

Attachment 7 – Statement and Map of Operational Design Domain

1. Intended Operational Design Domain of Cruise Autonomous Vehicles During Driverless Operations

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.¹

Cruise intends to have an expansive ODD that encompasses the City and County of San Francisco. Cruise vehicles are designed to operate at all hours and to navigate the unique challenges of city streets. While Cruise intends to have a broad ODD, it will initially deploy in limited geographic areas of the City during limited hours.

The Cruise vehicles that operate under the California Department of Motor Vehicle Permit to Deploy Autonomous Vehicles on Public Streets (“DMV AV Deployment Permit”) are also designed not to operate outside of their approved ODD. For example, Cruise’s software will prevent the AV from routing to locations or on streets that are outside of the vehicle’s ODD, which has been mapped in detail.

<p>Level of Automation</p>	<p>Cruise vehicles 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 ODD and has the capability to achieve a minimal risk condition without any expectation that a human driver will intervene.</p>
<p>Minimal Risk Condition</p>	<p>If a Cruise vehicle is in a situation where it has exited its ODD, the remote operator has identified an unanticipated change in the operating environment, or it experiences a dynamic driving task performance-related system failure, it is designed to achieve a minimal risk condition. The maneuver performed to achieve minimal risk condition is relative to the residual AV performance, resulting in either a pullover at the nearest available safe stopping location, or a controlled stop in lane.</p> <p>Cruise vehicles are designed to ensure they can safely achieve a minimal risk condition under any single or plausible multi-point failure in any hardware or software system. Sophisticated diagnostics are integrated into hardware and software systems that will initiate the appropriate dynamic driving task to bring the vehicle to a minimal risk</p>

¹ See 13 CCR § 227.02(j).

	<p>condition. Additionally, Cruise vehicles host redundant hardware and software systems that support the safe execution of achieving a minimal risk condition in the presence of a system failure.</p>
Geographic Area	<p>Cruise’s initial intended ODD 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>
Roadway Type	<p>Cruise’s intended ODD will include local and arterial roads, and will exclude steep hills, bridges, tunnels, overpasses, underpasses, and roundabouts.</p>
Speed Range	<p>Cruise vehicles will operate at a maximum speed of 30 miles per hour.</p>
Weather Conditions	<p>The intended ODD 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	<p>Cruise’s initial intended ODD 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.</p>
Other Domain Constraints	<p>Cruise may opt to further restrict certain domain constraints to evaluate various aspects of its system. For example, Cruise may opt to limit deployment to:</p> <ul style="list-style-type: none"> - Certain environmental conditions - Certain times of day - 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.