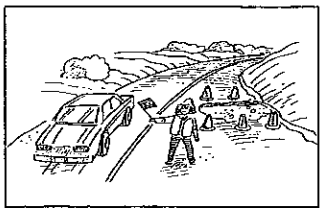


Heavy Construction—Flagging Safety

Overview Of Topic

A flagger is a person who provides temporary traffic control when permanent traffic controls (signs, signals, and barricades) do not provide the necessary protection for operations on highways or streets. Because flaggers are responsible for public safety and make more public contacts than any other highway worker, they should meet the following minimum qualifications:

- Sense of responsibility for safety of public and workers,
- Adequately trained in safe traffic control practices,
- Average or higher intelligence,
- Good physical condition, including sight and hearing,
- Mental alertness and ability to react in an emergency,
- Courteous but a firm manner, and
- Neat appearance.

29 CFR 1926.201 requires that flaggers conform to the signaling methods found in ANSI D6.1-1971:

Device	Signal	Method
Sign paddle	To stop traffic	The flagger shall face traffic and extend the STOP sign paddle in a stationary position with the arm extended horizontally away from the body. The free arm is raised with the palm of the hand toward approaching traffic.
	To direct stopped traffic to proceed	The flagger shall face traffic with the SLOW paddle held in a stationary position with the arm extended horizontally away from the body. The flagger motions with the free hand for traffic to proceed.
	To alert or slow traffic	The flagger shall face traffic with the SLOW sign paddle held in a stationary position with the arm extended horizontally away from the body.
Flag	To stop traffic	The flagger shall face traffic and extend the flag staff horizontally across the traffic lane in a stationary position so the full area of the flag is visible hanging below the staff. The free arm is raised with the palm of the hand toward approaching traffic.
	To direct stopped traffic to proceed	The flagger shall stand parallel to the traffic movement and with flag and arm lowered from view of the driver, motion with the free hand for traffic to proceed. Flags shall not be used to signal traffic to proceed.
	To alert or slow traffic	The flagger shall face traffic and slowly wave the flag in a sweeping motion of the extended arm from shoulder level to straight down without raising the arm above a horizontal position.

Note: The source of the text in the table is the 1993 revision of ANSI D6.1.

Flaggers must use red flags (at least 18 inches square) or sign paddles, and in periods of darkness, red lights. In addition to signals, §1926.201 calls for flaggers to be provided with and to wear red or orange warning clothing while flagging. Warning clothes worn at night must be of reflectorized material.

Employee Training

§1926.200-.202 do not contain training requirements. However, §1926.21 requires employers to instruct each employee in the recognition and avoidance of unsafe conditions and the regulations applicable to his/her work environment to control or eliminate any hazards or other exposure to illness or injury. This may include training flaggers in hand-signaling, warning clothing and other life-saving equipment, the flagger's role and location, traffic patterns, heavy equipment operations, communication methods and alarms, signs, channelizing devices (i.e, cones and barricades), working next to traffic and equipment, escape routes, hazards (i.e., vehicles, equipment, carbon monoxide, asphalt fumes, extreme heat/cold, rain and fog, darkness), and being as visible as possible.

Training Tips

Dress as a flagger. You may want to add white trousers or coveralls, a reflectorized hard hat, clothing for weather conditions, yellow rain gear, special equipment (i.e., radio, hard hat mounted mirror, and motion detectors), and/or the sign paddle, flag, and/or light normally used by your flaggers. Demonstrate the hand signals and the proper use of sign paddles, flags, and lights. Have trainees practice. Obtain a copy of ANSI D6.1-1971 Part VI to train employees on proper flagging. Remind them of the danger of vehicles approaching from behind and the need for a spotter, a motion detector, alarm, or hard hat mounted mirror. Demonstrate these devices. Use the jobsite as a training ground, if possible.

Where To Go For More Information

29 CFR 1926, Subpart G—Signs, signals, & barricades.

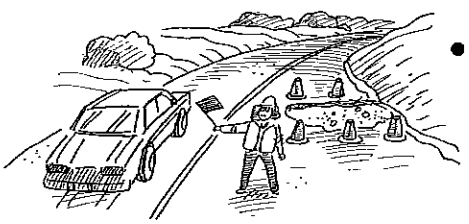
Part VI of either the 1988 Edition of the Federal Highway Administration (FHWA) Manual on Uniform Traffic Control Devices (MUTCD), with 1993 revisions (Revision 3) or the Millennium Edition of the FHWA MUTCD (Millennium Edition).

