Texas First Responder Guide

for Interactions with Automated Vehicles (AVs)

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Disclaimer

This guide reflects best practices on first responder interactions with autonomated vehicles as of the date of publication. It does not anticipate technologies, scenarios, policies, procedures, or best practices that may arise in the future. Because information provided in this guide is subject to change, please refer to existing or future applicable policies and procedures that preempt the contents of this guide.

Revisions

TxDOT will revise this guide as needed. TxDOT welcomes recommendations on how to improve this guide. Provide recommendations for improving this document to RTIMAIN@txdot.gov.

Introduction and Overview

This guide provides Texas first responders methods to safely and efficiently respond to a multitude of routine and adverse incident scenarios involving automated vehicles (AVs). It contains a catalog of 19 scenarios and best practices developed by the project team using first responder standards and industry practices.

This guide is divided into six main scenario sections:

- Law Enforcement Officer (LEO) Routine Interactions
- Secondary Interactions
- Commercial Motor Vehicle (CMV) Interactions
- LEO Non-Routine Interactions
- Crash Response and Investigation
- Traffic/Parking Management and Enforcement

How to Use This Guide

Scenario

Each scenario will include a “Scenario” title section. This section briefly describes the scenario and what vehicle autonomy level the scenario applies to.

Scenario Type

Each scenario will include a “Scenario Type” section. This section briefly describes the category classification for the scenario. Each scenario will have a “Primary Scenario Type” and, if applicable, a “Secondary Scenario Type.” The categories are LEO Routine Interactions; Secondary Interactions; CMV Interactions; LEO Non-Routine Interactions; Crash Response and Investigations; and Traffic/Parking Management and Enforcement.

Responder Type

Each scenario will include a “Responder Type” section. This section briefly describes which responders the scenario applies to. Each scenario will have a “Primary Responder Type” and, if applicable, a “Secondary Responder Type.” The categories are Firefighting and Emergency Medical Services (EMS); Law Enforcement; Crash Investigation; Courtesy Patrols, Highway Emergency Response Operator (HERO), Towing, and Traffic Management; Flaggers/Traffic Direction; and Combined Response Involving Multiple Response Agencies.

Scenario Context

Each scenario will include a “Scenario Context” section. This section briefly describes the circumstances of what the scenario consists of and how it can take place. It also states the vehicle autonomy level the scenario applies to.

Best Practice

Each scenario will include a “Best Practice” section. This section describes steps to address the scenario. These best practices are recommendations, not regulations or requirements. They leave room for jurisdictional guidance. Best Practice steps highlighted in blue in any scenario indicate steps added by TTI/TEEX to existing best practices to address AV-specific considerations.

Notes

Most scenarios will include a “Notes” section. This section contains information and additional context necessary to understand the scenario and best practice guidance.

Notes on the Development of Scenarios and Best Practices

The project team developed a list of scenarios and best practices to guide first responders in their interactions with automated vehicles, drawing from a wide range of sources. These sources include AV operator law enforcement and first responder interaction plans, federal, state, and local administrative codes, road safety and engineering manuals such as the current edition of the Manual on Uniform Traffic Control Devices, and first responder training manuals, guides, and standard operating procedures.

Notes on Acronyms and Terminology

Many references refer to *autonomous vehicles* (AVs) or *connected autonomous vehicles* (CAVs). The Texas Transportation Code uses the phrase *automated vehicles*. This document may use *autonomous vehicles* and *automated vehicle*s interchangeably. The abbreviation AV in this guide represents automated or autonomous vehicles.

NOTE: While AV or CAV and the phrase *autonomous vehicles* may refer to any level of autonomy, under Texas law, only SAE International (SAE) Level 3 to 5 automation capable vehicles meet the definition used in the Texas Transportation Code for *automated vehicles*. When required, the proper terminology will appear in place of the abbreviation.

Acronyms and Terminology

Appendix A identifies acronyms and terminology.

Additional Materials

Texas Automated Vehicle Recognition Guide for First Responders

The Texas Automated Vehicle Recognition Guide for First Responders is a companion to this guide. It provides essential information to assist in the identification and recognition of AVs testing or operating in Texas as of the date of publications, including detailed photographs and descriptions of key components for each AV model.

Texas Automated Vehicle Operator Contact Sheet

The Texas Automated Vehicle Operator Contact Sheet, provided only to first responders separate from this guide, provides emergency hotline numbers and non-emergency contact details for AV operators in Texas. This list is not exhaustive, as some operators did not supply some or any contact information. The contact sheet may help first responders access relevant operator information when needed.

First Responder Interaction Plans (FRIPs)/Law Enforcement Interaction Plans (LEIPs)

Some AV operators in Texas produced FRIPs/FEIPs, which provide first responders with information on how to interact with their specific AV models. Texas does not require such plans. These plans include information to assist in identifying vehicles, locating necessary documents, approaching vehicles, how to confirm the status of autonomy, how to disengage autonomy (if possible), and safety considerations for each vehicle operated by the respective company. While not mandatory in Texas, several companies proactively developed these guides and will share them with first responders on request.

Preparing Communities for AV Deployment

Upon learning an AV operator intends to operate in your jurisdiction, best practices developed by cities where AVs operate now include:

- Consult with the AV operator
  - Request first responder guides, FRIPs/LEIPss, emergency response guides, and extrication guides
    - NOTE: Interaction plans and guides may not be available as they are currently not required in Texas
  - Request AV Operators to conduct training for your first responders on how to interact with their vehicles
  - Obtain emergency contact and non-emergency contact information for the AV operator and share that information with your first responder organizations and dispatch centers
    - NOTE: Some AV operator emergency and non emergency contact information can be found in the Texas Automated Vehicle Operator Contact Sheet
- Form an AV Safety Task Force including key stakeholders (e.g., police, fire, public works, local elected leaders)
  - Conduct regular meetings between AV operator representatives and the AV Safety Task Force and first responders to address issues identified during operations
  - Consult with cities where AVs operate now
- Consider creating an AV incident tracking system for first responders that tracks incident details involving AVs and can provide the basis for discussions with AV operators
- Consider implementing geofencing
  - Provide the AV operator with the locations of sensitive facilities their vehicles should avoid (such “geofencing” is typical around fire stations, hospital entrances, and similar locations) or where the company may wish to exercise caution or choose to avoid (school zones, bus stops, youth centers)
  - Consider implementing a temporary geofence request system for serious or prolonged incidents or special events where humans may direct traffic or an active response may require a driver to deviate from the established rules of the road (e.g., drive on the shoulder of the roadway) – coordinate with the AV Operators to implement temporary geofences, discuss duration, and consider how the location may shift or, the duration may extend
  - Request for the AV operator to monitor response organizations’ social media accounts in their operating jurisdiction to react to incidents that may cause roadway shutdowns or affect their operations in another way
    - Recommend that they establish an internal key word notification system to monitor official social media accounts and give quick notification of a key word being used (e.g., traffic, crash, fire, swat, homicide, emergency) in a location or specific road where they operate

Levels of Vehicle Autonomy

A vehicle's level of autonomy relates to its capacity to operate and navigate with limited or no human intervention. SAE created an evolving framework consisting of five distinct levels of autonomy. These levels, outlined in SAE J3016 *Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles* (2021) and reproduced below, represent a hierarchical advancement in automation based on the extent to which the motor vehicle can independently perform driving tasks. Figure 1 shows the SAE Levels of Driving Automation and provides information on human driver engagement and support features for each level of automation. Table 1 provides examples of common features at each autonomy level, along with their designations and codes as used on the Texas CR-3 *Texas Peace Officer's Crash Report Form*. Law enforcement and first responders should familiarize themselves with these classifications to accurately assess and report autonomous vehicle involvement in incidents.

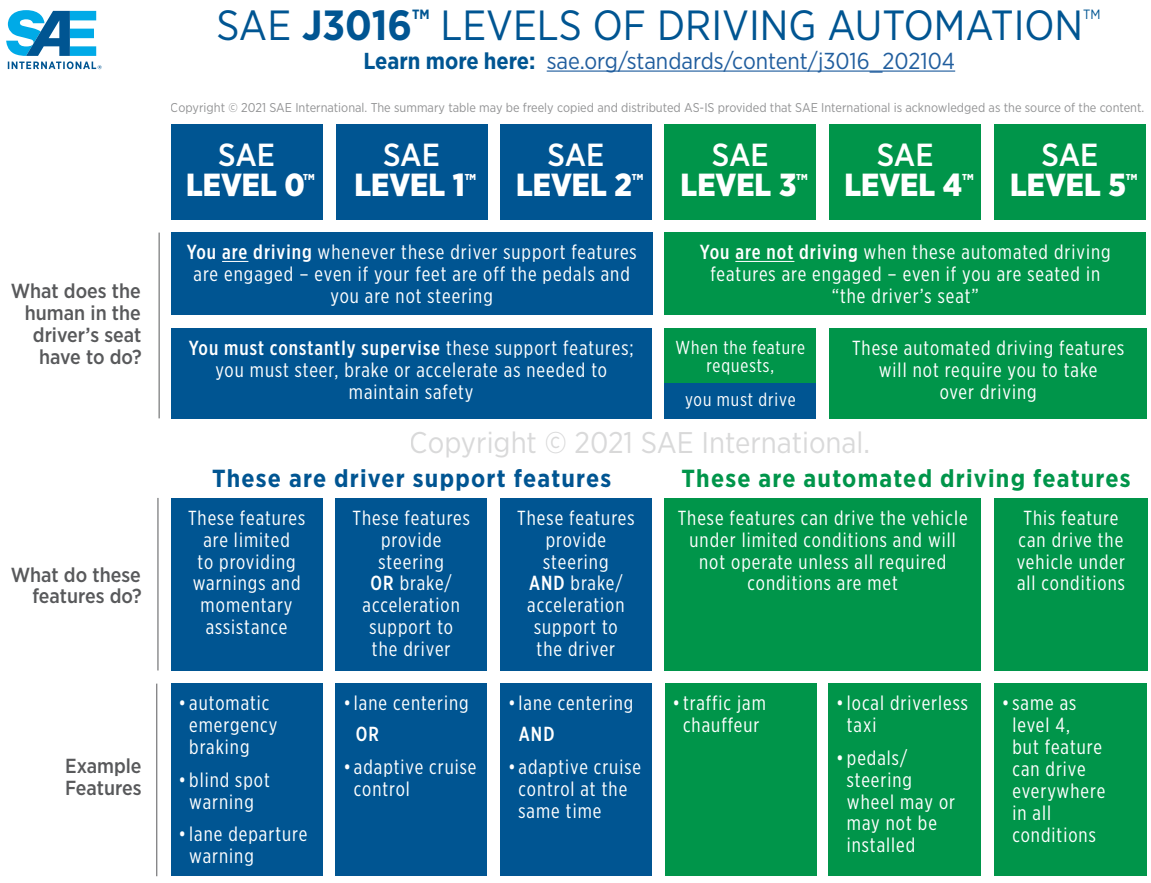


Figure 1. SAE Levels of Driving Automation (SAE, 2021)

Table 1. SAE International Levels of Driving Autonomy and Corresponding TXDOT CR-3 Codes

SAE Levels of Autonomy	SAE Level Examples	Texas CR-3 Code
SAE Level 0 No Automation	• Automatic Braking • Blind Spot Warning • Lane Departure Warning	**0** No Automation
SAE Level 1 Driver Assistance	• Lane Centering **OR** • Adaptive Cruise Control	**1** Driver Assistance
SAE Level 2 Partial Automation	• Lane Centering **AND** • Adaptive Cruise Control	**2** Partial Assistance
SAE Level 3 Conditional Automation	• Traffic Jam Chauffer • Automated driving in limited conditions	**3** Conditional Automation
SAE Level 4 High Automation	• Local Driverless Taxi Service • May Not Possess Traditional Driving Operation Features (Wheels or Pedals) • Automated driving in limited conditions	**4** High Automation
SAE Level 5 Full Automation	• Vehicle Can Drive Anywhere in All conditions	**5** Full Automation
		6 Automation Level Unknown
		99 Unknown (Use when Autonomous Unit Engaged Status [Box 8] is Unknown)

NOTE: SAE levels of autonomy may be referred to as an "L" in industry documents (e.g., SAE Level 4 as L4).

SAE Level 1-3

Vehicles manufactured between 2010 and 2016 may include advanced driver assistance systems (ADAS) at SAE Level 1 and 2. Vehicles manufactured after 2016 include such capabilities more often. Such features include adaptative cruise control and lane keeping assistance. SAE Level 3 vehicles only recently entered the U.S. market, which may include more advanced self-driving features that function in more limited circumstances. SAE Level 1-3 vehicles generally appear similar to other vehicles on the road and employ less visible sensors and cameras than those at higher levels of automation. Drivers must be in control or ready to take control of an SAE Level 1-3 vehicle at all times. Under the Texas Transportation code, such vehicles are not classified as fully automated vehicles.

SAE Level 4-5

SAE Level 4 and 5 automated vehicles do not require a driver ready to take control, and operate using automated driving systems (ADS). Current SAE Level 4 vehicles on Texas roadways include passenger vehicles operating as ride-hailing services, commercial motor vehicles (trucks and tractor-trailers), and delivery robots operating in the roadway. There are no SAE Level 4 vehicles currently available for consumer purchase and such vehicles remain in development, operated by the companies developing them. Such vehicles may or may not include a safety driver, and those operating driverless may be monitored remotely by the AV operator. Many SAE Level 4 vehicles have more prominent external components that make them distinguishable from other vehicles. Presently, no SAE Level 5 vehicles exist.

Autonomous Vehicle Diagrams and Components

Figures 2-7 provide diagrams for various autonomous vehicle types with key components and features labeled. Notable features include:

- **Front and Top-Mounted Cameras:** Frequently used inexpensive technology, however, complex algorithms are necessary to interpret the image data collected
- **Cameras Inside the Storage Area:** Used to verify products and assist in customer service (Typically utilized for delivery service automated vehicles and robots)
- **Front and Rear-Mounted InfraRed Sensors:** Allow for the detection of lane markings, pedestrians, and bicycles that are hard for other sensors to detect in low lighting and certain environmental conditions
- **Front-Mounted Radio Detecting and Ranging (RADAR):** A sensor that uses radio waves to determine the distance between obstacles and the sensor
- **Global Positioning Systems (GPS):** Locate the vehicle by using satellites to triangulate its position. Although GPS has improved since the 2000s, it is only accurate within several meters
- **Light Detection and Ranging (LiDAR):** A 360-degree sensor that uses light beams to determine the distance between obstacles and the sensor
- **Ultrasonic Sensors:** Provide short distance data that are typically used in parking assistance systems and backup warning systems

> **Note**
>
> Images of the AVs operating in Texas at the time of publication can be found in the Texas Automated Vehicle Recognition Guide for First Responders. Images may show details and components specific to the vehicle or operator which may assist responders with proper AV identification.

