



## Pedestrian Safety

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## Manual on Uniform Traffic Control Devices (MUTCD)

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### 6D. PEDESTRIAN AND WORKER SAFETY

#### 6D-1. PEDESTRIAN CONSIDERATIONS

There are three threshold considerations in planning for pedestrian safety in temporary traffic control zones on highways and streets:

- Pedestrians should not be led into direct conflicts with work site vehicles, equipment, or operations.
- Pedestrians should not be led into direct conflicts with mainline traffic moving through or around the work site.
- Pedestrians should be provided with a safe, convenient travel path that replicates as nearly as possible the most desirable characteristics of sidewalks or footpaths.

In accommodating the needs of pedestrians at work sites, it should always be remembered that the range of pedestrians that can be expected is very wide, including the blind, the hearing impaired, and those with walking handicaps. All pedestrians need protection from potential injury and a smooth, clearly delineated travel path.

Therefore, every effort should be made to separate pedestrian movement from both work site activity and adjacent traffic. Whenever possible, signing should be used to direct pedestrians to safe street crossings in advance of an encounter with a temporary traffic control zone. Signs should be placed at intersections so that pedestrians, particularly in high-traffic-volume urban and suburban areas, are not confronted with mid-block work sites that will induce them to skirt the temporary traffic control zone or make a mid-block crossing. It must be recognized that pedestrians will only infrequently retrace their steps to make a safe crossing. Consequently, ample advance notification of sidewalk closures is critically important. Refer to figures TA-28 and TA-29, section 6H-3 for typical traffic control device usage and techniques for pedestrian movement through work areas.

When pedestrian movement through or around a work site is necessary, the aim of the engineer should be to provide a separate, safe footpath without abrupt changes in grade or terrain. Judicious use of special warning and control devices may be helpful for certain difficult work area situations. These include rumble strips, changeable message signs, hazard identification beacons, flags, and warning lights. Flagger activated audible warning devices may be used to alert pedestrians of the approach of erratic vehicles. Also, whenever it is feasible, closing off the work site from pedestrian intrusions is preferable to channelizing pedestrian traffic along the site solely with temporary traffic control devices such as cones, tubular markers, barricades, or drums. If the possibility of vehicle impact is very low, chain link or other suitable fencing, placed well away from traffic, is acceptable. Solid fencing with plywood, however, can create sight distance restrictions at intersections and at work site access cuts. Care must be taken not to create fenced areas that are vulnerable to splintering or fragmentation by vehicle impacts. Similarly, temporary traffic control devices used to delineate a temporary traffic control zone pedestrian walkway must be lightweight and, when struck, present a minimum threat to pedestrians, workers, and impacting vehicles. Only minimally necessary ballasting with safe, lightweight materials should be used with these devices.

Movement by work vehicles and equipment across designated pedestrian paths should be minimized and, when necessary, should be controlled by flaggers or temporary traffic control. Cuts into work areas across pedestrian walkways should be kept to a minimum, because they often create unacceptable changes in grade and rough or muddy terrain. Pedestrians cannot be expected to traverse these areas willingly. They will tend to avoid the cuts by attempting non-intersection crossings.

At work sites of significant duration, especially in urban areas with high pedestrian volumes, and where falling debris is a concern (such as work on overhead structures), a canopied walkway is frequently needed to protect pedestrians from falling debris. These covered walkways should be sturdily constructed and adequately lit for nighttime use.

In places where pedestrians are judged especially vulnerable to impact by errant vehicles, all foot traffic should be separated and protected by longitudinal barrier systems. Where a barrier is clearly needed, it should have sufficient strength and low deflection characteristics, to keep vehicles from intruding into the pedestrian space. Further, short, noncontinuous segments of longitudinal systems, such as concrete barriers, must be avoided because they nullify the containment and redirective capabilities of the design, increase the potential for serious injury to both vehicle occupants and pedestrians, and encourage the presence of blunt, leading ends. All upstream leading ends that are present shall be appropriately flared or protected with properly installed and maintained impact attenuators. With regard to concrete barriers in particular, it is very important to ensure that adjacent segments are properly joined to effect the overall strength required for the system to perform properly.

