

## AVSC Best Practice for First Responder Interactions with Fleet-Managed Automated Driving System-Dedicated Vehicles (ADS-DVs)

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### Rationale

This AVSC best practice supersedes *Best Practice for First Responder Interactions with Fleet-Managed Automated Driving System-Dedicated Vehicles (ADS-DVs)* (AVSC00005202012), which was published in 2020.

This revision reflects the following updates:

1. Expanded “role definitions.”
2. The use-case scenarios in Section 4 are reordered based on the severity of risk.
3. [Table 4](#) in [5.4](#) recreated as a checklist and moved to [Appendix B](#).
4. Clarification of sections, examples, and terms throughout the document.

Today’s first responders have many well-established procedures to apply to the countless situations they face on the roadways. Standardized frameworks like this best practice may help first responders effectively interact with the growing number of ADS-DVs on public roads. While no document can represent a complete list of situations, this best practice provides a framework of recommended procedures and protocols automated driving system (ADS) developers, manufacturers, and fleet operators can follow to facilitate first responder interactions in multiple use cases.

A recommended framework for a First Responder Interaction Plan is also provided. This represents a proactive step in providing consistent information that first responders can use to establish their protocols, procedures, and plans for interacting with ADS-DVs. It is suggested that such an interaction plan be part of an ADS developer’s Safety Management System (SMS). The public will benefit from consistent and documented plans to communicate expected interactions, allowing first responders to continue rendering timely support and ensuring public safety.

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## Preface

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The Automated Vehicle Safety Consortium™ (AVSC) is an industry program of SAE Industry Technologies Consortia® (SAE ITC). The AVSC shares information to inform and accelerate industry-wide standards and advance the safe development, deployment, and fleet operations of automated driving systems (ADSs). The members of this consortium have decades of accumulated experience, including millions of cumulative miles of physical and simulated ADS testing focused on safer, reliable, high-quality transportation. They are committed to applying their experience and combined knowledge to earn public confidence in the safe operation of SAE level 4 and level 5 fleet-managed automated vehicles.

The wide range of technologies, use cases, and operating domains create unique challenges with public perception of ADSs. The consortium recognizes the beneficial role best practices and information reports can have for the industry and for the safe operation of SAE level 4 and level 5 automated driving system-dedicated vehicles (ADS-DVs). These technology-neutral documents provide key considerations for safely deploying ADS-DVs on public roads. AVSC documents are based on current state-of-the-art technology and the experiences of the AVSC members. AVSC members currently support, or intend to support, the best practices or equivalent measures to set a bar for other industry participants to meet.

Technology advances rapidly, and new information is becoming available at an increasing rate. The AVSC's best practices and information reports are living documents. As knowledge and experience grow, our publications will be revisited and updated, as needed, to continue to support safer on-road use of ADS-DVs. Comments and open discussions on the topics are welcome in appropriate industry forums.

## Introduction

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First responders, such as police, firefighters, and emergency medical services personnel, respond to millions of roadway incidents every year [1]. Industry and government organizations recognize the need for new techniques and protocols as ADSs assume the driving task and first responder interactions may no longer include human drivers. The National Highway Traffic Safety Administration (NHTSA) has published guidance documents related to safe testing and deployment of automated vehicles [2] [3] [4] [5]. In 2021, the Virginia Tech Transportation Institute (VTTI) prepared a report, *Law Enforcement, First Responder and Crash Investigation Preparation for Automated Vehicle Technology* for the Governors Highway Safety Association (GHSA), to educate stakeholders on ADS-related technologies and shared its findings pertaining to training for first responders interacting with ADS-DVs [13]. Additionally, in 2018, the Crash Avoidance Metrics Partners, LLC's (CAMP's) Automation and Public Safety Common Solutions (APSCS) Consortium published a report, *An Examination of Emergency Response Scenarios for ADS*, which examined first responder interactions across a broad spectrum of scenarios [1]. With this best practice, the AVSC seeks to update and continue to expand upon and operationalize CAMP's and VTTI's research findings related to emergency response scenarios. Many of the definitions and descriptions of first responder roles, types of interactions, use cases, and insights from CAMP's work are foundational to the recommendations put forth for interacting with ADS-DVs.

The NHTSA guidance and CAMP and VTTI research apply to vehicles with varying SAE levels of automation. Many of the vehicle types with varying ADS features are currently on public roadways, operating within their operational design domain (ODD).<sup>1</sup> ADS-DVs with SAE level 4 automation can perform all driving tasks within a specified ODD, including bringing the vehicle to a minimal risk condition (MRC) without the need for human intervention. ADS-DVs with SAE level 5 automation are not limited by an ODD, meaning they can complete all driving tasks without geographic<sup>2</sup> or environmental constraint. ADS-DVs with SAE level 4 and level 5 capabilities can perceive their surroundings and place in the world, process what they perceive, and use that information to make decisions about the driving task. ADS-DVs may not have conventional controls found in most vehicles today (i.e., those that can be manipulated by human drivers). [Section 5](#) addresses considerations for these systems that could impact first responder interactions.

A consistent framework for presenting useful information about ADS-DV interaction can help developers, manufacturers, and fleet operators prioritize and compile documentation about key processes and technologies. This can help with dialogue between developers, manufacturers, fleet operators, and first responders as deployments occur and plans are shared with the public safety community.

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<sup>1</sup> An ODD consists of the operating conditions under which a given driving automation system or feature is designed to function, including, but not limited to, environmental, geographical, and time-of-day restrictions, and the presence or absence of certain traffic or roadway characteristics (SAE J3016\_201806). For more information on describing an ODD, refer to AVSC00002202004, *AVSC Best Practice for Describing an Operational Design Domain: Conceptual Framework and Lexicon*.

<sup>2</sup> When available, SAE level 5 vehicles may be geographically constrained for legal or regulatory reasons.

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## 1. Scope

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This AVSC best practice **recommends a common approach for describing the interactions and associated protocols for incorporating vital information regarding first responder interactions with SAE level 4 and level 5 fleet-operated vehicles.**

This best practice provides the following:

1. Definitions of roles associated with emergency situations/processes.
2. Descriptions of expected interactions (use cases) between first responders and ADS-DVs.
3. Recommendations to address first responder and ADS-DV interactions.
4. Recommendation to ADS-DV developers, manufacturers, and fleet operators to create a First Responder Interaction Plan framework.

Procedures and frameworks in this document apply to all first responder types in all jurisdictions.<sup>3</sup>

ADS technology is still evolving and will continue to evolve for many years. First responder interactions with ADS-DVs are expected to mature with further understanding of the operation of ADS-DVs on public roads, along with deeper knowledge of the impact on first responder procedures and protocols. This best practice is a proactive step to identify and address key interactions between first responders and fleet-managed ADS-DVs. It addresses a list of interactions [1] important to first responders today. It is expected that the list of common interaction protocols will evolve over time to accommodate changes in technology and the experience gained.