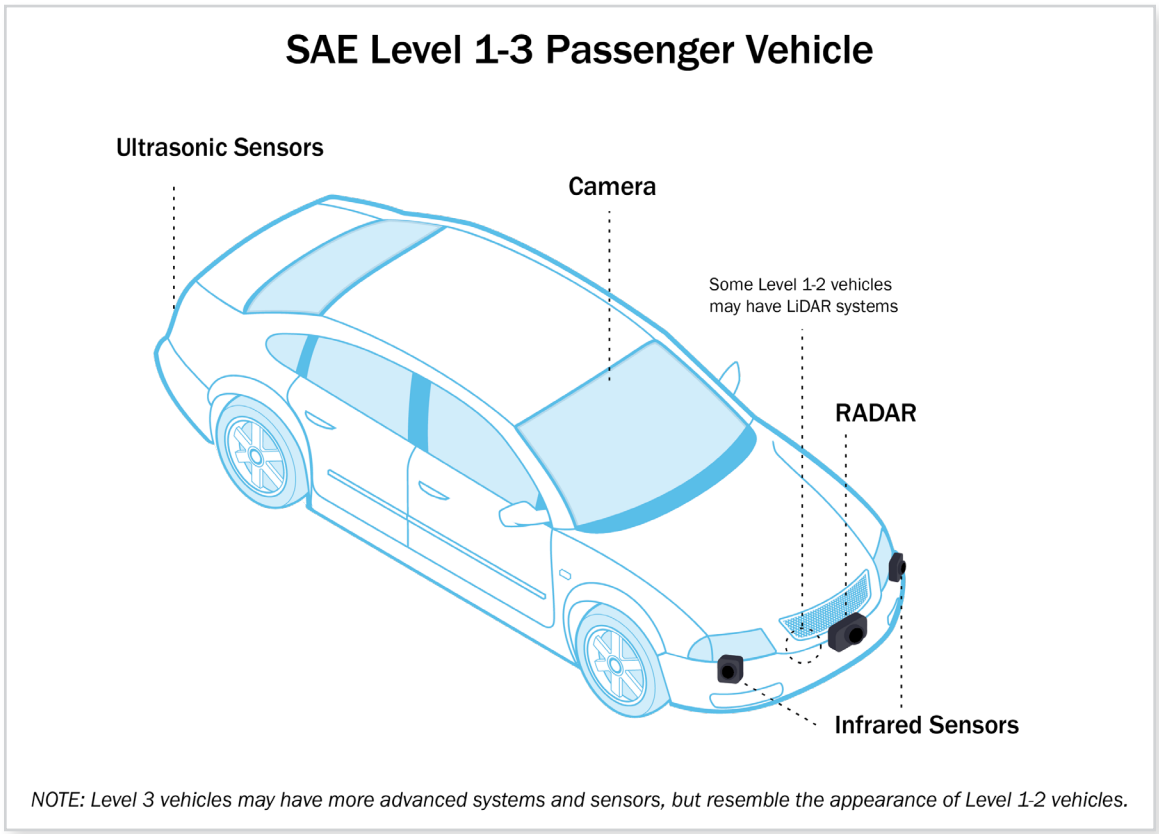


Figure 2. Diagram of an SAE Level 1-3 Passenger Vehicle

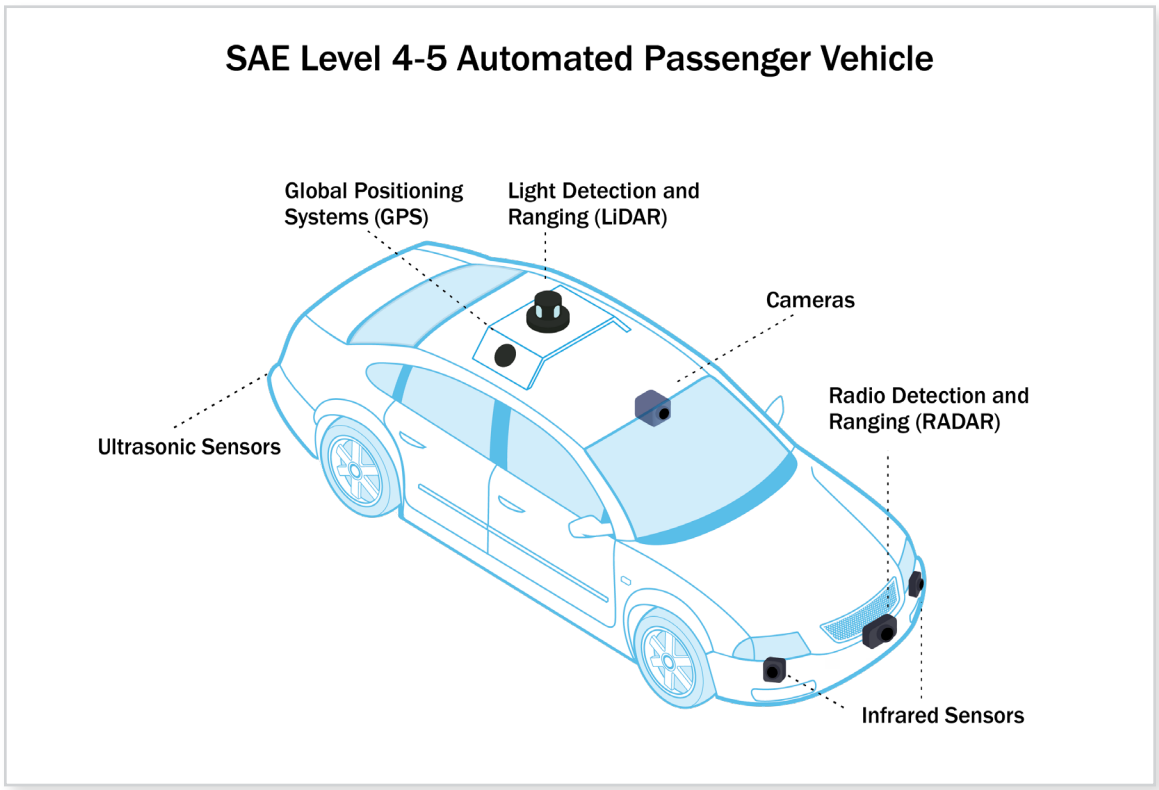


Figure 3. Diagram of an SAE Level 4-5 Automated Passenger Vehicle

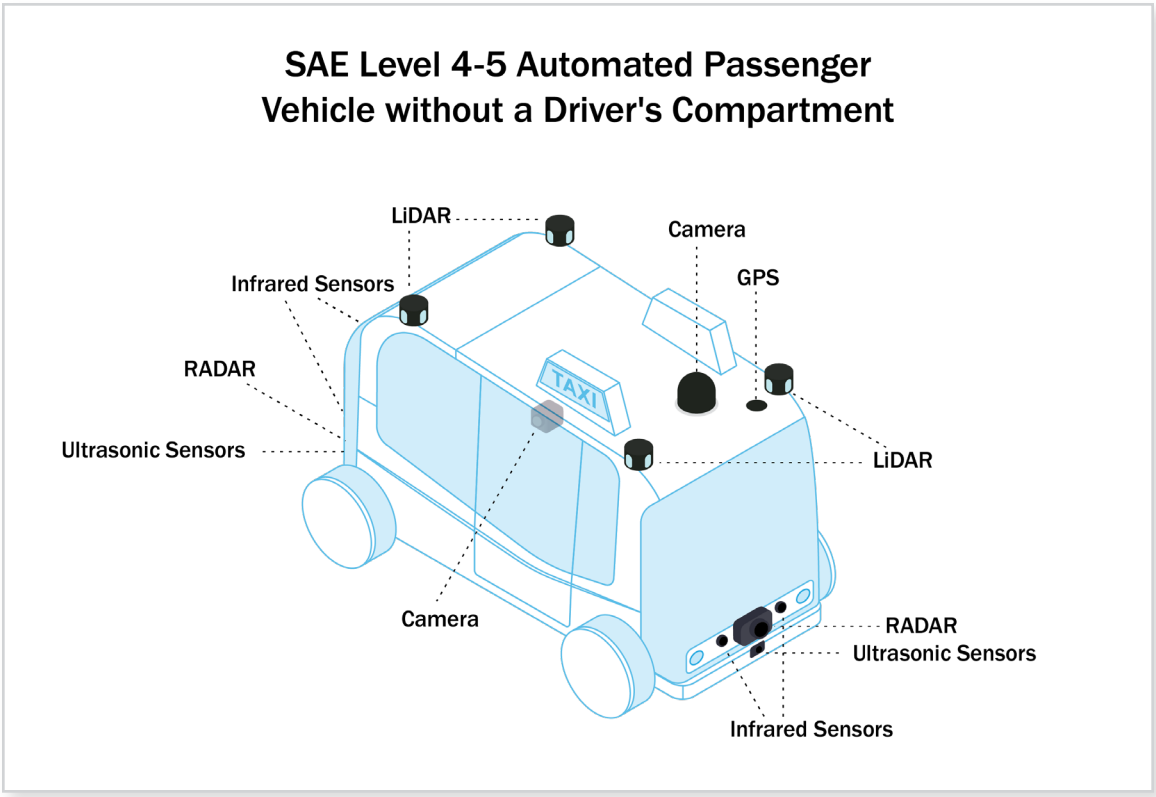


Figure 4. Diagram of an SAE Level 4-5 Automated Passenger Vehicle without a Driver's Compartment

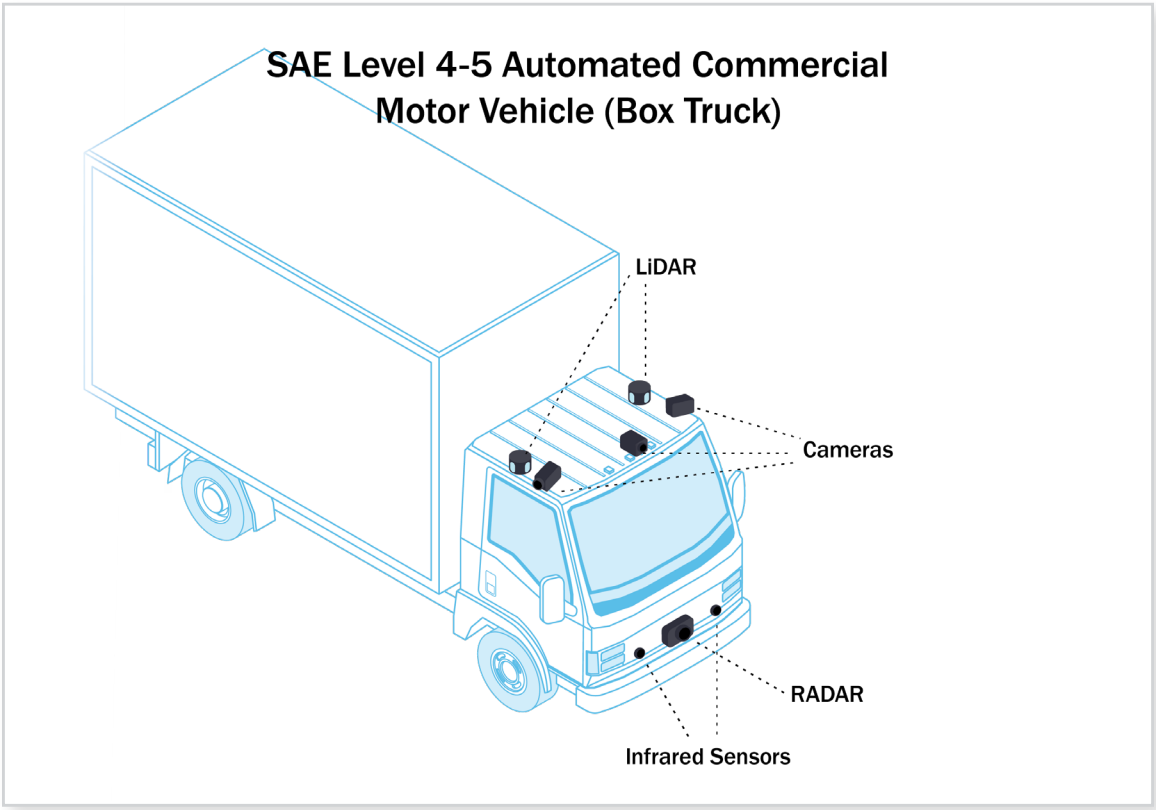


Figure 5. Diagram of an SAE Level 4-5 Automated Commercial Motor Vehicle (Box Truck)

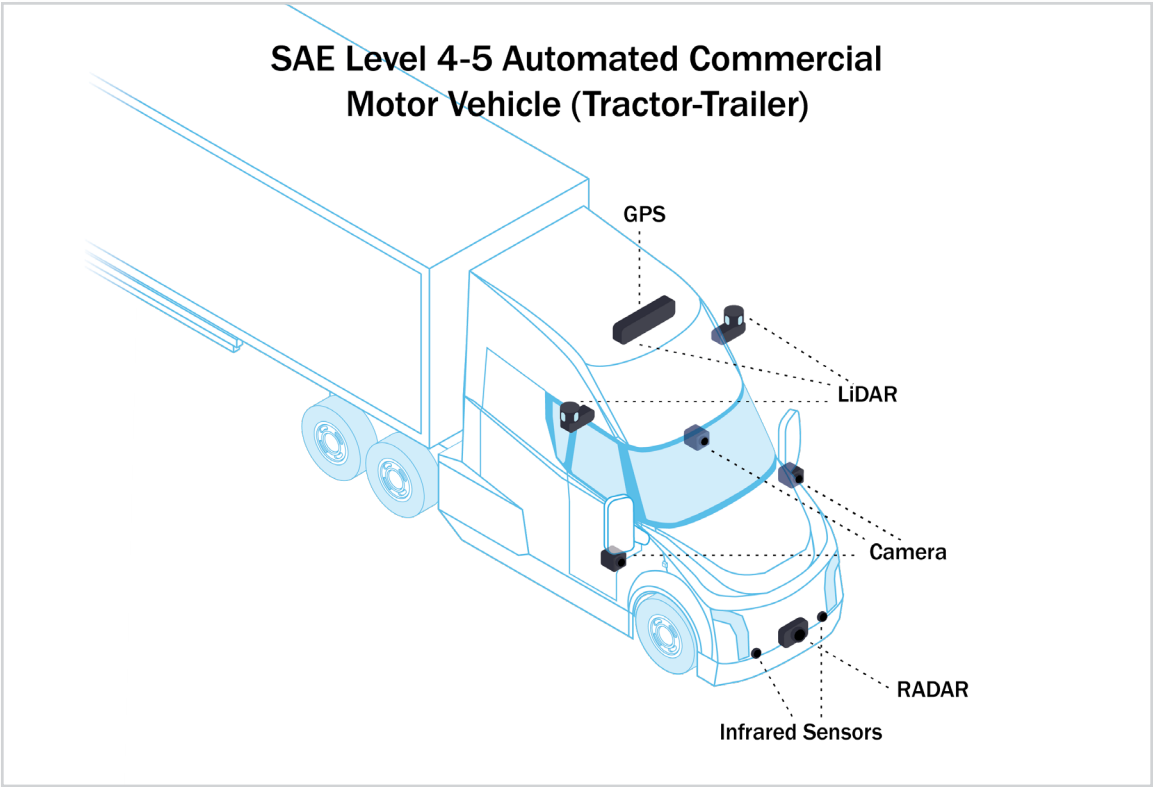


Figure 6. Diagram of an SAE Level 4-5 Automated Commercial Motor Vehicle (Tractor-Trailer)

