Company Policy

This policy for the prevention of employee exposure to hazardous Highway and Roadwork conditions is adopted in accordance with OSHA and MUTCD regulations.

This Company has implemented this plan to ensure that employees are aware how to avoid injury and illness in the workplace. The Company Safety Coordinator is the administrator of the Highway and Roadwork Safety Plan and will be responsible for maintaining medical records, verifying training, and overall supervision of the company program.

This Company provides this Highway & Roadwork Safety Plan as an overview of common hazards in highway and road construction and simple prevention measures. It is a labor-management safety program to which all employees must become familiar. Compliance with this plan is a condition of employment. The safety measures described in this plan reflect safe work practices for reducing highway work zone injuries and illness.

Upon initial hiring, all employees will be trained in exposure awareness and hazard prevention techniques for Highway and Roadwork. Employees will receive refresher training annually, or if observed to commit unsafe acts regarding potentially hazardous circumstances, or when changing job conditions or assignments warrants it. Training records will include date of training, training content, attendance records including job title, and will be kept on file at the office.

How Highway Workers are Exposed or Put at Risk

Highway workers routinely work in proximity to construction vehicles and motor vehicle traffic. Flaggers and other workers on foot are exposed to the risk of being struck by traffic vehicles or construction equipment if they are not visible to motorists or equipment operators.

Workers who operate construction vehicles or equipment risk injury due to overturn, collision, or being caught in running equipment. Highway workers, regardless of their assigned task, work in conditions of low lighting, low visibility, and inclement weather, and may work in congested areas with exposure to high traffic volume and speeds.

Government Safety Regulations and Recommendations

The Federal Highway Administration has developed and maintained the Manual on Uniform Traffic Control Devices (MUTCD), which provides for uniform design and setup of highway work zones and includes guidance for the development of temporary traffic control plans (TCP) that determine the flow of traffic through work zones. The primary focus of Part 6 of the MUTCD is the interaction between the road user and the work zone. The MUTCD contains exhaustive specifications for signage, pavement and curb markings, traffic signals, and marking of school zones, bicycle facilities, and highway-rail
crossings. It also prescribes temporary traffic control measures for numerous scenarios involving lane closures, lane shifts, detours, shoulder work, median crossovers, mobile operations, and blasting. The MUTCD addresses topics such as training, personal protective equipment, speed reduction, barriers, and lighting, as they apply to highway construction.

OSHA construction industry regulations (29 CFR 1926, Subpart O) address operation of vehicles and equipment within an off-highway job site not open to public traffic. However, Subpart O is not exhaustive in its coverage of machinery types or safety equipment, nor does it address work practices, traffic control plans, or shift work. Flagging and signaling practices are discussed in general terms in Subpart G, which covers signs, signals, and barricades. Subpart G defers to MUTCD on matters relating to hand signals, barricades, and traffic control devices.

Construction contractors, contracting agencies, and others responsible for work zone safety face the challenge of providing a safe workplace while ensuring the safe movement of the public through the work zone.

Highway and street construction presents a complex work situation in which workers face multiple injury risks under conditions that may change without warning.

**Highway workers are at risk of injury from:**

- The motoring public traveling through work zones.
- Construction equipment operating inside the work zone and in ancillary areas that support the work zone (e.g., temporary batch plants).
- Construction vehicles operating inside work zones, as well as construction vehicles entering and leaving the work zone.

Compliance with OSHA and the MUTCD regulations is a necessary first step in providing a safe work environment. However, these sources, taken together, do not provide comprehensive guidance to ensure worker safety in highway work zones. To identify gaps in standards and regulations, the following work-zone conditions must be considered:

- Safety of all workers on foot around traffic vehicles.
- Safe operation of construction vehicles and equipment in highway work zones.
- Planning for safe operations within work zones.
- Special safety issues associated with night work in highway construction.

The safety measures described in this plan reflect safe work practices for reducing highway work zone injuries that were generated by a broad cross-section of associations and organizations with extensive experience in the road-building field. However, these prevention measures should not be viewed as official regulations.
Injury Prevention Measures

Work Zone Layout

This Company has assigned the Safety Coordinator as “The Traffic Control Supervisor.” The Safety Coordinator is knowledgeable in traffic control principles and has overall responsibility for the safety of the work zone setup.

The company-designated traffic control supervisor will:

- Carefully review the temporary Traffic Control Plan (TCP) and, during contract negotiations, negotiate with the contracting agency as to revisions to the TCP that are needed to ensure worker safety.
- Ensure that the work zone is set up in accordance with the 2003 Edition of the MUTCD.
- Evaluate the effectiveness of the temporary traffic control setup by having the project supervisor walk or ride the job looking for evidence of near misses (e.g., skid marks, damaged barricades).
- Include employees in the walk- or drive-through as a training tool, and to emphasize that safety is a continuous priority.
- Authorize the job supervisor to temporarily halt work until unsafe conditions related to temporary traffic control have been eliminated.
- Document work zone setup and changes throughout the course of the project. Retain these records in a "job file" as a reference for future jobs.
- Where provided for in contract documents, increase the size of the lateral buffer zone to reduce worker exposure to passing motorists.
- To the extent practical, keep the length of the work zone appropriate to the work in progress so that motorists do not increase speed after passing through a long stretch with no sign of work activity.

When possible, the company designated traffic control supervisor will:

- Close the road completely and reroute traffic where feasible.
- On interstate and similar roadway systems, minimize worker exposure to traffic hazards by forcing traffic moving in both directions onto one side of the road and completely closing off the work zone.
- Specify the use of temporary pavement markings to laterally move the traffic lane away from the work space on projects lasting less than 2 weeks.
- For night work, will specify:
  - Increased taper length
  - Installation of low-level transitional lighting in advance warning areas and termination areas to ease motorists’ adjustment to changing lighting conditions.
When possible, the company designated traffic control supervisor will:

- Cooperate with the Prime Contracting Agency to design and implement TCPs in accordance with safety management principles that call for a hierarchical approach to prevention of worker injuries.
- Reduce worker exposure to injury to the extent possible. For highway construction, possible strategies to reduce exposure to injury from traffic vehicles include rerouting all traffic to one side of a multi-lane highway, or complete road closure.
- Where worker exposure to traffic cannot be completely eliminated, use positive protective barriers to shield workers from intrusions by traffic vehicles. Examples applicable to highway work zones are truck-mounted attenuators (TMAs) and temporary traffic barriers.
- Where installation of temporary traffic barriers is impractical or creates a greater hazard, install channelizing devices such as traffic cones and barrels to delineate the work zone. It will be kept in mind that channelizing devices supplement the use of temporary traffic barriers, but are a less effective physical barrier to prevent vehicles intruding into the work zone.
- Additional measures such as sensors, handheld radios, and intrusion alarms may be implemented, but will not rely on them as a primary protection against injury.

Use of Temporary Traffic Control Devices

When feasible, the company designated traffic control supervisor will:

- Use temporary traffic control devices, such as signage, warning devices, paddles, and concrete barriers, in a consistent manner throughout the work zone.
- Set up temporary traffic control within a reasonable time prior to construction so that motorists do not become complacent and ignore warning signs and devices when work begins.
- Provide flaggers with devices that increase their visibility to passing motorists and construction vehicles. One example that has been field-tested and shown to be effective is the flashing slow/stop paddle, which consists of a standard paddle with a strobe light mounted on its face.
- Keep channelizing devices clean and properly maintained to preserve their reflective intensity and visibility.
- Ensure that all traffic control devices are operating properly and in place at all times. Missing traffic control devices create the potential for motorists to inadvertently enter the work space or exit the highway in the wrong place.
For night work:
  o Reduce spacing between channelizing devices to compensate for reduced driver visibility.
  o Ensure arrow panels are set at nighttime levels; daytime settings used at night produce blinding light.
  o Increase the size of traffic control devices, reflective material, and lettering to improve driver recognition.