KELLER'S CONSTRUCTION TOOLBOX TALKS

Heavy Construction—Flagging

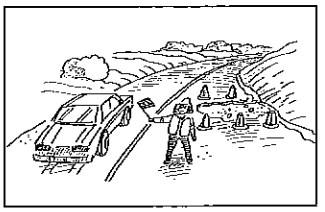
When signs, signals, and barricades do not provide enough protection for operations on highway or street construction, then flaggers or other traffic controls must be provided. Because flagging exposes the flagger to traffic—the number one cause of death for highway construction sites—the use of flaggers is avoided. Using the proper flagging signaling and warning garments, and work practices, however, makes the job of flagging safer:

- Use proper sign paddles or red flags (at least 18 inches square) when hand signaling in daylight. Most sign paddles have a red STOP sign on one side and an orange SLOW sign on the other. Current standards suggest that flags only be used in emergency situations. Use red lights when hand signaling at night.
- Use signals that conform to the *Manual On Uniform Traffic Control Devices For Streets & Highways*. Here are the signaling methods for sign paddles:
    - **To stop traffic**—Face traffic and hold the STOP sign paddle toward traffic with your arm extended horizontally away from the body. Raise your free arm with your palm toward approaching traffic.
    - **To direct stopped traffic to proceed**—Face traffic and hold the SLOW paddle toward traffic with your arm extended horizontally away from the body. Motion with your free hand for traffic to proceed.
    - **To alert or slow traffic**—Face traffic holding the SLOW paddle toward traffic with your arm extended horizontally away from the body. You may motion up and down with your free hand, palm down, indicating that the vehicle needs to slow down.



- Wear a red or orange vest, shirt, or jacket.
- Wear a reflectorized vest, shirt, or jacket and a reflectorized hard hat at night. It's also good to wear white pants.
- Coordinate with other flaggers and communicate by "walkie-talkie" if you have no visual contact.
- Know how to combat both heat and cold exposure, dress appropriately, and know where shelter is available.
- Be alert to symptoms associated with carbon monoxide from vehicular traffic (nausea and headache). If symptoms develop, get to fresh air.
- Use barricades, cones, tubular markers, vertical panels, drums, and barriers to mark areas.
- Be aware of construction equipment around you. In order to know what is approaching from behind, you may need to wear a hard hat mounted mirror, have a buddy "spot" you, or use some kind of motion detector. Equipment operators, too, should know where you are. Heavy equipment can crush and kill in a matter of seconds!

Flagging can be a safe job if you remain alert to everything around you at all times.



Heavy Construction—Flagging Safety Sign-Off Sheet

This sign-off sheet documents the employees at this company, _____, who have taken part in a training session on Heavy Construction—Flagging Safety. The session covered:

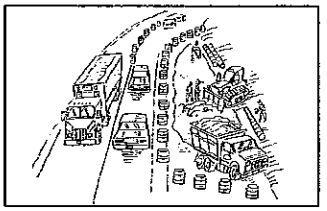
- When flaggers are required.
- Recogition and avoidance of unsafe conditions (i.e., vehicles, equipment, carbon monoxide, asphalt fumes, extreme heat/cold, rain and fog, darkness).
- OSHA rules for flaggers under §1926.201(a).
- Controlling or eliminating any hazards or other exposure (i.e., vehicles, equipment, carbon monoxide, asphalt fumes, extreme heat/cold, rain and fog, darkness).
- Hand-signaling.
- Warning clothing and other life-saving equipment.
- The flagger's role and location.
- Traffic patterns and heavy equipment operations.
- Communication methods and alarms.
- Signs and channelizing devices (i.e, cones and barricades).
- Working next to traffic and equipment, escape routes, and being as visible as possible.

The space below is for employees to "sign-off" that they were in attendance.

Date of Training: _____ **Job Location:** _____

Employee Signature	**Print Name Here**
_____	_____
_____	_____
_____	_____
_____	_____

_____
Supervisor's Signature



Heavy Construction—Highway Construction

Overview Of Topic

Highway construction has many hazards:

- Being struck by motorists
- Being struck by heavy or rotating equipment
- Heavy equipment rollover
- Heavy lifting
- Falling hazards (i.e., bridge sites)
- Overhead power lines
- Underground electrical lines
- Ungrounded electrical equipment
- Poorly maintained tools and jacks
- Unguarded moving parts
- Excavation cave ins
- Vibrating tools
- Carbon monoxide from vehicle exhaust
- Asphalt fumes
- Extreme heat/cold
- Rain and fog
- Darkness at night

OSHA rules for heavy equipment, falls, power lines, electrical equipment, tools, excavations, carbon monoxide, and asphalt fumes are covered throughout 29 CFR 1926. OSHA rules for highway construction sites (also called work zones) can be found in §1926.200-.203. Unfortunately, OSHA does not provide much in the way of protecting workers from hazards of work zone traffic. However, while the Department of Transportation (DOT) has the intention of protecting motorists and pedestrians, it also provides some protection for road workers under: 23 CFR 630 Subpart J and 23 CFR 655 Subpart F. Both OSHA and DOT refer to a national standard for traffic control on all public roads, including work zones. This standard, called the *Manual on Uniform Traffic Control Devices* (MUTCD), calls for:

- Traffic control plan
- Signs and signals
- Channelizing devices (cones, drums, barricades, etc.)
- Flaggers
- High-visibility clothing
- Training
- Other protective measures (barriers, lower speeds, shadow vehicles, vehicle arresting systems, rumble strips, road closure, law enforcement, lighting, and intrusion warning devices)

Employee Training

§§1926.200-.203 do not contain training requirements; however, §1926.21 requires employers to instruct each employee in the recogition and avoidance of unsafe conditions and the regulations applicable to his/her work environment to control or eliminate any hazards or other exposure to illness or injury.

