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The second highest cause of construction-related deaths is being struck by an object. Approximately 75% of struck-by fatalities involve heavy equipment such as trucks or cranes. The number of workers fatally struck by a vehicle was at a seven-year high in 1998.

Safety and health programs must take into account the many ways struck-by accidents can occur. The following related hazards cause the most struck-by injuries:



[Vehicles](#)



[Falling/Flying Objects](#)



[Constructing Masonry Walls](#)



DID YOU KNOW?
ONE IN FOUR "STRUCK BY VEHICLE" DEATHS INVOLVE CONSTRUCTION WORKERS. MORE THAN ANY OTHER OCCUPATION.

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Struck-By: Vehicles

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Am I In Danger?

If vehicle safety practices are not observed at your site, you risk being pinned between construction vehicles and walls, struck by swinging backhoes, crushed beneath overturned vehicles, or other similar accidents. If you work near public roadways you risk being struck by trucks or cars.



This accident happened because the excavation was not properly guarded or barricaded.

How Do I Avoid Hazards?

- ⌘ Wear seat belts that meet OSHA standards [[1926.601\(b\)\(9\)](#)], except on equipment that is designed only for standup operation, or that has no [rollover protective structure](#).
- ⌘ Check vehicles before each shift to assure that all parts and accessories are in safe operating condition [*For more, see [Vehicle Inspection](#)*].
- ⌘ Do not drive a vehicle in reverse gear with an obstructed rear view, unless it has an audible reverse alarm, or another worker signals that it is safe. 
- ⌘ Drive vehicles or equipment only on roadways or grades that are safely constructed and maintained.
- ⌘ Make sure that you and all other personnel are in the clear before using dumping or lifting devices.
- ⌘ Lower or block bulldozer and scraper blades, end-loader buckets, dump bodies, etc., when not in use, and leave all controls in neutral position.
- ⌘ Set parking brakes when vehicles and equipment are parked, and chock the wheels if they are on an incline.
- ⌘ All vehicles must have adequate braking systems and other safety devices [*For more, see [Brake Systems](#)*].
- ⌘ Haulage vehicles that are loaded by cranes, power shovels, loaders etc., must have a cab shield or canopy that protects the driver from falling materials.



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- ⌘ Do not exceed a vehicle's rated load or lift capacity.
- ⌘ Do not carry personnel unless there is a safe place to ride.
- ⌘ Use traffic signs, barricades or flaggers when construction takes place near public roadways.
- ⌘ Workers must be highly visible in all levels of light. Warning clothing, such as red or orange vests, are required; and if worn for night work, must be of reflective material.



Additional Information:

- ⌘ [OSHA Motor Vehicles Standard: 1926.601](#)
- ⌘ [OSHA Signaling Standard: 1926.201](#)
- ⌘ [FHWA Programs, Best Practices-Work Zones](#). Federal Highway Administration.

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Vehicle Inspection

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At the beginning of each shift, all vehicles that will be used must be inspected to assure that they are in safe operating condition and free of apparent damage that could lead to an accident. All defects must be corrected before the vehicle is placed in service.

Vehicle Inspection Checklist

Inspect the following parts, equipment, and accessories:

- ⌘ Service brakes, including trailer brake connections
- ⌘ Parking system (hand brake)
- ⌘ Emergency stopping system (emergency brake)
- ⌘ Tires
- ⌘ Coupling devices
- ⌘ Seat belts
- ⌘ Horn
- ⌘ Steering mechanism
- ⌘ Operating controls
- ⌘ Safety devices (e.g. reverse signal alarm, [ROPS](#), etc.)



Additional items if necessary:

- ⌘ Lights
- ⌘ Reflectors
- ⌘ Defrosters
- ⌘ Windshield wipers
- ⌘ Fire extinguishers





Additional Information:

☞ [OSHA Standard: 1926.601\(b\)\(14\)](#)



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Brake Systems

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All motor vehicles and mechanized equipment used in construction are required to have:

- ⌘ A service brake system, for slowing or stopping the vehicle during normal operations.
- ⌘ An emergency brake system, as a back-up in the event that the service brake fails.
- ⌘ A parking brake system, sometimes referred to as a *hand brake*.

It is permissible for these systems to share components, but in all cases they are *each* required to be maintained in good working condition, e.g. if the service brake and parking brake are working, they do not make up for a defective emergency brake.

