



HSE Handbook

Health, Safety and Environmental Handbook

Revised January 1, 2024

Acknowledgment

I hereby acknowledge receipt of a copy of the HSE Handbook.

Furnished by:

Primoris T&D

This HSE Handbook has been issued to me as a guide in safe methods of my work.

I agree to study this HSE Handbook carefully, to adhere to the practices outlines, and to bring this handbook to all safety meetings.

This HSE handbook is the property of Primoris and its business units and will be returned in good condition should I leave the employment of the company. If not returned the cost of this manual will be deducted from my final paycheck. If lost during my employment with Primoris Business Unit, I will be charged for its replacement.

Signed By: _____

Date: _____

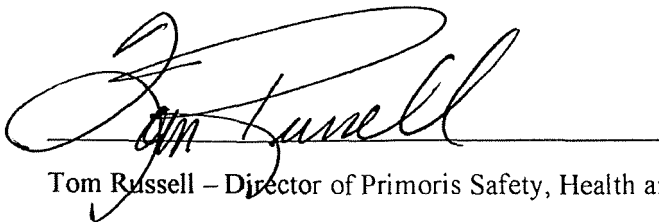
Foreword

This HSE Handbook is to be used by all employees of Primoris Business Unit which include: Primoris T&D Services – which will be referred to as Primoris from this point forward.

The safety and health of Primoris employees and the general public is fundamental to the operation of the Company. This objective can be reached by employing safe and health work practices in every job we do. No job is so important or rushed that safety and health can be compromised. Every employee is responsible for knowing and enforcing the safety rules in this handbook. Each employee is expected to follow these rules at all times.

The HSE handbook is a tool to be used for the prevention of accidents and incidents. Use it as you would any good tool. The rules herein have evolved into their present form through experience from actual accidents and the wisdom of workers. However, they are general rules and cannot possibly cover every situation that will be encountered. Good judgment by every employee in these situations is imperative. All employees shall adhere to the most restrictive regulation which includes state, federal, OSHA, our customers or Primoris rules in all work situations. If you are not certain about the safety and health practices for a particular job, consult your supervisor for specific instructions.

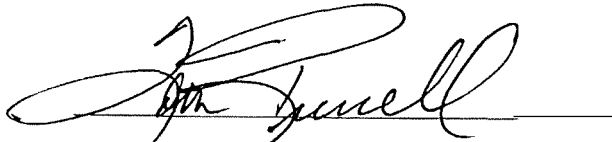
The combined commitment of all employees to safety awareness and the accident prevention program will provide an injury-free workplace of which we all can be proud.

A handwritten signature in black ink, appearing to read "Tom Russell", is written over a horizontal line.

Tom Russell – Director of Primoris Safety, Health and Environmental

Safety Policy

The safety and health of every employee are of prime importance to Primoris and their management. We are committed to the safety of all employees with emphasis on the prevention of accidents and injuries

A handwritten signature in black ink, appearing to read 'Tom Russell', is written over a horizontal line.

Tom Russell – Director of Primoris Safety, Health and Environmental

Supporting Principles

1. All injuries and occupational illnesses can be prevented.
2. Each lead-man, Foreman and Supervisor are responsible for administering the accident prevention program and will be evaluated accordingly.
3. Safety performance reviews must be a continuing process.
4. Training is an essential element for a safe working environment.
5. Injuries, unsafe practices and incidents with injury potential must be investigated.
6. The prevention of accidents, injuries and occupational illnesses is good business.

Safety Goals of Primoris

1. Zero incidents
2. Zero accidents
3. Zero outages
4. Zero injury

Primoris Safety Vision

At Primoris, we believe that great safety is not a cost but an investment with a high return across all the Primoris values and a key part of a high performance organization. We approach each and every safety incident with a mindset that it is preventable.

1. Safety is about leadership and leadership isn't about what's in your title; it's about what is in your character.
2. We will always strive to get better. When we fall short of our expectations, we'll find out why. When we succeed, we'll find how to reproduce that success elsewhere.
3. We will not compromise even in the face of great pressure on the time and discipline it takes to properly plan and execute our work in the safest way practical.
4. Stopping unsafe work isn't a right given to us by someone else. Stopping unsafe work is an obligation that we hold ourselves and each other to.
5. Production done in the absence of safety will not be valued or rewarded. Period.
6. Great safety isn't just about policies and procedures. Great safety is about openness, honesty, involvement, communication, and caring for one another.

Safety Statement:

"No phase of operation is of greater importance than safety. We commit to our people and our customers that safety in attitude and practice shall be on the job every day. Equipment, Training and leadership shall be provided to accomplish this commitment."

Introduction

Purpose:

The purpose of this handbook is to assist in the elimination or prevention of accidents and incidents.

Effectiveness:

- a. This manual shall be effective as of the date of issuance; compliance by every employee will be mandatory and is considered a requirement for employment.
- b. Existing governmental codes, statutes, rules and orders shall be considered a part of this handbook, and where any conflict exists between the two, the most restrictive regulation governs the situation in question.

Occupational Safety and Health Administration (OSHA) Requirements:

"Each employee shall comply with occupational safety and health standards and all rules, regulations and orders issued pursuant to this Act which are applicable to their own actions and conduct."

These employees who do not abide by the safety rules of this handbook shall be subject to disciplinary action, which may include dismissal.

The contents of this HSE handbook were developed from various sources, which include the Occupational Safety and Health Act of 1970 (OSHA).

Knowledge of Safety Rules:

Every employee shall become thoroughly familiar with the contents of this manual as they apply to their work activities.

Conditions Not Covered:

Although each employee is responsible for their own safety, in all instances where conditions are not covered by this handbook or the job is not completely understood, the employee shall obtain specific instructions from a supervisor before proceeding with work.

SA-SP- 14 Authority to Stop Work

Qualifications for Duty:

Any supervisor, having reasonable grounds to suspect that an employee under their jurisdiction is either mentally or physically unfit for the work assigned, shall prohibit such employee from working until satisfactory medical or other evidence indicating employee fitness is secured.

H-SP-19 Fit for Duty Standard

Performance of Duties:

Every employee shall use reasonable care in the performance of their duties and act in such a manner as to assure at all times maximum safety to themselves, their crew members and the public.

Gender Wording:

The male or masculine pronoun is used throughout the HSE handbook for convenience. The reference applies equally to males and females.

Disclaimer:

Any mention of trade names or commercial products does not constitute endorsement, or recommendation, for use by Primoris business units.

The final determination of the suitability of any information, procedure, or product for use contemplated by the user, and the manner of that use, is the sole responsibility of the user. This handbook is intended as an information source and should be used for direction only.

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Section 1 – General Work Rules

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101 – Handbook

Employees shall study the Safety Handbook and familiarize themselves with the contents that apply to their work. If any part of the Safety Handbook is not clear, the employees shall consult their supervision for further clarification. The Safety Handbook must continually be utilized as a reference manual for safe working practices and procedures.

All employees shall be trained in and familiar with the safety related work practices, safety procedures, and other safety requirements that pertain to their respective job assignments.

102 – Obedience to Rules and Penalties for Violations

An accident is defined as an unplanned event proceeded by an unsafe act or unsafe condition that frequently results in injury or damage and interrupts the completion of an activity. Many accidents are due to unsafe acts and human failure. It is the responsibility of every employee to comply with the safety and health standards and all rules that are applicable to their own actions and conduct.

A. Rules

1. Each rule shall be followed. Ignorance of the rules will not be accepted as an excuse for neglect or omission of duty. These rules represent minimum requirements; employees shall use good judgment or seek guidance in dealing with conditions not covered in these rules.

B. Personal Conduct

1. Employees shall be courteous and considerate of the public and of each other.
2. Displays of temper and ill feeling shall not be tolerated.
3. Participating in practical jokes, horseplay, scuffling and wrestling while on duty, company property or in company vehicle is prohibited.
4. Use of alcohol or illegal drugs while on duty is prohibited. Any employee who reports for duty and is known to be under the influence of alcohol or drugs shall not be permitted to work and must be removed from work activities and is subject to disciplinary action up to and including termination.

H-SP-09 – Substance Abuse Procedure

C. Disciplinary Action

Discipline will be administered for failure to comply with safety rules. The severity of this discipline shall be determined by the seriousness of the violation.

103 – Safety Meetings

It shall be the duty of all employees to attend and participate in safety meetings specifically scheduled or arranged by the supervisor in charge.

104 – Pre-Job Briefings

Before starting each job, the employee in charge or the designated employee in charge shall conduct a pre-job briefing at the job site with all employees on the job to discuss such subjects as:

- A. Emergency action plan
- B. Hazards of the job
- C. Work procedures to be used
- D. Energy source control and direction
- E. Personal protective equipment
- F. Placement of protective grounds
- G. Individual job assignments
- H. Location of “Muster Point” for the crew to meet and locate safety equipment.

It is important that all members of the crew know the exact location of the job. In the event of an emergency any crew member can direct emergency vehicles to the jobsite. If additional personnel arrive with the job in progress, the employee in charge is responsible for covering the pre-job briefing with these personnel. If significant changes are made to the original plan, another pre-job briefing shall be conducted.

Employees shall establish a “muster point” by placing a cone or establishing a location at the job site where safety equipment such as fire extinguishers, pre-job briefing, AED, and other required safety equipment are to be located. The location shall be discussed and documented on the pre-job briefing along with assignments such as who will call in an emergency, who will handle the AED etc.

105 – Individual Responsibility for Safety

- A. All work shall be done in accordance with accepted safe work practices and procedures.
- B. Before starting a job, the necessary time shall be taken to determine if danger exists. Employees working in or around hazardous places, or near energized equipment, shall consider the effect of each act and do nothing that might endanger themselves or others.

- C. Every employee on the job shall understand the procedure to be followed.
- D. Every employee shall check conditions for himself and not rely solely upon precautions taken by others for protection.
- E. Haste inconsistent with safety is prohibited.
- F. Employees shall become familiar with and use all protective devices which are provided for their protection. Minimum PPE requirements are head protection, eye protection, hand protection, and foot protection for all job sites.
- G. Personal Accountability
 - 1. Be responsible for your own safety.
 - 2. Always know and follow safety rules and standards – even when no one is watching.
- H. Active Caring
 - 1. Observe, stop, and coach co-workers who are not in compliance or who exhibits at-risk behaviors.
 - 2. Take action to assure the safety of others and be willing to accept advice.
- I. Hazard Recognition
 - 1. Be aware of your surroundings at all times
 - 2. Take time to actively seek out and mitigate hazards
 - 3. Participate actively in safety improvements efforts.
 - 4. Report incidents and near misses of all types including minor injuries and first-aid cases.
 - 5. Be fit for duty and capable of performing the task at hand.

106 – Housekeeping

Good housekeeping is conducive to safety and efficiency. Accidents may be caused by carelessly placing tools and other objects in places other than their proper storage locations. Objects can fall from elevated locations if improperly stored. Employees shall correct or report to their supervisor any unsafe condition that may exist in the workplace. The following precautions shall be observed:

- A. Work areas shall be kept clean and clear of all debris and material.
- B. Tools and equipment shall be stored in their proper place in vehicles, workshops, and storerooms.
- C. Truck beds and material hauling trailers shall be kept neat, and all wire and other material shall be stored properly. This is to be completed daily.
- D. All exposed nails, staples and other sharp objects shall be bradded or removed from all boards, barrels and packing crates.

- E. To prevent slips and falls, all leaks and spills of water, oil or other liquids shall be cleaned up immediately.
- F. Employees shall be responsible for cleanup after the job is completed.
- G. Good housekeeping is a vital safety measure, Keep offices and work areas neat and orderly.

--S-SP-52 - Housekeeping

107 – Suitable Clothing

- A. Employees shall wear clothing suitable for the job being done and weather conditions.
- B. Employees should make an effort to be recognizable when entering customer property.
- C. Employees shall not perform any work without a shirt. All shirts shall have sleeves. Wearing tank tops is prohibited.
- D. Employees shall wear long sleeve Fire Retardant shirts and pants when contacting treated wood products or herbicides.
- E. Employees who work on energized lines and apparatus and /or are exposed to the possibility of flames, molten metal, or electric arcs shall wear: (Minimum of customer's FR requirements)
 - 1. Flame Resistant (FR) outer most layer of all clothing.
 - 2. Properly rated Arc Flash suits shall be worn when required.
- F. Workers may not wear undergarments made from acetate, nylon, polyester, rayon, or polypropylene if performing energized work or having exposure to arc flashes, flames, or molten metal. Employees exposed to these hazards must wear undergarments made from natural fiber clothing or FR base layer
- G. Employees who work in a potentially gaseous atmosphere shall wear long-sleeved shirts that are tucked in, buttoned at the wrist and neck, and must meet customers' minimum FR clothing requirements.
- H. All Flame-Resistant Clothing shall be cared for and cleaned in accordance with the Manufacturer's specifications.
- I. Hi-Visibility Clothing
 - 1. A minimum of Class 2 traffic vest/rain gear apparel shall be worn while working on the ground within the road right of way or any other work location where visibility of worker is needed for protection.

2. Class 3 traffic vest/ rain gear apparel shall be worn when flagging traffic within the road right of way. Class 2 traffic vest/rain gear is acceptable for flagging traffic inside company-controlled access zones not related to public roads.
3. Flame resistant reflective vests/rain gear apparel shall be worn when there is potential to be exposed to an arc, flash, or contact.
4. Traffic vest/rain gear apparel shall be visible at a minimum distance of 1,000 feet.
5. Ensure that traffic vests are ANSI flame-resistant-rated before performing any energized work. or work that can expose the employee to an arch or flame.
6. High-visibility flame-resistant shirts can be worn without traffic vests if they are a minimum of ANSI Class 2 rated reflective apparel.
7. Dirt stains and other contaminants can reduce the visibility of reflective apparel. Follow manufacturer guidelines for cleaning reflective apparel. Replace damaged, faded or excessively soiled reflective apparel.
8. Traffic vests/rain gear shall not be altered from its original condition.

108 – Hand Protection

- A. Work gloves shall be worn when handling material and where there is a likelihood of hand injury.
 1. Supervisors shall require employees to use appropriate hand protection when the hands are exposed to hazards from cuts, lacerations, abrasions, or punctures, chemical or thermal burns, harmful temperature extremes, and skin absorption of harmful substances.
 2. Supervisors should base the selection of hand protection on an evaluation of the performance characteristics relative to hazards and potential hazards of the task(s) to be performed, conditions present, duration of use. For potential hazards that may be associated with chemical use, the SDS should be obtained and reviewed for the recommended PPE.

109 – Head Protection

- A. Hard hats shall meet ANSI-Z89.1 and EEI specifications as to dielectric strength and impact resistance. Hard hats shall be a Class E rated hard hat.
- B. Hard hats shall not be altered in any manner that would affect the dielectric strength or impact resistance. Decals are permitted with management approval.
- C. Hard hats shall be worn by employees and visitors on all job sites.
- D. Hard hats shall be worn at service center yards and storage areas when loading or unloading materials, transformers, poles, etc.
- E. Hard hats shall be worn when operating forklifts, backhoes, cranes, trenchers, or other material handling equipment which do not have enclosed cabs.

- F. Hard hats shall be properly worn when removing, installing, testing, or working on meter installations.
- G. Hard hats shall be worn in and around all areas where the potential of a head injury exists.
- H. Employees shall wear protective hard hats when working in areas where there is a potential for injury to the head from falling or flying objects and “bump” hazards.
- I. Each affected employee shall...
 - 1. Wear the hard hat in the manner it was designed and tested to be worn (bill towards front)
 - 2. Wear the hard hat free of any “unauthorized” head cover under the hat.
 - 3. Refrain from painting, marking, or melting the hard hat.
 - 4. Inspect the shell and support straps daily for signs of deterioration.
 - 5. No metal objects shall be placed on the hardhat.

110 – Jewelry

Employees shall not wear conductive articles of any type including but not limited to keys, wristwatches, necklaces, watch and/or wallet chains, rings, bands, earrings, piercings, or large belt buckles when working on or around energized equipment or where they create a hazard.

111– Foot Protection

- A. Work boots with a defined heel and leather upper shall be worn on all job sites. Primoris T&D requires a minimum 6 inch leather upper with safety toe.
- B. Additional foot protection may be needed based on the task being performed.
- C. Rubber boots or rubber overshoes shall be worn when working in fresh concrete.
- D. Steel-toed tennis shoes, sandal, work shoes, or open toed shoes are not permitted.

112 – Eye Protection

- A. Safety glasses approved by the ANSI-Z 87.1 standards, or face shield shall be worn when the wearing of a hard hat is required.
- B. Safety glasses approved by the ANSI-Z 87.1 standard, with side shields or face shields shall be worn at all times. Metal frames are prohibited.
- C. Safety goggles or face shield shall be worn where there is a reasonable probability of eye injury such as, but not limited to, the following examples:

1. Breaking of concrete, brick or plaster, chipping, chiseling, grinding, steam cleaning, power buffing, sanding, or drilling of metal
2. Observing or helping in welding of any type
3. When using an acetylene torch.
4. Blowing out equipment using compressed air
5. High dust areas
6. Handling chemicals where there is a possibility of splashing
7. Applying herbicides or pesticides
8. In areas with blowing gas
9. When installing meters in a 480-voltmeter base enclosure.

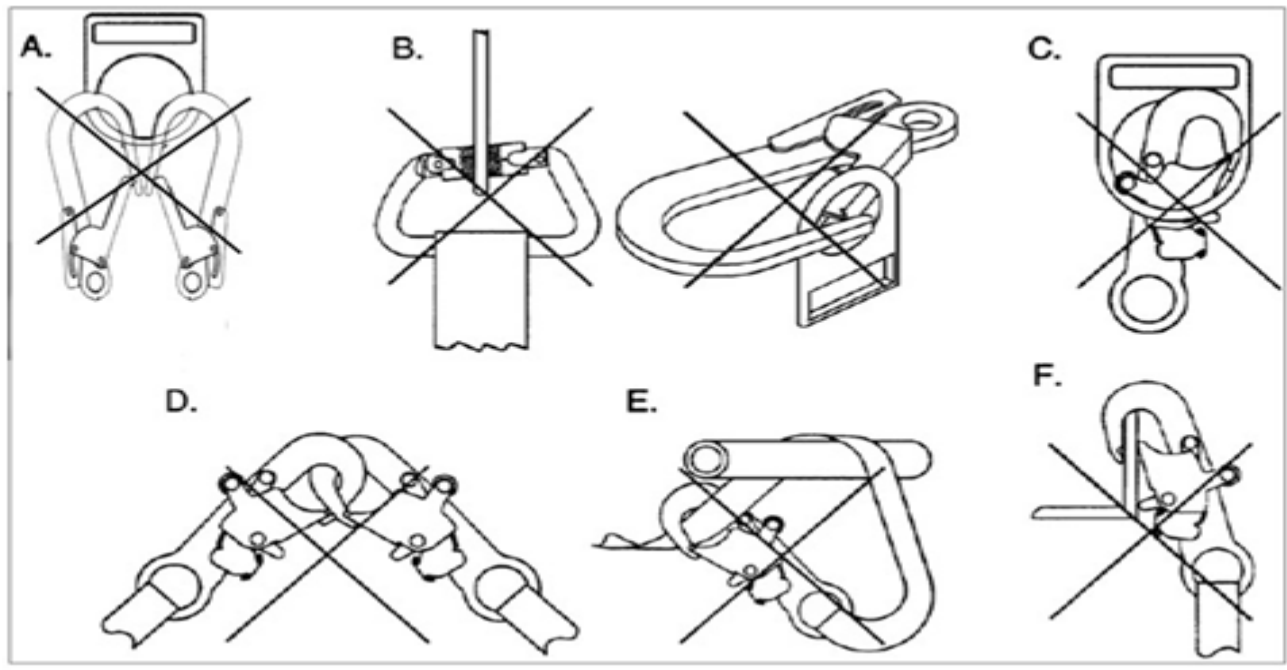
113 – Hearing Protection

Approved hearing protection shall be worn when entering or working around high noise level areas 85 dBA or above and in areas where employees cannot carry on conversation in normal tones within 2 to 3 feet of each other. Approved earplugs and/or earmuffs will be provided by crew leadership.

114 – Fall Protection

- A. 100 percent fall protection shall be properly used when ascending, descending, and working wood, concrete, and steel poles or towers. Structural design may prohibit 100 percent fall protection. In such cases, other agreed upon safeguards shall be used. In such cases, the employee should conduct a hazard assessment to determine whether an interim means of fall protection will eliminate or better mitigate the fall hazard.
- B. Fall arrest systems shall meet ASTM F887 when the employee is exposed to arc flash. [OSHA 1910.269(g)(2)(ii)]
- C. All equipment used for fall prevention (e.g., Personal Fall Arrest System (PFAS), worker restraint belts and lanyard, ladders, and platforms) shall be inspected before each use by the worker. PFAS harness and lanyard shall be inspected annually and documented by a Competent Person. PFAS harnesses shall never be modified, marked on, or painted unless material is approved for use by the manufacturer. Harnesses shall be taken out of service immediately if defective or exposed to an impact. [OSHA 1926.502]

- D. An employee shall not safety to, or use a conductor, insulator string, or similar devices for support unless the device is designed for that specific application (e.g., Boatswain chair, trolley, etc.). However, the condition of the conductor shall be inspected by a qualified employee and deemed able to support the worker.
- E. A full body harness with a shock absorber lanyard or self-retractable fall arrest device shall be worn when the worker is four feet or more above the ground in an aerial lift device.
- F. Self-retractable fall arrest devices shall be used while working on top of substation equipment four feet or more above the ground.
- G. All open sides of walking/working surfaces more than four feet above the ground or floor shall be protected by guard rails and toe boards. Where guard rails cannot be installed fall protection shall be used by employees while working on the platform. [OSHA 1926.501(b)(2)(ii)]
- H. Locking type snap hooks shall be sized to be compatible with the member to whom they are connected to prevent unintentional disengagement of the snap hook by depression of the snap hook keeper by the connected member. [OSHA 1926.502(d)(5)]
- I. Unless the snap hook is a locking type and designed for the following connections, snap hooks shall not be engaged:
 - 1. Directly to webbing, rope, or wire rope.
 - 2. To each other.
 - 3. To a D-ring to which another snap hook or other connector is attached.
 - 4. To a horizontal lifeline; or
 - 5. To any object which is incompatibly shaped or dimensioned in relation to the snap hook such that unintentional disengagement could occur by the connected object being able to depress the snap hook keeper and release itself. [OSHA 1926.502(d)(6)]



- J. Before climbing a wood pole, employees must determine if the pole is safe to climb as described in Section 226.
 - 1. If the pole is found to be unsafe to climb or to work from, it must be secured so that it does not fail while an employee is on it. The pole can be secured by a line truck boom, by ropes or guys, or by lashing a new pole alongside it. If a new one is lashed alongside the defective pole, work should be performed from the new one. Tag unsafe poles to prevent others from climbing.
- K. Before climbing towers, carefully examine to ensure they are safe and inspect base for corrosion or structural defects.
- L. Employees shall use fall protection (harness and lanyard connected to lifeline or anchorage point at all times when working at elevated locations and when ascending, descending or changing locations on steel towers, transferring from lifts to structures, steel poles, concrete poles and substation structures.
- M. Use full body harness with shock absorbing lanyard when working out of a bucket truck, on an aerial platform, or on top of transformers or other equipment.
- N. Employees climbing distribution and transmission class wood poles shall use fall protection equipment while ascending, descending and changing locations on a pole. This shall consist of a Buck Squeeze or similar equipment. Work positioning equipment alone is not allowed.

115 –General Fall Protection Requirements

- A. Prior to beginning each job, an assessment must be performed to determine if fall hazards are present and if protective measures are needed. Fall hazards and protective measures shall be included in pre-job briefing discussions and job planning as appropriate.
- B. Locations will have plans in place to rescue workers promptly if they fall while wearing fall arrest equipment. Rescue planning should minimize the amount of time a person is suspended in a fall arrest harness and may include provisions for self-rescue, calling local emergency services, or use of plant emergency responders.
- C. When personal fall arrest equipment is required, it shall include a full-body harness with a shock-absorbing lanyard, retracting lanyard or fall arrestor such as a rope grab. It may include other equipment for anchorage or attachment.
- D. Workers must rig fall protection equipment so that free fall is minimized (6 feet or less) and hitting obstructions or a lower level is avoided.
- E. Anchorage points must be capable of withstanding 5,000 pounds of force per worker attached or shall be selected by an engineer as part of a fall protection system with a safety factor of two.
- F. On vertical lifelines, each worker must have a separate lifeline with a breaking strength of at least 5,000 pounds.
- G. All fall protection equipment must be inspected before each use. Any defective pieces must be removed from service. Inspect for these defects:

Fall Protection Equipment Inspection Guidelines

Inspect	For evidence of defect or damage including:
Hardware D-rings, Buckles Connectors, etc.	Cracks, sharp edges, deformation, corrosion, chemical attack, excessive wear, alterations excessive heating.
Ropes Straps Lines Cables	Fraying, un-splicing, unlaying, kinking, knotting, broken or pulled stitches, excessive elongation, chemical attack, abrasion, excessive wear, excessive lubrication
Mechanical devices Rope grabs Connectors	Improper functioning, absence of parts

- H. Workers who are on surfaces at any height above dangerous equipment shall be protected by guardrails or fall arrest equipment.
- I. When wearing a fall arrest harness, take precautions to assure that the lanyard does not create a tripping hazard or get caught in rotating or moving equipment.

116 – Fire Prevention and Protection

A. Prevention

- 1. Employees shall not smoke where smoking constitutes a fire hazard.
- 2. Combustible waste material shall be deposited in metal containers with metal lids.
- 3. When stored indoors, quantities of flammable and combustible liquid in excess of 25 gallons shall be stored in an approved cabinet. Not more than 60 gallons of flammable or 120 gallons of combustible liquids shall be stored in any one storage cabinet. Not more than three such cabinets may be located in a single storage area. For additional information concerning storage of flammable and combustible liquids, contact Safety and Industrial Health.
- 4. Not more than five gallons of gasoline shall be stored in an enclosed building at any time, and it shall be kept in an approved safety can that shall be plainly labeled to indicate its contents. An approved safety can or a barrel with a hand pump shall be used when work equipment necessitates carrying gasoline or diesel to a work site.
- 5. Only properly licensed individuals may install or maintain LP gas piping, valves and regulators.
- 6. Gas shall be stored in portable DOT approved containers no larger than 5 gallons when carried on or in vehicles.
- 7. Be familiar with site procedure for reporting and/or responding to a fire.
- 8. Know how to recognize and report hazardous conditions and fire hazards associated with the materials and processes to which employees are exposed.
- 9. Practice good housekeeping in all buildings and vehicles to prevent the accumulation of flammable and/or combustible materials.
- 10. Keep electric control panel covers in place and /or door closed.
- 11. Do not use portable space heaters without prior approval from your supervision. If portable electric space heaters are used, they must be attended while in use, turned off after normal working hours and kept at least 3 feet away from combustible materials.

B. Protection – Fire Extinguishing Equipment

1. All employees shall be familiar with the fire plan at their work location.
2. Never store equipment or material in areas that would obstruct access to firefighting equipment.
3. Fire extinguishers shall be labeled to indicate their intended use.
4. All fire extinguishers shall be inspected monthly to see that they are in place and properly filled. The inspection tag shall be initialed.
5. All fire extinguishers shall be tested annually by a certified inspector and tagged to indicate the date of inspection.
6. Employees who may be expected to use a fire extinguisher in the event of a fire shall receive initial training and be retrained annually on fire extinguisher use and extinguishing techniques.
7. Discharged or untagged fire extinguishers shall be replaced.
8. Classes of Fire Extinguishers:
 1. Extinguishers suitable for Class A fires should be identified by a triangle containing the letter "A". If colored, the triangle shall be green. (See Figure 1-1) Class A fires are fires in ordinary combustible materials such as wood, cloth, paper, rubber and many plastics.
 2. Extinguishers suitable for Class B fires should be identified by a square containing the letter "B". If colored, the square shall be red. (See Figure 1-1) Class B fires are fires in flammable or combustible liquids, flammable gases, greases and similar materials.
 3. Extinguishers suitable for Class C fires should be identified by a circle containing the letter "C". If colored, the circle shall be blue. (See Figure 1-1) Class C fires are fires in energized electrical equipment; safety to the operator requires the use of nonconductive extinguishing agents.



Figure 1-1

117 – Marine Operations

A. Flotation Devices

1. Whenever employees are engaged in work where they may be pulled, pushed or fall into water and the danger of drowning exists, they shall use Coast Guard approved (Type III) personal flotation devices, and these devices shall be properly maintained and inspected before each use.
2. When fall protection is used and will prevent persons from falling into water, personal flotation device is not required.
3. Prior to and after each use, personal flotation devices shall be inspected for defects that would alter their strength or buoyancy. Defective units shall be discarded.
4. At least one lifesaving skiff shall be immediately available at locations where employees are working over or adjacent to water.