The MUTCD states that work zone employers should consider training to assure worker safety. This training should cover less vulnerable ways to work next to traffic. Those who are responsible for traffic control should learn various traffic control methods and how to use and place traffic control devices.

In addition, NIOSH suggests these training topics: recognizing and eliminating or avoiding equipment hazards; night hazards and protective measures; how to operate equipment/vehicles and prevent rollovers; communication methods and alarms; elements separating workers on foot from equipment; and traffic patterns, work zone layout, and channelizing device placement.

Training Tips

Use the worksite as a training ground. Dress as a worker with high-visibility garments and/or special equipment (i.e., radio, hard hat mounted mirror, and motion detectors). Explain that motorists and vehicle operators may not see workers on foot, so proper attire is important. Show slides of a site during the day, at night, in the rain, and in the fog. Have trainees sit in a vehicle to see an operator's view and its major blind spots.

Make sure all equipment/vehicle operators have a valid driver's license and are trained and authorized to operate their particular piece of equipment. Show them rollover protective structures. You may wish to go over vehicle inspections, chocking, and parking. Encourage trainees to report equipment problems.

Where To Go For More Information

29 CFR 1926, Subpart G—Signs, signals, & barricades.

Part VI of either the 1988 Edition of the Federal Highway Administration (FHWA) Manual on Uniform Traffic Control Devices (MUTCD), with 1993 revisions (Revision 3) or the Millennium Edition of the FHWA MUTCD (Millennium Edition).

National Institute for Occupational Safety and Health (NIOSH)—*Building Safer Highway Work Zones: Measures to Prevent Worker Injuries from Vehicles and Equipment* (Draft).

Various topics covered separately in this manual.

KELLER'S CONSTRUCTION TOOLBOX TALKS

Highway Construction Safety

Highway construction means working side by side with 3,000 pounds of metal speeding along two to three feet from you eight hours a day! Consequently, 86 workers died in 1999 from highway, street, bridge, and tunnel construction according to the Bureau of Labor Statistics.

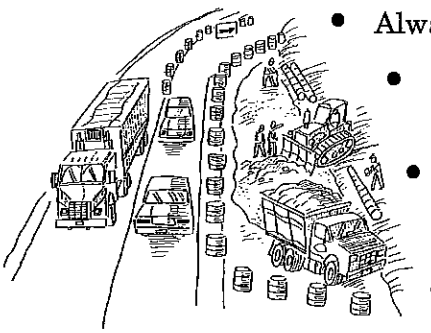
What are the hazards?

Traffic is not the only concern. Almost as many workers are killed by heavy equipment. Also, a number of fatalities occur when heavy equipment rolls over. Remaining hazards involve heavy lifting, falling hazards (i.e., bridge sites), overhead power lines, underground electrical lines, ungrounded electrical equipment, poorly maintained tools and jacks, unguarded moving parts, excavation cave-ins, vibrating tools, carbon monoxide from vehicle exhaust, asphalt fumes, extreme heat/cold, rain and fog, and darkness at night.

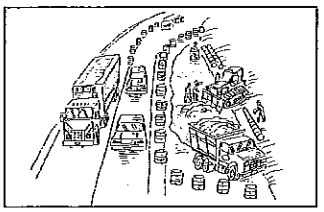
How can you protect yourself?

While there are many hazards, there are also many ways to protect yourself:

- Wear highly visible clothing and a light-colored hard hat. During the day, you must wear a vest, shirt, or jacket that is orange, yellow, yellow-green, or fluorescent version of these colors. At night, the vest, shirt, or jacket must be retroreflective.
- Work where drivers can see you, but as far as possible from traffic. Drivers may not be able to see you when the sun is low in the sky or when it is rainy, foggy, or dark.
- Get in and out of traffic spaces and heavy equipment areas quickly and safely.
- Stay alert and don't wear a radio headset.
- Do not operate equipment or a vehicle unless you are trained and authorized.



- Always wear your seat belt when operating equipment or vehicles.
- Make visual contact with workers on foot near you, before moving equipment.
- Make sure equipment is inspected and corrected daily.
- Use equipment with rollover protective structures.
- Chock two wheels when leaving equipment.
- If you must park your vehicle near traffic, park where drivers can see you (don't park around blind corners).
- If working on pile driving, know the special hazards of this work.
- If working on trenching and/or shoring associated with a work zone, be sure all excavations are being properly shored and be aware of cave-in hazards.
- If working on a bridge over another roadway or over water, use appropriate fall protection.