Protocols or procedures for determining and assigning responsibility, liability, or fault for the ADS-DV or passengers are not addressed in this best practice. Also out of scope are vehicle maneuvers involving dynamic driving task performance, acquisition of crash reconstruction data, parking-related violations, and wireless communication protocols. First responder interaction with human passengers is not discussed; rather, the focus is on first responder interactions with ADS-DVs. Second responders and other individuals, such as Good Samaritans, bad actors, or bystanders who may interact with ADS-DVs, are also beyond the scope of this best practice.

## 1.1 Purpose

The purpose of this best practice is to improve the public's trust and confidence in ADS-DVs through consistent and documented interactions between trained first responders and ADS-DVs.

This best practice is also intended to provide the means for continued engagement and dialogue between first responders, developers, manufacturers, fleet operators, and local communities to promote safe operations and consumer acceptance of fleet-managed ADS-DVs.

These recommendations are intended for use by the technical community (e.g., technology developers, manufacturers, fleet operators, testers) and to inform states, other infrastructure owner-operators (IOOs), and the first responder community. Stakeholders can compare the best practices identified in this document against existing procedures and documentation or use them as a guide to establish ADS-DV interaction protocols with first responders. States and IOOs can utilize this document as a reference to develop questions to pose to developers, manufacturers, and fleet operators in their jurisdictions.

AVSC acknowledges there are others involved in emergency situations who are not first responders and who may not be formally trained or are unfamiliar with ADS-DVs. These individuals are encouraged to call emergency services for assistance when they arrive on scene.

The public will benefit from documented interaction plans and consistent communication of the expected types of first responder interactions, while first responders continue to render timely support and ensure public safety.

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<sup>3</sup> Unique considerations for jurisdiction or type of first responder should be addressed in the ODD description section of the interaction plan ([Section 6](#)).

## 2. References

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### 2.1 Applicable Documents

The following publications were referenced during the development of this document. Where appropriate, documents are cited.

#### 2.1.1 SAE Publications

Unless otherwise indicated, the latest issue of the following SAE publications applies. Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), [www.sae.org](http://www.sae.org).

AVSC00002202004	AVSC Best Practice for Describing an Operational Design Domain: Conceptual Framework and Lexicon
AVSC00003202006	AVSC Best Practice for Passenger-Initiated Emergency Trip Interruption
AVSC00004202009	AVSC Best Practice for Data Collection for Automated Driving System-Dedicated Vehicles (ADS-DVs) to Support Event Analysis
AVSC00007202107	AVSC Information Report for Adapting a Safety Management System (SMS) for Automated Driving System (ADS) SAE Level 4 and 5 Testing and Evaluation
AVSC00009202208	AVSC Best Practice for Interactions Between ADS-DVs and Vulnerable Road Users (VRUs)
AVSC-I-04-2023	AVSC Best Practice for ADS Remote Assistance Use Case
SAE J2990_201907	Hybrid and EV First and Second Responder Recommended Practice
SAE J3016_202104	Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles

#### 2.1.2 Other Documents

- [1] Terry, T., Trimble, T. E., Blanco, M., Fitzgerald, K. E., Fitchett, V. L., and Chaka, M. (2018). *An examination of emergency response scenarios for ADS*. Crash Avoidance Metrics Partners, LLC. <https://www.campllc.org/publications/>
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- [10] Federal Highway Administration. (2017). *Safety service patrol priorities and best practices*. U.S. Department of Transportation. <https://ops.fhwa.dot.gov/publications/fhwahop16047/index.htm>
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- [12] Federal motor vehicle safety standards; Electric-powered vehicles: Electrolyte spillage and electrical shock protection, 49 C.F.R. § 571.305 (2018). [https://www.ecfr.gov/cgi-bin/text-idx?SID=7d443eb75ceba033fed91e90f816b574&node=se49.6.571\\_1305&rqn=div8](https://www.ecfr.gov/cgi-bin/text-idx?SID=7d443eb75ceba033fed91e90f816b574&node=se49.6.571_1305&rqn=div8)
- [13] Trimble, T., Travis, T., & Virginia Tech Transportation Institute. (2021). *Law enforcement, first responder and crash investigation preparation for automated vehicle technology*. Governors Highway Safety Association. <https://www.ghsa.org/sites/default/files/2021-09/Law%20Enforcement%2C%20First%20Responder%20and%20Crash%20Investigation%20Preparation%20for%20Automated%20Vehicle%20Technology%20FINAL.pdf>

### 3. Definitions and Roles

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#### 3.1 Definitions

The following terms are included in this best practice and are defined for clarification.

##### 3.1.1 Automated Driving System-Dedicated Vehicles (ADS-DV) (SAE J3016)

A vehicle designed to be operated exclusively by a level 4 or level 5 ADS for all trips within its given ODD limitations (if any).

##### 3.1.2 Infrastructure Owner-Operator (IOO)

Manage the roadways on which people, goods, and services move. They typically also have planned, designed, and built those roadways. IOOs are generally, but not always, public agencies working for a state, local, or tribal government. They are responsible for providing safe and efficient transportation services for their citizens and constituents.

##### 3.1.3 Interaction

Interaction is defined as “a situation where two or more people or things communicate with each other or react to each other” [6].

##### 3.1.4 Minimal Risk Condition (MRC) (SAE J3016)

A stable, stopped condition to which a user or an ADS may bring a vehicle after performing the dynamic driving task (DDT) fallback to reduce the risk of a crash when a given trip cannot or should not be continued.

### 3.1.5 Operational Design Domain (ODD) (SAE J3016)

Operating conditions under which a given driving automation system, or feature thereof, is specifically designed to function, including, but not limited to, environmental, geographical, and time-of-day restrictions, and the requisite presence or absence of certain traffic or roadway characteristics.

NOTE: The term operational design domain is used slightly differently between North America and the European Union. In the EU, the ODD captures the external conditions an ADS is intended to operate in, while the term “service area” describes the specific road network an ADS is intended to operate on. The common North American usage of ODD is used to describe both the external conditions and the road network an ADS is intended to operate within. This document is consistent with the North American usage of ODD.

## 3.2 Roles

The following roles have been identified as those most likely to interact with one another in emergency situations involving ADS-DVs.

### 3.2.1 ADS-DV Fleet Operator

An entity that manages a fleet of ADS-DVs and the services provided by said fleet. It supervises and provides technical, operational, emergency, or customer support assistance for ADS-DVs. Fleet operators may engage other organizations to provide supporting services (e.g., dispatch, maintenance, customer service). If contacted by first responders, as outlined in the First Responder Interaction Plan, fleet operators may provide direct support to first responders.

