

SECTION 135 Safety

135.1 Construction Safety Rules and Regulations

135.1.1 Legal Background

[Standard spec 107](#) requires the contractor to comply with all federal, state, and local laws governing safety, health, and sanitation, and to provide necessary safety devices, protective equipment, and safeguards. The contractor must also take action reasonably needed to protect the life and health of employees on the job and the safety of the public.

Wisconsin statute 101.11 requires every employer to furnish safe employment and provide a safe place of employment for employees and frequenters. The employer must furnish and require safety devices, protective devices, and safeguards; must adopt and use methods and processes reasonably adequate to render the employment and the place of employment safe; and must do everything reasonably necessary to protect the life, health, safety, and welfare of employees and frequenters. A frequenter is anyone who is not an employee of the contractor or not a trespasser.

OSHA is empowered to adopt rules or orders, having the full force of law, necessary for the safety and welfare of employees in the private sector. Thus, employees of the contractor and subcontractors are protected by the OSHA rules. OSHA administers and enforces its own rules.

The Wisconsin Department of Workforce Development (DWD) is empowered under Wisconsin statute 101.055 to adopt safety rules or orders, having the full force of law, necessary for the safety and welfare of public employees. Thus, employees of the state, county, town, city, and other political subdivisions of government are protected by the rules of DWD. DWD administers and enforces its own rules.

Under the Worker's Compensation Act, which is administered by DWD, a death benefit or compensation for an injury must be increased if the employer failed to comply with adopted rules or orders of DWD or OSHA. The death benefit or compensation for an injury must be reduced if the employee failed to use safety devices required by DWD or OSHA and provided by the employer, or if injury results from the employee's failure to obey any reasonable safety rule adopted and enforced by the employer (Wisconsin statutes 102.57 and 102.58).

135.1.2 Implementation

On department construction projects, WisDOT is primarily responsible for the safety and welfare of its employees, while the contractor is primarily responsible for the safety and welfare of the contractor's employees and frequenters. WisDOT personnel assigned to the project can be construed to be frequenters and, therefore, some degree of responsibility for their safety also rests upon the contractor.

WisDOT project personnel are expected to be aware of, and to follow the safety plan established by the contractor for the project. The contractor is required to have a site-specific safety plan based on the Job Hazard Assessment / Analyst (JHA) of the work to be performed. Examples of written programs include retrieval procedures in case of a fall, emergency procedures in case of trench collapse, and emergency rescue procedures for working over water.

WisDOT does not have the authority or responsibility for the direct enforcement of the OSHA safety codes on contract work under its jurisdiction. However, under the language of the standard specifications, it is considered to be within the authority of the engineer or safety representative to obtain correction of a condition that is obviously hazardous, whether or not the hazard is a violation of a safety code. Furthermore, the department's Risk and Safety Management section advises that the engineer or safety representative assumes additional risk if he/she observes a violation or hazard and nothing is done to alert the contractor and, subsequently, injury or death occurs.

Therefore, when hazardous conditions or a violation of a safety code are observed on a construction project, the engineer or inspector will promptly call the contractor's attention to it and request it be corrected. If the condition is not promptly corrected, the circumstances involved will be referred to the region office. The region office may notify the contractor in writing of the violation and demand immediate correction and notify OSHA to investigate the reported violation. Where the violation is flagrant, or a substantial hazard exists, work under the contract may be suspended.

Project safety specifications may provide for increased requirements beyond the scope of this document and will take precedence.

135.1.3 Summary of Safety Provisions

The following provisions have been extracted from the safety provisions of OSHA and DWD that particularly apply to highway and bridge construction. They have been condensed for the sake of brevity. The specific reference is shown in parenthesis following the text. This summary should be viewed as a good starting guide for project personnel assessing construction safety, not as a complete listing.

135.1.3.1 Selected OSHA Rules and Regulations for Contractor's and Subcontractor's Personnel

1. Accident Prevention Responsibility.

It is the responsibility of the employer to initiate and maintain a written safety program, including documented frequent and regular inspections of job sites, materials, and equipment by competent persons. The employer must instruct employees in the recognition and avoidance of unsafe conditions. The employer must allow only trained or experienced employees to operate equipment and machinery. Use of equipment, tools, and materials that do not comply with OSHA requirements are prohibited (OSHA 1926.20, 1926.21).

2. First Aid and Medical Attention.

The employer must make first aid services and provisions for medical care available. Provisions must be made before the start of the project for prompt medical attention in case of injury. A first aid kit containing at a minimum: latex or nitrile gloves; CPR masks; adhesive, pressure, and cling bandages; antiseptic wipes; bite/sting swabs; cold packs; and safety glasses. The first aid kit must be accessible and must be checked at least weekly to ensure that expended items are replaced. Where the eyes or body of a worker may be exposed to corrosive or potentially harmful materials, facilities for quick drenching or flushing the eyes and body must be provided and maintained in the work area for emergency use. In the absence of an infirmary, clinic, or hospital in proximity to the work site, a person having a valid certification must be available to render first aid. Proper equipment for prompt transportation of injured persons, or a communications system for contacting ambulance service, must be provided. Telephone numbers of doctors, hospitals, and ambulances must be conspicuously posted. (OSHA 1926.23, 1926.50)

3. Housekeeping.

Form lumber, scrap lumber with protruding nails, and other debris must be kept cleared from work areas, passageways, and stairs. Trash, waste, and refuse must be collected, separated, and stored in containers. Containers of garbage and oily, hazardous, and flammable substances must be covered. Safe means must be provided for the regular removal of combustible scrap and debris during construction. Garbage and waste must be removed at frequent and regular intervals (OSHA 1926.25).

4. Sanitation.

An adequate supply of potable water must be provided. Drinking water containers must be clearly marked, capable of being tightly closed and equipped with a tap. Water must not be dipped from the container. The common drinking cup is prohibited. A minimum of one toilet must be provided for every 20 workers. Washing facilities must be provided for employees applying paints or coatings or other work operations producing harmful contaminants. Washing facilities must be close to the job site and equipped to remove harmful substances (OSHA 1926.51).

5. Personal Protective Equipment.

The employer is responsible for the wearing of appropriate personal protective equipment by employees in operations that expose the employees to hazardous conditions (OSHA 1926.28).

