

# MICHIGAN



## MICHIGAN STATE UNIVERSITY: Prevention of work-related injuries & illnesses through research & investigation

### LOOK FOR MOBILE EQUIPMENT BLIND SPOTS

Hazard Alert: Blind Spots 4/9/20

A **blind spot** is the area around a piece of mobile equipment (e.g. vehicle, construction equipment, forklift) that is not visible to the operator, either by direct line-of-sight or indirectly by use of internal and external mirrors. **Operators should not depend upon backup alarms** as a warning to workers on foot. Alarms become “background noise” for many workers and due to the high prevalence of hearing loss in workers, especially those in the Construction and Agricultural industries, they may not hear it. **Thirty-eight (38)** individuals have died since 2001 when they were run over/struck while they were in an equipment/vehicle operator’s blind spot as the machine/vehicle was being operated.



Construction activities accounted for 14 (36.8%) of these fatalities, followed by Transportation and Warehousing (7 deaths, 18.4%), Administrative and Support and Waste Management and Remediation Services (5 deaths, 13.2%), Agriculture (4 deaths, 10.5%), and the remaining 8 deaths in multiple other industries.

### EXAMPLES OF MICHIGAN WORK-RELATED FATALITIES RELATED TO EQUIPMENT BLIND SPOTS

- A male heavy equipment operator in his 40s was killed when he was run over by a fuel truck backing up. The fuel truck had an operational back-up alarm and lights and had finished fueling equipment on a road widening construction site. The truck had backed up approximately 30-40 feet when it struck the decedent, who was walking with his back to the truck.
- A male excavation company laborer in his 20s died when he was struck and run over by a backing skid steer without a functioning back up alarm and missing rear-view windows. The decedent and the skid steer operator were leveling stone in preparation for a paving operation. Prior to backing, the skid steer driver noted the decedent standing out of the way on the paved portion of the road. The skid steer driver was watching the bucket when he backed over the decedent.
- A male excavating crew supervisor in his 50s died when he was crushed by an excavator as he was bent over picking up a rock during the restoration of a creek bed. A coworker, who was spotting yelled to the decedent to get out of the way. The decedent was apparently unable to hear him and was knocked to the ground and run over by the excavator track. The excavator had multiple defects, including missing mirrors, a broken proximity alarm, and an obscured window.
- A male equipment operator in his 20s died while sitting in a pickup truck that was parked behind and on the right side of a front-end loader on a dead-end, single-lane mine road. The front-end loader operator was unaware that the pickup was behind him. When his job task was completed, the operator looked over his left shoulder and began to back up, running over the pickup truck.
- A female worker in her 50s died when she was struck and run over by a forklift transporting an over-filled six-yard dumpster measuring 71 inches wide by 58 inches tall by 66 inches deep in a recycling center parking lot. The forklift driver was traveling forward (not trailing the load).
- A male job setter in his 40s was struck and run over by a forklift transporting a hopper measuring 86½ inches wide, 66 inches deep, and 47 inches high across a blacktop-surfaced yard to another building. The decedent had walked outside the manufacturing building and was talking to a family member on the phone when the forward-traveling forklift struck him.
- A male farm hand in his 60s died when he was struck by a front-end loader with a 4-yard bucket while he was bending down cutting the strings on a bale of hay.

## PREVENTING INJURIES AND FATALITIES RELATED TO EQUIPMENT BLIND SPOTS

When workers on foot are working around moving equipment, the need to be seen is critical for their safety; workers must be visible to equipment/vehicle operators in all light conditions and against complex background. **High visibility safety apparel (HVSA)** such as vests, jackets, pants, shirts, rainwear and coveralls **can be the difference between life and death!**