Motorist Education and Speed Enforcement

When practical, the company designated traffic control supervisor will:

  • Give motorists plenty of advance warning of upcoming work zones.
  • Ensure that motorists have real-time information in signage and in traveler's advisory radio broadcasts.
  • Install warning signs that provide estimated time of delay and other road closure information so that drivers have sufficient opportunity to exit and take a different route.
  • Keep warning sign messages simple and brief.
  • Cover or take down warning signs when workers are not present.
  • Remove channelizing devices when they are no longer needed.
  • Normal speed limits will be restored when work is no longer in progress, when workers are no longer at the job site, or when hazards have been removed or protected.
  • Use an advance media campaign to advise the public of upcoming roadwork.
  • Where possible, implement alternative speed control measures in the work zone:
    o Videotape speeding motorists to provide an incentive to slow down through the work zone.
    o Use pace vehicles to pull into lanes and slow traffic.
    o Increase presence of law enforcement at the beginning of the work zone.
    o Use a variety of speed control methods throughout the course of a project so that motorists do not learn how to anticipate and avoid speed controls.
    o Use a law enforcement officer who is trained in work zone traffic control as a flagger in work zones where speed control is needed.
    o Ensure that officers are trained in work-zone traffic control procedures and know the MUTCD
    o Ensure that officers working temporary traffic control are adequately protected from work zone hazards.
Flaggers

Where required, the company designated traffic control supervisor will:

- Train all flaggers consistent with their level of responsibility and work zone conditions. Flaggers should know the traffic flow, the work zone setup, and proper placement of channelizing devices.
- Assign each flagger responsibility for monitoring operations in his or her immediate work area. Authorize flaggers to recommend to the traffic control supervisor that operations be temporarily halted and the hazard corrected when they see a hazard threatening the safe movement of traffic through the work zone. Authorize flaggers to halt operations in the event a hazard arises and the traffic control supervisor is not in the immediate area.
- Train flaggers to maintain sufficient distance from other highway workers, so that they can be identified by passing motorists.
- In the event multiple flaggers are required, ensure they have the appropriate sight distance or two-way radios to communicate effectively.
- Avoid using flaggers whenever possible. Use alternative traffic management systems such as lane shifts, portable traffic signals, or remote signaling devices operated by workers away from the flow of traffic.
- Use alternatives to flaggers when traffic control is required under hazardous conditions such as high traffic speeds, inclement weather, night work, and other conditions which limit visibility.

High-Visibility Apparel

Where possible, the company designated traffic control supervisor will:

- Require all workers on foot to wear high-visibility safety apparel.
- Inspect high-visibility clothing regularly to ensure that color has not faded and that retroreflective properties have not been lost.
- Will require the use of fluorescent garments with retroreflective material when working under poor lighting conditions.
- Require fluorescent and retroreflective materials on head gear and on flaggers’ gloves.

The company designated traffic control supervisor will apply elements of the consensus standard that provides guidance on high-visibility safety apparel:

The voluntary consensus standard, ANSI/ISEA 107-1999, American National Standard for High-Visibility Safety Apparel, provides guidance for use of high-visibility safety apparel to protect workers exposed to hazards of low visibility, including highway construction workers. The standard specifies minimum amounts of retroreflective materials, colors, and placement of materials for high-visibility worker apparel. It also defines three garment classes based on the surface area of background and retroreflective material used to make the garment. Specifications in the standard are intended to make the wearer of the apparel conspicuous under any light conditions by day, and under illumination of vehicle headlights in the dark.
Though not considered a part of ANSI/ISEA 107-1999, Appendix B provides the following conspicuity criteria for selection of apparel:

**Class 1** – For use in situations which permit the worker’s full attention to approaching traffic, with ample separation of workers and vehicles, and traffic speeds not exceeding 25 mph.

Specifies a minimum of 0.14 m² fluorescent background material and 0.10 m² retroreflective material.

**Class 2** – For use in inclement weather conditions, for work on or near roadways with higher traffic levels, or for traffic speeds above 25 mph. Class 2 apparel is appropriate for use in situations where worker attention is diverted from approaching traffic, or where separation of workers and traffic is less than ample.

Specifies a minimum of 0.50 m² fluorescent background material and 0.13 m² retroreflective material.

**Class 3** – For use in settings where workers and vehicle operators have high task loads, where workers are exposed to traffic speeds above 50 mph, and where workers are exposed to a wide range of weather conditions. Class 3 apparel is recommended for all highway construction personnel.

Specifies a minimum of 0.8 m² fluorescent background material and 0.2 m² retroreflective material.

**Note:** Performance of Class 3 apparel, suggested for use by all highway construction personnel, exceeds the 1,000-foot distance visibility recommendation in the MUTCD. The new ANSI/ISEA standard states that the worker should be conspicuous through the full range of body motions and be identifiable as a person. Appendix B further suggests that workers needing Class 3 apparel should be conspicuous from a minimum distance of 1,280 feet.

**Illumination of the Work Zone**

**When possible, the company designated traffic control supervisor will:**

- When installing lighting within a work zone, ensure proper illumination for the work space, while controlling glare so as not to blind workers and passing motorists.
Work Zone Illumination Guidelines

Illumination guidelines for nighttime highway work have defined three categories of highway construction and have specified lighting levels needed for each:

Category I:

General illumination requirement for the work space (5 foot-candles).

Recommended for large-scale visual tasks with comparatively low need for accuracy.

Category II:

Provides for general illumination of tasks and around equipment (10 foot-candles).

Recommended for work done on and around construction equipment such as paving and milling which require somewhat greater accuracy and where workers are located near machinery.

Category III:

Specified for small scale visual tasks requiring high accuracy, such as repairing cracks or pot holes (20 foot-candles).

Also recommended for situations requiring extreme caution and attention, such as flagging and signaling.

The illumination guidelines cover light sources, lighting system configurations (temporary, portable, and equipment-mounted), steps for designing a lighting system, and the importance of maintenance and backup of the system. Also to consider are illumination guidelines for nighttime highway work that specify design requirements for work zone lighting, taking into account visibility requirements of motorists passing through the work zone.

Developing Internal Traffic Control Plans

A temporary traffic control plan (TCP) describes how a specific work zone is to be set up to ensure the safety of the motoring public traveling through the work zone; however, construction equipment and vehicles within the work space are not addressed by TCPs. In contrast to a TCP, an internal traffic control plan (ITCP) is a tool that project managers use to coordinate the flow of construction vehicles, equipment, and workers operating in close proximity within the activity area, so that the safety of workers can be ensured.
When required, the company designated traffic control supervisor will:

- Develop an “Internal Traffic Control Plan (ITCP)” once the temporary Traffic Control Plan (TCP) has been established. As the ITCP is developed, consider how the work space fits within the overall work zone and make sure that the ITCP is placed in the context of a temporary traffic control plan.
- Develop Internal Traffic Control Plans for all medium, large, and multi-contractor jobs. For small recurrent operations such as filling potholes, routine maintenance, and mowing, a checklist will be used in place of a complete ITCP.
- Develop schematic diagrams depicting the movement of construction workers and vehicles within the work space. Sample diagrams have been developed for paving, trenching, and dirt-spread operations. These diagrams provide an idea of how a typical ITCP diagram will look, but must be modified to assure compatibility with the overall TCP and to address site-specific conditions.

Management elements that are addressed in the ITCP:

- Chain of command.
- On-site equipment and personnel.
- Contact information, including company personnel, other on-site contractors, the contracting agency, and emergency response services.
- The location, time table, and scope of the project.
- An operations communication plan that includes the following:
  - A plan for orienting independent truck drivers and subcontractors to the work space and the ITCP.
  - Methods of communication regarding changes in the ITCP.
  - A means for workers on foot to talk with equipment operators, truck drivers, and the people controlling or coordinating the flow of vehicles and equipment entering and leaving the work space and the movement of heavy equipment within the work space.
  - A means for grader operators, dozer operators, truck drivers and scraper operators to communicate with each other and with the prime and sub-contractors.

Safety elements that will be addressed in the ITCP:

- Identification of ITCP coordinator assigned to the project.
- A description of the role and authority of the ITCP coordinator.
- A description of the role employees have in implementing the ITCP, and in recognizing, reporting and eliminating safety hazards.
Hazard assessment and control elements that are addressed in the ITCP:

- Schematic diagrams depicting the movement of construction workers and vehicles within the work space (see ITCP diagram elements).
- A checklist of site-specific hazards with a description of how these hazards will be minimized: what procedures, safety equipment, and control strategies will be used?
- A reporting system for all close-calls and incidents related to the internal traffic control plan (to encourage reporting, consider using an anonymous reporting system).
- A plan for safely handling intermittent traffic stoppages; e.g., for equipment turn-around.
- Anticipated traffic volume and speed, as well as speed limit for operation within the work space.
- Specifications for lighting in the work space.

Elements of an ITCP diagram:

- Standard symbols for pieces of equipment and project personnel that will be on site.
- Overview of how the activity area fits within the temporary traffic control plan.
- Location of proximate traffic control devices.
- Delineated areas around specific pieces of equipment and operations where workers on foot are prohibited (e.g., swing radius of an excavator, blind areas of a dump truck).
- Locations for storing and servicing materials and equipment.
- Location of parking for visitors and workers.
- Size and location of lateral buffer zones.
- Description of internal signage and all internal traffic control devices.
- Review of the compatibility of ITCPs with the project TCP.