6. Noise Exposure.

Feasible administrative and engineering controls must be used to reduce the noise levels to permissible levels. Failing that, personal protective equipment must be provided to employees and must be used. Devices to be inserted in the ear must be fitted by competent persons. Plain cotton is not an acceptable protective device (OSHA 1926.52, 1926.101).

TABLE 135-1 Permissible Noise Exposures

DURATION per DAY (hr)	SOUND LEVEL (dBA) ^[1]
8	90
6	92
4	95
3	97
2	100
1 - 1 1/2	102
1	105
1/4 or less	115
^[1] Maximum must not exceed 140 dB from impact or impulsive noise.	

7. Gases, Vapors, Fumes, Dusts, and Mists.

After using feasible administrative and engineering controls and finding they are not adequate or fail, employees exposed to harmful air contaminants must be provided with personal protective equipment and must use it. Respirators must be of an approved design appropriate for the purpose, inspected regularly

and maintained in good condition. Employees required to wear respirators must be instructed in proper use and equipment limitations (OSHA 1926.55, 1926.103).

8. Head Protection.

Employees working in areas where there is a possible danger of head injury from impact, falling or flying objects, or electrical shock or burns must be protected by protective helmets. The helmets must meet the specifications for the type of anticipated hazard (OSHA 1926.100).

9. Eye and Face Protection.

Employees must be provided with eye and face protection when exposed to potential eye or facial injury from machines or work operations producing physical, chemical or radiation agents. Protection must meet the specifications for the type of use or anticipated hazard (OSHA 1926.102).

10. Safety Nets.

Safety nets must be provided when work places are more than 25 feet above the ground, water surface, or other surfaces where ladders, scaffolds, catch platforms, temporary floors, safety lines, or safety belts are not practical. Work operations must not begin until the net is in place and tested. The nets must be hung as close under the work area as practical, but not more than 25 feet below the work surface. The nets must extend 8 feet beyond the limits of the work area (OSHA 1926.105).

11. Working Over or Near Water.

Employees working over or near water where the danger of drowning exists must be provided with U.S. Coast Guard approved life jackets or buoyant work vests. Before use, the life jackets and vests must be inspected for defects. Ring buoys with at least 90 feet of line must be available at locations no more than 1200 feet apart. A lifesaving boat must be available at the work site (OSHA 1926.106).

12. Fire Protection.

A fire protection burn permit program must be developed and followed. It must be designed to effectively meet without delay fire hazards as they occur.

Adequate firefighting equipment, appropriate for the intended use, must be provided. The equipment must be conspicuously located, readily accessible at all times, periodically inspected and maintained in good operating condition. As warranted by the project, a fire brigade must also be provided.

Portable fire extinguishers must be visually inspected monthly, and checked by a certified inspector at least annually. Carbon tetrachloride and other vaporizing liquid fire extinguishers are prohibited (OSHA 1926.150).

13. Flammable and Combustible Liquids.

Only approved containers and portable tanks must be used for storing and dispensing flammable and combustible liquids. Flammable and combustible liquids must be kept in closed containers when not in use.

Conspicuous and legible signs prohibiting smoking must be posted in service and refueling areas. Each service or refueling area must be provided with a fire extinguisher rated 20 B:C or higher located within 75 feet of dispensing equipment (OSHA 1926.152).

14. Signaling.

Flaggers or other traffic controls must be provided when signs, signals, and barricades do not provide necessary protection on or adjacent to a highway or street. Flaggers must wear a high visibility safety vest meeting ANSI/ISEA 107 2004 standards when flagging. Signals must conform to those in the FHWA Manual on Uniform Traffic Control Devices (OSHA 1926.201).

15. Hand Tools and Power-Operated Hand Tools.

Employers must not issue or allow the use of unsafe hand tools. Power-operated hand tools, which are designed to accommodate guards, must be equipped with the guards when in use. Electrical power-operated hand tools must either be of an approved double insulated type or suitably grounded. Fuel-operated tools must be stopped while being fueled, serviced, or maintained. High-pressure, atomizing airless paint spray guns must be equipped with a trigger safety catch (OSHA 1926.300-302).

16. Ladders and Scaffolding.

Ladders with broken or missing rungs or steps, broken or split side rails, or other faulty or defective construction are prohibited from use. Portable ladders must be used at a pitch or incline such that the horizontal distance from the top support to the ladder foot is about one-quarter of the working length of the ladder. Side rails must extend at least 3 feet above the landing.

Portable ladders must be placed on a substantial base and the area around the top and bottom of the ladder kept clean. Portable ladders in use must be secured to prevent being displaced. Ladders must not be placed in any location where they may be displaced, unless protected by barricades or guards. Metal ladders must be checked for corrosion in open-end hollow rungs. Portable metal ladders must not be used for electrical work or where they may contact electrical conductors (OSHA 1926.1053).

Scaffolds must be erected on firm, sound footings. Scaffolds must be capable of supporting four times the maximum intended load without failure.

Scaffold platforms more than 10 feet above the ground must be provided with guardrail and toeboards on open sides and ends. Guardrail must have a vertical height of 42 inches from the floor or platform to the upper surface of the top rail. An intermediate rail must be provided midway between the floor or platform and the underside of the top rail. The posts of uprights must be not less than nominal 2" x 4" spaced not more than 8 feet center-to-center, the top rail not less than nominal 2" x 4", and the intermediate rail not less than 1" x 6". Toeboards must be at least 4 inches high.

Scaffold platforms from 4 - 10 feet above the ground must be provided with guardrail (OSHA 1926.451).

WisDOT employees are required to tie off when working 6 feet or more above a surface.

17. Cranes, Derricks, Hoists, and Conveyors.

The rated load capacity, recommended operating speed, and hazard warnings or instructions should be conspicuously posted on all equipment. The employer must comply with equipment specifications and limitations. A competent person must make a thorough annual inspection of the hoisting machinery, and a record of the inspection must be kept. Before each use, the equipment and machinery must be inspected by a competent person to ensure it is in a safe operating condition and deficiencies corrected before use. It must also be inspected periodically during use. ANSI approved hand signals must be used. Pictures of the approved hand signals to crane and derrick operators must be posted at the work site. Accessible areas within the swing radius of the rear of the crane must be barricaded to prevent a person from being struck by the crane. A fire extinguisher rated 5 B:C or higher must be immediately available to the operator of the equipment.

Minimum clearance from live electrical power lines rated 50 kV or less must be 10 feet. Minimum clearance from live electrical power lines rated above 50 kV must be 10 feet plus 0.4 inch for each kV over 50.