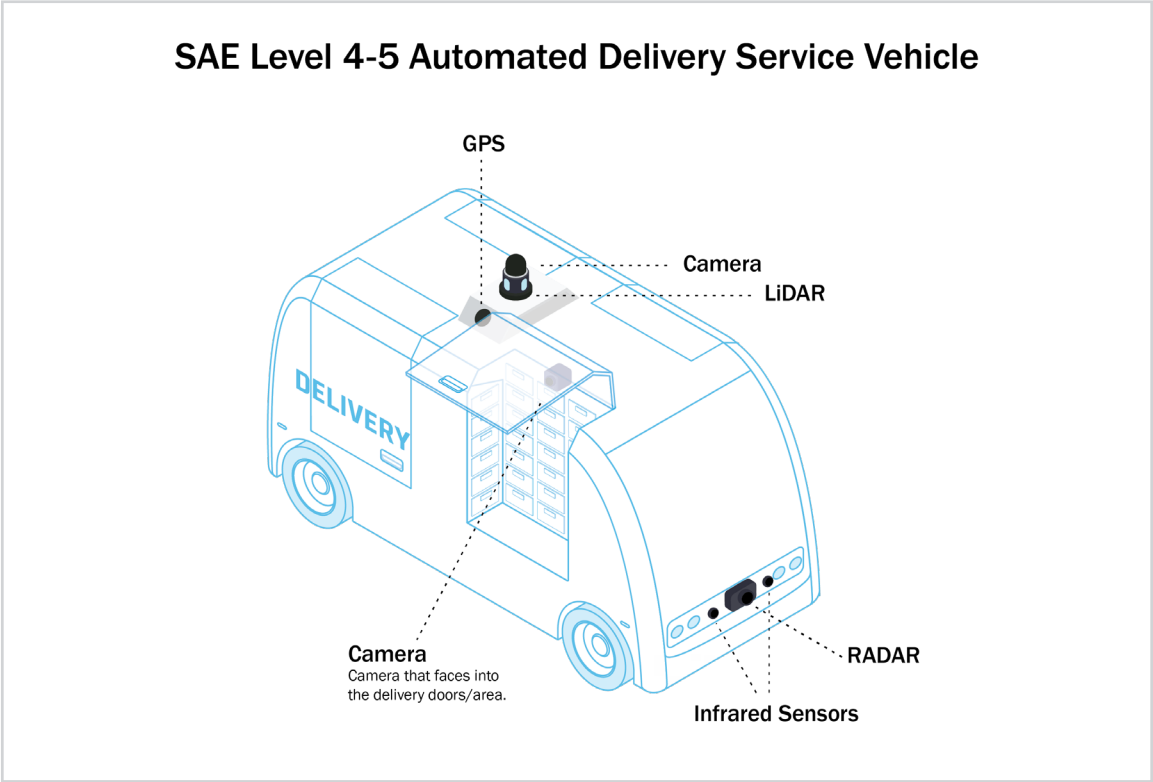


Figure 7. Diagram of an SAE Level 4-5 Automated Delivery Service Vehicle

Catalog of Scenarios

The project team then analyzed various existing and available AV training documents, emergency response guides, AV company law enforcement interaction plans, traffic codes, the Manual on Uniform Traffic Control Devices (MUTCD), officers' manuals and standard operating procedures, and other published literature and documents to develop best practices for each scenario identified.

The resulting scenarios (detailed in the main body of this report) appear in Table 2 below.

Table 2. First Responder AV Interaction Scenarios

LEO Routine Interactions *(e.g., a traffic stop)*

- Conduct a Traffic Stop of an SAE Level 1-3 Vehicle
- Conduct a Traffic Stop of an SAE Level 4-5 Automated Vehicle (with a safety driver)
- Conduct a Traffic Stop of an SAE Level 4-5 Automated Vehicle (without a safety driver)

Secondary Interactions *(e.g., AV entering an active response scene)*

- Conduct Emergency Disablement of an SAE Level 4-5 Automated Vehicle (without a safety driver)

Commercial Motor Vehicle Interactions *(e.g., inspection and enforcement)*

- Conduct an SAE Level 4-5 Automated Commercial Motor Vehicle Inspection (with a Safety Driver)
- Conduct an SAE Level 4-5 Automated Commercial Motor Vehicle Inspection (without a Safety Driver)

LEO Non-Routine Interactions *(e.g., emergency responses, unusual or non-routine situations)*

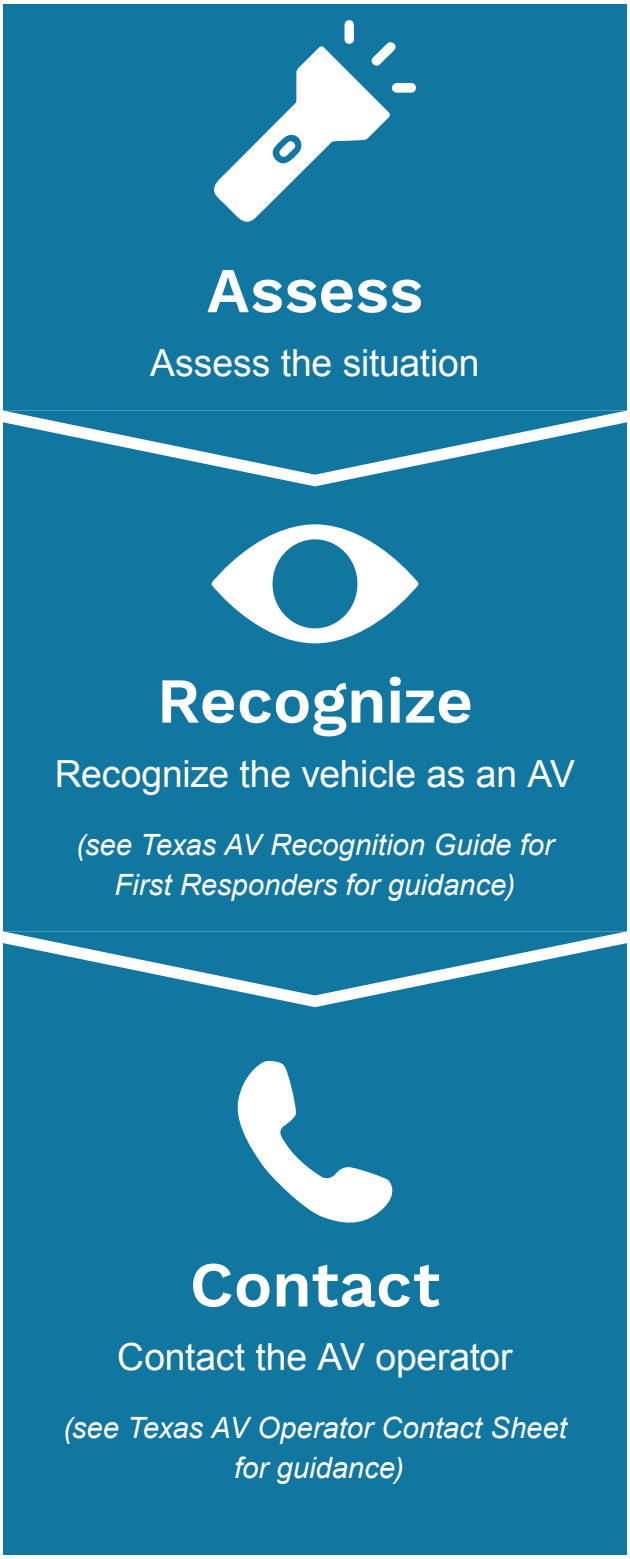
- Conduct a Vehicle Pursuit of an SAE Level 4-5 Automated Vehicle (without a safety driver)
- Respond to an SAE Level 4-5 Automated Vehicle with an Incapacitated Passenger

Crash Response and Investigation

- Respond to an SAE Level 1-3 Passenger Vehicle Traffic Crash
- Respond to an SAE Level 4-5 Automated Passenger Vehicle Traffic Crash
- Respond to an SAE Level 4-5 Automated Commercial Motor Vehicle Traffic Crash
- Respond to a Sodium- or Lithium-Ion Battery Fire in a Vehicle
- Conduct Driver/Passenger Extrication from an SAE Level 4-5 Automated Vehicle
- Complete Texas CR- 3 Crash Report Form for Automated Vehicle Involved Crashes

Traffic/Parking Management and Enforcement

- Move or Tow a Damaged, Malfunctioning, Abandoned, or Illegally Parked SAE Level 4-5 Automated Vehicle
- Direct an SAE Level 1-3 Vehicle Under Abnormal Road Conditions
- Direct an SAE Level 4-5 Automated Vehicle Under Abnormal Road Conditions (with a Safety Driver)
- Direct an SAE Level 4-5 Automated Vehicle Under Abnormal Road Conditions (without a Safety Driver)
- Directing Traffic in a School Zone with Automated Vehicles Present



Note

Some scenarios may span more than one page. Flip the page to ensure the scenario best practices and notes aren't continued on the next page.

LEO Routine Interaction Scenarios

The following scenarios address Law Enforcement Officer (LEO) routine interactions with automated vehicles:

- **Conduct a Traffic Stop of an SAE Level 1-3 Vehicle**
- **Conduct a Traffic Stop of an SAE Level 4-5 Automated Vehicle (with a safety driver)**
- **Conduct a Traffic Stop of an SAE Level 4-5 Automated Vehicle (without a safety driver)**

01

Scenario:

Conduct a Traffic Stop of an SAE Level 1-3 Automated Passenger Vehicle

Primary Scenario Type:
LEO Routine Interaction

Primary Responder Type:
Law Enforcement

Scenario Context: A traffic stop involving an SAE Level 1-3 vehicle should follow normal procedures as drivers must remain ready to take control of the vehicle. Under the law, drivers are still responsible for the safe operation of personally owned SAE Level 1-3 vehicles.

Best Practice

1) Assess the situation and execute a traffic stop following departmental procedures
2) Secure the area by positioning your vehicle safely and activating warning lights
3) If you recognize the vehicle as an SAE Level 1-3 vehicle instruct the driver to disable any self-driving features or turn off the vehicle once they pull over
4) If necessary, approach the vehicle with caution, observing for vehicle movement and any passenger actions
5) Request documentation from driver
6) If required, prepare a citation or warning per departmental procedures
7) Ensure the vehicle is safe to re-enter traffic
8) If your jurisdiction requires it, submit an AV interaction report through normal procedures

Notes

Some SAE Level 1-3 driving features will not respond to law enforcement. Drivers of SAE Level 1-3 vehicles must remain ready to always resume control of such vehicles. Failure to do so violates the Traffic Code.

Drivers of some SAE Level 1-3 vehicles may be more prone to distraction or even fall asleep during operation. While the vehicle may continue to operate, a distracted driver of an SAE Level 1-3 vehicle still violates state or municipal code in such circumstances (due to the requirement to remain ready to resume control of such systems).

Drivers should not operate SAE Level 1-3 vehicles while under the influence of drugs or alcohol, though intoxicated individuals may attempt to utilize self-driving systems in an attempt to evade detection.

Drivers of some SAE Level 2-3 vehicles may believe their vehicle has more automated driving capability than it does. Additionally, some SAE Level 2-3 manufacturers allow drivers to bypass warnings and enable automated driving features in places and situations where they should not operate. If a vehicle in such circumstances violates the traffic code or behaves in an unsafe matter, the driver is responsible under the traffic code, and you can cite them for the violation(s).

Scenario:

Conduct a Traffic Stop of an SAE Level 4-5 Automated Vehicle (with a safety driver)

Primary Scenario Type:
LEO Routine Interaction

Primary Responder Type:
Law Enforcement

Scenario Context: A traffic stop involving an SAE Level 4-5 automated vehicle with a safety driver should follow relatively normal procedures as safety drivers must remain ready to take control of the vehicle.

Best Practice

1) Assess the situation and execute a traffic stop following departmental procedures

2) Recognize the vehicle as an SAE Level 4-5 AV (see Texas AV Recognition Guide for First Responders for guidance)

- **a)** Identify vehicle make/model and the AV operator through markings, vehicle registration information, or the AV recognition guide

3) SAE Level 4-5 AVs should detect sirens and flashing lights from law enforcement and make efforts to slow down and arrive at a stopping point or the safety driver can disable autonomy and take control of the vehicle

4) Instruct the driver to disable the automation system and ensure the safety driver is in control of the vehicle's driving operations

- **a)** If necessary, instruct the driver drive or pull into a safer area

5) Secure the area by positioning your vehicle safely and activating warning lights

6) Approach the vehicle with caution

7) Request documentation from driver

8) If needed, prepare a citation or warning per departmental procedures

- **a)** Document any violations or issues, including the AV's automation level and the presence of a safety driver at the time of the incident
- **b)** Note if the safety driver was in control of the driving operation at the time of the cited incident or if the system was operating autonomously

9) Ensure the vehicle is safe to re-enter traffic

10) If your jurisdiction requires it, submit an AV interaction report through normal procedures

Notes

At the time of publication, no manufacturer sold SAE Level 4-5 vehicles for private use in the United States. All current SAE Level 4-5 automated passenger vehicles operating in Texas are developer owned and operated as taxi services. This may change, requiring modification of these procedures as to the responsible party for any violations.

SAE Level 4-5 vehicle should detect and respond to flashing lights and sirens and respond in accordance with the Traffic Code.

According to Tex. Transp. Code § 545.453, the AV owner is liable for any violations of traffic laws, regardless of whether a human passenger is present. However, if a safety driver is present and the automated system was disengaged at the time of the violation that driver may be liable (consult departmental policy for guidance).

Best Practice steps highlighted with blue in any scenario below indicate alterations added by TTI/TEEX to existing best practices to address AV-specific considerations.

Scenario:

Conduct a Traffic Stop of an SAE Level 4-5 Automated Vehicle (without a safety driver)

Primary Scenario Type:
LEO Routine Interaction

Primary Responder Type:
Law Enforcement

Scenario Context: Conducting a traffic stop is a routine procedure for law enforcement. However, stopping an SAE Level 4-5 automated vehicle without a safety driver presents new challenges. When a vehicle is operating autonomously (with or without passengers), first responders may need to communicate directly with the vehicle operator remotely, ensuring it safely pulls over and remains stationary. Additionally, the responsible party for any traffic violations by an SAE Level 4-5 vehicle is the company operating the AV.

The following procedures work for SAE Level 4-5 passenger vehicles, commercial motor vehicles, and for delivery robots operating in the roadway.

Best Practice

1) Assess the situation and execute a traffic stop following departmental procedures

2) Recognize the vehicle as an SAE Level 4-5 AV (see Texas AV Recognition Guide for First Responders for guidance)

- **a)** Identify vehicle make/model and the AV operator through markings, vehicle registration information, or the AV recognition guide

3) Once the AV comes to a stop, secure the area by positioning your vehicle safely and activating warning lights

- **a)** If passengers are present, inform passengers you stopped the vehicle for unsafe operation and instruct them to remain in the vehicle until instructed otherwise per departmental procedures using loudspeakers (do not approach the vehicle until you verify with the operator it will not move)

4) Obtain confirmation from the AV operator that the vehicle will not move before approaching the vehicle

5) If necessary, approach the vehicle with caution, observing for vehicle movement and any passenger actions

6) If continued operation of the vehicle may endanger passengers or the public, request the AV operator send representatives to the scene to retrieve the vehicle and any passengers

- **a)** Based on the officer's discretion and judgement as to the safety of passengers in the vehicle, officers may request passengers remain in the vehicle or move to a safe area once they confirm the vehicle will not move

Notes

At the time of publication, no manufacturer sold SAE Level 4-5 vehicles for private use in the United States. All current SAE Level 4-5 automated passenger vehicles operating in Texas are developer owned and operated as taxi services. This may change, requiring modification of these procedures as to the responsible party for any violations.

