehicle experience, including the in-vehicle tablets and communications with our remote operators. With these accommodations, our self-driving vehicles will provide mobility for many people who cannot drive themselves.

Interfacing with other road users

Our self-driving vehicle is designed to interact with other road users in a manner expected of typical human drivers engaged in safe driving practices. Our System Safety approach requires the Cruise AV to understand the behavior of other road users, including pedestrians, bicyclists and motorcyclists, and to account for those behaviors so it can operate safely. Our approach also drives requirements to understand and follow laws associated with other road users.

Interfacing with first responders

We have a long history of working with public safety and first responders when introducing new technology. Our OnStar business has for years worked with law enforcement and other first responders

to educate them and obtain their input on the OnStar experience. When we introduced our revolutionary Chevrolet Volt, we conducted nationwide safety tours. We talked to the National Fire Protection Agency, the International Association of Fire Fighters, the International Association of Fire Chiefs, the Association of Public-Safety Communications Officials, fire chiefs, police chiefs and 911 call centers. We trained over 15,000 people across the nation on safety protocols related to the Volt. Our established relationships, commitment to safety and experience in training on new technologies prepare us well for introducing self-driving vehicles. As we advance this new safety technology, we will inform, seek feedback from, and otherwise assist public safety officials and first responders so they are prepared when these vehicles are deployed.

In addition, our self-driving vehicles will have two-way communications capabilities allowing first responders to communicate with our remote advisors if needed.



VEHICLE CYBERSECURITY

Cybersecurity protects the vehicle control systems and customer information from unauthorized access.

Cybersecurity protects the operation of the self-driving system and other critical vehicle systems from malicious interference and supports high customer confidence in our vehicle's operation and use.

Our dedicated cybersecurity specialists are integrated with the rest of the self-driving vehicle development team to build cybersecurity into our Systems Safety engineering process. This team analyzes and addresses cybersecurity for all in-vehicle control systems, as well as any self-driving vehicle connected services (such as OnStar), mobile apps and in-vehicle apps created for the self-driving experience. The development team uses integrated systems security engineering practices, and a "security-by-design" strategy, to address security requirements for the entire self-driving vehicle ecosystem.

As with other areas of the vehicle, thorough use of analysis and evaluation tools, such as software scans and threat models, drive design features that respond to the risks of cybersecurity. These features, based on a "defense-in-depth" approach, include a variety of mitigating controls, such as device registration, message

authentication, secure programming and diagnostics, and intrusion detection and prevention systems. During implementation and validation, we use additional tools, such as penetration testing, to verify that implementation meets our goals of eliminating and minimizing risks. In addition, our active fleet management process will allow service technicians to regularly monitor vehicles for security-related abnormalities. If needed during deployment, we have robust incident response capabilities to monitor and address potential new cyber risks.

We work with many third parties to maintain and advance our cybersecurity capabilities, implement and advance cybersecurity guidelines and standards, and support the growth of industry cybersecurity practices. These activities include working with our suppliers, joint ventures, various automotive and security consortia, government agencies, the security research community and the Auto-ISAC. In addition, we regularly assess our security practices against guidance from NHTSA, NIST, Auto-ISAC and other industry experts.



CRASHWORTHINESS

Protecting occupants in the event of a crash (e.g., when another vehicle crashes into the self-driving vehicle).

The best protection against crashes is to avoid them. Our Object and Event Detection and Response system is designed to do just that.

For crashes that do occur, our engineering and validation of the vehicle's occupant protection system performance accounts for the self-driving system integrated into the vehicle. Our performance testing (including crash testing) encompasses the performance of the entire vehicle with the self-driving system included.

Our self-driving vehicle structure is based on the Chevrolet Bolt EV. We analyzed structural integrity to account for the addition of several new key systems (for example, the sensor roof module, sensor cleaning and drying system, power backup system and data management system) to the vehicle. This work supported our integrated structure crashworthiness strategy starting in the early stages of the program to include:

- Engineered load paths to manage crash forces to protect occupant space during frontal, side, rear and rollover crashes;
- A battery housing structure that protects the internal battery space in a crash; and
- Vehicle floor reinforcements to distribute loads and maintain occupant space in a crash.

We have completed sufficient simulations and crash testing of our self-driving vehicle prototypes to show the effectiveness of the above requirements.

When we took out the items that the vehicle doesn't need — the steering wheel, brake pedal, accelerator pedal and other human driver controls — the left front seat became another forward-facing front passenger seat. Other than that, the self-driving vehicle seating arrangement is the same as the current NCAP five star Chevrolet Bolt EV. We designed the air bags and seat belts for the left front passenger seat to meet the same injury protection criteria, including those specified in Federal Motor Vehicle Safety Standards (FMVSS), as the right front passenger seat. And for systems beyond the left front passenger seat, the vehicle meets all federal crashworthiness standards.

The self-driving vehicle will accommodate customers installing FMVSS certified child seats for children in the rear.

Our all-electric self-driving vehicle also incorporates battery safety measures. It includes a reinforced structure for the battery compartment and is equipped with a crash-safety system that cuts power in the event of a collision, making it safer for first responders.



POST-CRASH BEHAVIOR

After a crash, the vehicle should return to a safe state.

Our requirements for post-crash behavior account for both physical safety and standard practices in the event of a crash.

In general, after a crash the vehicle will enter a safe state. Typically, the vehicle will automatically apply brakes to bring the vehicle to stop in a controlled manner after the initial impact. Built-in sensors will automatically alert an OnStar Advisor, who will be connected promptly to see if a passenger needs help and to communicate with first responders on the scene. If passengers don't respond, an OnStar Advisor uses GPS technology to pinpoint the exact location of the

vehicle and request that emergency help be sent immediately. The self-driving vehicle crash response system will also unlock the doors and turn on the hazard lights (flashers) following the crash.

Our physical safety systems incorporate safety measures discussed above. In addition to the battery disconnect that cuts power in the event of a crash, the vehicle has a second battery disconnect. That disconnect is located underneath the rear seat and is intended for use by first responders or service technicians.



DATA RECORDING

Learning from crash data is a central component to the safety potential of self-driving vehicles.

Our self-driving vehicle has two data recording features — a conventional Event Data Recorder (EDR) and a second robust data logging system. The data logging system is highly reliable, has self-diagnostics, and stores data securely, protecting it against loss. The data logging system is designed to be fail-operational and to keep data intact even in the event of a crash. If a crash occurs, the data logging system stores predefined data from the vehicle. The collected data includes information on sensors, vehicle actions, any degraded behavior, malfunctions and other information useful for event reconstruction.

In addition to crashes, our vehicle's robust data recording capability provides information on vehicle performance during normal driving and avoided crash situations. We have IT teams in multiple states building computer systems to store and process data that we retrieve from our vehicles. With this retrieved data, we can evaluate design and driving performance during vehicle development and deployment, and for continuous improvement for future generations of self-driving vehicles.



CONSUMER EDUCATION AND TRAINING

Education and training are imperative for increased safety during the deployment of self-driving vehicles.

During development, we considered what consumers need to know to interact with our self-driving vehicle. The vehicle is designed for an intuitive and familiar user experience in a ride-sharing service. The mobile application, in-vehicle touch screens and other user interfaces will provide helpful information and safety reminders. Because we will deploy our vehicles in a self-driving ride-sharing service, consumers will not have a role in operating the vehicle itself. The intuitive interface, coupled with the ability to talk to remote support personnel, will provide all the information that customers need.

When the ride-share service is launched, we plan to publish material informing consumers about what to expect when using the service to obtain rides. This information will explain how to request rides, how to identify the self-driving vehicle that is assigned for the requested ride, what to expect during the ride, and what to expect when the ride ends.



FEDERAL, STATE AND LOCAL LAWS

Under our System Safety process, we develop requirements for compliance with federal, state and local laws and analyze the impact of those requirements within our safety development program.

Federal laws

Our self-driving vehicle will comply with federal laws. The vehicle will meet all applicable federal motor vehicle safety standards (FMVSS). Where FMVSS cannot be met because they are human-driver-based requirements, the vehicle will meet the safety purposes of those standards and we will petition for exemption (permission to meet the safety purpose of a standard through alternative means). We have filed such a petition for the Cruise AV.

