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## Pedestrian Safety

**Course Number:** HS-02-107

**PDH:** 1

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## Module 6: Manual on Uniform Traffic Control Devices (MUTCD)

### Learning Objectives

By the end of this section, you will be able to:

- **Evaluate** work zone layouts to ensure pedestrians are not led into direct conflicts with site operations or mainline traffic.
- **Select** appropriate longitudinal barrier systems and traffic control devices based on pedestrian vulnerability and site-specific hazards.
- **Implement** worker safety protocols, including visibility requirements and speed reduction techniques, to minimize personnel vulnerability.

*Executive Summary:* Effective traffic control requires a dual-focus strategy that prioritizes the physical separation of pedestrians and workers from moving traffic and work site machinery through engineering judgment, robust channelization, and the use of crashworthy positive barriers where high-speed incursions are possible.

### Pedestrian and Worker Safety

#### Pedestrian Considerations

Planning for pedestrian safety in temporary traffic control (TTC) zones revolves around three threshold considerations:

1. **Conflict Avoidance:** Pedestrians must not be led into direct conflicts with work site vehicles, equipment, or operations.
2. **Traffic Separation:** Pedestrians must not be led into direct conflicts with mainline traffic moving through or around the site.
3. **Path Replication:** Pedestrians should be provided a safe, convenient travel path that replicates desirable characteristics of sidewalks or footpaths as nearly as possible.

#### Accessibility and Path Delineation

Engineers must account for a wide range of pedestrians, including those who are blind, hearing impaired, or have walking handicaps. All pedestrians require a smooth, clearly delineated path.

- **Advance Warning:** Use signing at intersections to direct pedestrians to safe crossings before they encounter the TTC zone.
- **Mid-block Prevention:** Place signs strategically so pedestrians are not confronted with mid-block sites that induce them to skirt the zone or make unsafe crossings.

- **Path Quality:** Provide a separate, safe footpath without abrupt changes in grade or terrain.

💡 **Design Tip:** Pedestrians will infrequently retrace their steps to find a safe crossing; therefore, ample advance notification of sidewalk closures is critically important to prevent unsafe "skirting" of the work area.

## Safety Devices and Intrusion Prevention

Whenever feasible, closing off the work site from pedestrian intrusion is preferable to simple channelization using cones or barricades.

- **Delineation Tools:** Lightweight devices should be used for walkways; these must present a minimum threat if struck.
- **Fencing:** Chain link or suitable fencing is acceptable if vehicle impact probability is very low.
- **Warning Systems:** Audible warning devices activated by flaggers can alert pedestrians to erratic vehicles.

⚠️ **Safety Constraint:** Solid plywood fencing can create dangerous sight distance restrictions at intersections and access cuts. Furthermore, temporary devices must use only minimally necessary ballasting with safe, lightweight materials.

## Barriers and Debris Protection

In urban areas or high-volume zones, enhanced protection is often mandatory:

- **Canopied Walkways:** Required where falling debris is a concern (e.g., overhead work). These must be sturdily constructed and adequately lit.
- **Longitudinal Barrier Systems:** Necessary where pedestrians are judged especially vulnerable to errant vehicles.

⚠️ **Safety Constraint:** Vertical curbs, contractor-constructed wooden railings, and chain-link fencing with horizontal pipe runs are NOT acceptable substitutes for crashworthy positive barriers.

## Barrier Design Requirements

- **Containment:** Systems must have sufficient strength and low deflection to prevent vehicle intrusion.
- **Continuity:** Avoid short, noncontinuous segments (like unjoined concrete barriers), as they increase injury potential and create blunt leading ends.
- **End Treatment:** Upstream leading ends must be flared or protected with impact attenuators.



- **Connectivity:** Adjacent concrete segments must be properly joined to ensure overall system strength.

## Worker Safety Considerations


Worker safety is of equal importance to public safety, as work areas present unexpected and confusing conditions for drivers, increasing personnel vulnerability.

## Key Elements of Traffic Control Management

- **Training:** All workers must be trained to work next to traffic; specialized personnel require training in device usage and placement.
- **Clothing:** Workers exposed to traffic must wear bright, highly visible clothing similar to flagger attire.
- **Lighting:** Nighttime work requires lighting that allows drivers to comprehend site requirements without causing blinding glare.
- **Public Information:** Efforts to inform the public about work duration and alternate routes can significantly drop traffic volume and reduce conflicts.

## Site Control Strategies

- **Barriers:** Placement depends on lateral clearance, traffic speed, duration, and volume.
- **Speed Reduction:** Consider regulatory speed zoning, funneling, police units, lane reductions, or flaggers.
- **Road Closure:** If alternate routes exist, temporary road closure offers maximum safety and can facilitate quicker project completion.

 **Design Tip:** Use special devices like rumble strips and changeable message signs judiciously; misuse or overuse can greatly lessen their effectiveness.

## Pedestrian Traffic: Industrial and Forklift Safety

In industrial settings, forklift-related injuries typically involve striking pedestrians or pedestrians being hit by falling loads. Forklift overturns account for approximately 25% of all forklift-related deaths.

## Operator and Management Requirements

- **Right of Way:** Operators must always yield to pedestrians.
- **Audible Warnings:** Sound the horn at blind corners, intersections, doorways, aisles, and when backing up.

- **Site Management:** OSHA requires permanent aisles and passageways to be free from obstructions and appropriately marked.



**Figure 1.** Operator cautioning pedestrian to stop.



**Figure 2.** Yield right of way to pedestrians.



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



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

## Moving Personnel and Distance

**⚠ Safety Constraint:** Unauthorized personnel are strictly prohibited from riding on forklifts. Never transport employees on a platform (unless specifically designed and the vehicle is stationary) or on the forks.

- **Riders:** Passengers are only allowed if the forklift is specifically designed to accommodate them.
- **Clearance:** Maintain a safe distance from coworkers and stay out of the potential path of falling loads.



**Figure 5.** Do not carry passengers.



**Figure 6.** Specialized platform for lifting coworker.



**Figure 7.** Operator signaling to coworker to stand back.

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*Checkpoint Quiz*

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**1. Which of the following is NOT an acceptable substitute for a crashworthy positive barrier in a high-speed traffic zone?**

- a) Longitudinal barrier systems with low deflection
- b) Normal vertical curbing
- c) Contractor-constructed wooden railings
- d) Both b and c

**Answer:** (d). Normal vertical curbing and wooden railings cannot prevent vehicle intrusions and are dangerous when struck.

**2. According to the guidelines, when should a canopied walkway be utilized?**

- a) Any time a sidewalk is closed
- b) Only when nighttime lighting is unavailable
- c) In urban areas where falling debris from overhead structures is a concern
- d) When traffic speed exceeds 45 mph

**Answer:** (c). Canopied walkways are specifically used to protect pedestrians from falling debris in high-volume urban work zones.

**3. What is the protocol when transporting personnel using a forklift and specialized platform?**

- a) Employees may be transported across the plant floor while on the platform
- b) Employees can only be hoisted up and down; they cannot be transported
- c) Employees may ride on the forks if they have a spotter
- d) Personnel may ride on the forklift body if they hold onto the overhead guard

**Answer:** (b). Safety standards dictate that employees can only be hoisted up and down and never transported while on a platform.



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