SAE Level 4-5 vehicle should detect and respond to flashing lights and sirens and respond in accordance with the Traffic Code.

According to Tex. Transp. Code § 545.453, the AV owner is liable for any violations of traffic laws, regardless of whether a human passenger is present. However, if a safety driver is present and the automated system was disengaged at the time of the violation that driver may be liable (consult departmental policy for guidance).

Scenario: Conduct a Traffic Stop of an SAE Level 4-5 Automated Vehicle (without a safety driver) - cont.

7) Find operator provided registration and insurance documentation within vehicle

- **a)** Location of this documentation will be AV operator specific (see Texas AV Recognition Guide for First Responders for guidance)
- **b)** Consult operator specific documents (First Responder Interaction Plan/Law Enforcement Interaction Plan (FRIP/LEIP)) for more information, if available
- **c)** If necessary, request assistance from remote operator in locating required information in the vehicle

8) Document any violations or issues, including the vehicle automation level and lack of safety driver at the time of the incident

9) Document any statements made by passengers about vehicle operations and obtain contact information from the passengers for follow up, if needed

10) Based on the officer's judgement, if continued operation of the vehicle would be unsafe, after taking any statements from passengers necessary to document the incident, inform passengers that they may wait until AV Operator personnel arrive to transport them or that they may leave via another means, if they choose

11) If required, prepare a citation or warning per departmental procedures

- **a)** Cite the registered owner of the vehicle based on information obtained from the operator or found within the vehicle (see step 7)
- **b)** If, in the judgement of the officer, continued operation of the vehicle might endanger the public, request the operator place the vehicle out of service and issue the citation to company representatives per departmental procedures
  - **i)** If company personnel may be some time in responding to your location, assist any passengers with obtaining transportation from the scene before departing
- **c)** If, in the judgement of the officer, continued operation of the vehicle would not endanger the public, inform the operator of the citation, and follow departmental procedures about how to deliver the citation or warning to the operator, before allowing the operator to place the vehicle back into service/depart the scene

12) If your jurisdiction requires it, submit an AV interaction report through normal procedures

Secondary Interaction Scenarios

The following scenarios address secondary first responder interactions with automated vehicles, such as those entering an active response scene or crowded pedestrian areas.

- **Conduct Emergency Disablement of an SAE Level 4-5 Automated Vehicle (without a safety driver)**

02

Scenario:

Conduct Emergency Disablement of an SAE Level 4-5 Automated Vehicle (without a safety driver)

Primary Scenario Type: Secondary Interactions

Primary Responder Type: Law Enforcement

Secondary Responder Type: Firefighting

Scenario Context: Law enforcement officers, as well as firefighters, traffic management personnel, and other responders might find it necessary to disable a SAE Level 4-5 vehicle that is unresponsive to human issued commands and where the vehicles continued operation presents a danger to responders or the public.

Best Practice

1) Turn on lights and sirens

2) Recognize the unresponsive vehicle as an SAE Level 4-5 AV (see Texas AV Recognition Guide for First Responders for guidance)

- **a)** Identify vehicle make/model and the AV operator through markings, vehicle registration information, or the AV recognition guide

3) If the danger is not immediate, attempt to contact, or have dispatch contact the AV operator and ask them to disengage the autonomy

- **a)** Attempt to block the vehicle movement with responder vehicles (box it in)
- **b)** Keep everyone away from the vehicle

4) If you cannot block the vehicle with another vehicle and the danger is immediate, initiate contact with the AV with another vehicle (bump the AV with your vehicle bumper/push bar)

- **a)** SAE Level 4-5 vehicles should stop in the event of any vehicular incident/damage

5) If the danger is immediate to a pedestrian and another vehicle is not able to intervene, initiate physical contact with the vehicle by any means available

6) Do not approach a moving Level 4-5 AV unless absolutely necessary as it may move or change direction suddenly

7) Based on the officer's discretion and judgement as to the safety of passengers in the vehicle, officers may request passengers remain in the vehicle or move to a safe area once they confirm the vehicle will not move

8) Once the vehicle stops moving attempt to communicate with the AV operator through the in-vehicle communication system (if present) or via phone/dispatch

- **a)** Inform operator of the emergency situation and request a company representative report to the scene
- **b)** Request the AV operator send towing to the scene or request towing via departmental procedures
- **c)** Inform the towing operator the vehicle is an automated vehicle and autonomy is disabled

Notes

At the time of publication, no manufacturer sold SAE Level 4-5 vehicles for private use in the United States. All current SAE Level 4-5 automated passenger vehicles operating in Texas are developer owned and operated as taxi services. This may change, requiring modification of these procedures as to the responsible party for any violations.

SAE Level 4-5 vehicle should detect and respond to flashing lights and sirens and respond in accordance with the Traffic Code.

According to Tex. Transp. Code § 545.453, the AV owner is liable for any violations of traffic laws, regardless of whether a human passenger is present. However, if a safety driver is present and the automated system was disengaged at the time of the violation that driver may be liable (consult departmental policy for guidance).

Best Practice steps highlighted with blue in any scenario below indicate alterations added by TTI/TEEX to existing best practices to address AV-specific considerations.

Scenario: Conduct Emergency Disablement of an SAE Level 4-5 Automated Vehicle (without a safety driver) - cont.

9) Request passengers wait in a safe area until AV operator arrives to transport them, or the passengers choose to leave via another means

- **a)** Document any statements made by passengers regarding vehicle operations and their actions and obtain contact information from the passengers for follow up, if needed

10) Find operator provided registration and insurance documentation within vehicle

- **a)** Location of this documentation will be AV operator specific (see Texas AV Recognition Guide for First Responders for guidance)
- **b)** Consult operator specific documents (First Responder Interaction Plan/Law Enforcement Interaction Plan (FRIP/LEIP)) for more information, if available
- **c)** If necessary, request assistance from remote operator in locating required information in the vehicle

11) Document any violations or issues, including the vehicle automation level and lack of safety driver at the time of the incident

12) If required, prepare a citation or warning per departmental procedures

- **a)** Cite the registered owner of the vehicle based on information obtained from the operator or within the vehicle
- **b)** If, in the judgement of the officer, continued operation of the vehicle might endanger the public, request the operator place the vehicle out of service and issue the citation to company representatives per departmental procedures
  - **i)** If company personnel may be some time in responding to your location, assist any passengers with obtaining transportation from the scene before departing
- **c)** If, in the judgement of the officer, continued operation of the vehicle would not endanger the public, inform the operator of the citation, and follow departmental procedures about how to deliver the citation or warning to the operator, before allowing the operator to place the vehicle back into service/depart the scene

13) If your jurisdiction requires it, submit an AV interaction report through normal procedures

Commercial Motor Vehicle Interaction Scenarios

The following scenarios address routine first responder interactions specific to commercial motor vehicles:

- **Conduct an SAE Level 4-5 Automated Commercial Motor Vehicle Inspection (with a Safety Driver)**
- **Conduct an SAE Level 4-5 Automated Commercial Motor Vehicle Inspection (without a Safety Driver)**

03

Scenario:

Conduct an SAE Level 4-5 Automated Commercial Motor Vehicle Inspection (with a Safety Driver)

Primary Scenario Type:
Commercial Motor Vehicle Interaction

Primary Responder Type:
Law Enforcement

Scenario Context: Inspections of commercial motor vehicles are a routine task for law enforcement and commercial motor vehicle enforcement officials. However, SAE Level 4-5 automated vehicles introduce new complexities. This scenario assumes automated operation but with a safety driver present in the vehicle. The safety driver may not be actively engaged in driving but is present to take over if necessary.

Currently, Texas Automated Commercial Vehicle operators in Texas utilize the Commercial Vehicle Safety Alliance (CVSA) Enhanced Inspection Program for their automated trucks (with and without the use of safety drivers) and operate primarily on interstate highways. Currently, Texas automated commercial motor vehicle operators in Texas utilize the Commercial Vehicle Safety Alliance (CVSA) Enhanced Inspection Program for their automated trucks (with and without the use of safety drivers) and operate primarily on interstate highways. Under this program, the vehicles and trailers undergo a complete FMCSA inspection prior to every dispatch or operating period. Automated Commercial Vehicle operators pass information to the Texas Department of Public Safety during their runs that allow them to bypass DPS operated inspection stations on Interstate Highways. The following procedure is for situations where officers observe safety defects on an automated vehicle while in operation.

Best Practice

1) Observe a commercial motor vehicle with a safety defect or operating in an unsafe condition (e.g., improperly secured load or dangerous driving)

2) Recognize the vehicle as an SAE Level 4-5 Automated CMV (see Texas AV Recognition Guide for First Responders for guidance)

- **a)** Identify vehicle make/model and the AV operator through markings, vehicle registration information, or the AV recognition guide

3) Pull over the vehicle (see Scenario: Conduct a Traffic Stop of an SAE Level 4-5 Vehicle with a Safety Driver)

4) Instruct the safety driver to disable autonomy and/or to follow your vehicle to a safer location, if necessary to conduct the vehicle inspection

5) Identify the safety driver and request required documentation

6) Verify financial responsibility of driver/liability insurance

7) Inspect driver's logbook and shipping papers

- **a)** Verify safety driver is compliant with Federal Motor Carrier Safety Regulations (FMCSR) Hours of Service Requirements [49 CFR § 395.3]

Notes

For vehicles entering Customs and Border Patrol Inspection areas where vehicles may undergo other inspections, current procedures require AV operators to inform CBP of expected truck arrivals and officers direct the automated CMV utilizing special signs to areas for inspection or bypass of the inspection station.

Currently, no AV-specific procedures exist for USDA or other, non-DPS/CBP inspection stations.

Scenario: Conduct an SAE Level 4-5 Automated Commercial Motor Vehicle Inspection (with a Safety Driver) - cont.

8) Inspect the CMV for compliance with state and federal regulations up to your level of training and certification as a commercial vehicle inspector

- **a)** If you are not a commercial vehicle inspector, request aid through dispatch from a certified Commercial Vehicle Enforcement (CVE) officer or other trained and certified inspector

9) Document any violations or issues, including the CMV's automation level and safety driver's responses

- **a)** If there is a violation but the vehicle's conditions do not meet out-of-service criteria, issue notice of the violation and allow the CMV to continue
- **b)** If the vehicle is determined to be out-of-service, issue a citation and require the driver to cease operation until the noted issue is corrected
  - **i)** Instruct the driver to contact AV Operator/dispatcher to address the safety defect
  - **ii)** Ensure the vehicle returns to operable condition or is towed from the scene for repair

10) Assist the vehicle driver in safely re-entering traffic before departing the scene (if necessary)

11) If your jurisdiction requires it, submit an AV interaction report through normal procedures

Scenario:

Conduct an SAE Level 4-5 Automated Commercial Motor Vehicle Inspection (without a Safety Driver)

Primary Scenario Type:
Commercial Motor Vehicle Interaction

Primary Responder Type:
Law Enforcement

Scenario Context: Inspections of commercial motor vehicles are a routine task for law enforcement and commercial motor vehicle enforcement officials. However, SAE Level 4-5 automated vehicles introduce new complexities. This scenario assumes fully automated operation without a safety driver present in the vehicle.

Currently, Texas Automated Commercial Vehicle operators in Texas utilize the Commercial Vehicle Safety Alliance (CVSA) Enhanced Inspection Program for their automated trucks (with and without the use of safety drivers) and operate primarily on interstate highways. Under this program, the vehicles and trailers undergo a complete FMCSA inspection prior to every dispatch or operating period. Automated Commercial Vehicle operators pass information to the Texas Department of Public Safety during their runs that allow them to bypass DPS operated inspection stations on Interstate Highways. The following procedure is for situations where officers observe safety defects on an automated vehicle while in operation.

Best Practice

1) Observe a commercial motor vehicle with a safety defect or operating in an unsafe condition (e.g., improperly secured load or dangerous driving)

2) Recognize the vehicle as an SAE Level 4-5 Automated CMV (see Texas AV Recognition Guide for First Responders for guidance)

- **a)** Identify vehicle make/model and the AV operator through markings, vehicle registration information, or the AV recognition guide

3) Pull over the vehicle (see SCENARIO: Conduct a Traffic Stop for an SAE Level 4-5 Automated Vehicle (without a safety driver)

4) Contact AV operator and inform them of the observed safety defect or unsafe operation (see Texas AV Operator Contact Sheet for guidance)

- **a)** Instruct operator to disable autonomy and refrain from moving the vehicle
- **b)** Obtain confirmation from the AV operator that the vehicle will not move before approaching the vehicle
- **c)** Determine whether it would be necessary for the AV operator to send personnel to the scene and notify the operator

5) Consult with operator (or the developer-specific emergency response guide) to determine location and access for any documentation carried with the vehicle necessary for inspection

Notes

For vehicles entering Customs and Border Patrol Inspection areas where vehicles may undergo other inspections, current procedures require AV operators to inform CBP of expected truck arrivals and officers direct the automated CMV utilizing special signs to areas for inspection or bypass of the inspection station.

Currently, no AV-specific procedures exist for USDA or other, non-DPS/CBP inspection stations.

Scenario: Conduct an SAE Level 4-5 Automated Commercial Motor Vehicle Inspection (without a Safety Driver) - cont.