Conveyor systems must be equipped with an audible warning signal to be sounded before start-up (OSHA 1926.550, 1926.555).

18. Off-Highway Motor Vehicles.

Vehicles must be checked at the start of each work shift to ensure they are in safe operating condition. Construction equipment and vehicles must be equipped with a reverse signal alarm audible above the surrounding noise level. Vehicles with an obstructed view to the rear must not be used unless they are backed only when an observer signals that it is safe to back.

Vehicles loaded by crane, shovel, end loader, or similar equipment must have a cab shield or canopy to protect the operator. Rubber-tire vehicles must be equipped with fenders. Mud flaps may be used instead of fenders on vehicles not designed for fenders (OSHA 1926.601).

19. Earth Moving Equipment.

These rules apply to scrapers, loaders, bulldozers, graders, off-highway trucks, crawler or wheel tractors, agricultural and industrial tractors, and similar equipment used in earth moving operations.

Roll-over protection and brakes must be provided. Seat belts meeting industry standards must be provided and used on all equipment, except equipment designed for stand up operation and equipment without rollover protection. Brakes must be capable of stopping and holding fully loaded equipment. Rubber-tire equipment capable of speeds above 15 mph must be equipped with fenders on all wheels, unless it can be shown that the unprotected wheels present no hazard to personnel from flying objects. Equipment must not be backed unless equipped with a reverse signal alarm audible above the surrounding noise level, or is backed only when an employee signals that it is safe to back. Bi-directional machines must be equipped with an operative horn distinguishable from the surrounding noise level (OSHA 1926.602).

20. Excavation and Trenches.

Surface encumbrances such as trees or boulders that are located as to create a hazard must be removed or supported. Uncovered utilities must be supported and protected, or removed as needed to protect employees. A stairway, ladder, ramp, or other equipment must be provided in excavations more than 4 feet deep to provide a means of exit without more than 25 feet of lateral travel. Diversion ditches, dikes, or other suitable means must be used to prevent surface water from entering an excavation. Water must not be allowed to accumulate in an excavation. Excavated or other material must not be stored nearer than 2 feet from the edge of an excavation, unless restrained by a retaining device. A competent person must make daily inspection of excavations. If evidence of possible cave-in is found, work in the excavation must cease and employees must be removed until needed precautions have been taken. Adequate barrier protection must be provided at remotely located excavations. Wells, pits, shafts, etc., must be barricaded or covered (OSHA 1926.651).

Employees in an excavation must be protected from cave-in by an adequate protective system unless the excavation is in stable rock, or is less than 5 feet deep and inspection by a competent person indicates no danger of cave-in. For excavations deeper than 5 feet and not in stable rock, the contractor has the option of laying the sides of the excavation back to a 1 1/2:1 slope (horizontal distance to vertical distance), providing a sloping and benching system based on Appendices A and B of this OSHA section, providing a system designed by a registered professional engineer, or providing a system based upon data approved by a registered professional engineer. Information on the safe installation, use, and removal of any trench support system must be available at the job site. Trench boxes or shields may be used if designed or

approved by a registered professional engineer or selected on the basis of data approved by a registered professional engineer.

A "competent person" means one who is capable of identifying existing and predictable hazards in the surroundings, and has the authority to take prompt corrective action to eliminate the hazards (OSHA 1926.652).

21. Steel Erection.

During the placing of solid web structural members, the load must not be released from the hoisting line until the members are secured with at least two bolts of each connection and drawn up wrench-tight. When bolts or drift pins are being knocked out, means must be provided to keep them from falling (OSHA 1926.751, 1926.752).

22. Cofferdams.

Warning signals for evacuation of employees, in case of an emergency, must be developed and posted (OSHA 1926.802).

23. Explosives.

Explosive material must be stored in approved facilities. Only authorized and qualified persons must handle or use explosives. Blasters must take special precautions in congested areas or in close proximity to structures and highway to control the throw of fragments. Signs must be posted on all roads within 1000 feet of blasting operations, warning against using mobile radio transmitters. Utility owners in the proximity of blasting operations must be notified, and utility facilities safeguarded from the blast.

Before a blast is fired, the blaster in charge must make certain all employees are at a safe distance or under cover, and must sound a loud warning signal. Flaggers must be safely positioned on all highways to stop traffic passing through the blasting zone (OSHA 1926.900, 1926.909, ILHR 7 & 8).

24. Storage.

Materials stored in tiers must be stacked, blocked, or otherwise secured to prevent sliding, falling, spreading, tilting, or collapse (OSHA 1926.250).

25. Concrete Forms and Shoring.

Formwork and shoring must safely support all loads imposed during placing concrete. All protruding reinforcing steel onto which employees could fall should be guarded to remove hazard of impalement. No employee must place or tie reinforcing steel more than 6 feet above a working platform unless protected by a safety belt or equivalent (OSHA 1926.701).

26. Site Clearing.

All equipment must have a rollover protection system. In addition, equipment must be protected with an overhead canopy guard of 1/8 inch steel plate, 1/4 inch woven wire mesh, or equivalent, and a rear canopy guard of 1/4 inch woven wire mesh (OSHA 1926.604).

135.1.3.2 Selected DWD Rules and Regulations for Construction Personnel of the State and Other Political Subdivisions

DWD has adopted the OSHA regulations and supplemented them with some of their own. DWD rules apply to employees of the state and other political subdivisions such as towns, cities, and counties performing construction. For construction done by the state, a town, a city, or a county, the engineer or inspector reviewing the site should be aware that OSHA and DWD rules apply.

1. General.

No person may work on the surface of any structural member, floor or other working platform which has become slippery, unless the surface is cleaned, sprinkled with sand or made non-slippery (ILHR 32.37).

2. Scaffolding.

Support must be provided for all workers on inclined surfaces having a slope of more than 4 inches rise in 12 inches of horizontal run (ILHR 32.38).

3. Motor Vehicles.

Trucks with dump bodies must be equipped with positive, permanently attached dump body support, capable of being locked into position to prevent accidental lowering while being maintained, inspected or left unattended (ILHR 32.39).

4. Excavation.

A railing, guard, or barricade must be provided at the edge of an excavation as soon as it will not interfere with the work.

All excavations exposed to persons at night must be marked with yellow warning lights placed at un-barricaded points and along any side adjoining a public highway or sidewalk.

No person may work in any trench, shaft, tunnel, or caisson over 5 feet in depth without another person present at the surface (ILHR 32.40).