We are also working with industry groups and NHTSA to advance the development of new FMVSS that will (a) remove unnecessary roadblocks to new safety technology, such as self-driving vehicles, and (b) advance the safety of self-driving vehicle technology.

The self-driving vehicle will also comply with federal laws and regulations relating to fuel economy, emissions, noise, hazardous materials and labelling requirements.

State and local laws

We designed our Cruise AV to be capable of complying with state and local laws applicable in its operational design domain.

In addition, we will comply with non-traffic-related state and local laws, such as insurance requirements, reporting requirements related to field incidents and interventions, and others. We will communicate with and educate first responders on how our self-driving vehicles implement local law requirements (like where to find the registration and insurance) and what first responders can expect when encountering our self-driving vehicles.

CONTINUING TO CREATE AND IMPROVE NEW TECHNOLOGY

And we're not stopping. We're adding to our roster of talent in California, Michigan and elsewhere, and we're expanding our capabilities with new components and systems technologies — all of which will advance safety and performance. We are developing new computer systems and sensor technologies, such as LiDAR, to make the technology more affordable and available for customers, and to continue to advance the safety performance abilities of our self-driving cars to levels far beyond human drivers. Our self-driving vehicles have the potential to reduce vehicle crashes and save lives, to reduce vehicle emissions, to reduce congestion and save people time, and to make transportation more accessible to more people — bringing our vision of a world of zero crashes, zero emissions and zero congestion closer to realization.

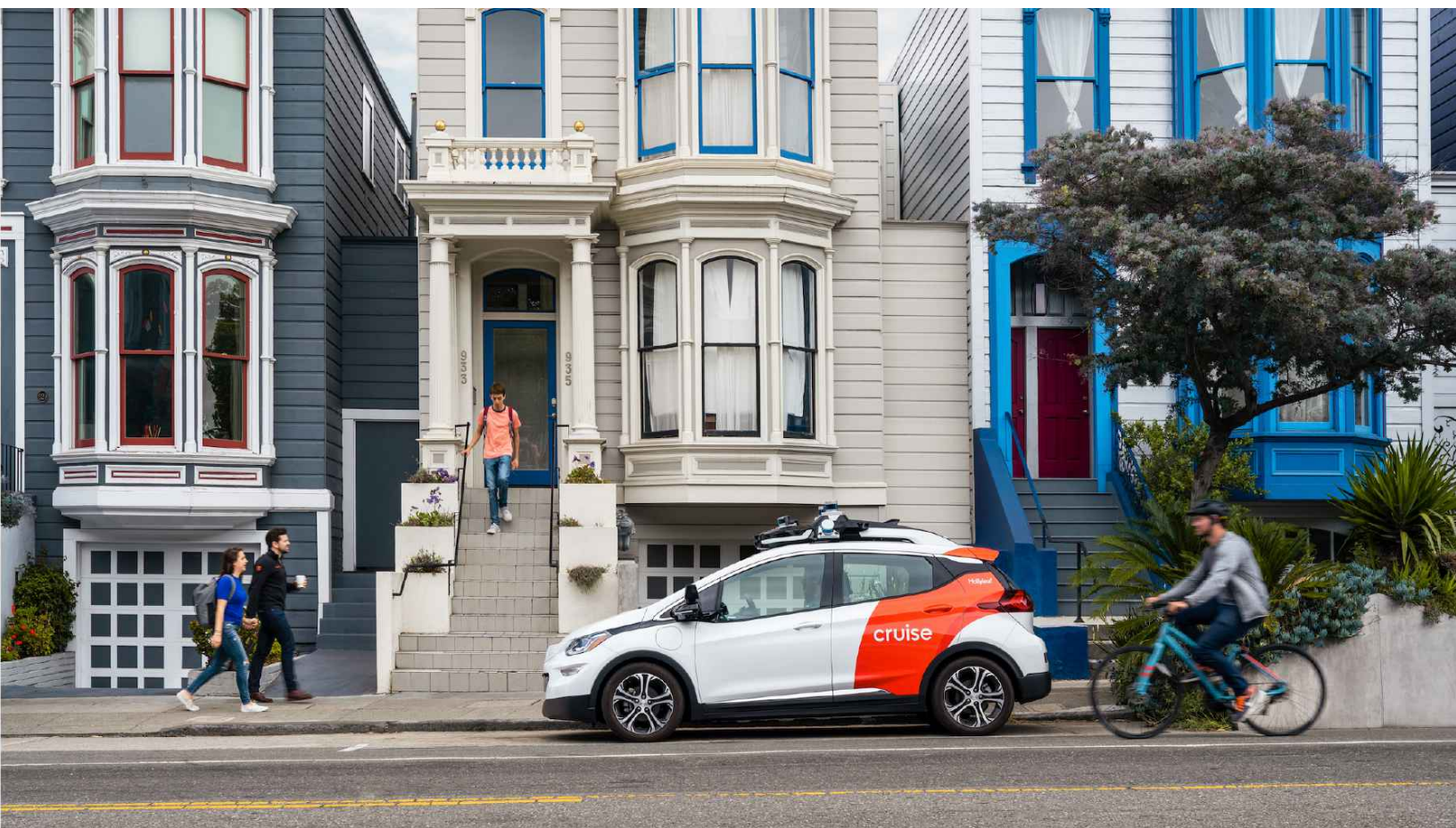
GENERAL MOTORS

EXHIBIT C

cruise

Driverless Deployment Program Guidance for First Responders

Updated September 2021



Document Objective

This document provides guidance to law enforcement and first responders regarding Cruise's driverless deployment and how to interact safely with our vehicles on the road in a variety of scenarios. Additional information about Cruise's safety program can be found in the [General Motors 2018 Self-Driving Safety Report](#)¹ and the [2018 Self-Driving Safety Report: Appendix A](#).²

Cruise Vision

Cruise is an all-electric self-driving technology company with a mission to build the world's most advanced autonomous vehicles to safely connect people to the places, things and experiences they care about. Founded in San Francisco, California in 2013, Cruise is committed to developing a shared, purposeful self-driving service that we believe will bring new safety, accessibility and environmental benefits to all Californians. Cruise received its drivered AV test permit from the Department of Motor Vehicles to test on public roads in June 2015. Since that time, Cruise has consistently tested its fleet of vehicles in San Francisco, one of the most dynamic and complex urban driving environments in the country. On October 15, 2020, Cruise received the DMV Driverless Vehicle Testing Permit to begin fully autonomous testing on public roads in San Francisco.

Cruise's mission is founded on the profound premise that today's transportation status quo is fundamentally broken. In 2018, 36,560 Americans died on U.S. roads, more than 90% of whom were lost due to human errors like drunk or distracted driving.³ The toll is astronomical globally: more than 1.3 million people died on roads around the world.⁴ The transportation sector is also known to be the single largest contributor to greenhouse gas emissions in the country, accounting for nearly 30% of total emissions.⁵ In our home state of California, transportation's portion is an even larger contributor, accounting for more than 40% of emissions.⁶ In addition, despite revolutionary changes in transportation, progress has been uneven. Six million people with disabilities do not have access to the transportation they need.⁷ A recent Harvard study found that commute times and access to employment opportunities proved to be some of the strongest predictors of upward mobility.⁸ The bottom line is

¹ *2018 Self-driving Safety Report*, GM, <https://www.gm.com/content/dam/company/docs/us/en/gmcom/gmsafetyreport.pdf>.

² *2018 Self-driving Safety Report Appendix*, GM, https://www.gm.com/content/dam/company/docs/us/en/gmcom/2018%20Self-Driving%20Safety%20Report%20Appendix%20A_DIGITAL_180614b.pdf.

³ *U.S. Transportation Secretary Elaine L. Chao Announces Further Decreases in Roadway Fatalities*, NHTSA (Oct. 22, 2019), <https://www.nhtsa.gov/press-releases/roadway-fatalities-2018-fars>.

⁴ *Global Status Report on Road Safety 2018*, WHO (June 17, 2018), https://www.who.int/violence_injury_prevention/road_safety_status/2018/en/.

⁵ *Sources of Greenhouse Gas Emissions*, EPA, <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions>.

⁶ *GHG Current California Emission Inventory Data*, CARB, <https://ww2.arb.ca.gov/ghg-inventory-data>.

⁷ *Self-Driving Cars: The Impact on People with Disabilities*, Ruderman Family Foundation, https://rudermanfoundation.org/white_papers/self-driving-cars-the-impact-on-people-with-disabilities/.

