



August 17, 2023

U.S. Department of Transportation, NHTSA
Docket Operations, M-30, Rm. W12-140
1200 New Jersey Avenue, S.E.
Washington, D.C. 20590
Filed digitally at www.regulations.gov
Docket # NHTSA-2022-0067 – General Motors

Dear NHTSA,

The City and County of San Francisco ("San Francisco") files these supplemental comments in Docket 2022-0067 to update information provided in September 2022 comments.

The San Francisco Municipal Transportation Agency (SFMTA) is a City department that has responsibility for designing San Francisco streets and traffic control devices, allocating street and curb space for safe and efficient multi-modal use, delivering public transit and paratransit services, enforcing parking regulations, and regulating taxis and emerging mobility. The **San Francisco County Transportation Authority (SFCTA)** is the county congestion management agency with responsibility for monitoring and analyzing travel activity and long-term transportation planning. We submit these supplemental comments in close collaboration with other City departments, including the San Francisco Police and Fire Departments.

In comments filed in **September 2022**, **San Francisco reported 28 incidents reported to 9-1-1** by members of the public and an additional 20 incidents posted on social media for **a total of 48 incidents**. Our discussion focused on "Travel Lane Road Failures" in which Cruise AVs stopped without apparent cause and remained disabled on City streets for periods of time ranging from minutes to hours. **As of August 16, 2023**, SFMTA has processed reports of **431 incidents** involving driverless Cruise AVs from members of the public and City employees. As discussed in Section 1.1 below, these unduplicated incidents reflect a far wider range of Cruise driverless AV driving problems, including both stops that interfere with other road users -- including emergency responders and transit vehicles -- and driving that fails to yield the right of way appropriately to other road users -- again including emergency responders and transit vehicles, among others.

Given the low number of driverless miles, it is too early to draw statistically significant conclusions about how driverless AV crash rates compare with human driver crash rates. While severe injury and fatal crash rates are an extremely important metric, they do not capture the

whole safety story. We are excited about driving automation because motor vehicle speed is the biggest killer on our streets, and it is fantastic that Cruise driverless AVs appear to follow posted speed limits. But reducing crashes is not the only key to improving safety. A safe systems approach requires attention to the new hazards that continue to mount in San Francisco.

As discussed in our September 2022 comments and addressed further in this update, leading indicators like near miss collisions and sudden acceleration and braking incidents may either demonstrate the value of automated driving or errors in automated driving where other intervening factors prevent serious injury or fatal crashes. At this early time, measuring system safety and the impacts of driverless AVs calls for a range of metrics. We are aware of no state or federal agency collecting data about new hazards that are caused by driverless operations, and we see this as a critical item for NHTSA conditions on approval of the Origin exemption petition.

These supplemental comments provide information about more recent driverless operations in San Francisco. We have migrated away from the term “Travel Lane Failures” used in our September 2022 comments and replaced it with the Term “Street Interference Incidents.” These include several categories of incidents described more fully in Section 1.1 below. We also respond to comments filed by GM & Cruise on September 21, 2022 (“GM & Cruise Comments”) and on March 21, 2023 (“GM & Cruise Answers”). Based on all of these new information sources, we offer some updates on our previous recommendations. Our comments use the same organization as our initial comments in order to facilitate expeditious NHTSA review.

San Francisco is concerned about the increase in driverless Cruise AV incidents affecting San Francisco Fire Department operations in 2023 and the recent 10 Cruise AV failure in North Beach. These incidents raise questions about the impact of Cruise AVs on San Francisco during large community events, broader emergencies and natural disasters. The Origin is a larger vehicle than the Cruise AV with a profile that will have greater impacts on sight lines for all road users. In addition, the absence of human controls will slow removal of disabled Origins from public streets. **San Francisco recommends that NHTSA investigate the Cruise AV incidents that reflect interference with routine emergency response operations as well as the reliability and resiliency impacts of driverless operations and failures during power outages, traffic signal outages, cellular network outages and disaster situations.**

Thank you for your interest in our experience as a pioneer city for AV operations.

Sincerely,



Jeffrey Tumlin
Director of Transportation, SFMTA



Tilly Chang
Executive Director, SFCTA

San Francisco Comments & Recommendations

Section 1: San Francisco Street Regulation and Observations of Cruise Driverless AVs

- 1.1. Reported Cruise AV Street Interference Incidents
- 1.2. Cruise AV Passenger Pick Up and Drop Off Stops

Section 2: Evaluation of General Motors Public Interest Arguments

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Exhibit A: Redlined Summary of San Francisco Updated Recommendations

Exhibit B: Declaration of Deputy Chief of Operations, San Francisco Fire Department, Darius Luttrupp

Exhibit C: List of Summarized California Vehicle Code Provisions Apparently Violated in Reported Street Interference Incidents

Section 1: San Francisco Street Regulation & Observations of Cruise AVs

San Francisco has no changes or additions to the descriptions of our approaches to design and regulation of streets and expectations of AV driving included in our September 2022 comments.

1.1 Reported Cruise AV Street Interference Incidents (S.I.I.)

San Francisco’s September 2022 comments focused on travel lane road failures. In most of the early incidents, Cruise AVs failed in City travel lanes and entered a degraded state that required vehicle retrieval by teams of human field supporters. Our comments described these failures as arising from minimal risk condition events, including some that required physical retrieval of a Cruise AV from San Francisco streets (“Vehicle Retrieval Events or VREs”). Between September 2022 and the date of this letter, we have learned that the nature, causes and impacts of Cruise AV incidents on San Francisco streets are more varied than we previously understood.

As to the nature of recent incidents, some are not stopping incidents but instead involve erroneous driving decisions. These include failure to comply with traffic signs and rules of the road, including failure to yield the right of way as required by the California Vehicle Code to

other road users, including vulnerable road users.¹ Some incidents involve slow Cruise AV response to street conditions that require immediate action. While other street users may perceive vehicles in these incidents as paralyzed, Cruise does not define them as minimal risk condition events.² Cruise defines others as minimal risk condition events. Of these, only a subset require physical retrieval of the Cruise AV from the streets. Cruise prefers to focus and report on only the subset that requires physical retrieval, but this may be the smallest group of consequential incidents and doesn't address the range of concerning incidents. As such, data collection and monitoring only for this group would obscure as much as it reveals.

While causes are important to understand in order to develop appropriate and effective corrective actions – including perhaps in some case action by City agencies or staff – it is equally important to understand the impacts of Street Interference Incidents. We now understand that not only can the full range of Street Interference Incidents cause new hazards that affect other road users in the immediate vicinity (including especially vulnerable road users and people with disabilities), they also affect emergency response operations (and thus the public generally who are on the receiving end of these services and may not even be near the AV), as well as transit operations, and street-based workers (including both human traffic control providers and construction workers). The benefits we appreciate from apparent Cruise AV compliance with posted speed limits must be considered in relation to these new hazards and impacts.

We discuss below the range of these negative unintended impacts. Note that San Francisco has no systematic data on the full range of these incidents and their effects. September 2022 comments identified primarily incidents that were reported to the City by public calls to 9-1-1. Since that time, we have made efforts to track these incoming reports and to track incidents reported by workers in some city departments, including transit operators, San Francisco Fire Department personnel, and employees from multiple City departments who build and maintain facilities under, on and overhead on public streets. However, we are aware that both public reports and employee reports undercount actual incidents. As to some City employees, stopping to make notes and file reports would fundamentally interfere with the public purpose of their work. These include employees *whose work in the street is both essential to street safety and makes them frequent witnesses to automated driving errors and hazards: school crossing guards, parking control officers and many San Francisco Police Department employees*. Thus, the reported Street Interference Incidents below understate the actual effects of Cruise AV driverless operations on San Francisco streets.

¹ See Exhibit C: Summarized CA Vehicle Code Provisions Apparently Violated in Street Interference Incidents.

² Two Cruise AVs blocking traffic at the corner of 4th Street & Bryant Street where they encountered construction cones on August 5, 2023 appear to illustrate this phenomenon.

<https://twitter.com/kuromorimine23/status/1688388089495048193>

1. Summary of Street Interference Incidents by Cruise AVs

Since Cruise was authorized to provide commercial passenger services in San Francisco between the hours of 10 pm and 6 am in a limited area of the city, members of the public and city employees have reported numerous incidents of unsafe and/or illegal Cruise AV driving and unsafe and/or illegal stops in travel lanes that interfere with the use of city streets by others. These reports have increased significantly in the spring and summer of 2023.

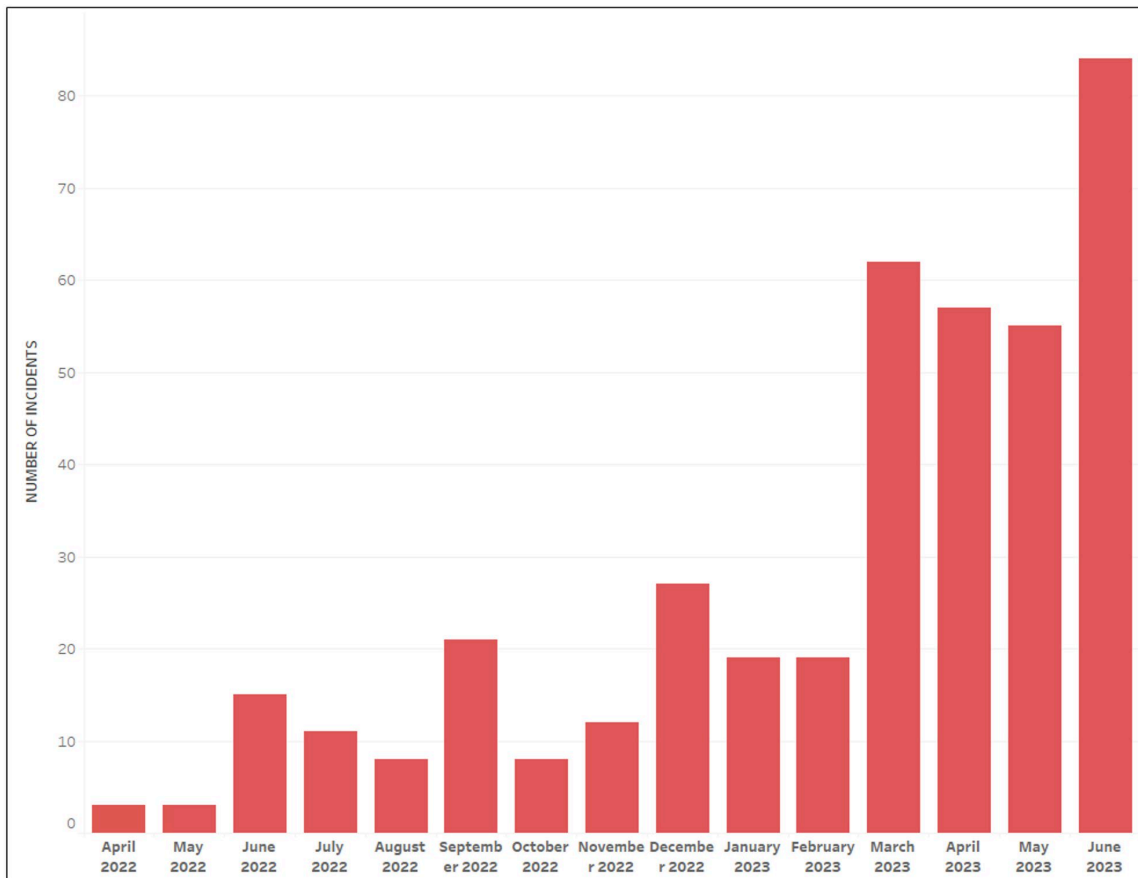


Figure 1: Reported Driverless Cruise AV Street Interference Incidents by Month (April 2022 – June 2023)³

³ SFMTA reviews incident reports to eliminate duplicate reports coming from multiple sources. Subject to the limitations that come from complaint-based reporting, our data is ‘complete’ through June 2023. Some sources, like the San Francisco Fire Department, submit reports more often, including incidents up through August 16, 2023. We have excluded these recent incidents from Figure 1 to show ‘complete’ monthly incident counts but include them in other figures below. Figures may thus include slightly different reporting periods.

As illustrated in Figure 2, the large majority of incidents involve some form of unexpected stop in an inappropriate location where they do not reflect ‘minimal’ risk but rather create unusual hazards. There is a significant concentration of reported incidents on streets and in locations of special concern. Where the street location was reported, **over a quarter of the Cruise AV incidents occurred in intersections or in crosswalks**. Many others (more than 60%) occurred on the city’s High Injury Network -- the 12% of city street miles that account for 68% of severe and fatal injuries. More than 75% occurred on streets used to deliver Muni public transit service, and more than half occurred on a street that is designated as part of the bicycle network.

