TORC

FIRST RESPONDER GUIDE

SCAN FOR

FIRST RESPONDER INFORMATION

TORC

DRIVING THE FUTURE OF FREIGHT

EMERGENCY CONTACT

Torc's First Response team: 1-888-747-1691

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ABBREVIATIONS

Abbreviation	Definition
AC	Alternating Current
ADS	Automated Driving System
ADS-DV	Automated Driving System–Dedicated Vehicle
DC	Direct Current
DOT	Department of Transportation
DTNA	Daimler Truck North America
EMO	Emergency Manual Override
FMCSA	Federal Motor Carrier Safety Administration
IFTD	In-vehicle fallback test driver
LIDAR	Light Detection and Ranging
ODD	Operational Design Domain
psi	Pounds per square inch
QR	Quick Response
RADAR	Radio Detection and Ranging
SC	Safety conductor
VSSA	Voluntary Safety Self-Assessment

TORC EMERGENCY NUMBER: 1-888-747-1691

I. INTRODUCTION

1.1 Purpose

The purpose of this document is to assist first responder agencies and safety officials who may interact with Torc trucks equipped with our Automated Driving System (ADS) on how to engage with the truck in the course of their jobs. This includes how to interact with Torc personnel, either on the scene or post-event. This information is intended to be used by trained safety professionals and will be updated as needed.

1.2 How to Obtain Copies of the First Responder Guide

You can access the current version of this document in the following ways:

- Click this link to see the document on Torc's website
- Scan either QR code that is located on both driver and passenger-side baggage compartments
- Scan the QR code on the cover of this document
- Locate the document in the binder in the driver-side overhead compartment **(Figure 1)**

Figure 1. Driver-side overhead compartment

2. TORC'S TRUCKS

Torc is an independent subsidiary of Daimler Truck AG. We are developing self-driving trucks that will operate without human intervention in defined domains and conditions. Our initial product offering is long haul, middle-mile operation. The truck is equipped with sensors for perceiving the environment, and automated controls for steering, braking, and throttle, which allow the truck to navigate the roadways autonomously. A test crew is present at all times to maintain safe operation of the truck and oversee testing.

2.1 Identifying a Torc Truck

The Torc test truck platform is a Freightliner Cascadia that has been modified for ADS operations. The truck can be identified by the following exterior features:

- Sensors and cameras mounted to the cab on the roof, the bumper, and below the doors.
- Torc branding is present on the front hood, above the windshield, and on the driver- and passenger-side doors.
- The Department of Transportation (DOT) number is located on both the driver- and passenger-side baggage compartment doors. It will show one of the following:
    - TORC Robotics, Inc. DOT #3811919
    - Daimler Truck North America LLC DOT #78046

Figure 2 (see following page) illustrates the branding and sensor locations on the truck.

Figure 2. Torc truck

2.2 Test Operations

Torc conducts testing with the ADS engaged in many states across the U.S. The states where we currently conduct testing include, but are not limited to, Virginia, New Mexico, Arizona, Oklahoma, and Texas. Additionally, we may drive in manual mode (human driver actively driving) in numerous other states.

Our tests are conducted using a systematic test progression plan and an operating design domain (ODD) that defines the operating conditions approriate for testing. The conditions and locations where we conduct testing will expand incrementally over time following our rigorous, systematic development process that includes the use of computer simulation and closed course testing. Torc's trucks currently operate on a variety of roadways, including highways, ramps, and surface streets. The environmental conditions range from no precipitation to moderate rain and light snow, as well as winds up to a maximum speed of 45 mph. Torc's trucks may operate in either daytime or nighttime conditions.

As part of our safety processes, we will continually monitor for inclement weather conditions, such as snow or high winds. When conditions could impact the safe operation of the truck, testing is stopped.

2.3 About the Test Crews

All tests that include ADS-engaged operations have two highly trained crew members on board.

In-vehicle fallback test drivers (IFTDs) are responsible for the safety of the truck and its occupants. IFTDs sit in the driver's seat to supervise the truck's performance and drive the vehicle manually when needed. When the ADS is engaged, the IFTD monitors the operation and is prepared to resume control of the truck.

A safety conductor (SC) is responsible for leading the safe execution of tests related to the ADS-engaged vehicles. Among other responsibilities, the SC ensures the conditions and navigation remain within the test objectives and monitors the IFTD performance.