Heavy Construction—Highway Construction Sign-Off Sheet

This sign-off sheet documents the employees at this company, _____, who have taken part in a training session on Heavy Construction—Highway Construction. The session covered:

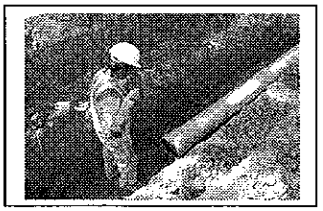
- Recogition and avoidance of unsafe conditions (i.e., vehicles, equipment, carbon monoxide, asphalt fumes, extreme heat/cold, rain and fog, darkness).
- OSHA rules for workers under §§1926.200-.203.
- Controlling or eliminating any hazards or other exposure (i.e., vehicles, equipment, carbon monoxide, asphalt fumes, extreme heat/cold, rain and fog, darkness).
- Traffic patterns, work zone layout, escape routes, traffic control methods, and how to use and place traffic control devices, if the trainee is responsible for controlling traffic.
- Elements separating workers on foot from equipment.
- Less vulnerable ways to work next to traffic.
- Night hazards and protective measures, including retroreflective garments.
- Proper life-saving personal protective equipment and high-visibility garments.
- Communication methods and alarms.
- How to operate equipment/vehicles and prevent rollovers.

The space below is for employees to "sign-off" that they were in attendance.

Date of Training: _____ **Job Location:** _____

Employee Signature	**Print Name Here**
_____	_____
_____	_____
_____	_____
_____	_____

_____
Supervisor's Signature



Heavy Construction—Pipeline Construction

Overview Of Topic

The following pipeline construction Toolbox Talk is based on OSHA safety inspection findings at various pipeline installation sites of the same contractor. The contractor received willful and serious violations of the Occupational Safety and Health Act.

The citations were for inadequately guarded trenches, improper operation and maintenance of pipelaying cranes, and allowing unauthorized employees to ride on machinery.

The inspections were: (1) spot checks conducted under OSHA's special emphasis program for trenching and excavation, (2) complaints or calls from the general public alleging unsafe working conditions, and (3) a fatality inspection at one of the jobsites.

Cave-in-protection

The common hazard found at most of the worksites was the lack of adequate cave-in protection for employees working in trenches five feet or more in depth.

Twenty-five American workers died in trenching-related cave-ins in 1998.

OSHA standards require that effective collapse protection be in place and in use before employees enter a trench. The absence of such protection leaves workers exposed to being struck by and buried beneath tons of soil before they have a chance to react or escape.

Other trenching and shoring violations that were observed were:

- Water accumulating in a trench.
- An inadequately guarded trench.
- A trench lacked a ladder or other means of exit every 25 feet.
- Spoil piles were placed too close to the edge of excavations.

Unauthorized modifications to heavy equipment

A pipelaying crane boom that was pulling an equipment sled fell, struck, and killed an employee riding on the sled. OSHA cited the company for making unauthorized modifications to the pipelayer and allowing employees to ride the sled.

Other equipment problems that were cited were:

- A custom-made lifting device had not been load-tested or had its load lifting capacity marked on the device.
- Damaged crane slings were in use.
- A sling was not marked with its load rating.
- A forklift truck was not inspected for defects.

Employee Training

No specific training is mentioned in the excavation standard nor the OSHA rigging equipment requirements. However, §1926.21(b)(2) says employees must be trained to recognize and avoid unsafe conditions and the regulations applicable to his work environment to control or eliminate the hazards. The OSHA rules at §1926.20(b)(4) says that employers shall permit only those employees qualified by training or experience to operate equipment and machinery.

Training Tips

Since this Toolbox Talk can cover various topics and span more than one Toolbox Talk session, go to the Toolbox Talk covering the particular subject for a training tip.

Where To Go For More Information

29 CFR 1926, Subpart P—Excavations.

29 CFR 1926, Subpart O—Motor Vehicles, Mechanized Equipment, and Marine Operations.

29 CFR 1926.251—Rigging equipment for material handling.

OSHA's Special Emphasis Program for Trenching and Excavation (OSHA CPL 2.69)—See J. J. Keller products: 101-HA-9 (Construction OSHA Compliance Handbook); or 100KS (Compliance Information Manager).

Toolbox Talks on Excavations, Motor Vehicles, and Materials Handling Equipment.

KELLER'S CONSTRUCTION TOOLBOX TALKS

Heavy Construction—Pipeline Construction

If you work on a pipeline, you and your company must obey the OSHA safety and health regulations. OSHA recently visited a number of pipeline installation jobsites in a northern state. This Toolbox Talk discusses the results of those OSHA visits.

The contractor received willful and serious violations of the Occupational Safety and Health Act. The citations were for: (1) inadequately guarded trenches, (2) improper operation and maintenance of pipelaying cranes, and (3) allowing unauthorized employees to ride machinery.

All of these activities are prohibited by the OSHA regulations.

Cave-in-protection

The common hazard found at most of the worksites was the lack of adequate cave-in protection for employees working in trenches five feet or more in depth.