B. Crossing Streams and Other Bodies of Water

1. Employees may cross streams or other bodies of water only if a safe means of passage is provided. I.e. water vessel with lifesaving equipment provided.

C. Working on Barges

1. When working on a barge, wear U.S. Coast Guard-approved Type I, II, III or V personal flotation devices. Inspect personal flotation device before and after each use. Note: Personal flotation devices must be available but are not required to be worn on structural barges with guardrails.
2. Assure availability of a Coast Guard-approved 30-inch life ring with 90 feet of line and at least one permanent ladder that will reach the surface of the water from the top of the barge.
3. When combustible materials are present, ensure fire extinguishers are readily available.
4. Assure safe access/egress to/from barge.
5. Ensure handrails are installed unless their presence is a more significant safety hazard.
6. Ensure all barge connections are in place before operation (e.g., barge-to-barge, spud wells-to-barge and anchorage).
7. Ensure engineering has approved all barge modifications.
8. Always designate and maintain unobstructed walkways/aisles.

9. Use and maintain anti-skid material on walking/working surfaces.
10. Safely secure all material/equipment to the barge deck.
11. Ensure operators of equipment (e.g., cranes, drills) are familiar with the equipment and can demonstrate the skills necessary to safely operate it from an unstable platform (e.g., barges, dredges).

118 – Drinking Water

- A. Drinking water will be available for all workers.
- B. Coolers with bottled water may be utilized.
- C. Portable containers used to dispense drinking water shall be capable of being tightly closed and equipped with a tap. Water shall not be dipped from containers.
- D. Any container used to dispense drinking water shall be clearly marked not used for any other purpose.
- E. A common drinking cup is prohibited.
- F. Where single service cups (to be used but once) are supplied, both a sanitary container for the unused cups and a receptacle for disposing of the used cups shall be provided.

119 – Hazardous Conditions and Criminal Activities

- A. Each employee is responsible for promptly reporting and guarding any hazardous condition that may result in injury, property damage or interruption to electrical service.
- B. Identify potential pinch points prior to each task so these hazards can be eliminated or avoided.
- C. When working overhead, keep tools and small materials not in use in the belts or in an appropriate container.
- D. Do not throw, toss, or drop tools, materials or trash unless the action had been discussed and determined to be the safest method during the job briefing.
- E. Inspect work locations prior to beginning work to identify potential hazards from animal and insect bites and stings. Animal and insect repellants, devices and protective apparel shall be used as necessary.
- F. Horse play is strictly prohibited

- G. Employees suspecting or detecting criminal activity shall preserve the safety of themselves and others and report such activities immediately to their supervisor and/or other proper authorities.

120 – Customer's Premises

- A. Employees shall not jump over barriers or fences.
- B. A customer's permission shall be obtained before using driveways or driving across private property. Customer's permission does not relieve us of the responsibility for damage.
- C. Any damage to customer's property caused by employees in the course of their work shall be reported to the appropriate supervisor immediately.

121 – Reporting Accidents and Injuries

- A. Emergency Assistance
 - 1. Contact crew supervisor or main office and safety immediately in emergency situations.
 - 2. The employee asking for assistance shall talk slowly and plainly, giving crew identification, crew location, the nature of the emergency and whatever assistance is needed. Always give as much information as possible and/or requested.
- B. All employee injuries shall be reviewed by the employee's supervisor.
 - 1. It is the duty of all employees to see that they receive proper first aid treatment for all minor injuries.
 - 2. Every injury, regardless of severity, must be reported.
- C. Automobile Accidents
 - 1. All accidents involving the public where Company property or personnel are involved shall be reported immediately to the crew supervisors and safety. (Proper forms must be completed by computer if possible.)
 - 2. The employee shall, in a courteous manner, procure all information pertaining to the accident, including the names and addresses of any witnesses. When possible, broken parts, damaged equipment or any other evidence shall be preserved until after an investigation has been made. Pictures shall be included with the final accident report.
 - 3. Employees shall not negotiate the settlement of claims, promise payment for injuries or damages or admit liability.
- D. Reporting
 - 1. A preliminary report will be completed within one hour after the time of the incident. All available information will be added, and crew supervisor or main office will be notified along with the Safety Department.

2. Incident report will be completed within 24 hours after the incident.

122 – Supervising Employees

A. Enforcing Rules.

1. Supervisors shall ensure that their employees understand all safety rules pertaining to their work.
2. Foreman shall require compliance with all safety rules.
3. Foreman shall be onsite and outside of vehicle observing work during work period.

B. If the supervisor or Foreman determines an employee is unfit for work or unwilling to work in accordance with safety rules, disciplinary action shall be taken.

C. Supervision or Foreman shall assign duties to those employees who, by reason of experience or training, are qualified to perform the operation and recognize the hazards involved.

D. Foreman shall require inspection, use and maintenance of applicable protective devices, tools, and equipment.

E. Supervision shall not permit the use of improper or unsafe devices or tools.

F. When defects in equipment or apparatus are reported, the supervisor shall ensure that such defects are corrected or that the defective equipment is removed from service.

G. Supervisor shall require employees to maintain a neat and orderly work area.

H. Supervisor shall require that fire extinguishing equipment in their care is in its proper place and ready for use.

I. Supervisor shall require that the first aid kits in their care contain the proper supplies and are ready for use.

J. Foreman shall require the placing of barricades, hole covers, warning signs, flags, warning lights and other means of protecting the public be placed at all necessary work sites.

K. Designating Authority and Combining Crews

1. When two or more employees are working on the same job, one will be designated as the person in charge by the supervisor. The designated person shall require that the safe work practices outlined in the Safety Handbook are practiced at all times.
2. Each crew member shall be informed who is in charge and shall be promptly notified when a change in authority is made.

3. When two or more crews are assigned to work together, one person shall be designated to be the person in charge of the combined crew.

123 – Cell Phone Usage

- A. Personal use of cell phones will be limited to the following guidelines:
 1. Cell phones shall be used only for high priority communication and not for casual use.
 2. The volume of the ringer on the cell phone shall be kept to a minimum not to startle other workers performing tasks.
 3. If a call must be received or made, the worker must ensure that the work area and all personnel in the work area are safe before answering or calling.
 4. Cell phone usage shall not be permitted while performing the following tasks:
 - Energized work.
 - Working from an aerial basket/platform.
 - Climbing poles or structures.
 - Where the call may create a safety issue or unnecessary work stoppage.
 - Driving or operating any company vehicle or equipment.

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201 – Safe Working Distance from Energized Apparatus

- A. Employees who perform work on or around exposed lines or apparatus energized at 50 volts or more shall be trained in First Aid and CPR.
 1. When work is to be done within Minimum Approach Distances (MAD) suitable barriers, suitable rubber, or other insulating protective devices shall be used to prevent employees or materials from falling into or making contact with energized apparatus.
- B. When working above energized distribution circuits, the lower circuit shall be: De-energized, short circuited and grounded, or covered with appropriate protective equipment, or moved out to a safe distance.
- C. Employees shall not be permitted to approach or take any conductive object closer to exposed energized parts than shown in Table 2-1:
 1. Employees may work closer to energized apparatus than the distances shown below provided that:
 - The employee is insulated or guarded from the energized parts with proper Personal Insulating Protective Equipment (PIPE).
 - The energized part is insulated or guarded from the employee and any other conductive object at a different potential.
- D. Precautions shall be taken while carrying conductive materials near energized apparatus.
- E. When apparatus is installed, it shall be arranged, if possible, so that the name plate can be read without personal danger.

Minimum Approach Distances for Voltages of 72.5 kV and Less		
Nominal Voltage (kV) phase-to-phase	Distance	
	Phase-to-Ground Inches	Phase-to-Phase Exposure Inches
0.50 to 0.300.....	Avoid Contact	Avoid Contact
0.301 to 0.750.....	13	13
0.751 to 5.0.....	25	25
5.1 to 15.0.....	26	27
15.1 to 36.0.....	31	36
36.1 to 46.0	34	39
46.1 to 72.5	40	48
• Employer may use the minimum approach distances in this table provided the worksite is at an elevation of 3,000 feet or less. If employees will be working at elevations greater than 3,000 feet above sea level, the employer shall determine minimum distance by multiplying the distances in this table by the correction factor found in OSHA Table R-5 corresponding the altitude of the work. • For single-phase system use voltage-to-ground.		

Minimum Approach Distances for Voltages more than 72.5 kV		
Nominal Voltage (kV) phase-to-phase	Distance	
	Phase-to-Ground Inches	Phase-to-Phase Exposure Inches
72.6 to 121.0.....	45	56
121.1 to 145.0	52	65
145.1 to 169.0.....	58	77
169.1 to 242.0.....	80	122
242.1 to 362.0.....	135	218
362.1to 420.0.....	168	269
420.1 to 550.0.....	200	325
550.1 to 800.0.....	271	449
- Employer may use the minimum approach distances in this table provided the worksite is at an elevation of 3,000 feet or less. If employees will be working at elevations greater than 3,000 feet above sea level, the employer shall determine minimum distance by multiplying the distances in this table by the correction factor found in OSHA Table R-5 corresponding the altitude of the work. - For single-phase system use voltage-to-ground.		
For any questions regarding the MAD table please contact Safety department for calculations		

Table 2-1

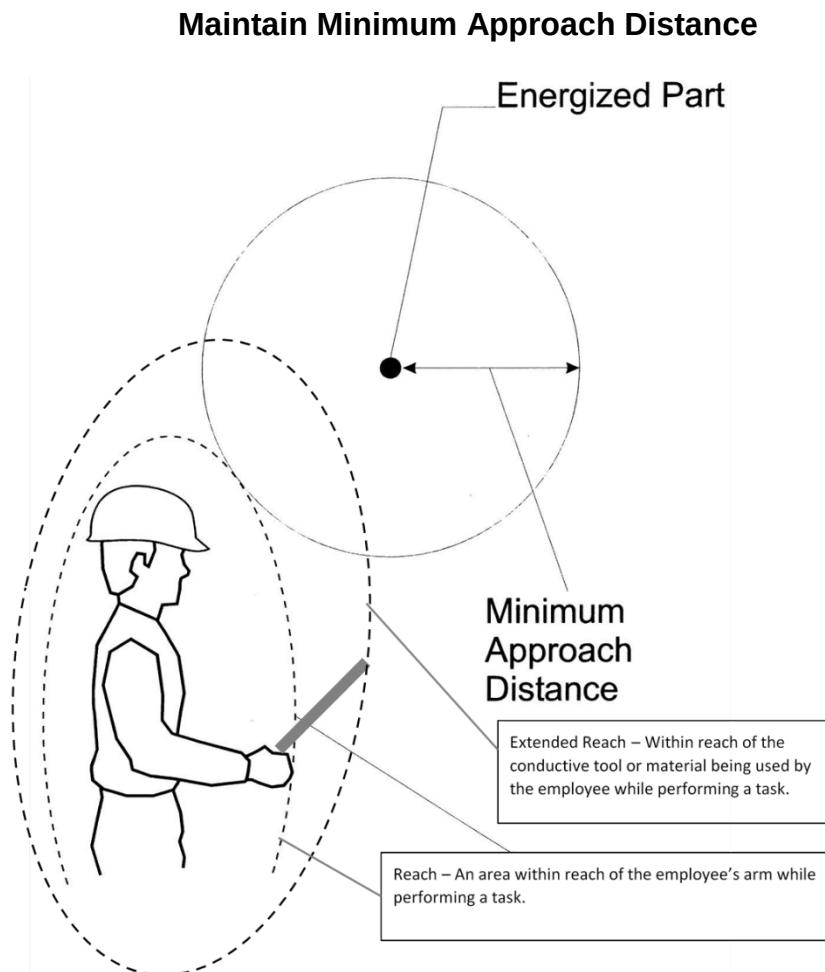


Figure 1—Maintaining the Minimum Approach Distance

202 – Work on or Around Energized Lines or Apparatus – General

- A. Consider electric lines and equipment energized unless they have been properly isolated, tested for voltage, tagged, and grounded.
- B. Only qualified employees shall work on or with exposed energized lines or parts and in areas containing unguarded, un-insulated energized lines or parts of equipment at 50 volts or more.
- C. When working around exposed energized parts, employees shall use proper protective equipment and work practices and comply with minimum approach distances.

- D. Proper illumination must be provided before employees are permitted to enter work areas containing exposed energized parts.
- E. For lines rated at 50kV or less, do not bring uninsulated equipment closer than ten feet to energized conductors until energized conductors have been properly covered.
- F. When installing or removing fuses with one or both terminals energized at more than 300 volts or with exposed parts over 50 volts, use the appropriate tools or gloves. When installing expulsion-type fuses with one or both terminals energized over 300 volts, wear safety glasses or goggles, stay clear of the fuse barrel exhaust path and use tools rated for the voltage.
- G. Ensure devices used to open circuits under load are designed to interrupt the current present.
- H. At least two employees shall be present for this work:
 - 1. Installation, removal, or repair of lines over 600 volts.
 - 2. Installation, removal, or repair of de-energized lines if an employee is exposed to contact with other parts over 600 volts.
 - 3. Installation, removal or repair of transformers, capacitors, and regulators if the employee is exposed to parts over 600 volts.
 - 4. Work involving the use of mechanical equipment, other than insulated aerial lifts, near parts over 600 volts.
- I. Employees may work alone on:
 - 1. Work involving equipment energized at 600 volts or less.
 - 2. Routine switching of circuits if conditions at the site allow the work to be done safely.
 - 3. Work done with live-line tools if the employee is not within MAD or otherwise exposed to contact with energized parts.
 - 4. Emergency repairs (e.g., power restoration) to the extent necessary to safeguard the general public.
 - 5. Substation work not requiring direct contact with live parts or climbing on structures.
 - 6. Opening disconnects with live-line tools.
- J. Substation Entry
 - 1. Upon entering a substation with work in progress, each employee other than those who are working in the station shall report their presence to the employee in charge in order to receive information on special system conditions affecting employee safety.
 - 2. Unqualified persons are prohibited from entering rooms or spaces (e.g., switch houses) while the control circuits are energized unless accompanied by a qualified person.

K. Rubber Glove and Rubber Sleeve Use

Rubber Gloves:

1. Whenever rubber gloves are in use, leather protectors shall be worn over the rubber gloves.
2. Must be worn under the following conditions:

When climbing poles or in insulated aerial lifts. (Bucket Trucks) Exception: Any deviation from this rule must be approved and documented on the job briefing.

Note: Does not apply to voltages greater than 46KV.

- When involved in such tasks as installing or removing guys, pulling wire, or when any part of the work is within minimum approach distances to energized conductors.
 - When setting poles within 10 feet of energized equipment or conductors.
 - Lock to Lock (From time UG equipment is unlocked until it is relocked) while work is being performed on underground equipment.
 - Anytime handling conductors on the ground that are connected to the system.
3. Where approved rubber gloves can be used with live line tools, they shall be used and considered as the primary employee protection.
 4. Store in approved bags at all times when not in use.
 5. Only turn inside out for testing. Gloves must be stored and shipped right side out. Turning them inside out for extended periods creates cracking and damages the gloves. Gloves shipped to test lab inside out are not tested.
 6. Must be visually inspected and air tested prior to each use.
 7. Must be dielectric tested at least every 6 months from the test date or issued date. May be issued anytime within 1 year from the test date.

Rubber sleeves:

1. Worn when:
 - Employees are within MAD of voltages above 600 volts to 46KV.
 - Employees climb above the common neutral or any equipment or conductor that either has been in service or is in service and is not grounded.
2. Visually check before each use.
3. Rubber sleeve shall be properly worn, per manufacturer's instructions.
4. Must be stored in approved bags at all times when not in use.
5. Must be dielectric tested and date stamped at least every 12 months.

203 – Ground Wires and Grounded Neutrals

- A. The presence of a grounded neutral, ground wire, or other grounded apparatus in the primary area can be hazardous to an employee while working on energized equipment.

Under these circumstances, employees shall isolate themselves or use appropriate rubber or other protective devices to cover such conductors or apparatus.

- B. Employees shall avoid opening ground wires or neutrals without first bridging the section to be opened with a suitable jumper.
- C. When work is to be done on the ground grid in an energized substation, employees shall avoid opening wires of the grid without first bridging the section to be opened with a suitable jumper.
- D. Where distribution lines are underbuilt on transmission structures and the overhead shield wire is used as the neutral of the distribution circuit, taps shall not be made to the pole ground wire but shall be connected separately to the shield wire.

204 – Connections in Common Neutral Systems

- A. Where the grounded neutral wire is used for both, the primary and secondary neutrals, the employee shall take the following precautions:
 - 1. All connections from the transformer to the grounded neutral shall be made before the connection from the transformer to the phase wire is made. The transformer case ground connection shall be made first.
 - 2. Each connection from the transformer to the neutral shall be made with a separate jumper and connected with separate connectors.
 - 3. Before disconnecting any transformer ground connections, the transformer shall be de-energized. (If the primary neutral jumper connection is disconnected from the neutral wire while the transformer is energized, the wire between the transformer and neutral will be energized at full primary voltage. On transformers with a single primary bushing, the case can be energized at full primary voltage.)
 - 4. Floating neutrals constitute a hazard and shall be regarded as energized.
 - 5. All pole ground wires shall be connected to the common neutral. The connection should be made to the ground rod first or rubber gloves shall be worn when making this connection.

205 – Phasing or Tying Circuits

- A. When work is done that would affect the phase relationships between circuits, the phasing shall be checked with appropriate phasing devices.
- B. All three phases shall be checked to ensure correct phasing.

206 – Installing or Removing Jumpers

- A. Employees shall avoid placing themselves in series with an electrical circuit. Approved hot-sticks or mechanical jumpers may be used while making these connections.
- B. Employees shall avoid opening or connecting jumpers or conductors (including neutrals) by hand when there is the possibility of creating a damaging arc because of a difference in potential or excessive load current. (Note: The installation of a temporary load interrupting device or load pickup device may be necessary in certain instances.)

- C. Approved hot sticks shall be used to make transformer primary connections and other connections, where the possibility of equipment failure or excessive load may cause a damaging arc.
- D. When permanent or temporary jumpers are to be installed on switches, breakers, etc., or will bypass existing energized jumpers, exercise extreme caution. Select and inspect the correct length mechanicals or jumpers on the ground before ascending to the work area. If applying Mechanical jumpers, apply different colored markings to identify the ends of the mechanicals. Use “Echo” protocol between the Qualified Observer and workers aloft before making each connection.
- E. Control of temporary jumpers shall be maintained. An insulated jumper holder or hanger may be used.
- F. If connecting de-energized equipment or lines to an energized circuit using a conducting wire or device, attach the wire to the de-energized part first.
- G. If disconnecting, remove the source end first, and keep loose conductors away from exposed energized parts.
- H. When lines or equipment are connected to or disconnected from energized circuits, keep loose conductors away from exposed energized parts.

207 – De-energizing Lines and Equipment for Employee Protection

- A. Before considering lines and equipment to be worked on as de-energized, ensure they are de-energized as described below, tested for voltage and grounded.
- B. For systems under the control of a dispatcher or operator, obtain a clearance to de-energize the lines according to standard operating procedures.
- C. De-energize lines and equipment by opening the proper switching device such as disconnects interrupters, circuit breakers, recloser, line switches or fuses.
- D. For systems not under the control of a dispatcher or operator, isolate lines by doing one or more of the following:
 - 1. Removing fuses
 - 2. Disconnecting recloser leads
 - 3. Opening switches
 - 4. Removing jumpers

Render inoperable any disconnecting means that are open to protect employees and that are accessible to the public.

- E. Test to verify that the lines and equipment are de-energized.
- F. Install grounds as outlined in “Grounding” in this document
- G. Apply tags to the open points.
- H. Do not re-energize lines until the tag holder has been contacted and all grounds have been removed, all crews have released their clearances, all employees are clear of the lines and equipment, and all tags have been removed.

208 - Operating Fuses & Disconnects on Distribution Transformers & Lines

- A. When operating primary fuses and disconnects of all types, the employee shall position themselves in such a manner as to reduce the possibility of injury in the event the fuse should blow, or in the event of an arc flash.
- B. When operating fuses or disconnects on energized primary or apparatus, only approved insulated sticks shall be used.

209 - Connecting, Disconnecting or Testing Transformers

- A. The transformer case ground (also primary and secondary neutrals where applicable) shall always be connected to the common neutral prior to energizing the transformer. (On a single primary bushing transformer, the transformer case can become energized at full primary voltage if the transformer case ground is not connected to the common neutral. On a two primary bushing transformer, the primary neutral bushing will become energized at full primary voltage if it is not connected to the common neutral.)
- B. When installing or removing Completely Self-Protected (CSP) transformers, the secondary breaker shall be in the open position before raising or lowering the transformer.
- C. When removing a CSP transformer from an energized bus, load on the transformer shall be broken by opening the secondary breaker. Remove the primary lead, remove the secondary leads and then all ground connections with the case ground shall be removed last.
- D. Voltage rating, polarity, impedance, etc., of the transformers shall be checked prior to installing transformers in parallel or installing three phase installations.
- E. If a transformer is to be paralleled with an existing transformer, the transformer to be added shall be connected to the same primary phase as the existing transformer. The added transformer shall be properly phased with the existing secondary prior to connecting the leads to the energized secondary. Transformers shall not be installed in parallel on installations where air switches, disconnects, or fused cutouts will be located between transformers.
- F. If the transformer lid is to be removed, the pressure relief valve shall be operated to relieve any pressure in the tank prior to unbolting the lid. If the transformer is not equipped with a pressure relief valve, the lid shall be restrained with a strap and the lid loosened slowly to relieve pressure.

210 – Installing or Repairing Services

- A. Energized services pulled at the customer's point of attachment shall have the ends securely taped.
- B. A minimum of two employees are required when stringing services from a transformer pole where the vertical primary risers extend below the secondary.
- C. The neutral conductor of a service shall be connected first. When disconnecting a service, the neutral conductor shall be disconnected last.

211 – Instrument Transformers

- A. The case shall be grounded or considered as energized on instrument transformers.
- B. On new installations, the secondary circuits of current transformers shall be carefully checked to see that no open circuits or loose connections exist before energizing the current transformers.
- C. Before opening the secondary circuit of any current transformer, the secondary leads shall be short-circuited and grounded with current links or wire large enough to carry the secondary current at a point between the current transformer and the location at which the secondary is to be opened.
- D. A split core test transformer shall be handled with the same protective devices as the circuit to which it is connected. It is recommended that a section of a line hose be installed on any wire or bus on which the split core transformer is to be connected. A split core transformer is a current transformer; therefore, the same precautions shall be observed in handling the secondary leads as are observed with other current transformers.

212 – Capacitors

- A. When capacitors are disconnected from the line, they shall be considered as energized until they have been grounded and short-circuited. Two bushing capacitors must have both terminals grounded and short-circuited. (A wait of at least five minutes is required from the time of disconnection until the capacitors are grounded and short-circuited.)
- B. Employees shall not enter the isolating fence around capacitor installations while the capacitors are energized.
- C. Coupling capacitors have an extremely high resistance that results in a discharge time constant of hours. To protect employees who must work on coupling capacitors, the following precautions shall be taken:
 - 1. A shorting wire shall be in place during shipping and storage to prevent the buildup of a static charge.
 - 2. During maintenance, a grounding wire shall be connected to all exposed parts that may be energized by the static charge. It is not sufficient to connect the ground wire momentarily because of the long discharge time. The grounding wire shall always remain in place during maintenance except while tests are being performed.
- D. Energizing Switched and Fixed Capacitor Banks
 - Maintain minimum approach distances, use proper PPE/PIPE/IPE
 - Verify circuit identity and location, log on with DDC. Log off when complete.
 - Verify oil/vacuum switches are open if equipped.
 - Clear vehicles and a path of retreat in the event of an equipment failure.
 - Close the fuse disconnects from the ground with an extendo stick, or a fully extended 30'+ extendo stick from a bucket.
 - Close oil/vacuum switches via controls if equipped.
 - Perform amp check to verify capacitors are online.

E. De-Energizing Switched and Fixed Capacitor Banks

- Maintain minimum approach distances, use proper PPE/PIPE/IPE
- Verify circuit identity, log on with DDC. Log off when complete.
- Open switched banks via the controls, then open the fuses.
- Open fixed banks with an approved load break device.
- Remove fuse doors and store upright.
- Place “Hold Card”, & contact DDC to update records.

213– Electrical Safety

- A. Employees who face a risk of electrical shock but who are not qualified workers shall be trained and familiar with electrically related safety practices.
- B. Employees working on energized conductors should work from below the wires.
- C. Safe work practices shall be employed to prevent electric shock or other injuries resulting from either direct or indirect electrical contact when work is performed near or on equipment or circuits which are or may be energized.
- D. When a hoist is being used to sag energized primary distribution conductors, a non-metallic strap hoist shall be used. In addition, the hoist shall be isolated from differences in electrical potentials by a form of insulation (e.g., insulated link stick, polymer insulator, bell insulators, etc.) rated for the voltage being worked.
- E. A lightning arrestor shall be energized or de-energized with a hot stick and shall be always considered energized except when the line terminal is disconnected.
- F. When kneeling or sitting on the ground, an approved insulated mat may be used, in addition to the appropriate rubber gloves, as a second level of protection.
- G. Proper body positioning should be used to avoid contact with other potentials while working on energized secondary.
- H. For exposed energized parts over 600 volts, work from a position where you cannot reach into the minimum approach distance unless wearing rubber gloves or using live-line tools.
- I. Conductive items such as jewelry or clothing shall not be worn.
- J. Employees shall not wear conductive articles of any type including but not limited to keys, wristwatches, necklaces, watch and/or wallet chains, rings, bands, earrings, piercings, or large belt buckles when working on or around energized equipment or where they create a hazard.

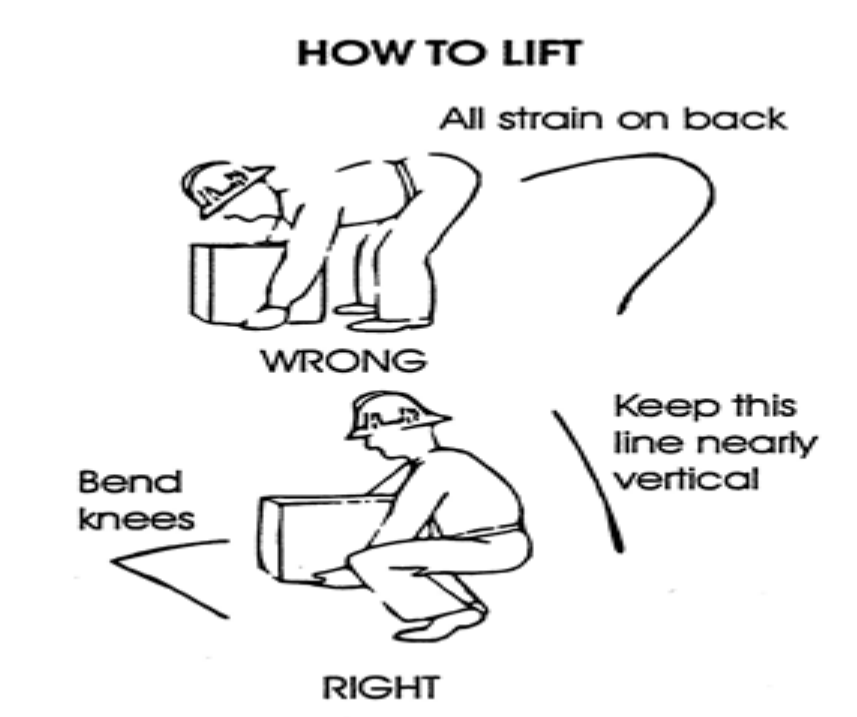
214 – Painting

- A. When spray-painting, adequate ventilation shall be provided, or the employees shall wear an approved respirator.
- B. Smoking is prohibited near spray painting operations.
- C. Spray painting shall not be allowed near energized parts unless barriers are placed between the spray gun and the energized parts.

- D. Pressure tanks used in spray painting operations shall be equipped with proper pressure relief valves, gauges, and a cutoff valve on the outlet of the tank.

215 - Handling Materials and Equipment

- A. Employees shall not attempt to lift loads beyond their capabilities. When lifting heavy loads, they shall be kept as close to the body as practical. Keep the back straight and use the leg muscles to raise the load.
- B. When two or more employees are lifting or pulling together, one employee shall give signals for the group. If possible, workers will face the direction the load is being carried. If the load is carried on the shoulders, the load should be on the same shoulder of each worker, if possible.
- C. Heavy objects shall be lowered in place, not dropped.