6) Inspect the CMV for compliance with state and federal regulations up to your level of training and certification as a commercial vehicle inspector

- **a)** If you are not a commercial vehicle inspector, request aid through dispatch from a certified Commercial Vehicle Enforcement (CVE) officer or other trained and certified inspector

7) Document any violations or issues, including the CMV's automation level

8) If there is a violation but the vehicle's conditions do not meet out-of-service criteria or can be corrected on the spot, consult with operator about dispatching personnel to the scene to remedy the defect and coordinate with AV operator regarding where and how you will deliver the notice of citation per departmental procedures

- **a)** If the vehicle is determined to be out-of-service, issue a citation and require the company personnel to cease operation of the vehicle until they correct the issue
- **b)** Ensure the vehicle returns to operable condition or operator tows it from the scene for repair

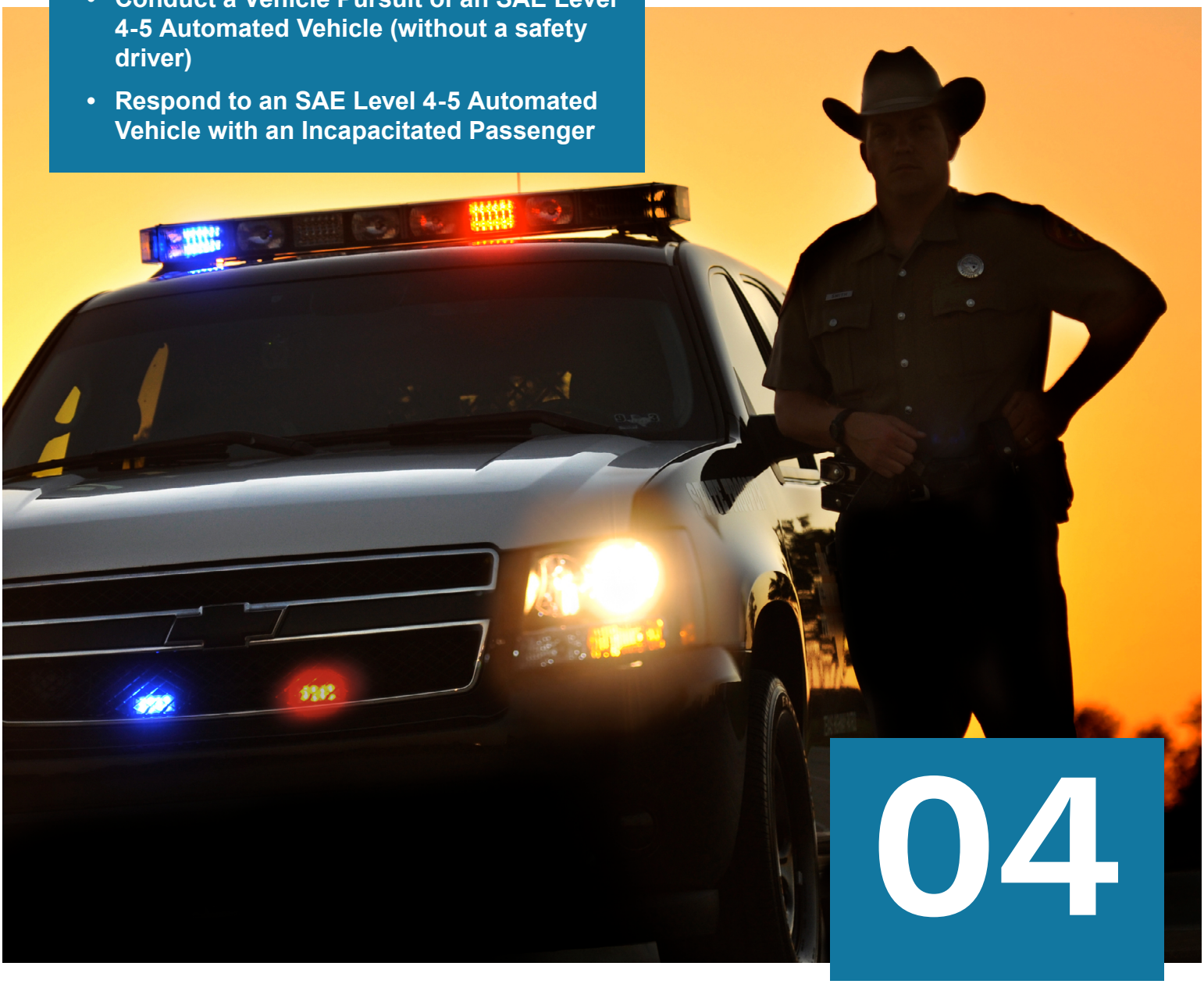
9) If necessary and present, assist the vehicle to safely re-enter traffic before departing the scene (if necessary)

10) If your jurisdiction requires it, submit an AV interaction report through normal procedure

LEO Non-Routine Interaction Scenarios

The following scenarios address law enforcement and other first responder interactions with automated vehicles in unusual or non-routine situations:

- **Conduct a Vehicle Pursuit of an SAE Level 4-5 Automated Vehicle (without a safety driver)**
- **Respond to an SAE Level 4-5 Automated Vehicle with an Incapacitated Passenger**



Scenario:

Conduct a Vehicle Pursuit of an SAE Level 4-5 Automated Vehicle (without a safety driver)

Primary Scenario Type:
LEO Non-Routine Interaction

Primary Responder Type:
Law Enforcement

Scenario Context: AV developers program their SAE Level 4-5 vehicles to recognize flashing lights and sirens used by law enforcement vehicles and make efforts to slow down and pull over for an officer. However, in instances where this system fails or is tampered with, an officer might need to conduct a vehicular pursuit and apply intervention tactics to stop or immobilize the vehicle.

Best Practice

1) Observe or receive notification of a vehicle fleeing from law enforcement or that a wanted or fleeing suspect is in an automated vehicle
2) Recognize the vehicle as an AV (see Texas AV Recognition Guide for First Responders for guidance)
    a) Identify vehicle make/model and the AV operator through markings, vehicle registration information, or the AV recognition guide
3) Activate lights and sirens
    a) SAE Level 4-5 vehicles should detect sirens and flashing lights from law enforcement and make efforts to slow down and arrive at a stopping point in accordance with the traffic code
4) If a vehicle fails to respond and stop, contact the AV operator, or request dispatch contact the AV operator (see Texas AV Operator Contact Sheet for guidance)
    a) Notify dispatch of the:
        i) Purpose of the pursuit
        ii) Any safety or environmental factors which might impact the pursuit including road hazards, weather, possession or use of firearms, and the current direction and speed of the pursuit
    b) Inform dispatch and the AV operator of the situation and request the AV operator assume control of the vehicle or instruct it to stop in a safe area
    c) If you determine that the vehicle/passenger represents a present danger to the public or officers apply intervention tactics to reduce or eliminate the vehicle's mobility
5) Once the AV comes to a stop, secure the area by positioning your vehicle safely and activating warning lights
6) Follow procedures found in Scenario: Conduct a Traffic Stop of an SAE Level 4-5 Automated Vehicle (without a safety driver) from this point

Notes

At the time of publication, no manufacturer sold SAE Level 4-5 vehicles for private use in the United States. All current SAE Level 4-5 automated passenger vehicles operating in Texas are developer owned and operated as taxi services, commercial motor vehicles, or . This may change, requiring modification of these procedures as to the responsible party for any violations.

SAE Level 4-5 vehicle should detect and respond to flashing lights and sirens and respond in accordance with the Traffic Code.

According to Tex. Transp. Code § 545.453, the AV owner is liable for any violations of traffic laws, regardless of whether a human passenger is present. However, if a safety driver is present and the automated system was disengaged at the time of the violation that driver may be liable (consult departmental policy for guidance).

Human drivers can take control of some SAE Level 1-4 vehicles (when a driver is present), unlike with SAE Level 4-5 vehicles without a safety driver, so officers may need to implement more severe intervention tactics to affect a stop.

Scenario:

Respond to an SAE Level 4-5 Automated Vehicle with an Incapacitated Passenger

Primary Scenario Type: LEO Non-Routine Interaction

Primary Responder Type: Law Enforcement

Secondary Responder Type: Firefighting and EMS

Scenario Context: An SAE Level 4-5 vehicle operating as a taxi or mini-bus service may transport passengers that become unresponsive due to medical emergencies or other problems. These vehicles and their associated phone applications allow passengers to unlock doors and, in an emergency, contact the operator. However, in some circumstances, a passenger may become unconscious due to medical conditions, drug abuse, alcohol consumption, or other factors. Law enforcement officers, as well as firefighters, EMS, and other responders may need to conduct rapid extrication and perform first aid on passengers discovered in SAE Level 4-5 vehicles when notified by the public or the AV Operator of such a situation.

Best Practice

1) Observe or receive notification of an automated vehicle with an incapacitated passenger

2) Recognize the vehicle as an SAE Level 4-5 AV (see Texas AV Recognition Guide for First Responders for guidance)

- **a)** Identify vehicle make/model and the AV operator through markings, vehicle registration information, or the AV recognition guide

3) If vehicle is actively driving, utilize the procedures in Scenario: Conduct a Traffic Stop if an SAE Level 4-5 Automated Vehicle (without a safety driver)

- **a)** If vehicle not actively driving/moving pull behind the vehicle and activate lights and sirens
- **b)** Attempt to block movement of the vehicle with your or other vehicles

4) Contact AV operator (or request dispatch contact them) to request they disable autonomy and to assist with opening the vehicle if the doors do not unlock automatically

5) Approach the vehicle cautiously, checking the surroundings for hazards and observing active lights, sounds, or vehicle movement

6) In deemed an emergency, you are unable to contact the operator, and if safe to do so or the vehicle could move before AV operator is able to disable, initiate physical contact and shout loudly into the vehicle you are a law enforcement officer (or fire department/EMS) responding to a passenger emergency and request the operator disable autonomy immediately

- **a)** If you have access to the relevant emergency response guide and the vehicle has an autonomy indicator and disengage system, disengage the autonomy

7) In an emergency, if unable to open the doors or obtain AV operator remote assistance, break a window and try to open the doors from the inside using mechanical releases (consult relevant AV emergency response guide for location of any door release)

Notes

At the time of publication, no manufacturer sold SAE Level 4-5 vehicles for private use in the United States. All current SAE Level 4-5 automated passenger vehicles operating in Texas are developer owned and operated as taxi services. This may change, requiring modification of these procedures as to the responsible party for any violations.

SAE Level 4-5 vehicle should detect and respond to flashing lights and sirens and respond in accordance with the Traffic Code.

According to Tex. Transp. Code § 545.453, the AV owner is liable for any violations of traffic laws, regardless of whether a human passenger is present. However, if a safety driver is present and the automated system was disengaged at the time of the violation that driver may be liable (consult departmental policy for guidance).

Human drivers can take control of some SAE Level 1-4 vehicles (when a driver is present), unlike with SAE Level 4-5 vehicles without a safety driver, so officers may need to implement more severe intervention tactics to affect a stop.

Best Practice steps highlighted with blue in any scenario below indicate alterations added by TTI/TEEX to existing best practices to address AV-specific considerations.

Scenario: Respond to an SAE Level 4-5 Automated Vehicle with an Incapacitated Passenger - cont.

8) Extricate the passenger if necessary or await arrival of EMS/Fire to extricate the passenger

9) Ensure the safety of the passenger while removing them from the vehicle

10) Provide first aid/medical assistance to your level of training until EMS arrives

11) If necessary following turnover of care to EMS, arrange towing with AV Operator or request towing through normal channels

12) If your jurisdiction requires it, submit an AV interaction report through normal procedures

Crash Response and Investigation Scenarios

The following scenarios address first responder interactions with automated vehicles involved in crashes or other incidents:

- **Respond to an SAE Level 1-3 Passenger Vehicle Traffic Crash**
- **Respond to an SAE Level 4-5 Automated Passenger Vehicle Traffic Crash**
- **Respond to an SAE Level 4-5 Automated Commercial Motor Vehicle Traffic Crash**
- **Respond to a Sodium- or Lithium-Ion Battery Fire in a Vehicle**
- **Conduct Driver/Passenger Extrication from an SAE Level 4-5 Automated Vehicle**
- **Complete Texas CR- 3 Crash Report Form for Automated Vehicle Involved Crashes**

05

Scenario:
Respond to an SAE Level 1-3 Passenger Vehicle Traffic Crash

Primary Scenario Type:
Crash Response and Investigation

Primary Responder Type:
Combined Response involving multiple responding agencies

Scenario Context: Traffic crashes occur regularly. This scenario includes SAE Level 1-3 AVs as one or more of the vehicles involved in the incident. SAE Level 1-3 vehicles will have a human operator in charge of the driving operation, though they may have some level of autonomy engaged at the time of the crash, the crash should disable the autonomy.

Best Practice

1) Arrive on incident scene

2) Determine if an involved vehicle is an electric vehicle (see Scenario: Respond to a Sodium- or Lithium-Ion Battery Fire in Vehicle)

3) Recognize the vehicle as an SAE Level 1-3 vehicle

- **a)** Identify vehicle make/model through markings or vehicle registration information

4) Inform dispatch of initial incident details and request additional support from fire and EMS if necessary

5) If SAE Level 1-3 vehicle is still running, turn off the vehicle or request that the driver (if able) turn off vehicle

6) If necessary, conduct emergency extrication and provide primary first aid until the arrival of EMS personnel

7) Secure the scene of the incident and remove vehicles from roadway, if possible

8) Establish traffic control and await fire and EMS response (if necessary)

9) Fire and EMS conduct extrication (if necessary)

10) Record information related to the ownership, make, model, and licensing of involved vehicles

11) Request a towing service to remove vehicle

12) If required, law enforcement officers should prepare a Texas Peace Officer's Crash Report Form CR-3 (see *Scenario: Complete Texas CR- 3 Crash Report Form for Automated Vehicle Involved Collisions*)

- **a)** Refrain from making statements of liability or fault at the scene
- **b)** Crashes with apparent damage over $1000 or which result in the death or injury of a person require the completion of a Texas Peace Officer's Crash Report (CR-3) form
- **c)** Advise involved parties that a CR-3 form will be available in the next three to five business days

Notes

Some SAE Level 1-3 advanced driving features will not respond to law enforcement. Drivers of SAE Level 1-3 vehicles must remain ready to always resume control of such vehicles. Failure to do so violates the Traffic Code.

Drivers of some SAE Level 1-3 vehicles may be more prone to distraction or even fall asleep during operation. While the vehicle may continue to operate, a distracted driver of an SAE Level 1-3 vehicle still violates state or municipal code in such circumstances (due to the requirement to remain ready to resume control of such systems).

Drivers should not operate SAE Level 1-3 vehicles while under the influence of drugs or alcohol, though intoxicated individuals may attempt to utilize self-driving systems in an attempt to evade detection.

Drivers of some SAE Level 2-3 vehicles may believe their vehicle has more automated driving capability than it does. Additionally, some SAE Level 2-3 manufacturers allow drivers to bypass warnings and enable automated driving features in places and situations where they should not operate. If a vehicle in such circumstances violates the traffic code or behaves in an unsafe matter, the driver is responsible under the traffic code, and you can cite them for the violation(s).

Best Practice steps highlighted with blue in any scenario below indicate alterations added by TTI/TEEX to existing best practices to address AV-specific considerations.

Scenario: Respond to an SAE Level 1-3 Passenger Vehicle Traffic Crash - cont.

13) Serious injury crashes and traffic fatalities may require additional investigation, reporting and information collection, request support from Crash Investigators, if needed

- **a)** Vehicle collected data regarding engagement of autonomous features may be evidence

14) If determined appropriate, issue citations to drivers for violations of the Traffic Code

15) Ensure the restoration of the orderly flow of highway traffic before leaving the scene of the incident

- **a)** Direct traffic around the scene of the incident if the investigation of facts remains on-going
- **b)** Contact appropriate municipal officials to request temporary traffic control devices, if necessary

16) Retain evidence and witnesses for fatality crashes

17) If your jurisdiction requires it, also submit an AV interaction report through normal procedures

Scenario:

Respond to an SAE Level 4-5 Automated Passenger Vehicle Traffic Crash

Primary Scenario Type:
Crash Response and Investigation

Primary Responder Type:
Combined Response Involving Multiple Responding Agencies

Scenario Context: Traffic crashes are common. Crashes involving one or more Level 4-5 automated vehicles may include injured safety drivers and passengers.

Best Practice

1) Arrive on incident scene

2) Determine if an involved vehicle is an electric vehicle (see Scenario: Passenger Vehicle Sodium- or Lithium-Ion Battery Fire)

3) Recognize the vehicle as an SAE Level 4-5 AV (see Texas AV Recognition Guide for First Responders for guidance)

- **a)** Identify vehicle make/model and the AV operator through markings, vehicle registration information, or the AV recognition guide

4) Inform dispatch of initial incident details and request additional support from fire and EMS if necessary

5) Contact AV operator (or request dispatch contact AV operator) and request assistance (see Texas AV Operator Contact Sheet for guidance)

- **a)** AV should recognize crash conditions and stop moving
- **b)** Some level 4-5 AVs may still attempt to move in some circumstances (conduct a pull over maneuver following a collision)

6) Request AV operator disable autonomy or, in an emergency and when safe to do so, disable autonomy (if possible) on scene (see vehicle specific emergency response guides)

- **a)** Obtain confirmation from the AV operator that the vehicle will not move before approaching the vehicle
- **b)** In minor crashes request a remote operator move the vehicle from the road, or for some models, disable the autonomy that allows a responder or tow operator to move the vehicle from the road (request developer documents (FRIP/LEIP) for that vehicle or obtain instructions from AV operator)

7) If necessary, conduct emergency extrication and provide primary first aid, if needed, until the arrival of EMS personnel

8) Secure the scene of the incident and remove vehicles from roadway, if possible

9) Establish traffic control and await fire and EMS response (if necessary)

Notes

At the time of publication, no manufacturer sold SAE Level 4-5 vehicles for private use in the United States. All current SAE Level 4-5 automated passenger vehicles operating in Texas are developer owned and operated as taxi services. This may change, requiring modification of these procedures as to the responsible party for any violations.