NOTE: Fleet operator excludes non-commercially deployed, privately owned vehicles [11].

### 3.2.2 Bad Actor

A bad actor is not a first responder, but rather a person or organization responsible for actions that are harmful, illegal, or morally wrong.

### 3.2.3 Bystander

A bystander is not a first responder, but rather a citizen or member of the general public who is present but not taking part in a situation or event.

### 3.2.4 Emergency Dispatcher

An individual employed by first responders to gather information related to emergency and non-emergency calls, provides assistance and instructions by voice, prior to the arrival of first responders, and the dispatching and support of resources responding to such a call.

### 3.2.5 Emergency Medical Services

Services dispatched to roadway incidents when there is a report of the possibility of one or more injured victims on the scene as a result of a fire or collision. They may also be dispatched to medical emergencies occurring on or near the roadway [8].

### 3.2.6 Fire and Rescue

Services dispatched to incidents, such as motor vehicle collisions, vehicle fires, or other fires in proximity to the roadway, medical emergencies on or near the roadway, hazardous materials incidents [8], and natural disasters.



### 3.2.7 First Responder

First responders are “emergency personnel who first arrive on the scene of an incident and take action to save lives, protect property, and meet basic human needs. In most incidents, these responders are local police, fire, and emergency medical personnel” [7, p. 494].

First responder roles associated with the “public safety domain” include law enforcement (police), fire and rescue, and emergency medical services [1]. Others who may provide first responder support include those providing roadway response services and towing and recovery services [8]. More information on training for first responders is available in [6.3](#).

### 3.2.8 Good Samaritan

A Good Samaritan is not a first responder, but rather a citizen or member of the general public providing aid to a situation; they may or may not have had formal training or experience. A Good Samaritan may have witnessed the incident or been first on the scene, or otherwise been engaged by an official to assist in response to a situation. A Good Samaritan may also be the first to recognize the need for, and to initiate contact with, first responders or required emergency services.

### 3.2.9 Law Enforcement/Police

Services or activities of the agencies responsible for maintaining public order and enforcing the law, particularly the activities of prevention, detection, and investigation of crime and the apprehension of criminals [9].

### 3.2.10 Roadway Response

Services employed by transportation agencies to provide support during heavy traffic periods or continuously (24-hour service) to render assistance to motorists to include basic auto maintenance, first aid, setting up roadway incident scenes, etc., and generally utilize highly visible liveries with warning lights [8]. These types of services may be referred to as Safety Service Patrols, Freeway Service Patrols, Courtesy Patrols, Emergency Response Units, Motorist Assistance Patrols [10], and Road Patrols.

### 3.2.11 Second Responder (SAE J2990)

Includes, but not limited to, tow/recovery personnel, vehicle storage operators, repair/service technicians, dismantlers, and auto salvage personnel.

### 3.2.12 Towing and Recovery

Services required when a roadway incident involves a vehicle that has become disabled for any reason and must be removed from the roadway and could be dispatched by the police, a transportation agency, or the ADS fleet operator [8].

## 4. First Responder and ADS-DV Interaction Use Cases

Trimble et al. (2018) identified over 90 emergency response scenario interactions and categorized them into seven use cases [1]. These use cases are described at a high level from the first responder perspective. Best practice recommendations for ADS developers, manufacturers, and fleet operators to address these use cases by interaction type can be found in [Table 4](#) under [Appendix B](#).

### 4.1 Stabilization and Extrication



Vehicle stabilization is the process of immobilizing a vehicle to prevent movement to create a secure environment for the first responders to work. Extrication is the process of removing an occupant from a vehicle and involves disentangling the occupant from a damaged vehicle by means of spreading, cutting, or removing vehicle pieces and parts. While extrication is a relatively rare event, it is the most direct contact that fire and rescue units have with vehicles [1].

### 4.2 Securing a Scene Involving an ADS-DV



First responders securing a scene involving an ADS-DV will gather and report information about an incident, determine if additional resources are required to secure the scene by blocking and diverting traffic, and continually assess the scene and individuals, if present [1]. First responders may need to disable, access, or move an ADS-DV, and must be aware of potential hazards (e.g., electrical power storage, high-voltage wiring and routing, fuel tank location, fuel lines) and unique hazards (i.e., hazards resulting from unexpected vehicle maneuvers or responses) presented by ADS-DVs. First responders should be able to identify an ADS-DV and be able to signal it or influence its behavior by contacting fleet operators or by using temporary traffic control devices (e.g., cones, flares, signs). Prior to deployment, first responders will need to be provided with required documentation, such as fleet operations contacts, safety information, and owner or service provider information about the ADS-DV.

### 4.3 Traffic Direction and Control



“First responders may need to manually direct traffic in a number of circumstances, such as at special events; during man-made or natural disasters; in adverse weather conditions; during fires, smoke, or fog; at traffic crash scenes; or in cases of damaged or malfunctioning traffic control devices” [1, p. 51]. First responders need to be able to signal or otherwise direct an ADS-DV (e.g., use of hand signals to direct a vehicle to stop) to a specific action or path of movement in accordance with necessary changes in normal traffic flow.

#### 4.4 Traffic Stop or Checkpoint



Traffic stops generally involve circumstances where police observe a violation and then request a driver to pull over [1]. Checkpoints and roadblocks are similar operations in which multiple vehicles are requested to stop by police and directed manually to the next available officer. Drivers may be required to stop and lower windows, open trunks, or perform other activities [1]. First responders will need to recognize an ADS-DV and signal the vehicle to stop. Once stopped, first responders will need to ensure the ADS-DV remains stationary (unless directed otherwise). It is suggested that the ADS operator provides the first responder with required documentation to determine the owner or service provider and additional direction. The first responder would release the vehicle(s) after the traffic stop/checkpoint activity is complete.

#### 4.5 Interacting with ADS-DVs in Traffic



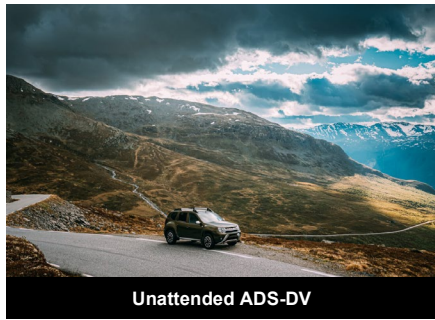
First responders answering an emergency call must reach the scene as quickly and safely as possible. This may require emergency vehicle operators to navigate through traffic and anticipate the reactions of other motorists [1]. First responders interacting with ADS-DVs in traffic while responding to an incident will need to communicate with or signal ADS-DVs, as they do with other motorists, to pass or otherwise proceed without being obstructed.