- D. When moving heavy equipment on rollers, such as transformers or machinery, employees handling the rollers should exercise care and should use rollers long enough to extend well past the skids.
- E. Hydraulic booms, hoists, blocks and tackles, jacks, and bars, etc., shall be used for objects too heavy to lift by hand.
- F. When lifting heavy equipment, synthetic fiber, chains or wire rope slings of suitable strength shall be used. The slings shall be placed to avoid cutting them on sharp edges. Synthetic fiber slings shall be used around energized equipment where the use of wire rope slings, or chains would create a hazard.

- G. When loading pipe of different sizes, load the larger size pipe first.
- H. Stack pipe in tiers and properly chock each tier. Do not stack in a pyramid. Do not stack pipe 3 inches and larger to a height over 48 inches. Coiled pipe must not be stacked to a height over 84 inches.
- I. Remove material from the top of the pile, not the side or bottom.
- J. When lowering pipe by ropes or down skids, stand opposite the direction that the pipe is moving. Skids used to lower heavy pipe from a truck must be secured to the truck.
- K. When using rollers to move heavy loads, rollers must extend beyond the skids or equipment base.
- L. Use caution when cutting the straps on coiled poly pipe, there may be a spring action from the pipe.

216 – Storing Materials

- A. When it becomes necessary to store material or equipment under or near energized lines or apparatus, consider induced voltage hazards and maintain applicable clearances.
- B. Where mechanical handling equipment is used, sufficient safe clearances shall be allowed for aisles, at loading docks, through doorways and wherever turns or passage must be made. Aisles and passageways shall be kept clear and in good repair, with no obstruction across or in aisles that could create a hazard. Permanent aisles and passageways shall be appropriately marked.
- C. Storage of material shall not create a hazard. Bags, containers, bundles, etc., stored in tiers shall be stacked, blocked, interlocked, and limited in height so that they are stable and secure against sliding or collapse.
- D. Scrap piles and junk material shall be kept as orderly as conditions permit. Care shall be used when handling scrap material to prevent injury.
- E. Chemicals shall be stored as determined by the Chemical Section of this handbook.
- F. Suitable compartments, boxes or containers shall be provided for storing rubber protective devices.
- G. Maximum safe load limits of floors within buildings and structures, in pounds per square foot, shall be conspicuously posted in all storage areas, except for the floor or slab on grade. Maximum safe loads shall not be exceeded. Handrails and toe-guards shall be provided.

217 – Welding

- A. General Rules
 - 1. Welding necessary to install or rebuild load-bearing devices shall be performed by a qualified welder.
 - 2. Gauntlet gloves shall be worn when welding or cutting. Outer clothing shall be free from oil or grease. Clothing around wrist and neck shall be fastened when necessary, and pants shall be long enough to cover the shoe tops. Fire resistant clothing shall be worn while welding or cuffing in close quarters. Pants shall not have turned up cuffs.

3. When welding or cutting, precautions shall be taken to see that sparks and hot metals do not strike or fall on persons or flammable materials. Retain all moveable potential fire hazards a minimum of 35 feet from the source of ignition.
 4. Hot materials shall be cooled or plainly marked before leaving them unguarded.
 5. Tanks, oil drums or other similar containers which have contained flammable liquids such as gasoline, transit oil, paints, solvents, etc., shall not have heat applied to them, either by fire or welding torch, until precautions have been taken to prevent fire or explosion.
 6. Proper ventilation is required when brazing, cutting, or welding.
 7. The firefighting equipment shall be maintained in a state of readiness during welding operations.
 8. Disposable butane lighters are specifically prohibited from being carried into areas where welding or other spark generating operations are being carried out. These lighters can explode with a force equivalent to three sticks of dynamite.
 9. Inspect welding equipment for broken rod holders, defective cables, shorts, and grounds, especially before welding in a damp area.
 10. Test for gaseous atmosphere prior to starting welding operations.
 11. If the object to be welded or cut cannot be moved, all movable fire hazards should be removed.
 12. Any welding, cutting, or burning of lead base metals, zinc, cadmium, mercury, beryllium or exotic metals or paints not listed here shall have proper ventilation, or respiratory protection.
- B. Oxygen Acetylene Welding
1. Welding apparatus shall not be handled with greasy gloves or greasy hands.
 2. The acetylene and oxygen hoses shall be inspected regularly for leaks. The hoses shall be protected from sparks, hot metals and crushing.
 3. Secondary check valves shall be installed on both lines to prevent back feed.
 4. Acetylene shall not be used at more than fifteen pounds of pressure. Cylinder valves shall be closed tightly when work is complete. When connecting the regulator to a new cylinder, the regulating spring shall be fully released.
 5. Acetylene cylinder valves shall be operated no more than three-quarters of a turn open to facilitate closing quickly in case of emergency.
 6. When using a gas cutting or welding torch in a confined area, an attendant shall be stationed at the cylinder to quickly close the valves should anything go wrong with either the hoses or torch.
 7. Approved welding goggles shall be worn by operators and helpers.
 8. Acetylene cylinders shall be transported and used with the valve end up. Care shall be taken to prevent dropping gas cylinders. Cylinders shall be secured at all times by chains or metal clamps.
 9. When transporting an oxygen-gas welding rig (other than by cart) the regulators shall be removed and safety caps installed during transit.
 10. Never use cylinders as a prop when cutting material.

11. Oxygen cylinders in storage shall be separated from fuel-gas cylinders or combustible materials (especially oil or grease), a minimum distance of 20 feet (6.1 m) or by a noncombustible barrier at least 5 feet (1.5 m) high having a fire-resistance rating of at least one-half hour.

C. Electric Welding

1. Approved shields or welder's goggles shall be worn by arc-welding operators and helpers. No one will be permitted inside the welding area while welding is in progress without wearing a shield or approved welders' goggles.
 2. When arc welding in a confined area, an attendant shall be stationed nearby. Proper ventilation shall be afforded at all times to replace oxygen consumed by the process and to remove gases generated by welding. Respiratory protection may be required (refer to Section 14).
 3. Caution shall be used to prevent accidental contact of the electrode to the welding machine ground.
 4. Before arc welding on any motor vehicle or trailer that has a wet cell battery, one lead of the battery shall be disconnected.
- D. Only welders qualified in accordance with the Company's qualified welder procedures will be allowed to weld on the Company's Distribution gas piping.
- E. Welders must be familiar with (1910.254 and with 1910.252) (a) (b) and (c).
- F. Fire watchers shall have Fire Extinguishers readily available. A fire watch shall be maintained for at least a half an hour after the welding or cutting operation is completed.
- G. First aid equipment must be available at all times.

218 - Fencing and Temporary Fencing

- A. When a substation fence must be expanded or removed for construction purposes, a temporary fence affording similar protection shall be provided when the site is unattended. Adequate interconnection with ground shall be maintained between the temporary fence and permanent fence.
- B. Temporary fencing installed around mobile equipment/open excavation shall provide adequate security while the equipment/excavation is unattended.

219 - Telecommunications Facilities

- A. Radio Frequency Transmission and Equipment
 1. Radio frequency equipment that is properly operated and maintained normally will not produce hazardous emissions of electromagnetic energy. However, improper installation or improper maintenance practices may result in radiation hazards, particularly at microwave frequencies. Exposure to energy radiated at microwave frequencies can cause injury to the eyes and other sensitive organs. No employee shall stand in front of or look directly into any open output port, waveguide or antenna that is connected to an energized microwave source.

2. Fiber optic transmitters and some types of fiber test equipment produce infrared radiation that cannot be seen but can produce eye damage. Therefore, - no employee shall look directly into un-terminated fiber or an output port that is connected to an energized fiber optic light source.
3. In all cases, employees who install, operate, or maintain radio frequency or fiber optic equipment shall be familiar with and adhere to the equipment manufacturer's safety warnings and recommendations.

220 – Natural Gas

- A. If a gas leak is reported at a residence, do not ring the doorbell, this could cause a tiny spark that could cause an explosion. Knock on the door.
- B. Do not use the customer's phone or allow them to call from their phone.
- C. Do not carry non-approved cellular phones or pagers into the home.
- D. Evacuate the home, as needed.
- E. If gas is detected in the structure, turn gas off at the meter and drain house piping.
- F. Wait for the gas to dissipate before entering.
- G. When approaching a meter, look for evidence of insects, such as wasps or fire ant mounds.
- H. Before entering a yard, check for dogs. Request the customer remove the dog from the yard if it is being aggressive.

221 – Pole Storage and Handling

- A. Poles shall be positioned so they will not roll and/or shift accidentally.
- B. Employees shall not climb on a pole pile during loading, unloading, handling, or inspecting.
- C. Whenever poles are to be loaded, unloaded, installed, or removed, a minimum of two employees shall be required.

Follow these guidelines when handling poles:

1. Examine the pole and the lifting, hoisting, and transporting equipment as part of the PJB hazard assessment.
2. Ensure the PJB procedures are complete and accurate and that all employees involved understand the hazards and task assignments.
3. Employees not directly involved in the work shall leave the area.
4. Inspect all tools, equipment, rigging and machinery before use. Confirm that all items are in good condition and are adequately rated for the load to be handled. Rigging chains and straps MUST have weight capacity tags attached and legible.
5. Park the pole trailer on level, stable ground.
6. Pole trailer shall have in place stakes, standards, or other such devices on both sides of the trailer to help prevent poles or pole sections from rolling off

- the trailer. These devices are to remain in place when pole(s) or pole section(s) are on the trailer.
7. Identify line-of-fire and pinch point hazards. Work from a position that does not expose workers to these hazards.
 8. Employees shall not enter areas where they are exposed to line of fire injuries from rolling or shifting loads.
 9. Employees shall not enter the area between the trailer and the hoisting equipment, or other fixed objects when the hoisting operation is underway.
 10. When unloading poles with multiple, separated layers, only the layer being unloaded may have the load tie-downs removed. All lower level tiedowns shall remain in place and secure.
 11. When unloading poles from a trailer, or on multi-layer loads, the load securement devices for the layer being unloaded shall not be removed until sufficient measures have been taken to ensure all pole(s) are secure from accidental rolling.
 12. Wooden wedges nailed to cribbing under a load shall not be the only means to hold a load in position during unloading operations.
 13. Use taglines to control the hoisted pole while being unloaded. NEVER guide a pole that is hoisted more than waist high by hand.
- A. Wooden Poles
1. The condition of the wooden pole should be carefully inspected before any hoisting operations begin.
 2. Pole stacks shall be examined carefully to identify hazards before moving any pole in the stack.
 3. Pole tongs shall not be used for extended pole handling or continuous movement of poles.
 4. Pole tongs shall only be used if it is impractical to use a sling.
 5. Employees shall roll poles away from them, using can't hooks or bars.
 6. Rolling or shifting poles shall not be caught with can't hooks.
- B. Concrete Poles
1. Concrete poles are to be lifted or hoisted only from the manufacturers designated lifting points.
 2. Concrete poles are to be lifted or hoisted with web-type slings only, chains and wire rope slings shall not be used.

3. The weights stamped on concrete poles by the manufacturer shall be used as guidelines only.

C. Steel Poles

1. Employees shall not walk on top of steel pole sections
2. Multiple layer loads being unloaded, only the layer being handled may have the tie-downs removed. All lower levels must have the tie-downs in place and secured.

222 – Transporting Poles

- A. After poles have been loaded, they shall be secured to the pocket stays, standards, trailer frame or rub rail with at least 3/8-inch chain or its equivalent web strap or cable.
- B. Use an escort vehicle and spotter(s) to prevent accidents and property damage when navigating congested areas.
- C. Employees shall use flags and wear a high viz vest when flagging traffic during pole transporting activity.
- D. Follow all local DOT regulations for lighting and flagging when transporting poles.
- E. Poles shall not be transported in the dark except as required for emergency response. Extreme caution should be used in these situations and escort vehicles shall be utilized.
- F. Caution shall be taken when poles are transported on digger truck headache racks. State laws shall be followed on length and weight limitations. Never exceed the GVWR of the vehicle.

223 – Poles Distributed Along Streets and Highways

- A. When poles are distributed along streets and highways, they shall be laid near the curb or in parkways between the curb and sidewalk where they will not interfere with traffic, driveways, or walkways.
- B. When poles are laid on an incline, they shall be blocked or staked to prevent rolling.
- C. Danger signs and/or warning lights shall be used as required to warn the public.
- D. Poles shall not be placed where they will interfere with drainage.

224 – Installing and Removing Poles, Towers, and Structures

- A. Care shall be taken to assure that the pole will not be top heavy when removed. Precautions shall be taken to eliminate a hazard should the top of the pole separate from the butt.
- B. All open pole or anchor holes shall be covered or barricaded when unattended.

- C. Rubber Gloves rated at or above the nominal voltage shall be worn when poles are being installed or removed in proximity to conductors or equipment energized at a nominal voltage of 34,500 and below. Precaution shall be taken to avoid contact with energized lines or equipment.
- D. Physical contact shall not be made with poles, towers, or structures when being installed or removed in proximity to conductors or equipment energized at a nominal voltage above 34,500. Taglines shall be used to control the pole.
- E. All members of a crew who are not actually engaged in the installation or removal of a pole shall stand clear.
- F. All pedestrians and traffic shall be kept at a safe distance or rerouted around the work site while a pole is being installed or removed.
- G. Taglines or other suitable devices shall be used to control loads being handled by hoisting equipment.
- H. Pole setting trucks shall be positioned so minimum safe working distances are observed. If safe working distances cannot be achieved, the equipment shall be de-energized or covered with approved protective devices.
- I. When work is being done in proximity to energized equipment, all employees shall keep clear of the vehicle.
- J. Pole guards or suitable rubber protective equipment shall be used when setting poles in energized primary.
- K. When setting multi-piece poles, all slip joints must be secured to prevent accidental separation of joints during movement. Securement devices must be capable of supporting the weight that could become suspended below the joint.

225 – Stringing and Salvaging Conductors

- A. Payout Reels and Tensioning Equipment
 - 1. Only payout reels equipped with a braking device shall be used when conductor is to be pulled in place under tension. Employees shall not attempt to stop a revolving reel with the hands or other parts of the body.
 - 2. The end of the conductor on the last layer of wire shall be secured prior to paying out the conductor. If the end cannot be secured, the conductor shall be adequately snubbed to maintain tension.
 - 3. When portable reels are used to payout conductor under tension, the reel shall be mounted sufficiently to withstand the strain impressed upon them without shifting.
 - 4. Tensioners shall be isolated from other equipment and properly grounded to the system neutral, or structure ground bonded to the system neutral where available.
 - 5. A rolling ground shall be placed between the tensioner and the first structure.
 - 6. Where an Equipotential Zone (EPZ) is established ensure all equipment and conductors are bonded together.

7. Always barricade equipment to prevent access by unauthorized personnel or pedestrians.
8. Operators must isolate or insulate themselves from hazardous differences of potential, or work within an EPZ.

B. Handling Conductors near Energized Lines or Equipment

1. Prior to stringing or salvaging conductor, a briefing shall be held to discuss the crew complement, roles, job plan, the equipment needed, grounding, crossings, and clearances.
2. Ropes or hard lines used to pull conductors under tension shall be of appropriate size for the conductor to be pulled.
3. Repair or replace defective pulling lines and accessories.
4. Do not use conductor grips on wire rope unless the grip is specifically designed for the application.
5. When replacing conductor, the old conductor may NOT be used to pull in the new conductor without an analysis to ensure the old conductor has the capacity to pull the new conductor under tension.
6. Conductors shall be pulled slowly, steadily and under control. The conductors shall be observed throughout the duration and length of the pull.
7. Do not exceed load ratings of stringing lines, pulling lines, conductor grips, load-bearing hardware, and accessories, and rigging and hoists.
8. When installing conductors near energized lines and apparatus, caution shall be taken to minimize the possibility of contact between the conductor being pulled and energized parts. This can be accomplished by covering the energized parts of distribution circuits with approved protective equipment or by constructing adequate guard structures.
9. If hazardous voltage induction is possible, do the following:
 - Ground each bare conductor so that no point is more than 2 miles from temporary protective grounds (TPG).
 - Do not remove the TPG until the conductor installation is completed between dead ends.
 - Remove grounds as the last phase of aerial cleanup.
 - If working on bare conductors, install grounds at:
 - Each work location where the employees are working.
 - All open dead-end or catch-off points or the next adjacent structure.
 - If splicing two bare conductors, bond and ground the conductors before splicing.

- Keep reel handling equipment, including pulling and tensioning devices:
 - In safe operating condition
 - Leveled
 - Aligned
 - Grounded
- 10. Employees who must stand on the ground to operate tensioning or pulling equipment and are exposed to differences of potential shall isolate and insulate themselves by using approved protective equipment.
- 11. Communication shall be maintained between the pulling rig operator, the payout reel, tensioner attendant and the employee assigned to follow the pulling grip.
- 12. The automatic reclosing feature shall be made inoperative if the conductors being pulled in will cross over or closely parallel circuits energized at 600 volts or more.
- 13. If conductors are to be spliced, they shall be bonded and grounded, prior to splicing, to prevent the employees being placed in series with the conductor.

C. Crossing Energized Circuits or Highways

1. Circuits with automatic reclosing capability shall have the automatic reclosing feature turned off when the conductors being pulled in will cross over or closely parallel circuits energized at 600 volts or more.
2. When stringing wires across highways or circuits energized at 600 volts or above, one of the following methods shall be used to support the new conductor:
 - Erect guard poles and guard structures to support the conductors well above the highway or energized circuits.
 - Mobile guard structures (bat wings) may be placed as an alternative to erecting guard structures. (Note: Bucket trucks are not acceptable as guard structures.)
3. Rolling grounds shall be used between the tensioner and the first structure, Extra High Voltage (EHV) rolling grounds shall be used when stringing conductor parallel to energized EHV transmission lines on the same right of way.
4. Transmission pulls shall use grounding blocks during stringing operations to provide intermediate grounding where high induced voltages could exist, at all energized crossings, and on the first and last structures of the pull.
5. Flaggers shall warn or stop traffic as necessary when pulling wires over highways or streets.

D. Removing or Salvaging Conductors

1. Rules for stringing wire also apply to the removal or salvage of wire. When possible, wire being removed shall be laid on the ground before rolling it up by hand or by a hand-driven take-up reel. When using a power-driven take-up reel, the wire may be rolled up without laying it on the ground.
2. Proper grounding and bonding must be utilized when removing conductors under tension.

226 – Climbing Poles

- A. A careful examination should be made of the condition of the pole.
 1. A qualified employee should inspect wood poles for the following conditions
 2. General condition. Buckling at the ground line or an unusual angle with respect to the ground may indicate that the pole has rotted or is broken.
 3. Cracks. Horizontal cracks perpendicular to the grain of the wood may weaken the pole. Vertical cracks, although not normally considered to be a sign of a defective pole, can pose a hazard to the climber, and the employee should keep his or her gaffs away from them while climbing.
 4. Holes. Hollow spots and woodpecker holes can reduce the strength of a wood pole.
 5. Shell rot and decay. Rotting and decay are cutout hazards and possible indications of the age and internal condition of the pole.
 6. Knots. One large knot or several smaller ones at the same height on the pole may be evidence of a weak point on the pole.
 7. Depth of setting. Evidence of the existence of a former ground line substantially above the existing ground level may be an indication that the pole is no longer buried to a sufficient depth.
 8. Soil conditions. Soft, wet, or loose soil around the base of the pole may indicate that the pole will not support any change in stress.
 9. Burn marks. Burning from transformer failures or conductor faults could damage the pole so that it cannot withstand changes in mechanical stress.
- B. Hammer test. Rap the pole sharply with a hammer weighing about 3 pounds, starting near the ground line, and continuing upwards circumferentially around the pole to a height of approximately 6 feet. The hammer will produce a clear sound and rebound sharply when striking sound wood. Decay pockets will be indicated by a dull sound or a less pronounced hammer rebound.
- C. For a more thorough inspection dig around the butt of the pole and probe with a large screwdriver.
- D. Before climbing, the employee shall first:
 1. Determine what circuits are energized and at what voltage.
 2. Inspect climbing equipment to ensure it is in good condition.
 3. Remove signs, tacks or nails that may be in the way of safe climbing.

4. Visually inspect all ground and neutral connections associated with the equipment mounted on the pole. CAUTION: Any equipment case with a broken or loose ground shall be considered energized.
- E. While climbing, the Employee:
 1. Shall use 100% Fall Protection Device. (i.e., buck squeeze & secondary safety).
 2. Shall climb on the high side of a leaning pole whenever possible.
 3. Shall take precautions to avoid weather cracks, checks, hard places, etc., to prevent climber cut out.
 4. Shall avoid grasping pins, crossarm braces, brackets or other attachments that might pull loose.
 5. Shall not stand on mailboxes, signs, fire alarm boxes or other equipment that may be attached to the pole or located near it.
 6. Shall not race up and down poles.
 7. Shall not climb a pole with conductors attached to the safety belt.

227 – Climbing Elevated Structures

- A. Before climbing ladders, scaffolds or other elevated structures, employees must first assure themselves that the structure or device is strong enough to safely support the added weight of the employee, tools, and equipment

228 – Climbing Steel Towers

- A. The same basic safety procedures that apply to climbing wood poles, apply to climbing steel towers. Note: 100% fall protection is required.
- B. Before climbing steel poles or towers, make sure that boots are free of mud, grease, or other slick materials.
- C. A minimum of two competent rescue climbers be on site while performing elevated tower work.

229 - Use of Handlines, Droplines and Taglines

- A. When work is to be performed on a pole, tower or structure that requires the raising or lowering of materials, a handline shall be carried aloft and securely fastened. Exception: A dropline may be used for transmission line climbing inspections, service work and light duty work in substations.
- B. Materials and tools shall not be thrown to employees working aloft; they shall be raised and lowered with a handline or dropline.
- C. Keep handline clear of vehicular and equipment movement.
- D. Never clip a handline to the D-ring on a body belt.
- E. Large items being raised or lowered with a handline shall be tied securely. Small items shall be raised and lowered in a canvas bag.

- F. Taglines should be used to guide materials around or over crossarms or other obstructions, and as a positive means of control when equipment is being moved near energized apparatus.
- G. Never exceed the ratings of the rope, block, or handline hook.

230 - Working Below Other Employees

- A. When assisting those working aloft, a drop zone shall be established, and workers shall stay out of the drop zone.
- B. If it is necessary to work near the pole, tower, or structure, notify the employee(s) aloft, who will stop work until the employee below is clear of the drop zone.
- C. While working on a pole, tower, or structure, it is sometimes necessary for one employee to work below another. This practice should be avoided whenever practical.
- D. Materials and tools shall not be left unsecured in overhead positions.

231 – Crossing a Structure

- A. Employees shall not walk timbers, cross arms, or structures unless there is additional support for fall arrest equipment.
- B. Employees shall not cross through an open-air switch that is energized on either side.
- C. Energized portions of the structure shall be isolated with barriers, and when needed, an employee shall be assigned to warn other employees approaching the energized area.
- D. Employees should not use air switch arcing horns for support.

232 – Tree Trimming and Cleaning Right of Way

- A. All tools, ropes and other equipment shall be inspected before use.
- B. Employees shall not engage in any phase of tree trimming work until they have been trained in safe tree trimming procedures.
 - 1. If a tree trimmer is to approach any conductor energized at more than 600 volts there shall be a second tree trimmer within normal voice communication distance.
 - 2. The minimum safe working distance (MAD) shall be observed when trimming trees around energized lines.
- C. Before starting any tree trimming, the necessary time shall be taken to identify the hazards involved.
- D. Employees shall remove vines and low hanging limbs to provide adequate room to swing an axe, brush hook or machete.
- E. Employees shall maintain separation from each other while using swinging tools such as an axe or sledgehammer etc.

- F. Employees and the public shall be kept at a safe distance when a tree is felled or trimmed.
- G. An axe shall not be used when working aloft in a tree.
- H. Large, heavy limbs shall be removed in sections and shall be bound below the cut when there is a possibility of the limb splitting. Limbs that may create a hazard shall be lowered with a rope.
- I. Trees and limbs touching energized conductors shall be considered as energized and shall be handled with insulated tools unless the lines are de-energized and grounded.
- J. When climbing trees, a ladder shall be used to gain access to the trees. When the use of a ladder is impractical, a 1/2-inch rope or larger (with a minimum breaking strength of 2300 lbs.) with saddle or approved tree gaffs may be used.
- K. All tree climbers shall use an approved body belt with safety strap. Safety straps shall be placed around a tree limb or taut rope to prevent falls.
- L. Employees shall satisfy themselves that tree limbs will support their weight or any strain that may be placed on the limb.
- M. All tools shall be raised or lowered from a tree with a handline or dropline.
- N. Precautions shall be taken to prevent trees being felled from contacting overhead lines.
- O. Employees shall not carry axes or brush hooks on their shoulders.
- P. Ropes or winch lines shall be used to guide the fall of a tree when there is a hazard.
- Q. All other PPE requirements are in place such as hearing protection, safety glasses, chaps, and hardhats.

233 – Brush Chippers

- A. Brush chippers shall be equipped with a locking device in the ignition system.
- B. Access panels for maintenance and adjustment of the chipper blades and associated drive train shall be in place and secure during operation of the equipment.
- C. Brush chippers not equipped with a mechanical in-feed system shall be equipped with an in-feed hopper of sufficient length to prevent employees from contacting the blades of the machine during operation.
- D. Trailer chippers detached from trucks shall be chocked or otherwise secured.
- E. Employees in the immediate area of an operating chipper feed table shall wear eye, face, and hearing protection.
- F. Employees shall not stand directly in front of the in-feed hopper while feeding brush.

234 - Operating Aerial Lifts Near Energized Lines or Apparatus

- A. Insulated equipment utilizing hydraulically operated booms to raise aerial baskets in which employees work on energized electric lines shall be equipped with upper and lower controls. The basket shall be equipped with an insulated liner when using the rubber glove technique on lines or apparatus energized at 600 volts or more.
- B. Employees shall be knowledgeable of the rubber glove technique and familiar with aerial basket equipment before being permitted to work on or around energized lines or apparatus from aerial basket equipment.
- C. Employees operating aerial basket equipment and working on or near energized lines or equipment shall properly wear appropriate protective equipment.
- D. A Qualified person shall watch the employee while working on voltages 600 and greater. The Foreman shall determine the qualification of the observer.
- E. An employee working alone shall not glove equipment energized above 600 volts.
- F. In a crew operation using aerial basket equipment, the work shall be observed by a qualified employee on the ground capable of operating the aerial basket controls in an emergency.
- G. Employees using the rubber glove technique shall not work on lines or apparatus energized at voltages above the electrical rating of the aerial basket.
- H. By-passing the insulation of the aerial basket equipment shall be prohibited.
- I. Conductive materials that could bridge the lower boom insert insulator shall not be stored around the pedestal.
- J. When operating aerial basket equipment, the use of electric drills, electric soldering irons, or similar tools requiring the use of extension cords is prohibited on energized lines and equipment.
- K. Employees working from an aerial lift shall wear an approved safety harness with a shock absorbing or self-retracting lanyard (SRL). The lanyard shall be attached from the harness to the boom.
- L. The operating controls shall be labelled to identify individual controls and indicate the direction of movement.
- M. The lift controls shall be tested each day prior to use to determine that such controls are in safe working condition. Tests shall be made at the beginning of each shift during which the equipment is to be used to determine that the brakes and operating systems are in proper working condition.
- N. Vehicles equipped with aerial basket equipment shall not be moved while the boom is uncradled or an employee is in the basket. Exception: When necessary to position the vehicle in congested areas, the vehicle may be moved with the employee in the basket for short, pole to pole, moves only. The

employee shall face the direction of the movement of the basket. The bucket must be stowed for the duration of the move.

- O. When working on energized equipment, the basket or boom shall not rest against conductors or devices that are not covered with protective equipment.
- P. Tools and equipment shall not protrude, hang, or be stowed from the basket when not in use. Hydraulic tools shall be stored in their proper container when not in use. Care shall be taken that the hose does not become entangled with the operating controls.
- Q. Employees shall not stand on top of the basket, on planks across the top of the basket, or on ladders placed in or across the basket.
- R. While in contact with energized lines or apparatus, the employee shall avoid:
 - 1. Touching the pole, structure, crossarms, grounds, opposite phases, etc., with any part of the body.
 - 2. Handing material or tools to personnel on poles or structures.
 - 3. Transferring material or tools to or from a handline attached to a pole or structure.
- S. Employees in double basket equipment shall not contact opposite phases, or a phase and a ground, at the same time.
- T. Before any employee contacts the vehicle, all work shall cease, and it shall be determined that the employee working in the basket and the boom is positioned outside of MAD.

Note: Communication between the worker aloft and the worker on the ground is essential.

- U. Boom and basket load limits specified by the manufacturer shall not be exceeded.
- V. The vehicle has a reverse signal alarm audible above the surrounding noise level or the vehicle is backed up only when an observer signals that it is safe to do so.