Implementing Internal Traffic Control Plans

When required, the company designated traffic control supervisor will:

- Train workers in the implementation of the ITCP for each project.
- Place a trained ITCP coordinator at each job site. By being at the job site, the coordinator is able to respond immediately to hazardous situations. The coordinator is authorized to make adaptive changes and/or halt operations as needed to ensure worker safety.
- Evaluate the effectiveness of the ITCP throughout the project, noting changes required as the project evolves. Retain schematic drawings and other documents in the "job file" for use in developing future ITCPs.
- At entrances to the activity area, distribute site-specific safety materials, including a copy of the ITCP and safety guidelines for workers on foot, to all drivers and visitors coming into the activity area. Other means of communicating this information include toolbox safety meetings, faxing the ITCP to other employers who will be on site, and distributing the ITCP to truck drivers at the loading facility.

Ensure that the prime contracting agency staff understand the ITCP for each project so that they can comply with the ITCP when they travel to a work site during inspections.
ACCOUNTABILITY AND COORDINATION AT THE WORK SITE

When feasible, the company designated traffic control supervisor will:

- Avoid assigning collateral duties that distract safety personnel from focusing on their safety responsibilities.
- Make supervisors accountable for daily documentation of hazards and how hazards were mitigated.
- Maintain lines of communication between the individuals responsible for different aspects of work zone safety.
- Require subcontractors to prepare site-specific hazard assessments that include identification of hazards and description of how hazards will be eliminated or controlled.
- For each project, use hazard assessments to guide identification of immediate worker training needs.
- Adopt a project-wide communication program in which each contractor informs all other contractors of hazards related to their work. This allows each contractor the opportunity to ensure that employees are aware of hazards resulting from work being done by others at the site.
- Conduct a pre-construction meeting among contractors to coordinate project activities, discuss potential hazards and how hazards will be eliminated, or minimized.

EQUIPMENT OPERATION AND MAINTENANCE

The company designated traffic control supervisor will:

- Make sure that each equipment and vehicle operator has a valid driver’s license.
- Allow equipment to be operated or repaired only by persons who have been trained and authorized to work with that piece of equipment. Assign responsibility for each piece of equipment to an individual worker.
- Designate a supervisor to be responsible for daily pre-shift equipment checks and for verifying that any problems are corrected. Although equipment may be inspected by various people, the supervisor must be responsible for ensuring that inspections are performed daily, that necessary repairs are made, that scheduled maintenance is performed, and that records of all inspections and repairs are maintained.
- Ensure that workers are paid for the time they spend performing equipment safety checks.
- When repairs are made on site, require that the operator’s controls are made inoperable so that the equipment cannot be moved by another worker while repairs are being made.
- Require equipment operators to set parking brakes when leaving equipment unattended.
  When equipment is parked on an incline, chock wheels in addition to setting parking brakes. Chocks should be of sufficient size and configuration to immobilize the equipment.
- Require employees to report equipment problems to the designated competent...
person and give employees the authority to shut down unsafe equipment without repercussion.

- Develop pictorial checklists to make equipment inspections easier.
- Keep operator manuals in the equipment cab.
- Ensure ready access to repair manuals by maintenance personnel at all work locations.
- Contact the equipment manufacturer to obtain operator and repair manuals when purchasing used equipment.
- For night work, install light strips on trucks to better delineate vehicles and equipment. Drivers must turn off this additional lighting before leaving the work area.
- Use equipment with rollover protective structures (ROPS). Purchase and have installed retrofit ROPS and seat belts for older equipment.

**Train equipment operators in safe work practices to prevent rollovers:**

- Maintain proper tire pressure.
- Know material density and surface stability.
- Use spotters with two-way radio communication.
- Train operators to use seat belts and to remain belted in the event of a rollover.
- Use edge guards on trailers to prevent rollovers.
- Use spotters during loading and unloading of equipment from transport trailers.
- Install full-width loading ramps on transport trailers.

**Safe Equipment Operation Around Workers on Foot**

The company designated traffic control supervisor will:

- Separate workers on foot from equipment as much as possible:
- Schedule work tasks to keep workers on foot out of areas where heavy equipment is in use.
- Channelize dump trucks leaving the work space and keep workers on foot out of that channel. Use flexible, colored poles (as used for snowplow markers) or temporary pavement marking inside the work space to mark pedestrian-free areas or flow-of-traffic lines. These delineators will be installed so that the public will not notice or respond to them, but the workers will recognize them as guideposts.
- Train subcontractors, crews, operators, and truck drivers to understand any symbols, markers, and colors used to separate workers on foot from equipment within the work space.
- Design the work space to eliminate or decrease backing and blind spots; when feasible, pull trucks in and let the operation catch up to them.
- Train workers on foot and equipment operators in appropriate communication methods (e.g., using hand signals and maintaining visual contact) to be used when workers on foot are required to be in the same area as equipment.
- Train equipment operators never to move equipment without making positive visual contact with any workers on foot near the equipment.
Training Guidelines
The company designated traffic control supervisor will:

- Implement performance-based training that evaluates trainees’ core and specialized knowledge and demonstrated ability to perform the tasks for which they were trained.
- Since all workers, including equipment operators and supervisors, are likely to be on foot around operating vehicles and equipment, train all workers to recognize and avoid the hazards of working on foot around equipment.
- Train all workers in hazards and adaptations for work at night and in other low-visibility conditions.
- Hold regularly scheduled Tailgate/Toolbox meetings at the jobsite to discuss and report hazards and close-calls, and to discuss safety considerations for performing the day’s tasks.
- Train workers on the specifics of the ITCP for each new construction project. Review ITCP with workers whenever it is modified.

Glossary of Terms

Activity Area - The portion of "the highway where the work takes place. It is comprised of the work space, the traffic space, and the buffer space."

Advance Warning Area - The area in advance of the work zone where drivers are informed of what to expect. "The advance warning may vary from a single sign or rotating/strobe lights on a vehicle to a series of signs in advance of the temporary traffic control zone activity area."

Certification - A process which assesses an individual's knowledge and skills to determine if the individual meets a minimum standard of qualification.

Channelizing Devices - "The function of channelizing devices is to warn road users of conditions created by work activities in or near the roadway and to guide road users. They are also used to separate motor vehicle traffic from the work space, pavement drop-offs, pedestrian or bicycle paths, or opposing directions of motor vehicle traffic. Channelizing devices include cones, tubular markers, vertical panels, drums, barricades, and temporary raised islands."

Chock - A wedge or block for blocking the movement of a wheel.

Competent Person - "One who is capable of identifying existing and predictable hazards in the surroundings or working environments which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them" (29 CFR 1926 Subpart C).
Consensus Standard - "Any occupational safety and health standard, or modification thereof, which has been adopted and promulgated by a nationally recognized standards-producing organization under procedures whereby it can be determined by the Secretary [of Labor] that persons interested and affected by the scope or provisions of the standard have reached substantial agreement on its adoption [and] was formulated in a manner which afforded opportunity for diverse views to be considered." (OSH Act, Sec-3).

Foot-candle - One lumen per square foot.

High Conspicuity Tape - Retroreflective marking material, usually white or an alternating red- white pattern that is applied to the rear and sides of vehicles to create visual contrast and clearly delineate vehicle size.

High-visibility Vest or Apparel - "Personal protective safety clothing intended to provide conspicuity during both daytime and nighttime usage" [ANSI/ISEA 1999].

Internal Traffic Control Plan - A traffic control plan developed to control the flow of construction workers, vehicles, and equipment within the work space.

Internal Traffic Control Plan Coordinator - A person designated by the contractor as a competent person who has the ability to recognize hazards associated with the movement of construction vehicles, equipment, and personnel within the work space and has the authority to modify conditions to eliminate those hazards.

Lateral Buffer Space - A "lateral buffer space may be used to separate the traffic space from the work space. . . [or a hazardous area], such as excavations or pavement drop-offs. A lateral buffer space also may be used between two travel lanes, especially [those carrying traffic in opposite directions]. The width of the lateral buffer space should be determined by engineering judgment."

Light Balloon - A self-inflating elliptical lighting fixture designed to produce uniform non-glare illumination.

Milling - Process in which a rotating drum, equipped with special working tools, cuts the pavement to a predetermined depth and reduces the cuttings to a minimum size in the process. Also called cold planning.

Pedestrian - A person traveling on foot, who may be a construction worker or a member of the public.

Pre-construction Meeting - A meeting between the owner’s representatives and representatives for the contractor(s) to discuss their respective safety requirements and implementation of health and safety provisions pertinent to the work under contract.

Pre-qualification - A process by which only selected contractors that meet predetermined performance criteria are entitled to bid on a construction project. The contractor’s safety performance is often one of the qualifying criteria.
Project Supervisor - Manages the activities at the construction site, schedules work crews and materials, and is responsible for keeping project on schedule and on budget.