#### 4.6 ADS Emergency Assistance



ADS emergency assistance includes activities such as calling a tow agency or waiting with a vehicle for another responder to provide aid [1]. First responders may need information or instruction (see [6.3](#) for training information) on how to safely approach the ADS-DV, disable the vehicle, gain access to the interior, or move the vehicle from the roadway before any emergency services proceed.

## 4.7 Unattended ADS-DV (Not in a Parking Spot)



An unattended vehicle is one that may be stationary, powered, or “running” without a driver or occupants inside [1]. Although it is highly improbable for a fleet-managed ADS-DV to be abandoned, the absence of active engagement in a driving task or its location outside a recognized staging area does not necessarily imply that the vehicle is unattended.<sup>4</sup> However, an ADS-DV in an area where the vehicle is not impeding traffic, that remains stationary for a significant period of time, and is without a human occupant or vehicle operator may appear unattended. To determine the operational status of a parked, unoccupied, or stationary ADS-DV, information should be available so first responders can contact fleet operators to verify the status of the ADS-DV.

## 5. First Responder and ADS-DV Interaction Types and Recommendations

There are three general types of interactions between first responders and ADS-DVs: direct, indirect, and informational [1]. Understanding of the types of interactions between first responders and ADS-DVs is expected to improve as vehicle technologies and architectures evolve. These factors may motivate future reviews and revisions to the types of interactions and recommendations described in this document. Recommendations for developers, manufacturers, and fleet operators are organized according to interaction type.

### 5.1 Direct Interactions

Direct interaction **involves physical contact** between a first responder and an ADS-DV; it includes touching the vehicle or using a piece of equipment to make contact [1].

Examples of direct interactions include:

- A firefighter checks a vehicle door handle to determine if a vehicle is locked.
- An emergency medical technician (EMT) enters a vehicle to provide aid to a passenger.
- A tow vehicle operator connects a tow apparatus to the vehicle.

In addition to the recommendations for direct interactions contained in this section, it may be advisable for first responders to contact fleet operators (in accordance with the First Responder Interaction Plan) for information about the vehicle and situation before proceeding in any of the following circumstances or gaining access to the vehicle.

[Table 1](#) lists some direct interactions between first responders and ADS-DVs and recommendations for developers, manufacturers, and fleet operators.

<sup>4</sup> Although an SAE level 4 and level 5 ADS-DV is, by definition, dedicated to driverless operation, situations may arise where human assistance by fleet personnel is needed. Humans may provide remote driving or remote assistance, or a human field representative may be dispatched to manually operate a vehicle.

**TABLE 1** Recommendations for ADS-DV developers, manufacturers, and fleet operators for direct interactions [1] with first responders

First Responder Direct Interaction	Considerations for Direct Interactions	ADS-DV Recommendations
Disable ADS-DV	First responders typically immobilize vehicles by conventional means such as blocking, barricading, chocking wheels, etc., without accessing the interior of the vehicle or communicating with fleet operators.	<ul style="list-style-type: none"> <li>• ADS-DVs should be capable of immobilization or otherwise being kept from physically moving. It is recommended that the vehicle provides an indication (e.g., indicator on the vehicle or an existing offboard confirmation process denoting that the ADS-DV will remain stationary even if power is lost later).</li> <li>• Developers, manufacturers, and fleet operators should make instructions, supporting documentation, reference materials, and training available to first responders to safely disengage the drive system/actuators in order to support the first responder efforts to ensure the ADS-DV will not move during an interaction (in addition to traditional means of immobilizing a vehicle).</li> </ul>
Access ADS-DV Interior	First responders may require access to the interior and compartments of a vehicle to complete their task. Traditional and non-traditional access points may be locked when a vehicle is stopped.	<ul style="list-style-type: none"> <li>• Developers, manufacturers, and fleet operators should provide a means for unlocking and granting access by either a fleet operator or a passenger (if present and able) to allow the first responder access to the ADS-DV interior.</li> <li>• Developers, manufacturers, and fleet operators should document all procedures or guidance for accessing the ADS-DV interior during non-emergency and emergency scenarios in their interaction plans.</li> </ul>
De-Power ADS-DV	ADS-DVs will contain a primary vehicle power source and may include a separate power source for the ADS. Power sources are assumed to be marked per industry standards [12].	<ul style="list-style-type: none"> <li>• ADS-DVs should be capable of being de-powered in accordance with industry guidelines.<sup>5</sup></li> <li>• Any unique considerations or processes for de-powering an ADS-DV should be documented by developers, manufacturers, and fleet operators in the interaction plans, if applicable.</li> <li>• A fleet operator should be able to assist first responders with information and directions for disengaging all vehicle power supplies.</li> </ul>
Move ADS-DV from Roadway	In certain situations, ADS-DVs may need to be moved around the scene or removed from the roadway to allow the free flow of traffic or to attend to passengers onboard. ADS-DVs may not have traditional driver controls.	<ul style="list-style-type: none"> <li>• Developers, manufacturers, and fleet operators should provide instructions on how to move the ADS-DV from the roadway.</li> <li>• Developers, manufacturers, and fleet operators should document information regarding known or expected hazards that are unique to the ADS-DV in the interaction plan and specific to moving the ADS-DV from the roadway.</li> </ul>

<sup>5</sup> For electric vehicle safety guidelines, refer to *Federal Motor Vehicle Safety Standard (FMVSS) 305: Electric-Powered Vehicles: Electrolyte Spillage and Electrical Shock Protection* [12]. FMVSS 305 S5.4 (electrical safety during normal vehicle operation) contains requirements on markings, service disconnects, protection from electrical shock, and generic electrical isolation. SAE J2344, *Guidelines for Electric Vehicle Safety*, identifies and defines the preferred technical guidelines relating to safety for vehicles that contain high voltage, such as electric vehicles. SAE journal article 08-07-01-0005, *A Bibliographical Review of Electric Vehicles (xEVs) Standards*, presents an all-inclusive, state-of-the-art bibliographical review of all categories of electrified transportation (xEVs) standards.

## 5.2 Indirect Interactions

Indirect interaction [1] involves a first responder influencing an ADS-DV **without coming into physical contact**. Examples of indirect interactions include:

- An emergency vehicle using lights or sirens while moving through traffic or while stationary on or near the roadway.
- A police officer using temporary traffic control devices (e.g., cones, signs, flares) to alter the flow of traffic or cordon off an area.
- An EMT positioning an ambulance (with or without emergency lights) to block first responders or patients from other vehicles or hazards.

[Table 2](#) lists a couple indirect interactions between first responders and ADS-DVs and recommendations for developers, manufactures, and fleet operators.