235 – Testing for Voltage

- A. Consider lines and equipment as energized until they have been isolated, tested for voltage and grounded where applicable.
- B. When work requires direct contact with electrical circuits, use voltage testing devices to verify that the equipment is de-energized.
- C. Be aware that equipment can be fed by more than one source or can be actuated from more than one location.
- D. If any unusual condition is encountered (e.g., voltage present when it should not be) immediately stop work, place the equipment in a safe condition and contact your supervisor.

- E. Test for voltage initially and after other work stoppage.
- F. If the circuit to be tested is over 600 volts, check the test equipment for proper operation immediately before use. Follow the manufacturer's instructions for the device.
- G. If there is a possibility of the re-accumulation of stored energy to a hazardous level, verify safe work conditions periodically throughout the shift until work is completed or until the possibility of such accumulation no longer exists.
- H. Before use, visually inspect test instruments, leads, cables, power cords, probes, and connectors for external damage. If there is any doubt as to the equipment's integrity, do not use it.
- I. Verify that voltage testing devices are operating properly and that appropriate settings are used for the voltage to be checked.
- J. Verify that the testing device is being used for the correct application and in the proper configuration. Follow the instructions in the operator's manual for the specific make and model being used.
- K. Do not exceed the maximum safe voltage for the test equipment. Follow manufacturer's guidelines and/or group procedures for specific limitations of equipment used.

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Underground Distribution

301 – General Work Area

- A. Whenever a dangerous condition is found, such as a broken manhole or vault cover, unlocked enclosures, etc., necessary steps shall be taken to protect employees and the public.
- B. It is the duty of the employee to inspect all protective devices and make sure they are in satisfactory condition before using them.
- C. The importance of keeping the general work area clean cannot be overstressed. Care should be taken that all tools and equipment are placed in an orderly manner.
- D. All URD equipment and conductors shall be treated as energized until approved testing methods confirm that they are de-energized.
- E. Primary rated rubber gloves, hard hat, and approved eye protection shall be worn when opening or closing an energized pad-mount transformer or switching cabinet.
- F. Door hinges of each enclosure shall be checked before it is opened. Both hands shall be used to keep positive control of the lid of the enclosure. Doors shall be blocked so that they cannot close accidentally. Cabinet doors of pad-mount transformers and switching cabinets shall not be left open while unattended.
- G. A thorough examination for defects shall be made of all energized cables or equipment in the work area. If defects are found, the cable or equipment shall not be moved until it is de-energized and grounded.
- H. Energized cables that are to be moved shall be inspected for defects. Where a cable in a manhole has one or more abnormalities that could lead to or be an indication of an impending fault, the defective cable shall be de-energized before any employee may work in the manhole, except when service load conditions and a lack of feasible alternatives require that the cable remain energized. In that case, employees may enter the manhole provided they are protected from the possible effects of a failure by shields or other devices that are capable of containing the adverse effects of a fault in the joint. [OSHA 1910.269(t)(7)(I)] (refer to manhole section 13 confined space/enclosed space)
- I. Employees shall “avoid contact” for primary URD cable provided an inspection of the cable verifies the following:
 - 1. The primary side conductors and elbows are designed and maintained with insulation sufficient for the voltage.
 - 2. The concentric neutral wire is not corroded and its connection at the tie-off tab on the elbow is intact
 - 3. The equipment grounding is in good condition.

- J. When work is being performed in service pedestals, hand holes, or pad-mount transformers on energized secondary conductors, all cover-up rules shall be followed
- K. Company approved FR clothing, appropriately rated rubber gloves, hard hat, and approved eye protection or face shield when required along with a second level of protection i.e., blankets, secondary covers shall be used while performing work inside pad-mount transformer or switching cabinet when exposed to unguarded or uncovered energized conductors or equipment.
- L. Treat all cables as energized until approved methods have been used to determine that they are de-energized.

302 – Opening and Closing Circuits

- A. All switching, tagging, and grounding rules shall be followed when de-energizing lines and equipment.
- B. A switching tool, appropriately rated rubber gloves, hard hat and eye protection/face shield when required shall be used when switches in an energized primary circuit are opened or closed.
- C. Although the primary cables and elbows are covered with a semi-conducting material that is grounded, all contact with unprotected parts of the body, tools or materials shall be avoided.
- D. Only those plug-in devices designed and approved for load-break shall be used with appropriately rated hot sticks to connect or disconnect energized circuits during switching operations
- E. When opening energized disconnects and fused cutouts in primary underground distribution systems that do not have load break devices, a load-break tool shall be used

303 – Work on Energized Equipment

- A. Before beginning work on any pad mount equipment, the equipment shall be visually inspected for any mechanical or electrical damage. If it is considered unsafe, the equipment shall be de-energized and grounded.
- B. When opening an enclosure where primary voltage could exist, the employee shall wear a hard hat, eye protection and appropriately rated rubber gloves. If it is necessary to work inside the enclosure where exposed energized primary parts could be contacted by overreaching, slipping, or falling, rubber sleeves shall also be worn. When working on circuits energized at 0-600 volts, Class 0 rubber gloves may be used if approved by management and Safety.
- C. Appropriately rated rubber gloves and sleeves shall be worn:

1. To remove any vegetation that may be in contact energized components of pad mount equipment or enclosures. (Hot sticks may be necessary to remove vegetation from live parts.)
 2. While performing switching operations on pad mounted equipment when operating Gang Operated Switches
- D. Dead-break elbows shall not be removed while they are energized.
- E. Only one energized secondary or service conductor shall be worked at a time. All grounds, cable sheaths and terminals energized at a potential different from that to be worked shall be covered with rubber protective equipment prior to starting work on the energized terminal.
- F. Employees shall not step on energized cables.
- G. When it is necessary to lay cable across an area accessible to traffic, the cable shall be protected by a barrier, temporary cover, or guard to prevent damage to the cable and for the safety of employees and the public.
- H. An arc flash rated jacket with hood, and rubber gloves shall be worn when working on enclosed, energized 277/480-volt equipment. It is permissible to check voltage in the secondary side of pad mount transformers without a flash jacket, hood, and face shield.

304 – Working on Distribution Primary Cables

- A. The external appearance of cables, whether primary, secondary or communication is, in many cases, similar. For this reason, it is extremely important to take all steps necessary to positively identify the cable to be worked and to assure that the identified cable is de-energized.
- B. Before a URD enclosure is opened, all unauthorized persons including private citizens shall be required to leave the work area and remain clear of all hazards involved in the work.
- C. If cables are to be punctured or cut, the cables shall be tested, grounded, and tagged. Spiking or puncturing shall take place using an approved device and above ground by a qualified employee only.
- D. When disconnecting terminations on cables that have not been punctured or cut and cannot be grounded at the work location, all personnel in the immediate work area shall wear appropriate personal protective equipment. Exposed cable ends shall be temporarily grounded before proceeding with the work.

- E. Any errors found in cable tagging, manhole records or maps should be reported to the supervisor. Under no circumstances should an identification tag be removed, changed, or placed on a circuit without permission of the supervisor.

305 – Pulling Cables

- A. When pulling cables, care should be taken to protect employees and the public from injury. This will require a study of the vehicular and pedestrian traffic at the location, so that the equipment will be set up in the safest manner possible. All persons, including employees, not directly involved with the pulling operation, shall stay clear of ropes or cables that are under strain.
- B. Employees should not remain in a hole while installing or removing cable if it is indicated that a heavy pulling strain will be necessary.
- C. Cables laid temporarily across sidewalks during pulling operations shall be properly protected and barricaded to avoid injuring pedestrians.
- D. When installing or removing cable with a winch line in the vicinity of energized equipment or conductors, extreme care shall be taken to isolate the winch line by using suitable barriers and rubber goods.

306 – High Voltage Pipe-Type Cable Systems

- A. Rules for working in manholes on distribution voltage systems apply to high voltage pipe-type systems.
- B. Pipes in oil-filled cable systems contain oil under high static pressures and care shall be taken not to rupture the pipe.

307 – Working on or near Exposed Energized Lines and Equipment

- A. Only Qualified employees and trainees working under their direct supervision may work on or with exposed energized lines or parts of equipment or access enclosures. Only qualified employees and trainees working under their direct supervision may work in areas containing unguarded, un-insulated energized lines or parts of equipment operating at 50 volts or more. When employees are performing on or associated with exposed lines or equipment energized at 50 volts or more, persons trained in First – Aid and cardiopulmonary resuscitation (CPR) shall be available as follows.
 - 1. For fieldwork involving two or more employees at a work location, at least two trained workers shall be available. Only one trained person needs to be

available if all new employees are trained in First aid and CPR within 3 months of their hire date.

2. For fixed work locations, the number of trained workers shall be sufficient to ensure that each employee exposed to electric shock can be reached within four (4) minutes by a trained person. Where the existing number of employees is not sufficient to meet this requirement (at a remote location, for example) all employees at the work location shall be trained.

B. At least two (2) employees will be present while the following types of work are being performed. (Except as noted in c. below):

1. Installation, repair, or removal of de-energized lines if an employee is exposed to contact with other parts energized at more than 600 volts.
2. Installation, repair, or removal of lines energized at more than 600 volts.
3. Installation, repair, or removal of equipment such as transformers, capacitors, regulators, switchgears, and sectionalizing cabinets, if any employee is exposed to contact with parts energized at more than 600 volts.
4. Work involving the use of mechanical equipment, other than insulated aerial lifts, near parts energized at more than 600 volts.
5. Any other work that exposes an employee to electrical hazards greater than or equal to those listed above.

C. Two employees do not need to be present on the following conditions:

1. Routine switching of circuits. (If it can be done safely).
2. Work performed with live line tools if the employee is positioned so that they are not within reach of or otherwise exposed to energized parts.
3. Emergency repairs are necessary to safeguard the public.

D. No employee may approach or take any conductive object closer to exposed energized parts than the clearances set forth in Section 201 Table 2-1 and following the requirements of 201.C in section 2 of this manual.

308 – Directional Boring Operations

- A. Employees shall be familiar with the operator's manual of the machine being used when operating directional boring equipment.
- B. Employees shall avoid all pinch points, rotating shafts and other moving parts that could cause injury.
- C. Employees shall not wear loose fitting clothing that may become entangled in the drill stem and shall restrain long hair to keep it away from moving parts. Employees shall stay clear of drill rod and drill unit when drilling is in progress.

- D. Proper care and maintenance of directional boring equipment shall be performed according to manufacturer's specifications.
- E. Employees shall be properly trained in the safe use of directional boring equipment.
- F. Employees shall follow all rules and regulations regarding open excavations.
- G. Proper PPE and FR Clothing shall be worn by all employees during directional boring operations. Rubber gloves shall be placed on the machine within the operator's reach.
- H. Machine shall be grounded to a pole ground when available. Use a temporary screw down ground or ground rod installed as deep as possible if a pole ground is not available.
- I. Strike alert system shall be tested and fully functional before boring operations begin

309 - Location of underground facilities.

- A. The person in charge shall contact a one call service and request the location of underground utilities and other services prior to starting boring operations. If a one call service is not available, each individual utility shall be contacted. A positive response shall be received and noted with no exceptions before work may begin.
- B. The person in charge shall conduct a visual inspection of the jobsite looking for conditions that indicate there may be buried utilities or other obstructions in the bore path. Conditions may include buried utility notices, utility using facilities without overhead lines, gas or water meters, junction boxes, drop boxes, pad-mounted transformers, light poles, manhole covers, sunken ground, or any other irregularity that may indicate previous trenching.
- C. The person in charge shall check to see that all utilities marked by other organizations look reasonable and that none appear to be overlooked. If locating equipment is available, spot checks of the locations flagged by others shall be made. If there is a doubt as to the location of a buried utility, the utility should be hand dug to determine the exact location.
- D. One or more of the following boring methods shall be used when operations are within 10 feet of a utility.
 - 1. Expose the utility along the bore path, by carefully hand digging.

2. Have the utility shut down during the boring operation, and upon completion, tested prior to turning on the service to ensure the utility has not been damaged during the operation
3. Use a steerable, tracked boring system and electrical strike system.

E. Storm Drain Protection

1. Prior to conducting bore work, protect storm drains in case drilling slurry escapes the work area.
2. Silt fences, silt socks, silt bags, and hay bales are examples of measures that can be used in and around storm drains.
3. Spill mats and storm drain covers can be used to block storm drains if a spill does in fact occur.

Excavation and Trenching

310 - General

- A. Call the local/state excavation hotline or vendor as applicable a minimum 48 hours (excluding weekends and holidays) before beginning any excavation work. For emergency locates, notify excavation hotline or vendor, and inform them of the nature of the emergency locate. Locates shall be confirmed with no exceptions.
- B. The location of sewers, telephone, gas, electric, water lines, or any other underground installations that may be encountered during excavation work, shall be determined prior to opening an excavation. The site shall be thoroughly inspected to determine if special safety measures shall be taken.
- C. If an excavation operation results in damage to hazardous facilities (such as gas lines, toxic or flammable pipelines, etc.), workers shall retreat to a safe distance, protect the public from entering the area, call 911, and follow state reporting requirements.
- D. All equipment, material, supplies, permanent installations (e.g., buildings or roadways), trees, brush, boulders, and other objects at the surface that could present a hazard to employees working in the excavation shall be removed or supported as necessary to protect employees.
- E. Before starting an excavation in any energized substation, the crew leader shall obtain all available information on existing subsurface structures such as power and control cables, pipes, ground wires, etc. Work in the vicinity of all underground facilities shall be done with great care. The crew leader shall designate the limits of the excavation and the employees shall keep within these limits.

- F. Excavation shall be done in a manner that does not endanger the employees engaged in the work or the underground installations. Protect utilities left in place by barricades, shoring, suspension, or other means as necessary to protect employees.
- G. While digging or excavating, there shall be No smoking or open flames while digging or excavating at any point due to the danger of ignition from escaping gas.
- H. Whenever excavation is done near buried facilities, precautions shall be taken to prevent damage. Hand digging or other soft dig techniques may be necessary. Rubber gloves and protectors shall be worn when probing around energized cable.
- I. When digging or trenching equipment is being used, employees and the public shall be kept at a safe distance. Except for training purposes, the operator shall be the only one allowed on the digging machine while it is in operation.
- J. Employees exposed to vehicular traffic shall be provided with and shall wear high visibility traffic vests with no exception.
- K. When drilling a pier, caisson, or shaft of 30 inches or more in diameter you shall use the following guidelines:
 - 1. The area around the pier shall be barricaded to prevent unauthorized access to the area. The barricade shall be no closer than 6 feet from the edge of the hole.
 - 2. The supervisor will designate one employee that will be authorized to enter the barricaded area during drilling operations.
 - 3. The employee entering the barricaded area shall be wearing a PFAS with a retractable lanyard.
 - 4. The retractable lanyard shall be attached to a dead man (concrete block) that is placed outside the barricade in case of cave in.
 - 5. No employee is permitted on top of a hole while pouring concrete without a PFAS.

311 – Protection of Workers in Excavations

- A. If an employee must enter a trench or excavation and conditions exist that may cause entrapment or engulfment, a Competent Person shall inspect the trench or excavation prior to entry. Inspections shall be made periodically for the duration of entry, and after rainstorms or other events that may cause a cave-in.
- B. Employees shall not be allowed to enter excavation four feet or more in depth without having at least two competent employees present in the immediate work area.

- C. Stairs, ladders, or ramps shall be provided where employees are required to enter excavations four feet or more in depth. The maximum distance of lateral travel (i.e., along the length of the trench) required to reach the means of egress shall not exceed 25 feet. Ladders shall extend a minimum of three feet above the top of the trench.
- D. Structural ramps that are used solely by employees as a means of access or egress from excavations shall be designed by a competent person. Structural ramps used for access or egress of equipment shall be designed by a competent person qualified in structural design and shall be constructed in accordance with OSHA 1926-650, 1926-651, and 1926-652.
- E. Ramps and runways constructed of two or more structural members shall have the structural members connected to prevent displacement.
- F. Structural members used for ramps and runways shall be of uniform thickness.
- G. Cleats or other appropriate means used to connect runway structural members shall be attached to the bottom of the runway or shall be attached in a manner to prevent tripping.
- H. Structural ramps used in lieu of steps shall be provided with cleats or other surface treatments on the top surface to prevent slipping.
- I. A warning system shall be used when mobile equipment is operated adjacent to the edge of an excavation if the operator does not have a clear and direct view of the edge of the excavation. The warning system shall consist of barricades, hand, or mechanical signals, or stop logs. If possible, the grade should be away from the excavation.
- J. Operators of trenching or digging equipment shall notify other crew members before putting the machine in motion. When digging equipment is in operation, workers shall stay clear of the operating zone of the equipment (360 degrees around the equipment, up to the equipment's maximum working radius).
- K. Employees shall not be permitted underneath loads handled by lifting or digging equipment. Employees shall be required to stand away from any vehicle being loaded or unloaded and utilize tag lines, when needed, to control the material being loaded or unloaded to avoid being struck by any spillage or falling material. Operators may remain in the cab of vehicles being loaded or unloaded when the vehicles provide adequate protection for the operator during loading and unloading operations.

- L. Where oxygen deficiency or a hazardous atmosphere exists or could reasonably be expected to exist in an excavation, the atmosphere shall be tested. A hazardous atmosphere could be expected, for example, in excavations in areas where hazardous substances are stored nearby, or in excavations near or containing gas pipelines.
- M. All employees working in trenches or excavations shall wear appropriate PPE for the hazards present.
- N. Walkways shall be provided where general foot traffic or equipment are permitted to cross over excavations. Guardrails shall be provided where walkways are six feet or more above lower levels.
- O. Employees shall not work in excavations that contain or are accumulating water unless precautions have been taken to protect employees against the hazards posed by water accumulation.
- P. If water is controlled or prevented from accumulating by the use of water removal equipment, the water removal equipment and operation shall be monitored by a person trained in the use of the equipment.
- Q. Where the stability of adjoining buildings, walls, or other structures is endangered by excavation operations, support systems such as shoring, bracing, or underpinning shall be provided to ensure the stability of such structures.
- R. Excavation personnel shall not be permitted to work above one another except when employees at the lower levels are protected from the hazard of falling, rolling, or sliding material or equipment.
- S. Employees shall be protected from excavated materials, equipment, or other materials that could pose a hazard by falling or rolling into excavations.
- T. Protection shall be provided by keeping such materials or equipment at least two feet from the edge of excavations, by the use of restraining devices that are sufficient to prevent materials or equipment from falling or rolling into excavations, or by a combination of both if necessary.
- U. Daily inspections of excavations, the adjacent areas, and protective systems shall be made by a competent person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions.
- V. An inspection shall be conducted by the competent person prior to the start of work and as needed throughout the shift. Inspections shall also be made after every

rainstorm or other hazard increasing occurrence. These inspections are only required when the excavation/trench will be or is occupied by employees.

- W. Where the competent person finds evidence of a situation that could result in a possible cave-in, failure of protective systems, hazardous atmosphere, or other hazardous conditions, exposed employees shall be removed from the hazardous area until precautions have been taken to assure their safety.
- X. Sidewalks, pavements, and structures shall not be undermined unless a support system or another method of protection is provided to protect employees from the possible collapse of such structures.

312 – Protective System Requirements

- A. Employees in an excavation shall be protected from cave-ins by using either an adequate sloping and benching system or an adequate support or protective system. The only exception is:
 - 1. Excavations less than five feet in depth where examination of the ground by a competent person provides no indication of a potential cave-in.
- B. The slope and configuration of sloping and benching systems shall be selected and constructed to meet OSHA 1926 Subpart P.
- C. Materials and equipment used for protective systems shall be free from damage or defects that might affect their proper function.
- D. Manufactured materials and equipment used for protective systems shall be used and maintained in accordance with the recommendations of the manufacturer, and in a manner that will prevent employee exposure to hazards.
- E. When material or equipment used for protective systems is damaged, a competent person shall examine the material or equipment and evaluate its suitability for continued use. If the competent person cannot assure the material or equipment is able to support the intended loads or is otherwise suitable for safe use, then such material or equipment shall be removed from service. These materials or equipment shall be evaluated and approved by a Registered Professional Engineer before being returned to service.

313 – Installation and Removal of Support

- A. Members of support systems shall be securely connected to prevent sliding, falling, kick outs, or other potential failures.

- B. Support systems shall be installed and removed in a manner that protects employees from cave-ins, structural collapses, or from being struck by members of the support system.
- C. Individual members of support systems shall not be subject to loads exceeding those that those members were designed to withstand.
- D. Installation of a support system shall be closely coordinated with the excavation.
- E. Before temporary removal of individual support members begins, additional precautions shall be taken to ensure the safety of employees, such as installing other structural members to carry the loads imposed on the support system.
- F. Removal of support systems shall begin at, and progress from, the bottom of the excavation. Members shall be released slowly. If there is any indication of possible failure of the remaining members of the structure or possible cave-in of the sides of the excavation, the work shall be halted until a competent person can examine it.
- G. Backfilling shall progress together with the removal of support systems from excavations.

314 – Soil types and Allowable Slopes

- A. A shoring system or proper sloping shall protect all trenches and excavations of five feet or more in which employees are exposed to dangers from moving material, or equivalent means as determined by the competent person.
- B. The maximum allowable slope of the excavation based on above soil type shall be as follows:

Less than 20 Feet in depth

SOIL OR ROCK TYPE	MAXIMUM ALLOWABLE SLOPES (H: V) (1) FOR EXCAVATIONS LESS THAN 20 FEET DEEP (3)
STABLE ROCK	VERTICAL (90°)
TYPE B	1:1 (45°)
TYPE C	1 ½:1 (34°)

1. Sloping or benching for excavations greater than 20 feet deep shall be designed by a registered professional engineer.
2. Numbers in parentheses are angles expressed in degrees from the horizontal. Angles have been rounded off.

- Type A – Cohesive soils such as clay, silty clay, sandy clay, clay loam, caliche, and hardpan.
- Type B – Cohesion less soil such as angular gravel (such as crushed rock), silt, and silt loam.
- Type C – Granular soils such as gravel, sand, loamy sand, or soil from which water is freely seeping.

315 – Shield System

- A. Shield systems shall not be subjected to loads greater than those that the system was designed to withstand.
- B. Shields shall be installed in a manner to restrict lateral or other hazardous movement of the shield that could occur during cave-in or unexpected soil movement.
- C. Employees shall be protected from the hazard of cave-ins when entering or exiting the areas protected by shields.
- D. Employees shall not be allowed in shields when shields are being installed, removed, or moved vertically.
- E. Excavations of material to a level not greater than two feet below the bottom of a shield shall be permitted, but only if the shield is designed to resist the forces calculated for the full depth of the trench. There shall be no indications while the trench is open of a possible loss of soil from behind or below the bottom of the shield.
- F. Unattended excavations or trenches shall be barricaded and clearly marked. Good judgment must be exercised when selecting the type of barricade to be used. Warning lights shall be used where such trenches are left open overnight.
- G. Adequate physical barrier protection shall be provided at all remotely located excavations when left unattended. All wells, pits, shafts, etc., shall be barricaded and covered when left unattended. Upon completion of excavations and similar operations, temporary wells, pits, shafts, etc., shall be backfilled.

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Section 4 – Substation

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Substation

401 –Substation and Switchyard Security

- A. Unauthorized persons shall not enter substations or switchyards. Authorized personnel shall be trained in the hazards present in a substation/switchyard or be accompanied by a qualified employee.
- B. Personnel shall contact the Controlling Authority and inform them of entrance to and exit from a substation or switchyard.
- C. The Controlling Authority shall notify the employee of any other known persons in the station. If information is not provided, ask the Controlling Authority if others are present in the station.
- D. Before entering a substation or switchyard, employees shall examine gate ground connections to ensure they are intact. Once inside the station, employees shall examine other ground grid connections to ensure they are not missing or damaged if working in proximity to energized facilities.
- E. If ground grid connections are missing or damaged, particularly equipment ground grid connections (i.e transformers, regulators, capacitors, CCVT's etc)., employees shall leave the immediate area and contact the appropriate utility representative.

Note: Missing or broken equipment ground connections to energized apparatus creates a significant touch potential hazard to the worker. Report the condition immediately and do not touch the equipment.

- F. Substation employees who are trained, qualified, and authorized in hazards present with missing ground grid connections, may make ground grid connection repairs following the processes communicated in Section 511 Repairs to Ground Grid Connections.
- G. All substation and switchyard gates shall be kept closed or barricaded to prevent public entrance when work is being performed inside the substation.

Note: some customers may permit gates to remain open, check with your customer representative for their policy.

402 – General

- A. Before beginning work on any equipment or structure, the employee in charge shall ensure the crew is informed of:

1. The status of the equipment
 2. Energized parts in the area
 3. The location and placement of protective grounds
 4. The defined limits of the work zone
 5. The clearance devices opened to disconnect the equipment from the source.
- B. Before switching is performed in a substation where work is in progress, the employee performing the switching shall notify all personnel working within the substation.

Note: check with customer for training requirements before performing any switching activities.

- C. When any substation equipment is removed from service, prior to work being performed, the switches or other means used to disconnect the equipment from service shall be checked open visually, tagged with appropriate tags, rendered inoperative, and temporary protective grounds shall be placed before work begins.
- D. When work is to be performed near energized high voltage equipment, Company approved temporary barricading and/or barrier equipment shall be placed between the space occupied by the worker and the nearest energized equipment, as protection and reminder of the safe working zone.
- E. When working in the confines of a substation, all non-insulated equipment trucks with small cranes, digger derrick trucks, man-lifts, etc. shall be grounded with an approved equipment ground anytime the unit is in operation and energized parts are present within the work zone.
- F. While working on or near exposed energized AC equipment 50 to 600 volts or exposed energized DC equipment greater than 70 volts, all live parts, and conductors in the immediate work area, except that part of the conductor being worked, shall be mitigated with insulating protective equipment (IPE) rated for the voltage being worked.

403 – Static/Induced Voltages in Substations

- A. Employees must recognize the hazards present in energized substations. When working from aerial lift equipment, caution should be exercised to avoid injury from static and induced voltage hazards. Bonding to remove the hazard is required.

404 – Handling Materials and Tools

- A. Materials or tools of any sort shall not be carried on the shoulder. Persons carrying long materials, including lumber, ladders, etc., shall carry it in a horizontal position at waist level or below.

- B. Welding cables, temporary ground cables, extension cords, and winch cables must be used with caution. They should be installed or used in such a manner as to prevent accidental contact with energized equipment.
- C. Only a non-conductive tape shall be threaded through a duct line supporting energized cables. Workers shall be stationed at each end of the duct line.
- D. Metal tapes or rulers shall not be used around energized conductors or equipment.
- E. Ladders shall be fiberglass type ladders, fiberglass ladders shall be the appropriate height for the job, and the factory weight limits must accommodate the weight of the employee and tools.

405 – Batteries

- A. Only authorized trained personnel wearing appropriate personal protective equipment shall install, remove, or maintain lead acid batteries.
- B. Employees shall wear approved protective equipment when handling batteries that expose workers to chemical hazards. Approved equipment shall include acid proof gloves, aprons, chemical goggles, and face shields.
- C. When it is necessary to do work in battery rooms, employees shall remove all exposed conductive articles such as key or watch chains, rings, or wrist watches or bands.
- D. Adequate ventilation shall be provided in battery and battery-charging areas. Where natural ventilation does not constantly change the air, forced ventilation shall be used.
- E. Approved quick drenching facilities for the eyes and body shall be provided within 25 feet of battery handling that involves physical contact with the batteries.
Exception: Batteries that are still in their shipping containers.
- F. The manufacturer's recommendations shall be followed in charging batteries to prevent excessive gas buildup and explosions.
- G. When working near batteries care shall be exercised to prevent short-circuiting battery terminals.
- H. If electrolyte is spilled on clothing, the contaminated clothing should be removed, and the skin should be washed with water as soon as possible.
- I. During charging operations, open flames, tools that can cause sparks and other sources of ignition shall be kept clear of the immediate area.

- J. When it is necessary to do work in battery rooms, if possible, the battery charger should be turned off. This will help stop the batteries from gassing while charging.
- K. Proper identification and warning signs shall be posted at all means of entrance to battery rooms or compartments.
- L. When using a hydrometer to check batteries, care should be taken to prevent splashing battery acid.

406 – Working on or Near Capacitor Banks

- A. Substation capacitor banks, cases, and support structures shall be considered energized at full potential until they have been de-energized, tested, tagged and properly grounded.
- B. The capacitor bank shall be de-energized a minimum of five minutes before grounds are applied.
- C. A smaller conductive wire or cable shall be connected to the ground and then touched to discharge the capacitor being worked on.

