



# Addressing Blind Zones in Commercial Trucks

Together for Safer Road  
Direct Vision Star  
Rating System

# EXECUTIVE SUMMARY

Together for Safer Roads (TSR) is a global NGO, leveraging private-sector technology, data and expertise to prevent traffic crashes, injuries and fatalities around the world. The organization is uniquely positioned to bring the knowledge and resources of public and private sector fleets together to positively impact road safety outcomes by collecting industry insights, creating novel solutions to shared problems, and delivering systemic interventions at scale. The topic of blind zones and the risk they pose to pedestrians, cyclists, children, and other vulnerable road users is of particular interest to TSR, as it presents a critical opportunity to prevent crashes and road fatalities.

This report outlines TSR's journey to create the first North American Direct Vision Star Rating System in partnership with public and private sector fleets. This system empowers fleet owners to assess the blind zones of their trucks, make informed purchasing decisions, and retrofit poorly rated vehicles for improved visibility. 12 fleets from across the United States have used the Direct Vision Measurement Kits to measure the blind zones of their fleet vehicles and rate them on a five point scale to determine their Direct Vision Star Rating score.

The Direct Vision Star Rating System is expected to benefit policymakers and fleet operators by providing a tool to evaluate blind zones in their current fleet and guide future purchases.

# REPORT

## The Fatal Impact of Blind Zones

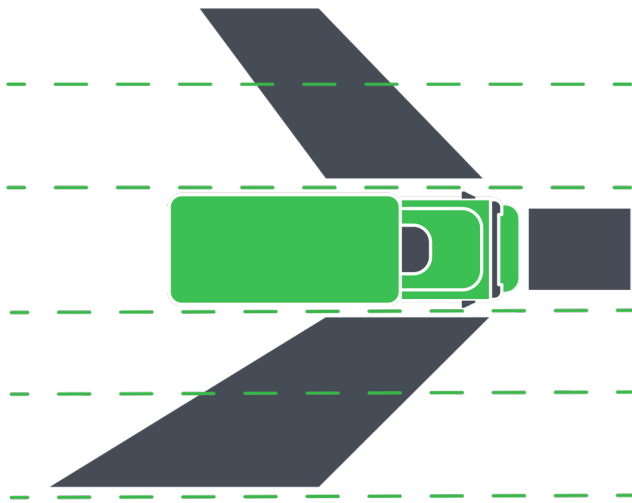
Blind zones are areas that cannot be seen by a driver when operating a vehicle. They block the view of the people around them and create dangerous conditions for all road users.

When we consider the experience of the millions of drivers operating conventionally designed trucks, we are presented with a troubling situation: large vehicles with significant blind zones and the reality that even the best trained and most experienced drivers simply cannot avoid what they cannot see. For example, in a classic conventional cab, if a heavy vehicle driver follows all the rules and pulls to a stop four feet back from a crosswalk, that driver, who is operating correctly, would still be unable to see children in the crosswalk.

Children in a crosswalk are part of a larger group of Vulnerable Road Users (VRUs) – motorcyclists, pedestrians, bicyclists, and other non-vehicle occupants – who are at an increased risk of injury and death when involved in vehicular crashes. Fatalities for this group have been increasing both absolutely and as a percentage of all crashes in the United States since 2000. The absolute numbers are alarming:

- In the United States in 2020, the death toll for pedestrians was in excess of 6,000, for bicyclists approached 900, and for motorcyclists was greater than 5,000.
- In 2020, the projected pedestrian death toll per billion vehicle miles traveled spiked 20% above what it was in 2019. Heavy duty commercial trucks, the focus of this work, are involved in a great many of the VRU deaths.
- NHTSA data shows that the number of frontover fatalities - instances where a driver hits and kills someone directly in front of them - has almost doubled in the past 5 years from 284 fatalities in 2015 to 526 frontover fatalities, and over 10,000 injuries, in 2020.
- A 2006 University of Michigan study found that 20 percent of truck-initiated crashes are linked to poor visibility from the driver's seat. While the UK, EU, and UN have recently strengthened vehicle design regulations to increase what drivers can directly see, U.S. vehicle design standards have not changed in this area.