Retroreflective Material - Retroreflective material reflects light back towards the source. For example, retroreflective material reflects vehicle headlights so that signs, safety clothing, and other safety devices appear more visible to drivers at night.

Senior Project Supervisor - The senior project supervisor has final authority and responsibility for safety and health on the project, ensuring correction or abatement of hazards, monitoring for potentially hazardous conditions, determining that competent persons are designated by contractors, notifying responsible contractor of conditions that may cause injury or illness, and maintaining project safety and health records.

Site-specific Hazard - "Review of plans and specifications to identify and assess the location and nature of potential hazards."

Skilled Construction Trades - A grouping of occupations that includes the traditional building trades, such as carpenters, painters, electricians, and cement finishers.

Taper - "Tapers may be used in both the transition and termination areas... Tapers are created using a series of channelizing devices and/or pavement markings to move traffic out of or into the normal path."

Temporary Pavement Markings - Markings used until "the earliest date when it is practical and possible to install pavement markings that meet [the full MUTCD standards] for pavement markings." Normally, it should not be necessary to leave temporary markings in place for more than 2 weeks.

Temporary Traffic Control Plan - "A temporary traffic control plan (TCP) describes temporary traffic control measures to be used for facilitating road users through a work zone... [The plan] may range in scope from being very detailed, to simply referencing typical drawings contained in [the MUTCD], standard approved highway drawings and manuals, or specific drawings contained in contract documents."

Termination Area - "The termination area is used to return road users to their normal path. The termination area extends from the downstream end of the work area to the END ROADWORK signs, if posted."

Tailgate Toolbox Meetings - Tailgate Toolbox Meetings are typically short (10 to 30 minutes), and are held on a regular basis (weekly, or daily) to discuss safety rules, procedures, hazards, corrective actions, mishaps, and injury and illness prevention.

Traffic Control Device - "A traffic control device is a sign, signal, marking or other device placed on, over, or adjacent to a street or highway, pedestrian facility, or bike way (by authority of a public agency having jurisdiction) to regulate, warn, or guide traffic."
Traffic Control Supervisor - A person designated by the contractor to assume overall responsibility for the safety of the work zone setup and conformance of the temporary traffic control devices with the TCP.

Traffic Space - The traffic space is the portion of the highway in which road users are routed through the activity area.

Transition area - "The transition area is that section of highway where road users are redirected out of their normal path" [FHWA 2000 (MUTCD: Section 6C.05)].

Truck-mounted Attenuator (TMA) - A safety appliance mounted on the rear of a truck that dissipates the energy of a rear-end collision.

Worker On Foot - A worker on foot is any worker, regardless of task assignment, who is on the ground (standing, walking, or sitting) rather than inside a vehicle or piece of equipment.

Work Space - "The work space is that portion of the highway closed to road users and set aside for workers, equipment, material, and a shadow vehicle if one is used upstream. Work spaces are usually delineated for road users by channelizing devices, or to exclude vehicles and pedestrians, by temporary barriers. The work space may be stationary or move as the work progresses."

Work Zone - The roadwork area between the first warning sign and the last traffic control device, as well as non-roadway areas (e.g., shoulders and drainages), and ancillary areas that serve as staging areas, or support areas for the work zone (e.g., temporary batch plants). This definition is broader than the work zone described in the MUTCD, which does not include ancillary areas that serve as staging areas, or support areas (e.g., temporary batch plants) for the work zone.
29 CFR – §1926 – Subpart O Motor Vehicles and Mechanized Equipment
§1926.600
Equipment

(a) General requirements.

(1) All equipment left unattended at night, adjacent to a highway in normal use, or adjacent to construction areas where work is in progress, shall have appropriate lights or reflectors, or barricades equipped with appropriate lights or reflectors, to identify the location of the equipment.

(2) A safety tire rack, cage, or equivalent protection shall be provided and used when inflating, mounting, or dismounting tires installed on split rims, or rims equipped with locking rings or similar devices.

(3) (i) Heavy machinery, equipment, or parts thereof, which are suspended or held aloft by use of slings, hoists, or jacks shall be substantially blocked or cribbed to prevent falling or shifting before employees are permitted to work under or between them. Bulldozer and scraper blades, end-loader buckets, dump bodies, and similar equipment, shall be either fully lowered or blocked when being repaired or when not in use. All controls shall be in a neutral position, with the motors stopped and brakes set, unless work being performed requires otherwise.

(ii) Whenever the equipment is parked, the parking brake shall be set. Equipment parked on inclines shall have the wheels chocked and the parking brake set.

(4) The use, care and charging of all batteries shall conform to the requirements of Subpart K of this part.

(5) All cab glass shall be safety glass, or equivalent, that introduces no visible distortion affecting the safe operation of any machine covered by this subpart.

(6) All equipment covered by this subpart shall comply with the requirements of 1926.550(a)(15) when working or being moved in the vicinity of power lines or energized transmitters.
(7) Rolling railroad cars. Derail and/or bumper blocks shall be provided on spur railroad tracks where a rolling car could contact other cars being worked, enter a building, work or traffic area.

§1926.601 Motor Vehicles

(a) Coverage. Motor vehicles as covered by this part are those vehicles that operate within an off-highway jobsite, not open to public traffic. The requirements of this section do not apply to equipment for which rules are prescribed in 1926.602.

(b) General requirements.

(1) All vehicles shall have a service brake system, an emergency brake system, and a parking brake system. These systems may use common components, and shall be maintained in operable condition.

(2) (i) Whenever visibility conditions warrant additional light, all vehicles, or combinations of vehicles, in use shall be equipped with at least two headlights and two taillights in operable condition.

(ii) All vehicles, or combination of vehicles, shall have brake lights in operable condition regardless of light conditions.

(3) All vehicles shall be equipped with an adequate audible warning device at the operator's station and in an operable condition.

(4) No employer shall use any motor vehicle equipment having an obstructed view to the rear unless:

   (i) The vehicle has a reverse signal alarm audible above the surrounding noise level or:

   (ii) The vehicle is backed up only when an observer signals that it is safe to do so.

(5) All vehicles with cabs shall be equipped with windshields and powered wipers. Cracked and broken glass shall be replaced. Vehicles operating in areas or under conditions that cause fogging or frosting of the windshields shall be equipped with operable defogging or defrosting devices.

(6) All haulage vehicles, whose pay load is loaded by means of cranes, power shovels, loaders, or similar equipment, shall have a cab shield and/or canopy adequate to protect the operator from shifting or falling materials.

(7) Tools and material shall be secured to prevent movement when transported in the same compartment with employees.

(8) Vehicles used to transport employees shall have seats firmly secured and
adequate for the number of employees to be carried.

(9) Seat belts and anchorages meeting the requirements of 49 CFR Part 571 (Department of Transportation, Federal Motor Vehicle Safety Standards) shall be installed in all motor vehicles.

(10) Trucks with dump bodies shall be equipped with positive means of support, permanently attached, and capable of being locked in position to prevent accidental lowering of the body while maintenance or inspection work is being done.

(11) Operating levers controlling hoisting or dumping devices on haulage bodies shall be equipped with a latch or other device which will prevent accidental starting or tripping of the mechanism.

(12) Trip handles for tailgates of dump trucks shall be so arranged that, in dumping, the operator will be in the clear.

(13) (i) All rubber-tired motor vehicle equipment manufactured on or after May 1, 1972, shall be equipped with fenders. All rubber-tired motor vehicle equipment manufactured before May 1, 1972, shall be equipped with fenders not later than May 1, 1973.

(ii) Mud flaps may be used in lieu of fenders whenever motor vehicle equipment is not designed for fenders.

(14) All vehicles in use shall be checked at the beginning of each shift to assure that the following parts, equipment, and accessories are in safe operating condition and free of apparent damage that could cause failure while in use: service brakes, including trailer brake connections; parking system (hand brake); emergency stopping system (brakes); tires; horn; steering mechanism; coupling devices; seat belts; operating controls; and safety devices. All defects shall be corrected before the vehicle is placed in service. These requirements also apply to equipment such as lights, reflectors, windshield wipers, defrosters, fire extinguishers, etc., where such equipment is necessary.

§1926.602 Material Handling Equipment

(a) Earthmoving equipment; General.

(1) These rules apply to the following types of earthmoving equipment: scrapers, loaders, crawler or wheel tractors, bulldozers, off-highway trucks, graders, agricultural and industrial tractors, and similar equipment. The promulgation of specific rules for compactors and rubber-tired "skid-steer" equipment is reserved pending consideration of standards currently being developed.
(2) Seat belts.