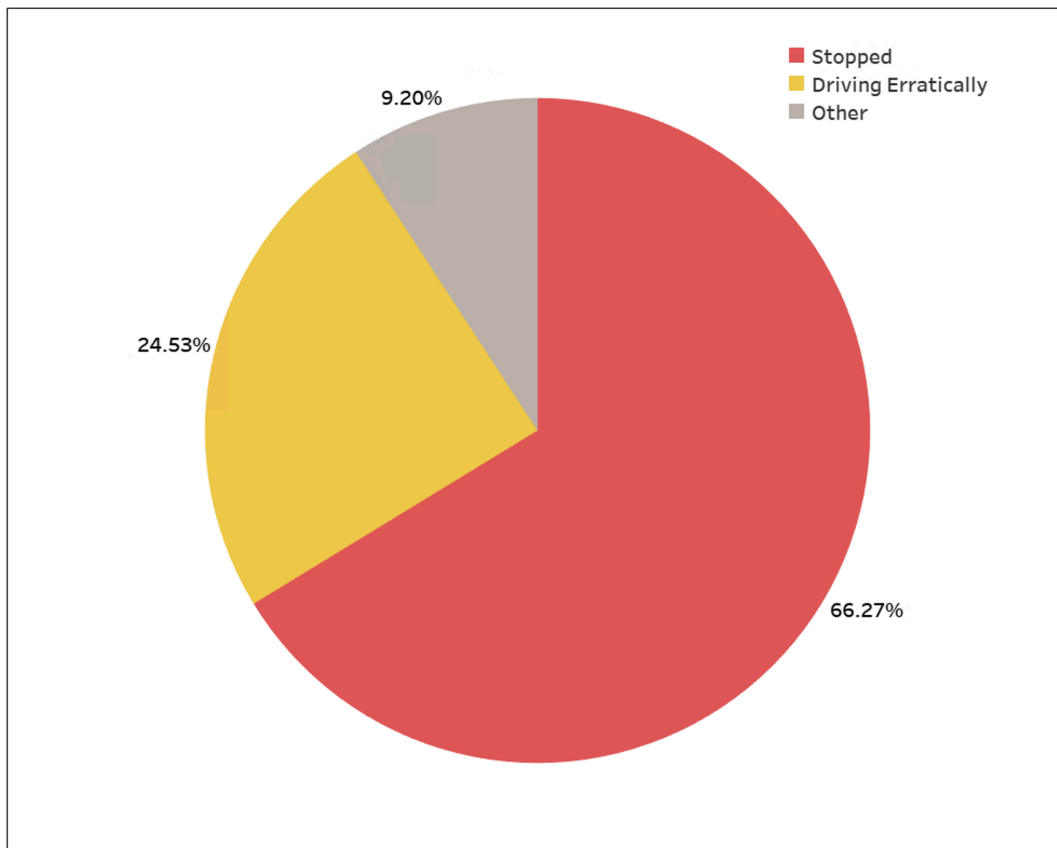


Figure 2: Reported Driverless Cruise AV Incidents by Type (April 2022 – August 2023)

As illustrated in Figure 3, while reported Street Interference Incidents are widely dispersed throughout the city, the majority occur on the city’s most congested streets in the northeast quadrant of the city.

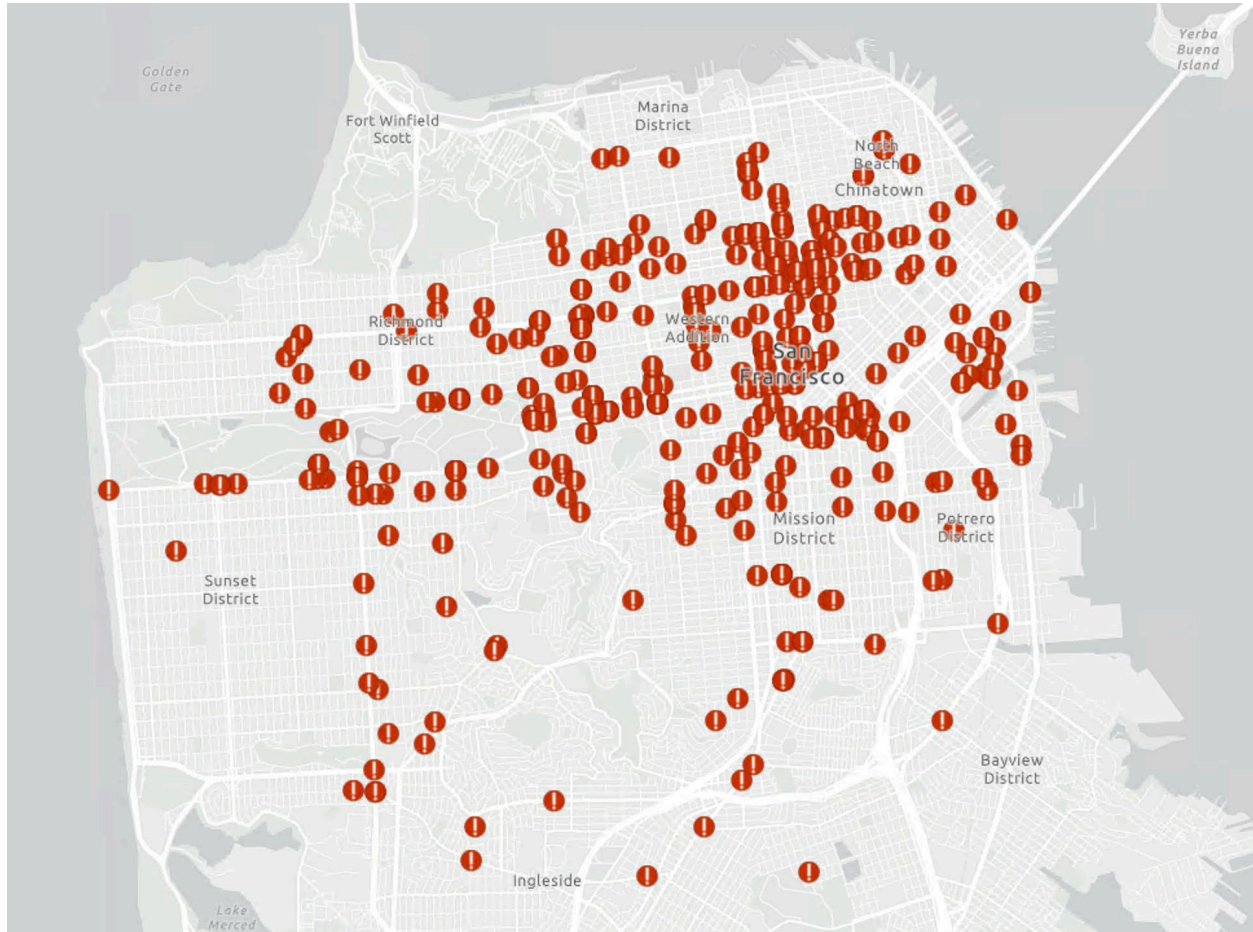


Figure 3: Known Locations of Reported Cruise AV Incidents (April 2022 – August 1, 2023)

2. Street Interference Incidents involving multiple Cruise AVs

San Francisco’s September 2022 comments discussed an incident on June 28, 2022 when 13 Cruise AVs stopped on Gough Street – a major one way southbound arterial – near the intersection of Fulton Street. These Cruise AVs blocked several lanes of traffic and had to be removed from the street manually – a process that took hours. NHTSA asked GM and Cruise about what remedies Cruise has implemented to prevent recurrence. In its response, GM and Cruise described a series of remedies and concluded that “with these technical and operational improvements, Cruise has not experienced any clustering events of a similar scale since June 2022.”⁴

On August 11, 2023, 10 Cruise AVs failed in place on three streets in the North Beach neighborhood – one of the City’s oldest neighborhoods with numerous narrow streets where

⁴ See GM and Cruise Answers page 7.

paralyzed AVs can bring all traffic – including transit and emergency response traffic – to a halt.⁵ As with the 2022 incident, Cruise attributed the fleet failure to connectivity problems between the Cruise AVs and their remote human advisors. In this case, Cruise identified “bandwidth constraints” caused by a large music festival taking place more than four miles away in Golden Gate Park.⁶ The center photo in Figure 4 illustrates a frequent occurrence: Cruise AVs that appear to have fallen back to a ‘minimal risk condition’ stop on a diagonal that blocks more than one lane of traffic.

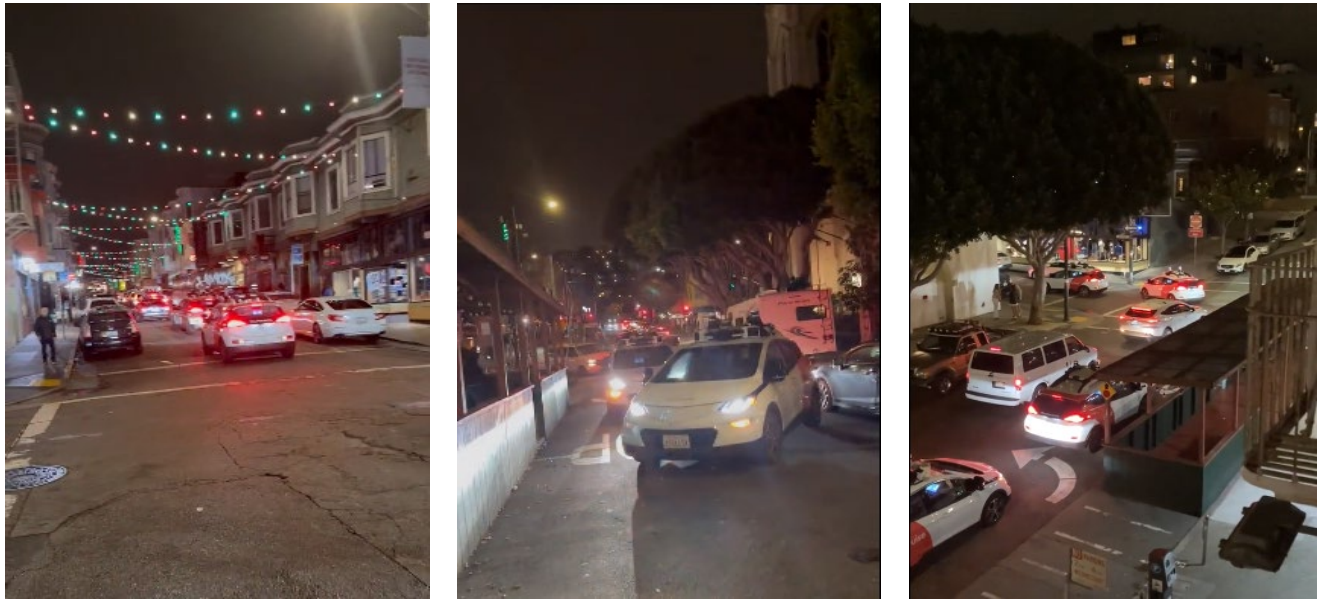


Figure 4: Images from the August 10, 2023, incident in North Beach, San Francisco

In response to NHTSA question 12 about Cruise real time vehicle operations tracking, GM and Cruise state: “The Origin has a crash rated connectivity module that houses SIM cards from all three major carriers. . . . this redundancy reduces the chance of cellular network connectivity, latency, bandwidth or reliability issues. . . . If a connectivity outage occurs. . . . there is a [REDACTED] resiliency threshold when the vehicle will continue to operate autonomously, *barring a need for a Customer Support or Remote Assistance call.*” (emphasis added)

⁵ See posting by member of the public at: <https://twitter.com/friscolive415/status/1690281516935589888?s=20>

⁶ See Cruise response posted at <https://twitter.com/Cruise/status/1690423649134854145?s=20>

Apparently some or all of the 10 vehicles paralyzed on North Beach streets last week did need a Customer Support or Remote Assistance call to continue operations. Or the Cruise connectivity features described to NHTSA were otherwise defeated by an annual music festival.⁷

As a vital cultural center for regional, national and international audiences, San Francisco hosts numerous sporting events, concerts, festivals, parades, and special events that draw tens of thousands of participants. Given the city's multiple large indoor and outdoor entertainment venues, multiple events drawing tens of thousands of cell phone users may occur at the same time. Driverless operations in San Francisco must be able to maintain the required connectivity to support continued normal operations through such events. If a music festival can cause significant Cruise AV outages, we must consider the effects of a civic emergency or disaster and the effect of hundreds or thousands of disabled Cruise AVs or Origins on City streets when they are most urgently needed for evacuation or other emergency response purposes. Without the capacity to reliably operate through periods of power outage, traffic signal outage and cellular data outage, Cruise AVs – and the Cruise Origin – create a problem, not a solution.