135.2 Safety Operations for WisDOT Personnel

On construction projects, particular attention to safety is necessary. Work may be performed by WisDOT employees in or near traffic, or in close proximity to construction activities. It is essential employees keep their own personal safety in mind and recognize the hazards connected with their duties. Also, engineers must always keep in mind the safety of the employees under their direction.

Each engineer is charged with the responsibility of providing safety leadership at all times and safety enforcement when necessary. Employees should receive instruction in the safe use of tools, materials, and equipment, and the safe prosecution of work projects. Employees should also refer to their Employee Handbook and the department Safety Manual for safety rules and policies.

The employee should ensure that an area is safe before entering for the purpose of inspection. For example, a deep trench must be adequately shored and braced before entering it.

State employees working around aggregate production and processing plants must be trained in WisDOT Mine Safety and Health Act (MSHA) and be particularly careful for both themselves and others to avoid accidents. The adequacy of foundations for storage hoppers, effectiveness of stairways and railing, hazards from moving belts or gears, dangers from falling or flying materials, exposure to hot materials, and other similar features are to be reviewed by the engineer, and desirable or necessary corrective measures called to the attention of the contractor or producer. The correction must be completed before WisDOT personnel are allowed to enter or work upon the premises.

The employee must at all times watch for backing trucks and not depend upon hearing alone for warning. The noise of plants and other equipment often makes it impossible to hear trucks approaching, and the truck driver's vision area is restricted when backing a truck. Constant vigilance is a life or death matter.

Parking state vehicles too close to the path of construction equipment, behind standing equipment, or in other hazardous locations is not allowed. Construction equipment is becoming larger, heavier, and faster, which in turn increases the hazards.

Where traffic is maintained on a construction job, inspectors and others must take care to not step onto the traveled portion of the roadway into the path of cars and trucks.

Where the engineering crew is working in conflict with traffic, the work area should be marked with proper signs and traffic control devices, and the crew should be protected by a qualified flagger equipped with STOP and SLOW sign paddles. High visibility safety garments meeting ANSI/ISEA 107 2004 certification must be worn.

Employees are prohibited from operating contractor's equipment or machinery, riding upon contractor's equipment, or flagging and directing traffic for the contractor. The occasional, necessary use of contractor's equipment or portable bridges or walkways to safely cross fresh concrete or asphaltic surfaces to obtain necessary measurements, etc., is allowed.

Vehicles of employees must be legally parked well back from the edge of the travel-way and preferably off the shoulder in rural areas. They should never be left where they may be a hazard due to proximity to moving traffic, by restricting or obstructing highway sight distance, or by obstructing work operations.

When a condition requires protective equipment use, the engineer or the employee's immediate supervisor is responsible for seeing the equipment has been furnished and is being used. It is the employee's responsibility to use the equipment. Under the Worker's Compensation Act, administered by DWD, a death benefit or compensation for an injury must be reduced if the employee failed to use safety devices required by DWD and provided by the employer.

135.3 Traffic Protection for Surveyors and Inspectors

135.3.1 General Safety Practices

The engineer is responsible for ensuring correct safety procedures, as well as proper use of safety devices, and that WisDOT personnel adhere to warning signs.

Before starting work involving exposure to moving vehicles, the engineer should warn employees of the potential hazards. Employees should be instructed in the safe manner of doing the work and the proper use of warning signs and devices. During the work, the engineer should require employees to follow established safe work practices.

All employees should be constantly on the alert. They should face in the direction of approaching traffic, whenever possible, when required to stop or stand in a traffic lane. They should never enter or cross a traffic lane without first watching for oncoming vehicles and waiting until the lane is clear.

Survey work, to the extent practicable, is conducted off the traveled way. Exposure to traffic hazards can be substantially reduced by using offset lines run on the shoulders or at some greater distance from the

pavement. Workers should minimize crossing of traffic lanes by taking measurements on one side of the highway at a time.

Measurement in a traffic lane should be done as quickly as possible. Standing in or adjacent to a live traffic lane while discussing the work or recording readings is not to be done.

Traffic hazards associated with peak volumes can be avoided by adjusting working hours to perform the work during off-peak traffic conditions.

When project construction barricades cannot adequately protect survey or inspection work, warning signs, and devices, it will be necessary to provide additional safety measures. Added protection should be provided to personnel performing work such as setting up and sighting instruments, painting numbers on pavement, or taking measurements. Flaggers, barricades, cones, and warning sign arrays are some measures that might be taken.

The work should be planned and performed so traffic is not unduly delayed or subjected to accident hazards. When necessary to stop traffic, hold delays to a minimum.

135.3.2 Warning Signs, Devices, and Flaggers

135.3.2.1 Advance Warning Signs

Warning signs should be used in these cases:

1. Where traffic is heavy or fast, and it is necessary for survey personnel or others to cross or enter a traveled lane occasionally, even though the majority of the survey operations are well clear of the traveled way.
2. Except when the traffic is extremely light, if the work is being done within or immediately adjacent to traveled lanes, and survey personnel must enter or cross the lanes at frequent intervals.
3. When restricted sight distances due to a hill or a sharp curve reduce visibility of the operations to a dangerous degree.

Standard warning signs reading "Worker (Symbol)" or "Survey Crew", as appropriate, should be placed before work starts in a position where readily visible to approaching traffic and at a sufficient distance from the work area to allow the motorist to slow, or stop if necessary, after seeing the sign and before entering the work area. On rural highways, the sign should be placed on the shoulder, 2-6 feet outside the traveled lane. On urban streets the sign should be placed approximately 2 feet back of the curb or in the parking lane, whichever will give adequate visibility. For divided roadways, a supplemental sign should be placed in the median for observation by drivers of vehicles in the inner or left lane. Signs should be provided for traffic from both directions when two-way traffic is involved.

To be effective, the signs should be placed not closer to the work area than 200 feet for traffic speeds up to 25 mph, 300 feet for speeds 25 mph to 35 mph, 500 feet for speeds 35 mph to 50 mph, and 1,000 feet for speeds over 50 mph. Signs should not be placed at so great a distance from the work that their warning value is lost. Generally, on rural locations the signs should be moved ahead when the work zone moves to a site more than approximately 3,000 feet from the sign. Signs placed at the far end of the work area for approaching traffic in opposite lanes should be placed at maximum distances and moved when minimum distances occur.