It has been determined through study and experience that vertical curbs cannot prevent vehicle intrusions onto sidewalks. As a consequence, normal vertical curbing is not a satisfactory substitute for positive barriers when these are clearly needed. Similarly, contractor-constructed wooden railings, chain-link fencing with horizontal pipe runs, and similar systems placed directly adjacent to vehicle traffic are not acceptable substitutes for crashworthy positive barriers; when struck, they are dangerous to vehicle occupants, workers, and pedestrians. In many instances, temporary positive barriers may be necessary to prevent pedestrians from unauthorized movements into the active work area and to prevent conflicts with traffic by eliminating the possibility of mid-block crossings.

If a high potential exists for vehicle incursions into the pedestrian space, judgment must be exercised as to whether to reroute pedestrians or use barriers. Normally, standard traffic control devices can satisfactorily delineate a temporary traffic control zone pedestrian path, but fail-safe channelization can never be guaranteed with these devices because of the gaps between them. Tape, rope, or plastic chain strung between devices can help discourage pedestrian movements off the designated pathway.

Good engineering judgment in each temporary traffic control zone situation should readily determine the extent of pedestrian needs. The engineer in charge of traffic control for temporary traffic control zones should provide both a sense of security and safety for pedestrians walking past work sites and consistent, unambiguous channelization to maintain foot traffic along the desired travel paths.

## 6D-2. WORKER SAFETY CONSIDERATIONS

Of equal importance to the safety of the public traveling through the temporary traffic control zone is the safety of the worker performing the many varied tasks within the work site. Work areas present temporary and constantly changing conditions that are unexpected by the traveler. Further, these work area conditions almost always

present situations that are more confusing for the driver. This creates an even higher degree of vulnerability for the personnel on or near the roadway.

Following the Fundamental Principles noted above in Section 6B will usually provide the degree of control and traffic operation that will bring about safe conditions for the worker. of particular importance is maintaining work areas with traffic flow inhibited as little as possible, providing standard and clear traffic control devices that get the driver's attention and provide positive direction.

Below are key elements of traffic control management that should be considered in any procedure for assuring worker safety:

- **Training**-All workers should be trained in how to work next to traffic in a way that minimizes their vulnerability. In addition, workers with specific traffic control responsibilities should be trained in traffic control techniques, device usage, and placement.
- **Worker Clothing**-Workers exposed to traffic should be attired in bright, highly visible clothing similar to that of flaggers.
- **Barriers**-Barriers should be placed along the work space depending on such factors as lateral clearance of workers from adjacent traffic, speed of traffic, duration of operations, time of day, and volume of traffic.
- **Speed Reduction**-In highly vulnerable situations, consideration should be given to reducing the speed of traffic through regulatory speed zoning, funneling, use of police, lane reduction, or flaggers.
- **Use of Police**-In highly vulnerable work situations, particularly those of relatively short duration, stationing police units heightens the awareness of passing traffic and will likely cause a reduction in travel speed.
- **Lighting**-For nighttime work, lighting the work area and approaches may allow the driver better comprehension of the requirements being imposed. Care should be taken to ensure that the lighting does not cause blinding.
- **Special Devices**-judicious use of special warning and control devices may be helpful for certain difficult work area situations. These include rumble strips, changeable message signs, hazard identification beacons, flags, and warning lights. Flagger activated audible warning devices may be used to alert workers to the approach of erratic vehicles. misuse and overuse of special devices/techniques can greatly lessen their effectiveness.
- **Public Information**-Improved driver performance may be realized through a well-prepared and complete public relations effort that covers the nature of the work, the time and duration of its execution, and its anticipated effects upon traffic and possible alternate routes and modes of travel. Such programs have been found to result in a significant drop in traffic; that reduces the possible number of conflicts and may allow a temporary lane closing for additional buffer area.
- **Road Closure**-If alternate routes are available to handle detoured traffic, the road may be closed temporarily during times of greatest worker hazard-which, in addition to offering maximum worker safety, may facilitate quicker project completion and thus further reduce worker vulnerability.

Like other provisions of work area safety set forth in this part of the MUTCD, the various traffic control techniques must be applied by qualified persons after appropriate engineering studies and with sound engineering judgment and common sense.

## Pedestrian Traffic



Figure 1. Operator cautioning pedestrian to stop.

Many pedestrians or bystanders are injured in forklift-related accidents. These injuries can occur when forklifts strike pedestrians or when pedestrians are struck by falling loads.