While this incident in North Beach is the most recent instance in which multiple Cruise AVs were involved in a Street Interference Incident, there have been other recent multi-AV events since GM and Cruise filed their response to NHTSA questions.

As illustrated in Table 1, city records identify 21 other occasions since our September 2022 comments when Street Interference Incidents involved more than one vehicle. On May 16, 2023, 3 Cruise AVs blocked ingress and egress to Fire Station 36. Because of the large size and bulky profile of the Origin, multiple vehicle incidents would likely have a greater impact on emergency responders, transit operations and other road users if these vehicles become immobilized in similar situations.

⁷ On Wednesday, August 16, 2023, Cruise released a new statement identifying an alternate cause for the outage in North Beach. https://www.sfexaminer.com/news/transit/cruise-sf-north-beach-traffic-jam-not-outside-lands-fault/article_1ad97e14-3c7f-11ee-9eeb-ef07004a5454.html Cruise stated that the outage was started by a pedestrian who intentionally touched a Cruise AV and thus triggered a minimal risk condition event akin to a crash. We note that the North Beach incident involved Cruise AVs stopped on two different streets (Grant Avenue and Vallejo Street) and it is not obvious from review of posted video that this "intentional touch" caused backups on both streets. We are eager to discuss this incident with Cruise; however, the revised explanation does not reduce our concerns about the impact that bandwidth or staffing constraints and slow communication may have during power outages affecting traffic signals and cellular service and/or the impact of disabled AVs on road capacity during major civic emergencies.

Cruise also stated that bandwidth limitations instead affected a different series of incidents when festival participants were leaving Golden Gate Park. See, https://www.sfexaminer.com/news/transit/cruise-sf-north-beach-traffic-jam-not-outside-lands-fault/article_1ad97e14-3c7f-11ee-9eeb-ef07004a5454.html

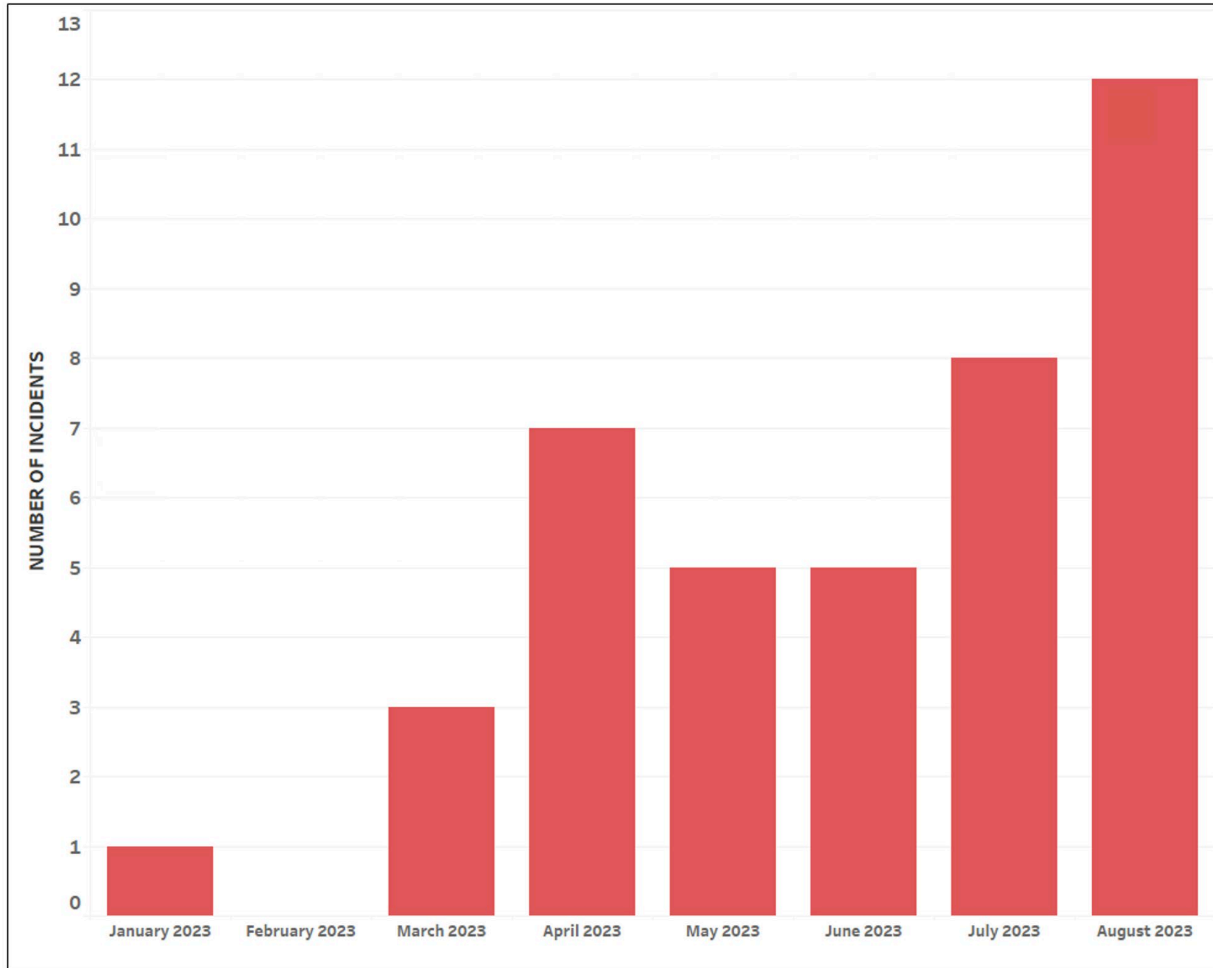
Table 1 Frequency of other incidents involving multiple Cruise AVs since Sep 2022

Number of vehicles	Number of incidents	Date Range
2	17	09/17/2022 – 06/06/2023
3	3	11/28/2022 – 05/16/2023
4	2	02/28/2023 & 03/21/2023
5	3	12/03/2022 – 06/25/2023
6	1	1/20/2023
8+	2	05/11/2023 & 05/12/2023

3. Street Interference Incidents that cause Emergency Responder Interference Events (ERIE)

As discussed above, the majority of reported Street Interference Incidents affecting emergency responders involve the San Francisco Fire Department. This is more an artifact of tracking challenges for SFPD officers than a true representation of how first responders have been affected by driverless Cruise incidents to date.

As of August 16, 2023 the San Francisco Fire Department (SFFD) has documented more than 43 written reports incidents that involve Cruise AV interference of SFFD first responders. As illustrated in Figure 5, these incidents have increased dramatically in August 2023. With only half of the month elapsed, the number of reported incidents exceeds those reported in July 2023, the previous month with the highest number reported incidents. See details described in Exhibit B, Declaration of Deputy Chief of Operations, San Francisco Fire Department, Darius Luttrupp.



*Figure 5: Emergency Responder Reports of Cruise AV Interference Events by Month, 2023
(August represents incidents between only August 1 and August 16, 2023)*

In these incidents, as illustrated in Figure 6, Cruise vehicles obstructed emergency scenes by stopping in lanes or key access points, obstructing fire trucks and vehicles en route to emergencies. In many cases, Cruise AVs did not respond to direction given by fire personnel to clear the way. In addition, multiple reported incidents involved hazardous contact or near misses with SFFD equipment and personnel and intrusion into active emergency scenes. Cruise vehicles also drove over fire hoses, an act that violates the California Vehicle Code because it poses great risk to firefighters. Cruise AVs tried to drive through active emergency scenes without recognizing caution tape, downed power lines or direction provided by human traffic control officers.

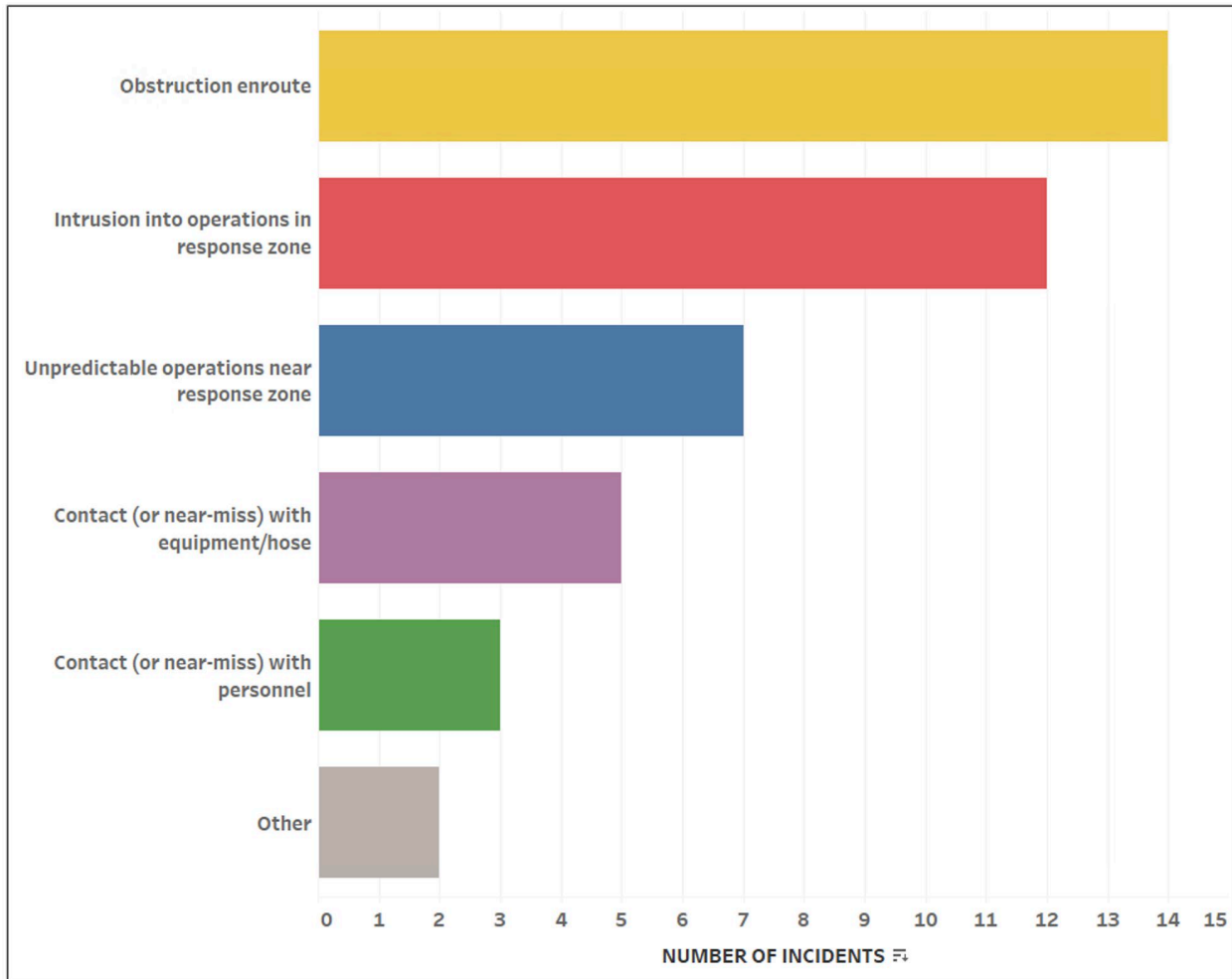


Figure 6: Emergency Responder (SFFD) Reports of Cruise AV Interference Events by Type, (April 1, 2022 – August 16, 2023)

In most incidents, delays in communication exacerbated challenges for SFFD personnel and their SFPD and SFMTA human traffic control supporters. Waymo driverless operations have also generated many emergency response interference events. As a result, SFFD has to manage the cumulative effect of multiple driverless operators – a number which may soon grow from two to three operators. A detailed description of the cumulative incidents involving both Cruise and Waymo is provided in the Declaration of Deputy Chief Darius Luttropp attached as Exhibit B.

Time is of the essence for emergency response operations. A fire can double in size within one minute and a minute can make the difference between life and death in response to many medical conditions. But SFFD personnel find that interacting with driverless Cruise AVs (and Waymo AVs) takes many steps that interfere with their ability to do their jobs. As illustrated in Figure 7 below, a Cruise AV that needs remote advisor assistance to navigate a scene may

require multiple interactions between the AV Remote Advisor and the vehicle's Automated Driving System before a corrective action can be taken. Emergency responders often cannot communicate directly with a Cruise AV from the exterior. When that direct communication has not been established between an emergency responder and a Cruise Remote Advisor, fire personnel must relay communications through the City's emergency radio system to the Remote Advisor. Where a Cruise customer is also seeking to influence the vehicle's movement, another layer of time-consuming interaction arises.