407 – Circuit Breakers

- A. All sources of hazardous energy, electrical and mechanical, must be recognized and controlled before beginning work on any style of breaker. Refer to Grounding Section 10.
- B. A Company approved remote racking device shall be used when racking circuit breakers in or out of metal clad switchgear. If a remote racking device is not available, the switchgear bus or substation shall be de-energized before the circuit breaker is to be racked in or out of metal clad switchgear. The procedure shall not include a switching suit for primary protection nor allow employees to be in the line of fire when racking breakers in or out of switchgear.
- C. Remote Racking Device controls shall provide the operator a minimum of 20 feet from the circuit breaker being racked in or out of the switchgear.
- D. Employees shall take all precautions necessary to prevent breaker operation when performing maintenance. When jacking mechanism for slow closing or opening, operating power shall be disconnected, and manufacturer supplied locking pins or other devices shall be used to prevent injury or damage.
- E. When using test equipment which produces a voltage or current that is applied to the equipment under test, the test area shall be barricaded.

408 – Gas Insulated Substations and Equipment

- A. Prior to entering a breaker or bus, all appropriate testing for any existing hazards shall be performed.
- B. When working on SF6 equipment, special precautions should be taken not to breathe the SF6 gas or its byproduct.
- C. Employees shall wear Company approved protective clothing to avoid skin contact with arc byproduct (powder residue), which may be found inside the SF6 gas containment system.
- D. Manufacturers' cautions shall be followed when performing maintenance on breakers or buses. This includes product bulletins, safety bulletins, and manufacturers' warnings.
- E. Gas breakers, with porcelain bushings, shall be under eight psi before torquing connections, installing jumpers, or removing jumpers on any installations. This rule applies to new or relocation due to unknown integrity of the bushings on the breaker after transport.
- F. Employees shall use manufacturer's recommendations when filling or adding SF6 gas.
- G. When adding gas to a single pressure SF6 gas filled dead tank circuit breaker, it shall be removed from service. The manufacturers' service manual and safety bulletins shall be followed for all other SF6 systems.
- H. When working on or near gas breakers with porcelain bushings, extreme care shall be taken to prevent damaging the bushing which could cause catastrophic failure of the bushing under pressure. Mitigation steps should be taken and notated on JSA.
- I. When working with an aerial device that could strike a porcelain bushing, a designated observer shall be used, and extreme caution shall be observed when moving the bucket/platform or boom.
- J. For grounding the breaker leads and for testing purposes, the grounds and test leads can be installed and removed without removing the SF6 gas from the breaker, provided they are installed in a manner that prevents striking the pressurized breaker bushing.
- K. If the breaker leads need to be removed from a pressurized porcelain bushing for testing purposes, consider reducing pressure to eight psi before working on the bushing.

409 – Transformers

- A. All transformers de-energized for maintenance or repair shall be tested for voltage and grounded on the high (primary), low (secondary) side, and the tertiary side, if present.
- B. Whenever an employee will access top of the transformer at least two trained employees shall be present.
- C. Employees shall not climb or reach (with hand or conductive object) on top of a transformer without the transformer being de-energized and grounded.
- D. When it is necessary to remove a manhole cover or inspection plate from a transformer, any pressure or vacuum shall be relieved prior to removing any stud or bolt.
- E. Before entering a sealed transformer, the unit shall be ventilated with forced air until the proper atmospheric conditions are obtained through testing by a competent person. Tests should be conducted continuously throughout maintenance activity to assure air quality.
- F. Employees shall use a tool lanyard to prevent tools or material from falling into the transformer through the manhole opening.
- G. Employees shall adhere to Confined Spaces procedures at all times when working in confined space.
- H. Before work begins on any power transformer suspected of internal faults, overloads, overheating, testing for combustible gases shall be done. If excessive combustible gases are present, the transformer shall be purged with nitrogen from the lowest point available until the gases are within permissible limits.

410– Repairs to Ground Grid Connections

Any accidental or intentional opening in the substation grounding system may be repaired after receiving permission from the operating authority.

Note: Missing or broken equipment ground connections to the ground grid creates a significant touch potential hazard to the worker.

- A. Place a temporary ground jumper across the opening using approved hot line tools and rubber gloves. Once the temporary ground jumper is installed, the repair may be completed.

- 1.If equipment grounds are cut, install a properly sized temporary ground jumper across the opening using approved hot line tools.
- 2.If fence grounds are cut or if a section of the substation fence is expanded or removed, grounding and bonding continuity shall be maintained at all times.
[OSHA 1910.269(u)(3)]
- 3.When making Cad Weld connections on copper-clad steel wire, workers shall use molds designed for the appropriate copper-clad steel wire. 4/0 AWG copper molds will not work on copper-clad steel wire.
- 4.If the X0/H0 ground on a Transformer(s) or Regulator(s) is floating or all case grounds are missing, the transformer(s) or regulator(s) shall be removed from service by remote operation (Control house switching will be acceptable). NO manual switching of the load shall be performed in the substation until transformer(s) or regulator(s) with the damaged X0/H0 ground is removed from service.

411 – Switchyards at Generating Plants

- A. Consider all conductors and equipment as energized until de-energized, tagged, tested for voltage and grounded.
- B. Report any unusual conditions observed on substation structures, equipment, ground wires, buses or wiring to supervision or the system coordinator.
- C. When entering an occupied substation, report your presence to the employee in charge.
- D. In pre-job briefings, discuss the location of energized equipment in or adjacent to the work area.
- E. Lock substation entrances that are not observed by an attendant.
- F. Post DANGER KEEP OUT signs (or the equivalent) to warn unauthorized persons.
- G. Provide guarding around live parts over 150 volts-to-ground, that do not have an insulating cover.
- H. Assure switching operations are performed only by qualified personnel.
- I. Never touch any substation equipment that does not have a case ground attached to the ground grid.

412 – Loading – Unloading – Handling Rebar Cages

When transporting rebar cages the following guidelines apply.

- A. Perform a thorough PJB to identify the hazards and mitigation requirements, and to assign work tasks. Ensure all employees are aware of the hazards and understand their assignment.
- B. Examine both the rebar cage and the hoisting and transporting equipment before work begins.
- C. Employees not directly involved in the work shall leave the area.
- D. Inspect all tools, equipment, rigging and machinery before use. Ensure all items are in good condition and are rated for the load to be lifted.
- E. Park the trailer on level and stable ground.
- F. Trailers used for hauling rebar cages shall have in place stakes, standards, or other such devices on both sides of the trailer to prevent the cages from rolling off the trailer. These devices shall remain in place as long as any cages are on the trailer.
- G. Identify line of fire hazards and work from a position outside the line of fire.
- H. Climbing on top of, or inside of the cage is prohibited.
- I. Use proper PPE to protect from sharp edges and sharp tie wire ends.
- J. When unloading rebar cages at least 2 load tie-downs shall remain secured until the load line of the crane is secured to the cage.
- K. When unloading cages with multiple, separated layers, only the layer being unloaded may have the load tie-downs removed. All lower level tie-downs shall remain in place and secure.
- L. On a multi-layer load securement shall not be removed until sufficient measures have been taken to ensure all cages are secure from accidental rolling.
- M. Wooden wedges nailed to cribbing under a load shall not be the only means to hold a load in position during unloading operations.
- N. Use tag lines to control the load and to allow more distance between the employee and a hoisted cage. Never guide a cage that is hoisted by hand, use a tag line(s).

413 - Safe Work Practices for overhead Transmission Work.

- A. The work practices identified below provide a safe and sensible guide for employees to follow while performing Transmission line work.
- B. General Safety Precautions:
 - 1. Electrical equipment and lines shall always be considered energized unless they are proven to be de-energized by testing and properly grounded.
 - 2. Operating voltage of lines and equipment shall be determined before working on or near energized parts.
- C. Personal protective equipment identified in this plan shall be worn as required, in addition to the basic PPE, hard hat, safety glasses with side shields, protective footwear and traffic vests as required.
- D. Be continually alert to changing conditions, unsafe conditions or work practices. Correct them, or immediately report them to the supervisor.

414 - Metal Tower Construction:

- A. Before ascending the tower, the employee should assess the work to be done and the best position to use on the structure to perform the work.
- B. A minimum of two competent rescue climbers be onsite while doing elevated tower work.
- C. When assembling and erecting towers, guy lines shall be used as necessary, to adequately support the structure. If hoisting equipment is located next to energized lines, it shall be bonded to a ground source and barricaded. Additional caution shall be exercised, and minimum clearance distances observed.
- D. All workers shall be prohibited from working under sections being erected except to guide and secure the section being set. A designated safety observer shall be utilized, as needed, to determine that required clearance is maintained when moving equipment over, under or near energized lines.
- E. When performing tower modifications to existing towers with energized lines attached, work shall be conducted utilizing live line procedures. Strict adherence to minimum approach distances must be maintained at all times during this work. A designated safety observer shall be appointed, as needed, to determine that the required clearance is maintained.

- F. A designated employee shall direct mobile equipment adjacent to footing excavations and no one shall remain in the excavated area while equipment is being spotted.
- G. When working in unstable material for pad or pile type footing excavations in excess of 5 feet deep, they shall be sloped to the proper angle of repose or shored if entry is required. Ladders shall be used for access to footing excavations in excess of 4 feet deep.
- H. When working in unstable material provisions shall be made for cleaning out auger – type footings without requiring a worker to enter the footing unless shoring is used to protect the worker.
- I. When necessary to assure the stability of mobile equipment, the location of use for such equipment shall be graded and level.
- J. Tower assembly shall be carried out with a minimum exposure of employees to falling objects.
- K. Tag lines shall be utilized to maintain control of tower sections being raised and positioned, except where the use of such lines would create a greater hazard.
- L. The load line shall not be detached from a tower section until the section is secured.
- M. Erection shall be discontinued in the event of high winds or other adverse weather conditions which would make the work hazardous.
- N. Equipment and rigging shall be inspected before each use and maintained in safe operating condition.
- O. Adequate traffic control shall be maintained when crossing highways with equipment.
- P. When operating on railways ROW a railroad flagman shall be on site.
- Q. A designated employee shall be utilized to determine that required clearance is maintained while moving equipment under or near energized lines.

Section 5 – Meter Operations

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501 – Classification of Meter Installation

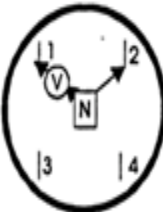
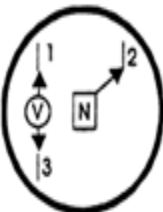
- A. Secondary Self-Contained Installation (300 phase-to-phase volts or below)
- B. Secondary Self-Contained Installation (301 phase-to-phase volts or above)
- C. Secondary Instrument Transformer Installation (600 phase-to-phase volts or below)
- D. Primary Instrument Transformer Installation (601 phase-to-phase volts or above)

502 - General

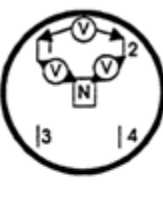
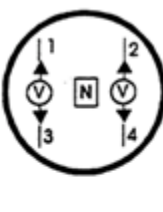
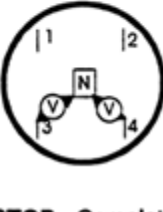
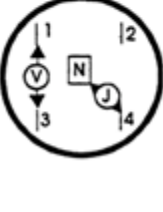
- A. The installation, removal, and testing of the meter equipment shall be performed by qualified personnel using proper personal protective equipment.
- B. The secondary circuit of the current transformers (CTs) shall not be opened while the primary is energized. The CT shall be shunted before opening the secondary metering circuit.
- C. Employees shall not remove, or make inoperative, even momentarily, any safeguards used to protect exposed live parts of test equipment.
- D. When load cannot be removed on meters operating below 250 volts, a face shield or the meter removal/install device shall be required in addition to other personal protective equipment (hard hats, safety glasses, approved work gloves, etc.).
- E. For installations below 250 volts, when an abnormal or hazardous condition (broken glass, blank display, apparent tampering, flash/arcing evidence, etc.) exists and the meter cannot be de-energized, employees shall remove the meters using safety glasses, face shield, rubber gloves, and an approved meter removal/installation device. The meter removal/installation tool is not required if the tool does not fit the meter properly or it cannot be used due to other limitations of the meter enclosure.
- F. Workers shall not attempt to pick up or drop any load, regardless of magnitude, with a meter energized at greater than 250 volts, self-contained meter or with the meter by-pass switch.
- G. For checking voltage and or rotation at the meter, on 480-volt systems, an eight-calorie face shield, safety glasses, hard hat, flash jacket with hood, and appropriately rated rubber gloves shall be required.
- H. All test equipment and test leads shall be inspected before using, to be sure that they are in safe working condition.
- I. When installing or removing electric meters and metering devices, the load side of the meter shall be installed first while standing to the side.
- J. Workers shall not strike or pound on glass meter covers when installing the meter.

- K. When installing a meter, light tapping on the cover is acceptable, but if excessive force is required to set a meter in a socket, a canvas meter guard or approved meter removal/installation device shall be used on the meter for protection in case of breakage.
- L. All metering devices shall be properly grounded.
- M. Prior to meter installation voltage readings between source, load, and ground, shall be made to prevent cross-phasing, back feed, or a phase-to-ground fault through the meter or meter socket, AND to verify correct meter type installation.
- N. A continuity check shall be made on new installations prior to energizing the meter loop.
- O. If a socket is to be left energized, employee shall install a meter, or approved socket cover on all energized sockets prior to leaving the work area.
- P. When working on polyphase installations, it is imperative that phase rotation be observed. Reversal of phase rotation can result in personal injury and/ or equipment damage.
- Q. It is recommended that meters shall not be installed, removed, or tested in sockets energized at 301 Phase to Phase volts or above.
 - 1. If it is not practical to de-energize the installation, all loads shall be removed and the Meter Technician performing the work shall wear flash equipment. It is also recommended that another employee be present as an observer.
 - 2. Flash equipment shall consist of a flash jacket with hood, face shield and rubber gloves.
- R. All broken glass should be removed from meters prior to packaging and shipping.

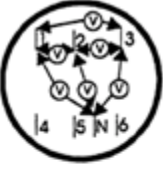
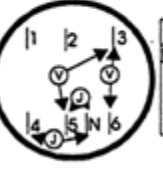
Meter Socket Checks – Single Phase 2W/120V

Check #1 Line Side Voltage  <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Voltmeter Connections</th> <th style="text-align: left;">Service Voltage</th> </tr> </thead> <tbody> <tr> <td>Line Side Phase to Neutral</td> <td>120</td> </tr> <tr> <td>1 to N</td> <td>120 Volts</td> </tr> </tbody> </table>	Voltmeter Connections	Service Voltage	Line Side Phase to Neutral	120	1 to N	120 Volts	Check #3 Load Side Phase to Neutral or Ground Faults  <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Voltmeter Connections</th> <th style="text-align: left;">Readings</th> </tr> </thead> <tbody> <tr> <td>Line Phase to Load Phase</td> <td></td> </tr> <tr> <td>1 to 3</td> <td>0 Volts</td> </tr> </tbody> </table> NOTE: Voltage reading other than 0 on connection 1 to 3 indicates a phase neutral or ground fault. Do not set meter until condition is corrected.	Voltmeter Connections	Readings	Line Phase to Load Phase		1 to 3	0 Volts
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Check #2 Back feed - Load Side  <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Voltmeter Connections</th> <th style="text-align: left;">Readings</th> </tr> </thead> <tbody> <tr> <td>Load Side Phase to Neutral</td> <td></td> </tr> <tr> <td>3 to N</td> <td>0 Volts</td> </tr> </tbody> </table> NOTE: Voltage reading other than 0 indicates an abnormal condition. Do not set meter until condition is corrected. STOP - Complete checks 1 & 2 before proceeding to 3.	Voltmeter Connections	Readings	Load Side Phase to Neutral		3 to N	0 Volts	NOTE: Check #4 Load Side - Phase to Phase Fault is not required since there is only 1 phase and 1 neutral in this base. BE SAFETY CONCIOUS - Follow The Rules!						
Voltmeter Connections	Readings												
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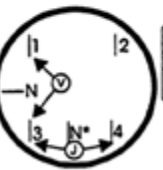
Meter Socket Checks – Single Phase – 3 wires

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Jumper	Voltmeter	Readings																	
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Meter Socket Checks – 3 Phase – 4 Wire 120/240

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Meter Socket Checks – Single Phase – 3 Wire 120/208 Network

Check #1 Line Side Voltage  <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Voltmeter Connections</th> <th style="text-align: left;">Service Voltage</th> </tr> </thead> <tbody> <tr> <td>Line Side Phase to Neutral</td> <td>120/208</td> </tr> <tr> <td>1 to N</td> <td>120 Volts</td> </tr> <tr> <td>2 to N</td> <td>120 Volts</td> </tr> <tr> <td>Line Side Phase to Phase</td> <td></td> </tr> <tr> <td>1 to 2</td> <td>208 Volts</td> </tr> </tbody> </table> * On older bases, neutral may be at 6:00 o'clock position.	Voltmeter Connections	Service Voltage	Line Side Phase to Neutral	120/208	1 to N	120 Volts	2 to N	120 Volts	Line Side Phase to Phase		1 to 2	208 Volts	Check #3 Load Side Phase to Neutral or Ground Faults  <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Voltmeter Connections</th> <th style="text-align: left;">Readings</th> </tr> </thead> <tbody> <tr> <td>Line Phase to Load Phase</td> <td></td> </tr> <tr> <td>1 to 3</td> <td>0 Volts</td> </tr> <tr> <td>1 to 4</td> <td>0 Volts</td> </tr> </tbody> </table> NOTE: Voltage reading other than 0 indicates a load side phase to neutral or ground fault. Do not set meter until condition is corrected.	Voltmeter Connections	Readings	Line Phase to Load Phase		1 to 3	0 Volts	1 to 4	0 Volts
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Line Phase to Load Phase																					
1 to 3	0 Volts																				
1 to 4	0 Volts																				
Check #2 Back feed - Load Side  <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Voltmeter Connections</th> <th style="text-align: left;">Readings</th> </tr> </thead> <tbody> <tr> <td>Load Side Phase to Neutral</td> <td></td> </tr> <tr> <td>3 to N</td> <td>0 Volts</td> </tr> <tr> <td>4 to N</td> <td>0 Volts</td> </tr> </tbody> </table> NOTE: Voltage reading other than 0 indicates an abnormal condition. Do not set meter until condition is corrected. STOP - Complete checks 1 & 2 before proceeding to 3 & 4.	Voltmeter Connections	Readings	Load Side Phase to Neutral		3 to N	0 Volts	4 to N	0 Volts	Check #4 Load Side - Phase to Phase Fault  <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Jumper</th> <th style="text-align: left;">Voltmeter</th> <th style="text-align: left;">Readings</th> </tr> </thead> <tbody> <tr> <td>Load Phase to Neutral</td> <td>Line Phase to Load Phase</td> <td>All Bases</td> </tr> <tr> <td>4 to N</td> <td>1 to 3</td> <td>0 Volts</td> </tr> </tbody> </table> NOTE: Voltage reading other than 0 indicates a load side phase to phase fault. Do not set meter until condition is corrected.	Jumper	Voltmeter	Readings	Load Phase to Neutral	Line Phase to Load Phase	All Bases	4 to N	1 to 3	0 Volts			
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503 – Lever Bypass Type Sockets

- A. Manufacturers do not rate or test a lever bypass socket as a load break device. If a customer breaker is accessible, then it shall be opened prior to opening the lever bypass.
- B. If a customer breaker is not accessible and the load exceeds 50 amperes, means other than the lever bypass must be used to disconnect the customer's load.

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Section 6 – Switching and Clearances

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601 – General Switching & Clearance Operations**Purpose:**

Clearances are used and established, in a formal, coordinated, and safe manner, a de-energized area within which employees can perform their assigned tasks in a safe manner. A clearance is for the protection of personnel, equipment protected is incidental. A clearance provides protection from accidental energization from known sources of energy. It does not provide protection from occurrences such as lightning strikes, induced electrical energy, or falling conductors from nearby circuits. Protection from such hazards is provided by proper personal grounding and is the responsibility of the crew Supervisor.

General Switching:

General switching is performed for line sectionalizing or system rearrangement due to changes in system operating conditions. Such operations are not normally associated with Clearances, Hot line Orders, or special conditions.

- A. Control of switching devices that could be operated to energize or de-energize lines and/or equipment is the responsibility of the controlling authority.
- B. In regions/districts or in specific work situations where it is impractical to control operation of devices by the controlling authority, the appropriate manager, superintendent, or supervisor may designate control responsibility.
- C. Qualified Switching Personnel

1. Minimum qualifications for switching personnel shall include:
 - Being familiar with the safety rules concerning switching, holds and clearances.
 - Having a working knowledge of the equipment involved in the switching order.
 - Being familiar with the switching procedures at that location.
 - Being able to follow instructions.
 - Being physically able to perform switching operations.

Personnel who do not meet the above qualifications shall not be allowed to switch at any point during the operation.

- D. Appropriate tags shall be placed on switching devices if they can be operated to energize equipment upon which a clearance is to be worked.
- E. In emergencies where human life is in jeopardy or failure of equipment justifies operation of switches, any qualified person may operate the required switches. In that case the appropriate authority shall be notified.
- F. All substation equipment under construction shall be released to the appropriate authority (for example, controlling authority, manager, etc.) before it is energized from a power source.
- G. No person, other than the person(s) performing the switching operations, should be within 20 feet of the equipment being energized until such switching is completed.
- H. When isolating equipment or returning equipment to service, switchman shall visually check devices operated to be in the correct position before and after operation is accomplished on each device.

602 – Circuit Breakers/Recloser

- A. When a circuit breaker is opened for a clearance on a line or other apparatus, a visible gap must be maintained in series with the breaker by opening disconnects removable jumpers or an air switch. Work shall not be performed as de-energized on a line or other apparatus with only open circuit breaker contacts between it and the source of the power.
- B. The circuit breaker must be opened before opening series disconnects or removable jumpers associated with that breaker. When determining whether the circuit breaker is

open, both the electrical indicator and the mechanical indicator shall be checked. The ammeter, if so equipped, shall be checked for current flow.

- C. When a circuit breaker is to be switched out for a clearance on the breaker, a tag shall be placed on the control to the circuit breaker and a tag shall be hung on each set of isolating disconnects.
- D. When the means of disconnection are clearly visible and under the exclusive control of a person working his own clearance, tags are not required with permission of the supervisor.
- E. When a circuit breaker of the metal-clad type is opened for a clearance, in cases where no disconnecting means are in series, the circuit breaker must be disconnected from the power source by racking it out to the test position.
- F. Reclosers are to be disabled when conductors being installed or removed cross over energized conductors more than 600 volts with design features permitting.
- G. When any live line work is done on high voltage lines or circuits with reclosers, it is required that the reclosing feature be disabled before the work is done. Working behind fuses is permitted with verification from the utility that reclosing will not occur of up-line equipment if a fault occurs.

603 –Air Switches

- A. When an air switch is opened for a clearance, it shall be inspected to see that all blades and arcing horns if applicable are fully opened.
- B. When a motor operated air switch is to be tagged, a tag shall be placed on the control to the switch and a tag shall be attached to the operating mechanism (preferably in the bail of the lock) that has been deactivated, disengaged, and locked in the open position.
- C. When a manual air switch is opened for a clearance, the switch shall be locked in the open position and tagged. The tag should be attached to the operating mechanism of the switch (preferably in the bail of the lock).
- D. When an air switch is opened, it shall be closed immediately if the arc is not extinguished.
- E. After an air switch is closed, the blades shall be inspected to see that all blades are fully closed. If any blade is not fully closed and a second closing attempt is to be made, the load to be interrupted should be considered.
- F. Air switches of the load break type should be visually inspected after opening or closing to be sure that the main contacts and the load break components are in the correct position.

604 –Disconnects

- A. Disconnects shall be operated with an insulated stick.

- B. Before a disconnect or removable jumper associated with a recloser or circuit breaker is operated, the circuit breaker shall be checked open. If a breaker will not open, it is permissible to open a series disconnect after an adequate bypass is established.
- C. Singularly operated devices may be used to break line and transformer bank charging currents and to open loop feed circuits. Under these conditions, the devices should be opened quickly to break the arc more effectively.
- D. Load-break devices should be used when excessive load conditions exist.
- E. Disconnect switches or removable jumpers shall be tagged by attaching a tag to one of the disconnect blades or by attaching it to a pole or structure immediately under or adjacent to the visible gap, jumpers or disconnects.
- F. The bypass disconnects of induction regulators shall not be closed while the regulators are energized.
- G. The bypass disconnects of step voltage regulators shall not be operated unless the regulators are verified to be in the neutral position, and the control circuit is in the manual position.

605 – Opening Switches, Fuses & Other Isolating Devices

- A. An employee shall not rely on the position of the operating indicator to determine if the switch is open or closed. A visual inspection shall be made to make sure that each blade is fully open or closed following the opening or closing of the switch.
- B. Employees shall not manually operate gang operated switches to break load unless the switch design allows.
- C. Devices used to open circuits under load shall be capable of interrupting the current involved. If load break device is not used, an amp reading shall be taken to ensure that the load can be separated by means of simply opening the switch.
- D. When opening or closing fuses or disconnects in an energized circuit at 480 volts or above, insulated tools and eye protection shall be used. Employees shall remain clear of the exhaust path of the fuse barrel.
- E. When raising or lowering fuse barrels with a telescopic stick, an approved positive control stick attachment shall be used if positive control of the stick can be obtained.

606- Back feed

- A. A circuit, bus, transformer, or regulator is not always de-energized when sectionalizing devices are opened. The equipment may be energized by back feed from a customer source, a transformer bank, foreign contact, induction, or in cases of regulators, a control

circuit. For these reasons, conductors and/or apparatus shall always be worked as energized or short circuited and grounded.

- B. The high voltage terminals of regulators shall be short circuited, grounded, and barricaded before external voltage is applied to the control circuit.

607 – Switching & Clearance Operations under Control of a Dispatch Office

- A. Follow the switching and clearance procedures of the utility for which you are working.
- B. Switching for emergency service restoration is excluded from these procedures.
- C. The written numbered orders (switching, clearance and hold) are mandatory for controlling authority issued clearances/holds. All related clearances/holds shall be cross referenced to prevent switching that could energize lines or equipment before all clearances/holds is released.
- D. Written switching and tagging orders shall be double checked and thoroughly understood by every person who will issue, receive, or execute them.
- E. Numbered air switches or disconnects shall not be operated except under specific orders or approval from the controlling authority unless this authority has been delegated.

608 – Switching and Tagging Orders

- A. A switching and tagging order are a written order and is used to control operation of switches for maximum safety. (A written order can be handwritten or typed on an approved form or processed as an electronic facsimile.) It confirms that the system exists as records indicate.
 - 1. The controlling authority shall assign a number and read the order to the switching person. The switching person shall write the order and then repeat the order to the controlling authority. If both are in agreement, the order will be executed. After the order has been executed, the switching person shall repeat to the controlling authority the order as it was executed and time of execution. To avoid misunderstanding, switching orders shall be executed by, or under supervision and observation of, the person to whom they are issued.
 - 2. Switching orders shall be executed in the exact sequence given. If any switch is found in a position other than that indicated by the switching order, the switching person shall stop and contact the controlling authority to correct the order.
 - 3. When written switching instructions cannot be followed or a question concerning conditions arises, notify the controlling authority so that the question can be resolved.
 - 4. Controlling authorities will not issue orders and employees shall not perform switching and tagging operations on equipment privately owned except when

customers or others agree, or contracts stipulate that employee may operate the equipment and assign numbers.

609 – Clearance Order

- A. A clearance order is a written order issued by the controlling authority on lines and/or equipment that have been de-energized for maintenance and construction. (A written order can be handwritten or typed on an approved form or processed as an electronic facsimile.) It is the final written form indicating that all steps have been taken to isolate a piece of equipment. Grounds shall be installed as a condition of the clearance.
- B. A clearance can be issued only when numbered switches and/or numbered jumpers can be opened or physically removed from the circuit to isolate the specified equipment from all sources of power.
- C. To issue a clearance order, the controlling authority shall complete a clearance order form or an electronically generated facsimile, assign a number, contact the person requesting the clearance and read the order. The person receiving the clearance shall repeat the information to be sure both agree. If both are in agreement, a clearance order time will be issued. This makes the clearance effective.
- D. A clearance issued to a specific person must be released only by that person unless he becomes unavailable. In this case, the supervisor of the person holding the clearance shall release the clearance. The name of the person who released the clearance must be noted on the log if the supervisor of the person holding the clearance releases the clearance.
- E. Before a clearance is released, it shall be determined that all personnel are clear of the equipment, all grounds are removed, and all switches covered by the clearance are in the proper position. The clearance release shall be read to the controlling authority and the controlling authority shall repeat the release. If both are in agreement, the release is effective.
- F. If a person holding a clearance is to become unavailable before work is completed, the controlling authority shall grant a new clearance and the existing clearance shall be released. It shall be the responsibility of the person holding the original clearance to see

that the person to whom the new clearance is issued is familiar with the location of protective grounds.

