

# **Proposal to the National Highway Traffic Safety Administration Re: Proposed Amendments to Standing General Order 2021-01 Standardized Definitions, Categories, and Metrics for ADS/ADAS Safety Reporting**

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Dear NHTSA Administrator Morrison and Office of Defects Investigation Staff,

I respectfully submit the following proposal for amendments to the Standing General Order 2021-01 (as amended through the Third Amendment effective June 16, 2025).

The current broad definition of “crash” creates several well-documented problems: • It is a loaded term that includes many events manufacturers cannot influence (e.g., a stationary vehicle struck from behind). • It produces statistics that are difficult for the public to interpret and impossible to compare fairly across manufacturers. • It mixes preventable system failures with unrelated incidents, obscuring the very issues manufacturers can and should address.

The proposed framework replaces this single, confusing term with clear, focused categories and normalized metrics. These changes would:

- Improve safety by directing attention and resources to incidents manufacturers can mitigate through software or hardware updates.
- Enable fair, apples-to-apples comparisons by standardizing terminology and requiring reporting by Operational Design Domain (ODD).
- Make statistics understandable to the public, manufacturers, and policymakers because every term has a single, consistent NHTSA definition and every rate is expressed in simple “miles per event” language.

The result will be data that truly track safety progress over time, build public confidence, and accelerate the deployment of safer automated vehicles.

## **1. Proposed Incident Reporting Categories**

**1.1 Reportable ADS/ADAS Safety Incident** “Reportable ADS/ADAS Safety Incident” means any event in which:

(a) the subject vehicle's ADS or Level 2 ADAS was engaged at any time during the period from 30 seconds immediately prior to the commencement of the event through its conclusion.

(b) the ADS or Level 2 ADAS contributed to, failed to prevent, or could have mitigated the event through its operational performance (steering, braking, acceleration, perception, or decision-making).

(c) the event results in any of the following:

- fatality or serious injury requiring hospital transport (to any person involved)
- strike of a vulnerable road user
- deployment of a passive safety system
- a near-miss or collision that the ADS/ADAS was expected to avoid under its operational design domain

Incidents in which the subject vehicle was stationary or passive (no ADS/ADAS contribution) and were struck by another party shall not qualify.

Fender bender type incidents where safety was not a concern and human drivers often don't report to insurance companies should not be included as a "Reportable Safety Event".

***Rationale:*** This definition eliminates confusion caused by the word "crash." It focuses exclusively on events where the manufacturer has responsibility and can take corrective action. Reportable Safety Events will focus statistics on issues of safety and not be diluted with trivial noise. Public statistics will now reflect real system performance rather than unrelated events such as rear-end collisions, allowing faster identification and resolution of safety issues.

**1.2 Safety System Performance Event** "Safety System Performance Event" means any incident in which a vehicle-level safety feature activates or performs its intended function, including:

- Deployment of a passive safety system (airbag, seatbelt pretensioner, etc.).
- Activation of crush zones or energy-absorbing structures.
- Activation of fire-prevention or fire-suppression systems.
- Activation of battery thermal-runaway mitigation (for electric vehicles).
- Any other structural or protective feature designed to protect occupants or prevent secondary harm.

This category shall be reported separately and used solely to evaluate the performance and reliability of these vehicle-level safety features, regardless of ADS/ADAS contribution.

**Rationale:** These features save lives and reduce injury severity even when the driving automation system is not at fault. Separating this data lets manufacturers be credited for excellent vehicle design (e.g., superior crumple zones or fire suppression) and lets NHTSA track improvements in occupant protection independently of driving automation.

**1.3 ADS/ADAS Avoidance Success Event** “ADS/ADAS Avoidance Success Event” means any event in which:

- a) The subject vehicle’s ADS or Level 2 ADAS was engaged at any time during the period from 30 seconds immediately prior to the potential incident through its resolution.
- b) The ADS or Level 2 ADAS contributed to avoiding or substantially mitigating what would otherwise have been a Reportable ADS/ADAS Safety Incident through active intervention (e.g., automatic emergency braking, evasive steering, trajectory adjustment, or enhanced perception/decision-making).
- c) The event results in no physical impact, or only negligible property damage below the threshold for a Reportable ADS/ADAS Safety Incident, with no injury, fatality, vulnerable road user strike, or passive safety system deployment.

**Rationale:** Current reporting ignores successful prevention. This category gives manufacturers credit for lives saved and injuries avoided, providing positive reinforcement and a complete picture of system capability.

## **2. Standardized Safety Metrics**

All metrics shall be calculated using engaged miles (vehicle miles traveled while the ADS or Level 2 ADAS is active or within the 30-second pre-event window) as the denominator. Every metric uses the same simple “miles per event” format so the public and media can immediately understand performance.

### **2.1 Miles per “Reportable ADS/ADAS Safety Incident” (MPSI)**

MPSI = Total fleet engaged miles ÷ Number of Reportable ADS/ADAS Safety Incidents (Higher values = fewer safety incidents per mile.)