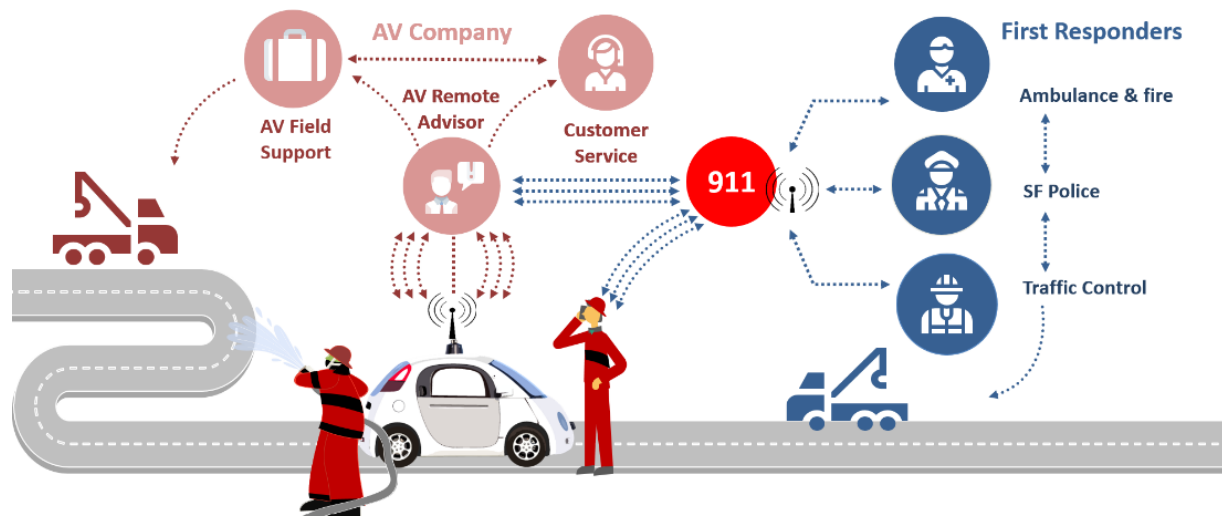


Figure 7: (SFMTA illustration) Human eye contact, simple gestures & on-site conversation are much faster than AV substitutes at current Cruise AV performance levels in San Francisco.

The delays caused by this complex set of communications slows emergency responders in their work. For example, on July 26th, 2023, when a Cruise AV intruded on an active fire suppression scene, it took 30 minutes before the Cruise AV was directed out of the scene remotely.⁸ In a July 28th, 2023, incident a Cruise vehicle approached a parked fire truck, partially obstructed a lane, and was not responsive to firefighter direction. SFFD personnel reported that it took 17 minutes to clear the vehicle.⁹

Where they are not avoided entirely, Cruise must improve the speed of communications in all segments illustrated in Figure 7. Because of its size, the Cruise Origin could exacerbate all of these problems by creating bigger actual obstacles in and around SFFD scenes and by reducing sight lines around vehicle. We urge NHTSA to ensure that the potential safety benefits of

⁸ July 26th, 2023, the incident took place near the intersection of 18th Ave & Balboa St. Source ID: SFFD-1047.

⁹ July 28th, 2023, the incident took place near the intersection of Webster St & Turk St. Source ID: SFFD-1050.

driverless AV operations are not achieved at the expense of the routine emergency response operations that are essential to San Francisco residents, visitors and travelers.



Figure 8: Multiple fire personnel at active fire suppression scene must attend to a Cruise AV stopped diagonally blocking two travel lanes on 24th Street and Valencia on August 10, 2023¹⁰

Written reports to the San Francisco Fire Department address occasions of actual interference with emergency operations. There are additional incidents where Cruise AV stopping locations might have interfered with fire suppression but did not for reasons related to the incidents themselves. For example, Figure 9 illustrates SFFD response to a multi-alarm fire that was reported on twitter. If the fire needed additional apparatus, the stopping location of the Cruise AV – which *appears* to have been triggered by SFFD engine lights and sirens, could have created a time-consuming obstacle to the arrival of additional resources. By good fortune, additional resources were not needed.

¹⁰ See https://twitter.com/Dylan_Why_/status/1690172027498639361



Figure 9. Cruise AV stopped at northern perimeter of active fire suppression scene on Lincoln Way at 8th Avenue on August 8, 2023.¹¹ Left image shows fire suppression to the south. Right image shows perimeter of incident to the north.

4. Role of Human Traffic Control in Emergency Responder Interference Events

Human traffic control officers from the San Francisco Police Department or the SFMTA play an essential role in connection with SFFD fire suppression activities because they establish and maintain a perimeter within which SFFD personnel can work without interference. Where vehicles do not understand the tools used to signal an emergency scene – including for example cones, parked vehicles with flashing lights, hand-carried stop signs, flares, eye contact and voice direction -- intrusions can compel SFFD personnel to pay attention to driverless vehicles rather than their fire suppression or medical response. While Cruise maintains that the Cruise AV

¹¹ <https://twitter.com/stanleycandles/status/1689119167738503168>

understands direction given by human traffic control officers, SFFD, SFPD, and SFMTA staff experience daily occasions where this is not the case.¹² The City has not developed a method for reporting and documenting these incidents, because such reporting would require constant interruption of public employee duties. If the City were able to capture these incidents in written reports, it would increase the number of reported Street Interference Incidents.

But some of these occasions are documented by media and social media. As reported in the SF Chronicle¹³, on August 3, 2023, a driverless Cruise AV had significant challenges operating through the intersection of Scott and Oak streets where a signal was out as a result of a nearby fire. SF Police and Parking Control Officers (PCOs) were deployed to direct vehicles safely through the intersection. The vehicle was reported to have been blocking traffic for roughly 30 minutes.

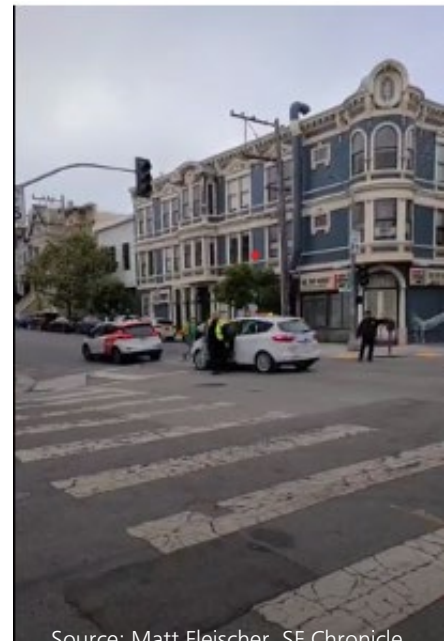


Figure 10: Challenges Facing Human Traffic Control in Directing Cruise AVs

SFPD officers and SFMTA Parking Control Officers also play a critical role in maintaining public safety for parades, community festivals, athletic events, funeral processions and other special events and for escorting public figures and visiting dignitaries. In some cases, these events also

¹² See for example use of PCO and SFPD resources on Wednesday, August 16, 2023 when Cruise AV drives straight into a closed opposing lane of traffic that is under construction instead of completing the legal left turn it started: https://twitter.com/miss_eleenius/status/1691873681067356568?s=46&t=RXzz7-N_ZhpDCS7klyLksQ

¹³ These still shots are taken from video available here: <https://www.sfchronicle.com/opinion/article/san-francisco-police-self-driving-cars-cruise-18277009.php>

require maintenance of a perimeter. In many cases, these events require maintaining a moving perimeter and require rolling street closures. San Francisco Police Officers riding bicycles and motorcycles, as well as Parking Control Officers, move from intersection to intersection to stop the flow of traffic and allow participants to safely proceed.

While these incidents are generally not reflected in San Francisco counts of Street Interference Incidents, affected City employees report that they frequently encounter Cruise AVs that are unable to recognize and respond appropriately to the direction they are given. Among the most troubling incidents are incidents in which Cruise AVs perceive the individuals and various signals, barriers and motions and nonetheless seek to go around them and proceed into prohibited areas. Public employees often stand directly in front of Cruise AVs. Where they are protecting a moving perimeter, this prevents the public employees from moving quickly to subsequent intersections. This can lead to further Cruise AV intrusions into prohibited areas.

5. Street Interference Incidents affecting transit operations

Incidents reported to the city between September 2022 and June 2023 show that driverless Cruise AVs have caused transit delays, with buses and trains being blocked by unexpected Cruise AV stops. These incidents cause delays for transit riders using the City's most space and energy efficient mode of travel and have cascading impacts upon transit operations.

For example, a Cruise driverless AV was involved in a near miss collision with a Muni light rail vehicle at a four-way stop at Carl and Cole streets on September 30, 2022, at 11:05pm. From the video recorded by the light rail vehicle, it is apparent that the Cruise AV enters the intersection after the train has rung its bell and started to proceed through the intersection. At the time there were approximately 140 passengers on board. Not only did the 140 passengers on board need to get off the vehicle on their way home late at night, but any passengers waiting down the line were also affected. Blocking transit vehicles, in this case for 7 minutes, causes impacts to both the passengers on board at the time, but also the performance of the larger transit and street network. A study of Muni's Market Street Subway found that a 15-minute delay causes 2.5 hours of residual system delay. No state or federal regulator currently requires incidents of this type to be reported.

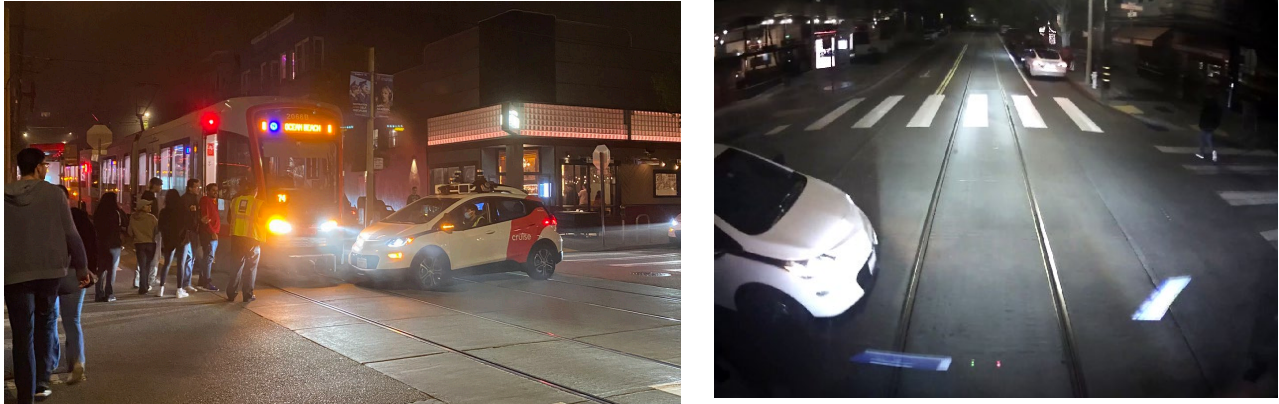


Figure 11: Cruise AV Near Miss Incident with Muni Light Rail Vehicle, September 30, 2022¹⁴

Another near-miss collision with a transit vehicle that Cruise is not required to report to any regulator occurred, on July 24, 2023 during the evening rush hour. A Cruise AV narrowly missed colliding with a Muni bus at Masonic Ave & Turk Blvd. The Cruise AV was following behind the bus in the right lane and when the bus was serving a bus zone, the Cruise AV moved into the left lane, driving on the edge of the lane line. When both vehicles proceeded forward at the next green light, the Cruise AV then merged back into the right lane very close to the bus and forcing a hard brake of the bus by the operator.

Cruise *was required* to report a March 23, 2023 incident when a driverless Cruise AV rear ended a Muni bus at 1439 Haight Street, and Cruise issued a voluntary recall report on 300 Cruise AVs.



Figure 12: Cruise AV Rear-Ending a Muni Bus, March 23, 2023

¹⁴ Cruise reported that it addressed the problems that triggered this incident. In early 2023, there were additional Street Interference Incidents that occurred on Muni light rail tracks.