3. IDENTIFYING STATUS OF THE AUTOMATED DRIVING SYSTEM (ADS)

To determine the status of the ADS, the first responder must access the interior of the truck. Indicator lights on the A-pillar of the driver side of the truck **(Figure 3)** and on the rear overhead compartment (Figure 4) show whether the ADS is engaged (green) or available (red). ADS is disengaged when both lights are off.

Figure 3. ADS indicator lights – A-pillar

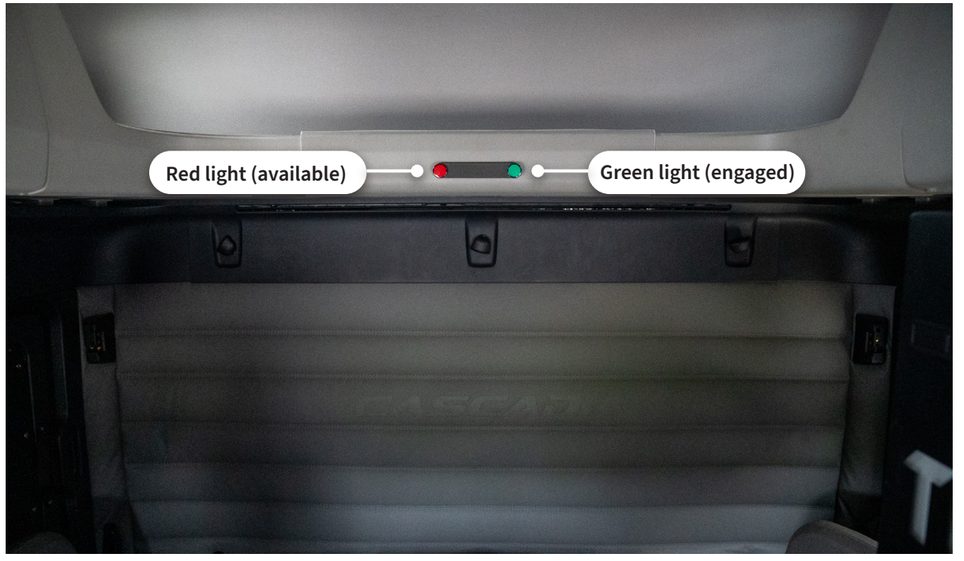

Figure 4. ADS indicator lights – rear overhead

4. CAB ACCESS AND OCCUPANT CAPACITY

The Freightliner Cascadia truck seats a maximum of four people and has two points of entry: the driver-side door and the passenger-side door. All tests that include ADS-engaged operations have the IFTD and the safety conductor onboard. Additionally, tests may include back seat passengers who may or may not be Torc employees.

The information in Section 4 is partially excerpted from the Freightliner *Cascadia Driver's Manual* (Daimler Truck North America LLC, 2023).

4.1 Accessing the Cab

To safely enter/exit the truck from either the driver **(Figure 5)** or passenger side **(Figure 6)**:

1. Use a firm grasp on the handholds.
2. Only move one limb at a time, maintaining three points of contact with the truck at all times.
3. Be certain to use the correct footholds. Never use a tire or a wheel hub as a foothold. These surfaces are likely to be slippery, and there is no good traction on a rounded surface.
4. To reduce the likelihood of personal injury, do not attempt to exit the truck with your back to the cab.

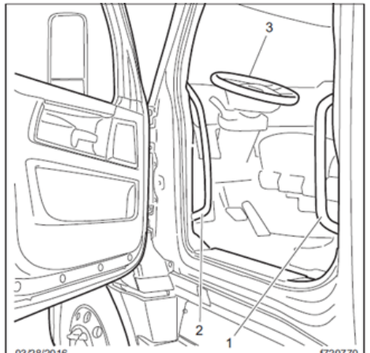

Figure 5. Driver-side entry (DTNA, 2023)

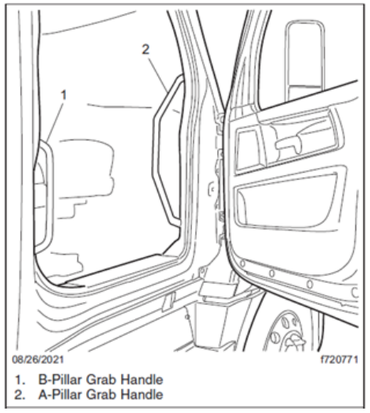

Figure 6. Passenger-side entry (DTNA, 2023)

4.2 Rear Passenger Seating

Figure 7 (DTNA, 2023) illustrates the rear passenger seating, with the table T-pull handle (1) and seat belts (4) identified.