According to Tex. Transp. Code § 545.453, the AV owner is liable for any violations of traffic laws, regardless of whether a human passenger is present. However, if a safety driver is present and the automated system was disengaged at the time of the violation that driver may be liable (consult departmental policy for guidance).

Best Practice steps highlighted with blue in any scenario below indicate alterations added by TTI/TEEX to existing best practices to address AV-specific considerations.

Scenario: Respond to an SAE Level 4-5 Automated Passenger Vehicle Traffic Crash - cont.

10) Fire and EMS conduct extrication (if necessary) (see *Scenario: Conduct Driver/Passenger Extrication from an SAE Level 4-5 Vehicle*)

- **a)** If vehicle is an electric vehicle, reference any manufacturer make and model specific cut guide prior to cutting vehicle frame

11) Request AV operator send towing to the scene or request towing via departmental procedures

- **a)** Inform the towing operator the vehicle is an autonomous vehicle and autonomy is disabled
- **b)** Instruct towing operator to contact AV operator for instructions for towing and moving vehicle

12) If required, law enforcement officers should prepare a Texas Peace Officer's Crash Report Form CR-3 (see *Scenario: Complete Texas CR-3 Crash Report Form for Automated Vehicle Involved Crashes*)

- **a)** Refrain from making statements of liability or fault at the scene
- **b)** Crashes with apparent damage over $1000 or which result in the death or injury of a person require the completion of a Texas Peace Officer's Crash Report (CR-3) form
- **c)** Advise involved parties that a CR-3 form will be available in the next three to five business days

13) Serious injury crashes and traffic fatalities may require additional investigation, reporting, and information collection, request support from Crash Investigators, if needed

- **a)** AV operator collected data and video may be evidence
- **b)** Request AV operator preserve all data captured before and during the crash
- **c)** Inform supervisor and crash investigation personnel of the presence of an AV and work through department procedures to obtain AV operator data and video of the crash for use in the crash investigation

14) If determined appropriate, issue citation to AV operating company for violations of the Traffic Code, per departmental procedures

- **a)** Cite the registered owner of the vehicle based on information obtained from the operator or within the vehicle
- **b)** If, in the judgement of the officer, continued operation of the vehicle might endanger the public, request the operator place the vehicle out of service and issue the citation to company representatives per departmental procedures
  - **i)** If company personnel may be some time in responding to your location, assist any passengers with obtaining transportation from the scene before departing

Scenario: Respond to an SAE Level 4-5 Automated Passenger Vehicle Traffic Crash - cont.

c) If, in the judgement of the officer, continued operation of the vehicle would not endanger the public, inform the operator of the citation, and follow departmental procedures about how to deliver the citation or warning to the operator, before allowing the operator to place the vehicle back into service/depart the scene

15) Ensure the restoration of the orderly flow of highway traffic before leaving the scene of the incident

a) Direct traffic around the scene of the incident if the investigation of facts remains on-going

b) Contact appropriate municipal officials to request temporary traffic control devices, if necessary

16) Retain evidence and witnesses for fatality crashes

17) If your jurisdiction requires it, also submit an AV interaction report through normal procedures

Scenario:

Respond to an SAE Level 4-5 Automated Commercial Motor Vehicle Traffic Crash

Primary Scenario Type:
Crash Response and Investigation

Primary Responder Type:
Combined Response Involving Multiple Responding Agencies

Scenario Context: Traffic crashes involving Commercial Motor Vehicles are often more serious than those involving passenger vehicles. Safety drivers may be present and injured.

Best Practice

1) Arrive on incident scene

2) Recognize the vehicle as an SAE Level 4-5 AV (see Texas AV Recognition Guide for First Responders for guidance)

- **a)** Identify vehicle make/model and the AV operator through markings, vehicle registration information, or the AV recognition guide

3) If it is safe to do so and you are certain the vehicle will not move, attempt to determine if the vehicle has a safety driver present

- **a)** If a safety driver is present continue next steps

4) Inform dispatch of initial incident details and request additional support from fire and EMS if necessary

5) If no safety driver present, or driver incapacitate, contact AV operator (or request dispatch contact AV Operator) and request assistance (see Texas AV Operator Contact Sheet for guidance)

- **a)** AV should recognize crash conditions and stop moving
- **b)** Some level 4-5 AVs may still attempt to move in some circumstances (e.g., conduct a pull over maneuver following a minor collision)

6) Request AV operator disable autonomy or, in an emergency and when safe to do so, disable autonomy (if possible) on scene (see vehicle specific emergency response guides)

- **a)** In minor crashes request a remote operator move the vehicle from the road, or for some models, disable the autonomy that allows a responder or tow operator to move the vehicle from the road (see emergency response guide for that vehicle or obtain instructions from AV operator)

7) If necessary, conduct emergency extrication and provide primary first aid, if needed, until the arrival of EMS personnel

8) Secure the scene of the incident and remove vehicle(s) from roadway, if possible

9) Establish traffic control and await fire and EMS response (if necessary)

10) Fire and EMS conduct extrication (if necessary) *(See Scenario: Conduct Driver/Passenger Extrication from an SAE Level 4-5 Vehicle)*

Notes

Currently in Texas, Automated Commercial Motor Vehicles (SAE Level 4-5) are traditional diesel vehicles with the automated driving system added. However, AV systems may draw power from a high energy battery mounted on the vehicle that poses hazards to responders, especially during extrication. There are also several developers testing and developing electric powered commercial trucks, though none yet operating in Texas. If a commercial motor vehicle is an electric vehicle, see Scenario: Sodium- or Lithium-Ion Battery Fire.

Additionally, commercial motor vehicles in the future may utilize alternative fuels (e.g., compressed natural gas, propane, or hydrogen). These require additional response measures (still in development) due to the possibility of Boiling Liquid Evaporating Vapor Explosions (BLEVEs) and other dangers associated with compressed flammable gases.

Under current Texas law, AVs must obey the rules of the road as defined in the Texas Traffic Code.

According to Tex. Transp. Code § 545.453, the AV owner is liable for any violations of traffic laws, regardless of whether a human passenger is present. However, if a safety driver is present and the automated system was disengaged at the time of the violation that driver may be liable (consult departmental policy for guidance). Safety drivers may also have FMCSR rules that apply to them (e.g., hours of service).

Best Practice steps highlighted with blue in any scenario below indicate alterations added by TTI/TEEX to existing best practices to address AV-specific considerations.

Scenario: Respond to an SAE Level 4-5 Automated Commercial Motor Vehicle Traffic Crash - cont.

NOTE: *Commercial motor vehicle saddle tanks if leaking/damaged may require hazardous materials response/cleanup and additional reporting due to the quantities involved*

11) Request a commercial towing service to remove automated commercial motor vehicle

- **a)** Inform the towing operator the vehicle is an autonomous vehicle and autonomy is disabled
- **b)** Instruct towing operator to contact AV operator for instructions for towing and moving vehicle

12) If required, law enforcement officers should prepare a Texas Peace Officer's Crash Report Form CR-3 (see *Scenario: Complete Texas CR- 3 Crash Report Form for Automated Vehicle Involved Crashes*)

- **a)** Refrain from making statements of liability or fault at the scene
- **b)** Crashes with apparent damage over $1,000 or which result in the death or injury of a person require the completion of a Texas Peace Officer's Crash Report (CR-3) form
- **c)** Advise involved parties that a CR-3 form will be available in the next three to five business days

13) Serious injury crashes and traffic fatalities may require additional investigation, reporting, and information collection, request support from Crash Investigators, if needed

- **a)** AV operator collected data and video may be evidence
- **b)** Request AV operator preserve all data captured before and during the crash
- **c)** Inform supervisor and crash investigation personnel of the presence of an AV and work through department procedures to obtain AV Operator data and video of the crash for use in the crash investigation

14) If required, prepare a citation or warning per departmental procedures

- **a)** Cite the registered owner of the vehicle based on information obtained from the operator or within the vehicle
- **b)** If, in the judgement of the officer, continued operation of the vehicle might endanger the public, request the operator place the vehicle out of service and issue the citation to company representatives per departmental procedures
  - **i)** If company personnel may be some time in responding to your location, assist any passengers with obtaining transportation from the scene before departing

Due to the involvement of a licensed Commercial Motor Vehicle, you may also need to submit additional reporting for violations of FMCSA rules and regulations (consult departmental policy and commercial vehicle enforcement officers for further guidance).

Scenario: Respond to an SAE Level 4-5 Automated Commercial Motor Vehicle Traffic Crash - cont.

c) If, in the judgement of the officer, continued operation of the vehicle would not endanger the public, inform the operator of the citation, and follow departmental procedures about how to deliver the citation or warning to the operator, before allowing the operator to place the vehicle back into service/depart the scene

15) Ensure the restoration of the orderly flow of highway traffic before leaving the scene of the incident

a) Direct traffic around the scene of the incident if the investigation of facts remains on-going

b) Contact appropriate municipal officials to request temporary traffic control devices, if necessary

16) Retain evidence and witnesses for fatality crashes

17) If your jurisdiction requires it, submit an AV interaction report through normal procedures

Scenario:

Respond to a Sodium- or Lithium-Ion Battery Fire in a Vehicle

Primary Scenario Type:
Crash Response and Investigation

Primary Responder Type:
Combined Response Involving Multiple Responding Agencies

Scenario Context: Many AV passenger vehicles and delivery robots are electric vehicles with large lithium- and sodium-ion battery packs. These electric powered vehicles pose unique challenges for fire officials due to a condition known as thermal runaway which can occur in defective batteries, crashes damaging the battery, or due to other environmental or use conditions. In a thermal runaway, vehicle batteries will emit toxic, flammable gas through holes in the battery pack or a relief valve. The battery will quickly heat to extremely high temperatures capable of damaging surround infrastructure and igniting additional fires. The flammable, toxic gas emitted may contact an ignition source and flash back, which may result in an explosion from inside the vehicle or in a confined space. Lithium-ion battery fires are difficult to extinguish and require specialized emergency responses. Battery fires may also re-ignite posing danger to towing operators and impound/storage lots.

Best Practice

1) Arrive on scene
2) Block traffic immediately
3) Determine an electric vehicle is involved in the incident
   a) Look for signs of a thermal runaway or fire (e.g., smoke, hissing sounds, fire)
   b) During thermal runaway prior to ignition, lithium-ion batteries begin to vent a whitish cloud of toxic, flammable gases through holes in the battery casing or from a relief port
   c) Gases may ignite and flash back if they reach an ignition source or result in an explosion in the vehicle cabin or an enclosed space
4) Instruct all vehicles in the immediate vicinity to turn off their vehicles
5) Instruct other responders and bystanders to remain at least 75 feet from the vehicle, upwind and uphill
6) If responsive, instruct the driver of the Level 1-3 AV to turn off the vehicle, exit, and move away from the vehicle
   a) A running EV makes little sound due to the lack of an internal combustion engine
7) Request dispatch provide fire department support for an electric vehicle incident if not already enroute and if enroute have dispatch inform them of an electric vehicle incident
8) Park all response assets upwind and uphill from the involved electric vehicle, if possible
9) All responders approaching the vehicle must wear full PPE and SCBA when vehicle fires or a thermal runaway occurs
10) Require those not engaged in active firefighting to wear a high-visibility vests (the gases from a thermal runaway may reduce visibility)

Notes

Consider an EV incident as not only a potential fire, extrication and victim care emergency, but also a hazmat response. Have sufficient personnel and air management refill equipment on hand for crew rotation, traffic blocking and rehabilitation.

Some AVs, while not electric, may have high energy batteries and wiring to power AV systems.

Store EVs involved in incidents at least 75 feet from other vehicles, buildings, or flammable materials

Best Practice steps highlighted with blue in any scenario below indicate alterations added by TTI/TEEX to existing best practices to address AV-specific considerations.

Scenario: Respond to a Sodium- or Lithium-Ion Battery Fire in a Vehicle - cont.

11) Conduct an initial 360-degree size-up with a thermal imaging camera to note any heat pattern or fire extension near the battery case – located either on the frame of the EV or on some models behind the back seat

12) Confirm the vehicle's power source is a lithium-ion battery

13) Determine your tactical priorities: fire, extrication, victim care

14) Stabilize the vehicle with chocks or cribbing to avoid it moving

15) Determine if the vehicle is on and if so, power down the EV from the information on that vehicle's specific high-voltage procedure

16) Understand your fire attack options - letting the vehicle burn is often the best option or you risk the batteries constantly reigniting

- **a)** Do not attempt to breach or punch holes in battery cases to introduce water
- **b)** Sodium- and Lithium-Ion battery fire responses may produce runoff containing toxic heavy metals – attempt to contain runoff and prevent entry of run off into drains and waterways

17) If extrication of victims is necessary, do so using a manufacturer specific cut-guide to avoid high-voltage electrical hazards

18) Containment of battery fires with water typically involves anywhere from 5,000 to 30,000 gallons of water over hours, requiring multiple pump trucks

19) Share information with the towing company that this is an EV with the possibility of reignition and to store it separated from other vehicles by at least 75 feet

20) Conduct decontamination of all responders and victims exposed to runoff/debris and initiate medical monitoring for heavy metal exposure

21) Request contracted hazardous materials cleanup and response crews (TxDOT, Public Works, etc.)

Scenario:

Conduct Driver/Passenger Extrication from a Level 4-5 Automated Vehicle

Primary Scenario Type:
Crash Response and Investigation

Primary Responder Type:
Combined Response involving Multiple Responding Agencies

Scenario Context: Traffic crashes involving passenger vehicles are a common scenario for first responders. However, when a SAE Level 4-5 automated vehicle is involved, additional considerations may require modifications to normal procedures. In this scenario, one or more Level 4-5 automated passenger vehicles have been involved in a crash, and extrication of occupants is required. Additionally, special attention must be given to the location of lithium-ion batteries and other high-voltage components that may pose additional risks during the extrication process.