**TABLE 2** Recommendations for ADS-DV developers, manufacturers, and fleet operators for indirect interactions [1] with first responders

First Responder Indirect Interaction	Considerations for Indirect Interaction	ADS-DV Recommendations
Initial Communication with ADS-DV	Relevant communications include the ability to detect and react to emergency vehicles, equipment, and personnel. ADS-operated vehicles may vary in their ability to respond to traditional methods of human communication (e.g., hand gestures, body language, eye contact, whistles, flashlights, batons). In some cases, interaction with a fleet operator may be required.	<p>The First Responder Interaction Plan should include details specific to the particular ADS-DV related to indirect interaction with first responders. For example, those may involve:</p> <ul style="list-style-type: none"> <li>• ADS-DVs’ ability to detect and comply with identifiable and customary first responder instructions, either independently or through communications with a fleet operator.</li> <li>• ADS-DVs’ capability to detect and react to emergency vehicles and if they are identifiable by the customary features possessed by those vehicles, such as flashing lights and sirens. This may include yielding the right-of-way, contacting fleet operators, or otherwise complying with local traffic laws.                             <ul style="list-style-type: none"> <li>○ In certain first responder scenarios, the ADS-DV may contact fleet operations to access the object/scene or otherwise provide guidance to the ADS (refer to AVSC-I-04-2023).<sup>6</sup></li> </ul> </li> <li>• ADS-DVs’ ability to detect and react appropriately to emergency equipment, such as temporary traffic control devices and stationary emergency vehicles.</li> <li>• ADS-DVs’ ability to detect and respond appropriately to first responders in the roadway.</li> <li>• Developers, manufacturers, and fleet operators should coordinate communication processes between first responders and fleet operators.</li> <li>• An ADS-DV directed to pull over by a first responder (e.g., a traffic stop) should remain stationary until it has been signaled to continue operations.</li> <li>• Developers, manufacturers, and fleet operators should develop methods for releasing an ADS-DV (e.g., after a traffic stop). These methods should be described in the interaction plans.</li> <li>• Developers, manufacturers, and fleet operators should document instructions for communicating with an ADS-DV and contacting fleet operators in interaction plans.</li> </ul>
Approach ADS-DV	Approaching vehicles involved in an incident and interacting with fleet operators and passengers are key steps in multiple use cases.	<ul style="list-style-type: none"> <li>• First responders should be able to contact fleet operators before they approach an ADS-DV.</li> <li>• Procedures for approaching an ADS-DV should be documented in the interaction plans.</li> <li>• First responders should be able to identify that the vehicle is stopped and will not move.</li> </ul>

<sup>6</sup> For example, upon detecting an existing emergency response scene such as a building fire with fire trucks in the roadway and hoses on the ground, the ADS may use flashing lights from the fire trucks as a signal to contact fleet operations for guidance prior to closing in on the scene. Fleet operations may reroute the ADS, suggest it comes to a safe stop, or provide other context-relevant guidance per AVSC-I-04-2023.

### 5.3 Informational Interactions

Informational interaction [1] (which may or may not require physical contact) between a first responder and an ADS-DV occurs **when information must be obtained from or about a vehicle** by the first responder. Examples of informational interactions include:

- A police officer scans or otherwise enters a license plate number into a vehicle registration system to determine the owner or service provider and other relevant information about the vehicle.
- A firefighter observes hazard lamps or other warning decals or tags during extrication or other manipulation of vehicle parts.
- A first responder visually determines if there are passengers in the vehicle as they approach.

Table 3 lists several informational interactions between first responders and ADS-DVs and recommendations for developers, manufactures, and fleet operators.

**TABLE 3** Recommendations for ADS-DV developers, manufacturers, and fleet operators for informational interactions [1] with first responders

First Responder Informational Interaction	Considerations for Informational Interaction	ADS-DV Recommendations
Identify ADS-DV	Depending on the developer/manufacturer, an ADS-DV may be identified by a distinctive shape, unique vehicle platform, or by the addition of external sensors or other hardware. Placement of these external sensors and hardware may vary between developers, manufacturers, and fleet operators or vehicle platforms. Furthermore, there may be other contextual clues for identifying an ADS-DV, which may include absence of traditional driving controls or even lack of a driver or occupants.	<ul style="list-style-type: none"> <li>• Developers, manufacturers, and fleet operators should document a description and location of any distinguishing features, along with any specific contextual cues that would help distinguish an ADS-DV from a conventional vehicle in the interaction plans.</li> </ul>
Contact ADS-DV Fleet Operator	First responders may need to contact fleet operators to obtain information relevant to a situation.	<ul style="list-style-type: none"> <li>• Developers, manufacturers, and fleet operators should document instructions for contacting and coordinating with fleet operators in their interaction plans.</li> <li>• Fleet operators should ensure availability during the anticipated hours of operation for contact by first responders.</li> </ul>
Access Required Documentation	State and local laws mandate copies of required documentation be present in the vehicle, such as vehicle registration and proof of insurance. In addition, physical documentation and information associated with registration, insurance, or other fleet information may also be provided through the license plate or by contacting fleet operators.	<ul style="list-style-type: none"> <li>• ADS-DVs will comply with applicable laws pertaining to documentation of registration and insurance.</li> <li>• Specific guidance for obtaining required documentation from fleet operators, or describing how to locate and access required documentation, should be documented by developers, manufacturers, and fleet operators in the interaction plans.</li> <li>• In a non-emergency, fleet operators may ask first responders to provide information regarding their credentials, such as their name and badge number, so their identity may be verified with their agency before the fleet operator grants them access to the vehicle or paperwork. This should occur according to pre-established protocols and training.</li> </ul>