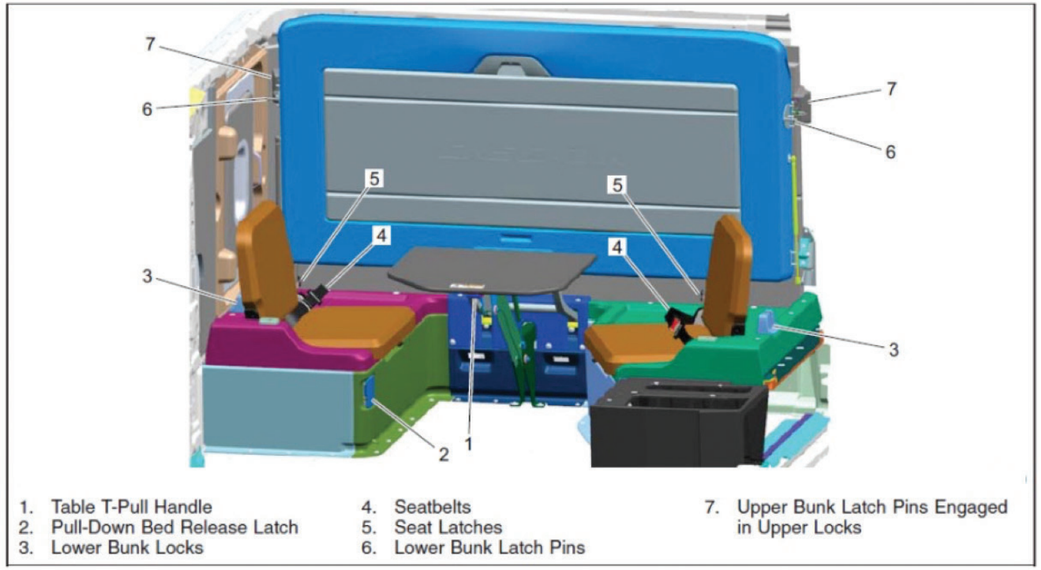

Figure 7. Rear passenger seats (DTNA, 2023)

5. IMMOBILIZING AND DISABLING THE TRUCK

To ensure that the ADS is disengaged, the truck is stationary, and the wheels are aligned for towing, the following steps should be taken in sequence:

1. Press the Emergency Manual Override (EMO) button to ensure ADS is disengaged.
2. Pull the parking brake and trailer air supply buttons.
3. Turn off the ignition.
4. Turn the red ADS power switch to OFF to cut direct current (DC) power to the ADS.
5. Turn the black ADS power switch to OFF to cut alternating current (AC) power to the ADS.
6. If appropriate, turn on the hazard flashers and deploy the hazard triangles.

Figure 8. Location of the EMO button

5.1 Emergency Manual Override (EMO) Button

ADS components are disabled automatically 15 seconds after the ignition is turned off; however, in case of an emergency, press the EMO button (the round yellow button on the dash) to ensure the ADS is disabled.

Figure 8 shows the location of the EMO button. In the event that the IFTD and SC are either incapacitated or otherwise unavailable, the first responder should push the EMO button to disengage ADS. Do not pull or twist the EMO button, as doing so puts the truck back in an ADS-capable state.

Figure 9. Brake valve control knobs

5.2 Parking Brakes

The parking brake controls **(Figure 9)** are standard in shape and color across the industry. To set the parking brake and trailer air supply, pull the yellow diamond-shaped knob, and then the red one.

Figure 10. Ignition switch

5.3 Ignition

The ignition switch is on the left side of the dashboard, below the headlight switch. **Figure 10** shows the location of the ignition, as well as the key in the OFF position.

Figure 11. Hazard Warning Signal Flasher

5.4 Hazard Warnings

Depending on the circumstance, it may be necessary to turn on the hazard warning signal flashers (i.e., hazard warning lights) and set out the roadside warning devices (i.e., hazard triangles). The red triangular hazard light button is located on the dashboard as shown in Figure 11.

The hazard triangles, as well as the fire extinguisher, are located in the passenger-side baggage compartment **(Figure 12)**.

Figure 12. Passenger-side baggage compartment

Figure 13. Passenger-side baggage compartment pull cable

To open the passenger-side baggage compartment, locate the BAGGAGE pull handle just inside the rear edge of the passenger-side cab door opening **(Figure 13)**. Pull the BAGGAGE cable handle forward to open the door.