In 2023, the number of incidents reported by Muni operators involving Cruise vehicles have remained steady at an average of two per month; in most cases a Cruise AV blocks a bus or rail vehicle or drives erratically near a transit vehicle. While this may appear to be a modest amount, recall that until recently Cruise’s commercial operations have been limited to late night hours when scheduled transit service is at its lightest. With recent approval to provide commercial service 24-hours a day, we expect the number of incidents affecting transit to increase. Also, just over 70 percent of Cruise AV incidents reported from all sources took place on a street with scheduled transit service, with a marked increase in incidents since March 2023. When Cruise expands daytime commercial service, we expect more interference with SFMTA transit operations. There are several other public transit operators that provide service into San Francisco from Marin, Alameda and San Mateo Counties. There may have been additional incidents affecting operations by these agencies.

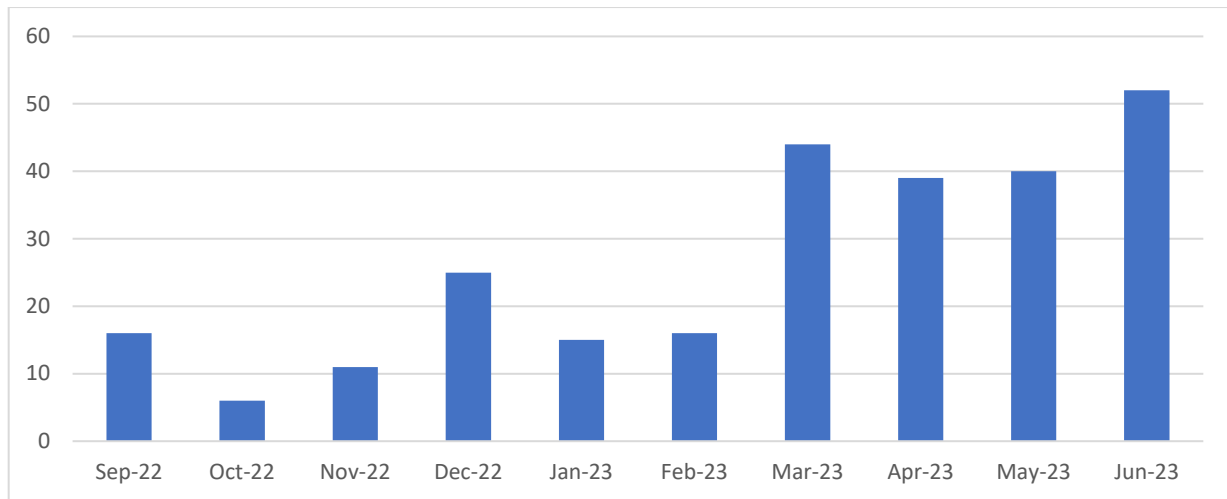


Figure 13: Cruise AV Street Interference Incidents on Streets with Scheduled Transit Service

6. Street Interference Incidents affecting construction and other street workers

The San Francisco Public Works Department is responsible for maintaining streets in good condition for all users. This work routinely requires crews to work in the streets, relying upon human traffic control, traffic control devices and signs to protect these workers. The SFMTA has launched a WZDX feed to communicate with navigation and passenger service providers about some temporary street closures; however, this feed, and a regional feed under development by the Bay Area Metropolitan Transportation Commission, are in their early stages and do not yet provide information about significant number of San Francisco street construction zones. The

Department of Public Works reported two recent events illustrating encroachments on street construction Work sites. On May 17, 2023, near 22nd Avenue and Ocean Avenue and on June 5, 2023, near Bacon Street and Cambridge Street, a driverless Cruise AV entered a work zone and did not stop until a flagger stepped in front of the vehicle to block its path. In the May incident, after leaving the scene, the vehicle circled the block and came back to the work site two additional times. These encroachments put the flaggers and construction crews at risk of injury.



Figure 14: Report of Street Interference Incident Triggered by Nearby Construction

In addition to encroachments on street construction workers, Cruise AVs continue to have challenges recognizing and responding appropriately to locations where ongoing construction is marked by signs, cones and tape. For example, on August 8, 2023, NBC Nightly News ran a story titled “Safety Concerns Over Driverless Taxis”. While the reporter was taking a ride with another passenger, the driverless Cruise AV came to a stop for 20 minutes on southbound 19th Avenue at Ulloa Street. The Cruise AV came to rest in a location on a diagonal that blocked two lanes of traffic. Cruise described the vehicle’s behavior in a statement: “The car encountered an unexpected construction zone that would have required several lane changes. The better course was for the autonomous vehicle to come to a safe stop rather than proceed.” 19th Avenue serves as California Highway 1, a primary north/south route through San Francisco, carrying over 100,000 vehicles per day. Work on the “unexpected construction zone” started in late 2020 and is documented in dozens of photos of the vicinity posted online by many individuals.

Cruise AV challenges with recognizing and responding appropriately to cones and signs marking street construction sites were illustrated again this week. The Cruise AV illustrated in Figure 15 became stuck in wet concrete in a work zone marked by orange cones and monitored by flaggers at both ends of the block.¹⁵

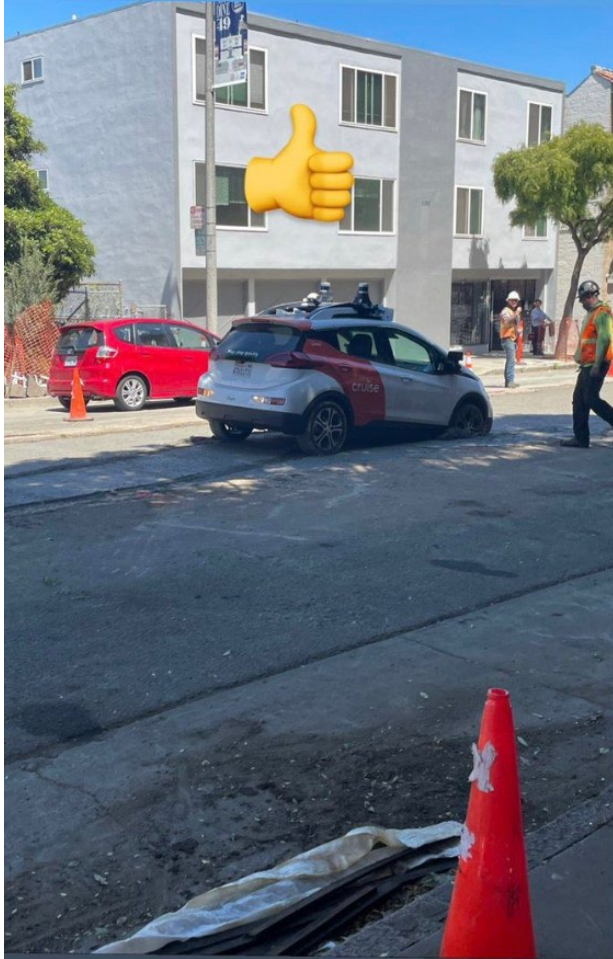


Figure 15: Cruise AV stuck in wet concrete in construction zone on Golden Gate Ave at Fillmore on 8/15/2023.

While we continue to observe good driving behavior on San Francisco streets, such as compliance with posted speed limits, since the filing of our letter on September 21, 2022, the

¹⁵ See <https://www.sfgate.com/tech/article/cruise-stuck-wet-concrete-sf-18297946.php>

number and types of incidents reported to the city have increased substantially. In addition to incidents resulting in blocked roadways, there continue to be incidents involving multiple Cruise vehicles, incidents that interfere with emergency responders, incidents where Cruise vehicles fail to appropriately respond to human traffic controllers, incidents that impact transit operations and the people using these transit services, and incidents affecting people working in our streets. Informed by these reports, we share revisions to our previously filed recommendations.

NEW RECOMMENDATION 1.1. San Francisco recommends that NHTSA investigate further both the Cruise AV incidents that reflect interference with routine emergency response operations as well as the reliability and resiliency impacts of driverless operations and failures during power outages, traffic signal outages, cellular network outages and overloads and disaster situations.

RECOMMENDATION 1.1.1 If NHTSA is inclined to approve the GM Petition, San Francisco recommends that NHTSA require General Motors to submit data quarterly ~~data~~ on Cruise AV and Origin¹⁶ Street Interference Incidents (S.I.I.), including but not limited to vehicle retrieval events (VRE), emergency response interference events (ERIE), and lane obstruction events (LOE) requests for remote advisor assistance as they operate on public roads and that affect any part of a travel lane on a public road, including bike lanes and lanes designated for transit or other vehicles for more than 30 seconds. S.I.I.s should be reported on a per incident basis and should include in relation to the vehicle model, date, time, and location, in relation to the monthly vehicle miles traveled both on an individual vehicle and monthly aggregate fleet basis by market area.¹⁷

RECOMMENDATION 1.1.2: If NHTSA is inclined to approve the GM Petition, San Francisco recommends that in addition to informing NHTSA, in the event of any cybersecurity incident that warrants issue of a “stop order” because it presents an unreasonable or unforeseen risk to the safety of vehicles on the road, NHTSA should

¹⁶ While the GM Petition addresses the Origin, it notes that the Origin will be operated by the same automated driving system that operates the Cruise AV. It is possible that the majority of Cruise automated driving will continue to be logged by Cruise AVs. Collection of data from both models could support more rapid development of automated driving standards, as well as help evaluate the safety record of the Origin in relation to the Cruise AV.

¹⁷ This recommendation is informed by years of San Francisco’s use of “mean distance between failures” as a metric for evaluating the reliability, mechanical performance and state of good repair for our trolley bus, motor coach, historic streetcar and light rail vehicles. Performance on this metric varies in relation to many factors— including the stage in the lifecycle of a fleet. For a fleet nearing the end of its useful life or an antique fleet, appropriate targets may be in the thousands of miles while targets for fleets at the peak of their performance may be measured in the tens of thousands of miles. See <https://www.sfmta.com/reports/muni-mean-distance-between-failure>

require General Motors to immediately report to all relevant Public Safety Answering Points the existence of the risk and what actions will be taken to cease operations in a safe manner.

RECOMMENDATION 1.1.3: If NHTSA is inclined to approve the Petition, NHTSA should use data reported by GM ~~and Ford~~ to develop key performance indicators for human advisor response to AV requests for assistance, ~~in lane failures on public roads~~ Critical Response Line pickup time¹⁸, Street Interference Incidents, including but not limited to lane obstruction events, emergency response interference incidents, and vehicle retrieval events on public roads, as well as road clearance time and other measures of safety performance and road impact.

RECOMMENDATION 1.1.4: If NHTSA is inclined to approve the requested exemptions, NHTSA should initially approve the GM petition in a way that limits the geographic deployment in the San Francisco market by number of vehicles and time of day and expands authorization only after GM demonstrate reasonable performance based on key performance indicators.

1.2 Observations of Cruise AV Driving: Passenger Pick-Up and Drop-Off Stops

Cruise has shared no information with San Francisco that addresses or in any way mitigates the concerns about the hazards and transportation network disruptions caused by stops to pick up and drop off passengers in travel lanes. San Francisco reaffirms our comments filed on this subject in September 2022 and our recommendation 1.2.

Further, we dispute the General Motors/Cruise assertion that, “Most recently, SFMTA has stated that dedicated curb space would not be offered to AV operators as part of the City’s General Loading Zone program unless the City is provided with various data on fleet operations and incidents – these would be new data reporting requirements that are not listed or required as part of the program’s application process for other applicants.”¹⁹ San Francisco has consulted with all SFMTA staff who have responsibility for either AV policy or curb management. We have identified no personnel who recall any such discussion and we have found no email that corroborates this statement. The criteria and data submission requirements for applicants for a General Loading Zone are applicable to all applicants.

¹⁸ With respect to Critical Response Line pickup time, NHTSA could for example seek data on the percentage of occasions when emergency responder calls to the Critical Response Line are picked up by a human within 10 seconds, 30 seconds, 1 minute and 3 minutes, and/or are picked up after a longer wait or are picked up by something other than a human. These standards are informed by the call processing standards of the National Fire Protection Association.

¹⁹ GM and Cruise Answers, page 8.

We offer correction to one error in our originally filed comments. The following text contains erroneous dates. Cruise videos discussed were released in the fall of 2020, not the fall of 2021 as stated, and the meetings between SFMTA and Cruise described took place in early 2021, not in early 2022 as stated.

“For these reasons, San Francisco has been discussing the importance and priority of safe and legal curb-side stops for passenger pick-up and drop-off with both Cruise and other AV developers since at least 2018. In November 2021, Cruise released two videos to the public documenting early driverless operations with no safety operator behind the wheel.²⁰ These videos show Cruise AVs stopping to pick up and drop off passengers in travel lanes—even where curb space dedicated to or available for passenger loading and unloading was adjacent to the passenger or to the vehicle. In early 2022, San Francisco held two meetings with Cruise in which we discussed specific concerns with the driving Cruise documented in its own videos. In May 2022, San Francisco evaluated video showing approximately 100 pick up and drop off stops—including video posted by Cruise and video posted by individual passengers on social media and did not find a single stop in which the Cruise AV pulled fully out of a travel lane to pick up or drop off passengers.