### **2.2 Miles per Mitigated Risk Event (MPMRE)**

MPMRE = Total fleet engaged miles ÷ Number of Mitigated Risk Events (Higher values = more successful preventions per mile.)

### **2.3 Miles per False Stoppage or Protective Avoidance (MPFSPA)**

MPFSPA = Total fleet engaged miles ÷ Number of False Stoppage or Protective Avoidance Events (Lower values = fewer unnecessary stops that create traffic hazards.)

### **2.4 Miles per Injury-Causing Crashes or Airbag Deployments (MPIC)**

MPIC = Total fleet engaged miles ÷ Number of Injury-Causing Crashes or Airbag Deployment Events (with ADS/ADAS Causation) (Higher values = fewer severe, system-attributable injuries per mile.)

**Rationale for all metrics:** Uniform terminology and normalization eliminate manufacturer-to-manufacturer differences in language and data access. The public will see clear, consistent numbers (e.g., “Tesla achieved 12 million MPSI in ODD-R4”) instead of vague or misleading “crash” counts.

## **3. Safety Correction Categories**

To distinguish between fixes that can be applied remotely and those that require physical service, two separate categories should be used when tracking how manufacturers resolve identified safety issues:

**3.1 Over-the-Air (OTA) Software Safety Correction** A remote software update that corrects a safety-related issue in the ADS, ADAS, or related systems and can be delivered to the entire fleet without requiring any vehicle to visit a service center.

**3.2 Physical Hardware Recall Event** A safety issue that requires physical intervention at a service facility (e.g., replacement of sensors, wiring, structural components, or other hardware) and cannot be resolved by software alone.

*Rationale:* An over-the-air software fix can be completed overnight for millions of vehicles and carries minimal disruption. A physical recall requires operators to bring vehicles in for service, creating greater inconvenience and cost. Separating these two categories lets the public and regulators see exactly how quickly and efficiently manufacturers address safety problems and whether the solution is a simple software patch or a more serious hardware fix.

OTA updates are often simply tweaks and minor corrections and encourage AV manufacturers to be more innovative. When a safety issue is severe, having an expedited fix is safety benefit. AV manufacturers should be encouraged to support the ability for OTA updates to speed implementation safety improvements.

#### 4. Operational Design Domain (ODD) Classification

To ensure fair comparison, every metric shall be reported by ODD class.

##### Road Network Scope

- ODD-R1: Fixed-Route / Dedicated Path (predefined repeating route, often segregated).
- ODD-R2: Geo-Fenced Urban / Local Streets Only (mapped area excluding freeways).
- ODD-R3: Geo-Fenced with Limited Freeway Access (includes select controlled-access highways).
- ODD-R4: Unrestricted / All Public Roads (any public roadway within legal jurisdictions).

##### Environmental Conditions Scope

- ODD-E1: Clear-Weather / Daytime Only (dry, visibility >500 ft, 40–95°F).
- ODD-E2: Moderate Adverse Weather (light rain/fog, nighttime, 20–110°F).
- ODD-E3: Full All-Weather / Extreme Conditions (heavy precipitation, snow/ice, high winds, extreme temperatures).

**Rationale for ODD Classes:** An airport shuttle operating on a fixed, low-speed route (ODD-R1) faces dramatically different challenges than a robotaxi that must navigate unrestricted highways in heavy snow (ODD-R4 + ODD-E3). Without ODD classification, comparisons are meaningless. These categories reflect real-world differences in complexity, traffic density, speed, and environmental stress, allowing regulators and the public to evaluate each system only against others operating under comparable conditions.

**Combined Reporting Requirement** Metrics shall be reported by combined ODD class (e.g., “MPSI in ODD-R2 + ODD-E2”).

*Rationale for Combined Reporting:* An airport shuttle (ODD-R1) is not the same as an ODD-R4/ODD-E3-rated vehicle operating on all public roads in extreme weather. Reporting by combined ODD class ensures apples-to-apples comparisons, prevents misleading headlines, and lets the public clearly understand the exact operating environment for each safety number measures.

**Conclusion and Requested Action** These definitions and metrics replace a single confusing term with clear, consistent language that manufacturers, regulators, and the

public can all understand. They focus attention on issues manufacturers can fix, give credit for successful prevention and vehicle-level safety features, distinguish between quick software fixes and physical recalls, and produce statistics that show genuine safety progress over time. The outcome will be faster safety improvements, reduced injuries and fatalities, and greater public trust in automated vehicles.

I respectfully request that NHTSA consider these amendments through a formal notice-and-comment process. I am available to provide additional details or participate in any stakeholder discussions.

Thank you for your leadership in advancing safe automated vehicle deployment.

Sincerely, William Marsh Villa Rica, Georgia

This revised document is ready for direct submission (as PDF) via [Regulations.gov](https://www.regulations.gov) or to the Office of Defects Investigation. If you would like any further adjustments—such as adding your full contact details, a specific docket reference, or minor wording changes—please let me know and I will revise it immediately.