First Responder Informational Interaction	Considerations for Informational Interaction	ADS-DV Recommendations
Identify ADS-DV Owner or Service Provider	First responders need to identify the owner or service provider as part of their notification and investigation process. Fleet-operated ADS-DVs may present unique challenges for determining the owner or service provider of a vehicle.	<ul style="list-style-type: none"> <li>• ADS-DV developers, manufacturers, and fleet operators may need to coordinate with local authorities to determine unique requirements for establishing the owner or service provider and allowable means for communicating the owner or service provider to first responders.</li> <li>• Instructions for first responders to identify the ADS-DV owner or service provider should be documented by developers, manufacturers, and fleet operators and included in the interaction plans.</li> </ul>
Identify ADS-Related Hazards	First responders will need to be aware of platform and ADS-related hardware hazards (e.g., electrical power storage, high-voltage wiring and routing, fuel tank location, fuel lines).	<ul style="list-style-type: none"> <li>• Platform and ADS-related hardware hazards (e.g., electrical power storage, high-voltage wiring and routing, fuel tank location, fuel lines) should be labeled per industry standards.<sup>7</sup></li> <li>• If contacted by first responders, fleet operators should be prepared to provide emergency response information about hazards associated with the ADS system or base vehicle.</li> </ul>
Determine Presence of Passengers (see 6.3 for training information)	Depending on the platform and use case, ADS-DVs may transport goods or people, or they may be empty (e.g., repositioning themselves, waiting to be called to service). ADS-DV visibility into the interior of the vehicle will vary by developer and manufacturer in accordance with laws and regulations. First responders need to determine the presence and number of passengers.	<ul style="list-style-type: none"> <li>• ADS-DVs should allow first responders a means to determine the presence and number of passengers (e.g., visual inspection).</li> <li>• Fleet operators should assist first responders with available information regarding the presence and number of passengers as allowable by law.</li> </ul>
Accessing ADS-DV Data	ADS-DV data recording is important to crash reconstruction, system performance investigations, and event analysis to identify lessons learned to enable industry-wide improvements in ADS safety. <sup>8</sup> Though an ADS can collect data from many different sources, this data is protected and only accessible by the appropriate first responder agency via due process. ADS-DV data is not directly accessible by first responders prior to arriving on the scene, while securing the scene, or as part of post-incident investigation.	<ul style="list-style-type: none"> <li>• Developers, manufacturers, and fleet operators should take “privacy by design” into consideration and should consider the various privacy protections as set forth by the applicable laws.<sup>9</sup></li> <li>• Developers, manufacturers, and fleet operators should establish procedures for protecting ADS data privacy during first responder interactions.</li> </ul>

### 5.4 Linking Use Cases to Interactions

See [Table 4](#) under [Appendix B](#) for a checklist that summarizes the linkages between each use case and each specific interaction organized by interaction type. [Appendix B](#) provides an easy reference to align the use cases described in [Section 4](#) with the interaction types described in [Section 5](#).

<sup>7</sup> For hazard labeling, refer to SAE J3108, *xEV Labels to Assist First and Second Responders, and Others* and SAE J2936, *SAE Electrical Energy Storage Device Labeling Recommended Practice*.

<sup>8</sup> Considerations for data collection for event reconstruction are addressed in AVSC00004202009, *AVSC Best Practice for Data Collection for Automated Driving System-Dedicated Vehicles (ADS-DVs) to Support Event Analysis*. It can also serve as part of the foundation for future discussions on sharing of data and lessons learned for industry-wide learning.

<sup>9</sup> Examples of existing privacy statutes are Texas Transportation Code § 547.615. Recording Devices, California Consumer Privacy Act (CCPA), and General Data Protection Regulation (GDPR).

## 6. Interaction Plan Framework

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**ADS developers, manufacturers, and fleet operators should have—or should develop—a First Responder Interaction Plan.** ADS-DV deployments should be accompanied by documentation providing all the information first responders might need to safely interact with the vehicle. The plan may include detailed documentation procedures, content about ADS platforms and systems, and specific instructions for the operating design domain where ADS-DVs are tested and deployed. A minimum set of interaction plan elements is recommended in [6.1.1](#). In addition to written instructions or descriptions for each element, developers, manufacturers, and fleet operators are encouraged to include diagrams, graphics, videos, or other appropriate means detailing procedural steps or other considerations.

The interaction plan framework consists of three aspects, all of which contribute to safe interactions:

1. Develop an interaction plan, including a minimum set of key elements.
2. Publish and maintain an interaction plan.
3. Provide ADS content to support first responder training development.

States and IOOs can utilize this framework as a reference to develop questions to pose to developers, manufacturers, and fleet operators operating in their jurisdictions.

### 6.1 Develop an Interaction Plan

**ADS developers, manufacturers, and fleet operators should develop a First Responder Interaction Plan. Input from first responders should be considered wherever possible and applicable.** All plans should be developed to meet the needs of first responders in an ODD.<sup>10</sup> Efforts should be made to address the concerns of local authorities and first responder stakeholders during planning and throughout operations. Ideally, developers, manufacturers, and fleet operators should develop interaction plans using a collaborative process with the first responders and emergency services community.

#### 6.1.1 Minimum Set of Interaction Plan Elements

**ADS developers, manufacturers, and fleet operators should include a minimum set of key elements in their interaction plans.** Recommended elements were derived from research [1], state requirements, developer and manufacturer guides, and on-road ADS experiences. An interaction plan is not limited to these elements and should be developed to best meet the requirements of first responders that may interact with ADS-DVs during the deployment. Many of the key elements relate to recommendations in [Section 5](#).

##### 6.1.1.1 Introduction

Describe and provide background on the process used to develop the plan, how the information is organized, the stakeholders included in creating the plan, and the review/update process and schedule.

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<sup>10</sup> Although wireless communications are out of scope for this document, developers, manufacturers, and fleet operators should address external communication technologies or infrastructure if relevant to the ODD. If applicable, a description of the capability, procedures, and other information should be included in the discussion with relevant elements.

### 6.1.1.2 Description of the ODD

Provide a description of the ODD elements wherein the ADS-DVs will operate, utilizing the elements of AVSC00002202004, *AVSC Best Practice for Describing an Operational Design Domain: Conceptual Framework and Lexicon*. At a minimum, the ODD description should include the following elements:

- Geographical area description, including applicable limitations.
- Road types, e.g., divided roads, one-way streets, highways.
- Speed range.
- Weather condition.
- Time of day.

Any updates to the described ODD, determined by manufacturers, developers, and fleet operators to materially alter first responder interactions with the ADS-DV, should prompt a revision to the interaction plan.

### 6.1.1.3 Fleet Operations

Describe the role(s) and responsibilities, type(s) of services provided, and hours of fleet operations.

NOTE: The ADS operator may verify a valid first responder request and prevent unauthorized access, misuse, and abuse following internally established non-public protocol. See [Table 3](#).

### 6.1.1.4 Identifying ADS-DVs

Provide a description, pictures, diagrams, or other means to identify the ADS-DVs. See [Table 3](#).

### 6.1.1.5 Contact Information

Describe the location of, or methods for determining, contact information to reach fleet operations. Contact information should be accessible under all conditions, i.e., no access to the interior of the vehicle. Consider including alternative contact methods in addition to accessing vehicle interior, such as phone number(s), vehicle ID code, website, or QR code.

NOTE: First responders may not be authorized to carry mobile/smart phones. See [Table 3](#).

### 6.1.1.6 Disabling ADS-DV

Provide instructions to safely approach the ADS-DV and how to determine the vehicle's mode (e.g., autonomous mode). Provide instructions for immobilizing the ADS-DV. Emphasis should be placed on special instructions or additional steps required to disable or immobilize the ADS-DV beyond traditional first responder stabilization procedures. Provide instructions that the ADS will remain stationary and, specific to vehicle movement, safe for first responders to operate around it. See [Table 1](#).