Best Practice

1) Receive notification of a vehicle crash

2) Arrive on incident scene

3) Recognize the vehicle as an SAE Level 4-5 AV (see Texas AV Recognition Guide for First Responders for guidance)

- **a)** Identify vehicle make/model and the AV operator through markings, vehicle registration information, or the AV recognition guide

4) Survey the scene of the incident

5) Inform dispatch of initial incident details and request additional support if necessary

6) Obtain confirmation from the AV operator that the vehicle will not move before approaching the vehicle

- **a)** see Texas AV Operator Contact Sheet for guidance
- **b)** Consult operator specific emergency response guide for more information
- **c)** Seek additional guidance from AV operator, if needed

7) Secure the scene of the incident and remove other vehicles from roadway if necessary and possible

8) Provide primary first aid to impacted passengers and other individuals

9) Begin the vehicle extrication process

10) Stabilize the vehicle to prevent any movement during the extrication

- **a)** Ensure all safety systems are deactivated, including airbags, to prevent accidental deployment during extrication

11) Use the appropriate tools to gain access to the vehicle, such as hydraulic cutters or spreaders, if doors or windows are jammed

- **a)** Ensure the vehicle remains immobile by engaging the parking brake or other immobilization methods as instructed by the AV

service

Notes

At the time of publication, no manufacturer sold SAE Level 4-5 vehicles for private use in the United States. All current SAE Level 4-5 automated passenger vehicles operating in Texas are developer owned and operated as taxi services. This may change, requiring modification of these procedures as to the responsible party for any violations.

Procedures for extrication from an SAE Level 4-5 vehicle remain the same as any other vehicle. Be sure to reference the relevant make/model cut guide.

Best Practice steps highlighted with blue in any scenario below indicate alterations added by TTI/TEEX to existing best practices to address AV-specific considerations.

Scenario: Conduct Driver/Passenger Extrication from a Level 4-5 Automated Vehicle - cont.

operator

12) Safely remove any trapped individuals

- **a)** Use caution when cutting through the vehicle to avoid damaging the vehicle's battery or electrical systems
- **b)** Follow AV operator's instructions, FRIP/LEIP, emergency response guide, or cut guide to ensure proper cutting and avoidance of high-voltage lines

13) Assess the condition of the vehicle after the extrication

- **a)** Check for signs of battery leakage or other hazardous materials
- **b)** Clear the incident scene
- **c)** Ensure all victims and responders are at a safe distance before removing the vehicle from the area
- **d)** If the AV cannot be driven or moved remotely arrange for a tow

Scenario:

Complete Texas CR-3 Crash Report Form for Automated Vehicle Involved Crashes

Primary Scenario Type:
Crash Response and Investigation

Primary Responder Type:
Law Enforcement

Scenario Context: Traffic crashes occur regularly. Changes to the Texas Peace Officer's Crash Report Form (CR-3), Code Sheet (CR-3CS) and Instructions to Police for Reporting Crashes (CR-100) now include specific requirements for automated vehicles.

Best Practice

1) The Autonomous Unit Field is a Mandatory Reporting Field on the CR-3

2) Prepare the Form CR-3 according to instructions contained in CR-100 and the CR-3CS Code Sheet

- **a)** For (Autonomous Unit) select 1 for Yes, 2 for No, and 99 for Unknown
  - **i)** If the Unit Description is NOT 1 – Motor Vehicle, or 7 – Non-Contact, then 'Autonomous Unit' must be set to 'No'
  - **ii)** If the vehicle year is less than 2000, then 'Autonomous Unit' must be set to 'No'
  - **iii)** If 'Autonomous Unit' is set to 'Yes' for a unit, the 'Make' and 'Model' must be populated for that unit and cannot be 'Unknown'
  - **iv)** If the Hit and Run is set to Yes and Vehicle Make is Unknown or blank, then the Autonomous Unit must be set to Unknown
  - **v)** If the entered unit VIN has the autonomous features of Adaptive Cruise Control, Lane Centering Assistance or Lane Keeping Assistance, set to Standard, then Autonomous Unit field should be set to 'Yes'
- **b)** For (Autonomous Level Engaged) utilize the SAE Level to Code Sheet Crosswalk, the AV recognition guide, and CR-100 instructions to enter the appropriate value
  - **i)** If Autonomous Unit is Yes, Autonomous Level Engaged must be 1 - Driver Assistance, 2 -Partial Automation, 3 - Conditional Automation, 4 - High Automation, 5 - Full Automation, or 6 - Automation Level Unknown
  - **ii)** When Autonomous Unit is No, then the Autonomous Level Engaged must be 0 - No Automation
  - **iii)** When Autonomous Unit is Unknown, Autonomous Level Engaged must be 99 - Unknown
  - **iv)** Unit Description is 2-Train, 3-Pedalcyclist, 4-Pedestrian, 5-Motorized Conveyance, 6-Towed/Pushed/Trailer, or 98-Other, therefore the Autonomous Level Engaged must be 0 -No Automation

Notes

The instructions here come from the 2024 editions of the CR-3, CR-3CS, and CR-100. These can and do change. Always consult the latest edition of crash reporting instructions and code sheets along with any departmental guidance before completing crash reports.

Scenario: Complete Texas CR-3 Crash Report Form for Automated Vehicle Involved Crashes - cont.

c) For (Total Number of Persons) the total number of persons must match the actual person count. If Person Type for one of the persons is 95-Autonomous, the Autonomous unit does not count as a person

d) For (DL/ID Type) if Person Type is set to 95-Autonomous, then the DL/ID Type must be set to 95-Autonomous

e) For (DL/ID State) if DL/ID Type is 95-Autonomous, then DL/ID State must be blank

f) For (DL/ID Number) if DL/ID Type is 95-Autonomous, then DL/ID Number must be blank

g) For (DL Class) if the person type is 95-Autonomous then DL Class must be set to 95-Autonomous

h) For (CDL Endorsements) If person type is 95-Autonomous then CDL Endorsement must be set to 95-Autonomous

i) For (DL Restrictions) if Person Type is 95-Autonomous then DL Restriction must be set to 95-Autonomous

j) For (Date of Birth) if Person Type is 95-Autonomous then Date of Birth is not allowed/must be blank

k) For (Person Number) if Person Type is set to 95-Autonomous the Person Number must be set to 1

l) For (Person Type) set to 95-Autonomous Unit

- **i)** If unit description is 1-Motor Vehicle or 7-Non-Contact, only one person associated with that unit may have a Person Type of 95-Autonomous
- **ii)** If a person type for a unit 95- Autonomous then the person must be the primary person in the unit and the person number must be 1
- **iii)** If the unit description field is 1-Motor Vehicle or 7-Non-Contact, the Person Type field for persons in the unit must be 1-Driver, 5-Driver of Motorcycle Type Vehicle, 2-Passenger Occupant, 6-Passenger Occupant on Motorcycle, 95-Autonomous, or 99-Unknown
- **iv)** If Autonomous Level is set to 0-No Automation, 1-Driver Assistance, 2-Partial Automation, 3-Conditional Automation, 6-Automation Level Unknown, or 99-Unknown, the Person Type cannot be set to 95-Autonomous for the primary person in the unit
- **v)** If unit description is 1-Motor Vehicle or 7-Non-Contact, and if one or more persons are entered, one should be a driver
- **vi)** If Autonomous Level is set to 4-High Automation or 5-Full Automation, then the Person Type must be set to 95-Autonomous for the primary person in the unit

Scenario: Complete Texas CR-3 Crash Report Form for Automated Vehicle Involved Crashes - cont.

m) For (Seat Position) if the Person type is 95 – Autonomous, the Seat Position must be 95 – Autonomous

- **i)** The person sitting in the Front Left seat is a considered a Passenger/Occupant for the Autonomous Level engaged is 4 – High Autonomation or 5-Full Autonomation only and will be captured on the second line

n) For (Name: Last, First, Middle) if person type is set to 95-Autonomous:

- **i)** The Last Name must equal the Owner/Lessee Last Name
- **ii)** The First Name must equal the Owner/Lessee First Name
- **iii)** The Middle Name must equal the Owner/Lessee Middle Name

o) For (Injury Severity) Injury code 95-Autonomous is used when Person type is 95 – Autonomous

p) (Age) is not allowed if Person Type is 95-Autonomous

q) For (Ethnicity) if person type is 95-Autonomous then Ethnicity must be 95-Autonomous

r) For (Sex) if Person type is 95-Autonomous then Sex must be 95-Autonomous

s) For (Ejected) if Person Type is 95-Autonomous then Ejected must be 97-Not Applicable

t) For (Restraint Used) if Person Type is 95-Autonomous then Restraint Used must be 97-Not Applicable

u) For (Airbag) if Person Type is 95-Autonomous then Airbag must be 97-Not Applicable

v) For (Solicitation) if Person Type is 95-Autonomous, Solicitation must be N-No Solicit

w) For (Alcohol Specimen Type) if Person Type is 95 Autonomous, Alcohol Specimen Type must be 96-None

x) For (Drug Specimen Type) if Person Type is 95 Autonomous, Drug Specimen Type must be 96-None

y) For (Owner/Lessee Name and Address) if Autonomous Level is 4-High Automation or 5-Full Automation then Owner/Lessee Last Name cannot be blank

z) For (Contributing Factors) if Autonomous Level is set to 4-High Automation or 5-Full Automation for a Unit, then the following contributing factors are NOT allowed for that Unit:

- **i)** 19-Distraction in Vehicle
- **ii)** 20-Driver Inattention
- **iii)** 40-Fatigued or Asleep
- **iv)** 45-Had Been Drinking
- **v)** 46-Handicapped Driver (Explain in Narrative)
- **vi)** 47-Ill (Explain in Narrative)

Scenario: Complete Texas CR-3 Crash Report Form for Automated Vehicle Involved Crashes - cont.

vii) 59-Pedestrian FTYROW to Vehicle

viii) 62-Taking Medication (Explain in Narrative)

ix) 67-Intoxicated - Alcohol

x) 68-Intoxicated - Drug

xi) 73-Road Rage

xii) 74-Cell/Mobile Device Use-Talking

xiii) 75-Cell/Mobile Device Use-Texting

xiv) 76-Cell/Mobile Device Use-Other

xv) 77-Cell/Mobile Device Use-Unknown

aa) For (Contributing Factors) and (May Have Contributed) and (Contributing Vehicle Defect) Vehicle Defect 14-Automation Failure can only be set when Autonomous Level is set to 3-Conditional Automation, 4-High Automation or 5-Full Automation for a unit

Traffic/Parking Management and Enforcement Scenarios

The following scenarios address interactions with automated vehicles related to traffic/parking management and enforcement:

- **Move or Tow a Damaged, Malfunctioning, Abandoned, or Illegally Parked SAE Level 4-5 Automated Vehicle**
- **Direct an SAE Level 1-3 Vehicle Under Abnormal Road Conditions**
- **Direct an SAE Level 4-5 Automated Vehicle Under Abnormal Road Conditions (with a Safety Driver)**
- **Direct an SAE Level 4-5 Automated Vehicle Under Abnormal Road Conditions (without a Safety Driver)**
- **Directing Traffic in a School Zone with Automated Vehicles Present**

06

Scenario:

Move or Tow a Damaged, Malfunctioning, Abandoned, or Illegally Parked SAE Level 4-5 Automated Vehicle

Primary Scenario Type: Traffic/Parking Management and Enforcement

Secondary Scenario Type: LEO Routine Interaction

Primary Responder Type: Courtesy Patrol, Highway Emergency Response Operator (HERO) and Towing/Traffic Management

Scenario Context: Stalled, damaged, abandoned and illegally parked motor vehicles impede traffic causing backups and delays for motorists and responders. If positioned on the shoulder, they may hinder first responders by limiting the space needed for emergency operations and increasing the risk of crashes for both responders and passing traffic.

Best Practice

1) Arrive on scene
2) Secure the area by setting up warning signals and ensuring a safe distance for other vehicles
3) Recognize the vehicle as an SAE Level 4-5 AV (see Texas AV Recognition Guide for First Responders for guidance)
   - a) Identify vehicle make/model and the AV operator through markings, vehicle registration information, or the AV recognition guide
4) Contact or have dispatch contact the AV operator obtain further directions (see Texas AV Operator Contact Sheet for guidance)
   - a) Request the AV operator remotely operate the vehicle to another location or request towing for the safe removal of the vehicle by the AV operator
   - b) If an urgent necessity to protect other drivers or restore the flow of traffic from a critical facility, request AV operator provide instructions (if possible) for an officer on the scene to drive the vehicle to a safe area
     - i) Obtain confirmation from the AV developer that the vehicle will not move
     - ii) Approach the vehicle cautiously and checking the surroundings for hazards
     - iii) Check the vehicle status for active lights, sounds, or movement
5) If parked illegally or violating the traffic code,
   - a) Prepare citation
   - b) Issue citation according to departmental procedures to the registered owner of the automated vehicle

Notes

Most AVs currently operated by AV operators will *fail-safe* when they encounter unfamiliar circumstances, road incidents, or suffer a fault in their programming. These vehicles may attempt to pull onto a nearby shoulder until given instructions by the AV operating staff or towed away. This can present challenges for highway users and first responders when these vehicles unintentionally park or stop in the middle of the road or in front of fire and police stations. To prevent AVs parking and blocking access to critical facilities, communities where testing occurs may coordinate with developers to geo-fence specific areas (like hospital emergency entrances or fire stations) so that AVs will not stop there.

Scenario: Move or Tow a Damaged, Malfunctioning, Abandoned, or Illegally Parked SAE Level 4-5 Automated Vehicle - cont.

6) If towing vehicle:

- **a)** Request AV operator send towing to the scene or request towing via departmental procedures
- **b)** Inform towing operator the vehicle is an automated vehicle and autonomy is disabled
- **c)** Continue to provide traffic direction until tow truck departs with vehicle and normal traffic flow resumes

7) If your jurisdiction requires it, also submit an AV interaction report through normal procedures

Scenario:

Direct an SAE Level 1-3 Vehicle Under Abnormal Road Conditions

Primary Scenario Type:
Traffic/Parking Management and Enforcement

Primary Responder Type:
Flaggers/Traffic Direction (e.g., LEO, public works, road construction crews, school crossing guards)

Secondary Responder Type: Law Enforcement

Scenario Context: SAE Level 1-3 vehicles rely on human operators for most driving tasks, though they may assist with certain functions such as lane keeping or adaptive cruise control. While the vehicle's autonomous systems may still assist, the human driver remains in control of the primary driving operation. Responders should provide direct instructions as normal.

Best Practice

1) Utilize standard traffic direction signaling as proscribed under state law and federal guidance (the Manual on Uniform Traffic Control Devices also includes instructions for the human direction of traffic during abnormal conditions)

- **a)** If an SAE Level 1-3 vehicle fails to comply, instruct driver to disable autonomy and follow directions
- **b)** If driver still fails to follow instructions, instruct them to pull to the side and disable autonomy

2) If required, prepare a citation or warning per departmental procedures

3) If your jurisdiction requires it, also submit an AV interaction report through normal procedures

Notes

37 Tex. Admin. Code § 3.41 (b-c) contains guidance to officers for directing traffic in Texas

7 Tex. Transp. Code § 542.501 criminalizes the failure to obey traffic directions given by police officers, school crossing guards, or escort flaggers for oversize or overweight vehicles

Scenario:

Direct an SAE Level 4-5 Automated Vehicle Under Abnormal Road Conditions (with a Safety Driver)

Primary Scenario Type:
Traffic/Parking Management and Enforcement

Primary Responder Type:
Flaggers/Traffic Direction (e.g., LEO, public works, road construction crews, school crossing guards)

Secondary Responder Type: Law Enforcement

Scenario Context: Personnel must direct traffic through abnormal or deviated roadway conditions, with one or more SAE Level 4-5 automated vehicles present. Currently, automated motor vehicles rely on pre-mapped routes and programming to determine their path. Developers program AVs to prioritize safe driving, and the vehicles may resist deviations from normal conditions, such as temporarily driving in the oncoming lane. Although SAE Level 4-5 automated vehicles should detect and respond to traffic signaling instructions, this scenario assumes safety drivers are available to intervene if necessary.