Consistent with Recommendation 2.4, San Francisco clarifies that the scope of our previously proposed research to analyze the impacts of Cruise AV and Origin pickup and drop off driving practices should include investigation of new hazards that specifically affect customers and potential customers who have disabilities, including people who use wheelchairs and people who are blind or have low vision, and on vulnerable road users who are not Cruise potential or actual customers, including those who have disabilities.

RECOMMENDATION 1.2: If NHTSA is inclined to approve the GM Petition, San Francisco urges NHTSA to work with the City to develop a research protocol to analyze pick up and drop off driving impacts, including new hazards to users and other road users, with and to condition approval on General Motors cooperation with research, subject to restrictions that may be necessary and appropriate to protect passenger privacy. The research protocol should include consideration of the impact of pick up and drop off practices on vulnerable road users and people with disabilities, including people who use wheelchairs and people who are blind or have low vision, and in each case on those who are GM/Cruise customers and those who are not.

²⁰ These videos can be found at the following two locations: <https://www.youtube.com/watch?v=dmvZBiWYkFQ>
<https://www.youtube.com/watch?v=svebS-uR7wc>

Section 2: Does GM make strong and persuasive arguments that granting the GM Petition furthers the purposes of the Motor Vehicle Safety Act and the other public interests advanced?

San Francisco reaffirms our comments filed on this subject on September 2022 and has no updates or modifications to those comments.

2.1 San Francisco agrees with the GM that approval will enable GM to share substantive ADS information with NHTSA.

San Francisco reaffirms our comments filed on this subject on September 2022. In addition, we note that as owner, designer, manager and steward of the San Francisco streets, the City of San Francisco has a strong public interest in knowing the precise location of crashes, near misses and other Street Interference Incidents that Cruise AVs and Origin vehicles are involved in on San Francisco streets. San Francisco traffic engineers engage in continuous analysis of factors that lead to injuries and fatalities on our streets. Cruise and the industry are quick to point out that AVs will not drive drunk or distracted, but they rarely acknowledge that automated driving will demonstrate and has demonstrated other significant driving weaknesses. Without information about the location of events that demonstrate these weaknesses, road owners and operators cannot evaluate what role our own infrastructure may play, and whether there are improvements that could make particular locations easier for both human and automated drivers to navigate safely. Other cities would have a similar interest in understanding how driverless vehicles are interacting with infrastructure designs, signs and markings. Accordingly, we make the following clarifications to our previously offered recommendation.

In addition, NHTSA asked Cruise about Minimal Risk Condition events and asked for documentation for all MRCs between January 1, 2022 and 12/31/2022. The GM/Cruise responses indicates that Cruise “does not retain data regarding non-VRE MRCs for extended periods” and thus provides limited data to NHTSA for a period of approximately six weeks.²¹ In light of the recent record of interference with San Francisco Fire Department operations, San Francisco amends Recommendation 2.1 as follows:

RECOMMENDATION 2.1: If NHTSA is inclined to approve the GM Petitions, San Francisco recommends that as a condition of approval, NHTSA expand city access to the precise location of safety critical incident information (such as crash, near miss and Street Interference Incidents) submitted by GM to enable road managers to evaluate factors that may affect the safety of automated driving systems operating on their streets. Further, San Francisco recommends that NHTSA require Cruise to retain sensor data

²¹ GM and Cruise Answers, page 12.

related to all Street Interference Incidents that reflect Emergency Response Interference events or Vehicle Retrieval Events.

2.2 GM asserts that approval of the Petition will promote the safety of the transportation system.

San Francisco reaffirms our comments filed on this subject in September 2022.

We add the following new concerns arising from recent operations of the Cruise AV. In addition to the new and continuing safety hazards described in Section 1.1 above and addressed in the new San Francisco Recommendation 1.1 and expanded Recommendation 2.1, we note that GM/Cruise comments filed on September 21, 2022 and responses to NHTSA questions that were filed on March 21, 2023, continue to frame claims as “the [Cruise AV] [Cruise Origin] *is designed to . . .*”²² The experience on San Francisco streets since the launch of Cruise driverless operations demonstrates much driving that is apparently compliant with posted speed limits and that reflects many other impressive characteristics. And yet, the GM/Cruise petition, September 2022 comments and March 21, 2023 supplemental comments continue to be long on design and short on data reflecting actual performance.

As NHTSA knows, the Cruise AV has been involved in numerous crashes and near misses that have triggered NHTSA investigations and/or voluntary recalls. The August 11, 2023 multi-AV outage in San Francisco’s North Beach neighborhood raises serious questions about the ability of Cruise AVs to continue operations during the many high attendance special events that occur frequently in San Francisco, and raise even more serious concerns about the impact of Cruise AV operations during an earthquake or other natural disaster that interferes widely with traffic signals or requires extensive re-routing in response to damaged infrastructure or widespread fire suppression and rescue operations.

We acknowledge that NHTSA has some performance data that has been redacted and is unavailable to San Francisco. For example, GM/Cruise has provided and redacted data about:

- the ‘decision trees’ that govern the cause of a Minimal Risk Condition and the stopping maneuver used to achieve the MRC;²³
- communications to passengers that may be displayed during an Origin pullover event;²⁴

²² For example, Cruise AVs, including the Origin, “are designed to comply with motor vehicle and traffic laws, including in response to emergency response vehicles.” GM and Cruise Answers, page 16.

²³ Id at page 9

²⁴ Id at page 13

- the time for response crews to reach a vehicle and to clear a vehicle from the road;²⁵
- the circumstances in which Cruise will contact local authorities or first responders, beyond those where contact is required by state or local law;²⁶
- the rate of VRE per 1000 miles of driving;²⁷

This information is of course of great interest to San Francisco, because it speaks directly to the impacts Cruise AVs have on San Francisco streets and impacts the Origin may have in the future. Because of the redactions, we are not able to compare the answers provided to NHTSA with more recent remarks from Cruise before the California Public Utilities Commission on Monday, August 7, 2023. Cruise reported 177 unexpected Vehicle Retrieval Events between 1/1/23 and 7/18/23. They also reported an average vehicle retrieval time of 14 minutes.²⁸

Cruise has previously given the City oral information that they have an internal metric of 10 minutes to achieve a VRE. As we have indicated to Cruise on many occasions, the Cruise metric may qualify as success from the perspective of the company, but from the perspective of the San Francisco Fire Department, even if Cruise achieved this performance consistently, it would stand as an unqualified failure where a Cruise AV or Origin is interfering with the ability of firefighters and paramedics to save the lives of people trapped by a fire or experiencing a heart attack. Similarly, where transit passengers are required to get off a bus or train because a Cruise AV has blocked its path or crashed into the vehicle, Cruise success, even a ten-minute VRE metric does not count as success to the passengers. GM/Cruise has demonstrated little interest in considering San Francisco's priorities as to the safety impacts and broader travel impacts of its driverless operations on San Francisco residents, workers and travelers. Many of these incidents are of a type that never occur for human driver vehicles because human drivers avoid the circumstances or immediately respond to direction from emergency responders to move away from a location in which they interfere with emergency response operations.

Finally, none of the material in any of the unredacted portions of the GM/Cruise answers reflect a recognition that a **“minimal risk condition” event that, for example, may prevent a minor crash between a Cruise AV and another motor vehicle, may have significantly greater negative safety effects on neighboring residents, emergency responders, or the public at large.** Indeed, both the cause or existence of an MRC event – with or without an associated VRE -- may have limited or

²⁵ GM and Cruise Answers at page 14

²⁶ Id at page 15

²⁷ Id at page 20

²⁸ Cruise has not explained the methodology it uses to determine this average response time. It is not clear whether they define an incident to have started when a Cruise AV first seeks help from a Remote Assistant or first stops on the street or whether an incident starts only after Cruise has concluded that manual retrieval is required. Thus, the actual average time of street interference that affects other road users could be significantly longer.

no bearing on the safety or other impacts of a Street Interference Incident on other road users and residents. Whether we consider the weekly or nearly daily Emergency Response Interference Events currently occurring in San Francisco, or the potential impacts that could arise from major cellular coverage outages, power outages, earthquake or fires, **San Francisco is concerned that the exclusive focus on avoiding traffic collisions may seriously miss the mark in considering the impacts of the Cruise Origin – *given current performance levels* – from a safe systems perspective.**

2.3. GM asserts that approval will take an important step towards unlocking potentially significant environmental benefits and will help advance environmental justice.

San Francisco has no updates or modifications to the discussion of environmental benefits and negative effects included in our September 2022 comments.

2.4 GM asserts that approval will help advance “greater transportation accessibility for all users.”

San Francisco reaffirms our comments filed on this subject on September 2022. In addition, we note that in response to NHTSA’s question 11, “Does GM/Cruise have a plan for deployment of specific Origin vehicles, if exempt, to geographic areas or customers in need of accessible transportation?” GM/Cruise describes opportunities it sees for the Origin and certain activities it has undertaken, but offers no plan, schedule or commitment to making a wheelchair accessible version of the Origin available to provide equivalent service to people who use wheelchairs.²⁹

RECOMMENDATION 2.4: If NHTSA is inclined to approve the petitions, San Francisco agrees with disability advocates who recommend that fully accessible model versions should be available when ADS-operated passenger service vehicles without human driving controls are launched in order to prevent discrimination and ensure safety for people with disabilities. Further, San Francisco urges NHTSA to work with the U.S. Access Board to define and establish minimum accessibility standards so that the Origin – and other vehicles that are purpose built to provide commercial passenger service --are equipped to provide equivalent service to people with disabilities, including people who use wheelchairs, by the time they are first used to provide commercial passenger service.

Section 3: Comments on Specific FMVSS Exemptions

San Francisco has no updates on the opening comments in this section submitted in September 2022.

²⁹ GM and Cruise Answers at page 16

FMVSS 101, Controls and Displays

San Francisco notes that General Motors did not seek exemption from FMVSS 101 and applauds the apparent decision to make vehicle hazard status telltales available to Origin passengers.

RECOMMENDATION 3.1: San Francisco urges NHTSA to require GM, ~~Ford and other manufacturers~~ to display system malfunction telltales so they are visible to passengers in vehicles operating in an ADS-driven mode. NHTSA should not allow ADS-operated vehicles to deprive passengers of safety-critical vehicle status information that may inform their decision to travel in such a vehicle.

FMVSS 102, Gear Selection Display

San Francisco has no updates or modifications to the discussion in this section submitted in September 2022 and retains our original recommendation:

RECOMMENDATION 3.2: San Francisco urges NHTSA, as a condition of approval, to require GM to ensure that the transmission and operational status of the vehicle (powered on or off) can be easily observed from the exterior of the vehicle to support the safety of passengers, first responders and other road users.

FMVSS 108, Hazard Lights (9.6.2)

San Francisco has no updates or modifications to the discussion in this section submitted in September 2022 and retains our original recommendation:

RECOMMENDATION 3.3: San Francisco urges NHTSA, as a condition for any approval, to consider requiring that the GM/Cruise Origin ~~and the Ford ADS-equipped vehicle~~ ensure passengers and first responders have the capacity to activate hazard lights manually when the vehicle is powered or depowered.

RECOMMENDATION 3.4: San Francisco urges NHTSA, as a condition for any approval, to consider requiring that first responders have the capacity to depower the GM/Cruise Origin ~~and the Ford ADS-equipped vehicle~~ manually.

FMVSS 111, Rearview Mirror

San Francisco has no updates on the comments in this section submitted in September 2022 and retains our original recommendation with minor changes.

RECOMMENDATION 3.5: San Francisco urges NHTSA, as a condition for any approval to consider requiring that the GM/Cruise Origin be equipped with a Safe Exit System and Ford ensure that that provides passengers, including passengers who are blind or have low vision, with specific information about oncoming traffic from the time the trip is stopped until all passengers requesting the stop have exited the vehicle

Section 4: Responses to NHTSA Notice Section VI. “Statement on Terms”

This section offers in-line responses to conditions, reporting requirements and questions reflected in Section VI of the Notice. San Francisco’s original responses are *in blue italics*. *Updated discussion and recommendations are in red italics*. Where a condition or reporting item is not reproduced below, San Francisco supports the condition or reporting requirement as reflected in the notice or reflected in San Francisco’s comments filed on September 21, 2022.