Twenty-five American workers died in trenching-related cave-ins in 1998.

OSHA standards require that effective collapse protection be in place and in use before you enter a trench. The absence of such protection leaves workers exposed to being struck by and buried beneath tons of soil before they have a chance to react or escape.

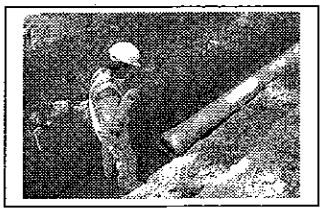
Other trenching and shoring violations that were observed were: (1) water accumulating in a trench, (2) a trench lacked a ladder or other means of exit every 25 feet, and (3) removed dirt piles were placed too close to the edge of excavations.

Unauthorized modifications to heavy equipment

The boom of a pipelaying crane that was pulling the equipment sled fell, struck, and killed an employee riding on the sled. OSHA cited the company for making un authorized modifications to the pipelayer and allowing employees to ride the sled.

Other equipment problems that were cited were: (1) a custom-made lifting device had not been load-tested or had its load lifting capacity marked on the device, (2) damaged crane slings were in use, and (3) a sling was not marked with its load rating.

Jobsites are complicated and busy. It takes alert supervisors and employees, ones that know the OSHA regulations, can spot hazards, and are willing to correct those hazards, to make jobsites safe.



Heavy Construction—Pipeline Construction Sign-Off Sheet

This sign-off sheet documents the names of employees who attended this training session on Heavy Construction—Pipeline Construction at _____ .
(company name)

The session covered:

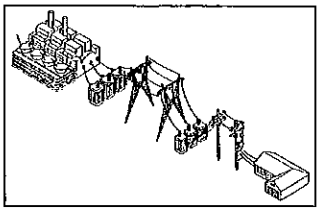
- Trenching and shoring safety.
- Equipment operation and modification.
- Slings and other rigging requirements.

The space below is for employees to "sign-off" that they were in attendance.

Date of Training: _____ **Job Location:** _____

Employee Signature	**Print Name Here**

_____
Supervisor's Signature



Heavy Construction—Power Transmission & Distribution System Construction—An Overview

Overview Of Topic

Power line workers who construct/repair power transmission and distribution systems face a wide range of serious and potentially fatal injuries, including electrocutions, falls from elevation, and injuries from falling objects. Major causes of non-fatal injuries include over-exertion, electrical shock injuries (burns), sprains and strains, cuts and lacerations, and contusions.

The Bureau of Labor Statistics' Census of Fatal Occupational Injuries identified 42 fatalities among electric power installers and repairers in 1993 (38 deaths per 100,000 workers).

Minimum requirements

The rules in Subpart V—Power transmission provide minimum requirements for worker safety and health. You may require adherence to additional rules and regulations that are not in conflict with the construction standards.

The general industry §1910.269—Electric power generation, transmission, and distribution standard protects employees from the hazards arising out of the operation or maintenance of electric power generation, transmission, and distribution installations. Although this standard does not apply to construction work, you are encouraged to refer to it for general information, since it provides comprehensive safe work practices.

OSHA has acknowledged that the construction industry standard is over twenty years old and inconsistent with the newer, more protective general industry standard. To improve worker protection, OSHA is designating power transmission and distribution in construction as a priority for rulemaking to revise the existing standard.

What is construction, what is not?

Trying to decide whether you are doing construction work or general industry maintenance on power transmission and distributions systems can sometimes be confusing. Do you use the §1910 general industry regulations or the §1926 construction regulations? Construction work means work for construction, alteration, and/or repair. Some examples of construction would be:

- Building new power lines and towers, generation plants, underground distribution facilities, power stations, and equipment.
- Alteration, conversion, and improvement of existing electric transmission and distribution lines and equipment.
- Refurbishing (replacement "in kind") equipment and space is maintenance and not construction.
- Repairing of specific limited portions of electrical systems to keep them in operation is not construction.

What is covered in the regulation

The regulations for building and improvement of electric transmission and distribution lines and equipment cover general requirements, tools and protective equipment, mechanical equipment, material handling, grounding for protection of employees, overhead and underground lines, and construction in energized substations.

Employee Training

A few specific requirements for training exist in Subpart V. You are required to provide training or require that employees are knowledgeable and proficient in: procedures involving emergency situations, and first aid fundamentals including resuscitation. You are also required to instruct and train employees in live-line hand techniques and safety requirements.

Other than that, you must adhere to OSHA's general training requirement for construction, i.e., you must instruct your employees in recognizing and avoiding unsafe conditions and the regulations that apply to their work environment to control or eliminate any hazards or other exposure to illness or injury.

Training Tips

As this Toolbox Talk is an introduction to power transmission work, you may want to go over your company safety rules and other rules that apply to their particular situations.

Where To Go For More Information

Construction regulatory text: §1926, Subpart V—Power transmission.

Construction regulatory text: §1910.269—Electric power generation, transmission, and distribution.