- **Install after-market proximity warning systems on mobile equipment/vehicles.** Consider the environment in which the equipment is used. For heavy construction equipment, choose systems made for and proven on this type of equipment. Proximity warning systems include radar, sonar, GPS, radio transceiver tags, and combinations of radar and cameras **Consider a sensor-based system combined with video cameras to provide both alarm functions and actual views of the blind area.**
- **Develop an internal traffic control plan. Use NIOSH [blind-area diagrams](#) when laying out job sites** to minimize placing workers in areas where vehicle operators have limited visibility **and as training aids** to illustrate typical blind spots around various equipment types. Establish:
  - On-site work rules: e.g., speed zones, prohibiting workers from approaching a truck until it stops, prohibiting pickup-truck parking along vehicle travel paths
  - On-site vehicle travel pattern
  - Set boundaries and travel paths for ground workers
  - Delineate worker-free zones in areas of concentrated vehicle traffic
  - Limit site access
  - Eliminate vehicle-backing maneuvers whenever possible
- **Learn equipment/vehicle's blind spots. Use NIOSH [blind-area diagrams](#).**
  - If the vehicle is not listed in the NIOSH diagrams, estimate the vehicle blind zone: Sit in driver's seat, have another person walk away from vehicle until driver can see his/her feet, measure distance. For side and rear, repeat process using use side/rear view mirrors. Area within measured distance is blind zone.
  - **Remember blind zones in front of vehicles**, just not rear blind zones (See Do You Know)
- **Ensure vehicle operators and workers on foot account for "unrecognized" blind spots.** For example, when a compactor operator focuses on the ground on the edge being rolled, the entire opposite side of the machine becomes a blind area.
- **Develop Standard Operating Procedure (SOP)** for backing vehicles.
- **Develop Driver backing vehicle training.** Training should **include:** driver stopping vehicle if he/she cannot see the Spotter, performing a walk-around to determine obstacles/hazards and site/vehicle clearances, sounding horn prior to backing, and demonstrating backing competency.
- **Develop Spotter backing vehicle training.** Training should **include:** signals to be used and agreed upon with driver, maintaining eye contact and a safe distance from backing vehicle on the driver's side, and demonstrating spotter competency. Don't have the spotter walking backwards while giving instructions.
- **Select appropriate class of high-visibility apparel to ensure worker visibility.**
  - Use only garments certified and labeled as [ANSI/ISEA 107](#) and [ANSI/ISEA 207](#).
  - Perform a risk assessment. Consider expected use settings and work activities to be performed.
    - ✓ **ANSI Type O, Class 1** - Performance Class 1 offers the minimum amount of high visibility materials to differentiate the wearer from non-complex work environments and is only appropriate for off-road environments. (O = Off-road)
    - ✓ **ANSI Type R or P, Class 2** - Performance Class 2 is considered the minimum level of protection for workers exposed to roadway rights-of-way and temporary traffic control (TTC) zones. Garments will have additional amounts of high-visibility materials that allow for better definition of the human form. (R = Roadway. P = Public Safety)
    - ✓ **ANSI Type R or P, Class 3** - Performance Class 3 provides more visibility to the wearer in both complex backgrounds and through a full range of movement by the required placement of background, retroreflective, and combined performance materials on the sleeves and pant legs (if present).
    - ✓ **ANSI Class E** - High visibility garments that do not qualify as meeting the requirements of the standard when worn alone, but when a Class E item is worn with a Class 2 or Class 3 garment, the overall classification of the ensemble is Class 3.
  - **Recognize enhanced visibility ≠ high visibility!** Enhanced visibility can be used for any garment of any color that has retro-reflective striping added to it in any configuration. These garments are not typically ANSI compliant and are for workers in lower risk environments.

### DID YOU KNOW?

- You can minimize blind spots as you travel on-the-road
  - Rear-view mirror: Sit in driver's seat. Adjust rear-view mirror so you can see directly out the center of the rear window.
  - Driver's side mirror: Sit in driver's seat
    - ✓ Roll up window and lean head against it
    - ✓ Adjust driver's side mirror so you can just barely see the rear of your vehicle in the mirror.
  - Passenger side mirror: Sit in driver's seat
    - ✓ Lean toward center of vehicle
    - ✓ Adjust passenger side so you can just barely see the rear of your vehicle in the mirror.
- Consumer Reports.org evaluated the best and worst of passenger vehicle blind spots:  
<https://www.consumerreports.org/car-safety/best-and-worst-cars-and-suvs-for-visibility/>
- **Front -end blind zones can also be deadly!** Blind zone measured in front of 22 vehicles.  
<https://www.wthr.com/article/13-investigates-reveals-hidden-dangers-your-vehicles-blind-zone>

### Resources

- MIFACE: [www.oem.msu.edu](http://www.oem.msu.edu)
- NIOSH Highway Work Zone Safety:  
<https://www.cdc.gov/niosh/topics/highwayworkzones/>
  - [Construction Equipment Visibility](#)
  - [Preventing Worker Injuries and Deaths from Backing Construction Vehicles and Equipment at Roadway Construction Worksites](#)
- OSHA: [Preventing Back-Overs](#) webpage
- National Work Zone Safety Information Clearinghouse:  
<https://www.workzonesafety.org/?s=backover>
- High Visibility Clothing – ANSI/ISEA 107-2015  
<https://webstore.ansi.org/standards/isea/ansiisea1072015>
  - ISEA – ANSI/ISEA 107-2015 [webpage](#)
- Reflective Apparel Factory:  
<https://www.reflectiveapparel.com/ansi-isea-107-2015.aspx>
- Vista Training: [Are you blind to your equipment blind spots?](#)
- ConstructionEquipment.com. [Dealing with deadly spaces: Machine Blind Spots.](#)