



U.S. Department
of Transportation

**Federal Transit
Administration**

Office of Transit Safety and Oversight
Washington, DC

SA-23-1

Safety Advisory

9/19/2023

Subject: Bus-to-Person Collisions

Summary: The Federal Transit Administration (FTA) issues Safety Advisory 23-1 to recommend that transit agencies that provide bus service consider mitigation strategies to reduce bus-to-person collisions. Transit agencies should identify specific hazards that may cause or contribute to bus-to-person collisions, assess the associated safety risk, and implement appropriate mitigations to reduce the likelihood and severity of those collisions.

Background: Hundreds of bus-to-person collisions occur every year. For this Safety Advisory, bus-to-person collisions include bus collisions with pedestrians, bicyclists, and people using other micromobility devices. From 2008 to 2021, transit agencies reported 7,298 bus-to-person collisions to the National Transit Database, which resulted in 537 fatalities (approximately 15 percent of all transit fatalities) and 7,329 injuries.

FTA examined available National Transit Database data from 2017 through 2021 and found:

- The largest proportion of injuries and fatalities from bus-to-person collisions occurred at roadway intersections (42 percent), as compared to the mid-block of roadways (38 percent), bus stops (15 percent), and all other locations (5 percent).
- Approximately 53 percent of crosswalk pedestrian injuries and fatalities occurred when the bus turned left, compared to turning right or proceeding straight.
- Of the fatalities and injuries that occurred at the mid-block of roadways, approximately 32 percent were with bicyclists, and 30 percent were with non-crosswalk pedestrians. At the mid-block of the roadway, collisions with bicyclists predominantly occurred on the side of the bus, while non-crosswalk pedestrians were predominantly struck head-on by the bus.

As part of its internal safety risk assessment, FTA identified the following hazards that may result in bus-to-person collisions:

1. Bus operator vision impairment due to components of the bus design, such as the A-pillar, fare box, and side mirrors. Mirrors and A-pillars can obstruct as much as a foot of an operator's field view of pedestrians and other hazards, particularly on left turns. The view of the front and side of the bus can also be cut off by electronic fare boxes or operator plexiglass shields or their framing, among other potential obstructions.
2. Bus operator vision impairment due to obstructions and activity outside of the bus, such as posts, street vendors, and signage.
3. Entry into the bus path by pedestrians, bicyclists, and other micromobility users.

4. Limited space at bus stops and adjacent sidewalks.

Recommended Action: FTA recommends that transit agencies consider mitigation strategies to reduce bus-to-person collisions. Transit agencies should identify specific hazards that may cause or contribute to bus-to-person collisions, assess the associated safety risk, and consider safety risk mitigations to address the assessed safety risks.

FTA recommends that transit agencies consider the hazard of bus operator vision impairment. FTA recommends that transit agencies also identify and assess additional hazards unique to their agency's operating environment.

Transit agencies focusing on bus operator vision impairment as a safety hazard may consider the below categories of safety risk mitigations, among others.

1. **Vehicle Design.**

- a. Vehicles. Agencies may consider including design performance specifications that limit blind spots in new vehicle procurements, including the size, location, and types of mirrors, and reducing the width of the A-pillar. Agencies may evaluate the performance of those specifications during pre-acceptance road tests.
- b. Vehicle Systems. Various on-board technology solutions are being developed, tested, and deployed across transit systems to detect, deter, and avoid collisions. Those systems include cameras and motion sensors to detect people outside the bus and audio and visual turn warning systems, for example, repeated "bus turning" audio warning and blinking side chevrons.

2. **Operator Driving Policies and Procedures.**

- a. Scanning. Policies may mandate constant sweeps of the road with periodic checks of mirrors. For example, a policy could require that on turns, to work around visual challenges such as the A-pillar and moving hazards, operators need to "bob and weave" or "rock and roll" in their seats to continue scanning the landscape or that an operator should avoid a fixed stare out the window.
- b. Square left turns. Policies and procedures could require that on left turns, bus operators generally should "walk a bus" through the turn while keeping the foot covering the brake, which allows more time for hazard recognition and response. Squaring a turn requires the operator to go deeper into an intersection to set up the pivot point, which allows more time for the operator to scan for hazards and for people to move through crosswalks. This type of turn necessitates slower speeds. In contrast, a "sweeping turn" that traverses an intersection in an arcing motion requires acceleration and more stopping distance to avoid hazards, while providing less time for hazard recognition.

Resources: FTA has a dedicated Bus-to-Person Collision webpage available at <https://www.transit.dot.gov/regulations-and-programs/safety/bus-person-collisions-safety-advisory-23-1>.

For fact sheets, guidance, and training available for bus transit providers on identifying safety hazards, completing a safety risk assessment, and developing mitigations, please visit FTA's

website at <https://www.transit.dot.gov/regulations-and-guidance/safety/public-transportation-agency-safety-program/bus-transit-providers>.

In addition, in January 2022, U.S. Department of Transportation (DOT) released the [National Roadway Safety Strategy \(NRSS\)](#), a comprehensive approach to significantly reduce serious injuries and deaths on the Nation’s highways, roads and streets. Alongside its release of the NRSS, U.S. DOT launched a complementary “Call to Action” campaign that invites stakeholders across the public, private, and non-profit sectors and Safe System elements to embrace and commit to specific actions supporting the NRSS vision of eliminating roadway fatalities. FTA specifically focused its efforts on bus agencies. FTA recommended that bus agencies consider committing to various actions that support the NRSS. Several example commitments listed in the Call-To-Action Letter are:

1. Implementing transit/bus-only lanes
2. Improving pedestrian/bike access to rail/bus stations
3. Using collision avoidance technology to reduce transit vehicle-to-car and transit vehicle-to-pedestrian crashes
4. Other Vision Zero-type projects

Contact: Please direct questions or comments regarding this Safety Advisory to Joe DeLorenzo, Associate Administrator for Transit Safety and Oversight and Chief Safety Officer, FTA, 1200 New Jersey Avenue, SE, Washington, DC 20590, telephone (202) 366-1783, or email Joseph.DeLorenzo@dot.gov.

FTA would like to facilitate the sharing of best practices and success stories. If you have examples of the successful implementation of a safety risk assessment or the development and implementation of safety risk mitigations for bus-to-person collisions that you would like to share, please send them to the FTA Public Transportation Agency Safety Plan Technical Assistance Center (PTASP TAC) by email at PTASP-TAC@dot.gov.