Sometimes, additional assistance may be necessary. For example, when parking on an incline, parking brakes alone may need to be augmented by chocks under the wheels



Additional Information:

- ⌘ [OSHA Standard: 1926.601\(b\)\(1\)](#)

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Deaths Due to Being Struck-By a Vehicle

Case Reports

The following Case Reports of vehicle accidents investigated by OSHA illustrate how seemingly innocent workplace activities can have deadly consequences.

- ✍ An employee was operating a bulldozer at the top edge of a sloped drainage ditch. The bulldozer began to slide down the side of the snow and ice covered excavation, tipped over on its side, and pinned the operator under the roll bars. The driver was not wearing a seatbelt.
- ✍ A contractor was operating a backhoe when an employee attempted to walk between the swinging superstructure of the backhoe and a concrete wall. As the employee approached from the operator's blind side, the superstructure hit the victim, crushing him against the wall. Employees had not been trained in safe work practices, and no barricades had been erected to prevent employee access to a hazardous area.
- ✍ A safety "over travel" cable attached between the frame and the dump box of a dump truck caught on a protruding nut of an airbrake cylinder. This prevented the dump box from being fully raised. The driver, apparently assuming that releasing the cable would allow the dump box to continue upward, reached over the frame and disengaged the cable with his right hand. The dump box then dropped suddenly, crushing his head.
- ✍ A worker was driving a front-end loader up a dirt ramp onto a lowboy trailer. The tractor was not centered and the tread slipped off the trailer. When the tractor began to tip, the operator jumped from the cab. As he hit the ground, the tractor's rollover protective structure fell on top of him, crushing him. The tractor was not equipped with seatbelts.
- ✍ A worker was cutting concrete along the white center line on a four-lane highway. Orange reflective barrels closed the left lane to traffic, which was routed to a single lane from approximately 8 miles. To accommodate the worker, three to four barrels had been moved into the active traffic lane, and a flagperson was slowing down traffic and directing it slightly onto the berm area. An approaching semi-tractor and trailer rig were exceeding the speed limit when the driver hit the guardrail and lost control of his vehicle. The tractor and trailer bounced back through the barrels and struck the worker from behind, killing him.
- ✍ While acting as a flagger on a highway construction project, an employee was struck and killed by an oncoming vehicle that failed to stop after being directed to do so.



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Struck-By: Falling/Flying Objects

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Am I In Danger?

You are at risk from *falling* objects when you are beneath cranes, scaffolds, etc., or where overhead work is being performed. There is a danger from *flying* objects when power tools, or activities like pushing, pulling, or prying, may cause objects to become airborne. Injuries can range from minor abrasions to concussions, blindness, or death.

How Do I Avoid Hazards?

General

- ⌘ Wear hard hats.
- ⌘ Stack materials to prevent sliding, falling, or collapse.
- ⌘ Use protective measures such as toeboards and debris nets.



Power Tools, Machines, etc.

- ⌘ Use safety glasses, goggles, face shields, etc., where machines or tools may cause flying particles.
- ⌘ Inspect tools, such as saws and lathes, to insure that protective guards are in good condition.
- ⌘ Make sure you are trained in the proper operation of powder actuated tools.



Cranes and Hoists

- ⌘ Avoid working underneath loads being moved.
- ⌘ Barricade hazard areas and post warning signs.
- ⌘ Inspect cranes and hoists to see



These workers are not protected from being struck by falling objects because they are working around/under other workers and not wearing hardhats.



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that all components, such as wire rope, lifting hooks, chains, etc., are in good condition.

- ⌘ Do not exceed lifting capacity of cranes and hoists.

Overhead Work

- ⌘ Secure tools and materials to prevent them from falling on people below.
- ⌘ Barricade hazard areas and post warning signs.
- ⌘ Use toeboards, screens, or guardrails on scaffolds to prevent falling objects, *or*,
- ⌘ Use debris nets, catch platforms, or canopies to catch or deflect falling objects.



Compressed Air

- ⌘ Reduce compressed air used for cleaning to 30 psi, and only use with appropriate guarding and protective equipment.
- ⌘ Never clean clothing with compressed air.