When the work zone extends over 2,500 feet or more, and workers are at more than one place in the area, supplementary warning may be provided if considered to be needed, by erecting traffic cones, with or without orange flags, or another warning sign. These would be placed at the locations on the shoulder, parking lane or outside the curb as previously explained.

On highways having sufficient volume of high-speed traffic to warrant their use, two advance warning signs should be provided and spaced 500 feet or more apart. One sign should be placed at about 500 feet from the beginning of the work area, as required for speeds over 35 mph. This sign should be moved ahead as the work progresses and as the nature of the work will allow. Generally, work operations should not advance more than 3,000 feet from this sign. The second sign should be initially placed 500 feet towards the approaching traffic from the first sign. It may be left in place until the 3,000 feet maximum for the first sign is reached, or until the second sign becomes ineffective. Both signs should then be picked up and reset at the original spacing. Signs placed at the far end of a work area for approaching traffic in opposite lanes should be placed at maximum distances and moved when minimum distances occur.

Warning signs and devices left in place when work operations are not in progress tend to create disrespect in motorists for the warnings. During the noon hour, at night or during other periods when work operations are suspended, signs and warning devices should be removed or covered to indicate they are not in effect.

Refer to figures 135-1 to 135-3 for typical signs and sign placements.

FIGURE 135-1 Advance Warning Signs and Cones

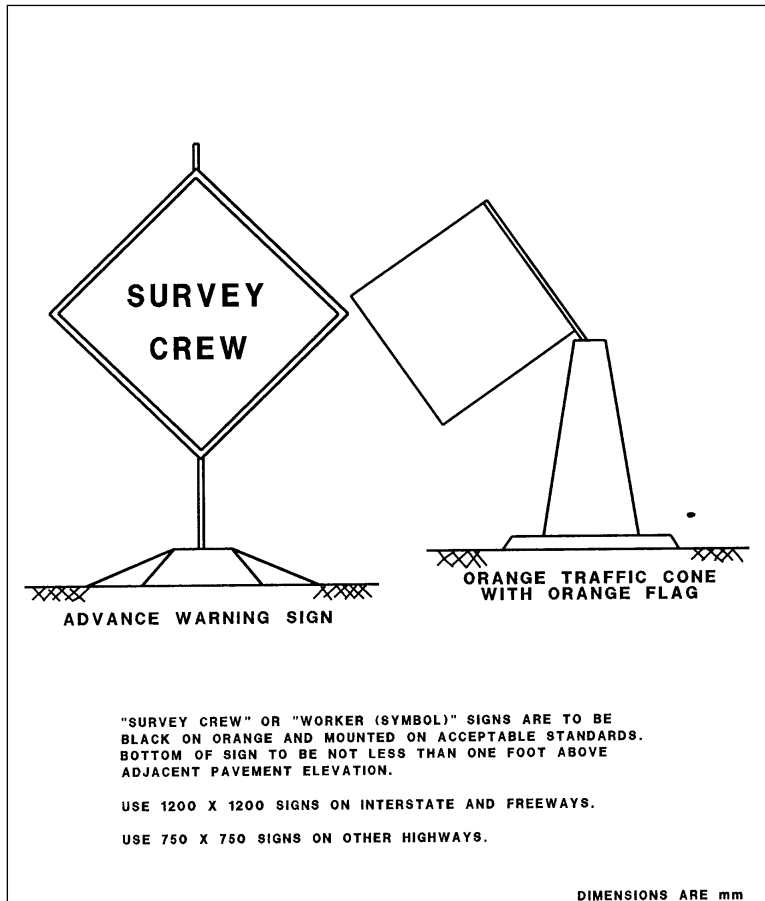


FIGURE 135-2 Typical Sign Placement for Work Area on a Single Roadway