Please comment on whether NHTSA should apply the following terms and conditions to a potential grant of GM’s exemption request:

1. Reporting within 24 hours of an exempt vehicle being involved in any crash, to include:
 - b. If the ADS was in control of the vehicle during the event, a detailed timeline of the 30 seconds leading up to the crash, including a detailed read-out and interpretation of all sensors in operation during that time period, the ADS's object detection and classification output, and the vehicle actions taken (*i.e.*, commands for braking, throttle, steering, etc.).

San Francisco has no updates on the comments in this section submitted on September 21, 2022.

- c. If a human operator took over control of the vehicle prior to the event, a detailed timeline of the 30 seconds leading up to the human operator taking over control, including a detailed read-out and interpretation of all ADS sensors in operation during that time period, the ADS's object detection and classification output, and the vehicle actions taken (*i.e.*, commands for braking, throttle, steering, etc.).

San Francisco has no updates on the comments in this section submitted on September 21, 2022.

- 2c. Detailed descriptions of any incidents in which any exempted vehicle violated any local or State traffic law, whether operating using the ADS or under human control.

NHTSA should clarify that it seeks reporting of all incidents of violation of local or State traffic laws, regardless of whether a vehicle is cited by civil or criminal enforcement officers. Further, data should be reported in a structured tabular form that includes date, time, GIS coordinates, and local or State laws violated.

GM and Cruise recommended revising this provision to require reporting of any incident in which the Origin was cited for a moving violation.³⁰ As discussed above, San Francisco has received video documenting numerous moving violations by Cruise AVs that cause great risks to other road users, including city personnel

³⁰ GM and Cruise Comments at page 4

in public streets. Traffic enforcement resources are allocated based on a variety of factors but will never be sufficient to observe even a fraction of Origin driving that violates state or local laws. There are likely many states like California in which a state law regulatory gap precludes issuance of moving violations to deter unlawful driving and induce lawful automated driving. These moving violations include failure to yield the right of way to other road users, including emergency responders, and failure to observe signs and signals, including those that prohibit various driving maneuvers. NHTSA should not allow GM/Cruise to avoid accountability for moving violations given their stated purpose of demonstrating superior driving.

- d. Detailed descriptions of any incidents in which the exempt vehicles experienced a sustained acceleration of at least 0.7g on any axis for at least 150 ms, or of any incidents in which the vehicle had an unexpected interaction with humans or other objects (other than crashes that require immediate reporting).

NHTSA should clarify that for all incidents meeting the requested criteria, require reporting of date and time, GPS coordinates, a detailed timeline, a read out and interpretation of sensor data, the ADS's object detection and classification output, and the vehicle actions taken (i.e., commands for braking, throttle, steering, etc.), as well as speed at start of acceleration and at end of acceleration.

GM and Cruise propose limiting the reporting of "unexpected interactions with humans or other objects" to incidents that result in injury or property damage.³¹ San Francisco has received documentation of numerous incidents of Cruise AVs failing to yield to other road users as required by law. We recommend that NHTSA define unexpected interactions to include at least incidents involving near misses with any other road users and failure to yield to other road users.

- e. Detailed descriptions of all instances in which a public safety official, including law enforcement, attempted to interact with an exempted vehicle, such as to pull it over, or contacted GM regarding an attempted interaction with an exempted vehicle.

NHTSA should require incident-level reports that contain, at a minimum, the VIN, date, time, GPS coordinates, duration of incident, the office or agency the public safety official represents, and the nature of the interaction, and type of citation issued, if any.

GM and Cruise state that they support providing this information to NHTSA with the understanding that this reporting requirement would be limited to instances in which a moving violation is issued or when law enforcement contact GM or Cruise to discuss an interaction. GM and Cruise also state that they would not likely otherwise be aware of "attempted" interactions that did not result in a citation or law enforcement outreach.³²

³¹ GM and Cruise Comments at page 4

³² Id at page 5

Cruise has stated to San Francisco that the Cruise AV is aware of and initiates a Remote Advisor Session whenever the vehicle perceives lights and sirens. This is just as should be expected, because yielding to emergency vehicles displaying lights and sirens is required by California law.³³ California law also requires a driver to respond to direction provided by a human traffic control official.³⁴

NHTSA should define “instances in which a public safety official. . . attempted to interact with an exempted vehicle” to include: 1) any occasion on which an emergency response vehicle, including motorcycle officers and civil traffic enforcement officials, use lights and sirens to either pull over a vehicle or to require a vehicle to yield to the emergency responder vehicle; and 2) any occasion on which a civil or sworn traffic control officer or firefighter gives direction to an AV driver.

NHTSA should not limit these reportable occasions to those where a moving violation is issued or when law enforcement reaches out to GM or Cruise as this could obscure precisely the driving behavior that is unlawful – failing to yield to, pull over or follow the direction of a civil or sworn emergency responder or traffic control officer. Incident reports should include the Vehicle Identification Number (VIN), license plate, date, time, GPS coordinates, the agency the official represents and the nature of the interaction. If a citation or moving violation is issued, the unique identifier of the citation or moving violation should also be required.

- f. Detailed descriptions of any “minimal risk condition fallback” events that occurred, even if no crash has occurred. If the event has occurred because the vehicle self-diagnosed a malfunction of a vehicle system, the report must include a detailed description of the cause and nature of the malfunction, and what remedial steps were taken. If the event was caused by the vehicle encountering a complex or unexpected driving situation, the report must include a detailed timeline of the ADS's decision-making process that led to the event, including any difficulties the ADS had in detecting and classifying objects.

As addressed in San Francisco Recommendation 1.1.1, to support analysis of the impact of the Origin on the overall transportation network, these reports should identify the GPS coordinates of the event, the number of travel lanes blocked by the event, the duration of the event, and how the involved ADS-equipped vehicle(s) were cleared from the scene.

GM and Cruise have urged NHTSA to narrow MRC reporting to those incidents requiring a Vehicle Retrieval Event.³⁵ Because the range of events that can have a significant negative effect on street safety and network

³³ California Vehicle Code 21806

³⁴ California Vehicle Code 21367

³⁵ GM and Cruise Comments, page 5

operations is broader than even Minimal Risk Condition events, San Francisco recommends that NHTSA require data reporting as per San Francisco's revised Recommendation 1.1.1

14. How should NHTSA consider accessibility in applying appropriate conditions to an exemption if it were granted? As noted above, many proponents of ADS technology often claim that ADS-equipped vehicles could help advance greater transportation accessibility for persons with disabilities. Should NHTSA impose conditions on grants of part 555 exemptions to learn more about specific actions that manufacturers and operators of ADS-equipped exempted vehicles are planning, or have taken, to further the attainment of accessibility and equity goals? Should NHTSA seek information from manufacturers granted an exemption as to how they ensure that their ride-hailing services comply with any applicable Americans with Disabilities Act (ADA) requirements, how many vehicles would be wheelchair accessible, how they reach people with disabilities to offer access to ride sharing services, or whether the exempt vehicles provide other accommodations for individuals with disabilities, such as communication and/or human-machine interface (HMI) features designed for individuals with sensory disabilities (such as sight or hearing) or cognitive disabilities? Should NHTSA require grantees to report on efforts, such as research or community outreach, that the manufacturer is planning, or has taken, to increase the likelihood that accessibility goals will be met? Comments are requested on whether there is other information related to accessibility that NHTSA should require from an entity when granting its petition.

Yes, NHTSA should impose conditions on grants of Part 555 exemptions to further the attainment of accessibility and equity goals and to seek information about how grantees comply with requirements of the Americans with Disabilities Act. In addition to Recommendation 2.4, San Francisco recommends that NHTSA require GM to submit quarterly reports on:

- *the number of wheelchair accessible vehicles that are available in each market area of operation (geographic ODD);*
- *all measures taken to ensure that the ADS software is equally proficient at identifying and appropriately responding to persons with disabilities who are other road users, notwithstanding any mobility devices they may be using or carrying;*
- *all measures taken to ensure that passengers using wheelchairs, walkers, canes or other mobility devices, can safely transition from the Origin to the sidewalk and vice versa;*
- *any people with disabilities identifiable in relation to crashes, near misses, and Street Interference Incidents*
- *measures taken to ensure that all components of an ADS-operated vehicle without human driving controls, including the smartphone user application and all passenger communication and support services, are accessible to passengers with disabilities;*
- *the scope and frequency of disability access training for all field and remote support staff who perform passenger supporting functions;*
- *how the owner/operator will collect feedback to identify any barriers to full access that may be identified by people with disabilities;*

- *research or community outreach undertaken to address any barriers to full access identified for people with disabilities and plans and timelines for remediation of barriers*

Exhibit A: Redlined Summary of San Francisco Updated Recommendations

Recommendations with Bold Recommendation Number have substantive additions or modifications.

NEW RECOMMENDATION 1.1: San Francisco recommends that NHTSA investigate further both the Cruise AV incidents that reflect interference with routine emergency response operations as well as the reliability and resiliency impacts of driverless operations and failures during power outages, traffic signal outages, cellular network outages and overloads and disaster situations.

RECOMMENDATION 1.1.1 If NHTSA is inclined to approve the GM Petition, San Francisco recommends that NHTSA require General Motors to submit ~~data~~ quarterly ~~data~~ on Cruise AV and Origin³⁶ Street Interference Incidents (S.I.I.), including but not limited to vehicle retrieval events (VRE), emergency response interference events (ERIE), and lane obstruction events (LOE) requests for remote advisor assistance as they operate on public roads and that affect any part of a travel lane on a public road, including bike lanes and lanes designated for transit or other vehicles for more than 30 seconds. S.I.I.s should be reported on a per incident basis and should include in relation to the vehicle model, date, time, and location, in relation to the monthly vehicle miles traveled both on an individual vehicle and monthly aggregate fleet basis by market area.

RECOMMENDATION 1.1.2: If NHTSA is inclined to approve the GM Petition, San Francisco recommends that in addition to informing NHTSA, in the event of any cybersecurity incident that warrants issue of a “stop order” because it presents an unreasonable or unforeseen risk to the safety of vehicles on the road, NHTSA should require General Motors to immediately report to all relevant Public Safety Answering Points the existence of the risk and what actions will be taken to cease operations in a safe manner.

RECOMMENDATION 1.1.3: If NHTSA is inclined to approve the Petition, NHTSA should use data reported by GM ~~and Ford~~ to develop key performance indicators for human advisor response to AV requests for assistance, ~~in lane failures on public roads~~ Critical Response Line pickup time,³⁷ Street Interference Incidents, including but not limited to lane obstruction events, emergency response interference incidents, and vehicle retrieval events on public roads, as well as road clearance time and other measures of safety performance and road impact.

³⁶ While the GM Petition addresses the Origin, it notes that the Origin will be operated by the same automated driving system that operates the Cruise AV. It is possible that the majority of Cruise automated driving will continue to be logged by Cruise AVs. Collection of data from both models could support more rapid development of automated driving standards, as well as help evaluate the safety record of the Origin in relation to the Cruise AV.

³⁷ With respect to Critical Response Line pickup time, NHTSA could for example seek data on the percentage of occasions when emergency responder calls to the Critical Response Line are picked up by a human within 10 seconds, 30 seconds, 1 minute and 3 minutes, and/or are picked up after a longer wait or are picked up by something other than a human. These standards are informed by the call processing standards of the National Fire Protection Association.

RECOMMENDATION 1.1.4: If NHTSA is inclined to approve the requested exemptions, NHTSA should initially approve the GM petition in a way that limits the geographic deployment in the San Francisco market by number of vehicles and time of day and expands authorization only after GM demonstrate reasonable performance based on key performance indicators.

RECOMMENDATION 1.2: If NHTSA is inclined to approve the GM Petition, San Francisco urges NHTSA to work with the City to develop a research protocol to analyze pick up and drop off driving impacts, including new hazards to users and other road users, with and to condition approval on General Motors cooperation with research, subject to restrictions that may be necessary and appropriate to protect passenger privacy. The research protocol should include consideration of the impact of pick up and drop off practices on vulnerable road users and people with disabilities, including people who use wheelchairs and people who are blind or have low vision, and in each case on those who are GM/Cruise customers and those who are not.

RECOMMENDATION 2.1: If NHTSA is inclined to approve the GM Petitions, San Francisco recommends that as a condition of approval, NHTSA expand city access to the precise location of safety critical incident information (such as crash, near miss and Street Interference Incidents) submitted by GM to enable road managers to evaluate factors that may affect the safety of automated driving systems operating on their streets. Further, San Francisco recommends that NHTSA require Cruise to retain sensor data related to all Street Interference Incidents that reflect Emergency Response Interference events or Vehicle Retrieval Events.