KELLER'S CONSTRUCTION TOOLBOX TALKS

Power Transmission & Distribution System Construction—An Overview

Power line workers who construct/repair power transmission and distribution systems face a wide range of serious and potentially fatal injuries, including electrocutions, falls from elevation, and injuries from falling objects.

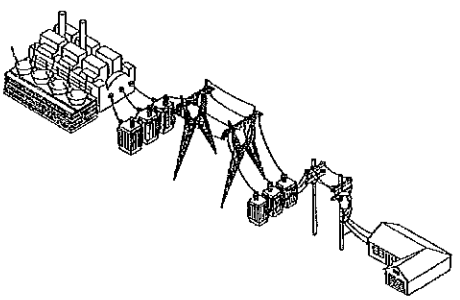
Major causes of non-fatal injuries include over-exertion, electrical shock injuries (burns), sprains and strains, cuts and lacerations, and contusions.

Minimum requirements

The rules in Subpart V—Power transmission provide minimum requirements for worker safety and health. Your company may require adherence to additional rules and regulations that are not in conflict with the construction standards.

What is construction, what is not?

Trying to decide whether you are doing construction work or general industry maintenance on power transmission and distributions systems can sometimes be confusing. Do you use the §1910 general industry regulations or the §1926 construction regulations? Construction work means work for construction, alteration, and/or repair. Some examples of construction would be:

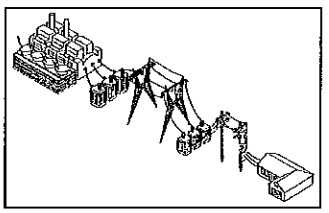


- Building new power lines and towers, generation plants, underground distribution facilities, power stations, and equipment.
- Alteration, conversion, and improvement of existing electric transmission and distribution lines and equipment
- Refurbishing (replacement "in kind") equipment and space is maintenance and not construction.
- Repairing of specific limited portions of electrical systems to keep them in operation is not construction.

What is covered in the regulation

The regulations for building and improvement of electric transmission and distribution lines and equipment cover:

- General requirements.
- Tools and protective equipment.
- Mechanical equipment.
- Material handling.
- Grounding for protection of employees.
- Overhead and underground lines.



Heavy Construction—Power Transmission & Distribution System Construction—An Overview—Sign-Off Sheet

This sign-off sheet documents the names of employees who attended this training session on Heavy Construction—Power Transmission & Distribution System Construction at _____.
(company name)

The session covered:

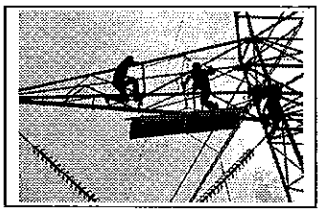
- Minimum requirements.
- What is construction, what is not?
- Training for fall protection users.

The space below is for employees to "sign-off" that they were in attendance.

Date of Training: _____ **Job Location:** _____

Employee Signature	**Print Name Here**

_____
Supervisor's Signature



Heavy Construction—Power Transmission & Distribution System Construction—General Requirements

Overview Of Topic

Before starting work on power transmission/distribution systems, your crews must determine existing conditions by inspection or test. Some conditions that may need to be determined are:

- Are the lines and/or equipment energized or deenergized?
- What is the condition of the poles?
- What is the location of circuits and equipment?
- What is the operating voltage of equipment and lines.

Electric equipment and lines MUST be considered energized until determined to be deenergized.

Line clearances

Employees must not approach or take any conductive object—without an approved insulating handle—closer to exposed energized parts than the distances in the **Alternating Current—Minimum Distances** table on the next page unless:

- They are insulated or guarded from the energized part, or
- Energized parts are insulated or guarded from the employees and any other conductive object at a different potential, or
- Employees are isolated, insulated, or guarded from any other conductive object(s) as during live-line bare-hand work.

In the table, the minimum clear hot stick distance is that for the use of live-line tools held by linemen when doing live-line work.

Conductor support tools, such as link sticks, strain carriers, and insulator cradles, may be used provided that the clear insulation is at least as long as the insulator string or the minimum distance specified in the table for the operating voltage.

Deenergizing lines and equipment

Editor's Note: The process of deenergizing lines and equipment is a part of the general "before work" preparations. But because of its length the subject has its own Toolbox Talk.

Alternating Current—Minimum Distances	
Voltage range (phase to phase) kilovolts	**Minimum working and clear hot stick distance**
2.1 to 15	2 ft. 0 in.
15.1 to 35	2 ft. 4 in.
35.1 to 46	2 ft. 6 in.
46.1 to 72.5	3 ft. 0 in.
72.6 to 121	3 ft. 4 in.
138 to 145	3 ft. 6 in.
161 to 169	3 ft. 8 in.
230 to 242	5 ft. 0 in.
345 to 362	7 ft. 0 in.*
500 to 552	11 ft. 0 in.*
700 to 765	15 ft. 0 in.*

*Note: From 345–362 kv., 500–552 kv., and 700–765 kv., the minimum working distance and the minimum clear hot stick distance may be reduced provided that such distances are not less than the shortest distance between the energized part and a grounded surface.