Figure 14. Location of hazard triangles and fire extinguisher

Figure 15. Driver-side baggage compartment

Figure 16. Driver-side baggage compartment pull cable

5.5 ADS DC Power Disconnect Switch

Torc's truck has two ADS disconnect switches located in the driver-side baggage compartment on the exterior of the vehicle **(Figure 15)**: one for DC voltage and another for AC voltage.

To ensure that the ADS is shut down completely, the ADS power disconnect switches should be switched to OFF.

To open the driver-side baggage compartment, locate the BAGGAGE pull handle just inside the rear edge of the driver-side cab door opening **(Figure 16)**. Pull the BAGGAGE cable handle forward to open the door.

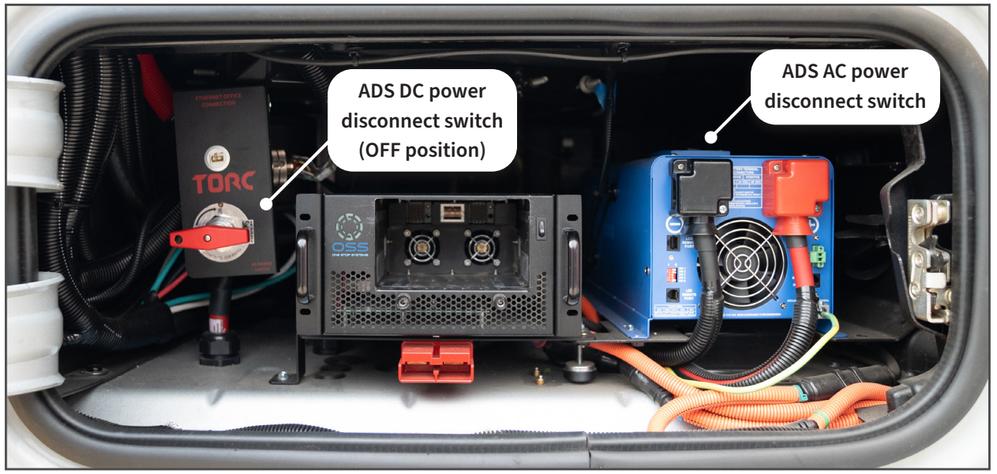

Figure 17. Location of DC and AC power disconnect switches

Figure 18. AC power switch (O is OFF)

The DC power switch is red and located on the left of the compartment, just under the red "Torc" logo. Switch it to OFF as shown in **Figure 17** by turning counterclockwise.

5.6 ADS AC Power Disconnect Switch

The AC power switch is a black rocker switch located on top of the blue inverter box on the right side of the baggage compartment. Switch it to the center position (O) as shown in **Figure 18**.

6. REMOVING TRUCK FROM THE ROADWAY

Before removing the truck from the roadway, it is important to ensure that the ADS is fully disabled according to Section 5, **Immobilizing and Disabling the Truck**.

6.1 If the Truck is Drivable

If the truck is drivable, a qualified Torc driver should move it from the roadway. If Torc authorized personnel are unable to move the truck, contact Torc's First Response team at 1-888-747-1691 and one will be dispatched as soon as possible.

6.2 If the Truck is Not Drivable

If the truck is not drivable, then the truck must be recovered and/or towed. Refer to Section 7, **Recovery and Section 8, Towing**. NOTE: Recovery hooks are to be used for recovery only, not towing.

7. RECOVERY

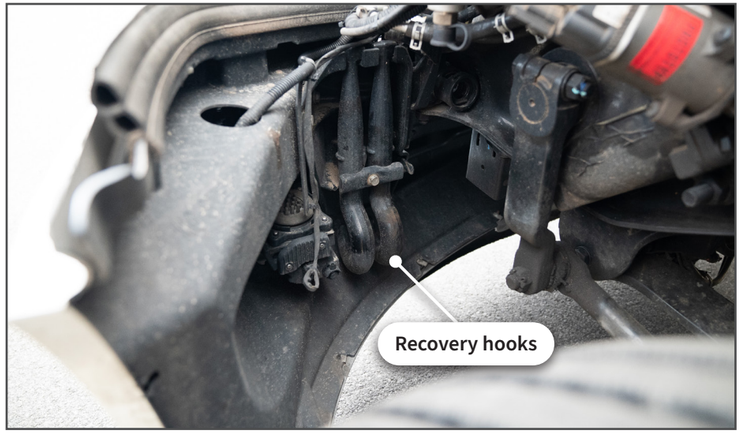

Figure 19. Recovery hooks

Before moving the truck, disable the ADS according to Section 5, Immobilizing and Disabling the Truck.

