

14. Sloping and benching systems. Employees will not be permitted to work on the faces of sloped or benched excavations at levels above other employees except when employees at the lower levels are adequately protected from the hazard of falling, rolling, or sliding material or equipment.
15. Shield systems.
 - a. Shield systems will not be subjected to loads exceeding those which the system was designed to withstand.
 - b. Shields will be installed in a manner to restrict lateral or other hazardous movement of the shield in the event of the application of sudden lateral loads.
 - c. Employees will be protected from the hazard of cave-ins when entering or exiting the areas protected by shields.
 - d. Employees will not be allowed in shields when shields are being installed, removed, or moved vertically.
 - e. Additional requirement for shield systems used in trench excavations. Excavations of earth material to a level not greater than two (2) feet below the bottom of a shield will be permitted, but only if the shield is designed to resist the forces calculated for the full depth of the trench, and there are no indications while the trench is open of a possible loss of soil from behind or below the bottom of the shield.

Work Zone Traffic Control

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. These work area conditions almost always present situations that are more confusing for the driver, creating an even higher degree of vulnerability for the personnel on or near the roadway.

Below are key elements of traffic control management that should be considered in any procedure for assuring worker safety. These various traffic control techniques must be applied by qualified persons with sound judgment and common sense.

- A. **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.
- B. **Worker Clothing.** Workers exposed to traffic should be attired in bright, highly visible clothing similar to that of flaggers.

- C. 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.
- D. 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.
- E. 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.
- F. 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 lessen their effectiveness greatly.
- G. 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.
- H. 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 project completion more quickly and, thus, further reduce worker vulnerability.
- I. Use of Police. In highly vulnerable work situations, particularly those of relatively short duration, stationing police units heightens the awareness of passing traffic and likely will cause a reduction in travel speed.