(i) Seat belts shall be provided on all equipment covered by this section and shall meet the requirements of the Society of Automotive Engineers, J386-1969, Seat Belts for Construction Equipment. Seat belts for agricultural and light industrial tractors shall meet the seat belt requirements of Society of Automotive Engineers J333a-1970, Operator Protection for Agricultural and Light Industrial Tractors.

(ii) Seat belts need not be provided for equipment which is designed only for standup operation.

(iii) Seat belts need not be provided for equipment which does not have roll-over protective structure (ROPS) or adequate canopy protection.

(3) Access roadways and grades.

(i) No employer shall move or cause to be moved construction equipment or vehicles upon any access roadway or grade unless the access roadway or grade is constructed and maintained to accommodate safely the movement of the equipment and vehicles involved.

(ii) Every emergency access ramp and berm used by an employer shall be constructed to restrain and control runaway vehicles.

(4) Brakes. All earthmoving equipment mentioned in this 1926.602(a) shall have a service braking system capable of stopping and holding the equipment fully loaded, as specified in Society of Automotive Engineers SAE-J237, Loader Dozer-1971, J236, Graders-1971, and J319b, Scrapers-1971. Brake systems for self-propelled rubber-tired off-highway equipment manufactured after January 1, 1972 shall meet the applicable minimum performance criteria set forth in the following Society of Automotive Engineers Recommended Practices:


Trucks and Wagons......................... SAE J166-1971.


(5) Fenders. Pneumatic-tired earth-moving haulage equipment (trucks, scrapers, tractors, and trailing units) whose maximum speed exceeds 15 miles per hour, shall be equipped with fenders on all wheels to meet the requirements of Society of Automotive Engineers SAE J321a-1970, Fenders for Pneumatic-Tired Earthmoving Haulage Equipment. An employer may, of course, at any time seek to show under 1926.2, that the uncovered wheels present no hazard to personnel from flying materials.
(6) Rollover protective structures (ROPS). See Subpart W of this part for requirements for rollover protective structures and overhead protection.

(7) Rollover protective structures for off-highway trucks. The promulgation of standards for rollover protective structures for off-highway trucks is reserved pending further study and development.

(8) Specific effective dates-brakes and fenders.

(i) Equipment mentioned in paragraph (a)(4) and (5) of this section, and manufactured after 01/01/72, which is used by any employer after that date, shall comply with the applicable rules prescribed therein concerning brakes and fenders. Equipment mentioned in paragraphs (a) (4) and (5) of this section, and manufactured before 01/01/72 which is used by any employer after that date, shall meet the applicable rules prescribed herein not later than 06/30/73.

It should be noted that, as permitted under 1926.2, employers may request variations from the applicable brakes and fender standards required by this subpart. Employers wishing to seek variations from the applicable brakes and fenders rules may submit any requests for variations after the publication of this document in the Federal Register. Any statements intending to meet the requirements of 1926.2(b)(4), should specify how the variation would protect the safety of the employees by providing for any compensating restrictions on the operation of equipment.

(ii) Notwithstanding the provisions of paragraphs (a)(5) and (a)(8)(i) of this section, the requirement that fenders be installed on pneumatic-tired earthmoving haulage equipment, is suspended pending reconsideration of the requirement.

(9) Audible alarms.

(i) All bidirectional machines, such as rollers, compacters, front-end loaders, bulldozers, and similar equipment, shall be equipped with a horn, distinguishable from the surrounding noise level, which shall be operated as needed when the machine is moving in either direction. The horn shall be maintained in an operative condition.

(ii) No employer shall permit earthmoving or compacting equipment which has an obstructed view to the rear to be used in reverse gear unless the equipment has in operation a reverse signal alarm distinguishable from the surrounding noise level or an employee signals that it is safe to do so.

(10) Scissor points. Scissor points on all front-end loaders, which constitute a hazard to the operator during normal operation, shall be guarded.

(b) Excavating and other equipment.
HIGHWAY & ROADWORK SAFETY PROGRAM

(1) Tractors covered in paragraph (a) of this section shall have seat belts as required for the operators when seated in the normal seating arrangement for tractor operation, even though back-hoes, breakers, or other similar attachments are used on these machines for excavating or other work.

(2) For the purposes of this subpart and of Subpart N of this part, the nomenclatures and descriptions for measurement of dimensions of machinery and attachments shall be as described in Society of Automotive Engineers 1970 Handbook, pages 1088 through 1103.

(3) The safety requirements, ratios, or limitations applicable to machines or attachment usage covered in Power Crane and Shovel Associations Standards No. 1 and No. 2 of 1968, and No. 3 of 1969, shall be complied with, and shall apply to cranes, machines, and attachments under this part.

(c) Lifting and hauling equipment (other than equipment covered under Subpart N of this part).

(1) Industrial trucks shall meet the requirements of 1926.600 and the following:

(i) Lift trucks, stackers, etc., shall have the rated capacity clearly posted on the vehicle so as to be clearly visible to the operator. When auxiliary removable counterweights are provided by the manufacturer, corresponding alternate rated capacities also shall be clearly shown on the vehicle. These ratings shall not be exceeded.

(ii) No modifications or additions which affect the capacity or safe operation of the equipment shall be made without the manufacturer's written approval. If such modifications or changes are made, the capacity, operation, and maintenance instruction plates, tags, or decals shall be changed accordingly. In no case shall the original safety factor of the equipment be reduced.

(iii) If a load is lifted by two or more trucks working in unison, the proportion of the total load carried by any one truck shall not exceed its capacity.

(iv) Steering or spinner knobs shall not be attached to the steering wheel unless the steering mechanism is of a type that prevents road reactions from causing the steering handwheel to spin. The steering knob shall be mounted within the periphery of the wheel.

(v) All high lift rider industrial trucks shall be equipped with overhead guards which meet the configuration and structural requirements as defined in paragraph 421 of American National Standards Institute B56.1-1969, Safety Standards for Powered Industrial Trucks.

(vi) All industrial trucks in use shall meet the applicable requirements of design, construction, stability, inspection, testing, maintenance, and operation, as defined in American National Standards Institute B56.1-1969, Safety Standards for Powered Industrial Trucks.
(vii) Unauthorized personnel shall not be permitted to ride on powered industrial trucks. A safe place to ride shall be provided where riding of trucks is authorized.

(viii) Whenever a truck is equipped with vertical only, or vertical and horizontal controls elevatable with the lifting carriage or forks for lifting personnel, the following additional precautions shall be taken for the protection of personnel being elevated.

[A] Use of a safety platform firmly secured to the lifting carriage and/or forks.

[B] Means shall be provided whereby personnel on the platform can shut off power to the truck.

[C] Such protection from falling objects as indicated necessary by the operating conditions shall be provided.

(d) Powered industrial truck operator training.

Note: The requirements applicable to construction work under this paragraph are identical to those set forth at §1910.178(l) of this chapter.

§1926.604 Site Clearing

(a) General requirements.

(1) Employees engaged in site clearing shall be protected from hazards of irritant and toxic plants and suitably instructed in the first aid treatment available.

(2) All equipment used in site clearing operations shall be equipped with rollover guards meeting the requirements of this subpart. In addition, rider-operated equipment shall be equipped with an overhead and rear canopy guard meeting the following requirements:

(i) The overhead covering on this canopy structure shall be of not less than 1/8-inch steel plate or 1/4-inch woven wire mesh with openings no greater than 1 inch, or equivalent.

(ii) The opening in the rear of the canopy structure shall be covered with not less than 1/4-inch woven wire mesh with openings no greater than 1 inch.
Basic Safety Training for Highway & Roadwork

Highway & Roadwork Hazards

Highway and street construction presents a complex work situation in which workers face multiple injury risks under conditions that may change without warning. Highway workers routinely work in proximity to construction vehicles and motor vehicle traffic. Flaggers and other workers on foot are exposed to the risk of being struck by traffic vehicles or construction equipment if they are not visible to motorists or equipment operators. Workers who operate construction vehicles or equipment risk injury due to overturn, collision, or being caught in running equipment. Highway workers, regardless of their assigned task, work in conditions of low lighting, low visibility, inclement weather, and may work in congested areas with exposure to high traffic volume and speeds.

Highway workers are at risk of injury from:

- The motoring public traveling through work zones.
- Construction equipment operating inside the work zone and in ancillary areas that support the work zone (e.g., temporary batch plants).
- Construction vehicles operating inside work zones, as well as construction vehicles entering and leaving the work zone.

Compliance with safe work practices is a necessary first step in providing a safe work environment. The following work-zone conditions must be considered:

- Safety of all workers on foot around traffic vehicles.
- Safe operation of construction vehicles and equipment in highway work zones.
- Planning for safe operations within work zones.
- Special safety issues associated with night work in highway construction.

Building roads and highways can be dangerous. Each year:

- More than 100 highway construction workers are killed.
- About 12,000 highway construction workers get hurt or sick.