Additional Information:

- ⌘ [OSHA PPE Standard \(Head protection\): 1926.100\(a\)](#)
- ⌘ [OSHA PPE Standard \(Eye and face protection\): 1926.102\(a\)](#)
- ⌘ [OSHA Materials Handling & Storage Standard: 1926.250\(a\)](#)
- ⌘ [OSHA Scaffolds Standard: 1926.451\(h\)](#)
- ⌘ [OSHA Cranes & Derricks Standard: 1926.550\(g\)\(4\)\(ii\)\(F\)](#)

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Deaths Due to Falling/Flying Objects

Case Reports

The following Case Reports of accidents investigated by OSHA illustrate how seemingly innocent workplace activities can have deadly consequences.

- ⌘ An employee was standing under a suspended scaffold that was hoisting a workman and three sections of ladder. Sections of the ladder became unlashed and fell 50 feet, striking the employee in the skull. The employee was not wearing any head protection and died from injuries received.
- ⌘ Two employees were using a wire rope to winch a wooden tool shed onto a flat bed trailer. The wire rope broke, snapped back, and struck one of the employees in the top of the head, killing him. The employee was not wearing a hard hat.
- ⌘ Workers were using a winch to pull a 10-foot section of a 600 lb. grain spout through a vent hole, when the spout became wedged. Using pry bars, they attempted to free the spout, which was still under tension from the winch. When it popped free, the release of tension caused it to strike one of the workers in the head, who had no head protection.
- ⌘ A carpenter was attempting to anchor a plywood form in preparation for pouring a concrete wall, using a powder actuated tool. The nail passed through the hollow wall, traveled some 27 feet, and struck an apprentice in the head, killing him. The tool operator had never been trained in the proper use of the tool, and none of the employees in the area, including the victim, were wearing personal protective equipment.



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Am I In Danger?

Constructing concrete and masonry walls is especially dangerous because of the tremendous loads that need to be supported. There are risks of major accidents, and even death, when jacks or lifting equipment are used to position slabs and walls, or when shoring is required until structures can support themselves.



These workers are constructing a block masonry wall.

How Do I Avoid Hazards?

- ✘ Do not place construction loads on a concrete structure until a qualified person indicates that it can support the load.
- ✘ Adequately shore or brace structures until permanent supporting elements are in place, or concrete has been tested to assure sufficient strength.
- ✘ Only allow those who are essential to and actively engaged in construction or lifting operations to enter the work area.
- ✘ Take measures to prevent unrolled wire mesh from recoiling, such as securing each end or turning the roll over.
- ✘ Do not load lifting devices beyond their capacity.
- ✘ Use automatic holding devices to support forms in case a lifting mechanism fails.



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Additional Information:

- ✘ [OSHA Standard: 1926 SUBPART O](#)

Deaths Due to Constructing Masonry Walls

Case Reports

The following Case Reports of accidents investigated by OSHA illustrate how seemingly innocent workplace activities can have deadly consequences.

- ⌘ In inclement weather, a 34-year old worker was positioning vertical and horizontal rebar for a cap tie beam to be poured the next day. Potent, gusting winds caused a free standing masonry block wall to collapse, fatally injuring the employee. Bracing and shoring could have prevented the collapse, or lessened the impact.
- ⌘ Three concrete finishers were working in the basement of a home under construction, placing cement for the basement floor. A cement truck was parked two feet away from the west wall, unloading 6 yards of cement into the basement. The 2-foot area around the foundation had been backfilled about an hour and a half before the cement finishers began their work. One of the employees directed the cement chute, starting at the northwest corner of the building. By the time he got to the southwest corner, the truck was empty. Suddenly, the west wall collapsed, crushing him to death. The other two employees were able to escape with only minor injuries.
- ⌘ An employee and two co-workers were erecting 8'x35' pre-stressed concrete wall panels. They would set the panel, then anchor the bottom, and then unhook the panels from the crane. Three panels had already been set, and the victim was atop the panels waiting for the welder to finish anchoring the bottom of the third panel. The panels began to tip outward and slowly fall, and the victim fell or jumped, landing in the path of the falling panels. He died from the head injuries he sustained.
- ⌘ The victim was a member of a crew that was erecting tilt-up wall panels around the perimeter of the slab floor of a one-story warehouse. The last three wall slabs were being hoisted into place with two 12-foot nylon web slings in a basket hitch. While the second panel was suspended in preparation for being set, it tilted in the sling and slid slightly, cutting through one sling and partially through the other. The erection crew scattered as it dropped, but the victim stopped momentarily to look back as he fled the building. Just then, the upper edge of a previously set panel, which had been dislodged by the falling panel, fell on him. He was crushed and killed.