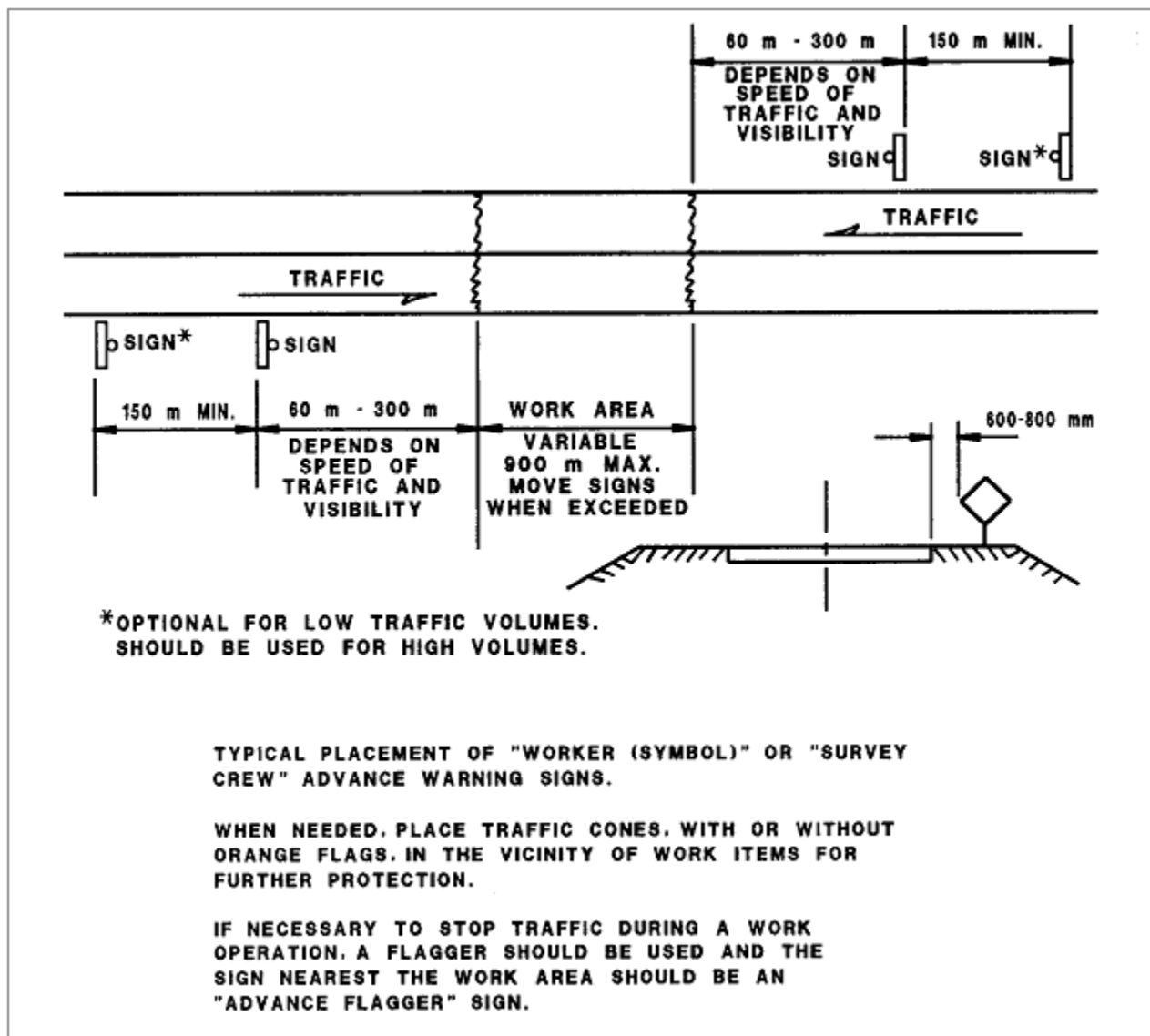
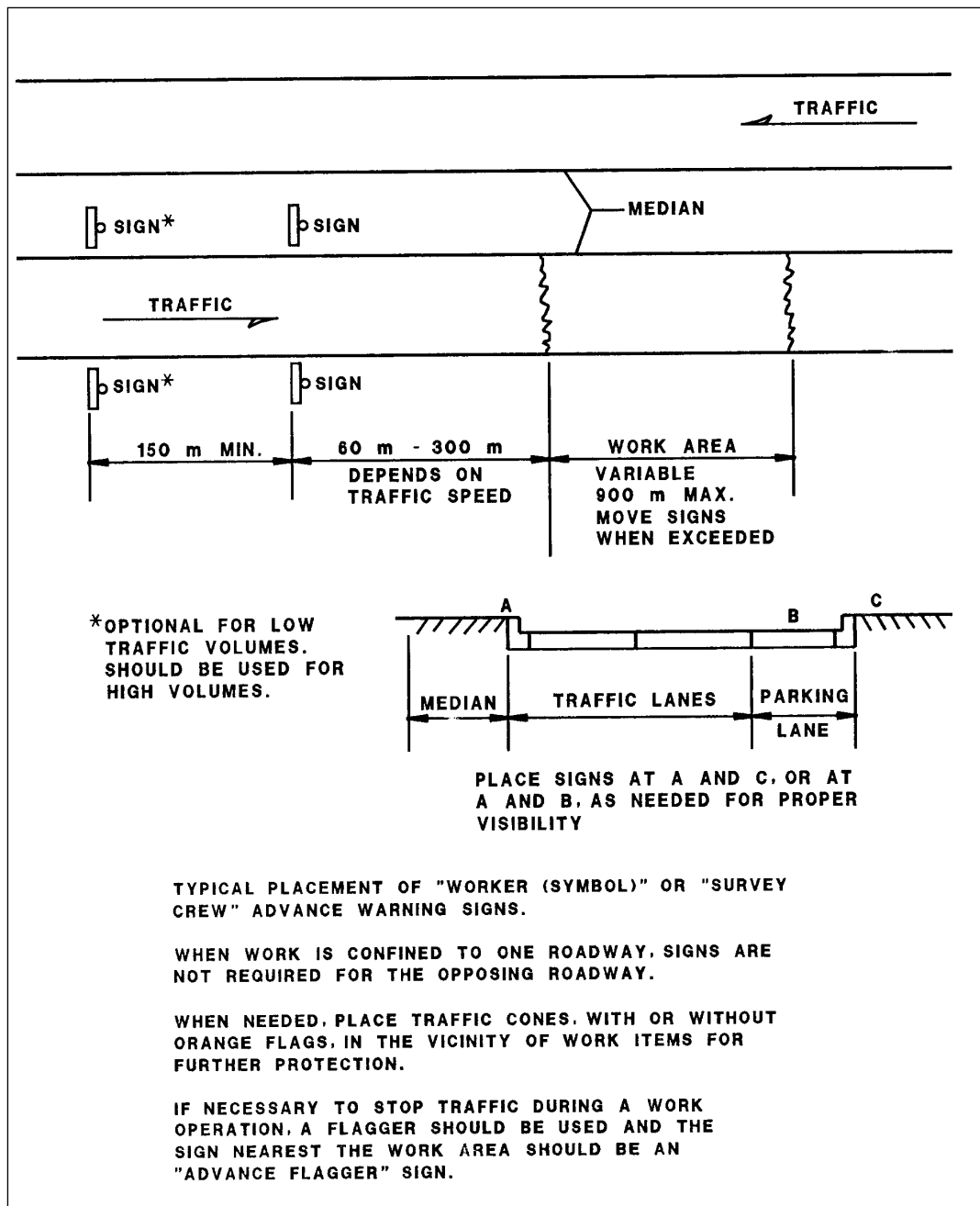


FIGURE 135-3 Typical Sign Placement for Work Area on Dual Roadways



135.3.2.2 Flags and Traffic Cones

Orange traffic cones may be used, with or without orange flags, in addition to the advance warning signs for the guidance of traffic where circumstances warrant. The cones should be arranged to define the work area and guide the flow of traffic past it. Generally, a minimum of 3 cones is needed. They should be placed from 20 to 50 feet apart, depending upon traffic and roadway conditions.

135.3.2.3 Flagging

Flagging operations are described as a part of the temporary traffic control required to protect work zones in [CMM 145.14](#).

135.4 Traffic Protection for Density Testing of Asphaltic Pavements

Ideally, this testing should be done while a lane is closed for pavement construction. Testing within the closed construction work area could be accomplished immediately behind the cold roller and a short distance, generally 50 to 200 feet, in front of the contractor's trailing flagger.

When the testing is delayed until after the lane is reopened because of manpower limitations or other reasons, those persons responsible for testing must also provide traffic control to protect the tester and the motorists. Variable field conditions will require customized traffic control planning for each project.

The inspector making the nuclear test must occupy the pavement for about 10 minutes at any one-test location. We advise that at least one flagger be used, regardless of traffic conditions, because of the vulnerability of the tester. In those situations where the lane is reopened before the tests have been made, the traffic control must conform to Part VI of the Manual of Uniform Traffic Control Devices, including revisions by the FHWA and supplements by WisDOT.