RECOMMENDATION 2.4: If NHTSA is inclined to approve the petitions, San Francisco agrees with disability advocates who recommend that fully accessible model versions should be available when ADS-operated passenger service vehicles without human driving controls are launched in order to prevent discrimination and ensure safety for people with disabilities. Further, San Francisco urges NHTSA to work with the U.S. Access Board to define and establish minimum accessibility standards so that the Origin – and other vehicles that are purpose built to provide commercial passenger service --are equipped to provide equivalent service to people with disabilities, including people who use wheelchairs, by the time they are first used to provide commercial passenger service.

RECOMMENDATION 3.1: San Francisco urges NHTSA to require GM, ~~Ford and other manufacturers~~ to display system malfunction telltales so they are visible to passengers in vehicles operating in an ADS-driven mode. NHTSA should not allow ADS-operated vehicles to deprive passengers of safety-critical vehicle status information that may inform their decision to travel in such a vehicle.

RECOMMENDATION 3.2: San Francisco urges NHTSA, as a condition of approval, to require GM to ensure that the transmission and operational status of the vehicle (powered on or off) can be easily observed from within and from the exterior of the vehicle to support the safety of passengers, first responders and other road users.

RECOMMENDATION 3.3: San Francisco urges NHTSA, as a condition for any approval, to consider requiring that the GM/Cruise Origin ~~and the Ford ADS-equipped vehicle~~ ensure passengers and first responders have the capacity to activate hazard lights manually when the vehicle is powered or depowered.

RECOMMENDATION 3.4: San Francisco urges NHTSA, as a condition for any approval, to consider requiring that first responders have the capacity to depower the GM/Cruise Origin ~~and the Ford ADS-equipped vehicle~~ manually.

RECOMMENDATION 3.5: San Francisco urges NHTSA, as a condition for any approval to consider requiring that the GM/Cruise Origin be equipped with a Safe Exit System ~~and Ford ensure that~~ that provides passengers, including passengers who are blind or have low vision, with specific information about oncoming traffic from the time the trip is stopped until all passengers requesting the stop have exited the vehicle.

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Docket # NHTSA-2022-0067 – General Motors

**DECLARATION OF DARIUS LUTTROP, DEPUTY CHIEF OF OPERATIONS,
SAN FRANCISCO FIRE DEPARTMENT, IN SUPPORT OF SUPPLEMENTAL
COMMENTS & UPDATED RECOMMENDATIONS FROM THE CITY AND COUNTY
OF SAN FRANCISCO**

I, Darius Luttrupp, being duly sworn, declare:

1. My name is Darius Luttrupp and I currently serve as Deputy Chief of Operations for the San Francisco Fire Department (“SFFD” or “the Department”), a role I have held since July 2023. I serve with two other deputies immediately below our Chief, Jeanine Nicholson, and I am her second in command.
2. I submit this declaration in support of the City and County of San Francisco’s Supplemental Comments & Updated Recommendations. I have personal knowledge of the matters stated herein, and if called as a witness could testify competently thereto.
3. I joined SFFD in 1998. Since joining, I have held a variety of roles, including serving as a firefighter at Rescue Squad 2, where I provided fire suppression and technical rescue responses and was part of SFFD’s technical rescue training cadre. I was later promoted to Lieutenant, and also worked as the Captain of Engine, Truck, and Rescue Companies. I have served as a Captain in the Sunset at Engine 18, and as Captain of In Service Training, where I oversaw the introduction of a live fire training program. I served as Battalion Chief in the Bayview, SOMA, and Mission Districts. Immediately prior to my current role, I was the Assistant Deputy Chief of Earthquake Safety and Emergency Response Bond Project Management.
4. In my current position as Deputy Chief of Operations, I oversee fire suppression, meaning I oversee all firefighters, up their chain of command. Among other things, I also

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oversee the division of training, the Fire Marshall, emergency communications, and SFFD special operations.

5. SFFD is one of the busiest fire departments in the nation. It is a responsible entity for San Francisco's Emergency Response Plan—the City's plan for when disasters, like major earthquakes, occur.
6. It is part of my job to know about incidents with autonomous vehicles ("AVs") that impact SFFD activities and emergency responses.
7. I oversee a system that SFFD has in place to log and report interactions with AVs that negatively impact SFFD activities in the field. Since approximately April 2022, our firefighters have been instructed to fill out a form to report when they have an interaction with an AV that changed what they would have normally done in the field, or which they perceived as dangerous. Since June 5, 2023, these reports have been called Autonomous Vehicle Incident Reports. Prior to that, firefighters were instructed to send Unusual Occurrence forms to report information about interference by AVs. Unusual Occurrence forms are a more generic form used in the Department, through which firefighters can report incidents in the field, but because of the high volume of AV-specific incidents and the Department's desire to streamline reporting of AV incidents, we adopted the AV-specific form. Filling out and submitting reports up the chain of command is a standard operating procedure for SFFD, whether about AV incidents or other matters of departmental concern. I am responsible for maintaining AV incident reports.
8. Whether submitting an Usual Occurrence form or an Autonomous Vehicle Incident Report regarding AV interference, firefighters are instructed to provide complete information about the incident, including the date, time, location, specific SFFD

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emergency incident number (if applicable), the AV company involved and any information about the vehicle, and details about what happened and how SFFD operations were impacted. Only firefighters can access the form portal to submit these reports.

9. Firefighters are instructed to submit these reports in a timely fashion. Most of the time, this means after the conclusion of the emergency, incident, or drill, although on some occasions it may be a few days later.
10. All reports of AV interference come to me, after others in the chain of command review them as well. As part of my duties as Deputy Chief of Operations, I have read all of the nearly 60 reports of AV interference that firefighters have filed between April 2022 and Friday, August 11, 2023.
11. In the incident reports, references to “code 3” mean that the SFFD vehicle was responding to call with its lights and siren on. Virtually every time SFFD receives a call, several SFFD vehicles of different types will be dispatched to respond and will operate their lights and sirens. References to “T[number]” are to a fire truck, identified by number. SFFD fire trucks are long vehicles that have a tractor-drawn aerial ladder component. References to “E[number]” are to SFFD engines, identified by number. Engines are the shorter vehicles that pump water and carry SFFD hoses. There are 44 engines in San Francisco. References to “B[number]” are to battalion SUVs or “buggys,” which Battalion Chiefs drive. SFFD also has ambulances, which respond to about 80% of calls in the City. SFFD ambulances are dynamically deployed, meaning they move around the City during their shift. Trucks, engines, and battalion SUVs return to SFFD stations after responding to a call.

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12. Because firefighters are often called to emergency situations, or need to attend to other more pressing operational concerns after an incident or emergency concludes, I believe the nearly 60 incident reports represent an undercount of the actual number of AV-interference incidents our firefighters have experienced.
13. The volume of incidents in which AVs have interfered with SFFD operations is concerning. I am very concerned that these incidents will become more common and widespread now that the companies have a profit motive to put more AVs on the road at all times. I understand that the CPUC has authorized Cruise and Waymo to expand their operations to take passengers for a fare at any time and in any part of San Francisco, with no limitations on the number of vehicles that can be deployed. Because SFFD has seen so many incidents to date based on the limited number of Cruise and Waymo AVs on San Francisco streets, I am very concerned that the number of incidents will increase dramatically with this new authorization and that SFFD operations will be even more negatively impacted.
14. It is vital that all vehicles, whether driven by humans or autonomous technology, follow the Vehicle Code and avoid interfering with first responders. It is essential to our operations that cars on the road yield to SFFD vehicles on route to a medical or fire incident, most importantly by getting out of the way and stopping along the right-hand side of the road to let us pass safely and quickly.
15. There have been several incidents where Cruise and Waymo AVs failed to yield to SFFD engines, trucks, and/or battalion vehicles that were responding to a medical or fire call. In some instances, SFFD vehicles had to back out of streets blocked by Cruise or Waymo vehicles and take an alternate route to the call, causing a several-minute delay. It is

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concerning to see so many incidents where a Cruise or Waymo AV failed to yield to a SFFD vehicle, because the cars do not seem to hear or respond to our sirens, lights, and commands. We can tell human drivers to pull over and get out of the way, and they almost always listen to us. But on numerous occasions, AVs have failed to yield or comply with directions from SFFD personnel.

16. AVs have also caused delays by blocking SFFD vehicles in their stations by stopping in front of fire station driveways. When our vehicles are blocked like this, or blocked by AVs out in the field, it is common for us to call for a replacement vehicle of the same type from a different location. This replacement vehicle will almost always come from somewhere farther away from the emergency location than the vehicle originally called. This causes delay.
17. Every minute is critical in responding to a medical emergency, especially when a person is experiencing a cardiac arrest or heart attack, has trouble breathing, or is overdosing. SFFD paramedics are often the geographically closest medical personnel able to respond to a medical call. Even a one-minute delay can be dangerous and potentially life-threatening.
18. Similarly, responding immediately to fire calls is essential. Fires can double in size in just one minute in San Francisco, given the dense urban landscape and the amount of furniture that San Francisco residents often have. It is more difficult and more dangerous to fight a larger fire.
19. On numerous occasions, Cruise AVs have driven over SFFD fire hoses. Not only is this illegal, it is dangerous. If an uncharged hose (meaning, a hose that is not filled with water) is run over by a car, the hose can get caught in the car's wheel and axle and pull

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the hose, sweeping nearby firefighters off their feet. This happened to an SFFD firefighter in recent years, and the hose (caught in the vehicle's axel) knocked the firefighter to the ground, where he hit his head and suffered a traumatic brain injury. It was not an AV vehicle that caused that specific accident, but it highlights the danger of having AVs run over SFFD hoses. If a car runs over a hose that is charged (meaning, is full of water), it can burst the hose and stop the flow of water to the fire. This is dangerous because it diminishes our ability to fight the fire. But even short of stopping the flow of water, a car that runs over a charged hose can cause the hose to roll or move around, and this is dangerous to first responders, too. Additionally, whenever a car rolls over a hose, serious damage to SFFD equipment can occur. Recently, a Cruise AV ran over SFFD fire equipment, causing significant damage to a gorter and wye, two vital (and expensive) pieces of equipment that allow for multiple smaller hoses to be deployed. Thankfully, that incident occurred during a drill, but had it occurred during an active firefight, the AV's actions could have caused catastrophe.

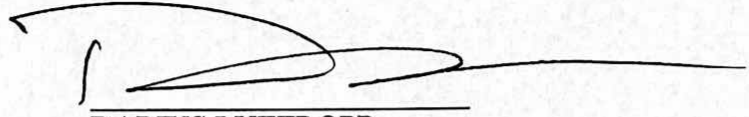
20. On other occasions, Cruise and Waymo AVs have entered active emergency scenes, getting in the way of firefighters who were trying to put out a fire or otherwise respond to hazards (like downed trees or overhead wires). With human drivers, our personnel can tell drivers where to go or simply put up cones or other barriers to indicate that drivers must go elsewhere. But this has not worked for AVs; in numerous incidents, Cruise and Waymo AVs failed to comply with these directions, signs, and signals.

21. There are also a number of reported incidents where AVs interfered with SFFD operations by behaving in unpredictable ways, seemingly threatening to enter emergency scenes or harm our members or equipment, causing our personnel to devote time and

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attention to the AVs, potentially at the expense of other tasks. Human drivers usually do not cause this kind of interference because the drivers respond to commands or avoid emergency scenes altogether.

I declare under penalty of perjury under the laws of the California that the foregoing is true and correct, executed this 17th day of August, 2023 in San Francisco, California.



DARIUS LUTTROPP

Exhibit C: List of Summarized California Vehicle Code Provisions Apparently Violated in Reported Street Interference Incidents

CVC Section	Summarized Requirements/Prohibitions
21367	Unlawful to disobey instructions of a person directing traffic or fail to comply with control devices provided for regulation of traffic that would endanger the safety of workers performing construction in street
21450	Drivers shall stop at the limit line (no blocking the box).
21650	No driving on the wrong side of the road
21655.1	No driving on transit only lane unless turning
21707	Only first responder vehicles can be operated within a block where there is an emergency situation unless there is a 300-foot buffer or they're directed otherwise by a first responder
21708	No driving over or damaging a fire hose in use or under supervision of any fire department
21752(d)	No passing on opposite side of road within 100' of intersection
21806	Drivers shall yield the right of way to an emergency vehicle approaching with lights & sirens and immediately drive to the right-hand edge or curb and stop until the emergency vehicle has passed
21950	Motor vehicles must yield to pedestrians who cross marked or unmarked crosswalks at an intersection
22500(a)	No stopping in an intersection
22500(l)	No stopping in a bus stop
22500(a)	No stopping in a transit lane
22500(h)	No double parking
22521	No stopping on a rail track