Many VRU deaths are attributed to the blind zones of most heavy trucks. For example, in the U.K., traditional heavy duty truck cabs place drivers 98 inches above the ground. Together, the higher cab height and larger engine volume of trucks is generally related to an increase in the region of the roadway which the driver cannot see directly in front and on the passenger side. **These large blind zones are estimated to be the second leading cause of truck- pedestrian strikes in the U.K., occurring in approximately one-third of such strikes.**



In the United States, it was estimated in 2006 that some **25% of the heavy truck-VRU fatalities per year were due to vision-related low-speed maneuvers at intersections.**

In 2019, this equates to 149 heavy truck fatalities. In New York City, a similar percentage of truck-VRU fatalities involving private garbage trucks were estimated to be vision-related. **Although the percentage of VRU crashes cannot be compared across countries because of the differences in cab design and geometry, the contributor to these crashes, blind zones, remains the same.**

In trucks without blind zones, the driver's view is not blocked, and they can see people around them, of any age. This "direct vision" cab design can help drivers avoid collisions and tragedies. Trucks with direct vision cabs are manufactured, but their presence outside of Europe is limited.

Looking beyond the United States, it is instructive to see how the City of London has systematically addressed the fatal impact of blind zones. Transport for London (TfL) launched the world's first Direct Vision Standard (DVS) in October 2019, with enforcement commencing on March 1, 2021, in line with the mayor's Vision Zero aim to eliminate all deaths and serious injuries from London's roads by 2041.

In the first year of DVS enforcement, TfL has seen positive outcomes<sup>1</sup>:

- A reduction in fatal collisions where vision is cited as a contributing factor
- An average daily compliance rate of 94.2% which reflects action taken by the freight industry to adopt the standards of the scheme
- A total of 191,769 permits issued with 112,259 0\* rated vehicles fitting a Safe System to improve indirect vision

Since this report, Transport for London, in partnership with the City of London, have tightened DV regulations even further and are mandating all HGVs rated below three stars to install the [Progressive Safe System](#), a comprehensive retrofitting kit to improve visibility using aftermarket systems.

# Creating a Direct Vision Star Rating System

Based on the research outlined above, we know that blind zones pose a serious risk. However, fleet managers may not be aware of how much risk they are taking on based on the size of the blind zones of the truck they purchase and operate. One truck model may have significantly larger blind zones than another make and model which has almost none.

In short, *you can't change what you don't know*. This is why Together for Safer Roads set out to create the first North American Direct Vision Star Rating System in partnership with public and private sector fleets, government officials, and industry experts. It's imperative for fleet owners to understand how the range of visibility in their trucks stacks up against other fleets; it empowers them to make better purchasing decisions and modify their existing fleets to increase visibility.

The Direct Vision Star Rating System provides policymakers and fleet operators with a tool to assess the blind zones of their current fleet vehicles and make better informed purchases when procuring new trucks. We believe it will also encourage fleet owners to retrofit poorly rated vehicles to improve visibility and reduce the size of their blind zones. In London, heavy goods trucks have been required to meet a direct vision standard since 2019, and report a 75% reduction in fatal crashes where vision was a factor. Similarly, vision-related crashes causing severe injuries fell 64% from 2017 to 2021.

## Building the Rating System

Together for Safer Roads and our design partner Cities Reimagined began this project with user research to (1) validate the problem we were working to solve, and (2) gather insights from managers and drivers that would inform the solution. Design researchers rode along with commercial truck operators in Boston and New York to see the problem from their point of view. Data and insights were collected from drivers and compiled into a report that identified themes and trends. This report then guided the development of the first Direct Vision Star Rating System.

Rather than design the system in a silo, Together for Safer Roads hosted a one-day design sprint in New York City to put drivers, fleet managers, and policymakers in the inventor's seat. The group prototyped a rating system that would measure and star-rate trucks according to the size of their blind zones. Operators can evaluate their vehicles by requesting a measurement kit and following a digital instruction manual to measure and rate their trucks.

## Design Sprint Participants



### Testing and Deploying Rating Kits

Throughout the summer of 2023, Direct Vision Measurement Kits were mailed to 20 public and private sector fleet managers to measure and rate the vehicles in their fleet. This data is being aggregated by Together for Safer roads and shared back out with policymakers and fleet managers through this report and in partnership with the Volpe Center at the U.S. Department of Transportation.