Further suggestions for protecting the asphaltic pavement tester include:

1. A "Be Prepared to Stop" sign.
2. A rotating dome-light or a flashing light on the inspector's vehicle.
3. A "Worker (symbol)" sign on the inspector's vehicle.

After the advance warning devices are in place and the flaggers are ready, the inspector's vehicle should be parked a reasonable distance upstream from the test site to warn traffic and protect the tester. The vehicle either can be centered in the closed lane, straddling the closed lane and shoulder, or completely on the shoulder.

135.5 First Aid Services

If injured, obtain medical treatment promptly and report the accident to your supervisor as soon as possible. If anyone else is injured, provide first aid within the limits of your skill and knowledge. Form DOA 6058 must be filled out by the injured employee.

Section 895.48 of the Wisconsin statutes provides immunity from civil liability for department employees rendering first aid at the scene of any emergency or accident.

135.6 Use of Liquefied Petroleum Gas Stoves

Where bottled gas stoves are used on the project for drying samples of soil, aggregates, etc., their use must conform to the safety requirements of OSHA 1926.153, Subpart F, as adopted by DWD. The following general rules will apply:

1. The bottle container and first stage regulatory device must be located outside the building that houses the stove. Container, regulator, valves, and fittings must bear the USDOT approval, or be approved by DWD or agencies recognized by them. A safety relief valve must be provided.
2. The container must be installed on a firm foundation or securely supported. The discharge from the safety relief valve on the bottle must be not less than 5 feet horizontally away from a window or opening in the building, which is below the level of the discharge.
3. A suitable length of a flexible hose designed to withstand at least 250 psi and approved by a recognized testing agency may connect the bottle to the stove. The gas must be shut off at the end of each working day's use.
4. Filled or partly filled bottles are to be stored outside. Each storage area must have at least one appropriately rated fire extinguisher.

135.7 Safety Equipment

135.7.1 General Requirements

Wisconsin statute 101.11 spells out the employer's responsibility to provide a safe work place and safe employment, and to furnish and to require using safety devices and safeguards.

Directive TAM 7 of the department elaborates further upon this responsibility of the employer. Supervisors and lead workers are responsible for the safety of all persons under their direction and all persons coming into the work area, and are responsible for:

1. Training employees in the safest manner to do their work.
2. Reviewing safety policies and procedures with employees.
3. Checking that necessary safety equipment is provided and used.
4. Taking prompt action to correct unsafe conditions and practices.
5. Investigating and reporting accidents, and recommending corrective action.

WisDOT employees are responsible for their personal safety and that of their co-workers. They are encouraged to report unsafe conditions and equipment to their supervisor. If they fail to comply with WisDOT safety rules and programs, they will be subject to discipline.

135.7.2 Safety Vests

WisDOT-approved high visibility safety vests are required for any employee working on highways, roads, streets, or their easements carrying traffic and including, but not limited to, the following specific locations and work activities (as outlined in Safety Directive 57):

- Members of pavement marking, signing, and electrical crews on field assignment. Electrical crews while working inside traffic signal controller cabinets or other electrical facilities.
- Members of field survey crews working in off-highway locations during hunting season.
- Construction personnel or other employees on field assignment while working in areas removed from normal vehicular travel where they are exposed to potential injury from construction equipment operations or other contractor or DOT vehicle operation within the area or project.
- Any employee who is a casual or infrequent visitor to any of the fore mentioned locations or work activities for purposes of review, discussion, or supervision.
- Where exposure to the specific conditions described above is intermittent, the general rule must be to opt for wearing high visibility safety vests, at all times.
- Approved safety vests and pants are required to be worn by DOT employees during the hours of darkness (1/2 hour before sunset & 1/2 hour after sunrise or during low visibility. Per ANSI/ISEA 107-2004, wearing high visibility pants in addition to the vest makes the Vest and Pant a Class 3 ensemble.

Supervisors are responsible for demonstrating safe practices and ensuring that employees are informed of the latest requirements/policies regarding safety vests and that safety vests be worn at all times in areas where the personal safety of an employee can be maximized by being highly visible. Safety vests meeting current department specifications may be obtained directly from Central Supply Services.

135.7.3 Standard Warning Devices

Advance warning signs, traffic cones, sign paddles, flags, and other safety devices are maintained in stock at Central Supply Services. Regions may requisition or replenish their supply of these items directly from Supply Services as needed.

To effectively attract the attention of motorists, warning devices must be legible. Signs should be handled carefully and transported so the sign face is not scratched or scuffed. Signs and other devices, which are damaged, dirty or faded, should be replaced, cleaned, or renewed. Flags and signs should be inspected when in use to make sure the flags are not wrapped around their supports, or that the signs have not been upset or turned so the message is not visible.

135.7.4 Eye Protection

Employees of the department working in the following areas and performing the following activities are required to use eye protection. These requirements are contained in Safety Directive 36 of the department.

1. Shop and field personnel who wear eyeglasses (including sunglasses) on the job must wear safety glasses or safety goggles where there is a hazard to eyes.
2. Employees repairing, removing, or installing any electrical or communications equipment must wear safety glasses or safety goggles.
3. Members of the marking and signing and survey field crews must wear safety glasses or safety goggles when on the job.
4. Employees exposed to flying particles, splashing metal or injurious radiant energy must wear safety glasses or safety goggles. This includes the driving of "frost pins" by survey crewmembers.

Supervisors are responsible for ensuring eye protection is worn at all times in an area where there is a hazard to the eyes. It is the responsibility of all employees who are exposed to eye hazards, including supervisory personnel, to wear the eye protection required and provided. Non-prescription safety and safety sunglasses may be obtained directly from Central Supply Services.

135.7.5 Foot Protection

Under the department's Safety Directive 30, department employees must wear safety shoes or strap-on metal foot guards in the following locations and performing the following activities.

1. Construction projects.
2. Maintenance and materials personnel on field assignment.
3. Signing, pavement marking, and electrical personnel.
4. Survey personnel on field assignment.
5. Supervisors and review personnel visiting these locations or activities.