⁸ *Where Is the Land of Opportunity? The Geography of Intergenerational Mobility in the United States*, National Bureau of Economic Research (Jan. 2014), <https://www.nber.org/papers/w19843.pdf>.



that transportation today is too dangerous, polluting, inaccessible and expensive, and Cruise believes the root of these failures lie with the 20th century model of the human-driven, internal combustion, single-occupant vehicle. That is why Cruise is designing, developing, and testing an autonomous vehicle that can provide both an alternative and a solution.

To further the objectives of safety, sustainability, accessibility and equity, Cruise has developed the Cruise Autonomous Vehicle (AV) with the goal of launching a self-driving service. Today's Cruise vehicle is purpose-built as a self-driving vehicle at a dedicated manufacturing plant in Lake Orion, Michigan, employing a safety-by-design approach that provides critical system redundancy. Each Cruise AV is designed with seamless hardware and software integration utilizing automotive grade technologies and processes, and crash tested extensively to ensure passenger safety.

Safety is Cruise's North Star. Cruise is developing and testing vehicles with advanced sensors that provide rich information about the world. We leverage the latest machine learning techniques and our tools to help our vehicles understand what's happening around them and what might happen in the future. We envision a future where AV technology has a positive overall impact on automotive safety and public health. We work tirelessly toward this goal because we believe deeply in its promise and know its impact will be measured in lives saved.

Additionally, because Cruise is committed to a clean, sustainable future for transportation, we are developing an all-electric AV fleet in San Francisco and are the first self-driving company to power its vehicles with 100% renewable energy - produced right here in the state of California.⁹ As a purpose-built fleet, we view our self-driving service as a way to expedite the electrification of transportation. Cruise customers need not worry about purchasing an electric vehicle nor about when or how to charge. In this way, Cruise AVs can dramatically increase access to clean, electric miles for those who may not be able to afford an EV, may not be in the market for a new vehicle, or like the millions of Americans that rent in our cities, not have access to chargers or the ability to install them.

Cruise believes AV technology has an historic opportunity to bridge gaps in transportation accessibility and equity that have existed for far too long. Cruise recognizes the significant benefits a self-driving service could have for seniors and people with disabilities, empowering greater independence and connection to community. Cruise actively partners with stakeholders within the accessibility community to understand the challenges faced within current transportation options and to co-design potential solutions with Cruise specialists. Cruise also recognizes that advances in transportation have not been inclusive in their beneficiaries, especially in lower socioeconomic and minority communities. In addition, Cruise regularly engages with neighborhood centers, organizations, and local leaders to create a strong feedback cycle with communities all across San Francisco. In response to the COVID-19 pandemic, Cruise is working to deliver meals and groceries to vulnerable communities¹⁰ across the city in partnership with the SF Marin Food Bank and the SF New Deal. AVs developed by Cruise provide the

⁹ *Cruise Becomes First Self-Driving Company to Power Vehicles With 100% Renewable Energy*, Cruise Medium (Apr. 22, 2020),

<https://medium.com/cruise/cruise-becomes-first-self-driving-company-to-power-vehicles-with-100-renewable-energy-3c7a7974590c>.

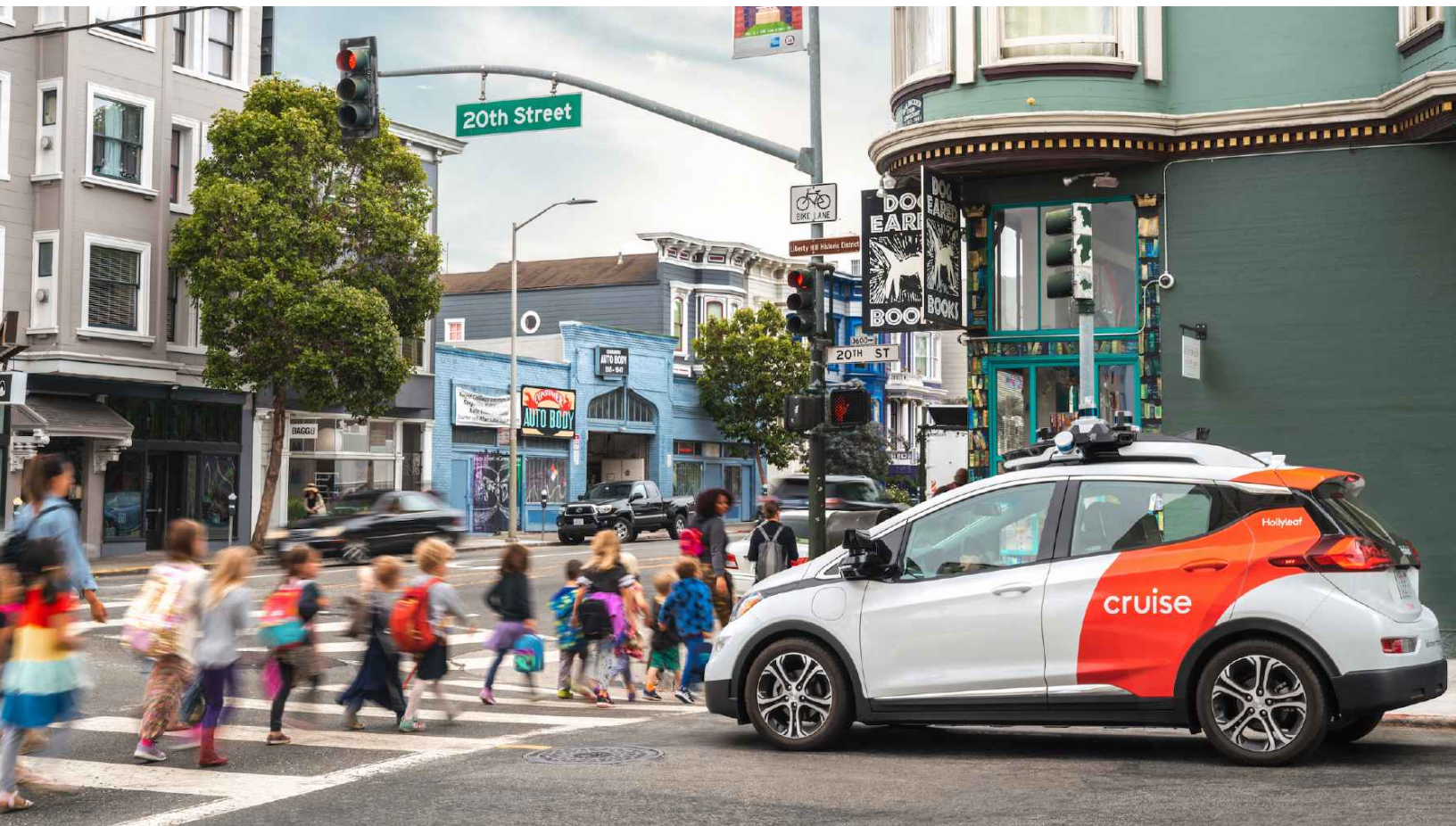
¹⁰ *Standing with San Francisco During COVID-19*, Cruise Medium (Mar. 31, 2020),

<https://medium.com/cruise/standing-with-san-francisco-during-covid-19-e90bfbff1a42>.

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opportunity to bridge the gap for individuals and organizations who otherwise would not have access to such advances in technology.