Night work

When working at night, emergency lighting must be provided as needed to perform the work safely.

Emergency procedures and first aid

You must provide training or require that your employees are knowledgeable and proficient in: (1) procedures involving emergency situations, and (2) first aid fundamentals including resuscitation, or you must comply with the provisions of §1926.50(c) regarding first aid requirements.

Employee Training

Except for first aid training requirements, there are no specific training requirements for this section of the OSHA rules. However, you must instruct your employees in recognizing and avoiding unsafe conditions and the regulations that apply to their work environment to control or eliminate any hazards or other exposure to illness or injury.

Training Tips

Go over your crews preparatory requirements/checklists to ensure they know the procedures.

Where To Go For More Information

Construction regulatory text: §1926.950—General requirements.

Construction regulatory text: §1910.269—Electric power generation, transmission, and distribution.

KELLER'S CONSTRUCTION TOOLBOX TALKS

Power Transmission & Distribution System Construction—General Requirements

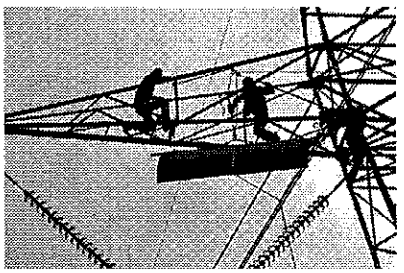
Before starting work on power transmission/distribution systems you must determine existing conditions by inspection or test. Some conditions that may need to be determined are:

- Are the lines and/or equipment energized or deenergized?
- What is the condition of the poles?
- What is the location of circuits and equipment?
- What is the operating voltage of equipment and lines.

Electric equipment and lines MUST be considered energized until determined to be deenergized.

Line clearances

You must not approach or take any conductive object—without an approved insulating handle—closer to exposed energized parts than the distances in the **Alternating Current—Minimum Distances** table in the OSHA regulations unless:



- You are insulated or guarded from the energized part. Gloves or gloves with sleeves rated for the voltage involved is considered insulation of the employee from the part, or
- Energized parts are insulated or guarded from you and any other conductive object at a different potential, or
- You are isolated, insulated, or guarded from any other conductive object(s), as during live-line bare-hand work.

In the table (provided by your instructor), the minimum clear hot stick distance is that for the use of live-line tools held by linemen when performing live-line work.

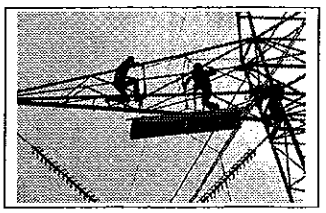
Conductor support tools, such as link sticks, strain carriers, and insulator cradles, may be used provided that the clear insulation is at least as long as the insulator string or the minimum distance specified in the table for the operating voltage.

Night work

When working at night, emergency lighting must be provided as needed to perform your work safely.

Emergency procedures and first aid

You must be provide training to ensure you are knowledgeable and proficient in: (1) procedures involving emergency situations, and (2) first aid fundamentals including resuscitation.



Heavy Construction—Power Transmission & Distribution System Construction—General Requirements—Sign-Off Sheet

This sign-off sheet documents the names of employees who attended this training session on Heavy Construction—Power Transmission & Distribution System Construction—General Requirements at _____.
(company name)

The session covered:

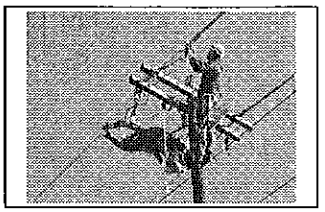
- Line clearances.
- Deenergizing lines and equipment.
- Night work.
- Emergency procedures and first aid.

The space below is for employees to "sign-off" that they were in attendance.

Date of Training: _____ **Job Location:** _____

Employee Signature	Print Name Here

_____
Supervisor's Signature



Heavy Construction—Power Transmission & Distribution System Construction—Deenergizing Lines & Equipment

Overview of Topic

Before starting work on power transmission/distribution systems your crews must determine existing conditions by inspection or test. One critical condition that must be determined is whether lines and equipment are energized or deenergized.

Deenergizing lines and equipment

When deenergizing lines and equipment operated in excess of 600 volts, and the means of disconnecting from electric energy is not visibly open or visibly locked out, the following rules apply:

- The particular section of line or equipment to be deenergized must be clearly identified, and it must be isolated from all sources of voltage.
- Notification and assurance from the designated employee* must be obtained that:
  - All switches/disconnectors through which electrical energy may be supplied to the particular section of line or equipment to be worked on have been deenergized.
  - All switches and disconnectors are plainly tagged indicating that employees are at work.
  - Where the design of the switches and disconnectors permits, they have been rendered inoperable.
- After all designated switches and disconnectors have been opened, rendered inoperable, and tagged, visual inspection of tests must be conducted to ensure that equipment or lines have been deenergized.
- Protective grounds must be applied on the disconnected lines or equipment to be worked on.
- Guards or barriers must be erected as necessary to adjacent energized lines.
- When more than one independent crew requires the same line or equipment to be deenergized, a prominent tag for each crew must be placed on the line or equipment by the designated employee in charge.