- G. If two or more independent crews are working on the same lines or equipment, each crew shall independently comply with the requirements of this section.
- H. Clearances on equipment under joint control of two regions/districts shall be issued by the entity that is charged with the operating responsibilities. Clearances on equipment under joint control of two companies shall be issued by the company doing the work.
 - 1. The controlling authority shall notify the controlling authority or other appropriate authority of the company/region/district whose equipment is also involved and shall secure approval for the clearance.
 - 2. At the designated time, switching and tagging orders shall be executed on the appropriate numbered switches.
 - 3. After all switching has been performed; the controlling authority of the company/region/district will issue a hold order to the controlling authority of the company/region/district that is to perform the work.
 - 4. The controlling authority of the company/region/district that is to perform the work may then issue clearances as appropriate.
- I. Before starting to work, the clearance order shall be checked to verify it covers the equipment on which the work is to be done. Every member of the crew must be able to properly identify the equipment that has been cleared. If every member of the crew cannot identify the equipment that has been cleared, then work will not begin.

610 – Grounds

- A. The entire responsibility for managing protective grounds rests upon the person receiving the clearance.
- B. Grounds shall be installed as a condition of the clearance.
- C. Grounds shall be removed before releasing a clearance unless a new clearance is to be issued and control of the grounds is to be transferred.

611 – Issuance of Clearance

- A. In any clearance transaction, it shall be the joint responsibility of the person requesting and/or receiving clearance and the person issuing clearance order to avoid any

misunderstanding of the intent of the clearance order and the identity of the equipment that will be affected.

- B. When it becomes necessary during construction or maintenance, clearances shall be obtained from the appropriate Controlling Authority and carried out by the designated persons.
- C. All field clearances shall have all crew member names documented that are working under the clearance order.
- D. After a line is cleared for work, the person doing the work or assigned crew member shall properly check for voltage. The use of a company approved hot line voltage detector is required for this practice.
- E. The person in charge of the work at the work site shall ensure that proper grounding has been accomplished prior to beginning work on the cleared equipment and/or line section. For work on transmission lines and substation equipment, a written grounding plan shall be developed.
- F. It shall be the responsibility of the person in charge to verify daily that the isolation point(s), tag(s), and grounds are intact and in agreement with the clearance before beginning work. This shall be documented on the tailboard conference and communicated daily.
- G. When a clearance order is to be issued behind a manual gang operated air brake switch, the switch shall be visually checked open or closed as directed, locked and a hold tag attached. If motor-operated disconnects are used for clearance purposes, they shall be visually checked open or closed as directed. The motor mechanism shall be disengaged, locked, and a hold tag attached. The supervisory control and DC power to the motor mechanism should be turned to the off position.
- H. When work is to be performed on circuit breakers or other devices requiring a clearance, the line and load disconnects and other necessary switches/disconnects shall be opened and a hold tag and/or tagging device attached to each set of switches.
- I. At any point during new construction on lines or equipment where the closing of a new switch and/or jumpers made up giving the switch the ability to energize the work area, the switch shall be tagged open using the switching procedure and a clearance order issued for the work area unless the work is performed using energized work rules and procedures.
 - 1. Switch having the ability to energize the work area is defined as: Switch installed, jumpers made up, fuse barrel hanging, and only one step is required to energize by closing fuse barrel.
 - 2. If new construction is to be energized by means other than a switch or a solid jumper having the ability to energize the work area is defined as: Jumper(s)

installed on take-off pole where only one step is required to energize the line by using a hot stick.

- J. While any work is being performed under a clearance order on lines or equipment, the Clearance Holder shall remain on the job site.
- K. When a clearance order is issued, the clearance holder shall hold the clearance until work is complete and equipment is ready for return to service. The clearance order shall not be given to any other employee or person. Only the clearance holder may release it to the issuing Controlling Authority. If the clearance holder is physically unable to release it, his/ her supervisor, after site inspection, can release the clearance order.

612 – Operating Orders

- A. A hold order is a written order and serves notice that the designated switch has been opened or closed for a specific person, is tagged, and will not be operated until the hold order is released. (A written order can be handwritten or typed on an approved form or processed as an electronic facsimile.) Both sides of the switch may be energized.
- B. To issue a hold order, the controlling authority shall complete a hold order form or an electronic generated facsimile, assign a number, contact the person requesting the hold and read the order. The person receiving the order shall repeat the information to be sure that both agree. If both are in agreement, a hold order time will be issued; this makes the hold order effective.
- C. A hold order issued to a specific person must be released by that person unless he becomes unavailable. In this case, the supervisor of the person who was issued the hold order shall release the hold order.
- D. Hold orders shall be released by reading the release to the controlling authority. The controlling authority will repeat the release. If both are in agreement, the release is effective. The person who released the hold must be noted if it is released by the supervisor of the person that was issued the hold order.

613 – Tags

- A. A tag is provided for each function and the appropriate tag shall be used.
 - 1. Danger Tag
 - A danger tag is used on equipment such as control switches, disconnects, etc. for the purpose of alerting persons that the circuit, or equipment is being worked on.
 - Danger tags shall be ordered placed on all switches which are opened to de-energize equipment for a clearance or hold.

- Danger tags shall be placed on remote control switches for circuit breakers and/or motor operated disconnects.
- Danger tags may be placed on other equipment at the specific request of the controlling authority.
- A danger tag is used when operation of the equipment is not permitted without specific authority.
- Danger tags placed on switching devices by written order of the controlling authority must be removed by written order.
- Danger tags ordered placed by the controlling authority shall include the number referencing the switching and tagging order.
- Danger tags placed by persons working their own clearance shall not be removed without approval of the person in charge of the clearance or the supervisor of the person who installed the tag.

2. Attention Tag

- The attention tag is used on reclosing relay/cut off/cut out switches, etc. to indicate that the equipment is placed in other than normal position.

3. Temporary Number Tag

- The temporary number tag is used to assign a number to all unnumbered switches and removable jumpers that are opened to de-energize equipment for a clearance / hold.

614 – Clearances Issued by Employees other than a Regular Controlling authority

- A. A temporary controlling authority may be designated to handle switching operations and clearances / holds on selected sections of the system. This may also include setting up a temporary or emergency dispatch center. Just as permanent dispatch centers must coordinate activities with other centers with which they interface, a temporary dispatch center shall do likewise.

615 – Switching & Clearance Operations Not under Control of a Dispatch Office

- A. The appropriate dispatch center shall be notified when any work is performed on facilities that are protected by equipment that is under supervisory control.
- B. The appropriate dispatch center shall be notified when any work is performed on facilities that are protected by equipment that is under supervisory control.

- C. Designated persons shall be responsible for switching, tagging, handling their own clearances, and managing protective grounds.
- D. If more than one independent crew is working on the same line or equipment, one person should be designated as the person in charge of switching, tagging, clearance and grounding operations for all crews.
- E. To transfer this responsibility, the person in charge (or, in case of forced absence, the persons' supervisor) shall notify the appropriate managers and/or supervisors and all persons in the crews of the transfer and the name of the new person in charge. It shall be the responsibility of the present person in charge to see that the person who is to be the new person in charge is familiar with the location of protective grounds, isolating devices, and tags. The name of the person in charge shall be changed on the danger tags to indicate the name of the new person in charge.
- F. When a danger tag is placed on a switching device by persons working their own clearances, the name of the person in charge shall be written on the tag.
- G. All switches, disconnectors, jumpers, taps and other means through which electric energy may be supplied shall be opened, rendered inoperable and tagged, as design permits.
- H. Exception: When the means of disconnection are clearly visible and under exclusive control of the person in charge, tags are not required.
- I. Open circuit breaker, recloser, oil switch or interrupter contacts are not by themselves sufficient isolation for personnel protection.
- J. All back feed shall be isolated, and equipment appropriately tagged.
- K. Automatically and/or remotely controlled switches that could cause the opened disconnection means to close shall be tagged at the point of control and rendered inoperable, as design permits.
- L. The lines and equipment to be worked as de-energized shall be:
 - 1. Tested for voltage.
 - 2. Short circuited and grounded.
- M. Only after all personnel on the crews have been informed that the lines and equipment are to be re-energized, all persons are in the clear, all protective grounds removed, and all crews have released their clearances, may action be taken by the person in charge to remove tags and re-energize the lines or equipment.

- N. Each independent crew working on the same lines or equipment shall comply with these requirements.
- O. Re-Energizing a circuit which has tripped while under a hot line order:
1. No employee will Re-energize a circuit tagged with a hot line tag without explicit permission from the job/crew supervisor holding the hot line order.
 2. When a circuit which is under a Hot Line Order becomes de-energized, the breaker shall not be closed until the job/crew supervisor holding the hot line order verifies it is safe to re-energize his portion of the circuit.
 3. When the job/crew Supervisor becomes aware that the line has become de-energized, he shall immediately order all crew/personnel clear of the circuit, ascertain whether the circuit within his work area can be safely re-energized, and contact the controlling authority to inform him or her of the details.
 4. Employees will remain clear of the line until the controlling authority informs the job/crew Supervisor of the status of the line and whether or not work may resume.
 5. Any employee who accidentally causes a line to trip (open) shall notify the job/crew Supervisor immediately. The job/crew Supervisor shall immediately contact the controlling authority to inform him or her of the details.
 6. Once the job/crew Supervisor holding the hot line order verifies his crew and equipment are clear and his portion of the line is safe to re-energize, the controlling authority shall:
 - Un-inhibit control of the circuit breaker.
 - Re-Inhibit control if the hot line order is to continue.
 - Notify the job/crew supervisor that the circuit is energized, the hot line order is in place, and work may resume.

616 – Release of Clearance

- A. Before the clearance is released and before the hold tags are removed, employees shall inspect the work area to ensure that non-essential items and field grounds have been removed and that the line and equipment components are intact and capable of operating properly. Hold tags authorized by the appropriate Controlling Authority shall not be removed until instructed by the Controlling Authority.
- B. Before releasing the clearance or before removing tags on a clearance, the clearance holder shall notify affected employees and advise them that the equipment or line section may be energized at any time and shall be treated as energized.

617 – Hazardous Energy Control/Lockout-Tagout)

- A. If an energy isolating device is not capable of being locked out a tag out system shall be used.
- B. Tags shall be attached to the same location as the lock would have been in a system that is capable of being locked out.
- C. Tagging should offer the same degree of protection as locking. This may require additional safety measures such as removal of an isolating circuit, blocking of a control switch, opening of an extra disconnecting device or the removal of a valve handle.
- D. Employees shall be trained to ensure that the purpose and function of the energy control programs are understood. Employees shall have the knowledge and skills required for the safe application, usage, and removal of energy controls.
- E. Lockout and Tagout devices shall be the only devices used for controlling energy and may not be used for other purposes.
- F. Lockout and Tagout devices shall be capable of withstanding the environment to which they will be exposed for the maximum period that exposure is expected.
- G. Tags shall be so constructed as to not deteriorate in corrosive environments.
- H. Locks and tags shall be standardized within the facility by color, shape, or size. For tags, print and format shall be standardized.
- I. Locks shall be substantial enough to prevent unauthorized removal without the use of excessive force.
- J. Tags shall be substantial enough to prevent accidental removal. Tag device means of attachments shall be non-reusable, attached by hand, self-locking, and non-reusable with a minimum unlocking strength of no less than 50 lbs.
- K. Lockout and Tagout devices shall have the capability of identifying the employee applying the devices.
- L. Tags shall warn against hazardous conditions if the machine or equipment is energized and shall include a legend such as "Do Not Start," "Do Not Open," "Do Not Operate," Etc.
- M. Lockout and Tagout allocation and removal may only be performed by the authorized employees who are performing the servicing and maintenance.

- N. Affected employees shall be notified of the application and removal of lockout or Tagout devices. Notifications shall be given before controls are applied and after they are removed. Another notification must occur before the machine or equipment is re-energized.
- O. The sequence of lockout/Tagout application is as follow:
1. Before an authorized or affected employee turns off a machine or equipment, the authorized employee shall have knowledge of the energy to be controlled and the method or means used to control it.
 2. The machine or equipment shall be turned off or shut down using the procedures established to do so in an orderly manner.
 3. All energy isolating devices that are needed to control the energy to the machine or equipment shall be physically located and operated in such a manner as to isolate them from energy sources.
 4. Lockout or Tagout devices shall be attached in a manner that will hold the energy isolating device in a “safe” or “off” position by authorized employees.
 5. When tags are used on energy isolating devices capable of accepting a lock, the tags shall be affixed at the same point of attachment as a lock would be.
 6. When a tag cannot be affixed directly to the energy isolating device, the tag shall be located as close as safely possible to the device, in a position that will be immediately obvious to anyone attempting to operate the device.
 7. After application of the lock or tag, all potentially hazardous energy shall be relieved, disconnected, restrained, or otherwise rendered safe.
 8. If there is a possibility of re-accumulation of stored energy to a hazardous level, verification of isolation shall be continued until the servicing or maintenance is complete or until the possibility of re-accumulation no longer exists.
 9. Before starting work on locked out or tagged out machine or equipment, the authorized employee shall verify that isolation and de-energizing have been accomplished. If normal energized parts are exposed to contact by an employee while the machine or equipment is de-energized, a test shall be performed to ensure that these parts are de-energized.
- P. The sequence of release from lockout/Tagout is as follows for the authorized employee:
1. The work shall be inspected to ensure that nonessential items have been removed and the machine or equipment components are operationally intact.
 2. The work area shall be checked to ensure that all employees have been safety positioned or removed.
 3. After lockout or Tagout devices have been removed and before a machine or equipment is started, affected employees shall be notified that the lockout or Tagout devices have been removed.
 4. Each lockout/Tagout device should be removed by the authorized employee who applied it.

5. If the lockout/Tagout device cannot be removed by the authorized employee who applied it, the following conditions shall be met:
 - Verify that the authorized employee who applied the device is not at the facility.
 - Make all reasonable efforts to contact the authorized employee to inform him that the device has been removed.
 - Ensure that the authorized employee has this knowledge before resuming work at the facility.
- Q. If the lockout/Tagout devices must be temporarily removed from energy isolating devices and the machine or equipment must be energized to test or position the machine, equipment, or component, the following sequence of actions shall be followed:
 1. Clear the machine or equipment of tools and material.
 2. Remove employees from the area.
 3. Remove the lockout or Tagout device
 4. Energize and proceed with testing or positioning
 5. De-energized all systems and reapply energy control measures to continue servicing or maintenance.
- R. When servicing or maintenance is performed by a crew, craft department, or other group, they shall use a procedure which gives the employee a level of protection equivalent to that provided by the use of a personal lockout/Tagout device. This procedure will consist of the following requirements, as a minimum:
 1. Primary responsibility shall be given to an authorized employee for a set number of employees working under the protection of a group lockout/Tagout device.
 2. The authorized employee shall be able to ascertain the exposure status of all individual group members with regards to the lockout or Tagout of the machine or equipment.
 3. When more than one craft, crew, department, or other group is involved, assignment of overall job-associated lockout or Tagout controls responsibility shall be given to an authorized employee designated to coordinate the workforce and ensure continuity of protection.
 4. Each authorized employee shall affix a personal lockout or Tagout device to the group lockout device when he /she begins work and shall remove those devices when he/she stops working on the machine or equipment.
- S. Procedures shall be used during shift or personnel changes to ensure the continuity of lockout/Tagout device protection between off going and ongoing employees.
- T. Whenever outside servicing personnel are used, they and the Utility shall inform each other of their respective lockout/Tagout procedures and ensure that employees from both sides understand and comply with each other's procedures.

U. If energy isolating devices are installed in a central location under exclusive control of a system operator, the following requirements shall apply:

1. The procedures shall afford employees with a level of protection equivalent to that provided by a personal lockout/Tagout device.
2. The system operator shall place and remove lockout/Tagout device in place of the authorized employee.
3. Provisions shall be made to identify the authorized employee who is responsible for (that is, being protected by) the lockout or Tagout device, to transfer responsibility for lockout and Tagout devices. Provisions shall also be made to ensure that an authorized employee requesting removal or transfer of a lockout/Tagout device is the one responsible for it before the device is removed or transferred.

618 - Lockout/Tagout for Facilities other than Transmission, Distribution and Generation

- A. Employees shall be trained in the requirements of the lockout/Tagout procedure in use prior to performing tasks that require lockout/Tagout.
- B. Identify all hazardous energy sources associated with work activities.
- C. Isolate hazardous energy sources, tag, and lock energy-isolating devices, and relieve stored hazardous energy.
- D. Before beginning work, verify by testing or operation that hazardous energy has been relieved.
- E. Before restoring hazardous energy, verify work is complete and persons are clear of equipment.
- F. Management and contractors will inform each other of their respective lockout/Tagout procedures.



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Section 7 – Grounding

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General Rules on Grounding

Personal Protective Grounding provides one method for reducing the probability of electrocution of workers engaged in construction, operation, and maintenance of electrical power lines.

Protective Grounding provides protection from accidental energization from the source, induced voltages, back feeds, static voltages, lightning, falling conductors and operational errors.

Aerial and ground personnel must understand the benefits and limitations of protective grounding. Proper usage requires skilled, knowledgeable, and properly trained personnel.

“Grounded”, “Short Circuited”, and “Short Circuited and Grounded” are three different connection configurations. Each is intended to accomplish the immediate operation of relaying and breaker schemes.

Protective Grounding provides workers maximum protection; however, grounding of any type also creates the possibility of step & touch Potential hazards. Therefore, both ground and aerial workers must understand the limitations of, and hazards created by protective grounding.

Protective Grounding has perimeters or boundaries that may be hazardous. Workers must recognize these perimeters or boundaries and not spend undue time in positions that can cause injury. Workers must be aware when they are contacting items that can be at a different potential and take additional precautions.

TPGs that have been placed must have a ground flag affixed with company name, contact name and phone number.

701 – Overhead Distribution Grounding 46kV & Under

Scope: This policy covers the use of temporary protective grounds on Distribution overhead line facilities. It does not cover the use of temporary protective grounds on underground line facilities, station facilities or transmission line facilities.

Grounding Procedures – General

- A. Proper sizing of ground sets 2/0 copper.
 - B. ~~Proper selection of ground set components~~
 - C. Proper assembly of ground set components.
 - D. Test date within the prior 12 months.
 - E. Grounds exposed to fault current must be removed from service and retested.
- Note: Temporary protective grounds and mechanicals may not be interchanged.

Fundamental Requirements to Achieve Effective Protection with Personal Protective Grounding

- A. Proper storage and care of grounding sets.
- B. Inspecting grounding sets before each use for:
 - 1. Loose connections.
 - 2. Proper assembly of compatible components.
 - 3. Proper components.
 - 4. Dirt or contamination.
 - 5. Broken or frayed conductor.
 - 6. "Dog knots" at ferrules.
- C. Repair or properly dispose of damaged or defective grounding sets.
- D. Clean grounding cable clamp contact surfaces with a wire brush before each use.
- E. Make sure that grounding cables are not coiled.
- F. Do not tie grounding cables in coils or to metallic objects.
- G. Never wrap cables around metal objects.
- H. Do not run grounding cables through metal loops or windows.
- I. Never apply grounds to painted, or contaminated surfaces. (When required to attach to such surfaces remove paint, or contaminants, clean with a brush before attaching grounding sets and after using as a grounding point, repaint or re-galvanize as needed.)
- J. Use the shortest grounding cables practical.
- K. Grounding sets shall be placed as near as practical to the work area.
- L. Always attach grounding cables in such a manner to minimize slack.
- M. Obtain permission to de-energize line from the authority having jurisdiction.
- N. Verify that the conductors or circuit being grounded is de-energized using an approved voltage detection instrument.
 - 1. Step one – Verify voltage detector is functioning correctly.
 - 2. Step two - Verify circuit being grounded is de-energized.
 - 3. Step three – Verify voltage detector is functioning correctly. (This procedure validates the instrument is functioning before and after voltage test.)
- O. Clean all conductors with a wire brush.
- P. Install grounding cables using appropriate style, type and length live line tools rated for the voltage of the energized line.
- Q. When installing grounding cables, attach the ground end first and attach to the closest conductor first, the next closest and so forth.
- R. Once grounds are placed identify the location with the information of the crew that placed the grounds.
- S. Remove all grounds in reverse order of installation
- T. When appropriate, de-energize and ground adjacent circuits or conductors.
- U. After job completion visually verify that all protective grounds have been removed.
- V. Notify all affected persons that circuit or equipment is being returned to service.

702 – Grounding Configurations

Bracket Grounding

This is a grounding method where temporary grounding cables are installed on each side of the work site. The worker is "between grounds."

Work Site Grounding

This is a grounding method where the temporary grounding cables are placed at the work site

structure/equipment and tied directly to the system neutral at the structure/equipment. Also known as single point grounding.

Master, Trip, Source Grounding

Placement of personal protective grounds at the source.

Once personal protective grounds are in place, workers aloft may remove rubber gloves.

1003 – Grounding Applications

Ground workers shall wear rubber gloves while handling grounded conductors that are connected to the system and avoid bodily contact. Proper hazard assessments and system voltage shall determine the class of insulating gloves.

Multiple Structures Down with Wire on the Ground – Not Connected to the System

When a situation is encountered where multiple structures are down with wire on the ground, bracket grounding may be utilized. After proper grounding is in place, workers working from a pole or from an insulated aerial lift device may remove their rubber gloves and use leather gloves.

New Construction/Retirements

New lines or equipment never connected or energized and old lines or equipment that have been permanently disconnected from the system with no possibility for energization or induced voltage may be worked without protective grounding if the following conditions are met.

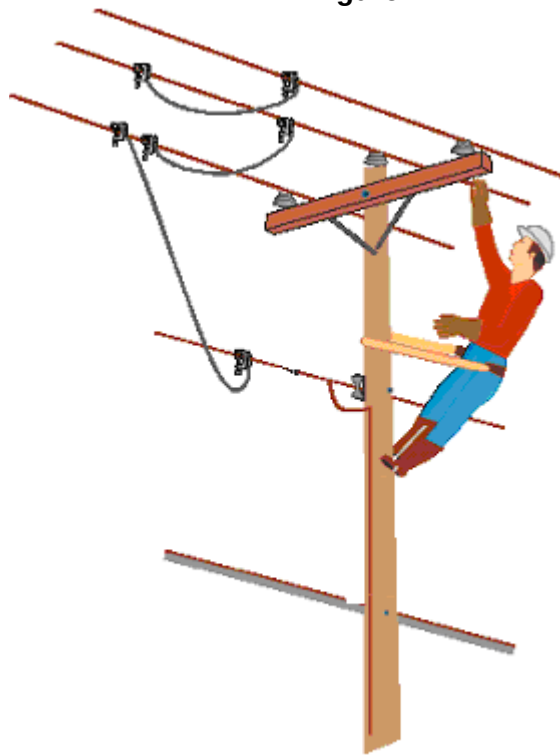
- A. There are visible open points in the circuit.
- B. Verify that the conductors or circuit is de-energized using an approved voltage detection instrument.
- C. No induction present.
- D. No lightning in the area.
- E. No energized lines pass over or under.
- F. No potential for back feed.
- G. PIPE may be removed, and leather gloves may be used

If any of the above conditions cannot be met, grounds must be placed and arranged in such a manner as to prevent each employee from being exposed to hazardous differences in electrical potential or insulating gloves shall be used.

Three Phase Cross Arm with Neutral on Pole

- A. Perform general grounding procedures.
- B. Install one end of grounding cable to the system neutral and the other end to the closest phase conductor.
- C. Clamp one end of the next grounding cable to grounded phase and the other end to the next closest phase conductor.
- D. Clamp one end of the next grounding cable to the last phase grounded and the other end to the last phase conductor.
- E. Remove grounds in reverse order.

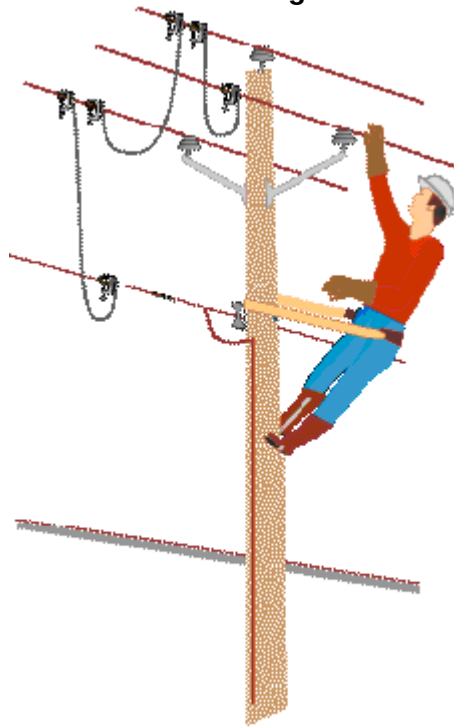
Figure 1



Three Phase Armless with Neutral on Pole

- A. Perform general grounding procedures.
- B. Install one end of grounding cable to the system neutral and the other end to the closest phase conductor.
- C. Clamp one end of the next grounding cable to grounded phase and the other end to the next closest phase conductor.
- D. Clamp one end of the next grounding cable to the last phase grounded and the other end to the last phase conductor.
- E. Remove grounds in reverse order.

Figure 2



Three Phase Cross Arm with Shield/Static Wire

- A. Perform general grounding procedures.
- B. Install one end of grounding cable to the static down lead and the other end to the closest phase conductor.
- C. Clamp one end of the next grounding cable to the grounded phase and the other end to the next closest phase conductor.
- D. Clamp one end of the next grounding cable to the last phase grounded and the other end to the last phase conductor.
- E. Clamp one end of the next grounding cable to the closest phase conductor and the other end to the static conductor.
- F. Remove grounds in reverse order.

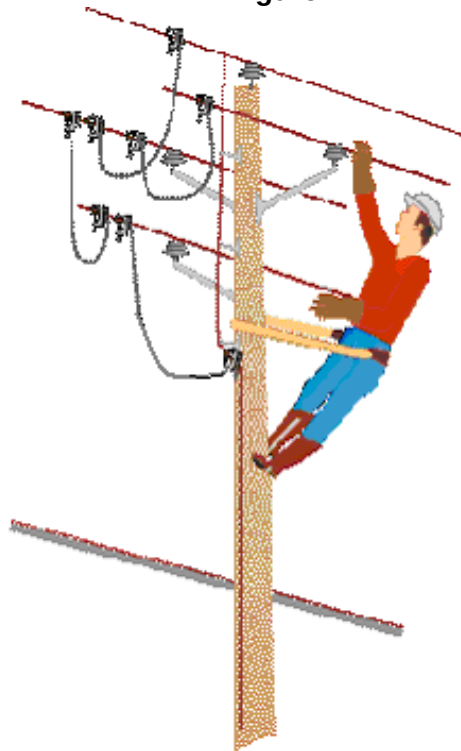
Figure 3



Three Phase Armless with Shield/Static Wire

- A. Perform general grounding procedures.
- B. Install one end of grounding cable to the static down lead and the other end to the closest phase conductor.
- C. Clamp one end of the next grounding cable to the grounded phase and the other end to the next closest phase conductor.
- D. Clamp one end of the next grounding cable to the last phase grounded and the other end to the last phase conductor.
- E. Clamp one end of the next grounding cable to the closest phase conductor and the other end to the static conductor.
- F. Remove grounds in reverse order.

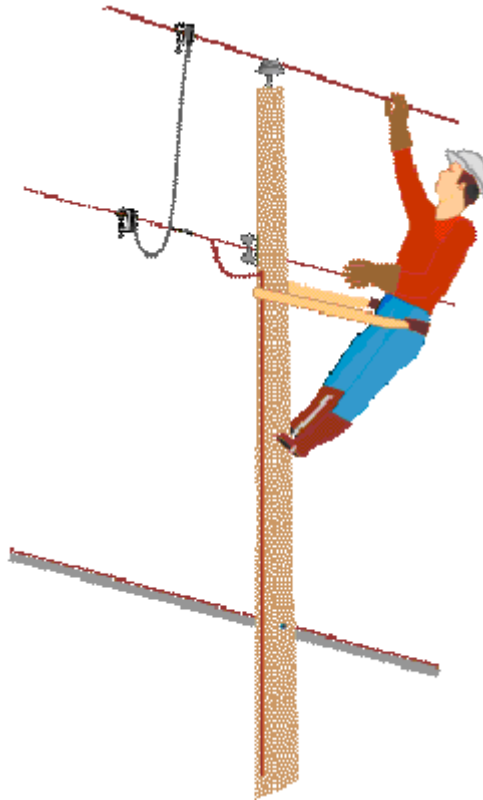
Figure 4



Single Phase with Neutral (Pos 05)

- A. Perform general grounding procedures.
- B. Install one end of grounding cable to the system neutral and the other end to the phase conductor.
- C. Remove grounds in reverse order.

Figure 5



Single Phase with Shield/ Static Wire

- A. Perform general grounding procedures.
- B. Install one end of the grounding cable to the shield wire static and the other end to the phase conductor.
- C. Remove grounds in reverse order.