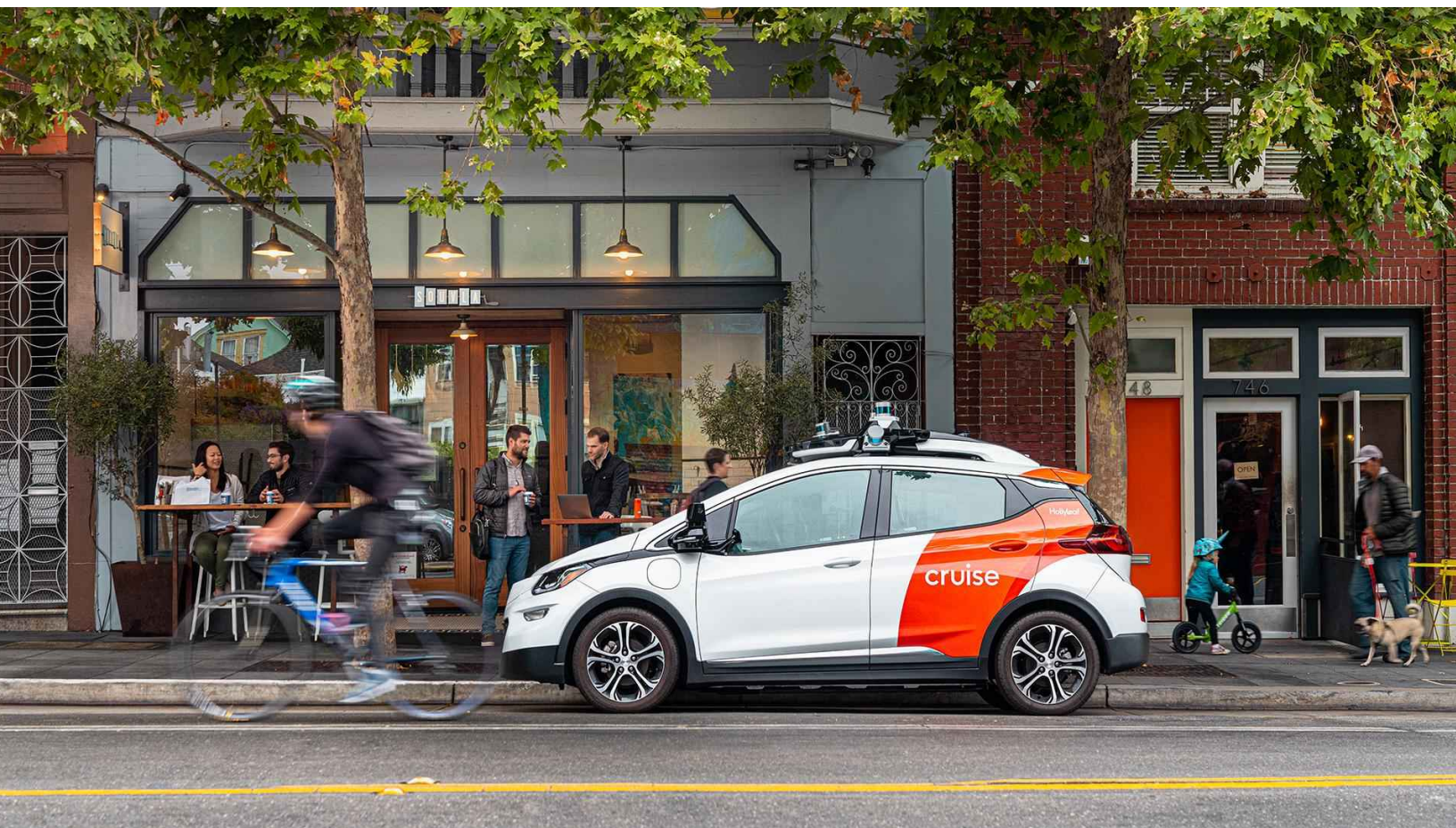
Cruise is committed to designing a shared, all-electric, self-driving service to strengthen and connect communities and experiences across San Francisco. After careful testing, thoughtful development, robust validation, and driverless testing, Cruise is prepared to take the natural next step in San Francisco by deploying a sustainable and accessible driverless ride hail and delivery service on California public roads. As with our enduring commitment to safety in drivered and driverless testing in California, Cruise will deploy a driverless ride hail and delivery service with the same level of care, initially within a defined geographic area. We believe that this incremental approach will ensure that we are able to bring the benefits of this technology to the public as safely and efficiently as possible. Cruise will also continue its ongoing drivered and driverless testing across San Francisco.



Guide for Law Enforcement & First Responder Safe Interaction with Cruise Autonomous Vehicles

Introduction:

Cruise's mission is to build the world's most advanced autonomous vehicles to safely connect people to the places, things, and experiences they care about.



At scale, self-driving technology holds the potential to save millions of lives, reshape our cities, reduce emissions, give back millions of hours of time and restore freedom of movement. At Cruise, we believe that the right way to build that future is to do it side-by-side with the community, especially with our partners in law enforcement and public safety.

We regularly work with state and municipal public safety officers in San Francisco and beyond, and have conducted multiple training sessions with law enforcement and first responders across the country in the localities where we test. Through these training sessions, we provide law enforcement and first responders with the



information they need to safely identify and interact with our Cruise Autonomous Vehicles (AV) and iterate on the feedback provided to us.

This instructional guide builds on those engagements and is designed to equip public safety officials with the information they need to safely interact with the Cruise driverless AV in multiple scenarios. This guide covers the following important material:

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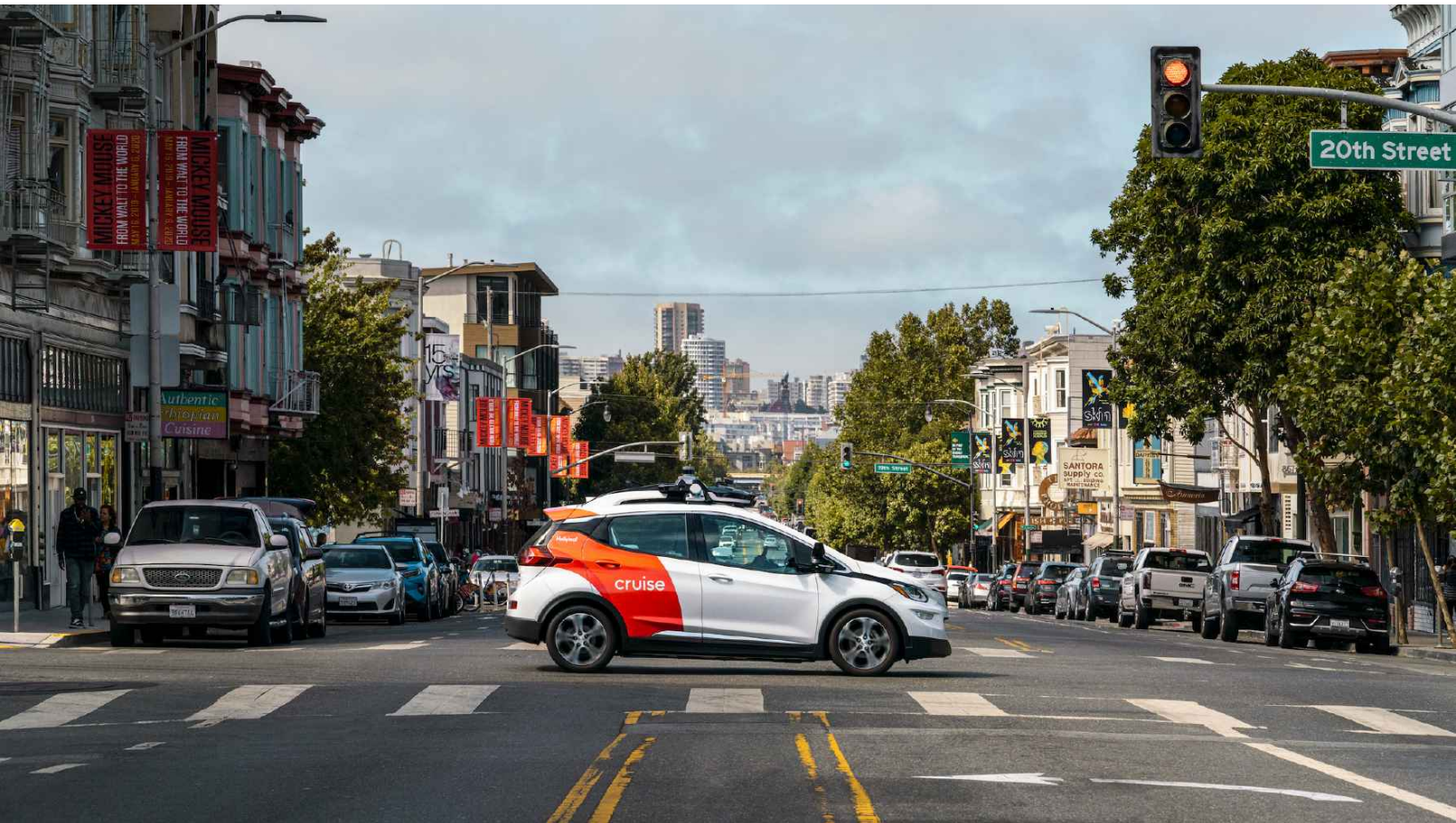


Cruise's goal is to develop an autonomous vehicle that improves road safety, and we are committed to doing so in a way that supports the crucial work of public safety officials in San Francisco, California, and beyond. If you have additional non-urgent questions regarding the Cruise AV not provided by this guide, please check out our page - www.getcruise.com/firstresponders - or contact firstresponders@getcruise.com. For all time sensitive inquiries, please call **888-662-7103**.