Design sprint participants work to create the Vision Star Rating System

### Direct Vision Rating Results

The City of Boston worked in partnership with the U.S. DOT Volpe Center to collect measurements on a wide variety of fleet vehicles using the Direct Vision Measurement Kit. The following vehicles were measured and ratings were calculated<sup>2</sup>:

# City of Boston Vehicle Ratings

Make	Model	Front Star Rating	Side Star Rating
Freightliner	Business Class M2 106	★★★★★	★★★★
Ford	F-350	★★★★★	★★★★
Ford	F-450	★★★★★	★★★★★
Ford	F-750	★★★	★★★
Blue Bird	All American/All Canada	★★★★★	★★★★★
Blue Bird	BBCV	★★★★★	★★★★★
Chevy	3500 Cut Van	★★★★★	★★★★★
Dennis Eagle	Elite NAS1	★★★★★	★★★
E-One	Cyclone	★★★★	★
E-One	Typhoon	★★★	★
Ford	E350	★★★★★	★★★★★
Ford	F-150	★★★★★	★★★
Ford	F-250 XL	★★★★	★★
Ford	F-450 Superduty XL	★★★★	★★★
Freightliner	108 SD	★	★
Freightliner	M2-106	★★★★★	★
Hino	338	★★★★	★
International	HV513	★	★
International	HV607	★★	★
International	MV607	★★★★	★
International	WorkStar/SF67 (7600)	★	★
Lion	LIONC (V1)	★★★★★	★★★★★
Mack	MRU 613	★★★★★	★
Thomas Built	MVP-EF (Engine Front)	★★★★★	★★★★★

# Putting the Insights to Work

The information presented through the Direct Vision Star Rating System empowers fleet owners and managers to make better, safer decisions. Ultimately, the goal of this work is to create a safe experience for all road users - paying special attention to those behind the wheel and those vulnerable road users who are outside of a vehicle.



Republic Services team members measure the blind zones of a new fleet vehicle, 2023

Together for Safer Roads has built a coalition of fleet stakeholders – owners, managers, drivers, pedestrians, bicyclists, and others who share the road, to address this issue. Their experience has helped create the first American Direct Vision Star Rating System, the standard by which commercial vehicles are measured and rated. Using this star rating standard as a baseline and policy tool, we believe it will:

- Enable fleet owners to evaluate which vehicles in their fleet have the best, or worst, visibility and how they should be modified, replaced or deployed
- Prompt public and private sector procurement policy reform to increase the percentage of direct vision vehicles in city fleets
- Educate drivers around the importance of switching to direct vision trucks

These outcomes will ultimately increase the percentage of direct vision commercial trucks on the road.

TSR is working in partnership with the U.S. DOT Volpe Center to field test and iterate upon the Direct Vision Rating System and reflect the rating data in the VIEW app, a public vehicle database where blind zone measurement information can be found. The goal of this data collection partnership with The Volpe Center is to create a representative

# The Road Forward

The enthusiastic response to TSR's Direct Vision Star Rating System and the one-day Design Sprint suggest a strong interest in further guidance on and resources for the increased adoption of direct vision cabs in private and public fleets. But, interested operators have questions: What tools exist to assess visibility in their current fleet vehicles or future purchases? What Direct Vision vehicles are available on the U.S. market and what do current users say about them? How can Direct Vision requirements be built into specs and procurement processes?

To address this need, TSR will create an operator-facing resource to help fleet operators begin procuring direct vision vehicles. This first-of-its-kind transition guide will provide private and public sector fleet operators with a one-stop resource for introducing Direct Vision vehicles into their fleets, including:

- An operator-focused overview of Direct Vision, including information on safety and driver satisfaction benefits and real-world examples from US cities and companies;
- Guidance on and step-by-step instructions for measuring visibility using the two major, complementary, measurement tools - TSR's Direct Vision Five Star Rating System and the U.S. DOT Volpe Center's Blind Zone Calculator;
- Procurement strategy tips developed with input for TSR's major fleet operating members, and; These outcomes will ultimately increase the percentage of direct vision commercial trucks on the road.
- Information on Direct Vision trucks (Class 6 and higher) currently in use in the U.S.