Foot protection must meet ANSI Standard 241.1.95/75. Table 135-2 shows the types and styles of foot protection and the locations in which they are to be worn:

TABLE 135-2 Foot Protection

Location	Min. Type *	Min. Style**
Asphalt or concrete paving sites	A	2
Bridge erection sites (bridge repair sites)	A	2
Building demolition sites	A	2
Emission Center	A	1
Location	Min. Type *	Min. Style**
Loading Docks:		
Where metal containers, equipment or parts are being loaded or unloaded.	B	2
Where wooden containers, equipment or parts are being loaded or unloaded.	B	2
All others	A	2
Materials Lab, Testing Machine Room	A	1
Pavement coring sites	A	2
Pavement Marking Shop	A	1
Portable truck weighing sites	A	2
Prestress concrete plants	B	2
Riot control sites	A	2
Sign erection sites	B	2
Sign Manufacturing Shop (exclusive of Drafting Room)	A	1
Sign Shops in the Regions	A	1
Signal installation and maintenance sites	A	2
Soil test drilling sites	A	2
Steel fabrication plants	B	2
Testing Machine Room at Materials Laboratory	A	1
Truck loading and unloading	A	2
Truck weighing scales (portable scales only)	A	2
Warehouses	A	1
All other field locations:	A	2

*Type: A - Class 75 Safety Shoe

B - Class 75 Safety Shoe with Metatarsal Guard

**Style: 1 - Oxford

2 - 5" Minimum High Shoe

Supervisors are responsible for ensuring foot protection is worn at all times in areas where there are hazards that could cause injury to the feet.

It is the responsibility of employees who are exposed to foot hazards to wear approved foot protection.

135.7.6 Protective Headgear (Hard Hats)

Employees of the department are required to wear protective hard hats in work areas where there is possible danger of head injury from impact, falling or flying objects, or electrical shock or burns. This requirement is contained in the department's Safety Directive 51.

Visitors will be furnished protective headgear for ensuring that head protection is worn at all times in areas where there are hazards that could cause injury to the head. Employees, including supervisors, who are exposed to head hazards, will be responsible for wearing the head protection provided by the department.

Supervisors, including engineers, should use good judgment in determining mandatory use of protective headgear during construction work operations. Areas where hardhat protection is required should be posted when possible.

All personnel are required to wear protective headgear in any area posted as being required by the contractor.

135.7.7 Hearing Protection

Failing to achieve feasible administrative and engineering controls to reduce the noise levels to permissible levels, personal protective equipment must be provided to WisDOT employees and must be used to reduce sound levels within the permissible levels. Plain cotton is not an acceptable protective device (OSHA 1926.52, 1926.101).

Personal Hearing Protection that conforms to the EPA Noise Reduction Rating (NRR) must be used and must provide sufficient noise reduction to lower the work environment sound levels to 85dB or less (see Safety Directive 95).

The requirements contained in the department's Safety Directives, can be found at the following link:

<https://wigov.sharepoint.com/sites/dot/Pages/Facilities/Safety.aspx>

135.7.8 Fall Protection

Employees of the department are required to maintain 100% tie-off in where the potential exists for a fall of 6 (six) feet or greater. Bridge projects are required to have, at minimum, two sets of serviceable fall protection equipment available: one for use and the second for recovery operations if necessary. Excavations with a fall potential of 6 feet also require fall protection while working along the top edge.

Department employees should never enter a situation where a fall potential exists without recovery assistance being immediately available.

Supervisors are responsible for ensuring fall protection is worn at all times in an area where there is a hazard. It is the responsibility of all employees who are exposed to fall hazards, including supervisory personnel, to wear the protection required and provided. Fall protection harnesses and lanyards may be obtained directly from Central Supply Services.

135.7.9 Confined Spaces

A confined space is a space with restricted means of access, not meant for continuous occupancy that by its nature may contain an atmosphere non-conductive to supporting human life. Employees of the department are not to enter a confined space without proper training in the entry procedures. Access should be only by persons trained in proper testing and entry procedures.

Typical confined spaces we encounter include manholes, utility vaults, pits, and trenches with limited ventilation or soil contamination, some types of formwork, and box beam girders.

Breaking the plane of the opening with any part of the body constitutes entry by OSHA definition.

Supervisors are responsible for ensuring conformance to confined space entry procedures and to ensure trained personnel are available when the need to enter a confined space exists. Required testing and recovery equipment is available on each region for use by the properly trained operators.

135.8 Pedestrian Safety

[Standard spec 104.6](#) specifically provide for the accommodation of pedestrian traffic. When the work area encroaches upon a sidewalk, crosswalk, or other areas near an area utilized by pedestrians, special consideration must be given to pedestrian accommodation and safety. Pedestrians are more susceptible to personal injury in working areas than are motorists. Visibility and recognition of hazards is an important requirement for the safety of pedestrians.

Where accessible routes are currently provided in accordance with the Americans with Disabilities Act, these routes must be maintained or suitable alternatives provided.

When evaluating the need to accommodate and protect pedestrians, emphasis should be placed on not creating a new barrier to pedestrian movement.

The contractor to ensure passageways are safe and well defined should provide protective barricades, fencing, handrails and bridges, together with warning and guidance devices. If not provided for in the contract, a change order to the contract may be necessary to furnish appropriate protection.

Where walks are closed by construction or maintenance, an alternate walkway should be provided when feasible. Where it is necessary to divert pedestrians into the parking lane of a street, barricades and delineation should be provided to separate the pedestrian walkway from the adjacent traffic lane.

Pedestrians should not be diverted into a portion of the street used by vehicular traffic. At locations where adjacent alternate walkways cannot be provided, appropriate signs should be posted at the limits of

construction and in advance of the closure at the nearest crosswalk or intersection to divert pedestrians across the street.

When hazardous work conditions exist overhead, it may be necessary to install a fixed fence-type or canopy-type pedestrian walkway to protect and control pedestrians. Wood and chain link fencing can be used with warning lights and illumination to warn and guide both pedestrians and motorists.

Fences around a construction area are often necessary and may be a requirement of the local jurisdiction building code. They are often constructed in conjunction with a special pedestrian walkway, when there are deep excavations, or when pedestrian access to the job site is not desirable. Installation of the fencing must take into account relocation of existing control devices and facilities such as traffic signals, pedestrian signals, traffic signs, and parking meters. Chain link fencing which can be seen through may be needed at intersections to provide adequate sight distance.

135.9 Site Health and Safety Checklist

The DTD Safety Coordinators and the DOT Safety Steering Committee have recommended that this form be posted next to the phone in all DOT field offices for safety purposes.

Staff can download form [WS1071](#) "Site Health and Safety Check List."