Highway & Roadwork does not have to be dangerous if our employees:

- Are made aware of the hazards.
- Are given ways to avoid the hazards.
- Raise safety concerns with their supervisors.
Do safety programs and policies help? Workers must follow Company safety policies. Workers should:

- Follow all safety rules and practices.
- Avoid horseplay and reckless behavior.
- Ask for instructions if you do not understand.
- Join in safety discussions, ask questions, and share knowledge/experience.

As an employer, we are responsible for ensuring that our employees understand this safety information. Working together, we can make sure everyone goes home safe and healthy.

**Runovers/Backovers**

Can road workers be safe near equipment and traffic? Being struck is the biggest danger in roadwork. Workers on foot must:

- Remain alert at all times.
- Check surroundings often, listen for warnings.
- Keep a safe distance from traffic.
- Stay behind protective barriers where possible.
- Look out for each other, warn coworkers.

What other precautions are needed? As your employer, it is our responsibility to provide proper Personal Protective Equipment (PPE) and it is our employees’ responsibility to wear it when required.

Workers must wear the following PPE when required:

- Respiratory, eye, face, and hearing protection.
- Head, hand, and foot protection.
- Proper class of safety vest at all times in the work zone.
- High-visibility clothing and headgear. Bright-colored hard hats are more visible.
  While on Roadwork sites, treat equipment and vehicles with caution.

When working around equipment and vehicle operations:

- Stay out of "blind spots."
- Communicate with operators by radio signals and/or eye contact.
- Do not approach until you communicate with and are acknowledged by the operator.
- Stay outside a "safety circle" around equipment.
- Stay clear of vehicles and know the traffic control plan.
- Use spotters when you must work with your back to equipment or traffic.
How can workers be safe when placing Traffic Control Devices (TCDs)? Simple precautions make placement of TCDs safer.

Workers should:

- Wear a Class III vest to be easily seen.
- Place, relocate, or remove TCDs when traffic flow is light.
- When possible, work from platform on vehicle.
- Use seat, seatbelt, fall restraint, or guardrail and a handhold when guardrail must be removed.
- Stay in constant communication with driver.
- Use shadow vehicle to warn drivers.

Equipment Operator Safety

How can equipment operators stay safe? Unload and operate equipment only if qualified.

Safe equipment operation includes:

- Before starting equipment, do a walk around inspection.
- Test back up alarm, other safety devices.
- Locate and test all controls.
- Know equipment blind spots and swing radius.
- Use equipment seatbelts.

Entering and exiting equipment:

- Use 3 points of contact to prevent falls
- Look for other moving equipment or vehicles.
- Wipe up all grease and fluids on equipment walking/working surfaces. One of the primary safety measures is to stay alert and be aware of the hazards.

General equipment maintenance/repair:

- Report all repair needs to your supervisor.
- Always lock out and tag out equipment that cannot be safely operated.

General equipment safety:

- Use personal protective equipment (PPE) supplied/required by your employer.
- Never use cell phones, AM/FM radios, or CD players while operating equipment.
- Safely secure equipment before using employer-provided hand-held cell phones or walkie-talkies.
- Secure unattended equipment.
- Lockout, tagout before maintenance, set parking brake, chock wheels, block dump truck bed.
To help maintain safety in the Work Zone, the operator has special responsibilities. Know the job:

- Know the work zone and your position in it.
- Know the internal traffic control plan.
- Use designated equipment routes and areas.
- Identify rollover hazards such as unleveled areas, embankments, or unstable soil.
- If you must move cones or barricades, return them to the original positions as soon as possible.

One of the best ways to protect other workers is to keep them in mind. On the worksite:

- Know the locations of other workers around you at all times.
- Set up a means of communication with workers around you such as flaggers or grade checkers.
- Never allow other workers to ride on equipment.
- Where possible, provide barriers between workers and equipment.
- Avoid excessive speeds and dangers caused by hills, obstacles, and curves.

**Struck or Crushed**

Tools and materials are two major hazards that cause road workers to be struck.

To avoid being struck by tools:

- Use point of operation guarding on portable hand tools.
- Use a chain saw safety program.
- Always use the appropriate PPE.

To avoid being struck or crushed by materials:

- Keep workers out of lifting areas and from beneath loads.
- Use safe methods for rigging, hoisting, and setting:
  - Steel plates
  - Manhole frames
  - Jersey barriers
  - Manhole covers
- Use PPE - hard hats, footwear, eye protection.

There are many ways how road workers can be struck. Trees and equipment maintenance are hazards.

To avoid being struck by trees:

- Restrict access during felling, trimming, and loading.
- Use protective structures on equipment.
- Use safe hoisting and rigging for logs and limbs.
To avoid being struck by equipment parts:

- Use Lockout/Tagout procedures for hazardous energy control during maintenance, repair, cleaning, and inspection.

**Flagger Safety**

One of the main hazards of flagging is that motorists kill about 20 flaggers each year.

Flagging can be dangerous due to:

- High speed traffic.
- Angry or aggressive drivers.
- After seeing the flagger, a motorist going 60 mph needs almost 400 feet to stop.

Flaggers can protect themselves by being visible and wearing protective equipment.

Wear high visibility clothing:

- Orange, yellow, or green vest.
- Reflective vest at night.

Wear other high visibility protective equipment:

- Long-sleeved shirt and pants.
- Hard hat.
- Appropriate clothes for expected weather (rain gear, warm coat)

Other ways flaggers can protect themselves is to stay alert and out of harm's way. Keep your guard up:

- Stand alone on shoulder in clear view, not in open traffic lane.
- Plan an escape route for emergencies.
- Stay in communication with other flaggers.
- Stay alert and keep focused on work.
- Make sure that hand signals do not conflict with traffic signals.
- Treat motorists with respect and courtesy, do not pick fights or respond to anger. Notify law enforcement when motorists do not obey flaggers.
Flaggers must avoid dangerous behavior. When working as a flagger, DO NOT:

- Stand where you can be crushed.
- Stand in the shade, over the crest of a hill, or around a sharp curve.
- Leave your position until properly relieved.
- Stand near equipment.
- Stand in a group.
- Make unneeded conversation.
- Read or daydream on duty.
- Listen to music or use ear phones.
- Turn your back to the traffic.

Night Work

Special challenges of night operations are how darkness changes the work environment.

Some changes darkness has on the worksite:

- Poor visibility for motorists.
- Poor visibility for workers.
- Communication between shifts.
- Impaired or drowsy drivers.

Physical and social disruptions night work has on workers:

- Sleep disruption.
- Risk of injury from drowsiness.
- Impaired family or social relationships.

In order to protect workers doing night work, use SPECIAL PRECAUTIONS at the site. Use these methods to increase worker visibility:

- Retro-reflective clothing.
- Flashing lights on body/clothing.
- Retro-reflective tape on equipment.
- Good work area lighting.

Be aware of the work surroundings:

- Vehicle and equipment paths.
- Assigned work areas.
- Safe paths to/from work locations.
- On foot, watch out for equipment.
- On equipment, watch out for workers.
Provide clear signage:
- Position signs for best visibility.
- Use changing message/arrow signs.
- Space drums and cones closer together.
- Use proper lighting. Contrast work lights from warning lights.

Inspect traffic control setup:
- Test-drive the current operation area to highlight problems.
- Make frequent inspections.

Night work is not normal; workers must compensate by adjusting their health habits.
While on the worksite:
- Eat protein-rich meals, avoid sugars and fats
- Drink water, avoid caffeine

While off shift, at home:
- Make sure getting plenty of sleep is a priority.
- Follow a pre-sleep routine.
- Have a light snack before going to bed.
- Use methods to keep out the daylight.
- When possible, eat family meals together.
- Plan family social activities during the daytime.

Excavations

A trench is an excavation deeper than it is wide. Trenches are dangerous.

Some ways trenches can kill:
- Workers can be buried alive
- Cave-ins can result from stresses in walls, nearby moving vehicles and equipment, or spoil piles.
- Water can collect in the bottom of the trench.
- Flammable or toxic gases can build up and create hazardous atmospheres.
- Gas from nearby sewer or gas lines can seep into trench.

Before digging operations are commenced:
- Ensure that underground utilities are properly located and marked.
- Call electrical, gas, and communications utilities.
- Use extreme caution with digging equipment.
An excavation with formwork fifteen feet or less from a sidewall is also a trench. Trenches deeper than four feet are considered to be confined spaces. Unless dug in stable rock, trenches five feet or deeper require support.

Cave-in prevention requires:

- Sloping: Soil angled to increase stability.
- Benching: Steps in trench wall.
- Shoring: Support system made of posts, wales, struts, and sheeting or hydraulic shoring.
- Shielding: Protective frame or box to protect workers after a cave-in.
- Keep spoil piles at least two feet away from trench edge.

