

PERRP Safety Alert

Hazards of work zone operations

This PERRP Safety Alert (PSA) is not a standard or regulation, and it creates no new legal obligations. The PSA is advisory in nature, informational in content, and is intended to assist public employers in providing a safe and healthful workplace.



Purpose

This PERRP Safety Alert discusses ways to reduce or eliminate work zone related accidents. It identifies training, work practices and controls that may be necessary to reduce the risk of serious injury.

Public employee fatalities during work zone operations demonstrate a need to bring attention to these hazardous conditions. Temporary work zones have multiple risk factors including, but not necessarily limited to: setting up traffic control elements, flagging, mobile operations and operations at night or at other times with reduced visibility. Inadequate employee training and failure to wear high-visibility safety apparel also contribute to work zone incidents.

Safeguards for work zone operations

High-Visibility Work Apparel

All workers, including emergency responders, within the right-of-way who are exposed either to traffic or to work vehicles and construction equipment within the temporary traffic control (TTC) zone must wear high-visibility safety apparel (e.g., vest, jacket, pants, hardhat, etc.) that meets the Performance Class 2 or 3 requirements of the ANSI/ISEA 107-2004 publication entitled "American National Standard for High-Visibility Safety Apparel and Headwear."

A person designated by the employer as responsible for worker safety must make the selection of the appropriate class of garment. The designated person must determine the appropriate class of high-visibility safety apparel based upon the anticipated work conditions. Things to consider are closeness of work area to traffic, time of day/night, weather, complexity of the background environment, and traffic speed. A trained person designated by the employer must conduct a basic hazard assessment for the worksite and job classifications required to work in the activity area. This safety professional should determine the need for engineering, administrative, or personal protective equipment for workers in the activity area.

Stats

Worker fatalities in Ohio work zones¹

2014 – Six
2013 – Three
2012 – Three

Worker fatalities nationally in work zones¹

2014 - 116
2013 - 105
2012 - 133

Causality data – struck by vehicle, object or equipment in work zone (national only)¹

2014 - 67
2013 - 69
2012 - 81

United States Department of Labor, Bureau of Labor Statistics, [Census of Fatal Occupational Injuries](#)

Type of injuries

Blunt force trauma injuries due to employees being struck by vehicles or mobile equipment leads to many work zone fatalities and injuries

Temporary work zones

Most TTC zones are divided into four areas: the advance warning area, the transition area, the activity area and the termination area.

1. **Advance warning area** informs road users about the upcoming work zone or incident area. The advance warning area may vary from a single sign to high-intensity rotating, flashing, oscillating or strobe lights on a vehicle to a series of signs in advance of the work zone activity area.
2. **Transition area** re-directs road users out of their normal path. Transition areas usually involve strategic use of tapers. Tapers are created by using a series of channelizing devices and/or pavement markings to move traffic out of or into the normal path.
3. **Activity area** includes all sections where the work activity takes place. It is comprised of the workspace, the traffic space, and the buffer space. The workspace is that portion of the highway closed to road users and set aside for workers, equipment, and material. Channelizing devices or temporary barriers to exclude vehicles and pedestrians usually delineate workspaces for road users. You may position buffer spaces may either longitudinally or laterally with respect to the direction of road user flow.
4. **Termination area** returns road users to their normal path. The termination area shall extend from the downstream end of the work area to the last temporary traffic control device such as END ROAD WORK signs, if posted.

Work Duration

Work duration is a major factor in determining the number and types of devices used in TTC zones. The duration of a TTC zone is defined relative to the length of time a work operation occupies a spot location. The five categories of work duration and their time at a location are:

1. **Long-term stationary** is work that occupies a location more than three days;
2. **Intermediate-term stationary** is work that occupies a location more than one daylight period up to three days, or nighttime work lasting more than one hour;
3. **Short-term stationary** is daytime work that occupies a location for more than one hour within a single daylight period;
4. **Short duration** is work that occupies a location up to one hour;
5. **Mobile** is work that moves intermittently or continuously.

Mobile operations

Mobile operations present unique temporary traffic control challenges and the TTC devices must be moved or move along with the operation. Therefore, fixed signs and channelizing devices may not be appropriate to provide advance warning and establish a transition area. Mobile operations generally require more dominant vehicle-mounted traffic control devices, such as: arrow boards; portable changeable message signs and; shadow and work vehicles that display high-intensity rotating, flashing, oscillating, or strobe lights. Safety in short-duration or mobile operations must not be compromised by using fewer devices simply because the operation will frequently change its location. Highway mobile operations may require multiple vehicles with advanced warnings.

Flagging

Flaggers and others providing temporary traffic control must wear high-visibility safety apparel. Warn drivers in advance with signs that there will be a flagger ahead. Flaggers should use STOP/SLOW paddles, paddles with lights, or flags (use flags only in emergencies.) The STOP sign must be octagonal with a red background and white letters and border. The SLOW sign is the same shape, with an orange background and black letters and a border. Illuminate flagger stations. Lighting for employees on foot and for equipment operators should be at least five foot-candles or greater.



Because flaggers are responsible for public safety and make the greatest number of public contacts of all highway workers, they should have the following minimum qualifications:

- Sense of responsibility for the safety of the public and workers;
- Training in safe traffic control practices;
- Good physical condition, including sight and hearing;
- Mental alertness and the ability to react in an emergency;
- Courteous but firm manner;
- Neat appearance.