### 6.1.1.7 Accessing Required Documentation

Provide instructions for accessing vehicle information, such as owner or service provider information, vehicle registration, and proof of insurance. See [Table 3](#).

### 6.1.1.8 De-Powering ADS-DV

Describe the vehicle's electrical power source(s) and instructions for safely disconnecting or otherwise disabling electrical power on the vehicle. See [Table 1](#).

### 6.1.1.9 Moving ADS-DV from Roadway

Provide instructions that enable first responders to act independently or in concert with fleet operations to drive or otherwise safely remove the ADS-DV from the active portion of the roadway. Include instructions for first responders to move the ADS-DV from the roadway if they are unable to contact fleet operations. See [Table 1](#).

### 6.1.1.10 Determining Presence of Passengers

Describe the means for determining the presence of passengers and how first responders may assist them with exiting the vehicle. See [Table 3](#).

### 6.1.1.11 Extricating Passengers

Describe any special considerations for extricating passengers from the ADS-DV. Include appropriate and inappropriate cut points or cut zones in the vehicle body/structure. Include potential hazards which may be unfamiliar to first responders. Highlight any steps or procedures that differ from traditional vehicles when extricating a passenger from the ADS-DV. See [Table 1](#) and [Table 3](#).

### 6.1.1.12 Firefighting on or Around ADS-DV

Describe any unique hazards or other special considerations for extinguishing fires on or around the vehicle, if applicable. See [Table 3](#).

### 6.1.1.13 Safe Towing ADS-DV

Provide instructions for coordinating with fleet operators and safety considerations for first responders needing to tow the ADS-DV from the roadway. Include instructions for first responders to tow the ADS-DV if they are unable to contact fleet operations. See [Table 1](#).

### 6.1.1.14 Releasing ADS-DV

Describe how to communicate the ADS-DV's release after the vehicle has been signaled and pulled over (e.g., traffic stop). See [Table 2](#).

### 6.1.1.15 Accessing ADS-DV Data

Describe the process to access ADS data during/after first responder interactions. See [Table 3](#).

### 6.1.1.16 Other Considerations

Any special considerations for first responder activities could be included in the interaction plan in this section. Describe other interaction procedures and considerations not addressed in this best practice that may be specific to the ODD or identified during stakeholder engagement activities.

## 6.2 Publish and Maintain an Interaction Plan

**ADS developers, manufacturers, and fleet operators should publish and distribute their interaction plans.** Publication and distribution should be accomplished through an appropriate media and method for relevant stakeholders (e.g., internet website address, printed materials, presentations, app).

Interaction plans should be periodically reviewed and updated as technologies, operational conditions, use cases, regulatory guidance, or related considerations may result in a material change in first responder interactions with ADS-DVs. Subsequent changes need to be communicated expeditiously to the first responder community.

### 6.3 ADS Content to Support First Responder Training Development

ADS developers, manufacturers, and fleet operators should collaborate, as needed, with first responders as they operationalize protocols and procedures in their jurisdictions. Developers should have an established pathway and protocol for providing training to first responders on the critical elements of interacting with the ADS-DV in a range of event circumstances. This process should include a reference to resources, videos, or in-person training classes. Training should be updated regularly as needed to ensure first responders have the most recent information. **ADS developers, manufacturers, and fleet operators should provide ADS platform and system content to assist first responders in the development of training materials as it is central to first responder responsibilities, safety, etc.** [Section 6.1.1](#) includes the minimum set of ADS content that should be available to first responders. ADS platform and system content may be made available or distributed via web-based tools, written media, or in-person/classroom sessions. Recommendations or assistance with training should reference information in the interaction plan and may be directly linked as appropriate.

## 7. Summary

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As more first responders are required to interact with ADS-DVs, the need for common procedures and training increases. This best practice outlines key roles, interaction types, and use cases associated with first responder interactions with ADS-DVs. Recommendations for ADS manufacturers, developers, and fleet operators are provided to promote safe interactions. This best practice contains a recommended format for a First Responder Interaction Plan, with a minimum set of key elements to be included. It also provides considerations for developing, distributing, training, and maintaining an interaction plan that will inform, educate, and communicate important information to first responders.

## 8. About Automated Vehicle Safety Consortium™

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The objective of the Automated Vehicle Safety Consortium™ (AVSC) is to provide a safety framework around which automated vehicle technology can responsibly evolve in advance of the broad use of commercialized vehicles. The consortium will leverage the expertise of its current and future members and engage government and industry groups to establish safety principles and best practices. These technology neutral principles are key considerations for deploying SAE level 4 and level 5 automated vehicles on public roads.

### **AVSC Vision:**

Public acceptance of SAE level 4 and level 5 automated driving systems as a safe and beneficial component of transportation through industry consensus.

### **AVSC Mission:**

The mission of the Automated Vehicle Safety Consortium™ (AVSC) is to quickly establish safety principles, common terminology, and best safety practices, leading to standards to engender public confidence in the safe operation of SAE level 4 and level 5 light-duty passenger and cargo on-road vehicles ahead of their widespread deployment.

The AVSC will:

- Develop and prioritize a roadmap of pre-competitive topics.
- Establish working groups to address each of the topics.
- Engage the expertise of external stakeholders.
- Share output/information with the global community.
- Initially focus on fleet service applications.

## 9. Contact Information

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To learn more about the Automated Vehicle Safety Consortium™, please visit <https://avsc.sae-itc.org>.

Contact: [AVSCinfo@sae-itc.org](mailto:AVSCinfo@sae-itc.org).

## 10. Acknowledgements

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## 11. Abbreviations

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ADS	Automated driving system
ADS-DV	Automated driving system-dedicated vehicle
APSCS	Automation and Public Safety Common Solutions
AVSC	Automated Vehicle Safety Consortium™
CAMP	Crash Avoidance Metrics Partnership, LLC
DDT	Dynamic driving task
DV	Dedicated vehicle
EMT	Emergency medical technician
GHSA	Governors Highway Safety Association
IOO	Infrastructure owner-operator
MRC	Minimal risk condition
NHTSA	National Highway Traffic Safety Administration
NSTC	National Science and Technology Council
ODD	Operational design domain
SAE ITC	SAE Industry Technologies Consortia®
SMS	Safety Management System
VTTI	Virginia Tech Transportation Institute

## APPENDIX A. Best Practice Quick Look

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**Roles (3.6).** Roles associated with first responders and others.

**First Responder and ADS-DV Interaction Use Cases (Section 4).** Use case descriptions provided as context for first responder interactions.

**First Responder and ADS-DV Interaction Types and Recommendations (Section 5).** Three general types of interactions are anticipated between first responders and ADS-DVs. [Appendix B](#) summarizes linkages between use cases and interaction types.