Best Practice

1) Recognize the vehicle as an SAE Level 4-5 AV (see Texas AV Recognition Guide for First Responders for guidance)
   a) Identify vehicle make/model and the AV operator through markings, vehicle registration information, or the AV recognition guide
2) Utilize standard traffic direction signaling as proscribed under state law and federal guidance (the Manual on Uniform Traffic Control Devices includes instructions for the human direction of traffic during abnormal conditions)
   a) If vehicle fails to comply, instruct driver to disable autonomy and follow directions
   b) If driver still fails to follow instructions, instruct them to pull to the side and disable autonomy
3) If deemed appropriate and you possess the legal authority to issue citation
   a) Cite the driver for violating the Traffic Code if they failed to intervene or the autonomy was disengaged at the time of the violation
4) Cite the registered owner of the vehicle or the safety driver according to departmental procedures
5) If your jurisdiction requires it, also submit an AV interaction report through normal procedures

Notes

37 Tex. Admin. Code § 3.41 (b-c) contains guidance to officers for directing traffic in Texas.

Under current Texas law, AVs must obey the rules of the road as defined in the Texas Traffic Code.

According to Tex. Transp. Code § 545.453, the AV owner is liable for any violations of traffic laws, regardless of whether a human passenger is present. However, if a safety driver is present and the automated system was disengaged at the time of the violation that driver may be liable (consult departmental policy for guidance).

7 Tex. Transp. Code § 542.501 criminalizes the failure to obey traffic directions given by police officers, school crossing guards, or escort flaggers for oversize or overweight vehicles.

Scenario:

Direct an SAE Level 4-5 Automated Vehicle Under Abnormal Road Conditions (without a Safety Driver)

Primary Scenario Type:
Traffic/Parking Management and Enforcement

Primary Responder Type:
Flaggers/Traffic Direction (e.g., LEO, public works, road construction crews, school crossing guards)

Secondary Responder Type: Law Enforcement

Scenario Context: Personnel must direct a fully autonomous Level 4-5 vehicle through abnormal or hazardous road conditions, such as construction zones or crash scenes, without the presence of a safety driver. These vehicles operate independently using pre-mapped routes and advanced safety algorithms, but they may struggle to adjust to unplanned deviations like temporary lane shifts or detours. Without a human operator to intervene, responders must rely on the vehicle's ability to detect and respond to traffic signals, ensuring it navigates safely. If this system fails, the responder must contact the AV operator.

Best Practice

1) Recognize the vehicle as an SAE Level 4-5 AV (see Texas AV Recognition Guide for First Responders for guidance)

- **a)** Identify vehicle make/model and the AV operator through markings, vehicle registration information, or the AV recognition guide

2) Utilize standard traffic direction signaling as proscribed under state law and federal guidance (the Manual on Uniform Traffic Control Devices includes instructions for the human direction of traffic during abnormal conditions)

- **a)** If the vehicle fails to respond or pulls onto the shoulder blocking traffic, attempt to contact the AV operator (see Texas AV Operator Contact Sheet for guidance)
- **b)** Request the AV operator instruct the vehicle to navigate the temporary traffic route or move to a safer location that doesn't impede traffic flow
- **c)** If the vehicle behaves erratically or presents a danger to you or others, block traffic, warn others in the vicinity, and keep clear of the vehicle until you can contact the operator

3) If deemed appropriate and you possess the authority, issue a citation to the registered owner of the vehicle for failure to follow the traffic code, per departmental procedures

4) If your jurisdiction requires it, submit an AV interaction report through normal procedures

Notes

Some SAE Level 4-5 automated passenger vehicles may temporarily pull onto the shoulder or stop in the roadway, obstructing traffic, if they determine deviations from normal roadway rules or conditions (e.g., an officer guides vehicles to drive on the shoulder around a crash).

37 Tex. Admin. Code § 3.41 (b-c) contains guidance to officers for directing traffic. Under current Texas law, AVs must obey the rules of the road as defined in the Texas Traffic Code.

According to Tex. Transp. Code § 545.453, the AV operator, through the installation of the automated driving system, is liable for any violations of traffic laws.

7 Tex. Transp. Code § 542.501 criminalizes the failure to obey traffic directions given by police officers, school crossing guards, or escort flaggers for oversize or overweight vehicles.

Scenario:
Direct Traffic in a School Zone with Automated Vehicles Present

Primary Scenario Type: Traffic/Parking Management and Enforcement

Primary Responder Type: Flaggers/Traffic Direction

Secondary Responder Type: Law Enforcement

Scenario Context: Any SAE Level of automated vehicle may operate in school zones where they may encounter pedestrian crossings during school arrival and departure times where a school crossing guard is present. Some current automated driving systems struggle to recognize human directed traffic.

Best Practice

1) Law enforcement officers performing school crossing supervision and adult crossing guards shall wear high-visibility retroreflective safety apparel labeled as ANSI 107-2020 standard performance for Class 2, Type R, as described in Section 6C.05

2) Adult crossing guards shall not direct traffic in the usual law enforcement regulatory sense. In the control of traffic, they shall pick opportune times to create a sufficient gap in the traffic flow. At these times, they shall stand in the roadway to indicate that pedestrians are about to use or are using the crosswalk, and that all vehicular traffic must stop

3) Adult crossing guards shall use a STOP paddle. The stop paddles shall be the primary hand-signaling device. The STOP paddle shall comply with the provisions for a STOP/SLOW paddle (see Section 6D.02) except both sides shall be a STOP face. The paddle shall be retroreflective or illuminated when used during hours of darkness

4) Utilize standardized Traffic Direction Signaling

5) If a vehicle of any level of autonomy approaches the pedestrian crossing and fails to respond to instructions:

- **a)** If a driver is present, instruct driver to disable autonomy
- **b)** Based on the officer's discretion and judgment as to the safety of the passengers in the vehicle, officers may request passengers remain in the vehicle or move to a safe area
- **c)** Do not stand in front of a moving autonomous vehicle, even if it is inching forward slowly
- **d)** If possible to do so safely, note the license plate of the vehicle
- **e)** Report incident to law enforcement and if your jurisdiction requires it, have them submit an `AV interaction report through normal procedures

6) Law enforcement officers present for such violations may follow Scenario: Conduct a Traffic Stop for the appropriate level of autonomy and presence of a safety driver and issue a citation according to departmental procedures

7) If your jurisdiction requires it, submit an AV interaction report through normal procedures

Notes

Some automated vehicles have difficulty interpretating hand and arm signals. This may extend to the misinterpretation of a crossing guard with a STOP paddle and signals to pedestrians and cars associated with allowing the safe crossing of pedestrians across a crosswalk.

While current SAE Level 1-3 vehicles are not capable of driving safely on city streets with the automation on, several manufacturers authorize drivers to bypass warnings and enable "self-driving features." If an SAE Level 1-3 vehicle driver has self-driving features engaged and the vehicle is not responding to crossing guard instructions, take precautions as one would for any other distracted or dangerous driver in a school zone.

Best Practice steps highlighted with blue in any scenario below indicate alterations added by TTI/TEEX to existing best practices to address AV-specific considerations.

Additional Resources

Automated Vehicle Safety Consortium™ (AVSC)

The AVSC is a program within the SAE Industry Technologies Consortia (SAE ITC). The AVSC is focused on publishing the best practices to inform and lead in the safe deployment of Automated Driving Systems (ADS). Their goal is to build public trust and acceptance of automated vehicles as a safe and beneficial form of transportation. https://avsc.sae-itc.com/

Autonomous Vehicle Industry Association (AVIA)

The AVIA is focused on the safe and timely deployment of autonomous driving technology through state, federal, and international policy recommendations. They have members and partners involved in autonomous driving technologies as developers, users, and researchers. https://theavindustry.org/

Texas Connected and Autonomous Vehicle Task Force (CAV-TF)

The CAV Task Force is a program of the Texas Department of Transportation. They are a coordination and information source for CAV technology and deployments in Texas. https://www.txdot.gov/about/programs/innovative-transportation/connected-automated-vehicles-task-force.html

Sources

Commercial Vehicle Inspection Items, 37 Tex. Admin. Code. § 23.42 (2017).

Commercial Vehicle Safety Alliance. (2014). North American Standard Inspection Procedures. https://csa.fmcsa.dot.gov/safetyplanner/documents/396%20Forms/Inspection%20Procedure.pdf

Commercial Vehicle Safety Alliance. (2022). Enhanced Commercial Motor Vehicle Inspection Procedure (for motor carrier operations). https://downloads.regulations.gov/FMCSA-2018-0037-0324/attachment_1.pdf

Commercial Vehicle Safety Alliance. (2024). North American Standard Out-of-Service Criteria, 2024 edition. Commercial Vehicle Safety Alliance.

Commercial Vehicle Safety Alliance. (n.d.). Inspections. Commercial Vehicle Safety Alliance. https://www.cvsa.org/inspections/

Cruise, LLC. (2024). Guide for Law Enforcement & First Responders for Interacting with a Cruise Autonomous Vehicle: Cruise AV (Chevy Bolt Platform) Version. Cruise, LLC.

Daley, M. (2019, April 23). Motor Vehicle Extrication: Initial Response Considerations. Firehouse. https://www.firehouse.com/rescue/vehicle-extrication/article/21075292/motor-vehicle-extrication-initial-response-considerations.

Federal Highway Administration. (2023). Part 6: Temporary Traffic Control. Manual on Uniform Traffic Control Devices for Streets and Highways (11th ed.) (pp. 765-968). Federal Highway Administration.

Federal Motor Carrier Safety Regulations -Inspection, Repair, and Maintenance, 49 C.F.R. § 396 et seq.

Fleeing or Attempting to Elude Police Officer; Offense, 7 Tex. Transp. Code § 545.421 (2009).

Governmental Authorities, 7 Tex. Transp. Code § 541.002 (1995).

International Association of Fire Chiefs. (2021). IAFC Bulletin: Fire Department Response to Electric Vehicle Fires. International Association of Fire Chiefs. https://www.iafc.org/docs/default-source/1haz/respondingtoelectricalvehiclefires.pdf?sfvrsn=9421650c_6

International Association of Police Chiefs. (2019). Vehicular Pursuits. https://www.theiacp.org/sites/default/files/2019-12/Vehicular%20Pursuits%20-%202019.pdf

Legal Authorities for Police Officers to Direct Traffic, 37 Tex. Admin. Code § 3.41 (1976).

Maxfield, M. (2008). Problem-oriented Guides for Police, No. 53: Abandoned Vehicles. United States Department of Justice, Community Oriented Policing Services.

Maximum Driving Time for Property-Carrying Vehicles, 49 C.F.R. § 395.3 (2020).

Michigan Firefighter Training Council. (2001). State of Michigan Basic Vehicle Extrication Student Guide. https://www.michigan.gov/-/media/Project/Websites/lara/bfs/Folder2/Extrication_-_Student_Guide_1_Mar_01.pdf?rev=8fbe2bcaf0624f818a33a9a729748651

National Highway Traffic Safety Administration. (2014). Interim Guidance for Electric and Hybrid-Electric Vehicles Equipped with High-Voltage Batteries: Law Enforcement/Emergency Medical Services/Fire Department. United States Department of Transportation.

Obedience Required to Police Officers, School Crossing Guards, and Escort Flaggers, 7 Tex. Transp. Code § 542.501 (2019).

Operator of Automated Vehicle, 7 Tex. Transp. Code. § 545.453 (2017).

Police Executive Research Forum. (2023). Vehicular Pursuits: A Guide for Law Enforcement Executives on Managing the Associated Risks. Washington, DC: Department of Justice, Office of Community Oriented Policing Services.

Powers of Local Authorities. 7 Tex. Transp. Code § 542.202 (2003).

Requirement to Take Action. 37 Texas Admin. Code § 3.21 (1976).

Rielage, R. (2024, June 17). Developing SOPs for electric vehicle incidents. FireRescue1. https://www.firerescue1.com/electric-vehicles/articles/developing-sops-for-electric-vehicles-incidents-CbHhgn5759QnLDv3/

Stopping, Standing, or Parking Prohibited in Certain Places, 7 Tex. Transp. Code § 545.302 (1999).

Texas A&M Engineering Extension Service. (2023). Report from the TEEX Electric Vehicle/ Energy Storage Systems Summit. Texas A&M Engineering Extension Service.

Texas A&M Engineering Extension Service. (2024). Current Practices: Electric Vehicle and Energy Storage Systems. Texas A&M Engineering Extension Service. https://teex.org/ev-ess-current-practices/

Texas Commission on Law Enforcement. (2023). Traffic Code/Crash Investigation/TIM. In Basic Peace Officer Course Licensing Requirement. https://www.tcole.texas.gov/course-curriculum-materials-and-updates

Texas Department of Public Safety, Safety Regulatory Services Division. (2022). Texas Department of Public Safety: Vehicle Inspections. https://www.dps.texas.gov/internetforms/getForm.ashx?id=VI-82.pdf

Texas Department of Public Safety. (2023). Chapter 6: Commercial Motor Vehicle. In Vehicle Inspection Operations & Training Manual for Official Vehicle Inspection Stations (Vehicle Safety Inspection). Texas Department of Public Safety.

Texas Department of Transportation, Traffic Safety Division (2023), Texas Peace Officer's Crash Report Code Sheet CR-3CS, April 1. https://www.txdot.gov/data-maps/crash-reports-records/forms-law-enforcement.html

Texas Department of Transportation, Traffic Safety Division (2023), Texas Peace Officer's Crash Report CR-3, April 1. https://www.txdot.gov/data-maps/crash-reports-records/forms-law-enforcement.html

Texas Department of Transportation, Traffic Safety Division (2024), State of Texas Instructions to Police for Reporting Crashes CR-100, Version 28.0, September 5. https://www.txdot.gov/content/dam/docs/trf/crash-records-forms/cr100-v28.0.pdf

Texas Department of Transportation. (2014). Part 7: Traffic Control for School Areas. In Texas Manual on Uniform Traffic Control Devices (2011, 2nd revised ed.) (pp. 755-770). Texas Department of Transportation.

U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration (2024). "Guide 147: Lithium Ion and Sodium Ion Batteries," Emergency Response Guidebook. https://www.phmsa.dot.gov/training/hazmat/erg/emergency-response-guidebook-erg

Waymo, LLC. (2024). Waymo autonomously driven Jaguar I-PACE: Emergency response guide and law enforcement interaction protocol. Waymo, LLC

Zoox. (2024). Emergency Response Guide Information for First and Second Responders for Autonomous Zoox Vehicles.

Zoox. (2024). Law Enforcement Interaction Plan: California. Zoox.

Appendix A. Terminology and Acronyms

ADS	Automated Driving System
ADAS	Advanced Driver Assistance System
AV	Automated or Autonomous Vehicle
CAV	Connected Autonomous Vehicle
CMV	Commercial Motor Vehicle
CR-3	Texas Peace Officer's Crash Report Form
CVE	Commercial Vehicle Enforcement
EMS	Emergency Medical Services
FRIP	First Responder Interaction Plan
HERO	Highway Emergency Response Operator
LEO	Law Enforcement Officer
LEIP	Law Enforcement Interaction Plan
TEEX	Texas A&M Engineering Extension Service
TTI	Texas A&M Transportation Institute
TxDOT	Texas Department of Transportation
SAE	SAE International