Cruise key contacts

Non-urgent: email firstresponders@getcruise.com

Time sensitive inquiries: call 888-662-7103



Section One: The Cruise Autonomous Vehicle



Image of a Cruise self-driving, all-electric vehicle

Today, the Cruise AV is a fully integrated self-driving system based on the award winning all-electric Chevrolet Bolt platform. While many law enforcement officers and first responders are familiar with the Chevrolet Bolt EV platform, the Cruise AV is engineered to operate safely on its own - with no driver - within a defined operating environment and under a specific set of conditions. More information about those parameters can be found in the Operational Design Domain (ODD) section of this guide.

**At Cruise, it's every employee's job to make our product safe.
Our first rule, always and everywhere, is safety first.**

The Cruise AVs are built at a General Motors (GM) assembly plant in Orion Township, Michigan, which builds thousands of production vehicles every year. In concert with our partner GM, we engineered safety into the vehicle from the ground-up, at every step of design, development, manufacturing, testing and validation. The Cruise AV is designed with seamless hardware and software integration, built to automotive grade standards, and crash tested as other production vehicles. All suppliers who manufacture components for the Cruise AV are required to make sure their quality meets our rigorous standards.

Our self-driving system is integrated into the vehicle from the beginning. Through close coordination between the hardware and software teams at both GM and Cruise, we have evaluated potential failure modes for all systems, addressed them throughout development to ensure a safe and reliable product and built redundancy into every element of critical system functioning.

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Identifying the Cruise AV

Each Cruise AV can be distinguished by orange branding and the Cruise emblem visible on the exterior, and each vehicle has a unique identifier or vehicle name that can be found at the front hood, rear hatch, and right and left rear quarter panels.

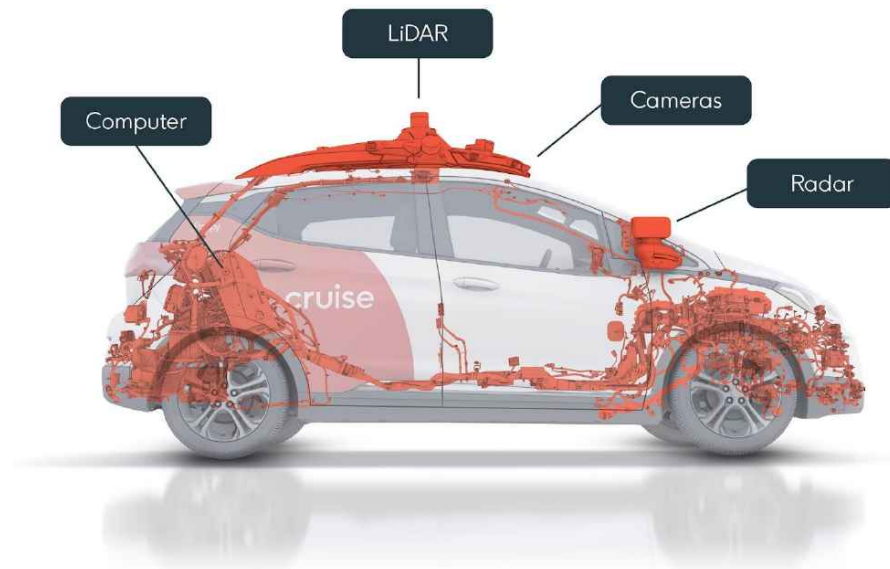


Location of the name on each Cruise vehicle

alternative rear-end preventive design

cruise

A hallmark of the Cruise AV is its hardware sensor suite customized for self-driving, some of which are visible on the exterior and others which are not. The array of external sensors enable the Cruise AV to gather information about its environment and inform the system's driving decisions. Inside the AV is a computer that comprises the "brain" of the system. The computer, and its redundant back up, will not be visible or accessible to passengers on their trip. The autonomous technology works by rapidly synthesizing information collected by the sensor suite to inform driving behavior through perception (understanding the environment), prediction and planning (evaluating possible safe paths or trajectories for the vehicle given the environment), and controls (the driving maneuver). More information about how the Cruise AV system works and is designed to be a safe driver is available in the **Cruise Safety Report** [here](#).¹¹



Location of the Cruise hardware sensor suite and computer

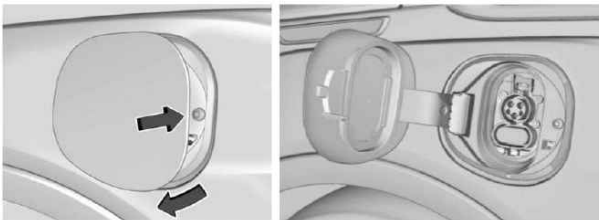
¹¹ 2018 Self-driving Safety Report, GM,
<https://www.gm.com/content/dam/company/docs/us/en/gmcom/gmsafetyreport.pdf>.

Inside the Cruise AV

While the Cruise AV is designed to be fully autonomous, public safety officials might encounter the vehicle with Autonomous Vehicle Test Operators (AVTOs) inside. This guide includes information that is relevant whether there are AVTOs inside the vehicle or not.

Vehicle Identification Information

Each Cruise AV is equipped with documentation that includes the vehicle registration, owner information, proof of insurance and AV testing permit and can be found inside the charge port door. Location of the charge port door and instructions for how to open it are included below.



Push the rearward edge of charge port door and release to open the door



Location of charge port door on a Cruise AV



Section Two: Communicating with the Cruise Team

The Cruise escalation team brings comprehensive experience from relevant industries, such as transportation, technology, aerospace, defense and public safety. Our response procedures were designed, tested and vetted by former members of highway patrol who applied best practices to ensure we can properly support and interact with law enforcement and first responders.

Contacting Cruise

To reach the appropriate Cruise contact, police officers and first responders should call Cruise's critical response line **888-662-7103**. Cruise's critical response line is staffed by an escalation team that is ready to respond to emergency and non-emergency events and inquiries. To ensure the high availability and resiliency of this phone number, Cruise hosts the critical response line on a verified third party platform that also serves other safety-critical services. There is a redundant cellular connection between Cruise Incident Experts and the Cruise vehicle for all AV functionality and tracking that can make use of any of three cellular networks.

Once connected with Cruise, first responders will be asked to provide the following information:

- Reason for your call
- Vehicle identification information (vehicle name located at the front hood, rear hatch, right and left rear quarter panels)
- Geographic location information

In addition to Cruise's critical response line, each Cruise AV is equipped with a two-way audio communications link inside the vehicle that is also equipped with 24/7 OnStar functionality and can be used to directly connect with the appropriate remote team member depending on the situation. The communications link is accessed using one of the clearly marked help buttons inside the vehicle. These buttons appear above both the front and rear seats inside the vehicles. In the event of an emergency, trained specialists from Cruise's Incident Expert team and OnStar will be available to assist. Passengers will receive instruction on how to contact the appropriate team. Cruise response time from the two-way communications link is within seconds.

In the event of a collision, Cruise will respond within seconds whether or not a two-way communication button is pressed by the passenger. Cruise is alerted to potential incidents by both automated and human review processes monitoring the vehicle at all times.

However, to ensure the best support possible, we advise that public safety officials call the Cruise critical response line at **888-662-7103** rather than using in-car buttons designed for occupants.





Cruise Incident Experts

When police officers and first responders call the Cruise critical response line, they have the option to connect with Cruise's Incident Expert team who are specially trained to actively monitor signals from the AV that indicate it may need assistance and can assist with technical issues related to the vehicle in non-emergency and emergency situations. For example, this team can facilitate unlocking the vehicle, confirm operating status, disengage the Cruise AV from autonomous driving mode and ensure that it remains in a safe, stationary position. Incident experts are also trained to communicate with passengers and third parties during emergency situations.