Trenching and excavation operations require that a designated “Competent Person” be on the jobsite.

The Competent Person must inspect trenches:

- At least daily and at the beginning of each shift.
- After precipitation, a thaw, and other events that could increase hazard.
- For disturbed ground, water, toxics, and other hazards.
- If walls sag or crack or the bottom bulges.
- To keep spoil piles and equipment at least two feet from the trench edge.
- If there are nearby sources of vibration such as railroads or pile driving.
- That no worker is more than 25 feet from an exit.

The designated Competent Person should immediately work if a hazard exists.

**Electrical Hazards**

Electricity is potentially and contact can cause explosion, fire, or electrocution.

When electrical utilities are encountered on the worksite:

- Equipment contacting electrical lines can cause fire, explosion, or electrocution.
- Electricity can arc from the line to the equipment.
- Electricity can cause severe burns and death.

Work around electricity only:

- When you are trained in all aspects of the job.
- When you have a reason to be there.
Use extreme caution and keep your distance when working in the proximity of above ground utilities.

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<tr>
<th>Minimum Safe Distances</th>
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<tr>
<td><strong>Power Lines</strong></td>
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<tr>
<td>50 kV or below</td>
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More in fog or rain

When working around power lines:

- Get the utility company to mark, flag, and shield lines.
- Assume it is live until tested. Have it de-energized and visibly grounded.
- If it must remain energized, keep equipment and load at least 10 feet away and use a spotter to warn the operator.
- Post signs at ground level to mark safe distance.
- All workers and drivers who enter the area must be aware of the overhead lines.

Tips for vehicle or equipment operators working around overhead lines:

- Mark a safe route for repeated travel.
- Slow down.

If contact occurs, do not touch equipment or the person making contact. If you are on the ground, stay away from the vehicle! Until lines are de-energized, the operator may be safest in machine.

- Do not touch any equipment or person in contact with the line.
- Get the lines de-energized.

If you are in the vehicle:

- Stay in the vehicle and do not touch any metal.
- If you must get out, jump clear, then shuffle slowly away.

Accidental contact with buried utilities can cause explosion, fire, and electrocution. Before digging:

- Call electrical, gas, and communications utilities.
- Carefully review marked out areas as they may not be exact. Hand-dig after getting within two feet of mark-out.

When digging, look for:
• Signs of previous digging:
  o Changes in soil types
  o Asphalt patches or depressions
  o Concrete, plastic, or gravel
• If a line is hit, it must be immediately reported.
• If it is a gas line, evacuate and secure area, then call the fire department.

**Strains and Sprains**

The most common injuries can happen once or can accumulate.

Common strain and sprain injuries in Roadwork include:
• Hand and wrist problems.
• Back injuries.
• Strains, sprains, and overexertion.

Forty-three percent of lost workday injuries in roadway construction are caused by sprains and strains. These injuries usually occur while doing the most difficult parts of your job.

These injuries may be caused by:
• Working in awkward postures, such as raking asphalt.
• Handling heavy materials, like in concrete formwork.
• Using vibrating tools, like a pavement breaker.
• Repetitive work, like rebar tying and operating a joystick.
• Whole body vibration for equipment operators.

Strains and sprains may be avoided by figuring ways of doing the job differently. Work can be made easier:

• Minimize manual materials handling with dollies, hoists, and other equipment.
• Better job planning (deliver materials where they are to be used).
• Storage of materials for easy access.
• Use tools that are comfortable and easy to handle.

Use of PPE and taking timely breaks can help:
• Wear PPE like kneepads and shoulder pads.
• Take breaks when possible and rotate between difficult and easier tasks. Implement at least some of these measures to help prevent common injuries.
To prevent injuries:
- Plan and maintain a clear, level walking path.
- Do not lift too much by yourself. Find some help.
- Use proper lifting technique; lift with your legs and not your back.
- Avoid working in awkward postures.
- Do stretching exercises before work.
- Maintain good physical condition in order to do the work that may be required.

**Fall Hazards**

Most of the falls in roadwork are slips or trips on the same level.

Falls on walking and working surfaces:
- Tripping over materials or debris.
- Falling on hills or embankments.
- Stepping in holes or walking on irregular ground.
- Stumbling while carrying loads that block vision.
- Slips or trips in muddy, wet, or icy conditions.

Falls from heights or elevations include:
- Falls from equipment.
- Falls from bridges.
- Falls from formwork.
- Falls into excavations

There are many methods to prevent falls on the same level. Some remedies include:
- If possible, avoid walking on muddy, wet, or icy surfaces.
- Use footwear with ankle support and soles that grip.
- Do not carry heavy loads, use hauling equipment.
- Practice good housekeeping.
- Fill in or mark hidden holes in ground.
- Clear walking/working surfaces of tripping hazards.
- Include walking routes in site safety plan.
- Maintain good physical strength and conditioning.
There are many methods to avoid falls from heights or elevations. Some remedies include:

- Use a 100% fall protection program.
- Plan work for personal fall arrest anchor points or guardrail.
- Erect guardrails around large excavations.
- Seatbelts or restraints for riding in cars, trucks, and personnel carriers.
- Use modular erection to avoid work at heights on forms. Use 3-point contact when climbing.

**Noise Hazards**

Too much noise is a serious problem that may cause hearing loss. The inability to hear well could cause someone to lose his or her life.

On the job:

- Noise can be distracting and you may not hear warnings.
- Noise damages the nerves in the inner ear which cannot be repaired.

After 15 to 20 years in the trade:

- You may suffer permanent hearing loss.
- You may suffer constant ringing (tinnitus).

If you suffer hearing loss:

- You cannot hear well, especially when there is background noise.
- It can affect your family and personal life.

There are many noise sources that are common in road work. Some of the most common sources are:

- Heavy equipment.
- Pile driving.
- Compressors.
- Pavement breakers.
- Traffic.

Effort should be made to make the jobsite less noisy. Noise levels can be reduced by:

- Buying or renting quieter equipment.
- Keeping equipment well maintained.
- Move noisy equipment away.
- Erect sound barriers around equipment.
When the work zone gets too noisy, you should wear hearing protection when possible. If you must shout to talk with someone 3 feet away, you need protection from noise.

- Use hearing protectors provided by the Company.
- Notify your supervisor if proper hearing protection is not available.
- Make sure hearing protection fits and is comfortable.
- Follow instructions for proper hearing protection use.
- Get a hearing test about once a year to ensure your hearing protection works.

Health Hazards
Toxic substances can harm workers by entering the body by 3 routes.

The effects of toxic substances may be:
- Short-term or acute: Effects such as eye irritation or dizziness.
- Delayed or chronic: Effects such as cancer or chronic lung disease. Silica is common but can be very harmful.

Silica dust hazards include:
- May be found in many construction dusts such as concrete and rock.
- High exposure tasks include sand blasting, rock drilling, and concrete cutting.
- Long-term exposure leads to lung disease (silicosis).
- Long-term exposure increases the risk of cancer.

To prevent silica exposure:
- Reduce airborne dust through ventilation and wetting.
- Use NIOSH-approved toxic dust respirators. Asphalt fumes and skin contact can be harmful.

Asphalt hazards include:
- Fumes may cause eye and respiratory irritation.
- Hot asphalt can severely burn skin.
To prevent exposure:
- Work upwind whenever possible.
- Maintain a lower temperature to minimize fumes.
- Use ventilation on paving machines.
- Wear gloves and long sleeves to prevent skin contact.

Wet concrete is harmful because it can cause dermatitis and skin burns. Dermatitis can be:
- Irritation from caustic chemicals in concrete.
- Allergic reactions.

Prevent dermatitis and burns by:
- Wear long-sleeved gloves.
- Keep concrete out of your boots.
- Wash out or change gloves or boots when contaminated inside.
- Wash hands in clean water with pH-neutral soap.
- Protect cuts with bandages.
- Wear eye protection.

Lead is harmful and may damage nervous and reproductive systems. Lead hazards include:
- Toxic metal found in paints on bridge renovation.
- Dust & fumes can be inhaled or ingested when sandblasting, welding, or cutting.
- Dust can be carried home and poison your family.

To prevent lead poisoning:
- Remove paint before cutting or welding.
- Use long-handled torches for cutting.
- Use local exhaust ventilation.
- Wear the proper respirator.
- Wash face and hands before eating, smoking, or drinking.
- When possible, shower and change clothes before leaving work.
- Get your blood lead tested periodically to assure you are not overexposed. Most other health hazards can be avoided with basic precautions and protections.