Figure 6



Three Phase Cross Arm with Neutral All Wires Down

- A. Perform general grounding procedures.
- B. Install one end of grounding cable to the system neutral and the other end to the closest phase conductor.
- C. Clamp one end of the next grounding cable to grounded phase and the other end to the next closest phase conductor.
- D. Clamp one end of the next grounding cable to the last phase grounded and the other end to the last phase conductor.
- E. When all conductors are down as shown in the drawing, protective grounds shall be installed on each side of the break. **All workers** must wear insulating gloves until a bond is established across the break to avoid differences in ground potential. This bond may be established by repairing one of the phase conductors or the neutral conductor so that a low impedance connection exists across the break.
- F. Remove grounds in reverse order.

Figure 7

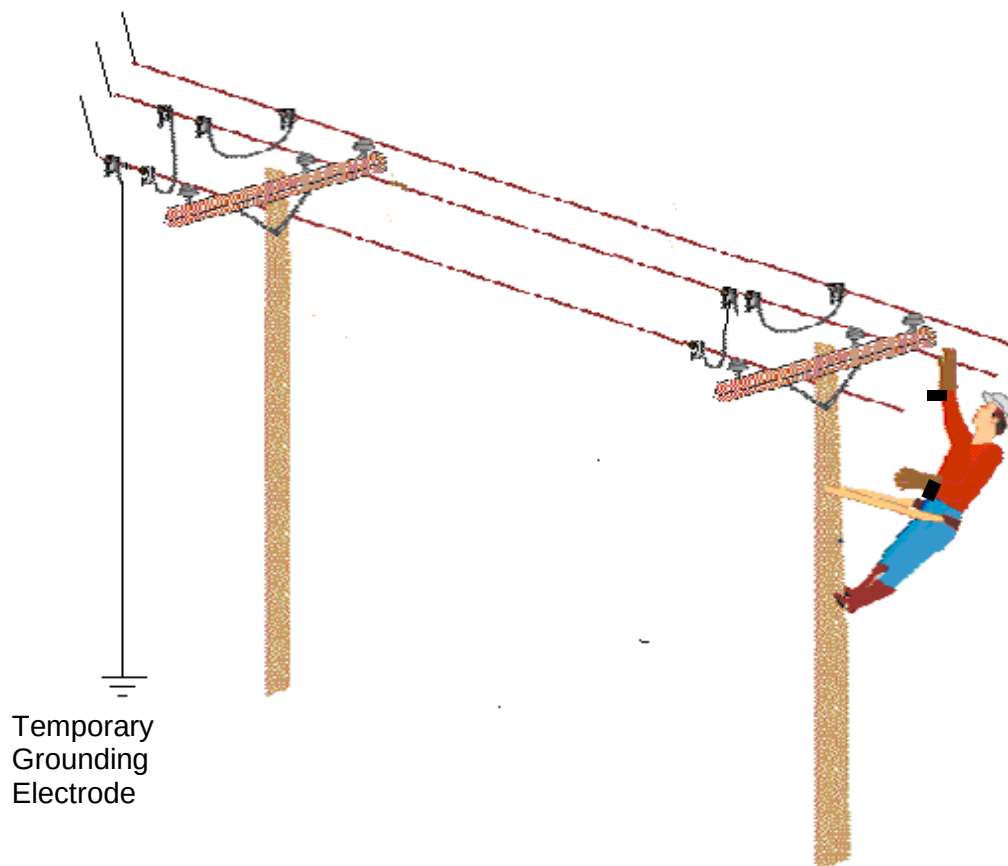


Three Phase Cross Arm Without Neutral

- A. Clamp one end of the grounding cable to a phase conductor and the other end to the next closest phase conductor.
- B. Clamp one end of the next grounding cable to the last phase bonded and the other end to the last phase conductor.
- C. Remove ground sets in reverse order.

NOTE: On poles without a system neutral and pole ground, **workers must always wear insulating gloves**. Where this line leaves the system neutral, fuses or other sectionalizing devices shall be opened and isolated and grounds installed on the de-energized conductors and connected to the system neutral. In the absence of a system neutral at the take-off pole, a temporary grounding electrode shall be installed at the take-off location and connected to the ground set.

Figure 8



Single Point Grounding with One or More Phases Down

- A. Perform general grounding procedures.
- B. Install one end of grounding cable to the system neutral and the other to the closest phase conductor.
- C. Clamp one end of the next grounding cable to grounded phase and other end to the next closest phase conductor.
- D. Clamp one end of the next grounding cable to the last phase grounded and the other end to the last phase conductor.
- E. Add additional grounding cables as required to bond all conductors.
- F. Ground personnel must avoid bodily contact and wear insulating gloves for handling conductors.
- G. Remove grounds in reverse order.

Figure 9



Underground Distribution Grounding

704 – Underground Distribution Grounding

Scope: This policy covers the use of temporary protective grounds on Distribution Underground facilities. It does not cover the use of temporary protective grounds on overhead line facilities, station facilities or transmission line facilities.

705 – Grounding Procedures – General

- A. All underground cables and equipment, including services, shall be considered energized until the equipment is de-energized, tested for voltage and grounded.
- B. All underground cables and apparatus energized at voltages above 600 voltsshall be de-energized, tested for voltage and grounded before cables are cut or spliced.
- C. Rubber gloves and a hot stick shall be used when placing personal protective grounding.
- D. Approved voltage tester shall be used to verify that the conductors are de-energized.
- E. When work is to be done on equipment or cables of an underground system, precautions to prevent back feed shall be taken. This shall include grounding of the secondary conductors where applicable.
- F. When work is to be done on the termination end of the cable, the ground may be removed from the end of the cable, provided the opposite end of the cable remains grounded.
- G. When it is necessary to remove protective grounds for testing or fault locating, remember the cable will be charged until it is grounded.

706 – Underground Grounding Equipment

- A. All protective grounding clamps and cables shall meet Primoris T & D requirements.
- B. Elbows and Feed through devices used for protective grounding shall be loadbreak rated.
- C. Non load break 200 ampere elbows not specifically designed for protectivegrounding shall not be used for protective grounding.

- D. Proper care and storage of grounds and grounding equipment will keep them in good working condition.
- E. Grounds must be electrically tested and have a test date within the prior 12 months.
- F. Grounds exposed to fault current will be removed from service until they are inspected and re-tested.

707 – Voltage Hazards on Underground System

- A. An underground cable retains a capacitive charge after it has been disconnected from a source. A static-type arc can occur when the grounds are applied to these cables.
- B. Accidental energization of cables or underground equipment by connecting to an energized source
- C. Back feed through a transformer
- D. Ground fault rise impressed on the system neutral by a cable or equipment failure
- E. Human error
- F. Equipment failure.

708 – Protection from the Hazard of Underground Systems

- A. Insulate or isolate workers from any possible potential difference between the cable and the earth.

709 – Grounding Procedures

- A. Identify the cable to be grounded.
- B. Obtain a visible opening on both ends of the cable by parking the cable's elbows on feed-thru bushings.
- C. Use approved testing equipment to validate the cable is de-energized by testing both ends of the cable.
- D. Install tags to cable to communicate clearance.
- E. Using a grounding elbow, ground both ends of the cable.

710 – Underground Testing

- A. After receiving clearance from the host utility representative that the underground circuit to be worked on has been de-energized, and tagged, authorized personnel may begin the process of testing.
- B. The circuit to be worked on must be tested for the presence of hazardous voltage using an approved voltage detector before the application of any grounds.
- C. The line worker must verify that the detector is in operating order prior to and after testing for hazardous voltage.
- D. Testing for voltage shall be done at the point where the protective grounds are to be placed.
- E. Protective grounds shall be installed promptly after testing the circuit.

Substation Grounding

711 – Substation Grounding

Scope: This policy covers the use of temporary protective grounds on Substation facilities. It does not cover the use of temporary protective grounds on distribution overhead, underground line facilities, or transmission line facilities.

712 – Grounding Procedures – General

- A. To perform substation work, the substation equipment must be isolated and grounded. Isolation is achieved when equipment is disconnected from all sources of energization.
- B. Isolation points must provide a visible opening.
- C. Two qualified employees must be present for grounding.
- D. The circuit to be grounded shall be tested with an approved voltage detection device to ensure it is de-energized. The test device shall be verified before and after use. (Live,Dead,Live)
- E. Temporary protective grounds may be installed after a clearance has been issued by the controlling authority and following testing of the circuit.
- F. Temporary protective grounds shall be placed at such locations and

arranged in such a manner as to prevent each employee from being exposed to hazardous differences in electrical potential.

- G. It is the responsibility of the person in charge to determine the proper grounding method to be used and ensure that all crew members know and understand that grounding method.
- H. Temporary protective grounds shall be placed at such locations and arranged in such a manner as to prevent each employee from being exposed to hazardous differences in electrical potential.
- I. The TPG's, ground connection must be made first, then the conductor or equipment end must be placed with a hot stick of appropriate length to maintain minimum approach distance (MAD) for the voltage.
- J. Removal of the TPGs must be in reverse order. The conductor or equipment end of the TPG must be removed with a hot stick of appropriate length to maintain minimum approach distance (MAD) for the voltage before the ground connection is removed.

713 – TPG Grounding Components

- A. Only approved grounding equipment shall be used for temporary protective grounds.
- B. All grounding equipment shall comply with applicable industry standards.
- C. TPG leads shall be constructed of 4/0 copper and 5H rated clamps. Testing and Commissioning may utilize parallel 2/0 grounds with properly rated clamps when necessary.
- D. Parallel grounds shall be placed where fault current exceeds 40kA the capacity of the standard 4/0 copper TPG conductor.
- E. Ground leads shall be terminated at both ends with ferrules and ground clamps that are both electrically capable of conducting the required fault current and mechanically strong enough to endure the electromechanical stresses which are imposed on the grounding assembly during faults.
- F. Ground clamps shall be used only on the type of surfaces for which they are designed. C-clamp to round, flat to flat, etc.
- G. TPG assemblies shall be electrically tested before being placed into service. The test date shall be securely affixed to the TPG assembly in such a manner that it will remain legible for one full year.
- H. TPGs shall be electrically tested annually.
- I. Proper care and storage of grounds and grounding equipment will keep them in good

working condition.

- J. TPGs that experience a fault shall be removed from service and retested.

714 – Approved Substation Grounding Methods

A. Bracket (box) grounding:

Bracket grounding is defined as the location of temporary protective grounds (TPGs) on all sides of the worksite.

B. Combination Grounding:

Combination grounding is defined as a grounding method where temporary protective grounds (TPGs) sets are installed as source grounds with an additional ground set installed at the worksite.

- C. Bonding: Bonding is establishing an electrical connection between all conductive objects to ensure no hazardous differences of potential are present. When working from an uninsulated lift, the basket must be bonded to the bus or conductive object being worked.

1015– Substation Grounding Requirements

A. Breaker/Regulator:

1. When working on a breaker or regulator, a single set of box/bracket grounds shall be required.

B. Bus Work:

1. For working on a bus, temporary protective grounds (TPGs) shall be installed between any source and your work area. The following two grounding methods may be utilized:
 - Bracket grounding around work area with grounds placed as close as possible to the work site.
 - Combination grounding shall be utilized with worksite EPZ.

C. Transformer Work:

1. Bracket grounds shall be required on the low voltage side.
2. Bracket grounds shall be required on the high voltage side.
3. External tertiary shall require a single set of grounds.

Note: High fault current conditions may require double grounding.

D. Capacitor Bank:

1. Two sets of grounds shall be required.
2. The primary source side of each phase capacitor

bank shall be grounded.

3. Any additional stage of capacitors shall have each phase grounded on its source side of the bank.
 4. Parallel grounds shall be used where the fault current exceeds the capacity of the largest grounds available.
 5. Grounding of the capacitor frames and interconnecting jumpers between racks capacitor bank shall be accomplished.
- E. When working on devices (e.g., arresters, switches, CCVT, etc.) or a bus section that is directly connected to a transmission line, the line side of the device shall be grounded using combination grounding to satisfy the transmission line grounding.

Transmission Grounding

716 – Transmission Grounding

Scope: This policy covers the use of temporary protective grounds on Transmission facilities. It does not cover the use of temporary protective grounds on distribution overhead, underground line facilities, or substation facilities

717 – Purpose

Temporary protective grounds (TPGs) are placed to prevent worker exposure to hazardous differences of potential when working on de-energized substation, transmission, distribution and generation circuits and equipment.

718 – Basic Requirements

- A. Temporary protective grounds (TPG) must be located and arranged in a manner that will prevent worker exposure to hazardous differences in potential. OSHA 1910.269(n)(3)
- B. Temporary protective grounds must be rated to withstand the full available fault current for the time required for the protective device(s) to clear the fault. OSHA 1910.269 Appendix C
- C. Temporary protective grounds must be rated to handle the heat and mechanical energy a fault will place upon the ground assembly for the full duration of the fault.
- D. Circuits and equipment must be properly isolated, tagged out or locked out, and tested for voltage before temporary protective grounds are placed.
- E. Test for voltage with an approved device.
- F. The TPG's ground connection must be made first, then the conductor or equipment end must be placed with a hot stick of appropriate length to maintain minimum approach distance (MAD) for the voltage. Removal of the TPGs must be in the reverse order. The conductor or equipment end of the TPG must be removed with a hot stick of appropriate length to maintain minimum approach distance (MAD) for the voltage before the ground connection is removed.
- G. Caution must be used to prevent contact with the TPG cable during installation and removal. Never place yourself in series with the TPG. The outer covering of the TPG is weatherproofing only, not insulation.

719 Temporary Protective Grounds

- A. Only approved grounding equipment shall be used for temporary protective grounds
- B. All grounding equipment used by Primoris T & S shall comply with applicable industry standards.
- C. TPG leads shall be constructed of 4/0 copper.
- D. OSHA requires the host utility to provide information on available fault current to utility contractors. Primoris T & S workers must check with the host utility or line owner to identify the maximum available fault current at the worksite. Primoris T & S will determine if parallel leads are required to handle the available fault current.

- E. Parallel grounds shall be placed where fault current exceeds 40kA the capacity of the standard 4/0 copper TPG conductor.
- F. Ground leads shall be terminated at both ends with ferrules and ground clamps that are both electrically capable of conducting the required fault current and mechanically strong enough to endure the electromechanical stresses which are imposed on the grounding assembly during faults.
- G. Ground Clamps shall be rated grade 5H or greater.
- H. Ground clamps shall be used only on the type of surfaces for which they are designed. C-clamp to round, flat to flat, etc.
- I. TPG assemblies shall be electrically tested before being placed into service. The test date shall be securely affixed to the TPG assembly in such a manner that it will remain legible for one full year.
- J. TPGs shall be electrically tested annually.
- K. TPGs that experience a fault shall be removed from service and retested.

720 – Ground Connections

To ensure the fastest clearing time possible the best ground available must be used.

- A. Grounded system neutral (provided the adequate size conductor for the available fault current is present)
- B. Substation ground grid
- C. Grounded static/shield wire incorporated into the TPGs grounding scheme
- D. Remote ground source
 - 1. Structure ground (adequate size conductor for available fault current) A screw rod may be placed to connect the structure ground and the TPGs when structure ground wire is not adequate.
 - 2. Anchor rod (not the guy wire which is steel and will fail if subjected to fault currents)
 - 3. Screw rod or driven ground rod inserted to 5' minimum or to the maximum possible depth the soil conditions will allow
 - 4. TPG clamp must be attached to the main shaft of the screw rod, never to the handle.

NOTE: When driven or screw rods are used as the primary earth connection the effectiveness of the ground rod will be dependent on the soil conditions. Screw rods should be barricaded to prevent workers from being exposed to step potential hazards. Work activity should be considered before placing the screw ground rod.

721 – Applying Temporary Protective Grounds

Before Placing Temporary Protective Grounds

- A. All lines and equipment shall be considered energized until all phases have been de-energized, tested for voltage, grounded, and short-circuited.
- B. No employee shall begin work on any line or equipment before all required temporary protective grounding has been completed.
- C. Temporary protective grounds shall be applied and removed using Class 3 rubber gloves

and an approved hot stick of the appropriate length for the voltage being worked.

- D. TPG cables and clamps shall be visually inspected prior to each use.
- E. Items to be inspected:
 - 1. clamps are not broken or cracked
 - 2. connections at the ferrules are not loose
 - 3. conductor is not frayed or have broken strands
 - 4. the protective covering is not damaged
 - 5. the movable jaw operates freely
 - 6. the contact surfaces of the clamp are free of oxidation and other coatings that would prevent a good connection
 - 7. TPG assembly has been electrically tested and tagged within the past year

Test for Voltage

- A. Use an approved voltage tester.
- B. The voltage tester must be tested to ensure proper operation before testing the line or equipment for voltage.
- C. Ensure the unit is operating properly and a live, dead, live test should be performed as well.
- D. After proving the voltage tester is operating properly, the line or equipment may be tested to confirm it has been disconnected from all sources.
- E. After the line or equipment has been tested for voltage, the tester must again be tested to ensure proper operation.

Prepare the Surfaces

- A. To ensure a good connection is present at all connection points, each one must be properly cleaned before placing the TPG.
- B. The surfaces to which grounding cables are applied shall be cleaned to ensure a good connection is established.
- C. Ground rods and pole bails must be cleaned using a wire brush, emery cloth or other type abrasive device.
- D. The jaws of each ground head clamp must be cleaned with a wire brush prior to placement.
- E. Each conductor must be cleaned with a hot stick conductor brush, stiff enough to remove oxidation prior to placing TPG clamps.

Grounds shall not be applied to painted surfaces.

Placing Temporary Protective Grounds

- A. Two qualified workers are required to install TPGs
- B. Two tested hot sticks of the length required to maintain MAD for the voltage being worked, must be available.
- C. The ground end of the TPG shall always be installed first and removed last.
OSHA 1910.269(n)(6)(i)
- D. The ground end shall be connected to the best available ground source. The

system neutral, substation grid, grounded static, remote ground like a steel

structure or other structure ground, or a driven ground rod.

- E. Employees shall exercise care in applying grounding devices. They shall never place themselves in series with the ground lead.
- F. Do not allow the TPG cable or clamp to contact your body when applying or removing TPGs
- G. MAD should be maintained from the TPG conductors until all phases have been grounded.
- H. Once the ground connection has been made the conductor or equipment end of the TPG may be placed with a hot stick
- I. Subsequent phase attachments may then be made starting with the grounded conductor and moving to the ungrounded one.

NOTE: If all conductors and equipment will be individually connected to a ground source, each ground connection should be established before the conductor or equipment end of any lead is attached.

- J. TPGs that have been placed must have a ground flag affixed with company name, contact name and phone number.
- K. Removing TPG connections must be done in reverse order. All conductor or equipment connections MUST be removed with a hot stick of appropriate length for the voltage before any ground connection is removed. OSHA 1910.269(n)(6)(ii)
- L. When work is to be done on transmission lines equipped with pole gaps in the ground wires, the employee shall bridge such gaps with approved grounding devices before moving above the gaps.
- M. When working on de-energized lines or equipment, employees shall not place themselves in series with open jumpers, switches, etc. unless TPGs are placed on both sides of the opening, or the opening is bridged with an approved grounding lead.

722 TPG Configurations

There are several configurations of TPGs that are used in the electric utility industry. The two primary configurations are known as *bracket* grounding and *work site* grounding. Proper utilization of these two configurations in what is known as *combination* grounding reduces the risk of exposing workers to hazardous differences of potential.

Bracket Grounding

- A. TPGs are placed in a configuration that grounds and short circuits each phase. This may be accomplished with phase-to-phase installation of TPG leads (daisy chain) or by bringing all phase TPG leads to a common ground point at the structure.
- B. Bracket grounding may be used for “source” or “master” grounds and for “trip” grounds.
- C. Trip grounds must be placed at energized crossings, between the worksite and the

energized circuit.

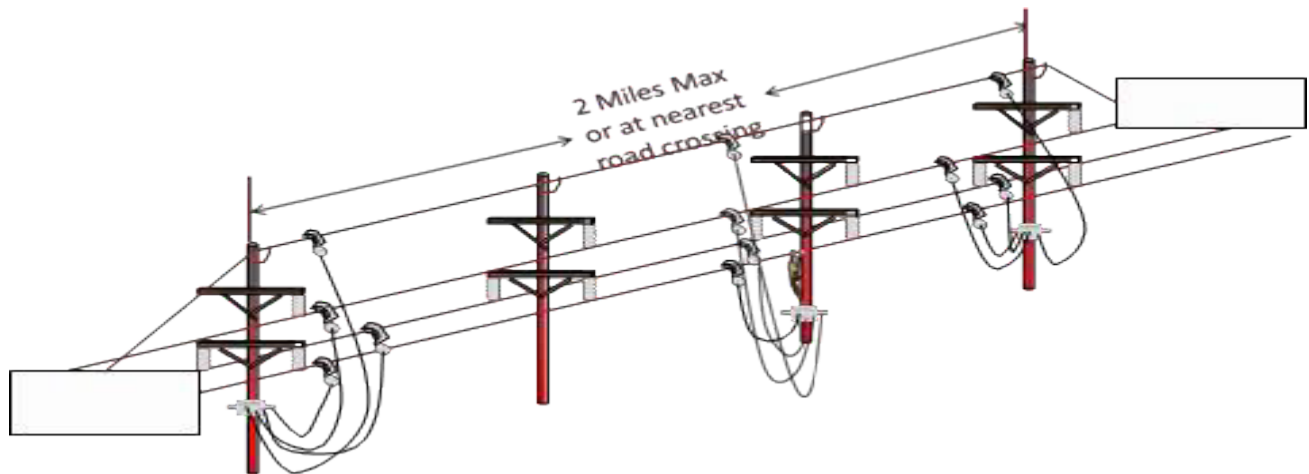
- D. Bracket grounding does not create a worksite EPZ as required by OSHA

Worksite Grounding

- A. Worksite grounding must create an equipotential zone (EPZ). An EPZ is created by grounding and bonding all conductive objects within the reach of the worker to a common ground connection.
- B. Worksite grounds are always in the immediate vicinity of the worker.
- C. Worksite grounds must be placed close enough to the worksite and arranged in a manner that will prevent hazardous differences of potential across workers within the worksite.
- D. Close enough is the distance that may be reached with a hot stick, but never more than 15 feet.
- E. EPZ grounding requires the use of a pole bail or bracket on wood and concrete poles to effectively bring all conductive objects to the same potential and to establish a low resistance parallel path for fault current around the worker.

Combination Grounding

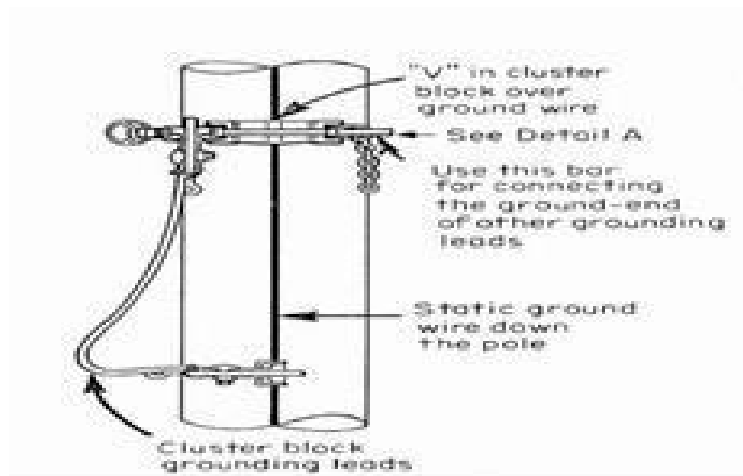
- A. Combination grounding is the utilization of both bracket and worksite EPZ grounding. The bracket or master grounds are placed up to two miles apart and at energized crossings. Workers place protective grounds at each worksite to create an EPZ.

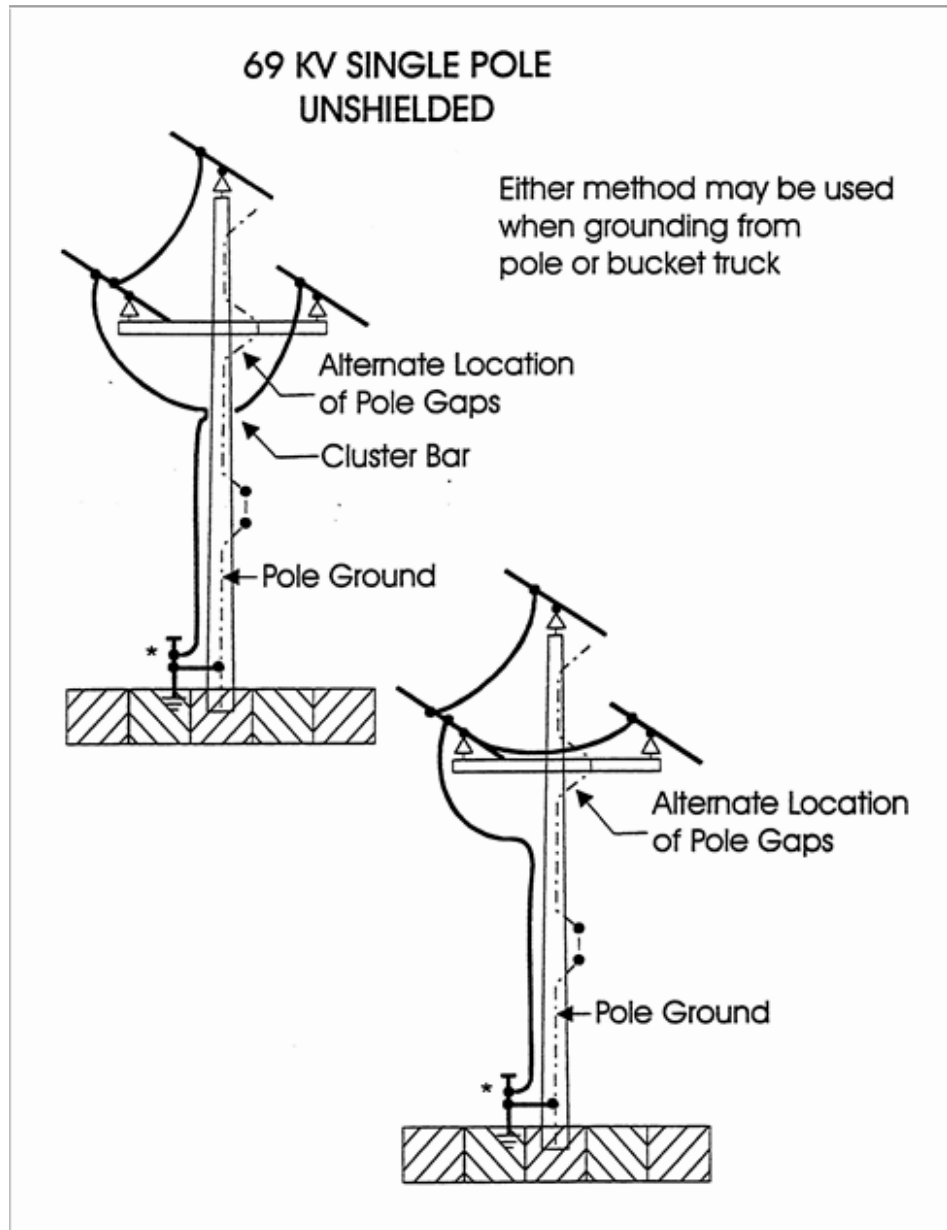


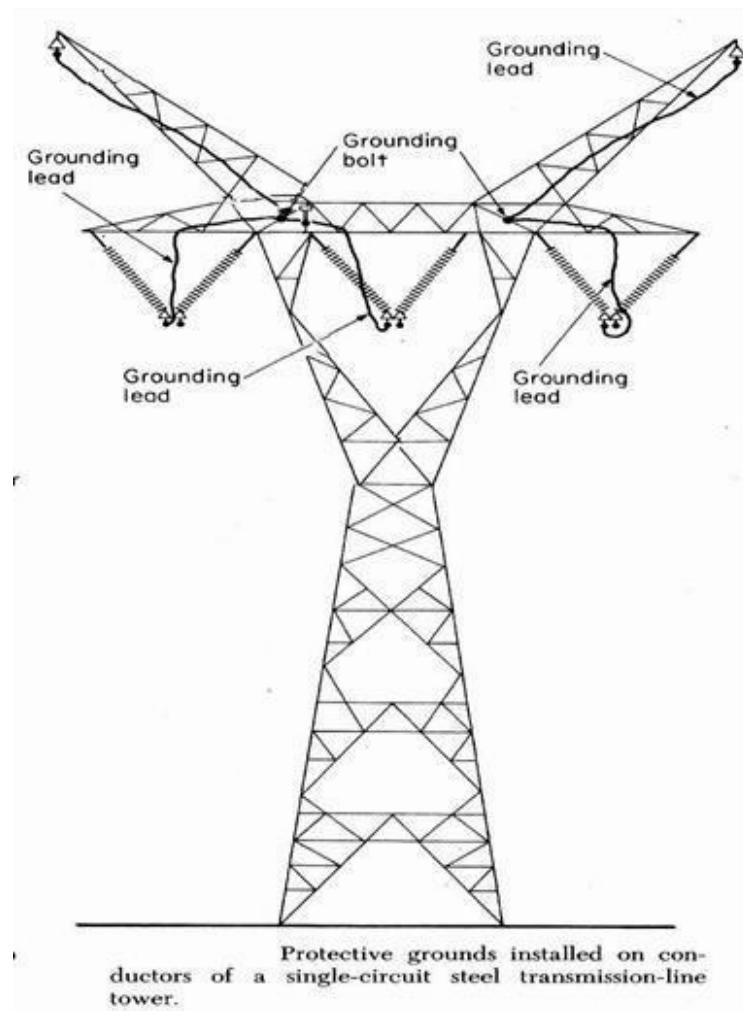
Creating an EPZ

- A. Anytime a worker will contact a conductor and the structure, whether from the structure or from an aerial lift, worksite EPZ grounds **MUST** be placed.
- B. When a pole ground is present the pole ground must be connected to the pole bail/bracket with a short TPG lead.
- C. The EPZ cluster bar (bail/bracket) shall be installed at the bottom of the EPZ zone in a location that ensures the bracket is always below the workers feet for personnel on the

pole and for those working from an aerial lift device.