- When completed with work on deenergized lines or equipment, designated employees in charge must determine that all employees in their crew are clear, that protective grounds installed by their crew have been removed, and they report to the designated authority that all tags protecting their crew may be removed.

Editor's Note: When performing lockout/tagout procedures, you may want to enhance your program by reviewing procedures found in the general industry regulations at 1910.269(d)—Hazardous energy control (lockout/tagout) procedures.

When a crew working on a line or equipment can clearly see that the means of disconnecting from electric energy are visibly open or visibly locked-out, the following provisions will apply:

- Guards or barriers must be erected as necessary to adjacent lines.
- Upon completion of work on deenergized lines or equipment, each designated employee in charge must determine that all employees in their crew are clear, that protective grounds installed by their crew have been removed, and they must report to the designated authority that all tags protecting their crew may be removed.

* Your designated employee is you qualified person delegated to perform specific duties under the existing conditions.

Employee Training

There are no specific training requirements for this section of OSHA regulations. However, you must adhere to OSHA's general training requirement for construction, i.e., you must instruct your employees in recognizing and avoiding unsafe conditions and the regulations that apply to their work environment to control or eliminate any hazards or other exposure to illness or injury. This is especially critical in this line of work.

Training Tips

As this Toolbox Talk is an introduction to power transmission work, you may want to go over your company safety rules and other rules that apply to their particular situations.

Where To Go For More Information

Construction regulatory text: §1926, Subpart V—Power transmission.

Construction regulatory text: §1910.269—Electric power generation, transmission, and distribution.

KELLER'S CONSTRUCTION TOOLBOX TALKS

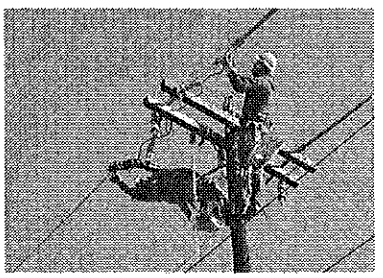
Power Transmission & Distribution System Construction– Deenergizing Lines & Equipment

Before starting work on power transmission/distribution systems, crews must determine existing conditions by inspection or test. One critical condition that must be determined is whether lines and equipment are energized or deenergized.

Deenergizing lines and equipment

When deenergizing lines/equipment operated in excess of 600 volts, and the means of disconnecting from electric energy is not visibly open or visibly locked out, the following rules apply:

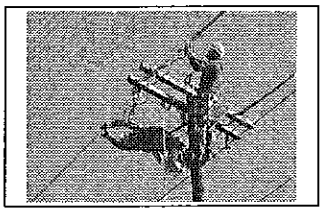
- The particular section of line or equipment to be deenergized must be clearly identified, and it must be isolated from all sources of voltage.
- Notification and assurance from a designated employee must be obtained that:
  - All switches/disconnectors through which electrical energy may be supplied to the particular section of line or equipment to be worked on have been deenergized.
  - All switches/disconnectors are plainly tagged indicating that employees are at work.
  - Where the design of the switches and disconnectors permits, they have been rendered inoperable.



- After all designated switches and disconnectors have been opened, rendered inoperable, and tagged, visual inspection or tests must be conducted to ensure that equipment or lines have been deenergized.
- Protective grounds must be applied on the disconnected lines/equipment to be worked on.
- Guards or barriers must be erected as necessary to adjacent energized lines.
- When more than one independent crew requires the same line or equipment to be deenergized, a prominent tag for each crew must be placed on the line or equipment by the designated employee in charge.
- When completed with work on deenergized lines or equipment, designated employees in charge must determine that all employees in their crew are clear, that protective grounds installed by their crew have been removed, and they report to the designated authority that all tags protecting their crew may be removed.

When a crew working on a line or equipment can clearly see that the means of disconnecting from electric energy are visibly open or visibly locked-out, the following provisions will apply:

- Guards or barriers must be erected as necessary to adjacent lines.
- Upon completion of work on deenergized lines or equipment, each designated employee in charge must determine that all employees in their crew are clear, that protective grounds installed by their crew have been removed, and they must report to the designated authority that all tags protecting their crew may be removed.



Heavy Construction—Power Transmission & Distribution System Construction—Deenergizing Lines & Equipment Sign-Off Sheet

This sign-off sheet documents the names of employees who attended this training session on Power Transmission & Distribution System Construction—Deenergizing Lines & Equipment

_____.

(company name)

The session covered:

- Deenergizing lines and equipment.

The space below is for employees to "sign-off" that they were in attendance.

Date of Training: _____ **Job Location:** _____

Employee Signature	**Print Name Here**

_____

Supervisor's Signature