Other health hazards include:
- Common substances such as solvents and Carbon Monoxide.
- Special products such as sealants and paints.
Avoiding health hazards means:

- Reviewing the product Material Safety Data Sheets.
- Limiting exposure as much as possible.
- Staying upwind of hazardous exposures.
- Making sure that hazard controls such as fans are working.
- Wearing protective equipment such as respirators and skin coverings.
- Promptly reporting any health complaints to your supervisor.

**Working Outdoors**

Skin cancer is the most serious sun exposure risk.

You are at greater risk if you:

- Have lighter skin with freckles and moles.
- Work at higher elevations.
- Work around reflective material, like water or concrete.

You can protect yourself with:

- Pants and long-sleeved shirts in neutral colors.
- Broad-brimmed hat and neck flap.
- Safety glasses with tinted polarizing lenses.
- SPF 15-25 sun block 30 minutes before work, then every 2 to 3 hours.
- Check skin for early signs of cancer; see a dermatologist for check-ups. These tips will prevent sunburn, too.

Be alert for skin cancer warning signs and see a doctor if you have questions.

What to look for:

- **ASYMMETRY:** Most early melanomas are asymmetrical. A line through the middle would not create matching halves.
- **BORDER:** Borders of early melanomas are often uneven and may have scalloped or notched edges.
- **COLOR:** Varied shades of brown, tan, or black are often the first sign of melanoma. Red, white, and blue may appear later.
- **DIAMETER:** Early melanomas tend to grow larger than common moles - at least the size of a pencil eraser.

Hot weather is hazardous and can lead to heat stress, heat exhaustion, or heat stroke. Heat illnesses can be caused by a combination of:

- Heat exposure.
- High humidity.
- Non-breathing synthetic clothing.
- Not drinking enough fluids to replace sweat.
• Hard work, body heat, and not being "acclimatized."

Heat stress:
• Can lead to heat rash, cramps, exhaustion, and stroke.
• May be more likely if you are overweight and not fit.
• Alcohol increases risk.

Heat exhaustion is a potentially dangerous illness.

Heat exhaustion symptoms include:
• Extreme weakness or fatigue.
• Dizziness and confusion.
• Nausea.
• Moist, clammy skin.
• Pale or flushed complexion.
• Slightly elevated body temperature

Heat exhaustion treatment:
• Rest in a cool, shaded place.
• Drink plenty of water.

Heat stroke can cause hallucinations and if not treated, possibly even death. Heat stroke symptoms and treatment:

• Hot, dry skin, no sweating, chills, high body temperature, mental confusion, and slurred speech.
• Call 911, place victim in a shady area, wet down clothes, fan body, & apply ice.

Protect yourself from HEAT!
• Wear light-colored clothing.
• Gradually build up to heavy work.
• Schedule heavy work during coolest parts of the day.
• Take more breaks in extreme heat and humidity.
• Drink plenty of water, at least several quarts during the workday.

Cold weather is hazardous and cold stress can lead to hypothermia and frostbite. Cold stress is caused by a combination of:

• Cold/cool temperatures (50° F and less).
• Wet weather and/or conditions.
• High winds (40+ MPH).
• Inadequate clothing

Cold stress is prevented by:
• Warm layers of correct clothing, head cover, warm gloves, and wool socks.
- Keeping dry.
- Taking breaks in warm areas and drinking hot liquids.
- Keep in good physical condition.

Hypothermia and frostbite have these many symptoms. Hypothermia symptoms include:

- **EARLY**: Shivering, fatigue, loss of coordination, confusion, and disorientation.
- **LATE**: No shivering, blue skin, dilated pupils, slowed pulse and breathing, loss of consciousness, and coma.

Frostbite symptoms include:

- Body reduces blood flow to hands and feet to maintain core temperature.
- Fingers or toes can freeze.
- Symptoms include numbness, tingling, aching, and bluish skin.
- Can cause the tissue to die and require amputation.

Plants and animals can be hazardous and can cause rashes, illness, and even death. Outdoor work may expose you to:

- Bites from animals (dogs, snakes) and from insects and arachnids (bees, wasps, ticks, and spiders).
- Plants such as poison ivy, poison oak, and hogweed.

To prevent these problems:

- Avoid contact with any animals.
- Learn to recognize and avoid poisonous plants.
- Wear long-sleeved shirts and pants, use insect repellents.
- Check for tick bites each day for Lyme disease (red bull’s-eye).
- Get prompt medical/first aid treatment for any problems.

**Emergencies**

There are many different possible emergencies on a road work site.

The most common emergencies include:

- A worker is killed or seriously injured.
- Contact with gas line or electrical line.
- Trench collapse.
- Traffic entering the work zone.
- Toxic chemical spill.
The employer must have a plan for what to do in the event of an emergency. Emergency steps for our Company include:

- Call 911 and get medical help as soon as possible.
- Contact on-site first aid/CPR trained person.
- Shut down equipment and evacuate the area if potential toxic exposures or chance of explosions become apparent.
- On-site emergency coordinator contacts nearest fire department or EMS.
- On-site emergency coordinator contacts utility company if applicable.

To be prepared for emergencies, our employees must know the Company plan. After an emergency, if you have been affected by a tragedy or near miss, ask for counseling.

Emergency planning includes:

- Warning system and signal to alert workers for evacuation.
- Everyone must know where emergency phone numbers are posted for hospital, fire fighters, utilities, etc.
- Everyone must know who the emergency coordinator is and who on the site is trained in first aid/CPR.
- Everyone must be trained in the emergency plan and participate in regular drills.

**Safe Driving**

Many workers die while driving to and from work or between sites.

Safe driving tips include:

- Check vehicle to make sure all safety devices (brakes, turn signals, headlights, tail lights, horn) are operable and effective.
- Adjust mirrors to give yourself optimal view.
- Always use seat belt.
- Avoid distractions - do not eat, drink, or talk on cell phone - pull over or ask passenger to make calls.
- NEVER drive if you are drowsy or have been drinking. Some prescriptions and over-the-counter drugs also affect driving.
- Do not speed; go at or below posted limit - slower in bad conditions.

Unless you drive safely, driving to or from work may be more dangerous than the job.

More safe driving tips:

- Buy vehicles with front and side air bags and ABS brake system.
- Drive with headlights on - even in daytime.
- Drive defensively.
- Avoid aggressive driving (e.g., quick lane changes and tailgating).
- Map out a route ahead of time if you are unfamiliar with where you are headed.
• Never let anyone ride in the bed of your pick-up truck.

Road workers should remember that they face special driving hazards. Construction vehicle operators should:

• Keep cab clean to prevent slippery pedals and debris under brake pedal.
• Keep all window glass clean and in good repair to prevent distortion.
• Make sure all cargo is secured to prevent it from striking the cab.
• Be careful when changing lanes, change only when necessary.
• Keep a safe distance from vehicles in front of you.
• Back up as little as possible.
• Be especially cautious at rail-road crossings.

After a night shift:

• Drink coffee or caffeinated beverages only if you need it to help get you home.
Highway & Roadwork Basic Safety Training

Employee Acknowledgement

By my signature below, I acknowledge that I have received instruction and have read this company Highway and Roadwork Safety Program. I have been given the opportunity to ask questions and have received answers, instruction, and clarification to my questions. I understand the contents of and agree to follow this company’s policy with regard to the Highway and Roadwork Safety Program.

Highway and Roadwork Safety Program received on

__________________________
Printed Name of Employee

__________________________
Signature of Employee

__________________________
Social Security Number

__________________________
Printed Name of Trainer

__________________________
Signature of Trainer
Certification

Employee Training for Highway &
Roadwork

This Company certifies that the following employee has been trained in the understanding, knowledge, and skills necessary for the safe performance of duties assigned in areas of Highway and Roadwork hazards.

________________________________________ has demonstrated proficiency in the following areas of Highway and Roadwork safe work practices.

Recognizing and voiding risk of injury to Highway & Roadworkers from

- The motoring public traveling through work zones.
- Construction equipment operating inside the work zone and in ancillary areas that support the work zone (e.g., temporary batch plants).
- Construction vehicles operating inside work zones, as well as construction vehicles entering and leaving the work zone.

Above-named employee agrees to comply with OSHA and MUTCD regulations and understands these are necessary steps in providing a safe work environment. The following work-zone conditions were considered during safety training:

- Safety of all workers on foot around traffic vehicles.
- Safe operation of construction vehicles and equipment in highway work zones.
- Planning for safe operations within work zones.
- Special safety issues associated with night work in highway construction.
- The correct procedures for the handling and storage of equipment and materials and the erection of overhead protection.
- The role of employees in the fall protection work plan.

Employee Trained by ____________________________ Date of Training ____________

Signature of Trainer ____________________________ Date ____________

Employee Signature ____________________________ Date ____________