Additional Resources: NIOSH Alert: Preventing Injuries and Deaths of Workers Who Operate or Work Near Forklifts. DHHS (NIOSH) Publication No. 2001-109, (2001, June). Forklift overturns are the leading cause of fatalities involving forklifts; they represent about 25 percent of all forklift-related deaths.

## Pedestrian Traffic

Forklift operators should always be aware of conditions in their workplace, including pedestrian traffic. Forklift traffic should be separated from other workers and pedestrians where possible.

### Potential Hazards:

Danger of striking pedestrians and objects

### Requirements and Recommended Practices:

Yield right of way to pedestrians.



Figure 2. Yield right of way to pedestrians.

When a person or group of people walks across your planned route:

- Stop.
- Wait until the pedestrians pass by.
- Proceed cautiously through any congested area.



Figure 3. Slow down, stop and sound horn at intersections and wherever your vision is obstructed.

If an area is cluttered, walk the route first to spot problems.

- Check for situations that require a spotter and use one when traveling.
- Warn pedestrians, by asking them to move, if there is not sufficient safe clearance.
- Sound the horn at blind corners, doorways and aisles.
- Sound the horn or other alarm when you back up.

## Reminders for the Driver



Figure 4.  
Sign posted in area with high pedestrian traffic.

The driver should remember:

- Slow down, stop and sound horn at intersections, corners, and wherever your vision is obstructed.
- When provided, use flashing warning light or backup alarms when traveling in reverse.
- Do not move the truck if you do not have a clear view of travel.
- Use a spotter for blind spots.
- Always look in the direction of travel.
- Keep a clear view.
- Start, stop, travel, steer and brake smoothly.
- Signal to pedestrians to stand clear.
- Do not allow anyone to stand or pass under the load or lifting mechanism.
- When possible, make eye contact with pedestrians or other forklift operators.

### **Reminders for the Pedestrians:**

Pedestrians should remember:

- Be aware that lift trucks cannot stop suddenly. They are designed to stop slowly to minimize load damage and maintain stability.
- Stand clear of lift trucks in operation.
- Avoid a run-in. The driver's visibility may be limited due to blind spots.
- Be aware of the wide rear swing radius.
- Use pedestrian walkways, or stay to one side of the equipment aisle.
- Never ride on a forklift, unless authorized and the forklift is designed for riders.
- Never pass under an elevated load.

### **Reminders for Plant Safety Managers:**

OSHA requires that permanent aisles and passageways be free from obstructions and appropriately marked where mechanical handling equipment is used. [29 CFR 1910.176(a)]

Plant Safety Managers should remember:

Consider separating pedestrians from lift trucks by providing:

- Pedestrian walkways,
- Permanent railings or other protective barriers,
- Adequate walking space at least on one side, if pedestrians must use equipment aisles,
- Pedestrian walkway striping on the floor, if barriers cannot be used.
- Install convex mirrors at blind aisle intersections.
- Post traffic control signs.
- Post plant speed limits.



## Moving Personnel



Figure 5. Do not carry passengers.

Specialized platform for lifting coworker. Note: There is a guard on the back of the platform to keep the person in the platform and protect the worker's arms and hands.



Figure 6. Specialized platform for lifting coworker.

Note: There is a guard on the back of the platform to keep the person in the platform and protect the worker's arms and hands.

Passengers should not be allowed on forklifts unless the forklift is specifically designed to accommodate passengers.

Potential Hazards:

Danger of falling



### Requirements and Recommended Practices:

The OSHA standard [29 CFR 1910.178(m)(3)] states that unauthorized personnel are prohibited from riding on a forklift. If riders are authorized, a safe place must be provided.

- Unless authorized, never carry passengers -- NO RIDERS.
- Use only specialized equipment designed to raise personnel.
- Never transport employees on a platform. Employees can only be hoisted up and down.
- Never transport employees on the forks.

## Maintain Distance



Figure 7. Operator signaling to coworker to stand back.

Forklift operators should keep a safe distance from workers on foot and other pedestrians.

Potential Hazards: Danger of striking pedestrians

### Requirements and Recommended Practices:

- Warn pedestrians of your approach by horn, hand signal, or warning light.
- Maintain a safe clearance from coworkers.
- Employees should stay out of the potential path where a load can fall.