7.1 Recovery Hooks

Remove the recovery hooks, which are located under the hood, behind the driver-side bumper **(Figure 19)**.

7.2 Recovery Attachment Points

Figure 20 shows the location of the Torc truck's recovery attachment points.

Figure 20. Freightliner Cascadia recovery attachment points

NOTICE

When using recovery hooks to move the truck, **do not** pass a sling (for example, a rope or chain) from one hook to another. Known as reeving, this practice is not permissible in most industrial applications of towing and hoisting. Reeving can overload the hooks and result in damage to the truck. (DTNA, 2023) **NOTE:** Recovery hooks are to be used for recovery only, not towing.

8. TOWING

A heavy-duty wrecker is required for towing; flatbed towing is not possible. Reference Freightliner Service Bulletin 31-034 for detailed towing instructions.

Call Torc's First Response team at (888) 747-1691 for assistance if needed.

9. SAFETY CONSIDERATIONS

9.1 Disconnecting Power from the Main Battery

If it is necessary to cut off the power to the base truck, turn off the cab load disconnect switch, which is located just inside the driver-side door on the floor **(Figure 21)**. Turn the knob counterclockwise to the OFF position.

Figure 21. Location of the cab load disconnect switch

If this switch is not accessible, the batteries are accessible via a panel below the driver-side door **(Figure 22)** and below the catwalk **(Figure 23)**.

NOTE: The Torc truck is equipped with a standard diesel internal combustion engine. It is not an electrified powertrain.

Figure 22. Driver-side panel, showing location of batteries

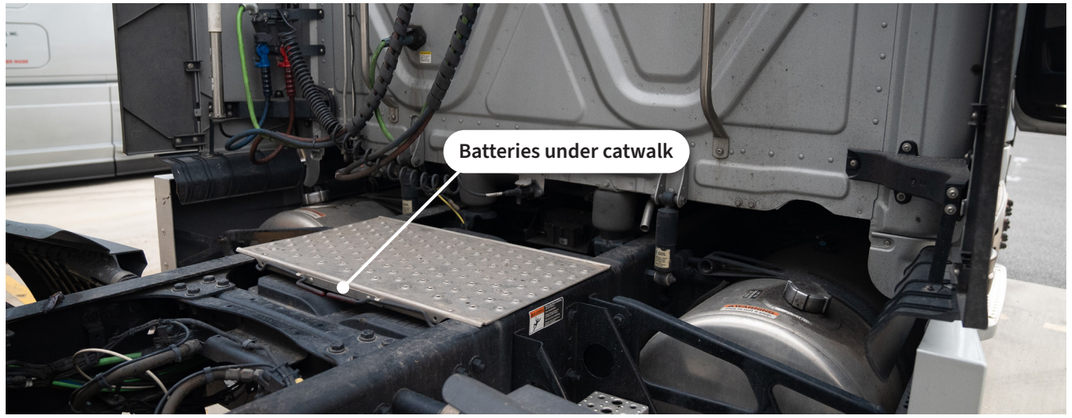

Figure 23. Location of batteries under catwalk

9.2 Preventing Rollaway

If necessary, a heavy-duty wrecker may need to chock the wheels. This is performed on the Torc truck in the same manner as any conventional Class 8 truck.

9.3 Fire Extinguisher

The fire extinguisher is in the passenger-side baggage compartment, along with the hazard triangles **(Figure 14)**.

9.4 Extrication

There are a few areas to avoid when attempting to extricate individuals from the truck cab, including:

1. The fuel tanks and fuel lines, located underneath the cab **(Figure 24)**.

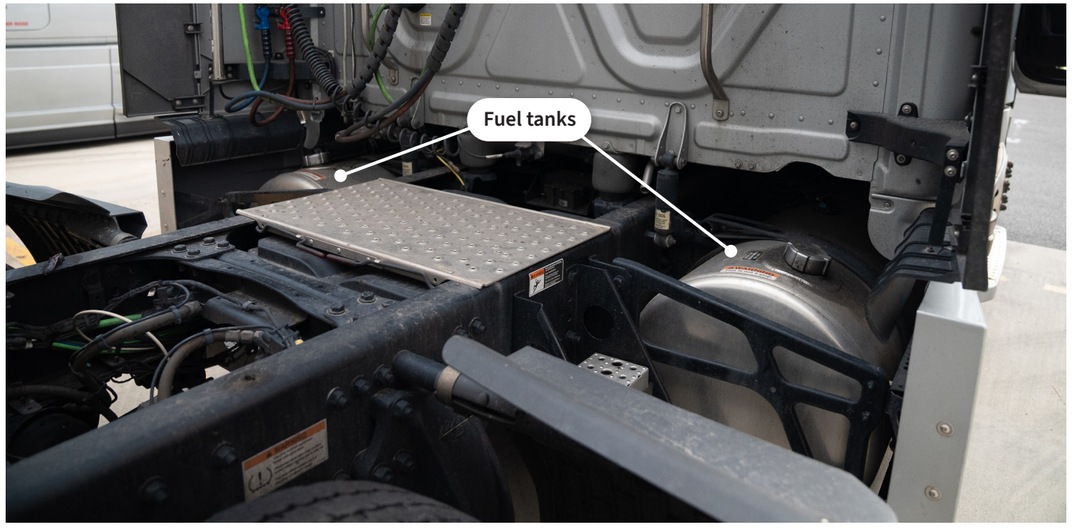

Figure 24. Fuel tanks

2. ADS system:
   - Electrical wiring (120V AC and 48V DC) is located underneath the cab **(Figure 25)**.
     PLEASE NOTE: Do not cut. High voltage connected to the ADS computer equipment.
   - Computer equipment located directly behind the driver seat in a black metal cabinet with the Torc logo **(Figure 26)**.

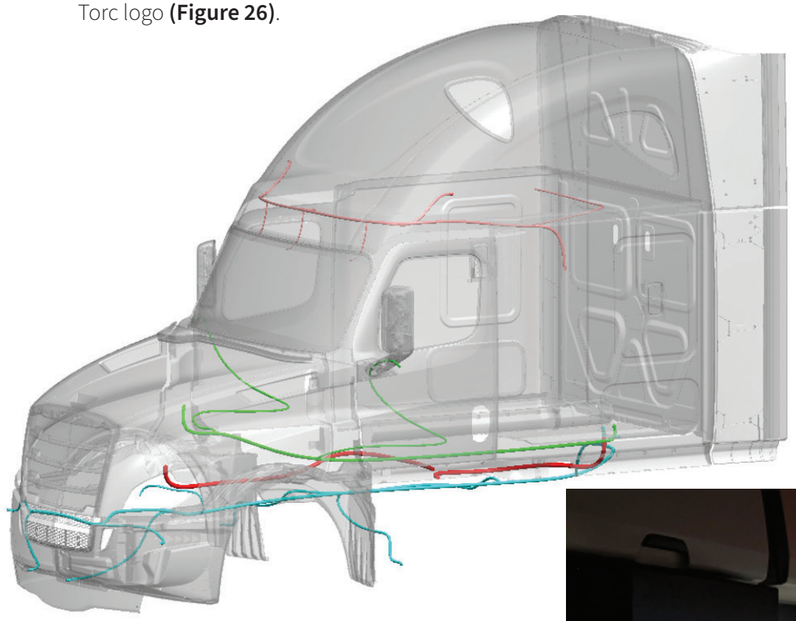

Figure 25. Electrical wiring diagram

Figure 26. ADS computer equipment

10. SUPPORT

Emergency responders or law enforcement should contact Torc's First Response team at (888) 747-1691.

In addition, first responder information is also available on Torc's website.

11. OTHER RESOURCES

Automated Vehicle Safety Consortium. (2020). Best Practice for First Responder Interactions with Fleet-Managed Automated Driving System-Dedicated Vehicles (ADS-DVs). SAE Industry Technologies Consortium.

Daimler Truck North America LLC. (2023, January 16). Freightliner Cascadia Driver's Manual. Retrieved March 8, 2023, from freightliner.com: https://dtnacontent-dtna.prd.freightliner.com/bin/dtna-servicelit/downloadpdf?path=/content/public/dtna-servicelit/dtna/en_us/freightliner/drivers-manuals/cascadia-drivers-manual&SM_USER=

Torc Robotics LLC. (2021, January 4). Voluntary Safety Self-Assessment (VSSA). Retrieved from torc.ai: https://torc.ai/wp-content/uploads/2022/01/Torc-Robotics-VSSA.pdf

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