Law enforcement and first responders can contact the Cruise Incident Expert team by calling Cruise's critical response line: 888-662-7103

OnStar Emergency Assistance

For more than 20 years, OnStar has offered peace of mind with the push of a button. Inside the Cruise AV, there is a help button that enables a two-way audio communication link for support from an OnStar Emergency Advisor and Cruise's Incident Expert team, as needed.

In the event of an incident or medical emergency, OnStar Emergency Advisors work with Cruise Incident Expert to provide 24/7 support for passengers and coordinate with first responders as necessary. In addition, On-Star functionality includes Automatic Crash Response. Should a significant collision occur, OnStar Automatic Crash Response will automatically initiate contact with a trained Emergency Advisor who will work with Cruise and notify 9-1-1 dispatch without needing passenger initiation.



Section Three: Intended Operational Design Domain of Cruise Vehicles During Driverless Deployment

An “Operational Design Domain” (ODD) is the specific operating domain(s) in which an automated function or system is designed to properly operate, including but not limited to geographic area, roadway type, speed range, environmental conditions (weather, daytime/nighttime, etc.), and other domain constraints.¹²

Cruise plans to have a broad operational design domain that serves consumers throughout California at all times of day and night. Our first step on that path is an initial ODD that encompasses portions of the City and County of San Francisco. Cruise will work closely with the DMV as such initial domain constraints are updated. The below map represents the geofence of the initial intended ODD for this deployment permit. Within that geofence, certain conditions and other constraints further described below are also outside of the initial intended ODD.

The Cruise vehicles that operate under the driverless permit are designed not to operate outside of their approved operational design domain. For example, Cruise’s software will prevent the AV from routing to locations or on streets that are outside of the vehicle’s operational design domain, which has been mapped in detail.

An “Operational Design Domain” (ODD) is the specific operating domain(s) in which an automated function or system is designed to properly operate, including but not limited to geographic area, roadway type, speed range, environmental conditions (weather, daytime/nighttime, etc.), and other domain constraints.¹³

<p>Level of Automation</p>	<p>Cruise vehicles under the driverless deployment permit meet the description of a Level 4 automated driving system under SAE International’s <i>Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles</i>, standard J3016 (SEP2016).</p> <p>Cruise’s self-driving system is designed to perform the entire dynamic driving task within a defined operational design domain and has the capability to achieve a minimal risk condition without any expectation that a human driver will intervene.</p>
<p>Geographic Area</p>	<p>During driverless deployment, Cruise’s initial intended operational design domain will include a geo-fenced area within the City and County of San Francisco. Cruise will communicate with the DMV as it updates the geographic areas in which it will deploy within the City and County of San Francisco, and ultimately beyond.</p>
<p>Roadway Type</p>	<p>During driverless deployment, Cruise’s intended operational design</p>

¹² See 13 CCR § 227.02(j).

¹³ See 13 CCR § 227.02(j).

	domain will include local and arterial roads and will exclude steep hills, bridges, tunnels, overpasses, underpasses, and roundabouts.
Speed Range	During driverless deployment, Cruise vehicles will operate at a maximum speed of 30 miles per hour.
Weather Conditions	<p>During driverless deployment, the intended operational design domain of Cruise vehicles will exclude the following weather conditions:</p> <ul style="list-style-type: none"> - Heavy Fog - Heavy Rain - Heavy Smoke - Hail - Sleet - Snow
Time of Day	During driverless deployment, Cruise’s initial intended operational design domain will be between late evening and early morning. Cruise will progress to operate at all hours of day and night and will communicate with the DMV as it expands the operating hours.
Other Domain Constraints	<p>When engaging in driverless deployment, Cruise may opt to further restrict certain domain constraints, such as limiting driverless deployment to:</p> <ul style="list-style-type: none"> -Non-inclement weather conditions -Certain routes

The geographic boundaries of Cruise’s intended operational design domain is reflected in the map below.

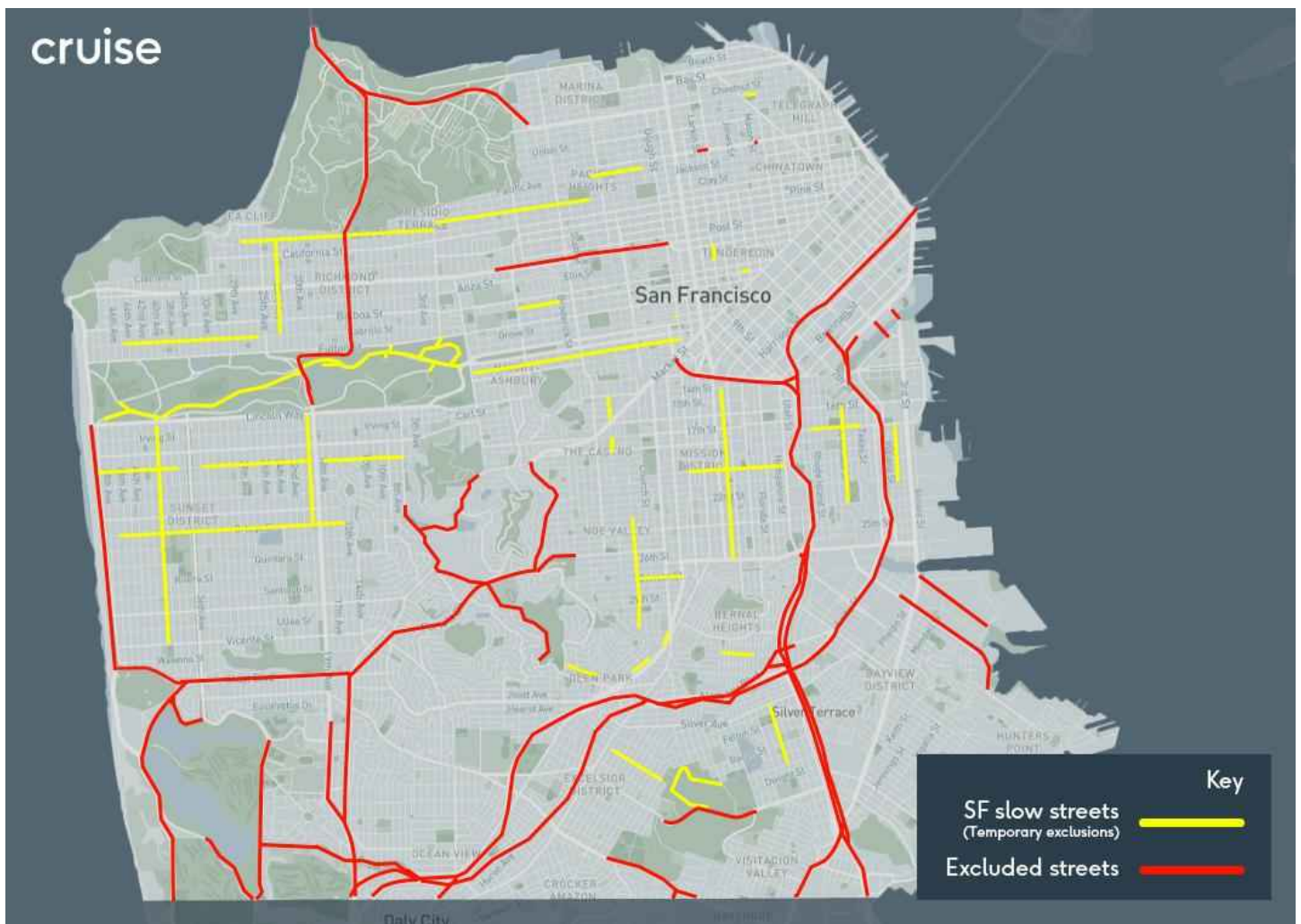


San Francisco ODD shown in Cruise Cartographer tool

This map represents a snapshot of street and area exclusions. In red, this map shows streets or portions thereof and areas Cruise has excluded from its initial intended ODD. In yellow, the map shows streets or portions thereof and areas that are restricted from its initial intended ODD based on city programs like Slow Streets as of the date of this submission. The map will evolve to reflect any modifications to the City’s designated Slow Streets as part of Cruise’s continuous mapping process.

The initial intended ODD depicted in the map above represents an incremental approach to deployment, which Cruise believes firmly promotes bringing the benefits of this technology to the public in a safe and responsible manner. Cruise will continue to prioritize safety and responsibility as it updates its ODD over time to make its service available to all Californians.