- **Direct interactions (5.1).** Involves physical contact between a first responder and an ADS-DV. Recommendations for direct interactions are included in [Table 1](#).
- **Indirect interactions (5.2).** Involves a first responder influencing an ADS-DV without coming into physical contact. Recommendations for indirect interactions are included in [Table 2](#).
- **Informational interactions (5.3).** Interactions between a first responder and an ADS-DV occur when information must be obtained from or about a vehicle by the first responder. Recommendations for informational interactions are included in [Table 3](#).
- **Linking use cases to interaction types (5.4).** [Appendix B](#) summarizes interaction use cases described in [Section 4](#) with the interaction types described in [Section 5](#).

**Interaction Plan Framework (Section 6).** Framework for developing, publishing, and communicating an interaction plan. **ADS developers, manufacturers, and fleet operators should have a first responder interaction plan.**

- **Develop an interaction plan (6.1).** ADS developers, manufacturers, and fleet operators should develop an interaction plan, including input from first responders wherever possible and applicable.
- **Minimum set of interaction plan elements (6.1.1).** Developers, manufacturers, and fleet operators should include a minimal set of key elements in their interactions plans.
  - Introduction ([6.1.1.1](#)).
  - Description of ODD ([6.1.1.2](#)).
  - Fleet operations ([6.1.1.3](#)).
  - Identifying ADS-DVs ([6.1.1.4](#)).
  - Contact information ([6.1.1.5](#)).
  - Disabling ADS-DV ([6.1.1.6](#)).
  - Accessing required information ([6.1.1.7](#)).
  - De-powering ADS-DV ([6.1.1.8](#)).
  - Moving ADS-DV from roadway ([6.1.1.9](#)).
  - Determining presence of passengers ([6.1.1.10](#)).
  - Extricating passengers ([6.1.1.11](#)).

- Firefighting on or around ADS-DVs ([6.1.1.12](#)).
  - Safe towing ADS-DV ([6.1.1.13](#)).
  - Releasing ADS-DV ([6.1.1.14](#)).
  - Accessing ADS-DV data ([6.1.1.15](#)).
  - Other considerations ([6.1.1.16](#)).
- **Publish and maintain an interaction plan ([6.2](#))**. ADS developers, manufacturers, and fleet operators should publish and distribute their interaction plans. Interaction plans should be updated when material changes affecting the ADS-DV and first responder interactions occur.
  - **ADS Content to Support First Responder Training Development ([6.3](#))**. ADS developers, manufacturers, and fleet operators should provide the ADS platform and system content to assist first responders in the development of training materials.



## APPENDIX B. Use Case versus Interactions

**TABLE 4** Checklist of recommendations that align to interactions listed within each interaction plan

Use Case	Direct Interaction (5.1)		Indirect Interaction (5.2)		Informational Interaction (5.3)	
<b>Stabilization and Extrication (4.1)</b>	Access ADS-DV interior	✓	Approach ADS-DV	✓	Access required documentation	
	De-power ADS-DV	✓	Communicate with ADS-DV <sup>(1)</sup>		ADS-DV data	
	Disable ADS-DV	✓			ADS-DV data integrity	
	Move away from roadside				Contact ADS-DV fleet operator	
					Determine presence of passengers	✓
					Identify ADS-DV	
					Identify ADS-DV owner or service provider	
				Identify ADS-related hazards	✓	
<b>Securing a Scene Involving an ADS-DV (4.2)</b>	Access ADS-DV interior	✓	Approach ADS-DV	✓	Access required documentation	✓
	De-power ADS-DV		Communicate with ADS-DV <sup>(1)</sup>	✓	ADS-DV data	
	Disable ADS-DV	✓			ADS-DV data integrity	✓
	Move away from roadside	✓			Contact ADS-DV fleet operator	✓
					Determine presence of passengers	✓
					Identify ADS-DV	✓
					Identify ADS-DV owner or service provider	✓
				Identify ADS-related hazards		
<b>Traffic Direction and Control (4.3)</b>	Access ADS-DV interior		Approach ADS-DV		Access required documentation	
	De-power ADS-DV		Communicate with ADS-DV <sup>(1)</sup>	✓	ADS-DV data	
	Disable ADS-DV				ADS-DV data integrity	
	Move away from roadside				Contact ADS-DV fleet operator	✓
					Determine presence of passengers	
					Identify ADS-DV	✓
					Identify ADS-DV owner or service provider	
				Identify ADS-related hazards		
<b>Traffic Stop or Checkpoint (4.4)</b>	Access ADS-DV interior		Approach ADS-DV	✓	Access required documentation	✓
	De-power ADS-DV		Communicate with ADS-DV <sup>(1)</sup>	✓	ADS-DV data	✓
	Disable ADS-DV				ADS-DV data integrity	
	Move away from roadside				Contact ADS-DV fleet operator	✓
					Determine presence of passengers	
					Identify ADS-DV	✓
					Identify ADS-DV owner or service provider	✓
				Identify ADS-related hazards		

Use Case	Direct Interaction (5.1)		Indirect Interaction (5.2)		Informational Interaction (5.3)	
<b>Interacting with ADS-DVs in Traffic (4.5)</b>	Access ADS-DV interior		Approach ADS-DV		Access required documentation	
	De-power ADS-DV		Communicate with ADS-DV <sup>(1)</sup>	✓	ADS-DV data	
	Disable ADS-DV				ADS-DV data integrity	
	Move away from roadside				Contact ADS-DV fleet operator	✓
					Determine presence of passengers	
					Identify ADS-DV	
					Identify ADS-DV owner or service provider	
				Identify ADS-related hazards		
<b>ADS Emergency Assistance (4.6)</b>	Access ADS-DV interior	✓	Approach ADS-DV	✓	Access required documentation	✓
	De-power ADS-DV	✓	Communicate with ADS-DV <sup>(1)</sup>	✓	ADS-DV data	
	Disable ADS-DV	✓			ADS-DV data integrity	
	Move away from roadside	✓			Contact ADS-DV fleet operator	✓
					Determine presence of passengers	✓
					Identify ADS-DV	✓
					Identify ADS-DV owner or service provider	
				Identify ADS-related hazards	✓	
<b>Unattended ADS-DV (Not in a Parking Spot) (4.7)</b>	Access ADS-DV interior	✓	Approach ADS-DV	✓	Access required documentation	
	De-power ADS-DV	✓	Communicate with ADS-DV <sup>(1)</sup>	✓	ADS-DV data	
	Disable ADS-DV	✓			ADS-DV data integrity	
	Move away from roadside	✓			Contact ADS-DV fleet operator	✓
					Determine presence of passengers	✓
					Identify ADS-DV	✓
					Identify ADS-DV owner or service provider	
				Identify ADS-related hazards		

<sup>(1)</sup> Communicating with an ADS-DV may require contacting and coordinating with fleet operators.