Other considerations

Many incidents occur in work zones involving a worker being struck by a piece of construction equipment or other vehicles. A worker in this industry is just as likely to be struck by a piece of construction equipment inside the work zone as by passing vehicles. Below is a list of topics to think about before entering a work zone.

- Develop and use a site plan that provides traffic flow details.
- Limit access, barricade, or set up controlled access zones where you will use equipment. When using equipment that rotates and/or carries/dumps loads, create an access zone that extends beyond the maximum rotation/swing radius of the equipment and/or beyond the area where loads will be carried/dumped.
- Establish/follow traffic control patterns with cones, barrels or barricades in work areas.
- Use spotters where visibility is limited.
- Do not drive in reverse gear with an obstructed rear view unless the vehicle has an audible alarm or a signaler is used.
- Ensure that spotters and heavy equipment operators have communications equipment or agree on and use hand signals.
- Workers should make eye contact with heavy equipment operators before proceeding near equipment or operating areas.
- Train workers not to position themselves between mechanical equipment and a fixed object.
- All vehicles with cabs must have windshield wipers and operable defogging or defrosting devices.
- All vehicles must have headlights and brake lights in operable condition.
- All vehicles must have audible horns.
- Vehicles used to transport employees must have as many seats as there are people and vehicle occupants must wear seat belts.
- Operators must wear their seat belt when seated in the normal seating arrangement for tractor operation.
- Rotating and moving equipment can cause injury and death. Place warning signs like cones, signs and posts around equipment to warn workers of the hazard.
- The "competent person"* on the jobsite can conduct a daily briefing with all workers as to the location and expected work path and location of any piece of equipment.

* "Competent person" means one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them. [\[ref. 29 CFR 1926.32\(f\)\]](#)

BWC training resources

BWC Division of Safety and Hygiene Library Videos

Order #	Title	Length (format)	Year
400109	Roadway worker safety: in the zone	24 min	2008
400154	Work zone safety depends on you (flagger safety)	17 min	2009
400101	Flagger safety	13 min	2004
400153	Highway worker safety program	83 min	2009

BWC Division of Safety & Hygiene - training center course

Work Zone Traffic Control and Safety

Who should attend:

Individuals involved in roadway maintenance and others responsible for work zone set up should attend.

You will learn:

- Basic elements and typical applications of roadway work zones for temporary traffic control;
- How to use advance warning signs, traffic control devices such as cones/drums/barricades and flagging procedures.

After this course, you will be able to:

- List safety hazards in a traffic work zone;
- Suggest control measures to mitigate risk factors.

For the dates and locations of this course, log on to the [BWC Learning Center](#)

Adopted standards and other publications

Adopted Ohio Employment Risk Reduction Standards

[29 CFR 1910.132 Personal Protective Equipment, General Requirements](#)

[29 CFR 1926.601 Motor Vehicles, Mechanized Equipment, and Marine Operations](#)

[29 CFR 1926.200 Accident prevention signs and tags](#)

[29 CFR 1926.20 General Safety and Health Provisions](#)

[29 CFR 1926.21 Safety training and education](#)

[29 CFR 1926.651 Specific Excavation Requirements](#)

[Ohio Manual of Uniform Traffic Control Devices \(Ohio Revised Code §4511.09\)](#)

International Safety Equipment Association (ISEA)

[ANSI/ISEA 107-2015, American National Standard for High-Visibility Safety Apparel and Headwear](#)

American Traffic Safety Services Association (ATSSA)

[High Visibility Apparel in Work Zones](#)

[Brochure on Decommissioning High Visibility Apparel](#)

[Field Guide for the Use and Placement of Shadow Vehicles in Work Zones](#)

[Field Guide on Installation and Removal of Temporary Traffic Control for Safe Maintenance and Work Zone Operations](#)

[Guidelines on Rolling Roadblocks for Work Zone Applications](#)

National Institute for Occupational Safety and Health (NIOSH)

[NIOSH publication 2001-128, Building Safer Highway Work Zones: Measures to Prevent Worker Injuries From Vehicles and Equipment](#)

PERRP is the authority for protecting Ohio public worker's safety and health on the job. Its mission is to eliminate on-the-job injuries, illnesses, and fatalities. PERRP accomplishes its mission by setting and enforcing standards; providing training, outreach, and education; establishing partnerships; and encouraging continual improvement in workplace safety and health.

This PSA is not a standard or regulation, and it creates no new legal obligations. The PSA is advisory in nature, informational in content, and is intended to assist public employers in providing a safe and healthful workplace. Pursuant to the Ohio Public Employment Risk Reduction Act, public employers must comply with hazard-specific safety and health standards adopted by PERRP. In addition, Ohio Revised Code, Chapter 4167, Section 4(a)(1), the General Duty Clause of the Act, requires public employers to provide their employees with a workplace free from recognized hazards likely to cause death or serious physical harm. Employers can be cited for violating the General Duty Clause if there is a recognized hazard and they do not take reasonable steps to prevent or abate the hazard. However, failure to implement any recommendations in this PSA is not, in itself, a violation of the General Duty Clause. Citations can only be based on standards, regulations, and the General Duty Clause.

Under the Ohio Public Employment Risk Reduction Act of 1992 (HB308), public employers are responsible for providing safe and healthful workplaces for their employees. PERRP's role is to ensure these conditions for Ohio's public employees by adopting and enforcing standards, and providing training, education and assistance. To ask questions, obtain compliance assistance, file a complaint, or report workplace multiple hospitalization accidents, fatalities or situations posing imminent danger to public employees, call PERRP's toll-free hotline at 800-671-6858. **For more information, visit: www.bwc.ohio.gov**