As Cruise expands this initial intended ODD, its San Francisco geofence will look more like the map below. Cruise will communicate with the DMV when required as its geofence expands.



San Francisco full 7x7 map shown in Cruise Cartographer tool



Section Four: Incidents & Emergency Scenarios

The Cruise AV is designed to be capable of identifying and responding to emergency and law enforcement vehicles, including having the capacity to safely yield to an emergency vehicle with lights and sirens activated. Due to its design, the Cruise AV can identify emergency vehicles, including their lights and sirens. Cruise has conducted emergency vehicle identification and response testing with public safety officials in San Francisco to ensure the Cruise AV behaves properly around emergency vehicles.

In this section, we provide guidance for first responders on how to safely interact with the Cruise AV on the scene of an incident or emergency scenario. As a precaution and when circumstances allow, we ask responders to call Cruise's critical response line **888-662-7103** to reach Cruise's Incident Expert team before interacting with the vehicle and for additional information and support.

Responding to Non-Emergency Incidents

For a non-emergency event or incident, please call Cruise's critical response line **888-662-7103** where you will have the option to connect with a Cruise Incident Expert. Our Incident Experts are available for relevant questions during driverless testing and can provide support in emergency situations. Please contact them before approaching and interacting with the Cruise AV. If you have additional non-urgent questions regarding the Cruise AV not provided by this guide, please check out our page - www.getcruise.com/firstresponders - or contact firstresponders@getcruise.com.

Responding to an Emergency

OnStar Emergency Advisors are available 24/7 to receive help requests from the Cruise AV - either from a passenger who pressed the help button inside the AV or automatically through the Automatic Crash Response system. In addition, Incident Experts actively stand by to immediately respond to notifications from the AV that it may be in need of assistance.

In the event of an emergency, Cruise and OnStar teams are highly trained and are available to provide support to passengers over the two-way audio communications link into the vehicle and to concurrently work with first responders as necessary to prioritize safety of passengers and to maximize efficiency and response times.

In collaboration with our partners at OnStar, Cruise's Incident Experts are available on-demand to our passengers for immediate assistance and our team is highly trained to be responsive to a broad range of scenarios including medical emergencies. In addition, Cruise can initiate communication to passengers in real time via the two way audio communications link or via call and can further escalate to public safety and first responders as necessary.

Upon arriving at the scene, we recommend that first responders contact Cruise's critical response line by calling **888-662-7103** when possible before approaching or interacting with the Cruise AV.

In the event of any situation that prevents an AV from continuing autonomously, Cruise will dispatch a Field Support team to respond to the AV on-site and can provide in-person support depending on the scenario.

Approaching the AV - When an AVTO is Present

It is a priority in our AVTO training program to educate our trainees how they should respond to a range of potential incidents, from a flat tire, to another vehicle bumping into the Cruise AV or more severe potential situations. They are instructed on how to interact with first responders. If an emergency arises and AVTOs are present, the AVTO will be on site to immediately:

1. Disable self-driving mode and, if possible and needed, relocate the vehicle to a safe location
2. Ensure the vehicle remains immobilized
3. Provide vehicle registration, insurance, and his/her driver's license upon request
4. Give instructions for towing, if required

Approaching the AV - When an AVTO is Not Present

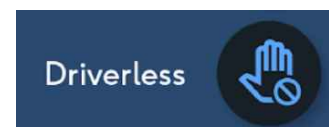
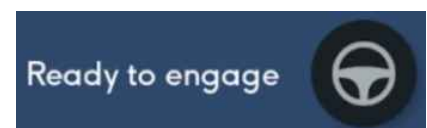
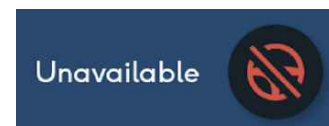
If incident or emergency arises and an AVTO is not present or able to serve as a resource, first responders should:

1. Call the number **888-662-7103** to be connected to a Cruise Incident Expert and follow the verbal instructions from the Expert on how to approach the Cruise AV
2. Receive information from the Cruise Incident Expert pertaining to current status of AV
3. Continue to follow instruction from the Cruise Incident Expert on how to safely interact with the Cruise AV as necessary

Please note that in the event of an incident or emergency situation, the Cruise AV will achieve a minimal risk condition and come to a stop.

Determining Autonomous Mode

The Cruise AV system is designed to appropriately and safely respond to its surroundings. Although we recommend connecting with a Cruise Incident Expert before taking any action, the Cruise AV will interact safely with anyone approaching the vehicle. After being connected with an Incident Expert from the Cruise team and approaching the Cruise AV, the law enforcement official or first responder can also determine whether the vehicle is in autonomous mode by looking at the tablet in the center of the car's front panel. The Cruise AV is only able to move autonomously if it is in the Driverless state, signified by a blue hand icon in the bottom right corner of the tablet. If this icon is not present, the Cruise AV is **not able to move autonomously**.





Disengaging From Autonomous Mode

Our Incident Experts are always available to support first responders and safely guide them through the process of interacting with a Cruise AV. Please contact them before making any attempts to move the vehicle.

Towing

Cruise representatives will be dispatched in the event of a disabled AV and will facilitate AV retrieval, including towing if required. If needed, via contact information provided in the Law Enforcement Interaction Plan, Cruise can remotely instruct emergency responders on interaction with the AV. In exigent circumstances, the Cruise AV can be towed on a flatbed using standard wheel dollies on rear wheels via the same process that would be used to tow an immobilized Chevy Bolt. These instructions have been updated to the Law Enforcement Interaction Plan: www.getcruise.com/firstresponders.

Pushing

First responders should call Cruise's critical response line **888-662-7103** and Cruise will initiate vehicle retrieval. In the event of any situation that prevents an AV from continuing autonomously, Cruise will dispatch a Field Support team to respond to the AV on-site and can provide in-person support.

Providing Emergency Assistance for Electric Vehicles

Cruise is proud that all of our AVs are all-electric and operate on the Chevrolet Bolt EV platform. GM has conducted nationwide safety tours that included talking to the National Fire Protection Agency, the International Association of Fire Fighters, the International Association of Fire Chiefs, the Association of Public-Safety Communications Officials, fire chiefs, police chiefs and 911 call centers. GM also trained over 15,000 people across the nation on safety protocols related to the base vehicle.

There are a few specific safety instructions that first responders should know when responding to a situation involving an EV; however, all standard operating procedures (size-up, approach, immobilize, extinguish) for first responders still apply. There are no increased risks if the vehicle is on fire or immersed in water.

More information can be found at [GM First Responder Guides](#) and the [Electric Vehicle Safety for Emergency Responders Online Training](#).

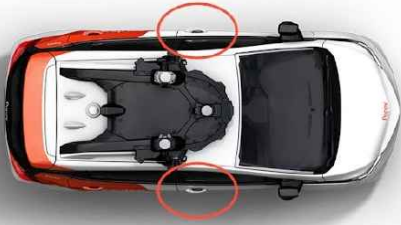
High Voltage and Airbag Disconnect Procedures

To disconnect the high voltage battery and airbags, open the hood and follow the [Cruise AV First Responder Quick Reference Guide](#). Cutting the first responder label shown below or both 12V battery ground cables will remove all power.

First Responder High Voltage & Airbag Disconnect Procedure

Do not cut any orange high voltage cables

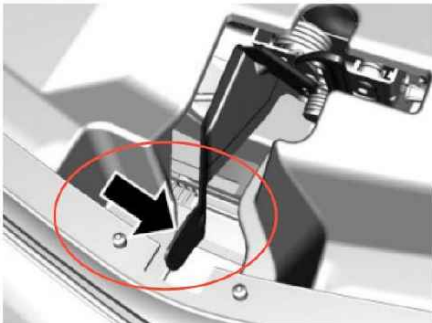
- 1 Enter the vehicle**
Use door handles on driver or passenger side door



- 2 To access high voltage disconnect, forcibly remove cover and pull interior hood release** 
Primary release on lower left of driver side



- 3 Open hood to access labeled 12V cut location**
Secondary lever under front of hood



- 4 Cut and remove section of 12V cable covered with a first responder label**
Driver side of engine compartment



Emergency extrication cut points

Note: Removal of articulating radars (in location of side-view mirrors) may be required to improve A-pillar access.

Caution: Use caution with removal of roof, center of gravity, and weight are impacted by autonomous vehicle-specific sensors.



Section Five: Frequently Asked Questions - [one-page PDF version](#)

Will contact information be available in each vehicle?

Each Cruise AV is equipped with documentation that includes the vehicle registration, owner information, proof of insurance and AV testing permit and can be found inside the charge port door.

Will there be a 24-hour contact line for first responders?

Yes. Law enforcement officers and first responders can reach Cruise by calling our critical response line:

888-662-7103. This line is staffed by Cruise team members to handle incidents and emergencies. It is also the best line of communication to reach Cruise's Incident Expert Team before interacting with the AV. If you have additional non-urgent questions regarding the Cruise AV not provided by this guide, please check out our page - www.getcruise.com/firstresponders - or contact firstresponders@getcruise.com.

If there is an emergency on-board the vehicle, can the vehicle notify the police or medical rescue remotely?

Yes. Each Cruise AV is equipped with OnStar emergency services. Through its Automatic Crash Response service or passenger-initiated help request, OnStar can connect a trained Emergency Advisor to the AV.

Does the vehicle have additional safety shutdown procedures to make sure the vehicle doesn't drive itself away while first responders are on the scene?

In the event of an incident or emergency, the Cruise AV will achieve a minimal risk condition and come to a stop. In addition, Cruise's Incident Expert team monitors the AV fleet at all times during testing and can confirm the mode of the Cruise AV. The Incident Expert Team can bring the AV to a stop, disengage the AV from autonomous mode, and immobilize the vehicle. Please call Cruise's critical response line to speak to an Incident Expert before approaching or interacting with the AV.

How can first responders gain access to the interior if it is locked?

To gain access, please call the Cruise Incident Expert team at **888-662-7103**. This team can facilitate first responders gaining access to the interior of the Cruise AV.

What is the stolen vehicle protocol?

Should you suspect unauthorized use of a Cruise vehicle, please contact **888-662-7103** immediately. Cruise's Incident Expert team is specially trained to actively stand by and immediately respond to notifications from the AV that it may be in need of assistance at all times. Additionally, we can work with OnStar to resolve any situation of unauthorized use.

How do you confirm that the vehicle is not in autonomous mode?

Our Incident Experts can confirm the mode of the vehicle and can disengage the vehicle from autonomous mode.

After being connected with an Incident Expert from the Cruise team and approaching the Cruise AV, the law enforcement official or first responder can also determine whether the vehicle is in autonomous mode by looking at the tablet in the center of the car's front panel. The Cruise AV is only able to move autonomously if it is in the

Driverless state, signified by a blue hand icon in the bottom right corner of the tablet. If this icon is not present, the Cruise AV is not able to move autonomously.

Are there additional power lines or cables we need to be concerned with like in hybrids or EVs that may present a safety issue when cutting into the vehicle?

All high voltage cables are indicated by an orange color and are also found in the First Responder High Voltage & Airbag Disconnect Procedure. Orange cables should be treated as if they are powered - do not cut.

Are there additional power sources for the vehicle computer and electronics beyond the standard vehicle battery system?

In addition to the high voltage battery, two 12V lithium ion batteries power the AV. When engaging with the 12V lines, follow the procedure outlined above to disconnect power to the airbags and from the high voltage battery - both will discharge within 2 seconds. Orange cables should be treated as if they are powered - do not cut these lines.

Are there any flammable liquids that must be accounted for?

The AV poses no unique flammability concerns. As described in [NFPA standards](#), use copious amounts of water should be used to help cool and extinguish in case of battery fire.

Where is the vehicle's HV battery, how many volts does it have, and should it be shut off?

Similar to other electric vehicles, the Cruise AV has a HV battery located in the center of the vehicle, under the passenger compartment as indicated in the First Responder High Voltage & Airbag Disconnect Procedure. Battery voltage is 350V.

Please note that the manual service disconnect for the HV battery is designed for vehicle repair situations or in preparation for vehicle disposal, and not roadside incidents or emergency situations. For incidents and emergencies, first responders should cut the 12V lines found under the hood and/or in the hatch to remove power from airbags and the HV battery.

How are the vehicle's sensors impacted by weather?

The Cruise AV is designed and built to properly recognize and respond to changing weather conditions. When the Cruise AV detects changes in weather conditions that are outside of its operational design domain, it will achieve minimal risk condition. For weather conditions within its operational design domain, the AV may adjust its behavior accordingly; including responding to slow traffic in light rain.

The Cruise AV does not operate outside our operational design domain (ODD), which means that the Cruise AV will not drive in weather that falls outside of the ODD. Cruise operators are standing by to immediately respond to notifications from the AV to help ensure each Cruise AV remains within our ODD.

ATTACHMENT 2

DEPARTMENT OF MOTOR VEHICLES

REGISTRATION OPERATIONS DIVISION
P.O. BOX 825393
SACRAMENTO, CA 94232-5393



September 30, 2021

Ms. Prashanthi Raman
Cruise LLC
333 Brannan Street
San Francisco, CA 94107

Dear Ms. Raman:

On March 29, 2021, the California Department of Motor Vehicles (DMV) received Cruise LLC's signed Application for Permit to Deploy Autonomous Vehicles on Public Streets (OL 321). The application is approved, effective September 30, 2021.

This letter serves as authorization for the deployment of the following vehicles described in the application:

- Cruise AV

Pursuant to California Code of Regulations (CCR) Title 13, Division 1, Chapter 1, Article 3.8 § 228.26 (a) and (b), all vehicles shall be identified as "autonomous" on both the certificate of ownership and registration card prior to operation.

Cruise LLC shall not deploy vehicles with any changes specified in CCR Title 13, Division 1, Chapter 1, Article 3.8 § 228.10 (b) until the amended application is approved by the DMV.

If you have any questions, please contact me at (916) 657-9735.

Sincerely,

A handwritten signature in blue ink that reads "Miguel D. Acosta".

MIGUEL ACOSTA, Chief
Autonomous Vehicles Branch

ATTACHMENT 3



Attachment 3 - Certification of Compliance with DMV Regulations

November 5, 2021

California Public Utilities Commission
Consumer Protection & Enforcement Division, License Section
505 Van Ness Avenue
San Francisco, CA 94102

To Whom It May Concern:

Pursuant to the California Public Utilities Commission Decision (D.)20-11-046, as modified by D.21-05-017, Cruise LLC ("Cruise) hereby certifies that, to the best of its knowledge, it is in compliance with all DMV regulations.

I certify under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

11/5/2021

Date

DocuSigned by:

Alicia W Fenrick

C7097063861D4CD...

Alicia Fenrick, Associate General Counsel

ATTACHMENT 4



Attachment 4 - Attestation of 30 Days of Driverless Operations

Pursuant to the California Public Utilities Commission Decision (D.) 20-11-046, as modified by D.21-05-017, Cruise LLC (“Cruise”) hereby submits the below attestation of 30 days of driverless autonomous vehicles (“AV”) testing under the California Department of Motor Vehicle Permit to Deploy Autonomous Vehicles on Public Streets (“DMV AV Deployment Permit”). Cruise received its DMV AV Deployment Permit on September 30, 2021. At least one Cruise AV that is representative of the AV fleet and of the technology that Cruise plans to use in offering Driverless AV Passenger Service has been in permitted operations on roads in California for a minimum of 30 days following the grant of the DMV AV Deployment Permit to Cruise. In addition, Cruise hereby attests to the following:

- Start date of actual operations on California roads: Thursday, September 30, 2021
- Geographic location of operations in California: San Francisco, CA
- Times of day and number of hours per day in operation during the 30-day period: 10:00PM - 6:00AM, up to 7 hours per day
- Type of environment in which the AV has operated: Urban
- Statement and map of the Operational Design Domain on Cruise’s DMV AV Deployment permit: See Attachment 7.

I certify that the foregoing is true and correct.

11/5/2021

Date

DocuSigned by:

Todd J Brugger

08CCADEE3009400...

Todd Brugger
Vice President, Markets
Cruise LLC



California
Public Utilities
Commission



CPUC Home

CALIFORNIA PUBLIC UTILITIES COMMISSION

Service Lists

PROCEEDING: R1212011 - CPUC - OIR ON REGULA
FILER: CPUC
LIST NAME: LIST
LAST CHANGED: NOVEMBER 3, 2021

[Download the Comma-delimited File](#)
[About Comma-delimited Files](#)

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