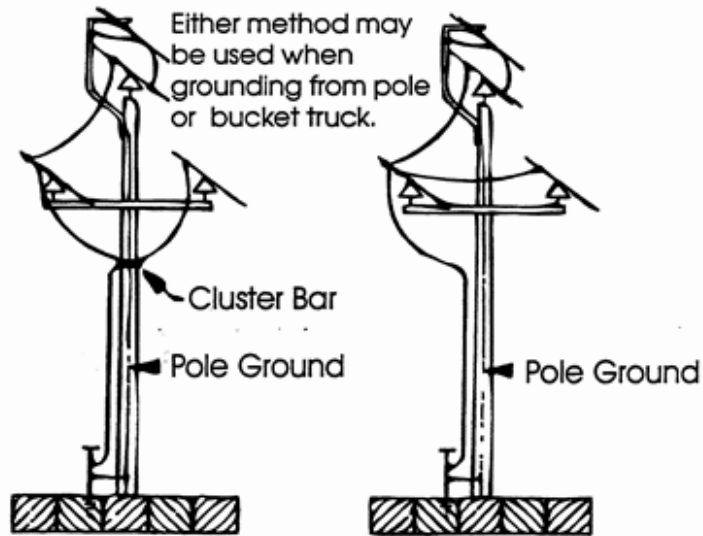




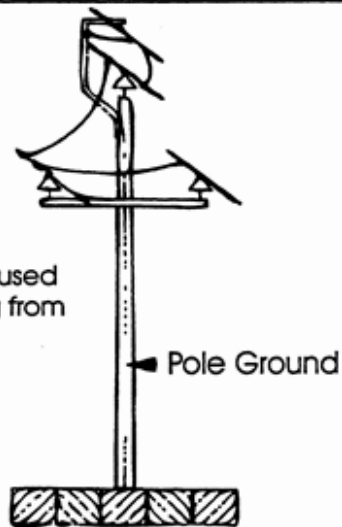


69 KV SINGLE POLE SINGLE OVERHEAD SHIELD WIRE

Where a permanent lead does not exist from the overhead shield wire to the bayonet a permanent lead should be installed. The lead should be installed first where practical and shall be a minimum of #6 AWG copper for wood structures.

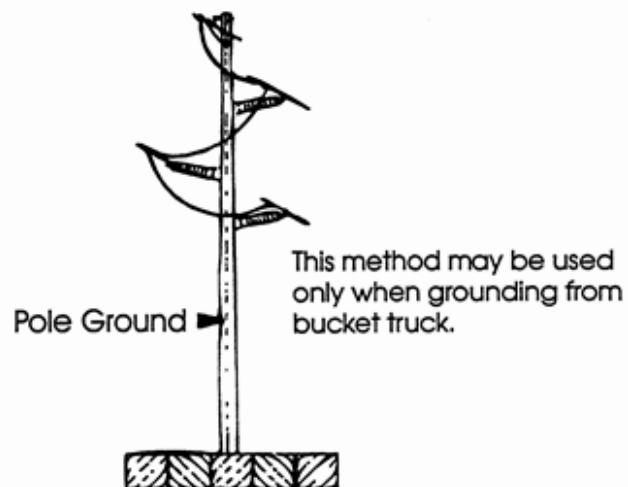
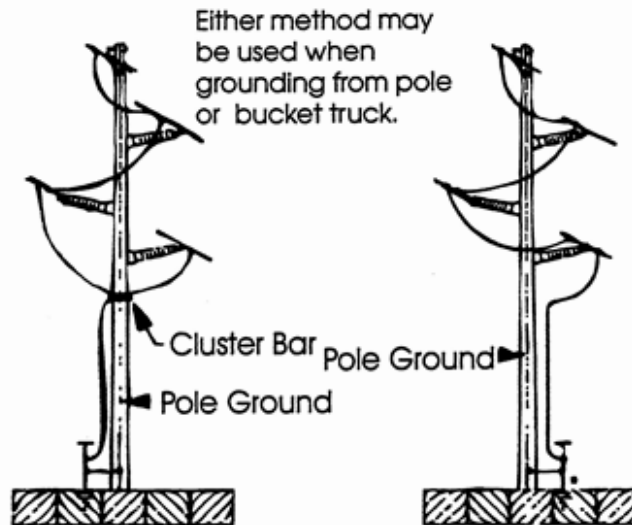


This method may be used only when grounding from bucket truck.



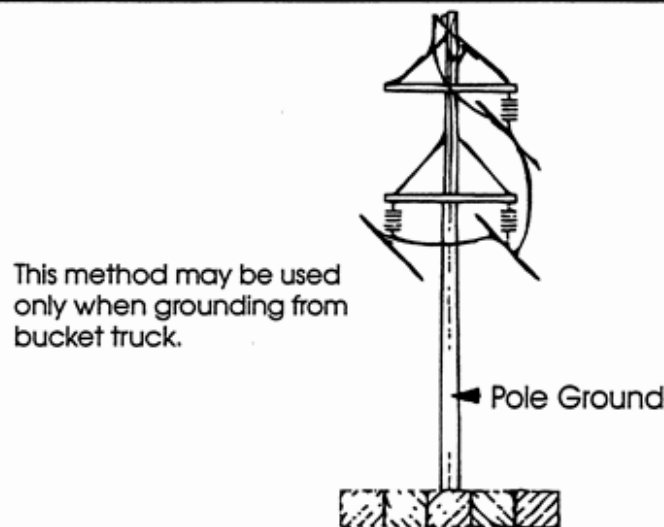
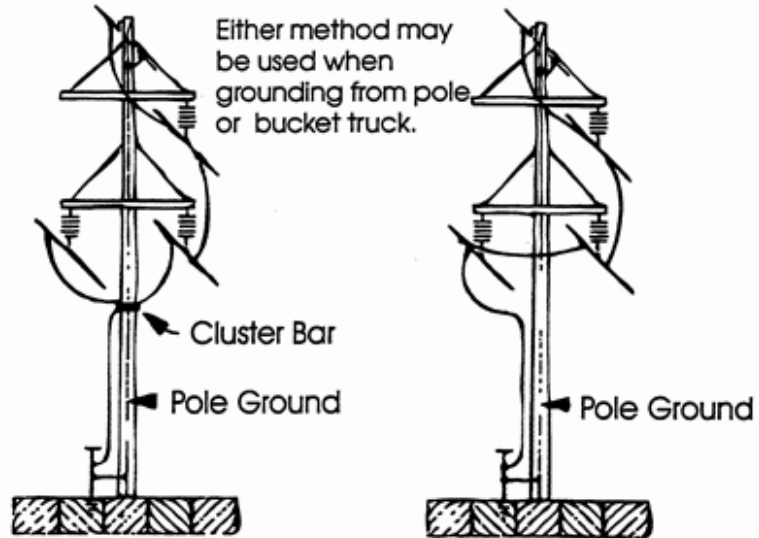
69 OR 138 KV SINGLE POLE WITH HORIZONTAL LINE POSTS

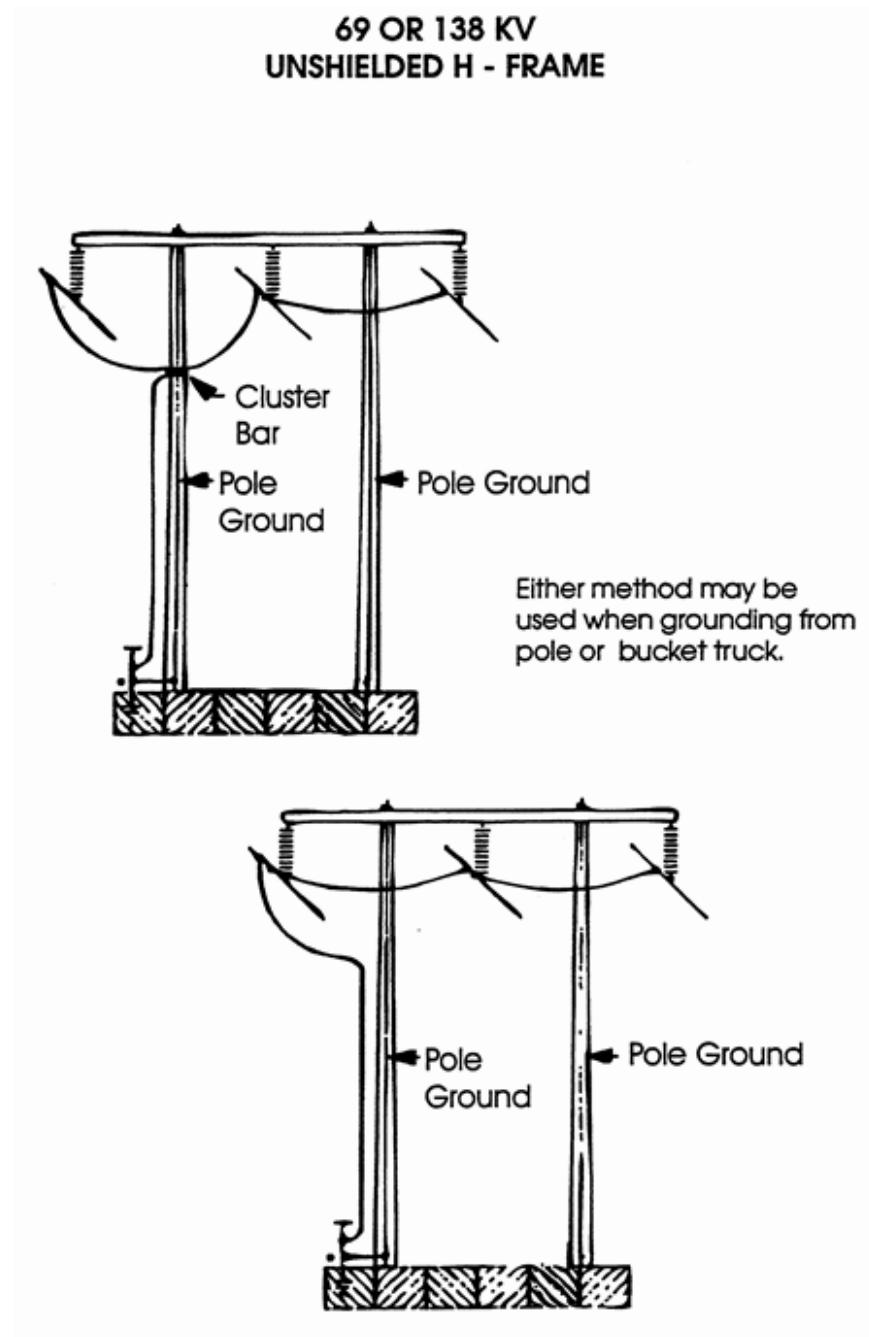
Where a permanent lead does not exist from the overhead shield wire to the bayonet a permanent lead should be installed. The lead should be installed first where practical and shall be a minimum of #6 AWG copper for wood structures.



**69 KV SINGLE POLE
SINGLE OVERHEAD SHIELD WIRE**

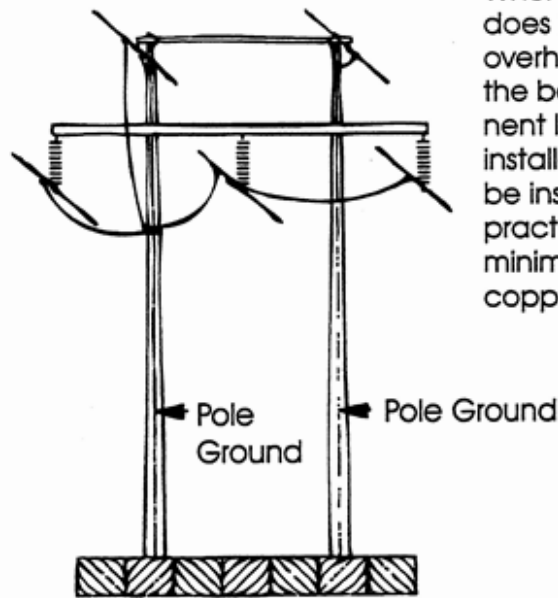
Where a permanent lead does not exist from the overhead shield wire to the bayonet a permanent lead should be installed. The lead should be installed first where practical and shall be a minimum of #6 AWG copper for wood structures.



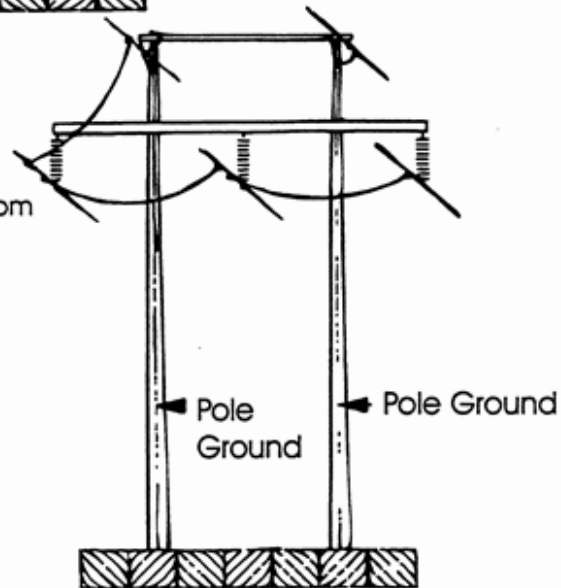


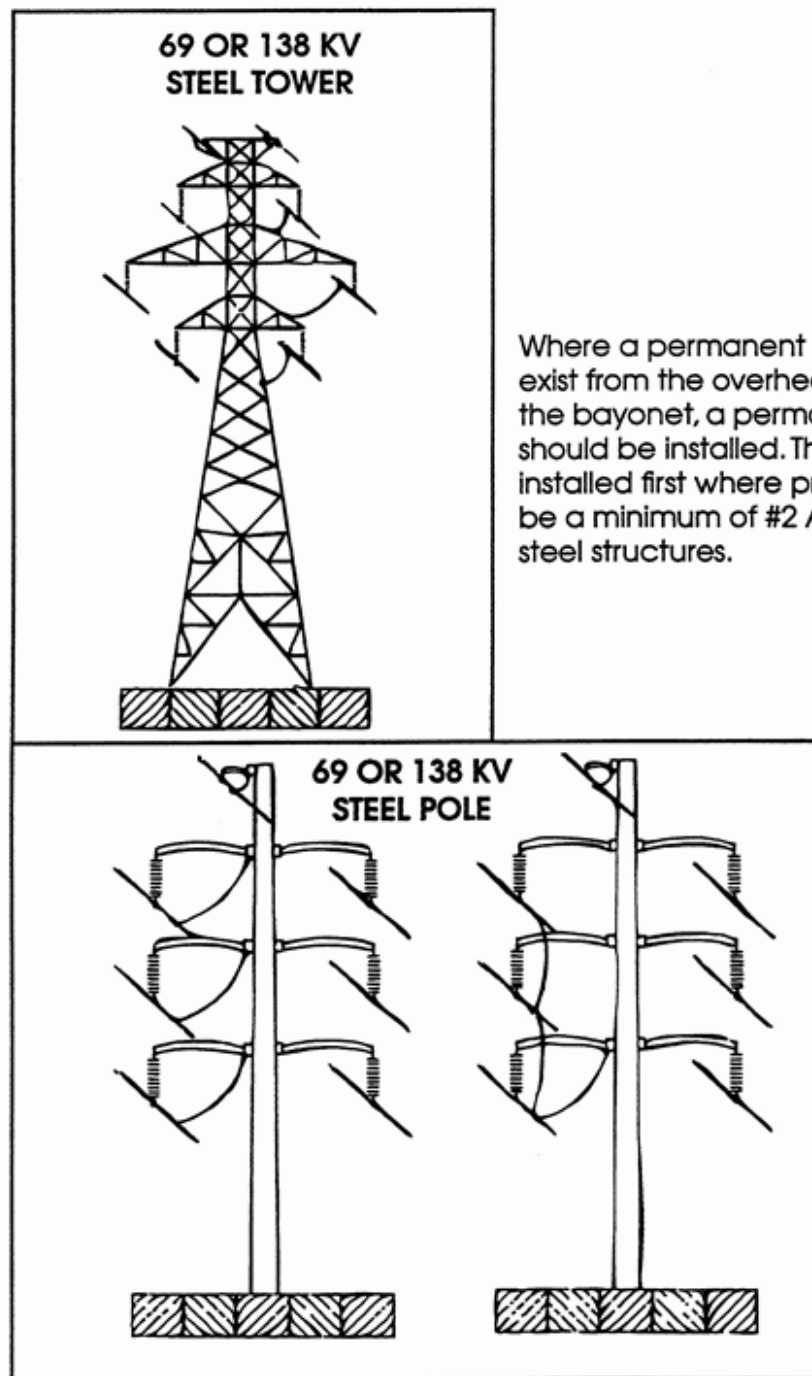
**69 OR 138 KV H - FRAME
TWO OVERHEAD SHIELD WIRES
(ONE OVERHEAD SHIELD WIRE SIMILAR)**

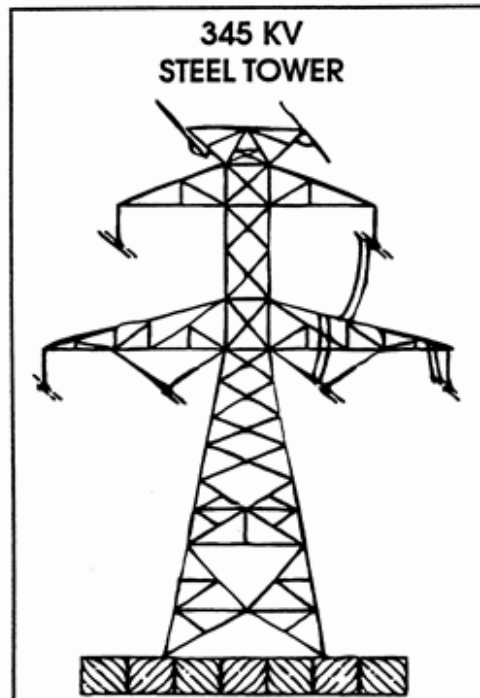
Where a permanent lead does not exist from the overhead shield wire to the bayonet, a permanent lead should be installed. The lead should be installed first where practical and shall be a minimum of #2 AWG copper for steel structures.



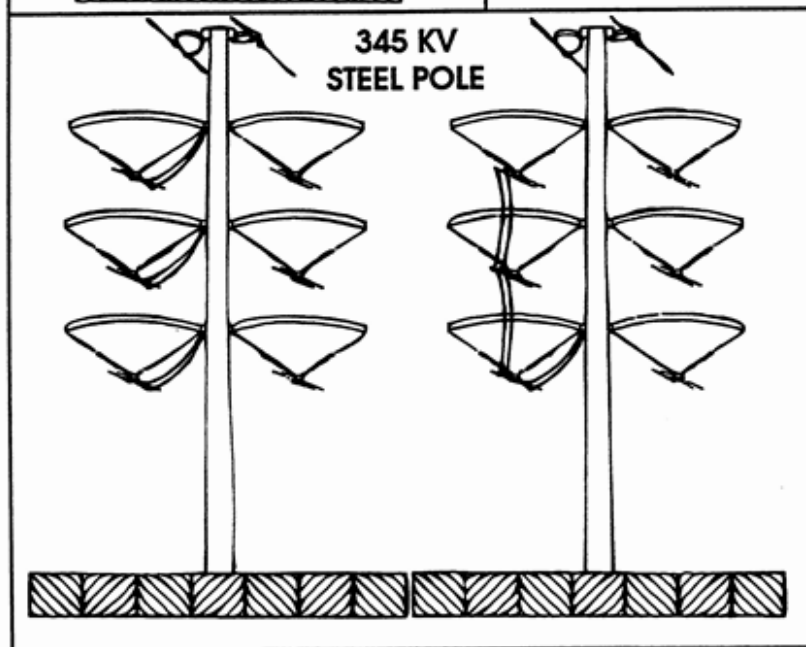
Either method may be used when grounding from pole or bucket truck.







Where a permanent lead does not exist from the overhead shield wire to the bayonet, a permanent lead should be installed. The lead should be installed first where practical and shall be a minimum of #2 AWG copper for steel structures.



GROUNDING VEHICLES AND MOBILE EQUIPMENT

GENERAL

This document describes work methods for grounding vehicles and mobile equipment. The intent of grounding vehicles and equipment is to provide a low resistance path to ground that enables the fastest available clearing time to de-energize the line.

NOTE: It is important to understand that grounding vehicles and mobile equipment does not protect the employee on the ground, it protects the system by providing a low resistance path to earth. Protecting employees from hazardous differences in potential requires wearing appropriate PPE, barricading access, establishing an equipotential zone, or insulating employees from hazardous potential differences with rubber gloves, and insulated mats or die- electric overshoes. These are all barriers that may be used to protect employees from hazardous differences in step and touch potentials.

GENERAL REQUIREMENTS

Vehicle and mobile equipment grounds shall be at least 2/0 copper.

Ground all non-insulated vehicles and mobile equipment when operating within Minimum Equipment Clearance, (10') of overhead, ungrounded lines or equipment operating at 0 to 50kV, or when there is a potential for the equipment to become energized when operating outside of MEC. For voltage exposure above 50kV to 350 kV ground if working within (20').

Transmission equipment must be grounded at all times, except during construction or maintenance operations that do not present any possibility of the equipment becoming energized.

Insulated bucket trucks are not required to be grounded if all the below requirements are met:

- A. The upper boom is insulated, and the lower boom has an insulated insert,
- B. The lower boom has been di-electrically tested within the past year and is inspected daily for any visible damage,
- C. The un-insulated portion of the boom cannot violate minimum approach distance for energized conductors.
- D. Working outside of substations on distribution lines.
- E. The host utility does not require it.

Any mobile equipment being used in an energized substation must be grounded to the substation grounding grid. This includes insulated bucket trucks.

Inspect grounding assemblies prior to use. Visually inspect to ensure the following:

- F. Clamps are not broken, cracked, or deformed.
- G. Grounding conductor connections are not loose or defective.

- H. Grounding conductor is not frayed or broken.
- I. Protective covering for the ferrule end of the grounding cable is not damaged.
- J. Threads and moving parts operate freely to ensure a positive connection.
- K. Contact surface area of the clamp is clean,
- L. Grounds have been electrically tested within the past yr & marked with a current test date.

Prior to making connections, clean all conductors and ground clamp heads with a wire brush.

To lengthen grounding cables, you must use an approved bar to join two grounding cables together. Grounds are not to exceed 50 feet.

Ground personnel shall stay clear of the unit when the boom is un-cradled and in operation.

NOTE: Employees shall not touch aerial equipment when the boom or bucket is in the air and within Minimum Approach Distance (MAD). To touch the vehicle, the employee must communicate with the bucket or boom operator and confirm that the bucket/ boom is outside of MAD and stationary before they can touch the vehicle. The boom/bucket cannot move until the employee is off the vehicle and communicated via 3-way communication with the operator.

Ground cables that have carried fault current shall be removed from service and sent for testing.

Grounding & Un-grounding Vehicles & Mobile Equipment

Observe the following requirements when grounding and un-grounding vehicles and mobile equipment:

- A. Connect one end of the grounding cable to a designated grounding point on the vehicle or equipment. Attach the other end of the grounding cable to an identified primary/system neutral or an approved grounding source attachment point by hand or live-line tool while wearing all required personal protective equipment (PPE).
 - 1. Before attaching the vehicle or equipment grounding cable to a pole ground, confirm that the pole ground is attached to the system neutral.
- B. Before installing the vehicle or equipment ground, uncoil the grounding cable completely. Make sure that there are no coils or kinks in the cable unless the cable is designed to ground at intermittent lengths.
 - 2. Operators must either be at the same potential as the grounded equipment while it is being operated or isolated from differences of potential or paths to ground

via 2 forms of insulation, rubber gloves (required), and standing on a dielectric mat, or insulating platform, or wearing di-electric overshoes.

- C. When work is completed at any location, equipment grounds must be properly stored before moving vehicles or equipment to the next pole or location.

Grounding Sources

Grounding source preferences are based on minimizing the amount of clearing time to open a circuit in case the vehicle or mobile equipment becomes energized. Generally, the higher the fault current, the shorter the clearing times for the same type of fault. Therefore, to ensure the fastest available clearing time, the grounding method must maximize the fault current with a low impedance connection to ground. To accomplish this objective, ground the circuit conductors to the best ground available at the worksite. Thus, ground to a grounded system neutral conductor if one is present. A grounded system neutral has a direct connection to the system ground at the source, resulting in an extremely low impedance to ground. In a substation, ground to the substation grid, which also has an extremely low impedance to the system ground and, typically, is connected to a grounded system neutral when one is present. Connections to the system neutral yields the fastest backup operation and the lowest body current for a ground worker because of its lower current return path. Remote system grounds, such as pole and tower grounds, have a higher impedance to the system ground than grounded system neutrals and substation grounding grids; however, use a remote ground when lower impedance grounds are not available. In the absence of a grounded system neutral, substation grid, and remote ground, a temporary driven or screw ground may be used at the worksite.

Grounding sources when working outside the Substation

Install the grounding cable to one of the following grounding sources **(listed in order of preference):**

- A. System neutral
- B. The pole/structure ground bonded to the system neutral.
 - 1. Before attaching to any pole ground, visually verify that the ground is attached to the system neutral.
- C. Anchor rod, driven ground rod, or screw ground installed to a depth of at least 5 ft.
 - 1. Screw or driven grounds should be installed at least 15' away from the work area to reduce hazardous step potential at the worksite.
 - 2. Screw or driven ground should not be placed in disturbed earth.

NOTE: If you are using an anchor rod, driven ground, or screw ground, barricade uninsulated vehicles and mobile equipment and the grounding source. Barricade vehicles, mobile equipment, and the grounding source to keep workers and bystanders from contacting any parts of the vehicles, mobile equipment or grounding source that could become energized.

4. Examples of barricading items include, but are not limited to caution and flagging tape, plastic chain, rope, and barricading sticks.
5. Barricades shall be placed in a manner that controls access to the vehicle and equipment and provides a visual and physical deterrent to prevent workers from being exposed to hazardous step and touch potentials.
6. Transmission Only: Barricaded areas shall extend 10 feet beyond the perimeter of the equipment set up unless establishment of barricaded area at 10 foot poses a greater hazard. In this case document the hazard on the pre-job briefing, reduce the barricaded area and assign a spotter for the jobsite.

NOTE: Do not leave barricaded vehicles unattended if the boom is within 20' of energized parts.

Grounding to the System Neutral

Use the following method to ground vehicles and equipment to the common neutral from a bucket or a pole:

- A. Positively identify the neutral conductor using an approved voltage detector or making a visual confirmation (such as confirming that the pole ground is attached to the neutral).
- B. Install the mobile equipment ground to the neutral.
- C. Use handline to carry ground aloft.

Grounding Sources when working inside the Substation

Install the grounding cable to one of the following grounding sources

- A. Substation grounding grid. (Preferred)
- B. Tower structure ground

Grounding Conductors on Pulling & Tensioning Equipment

Observe the following requirements when grounding pulling and tensioning equipment:

- A. When stringing or pulling out overhead conductors or underground cables located near energized non-shielded circuits or equipment that could energize the conductor or equipment, the pulling and tensioning equipment must be grounded to the best available ground.
- B. When pulling non-insulated conductors, a rolling ground must be installed between the reel and the first structure.
 - 1. The rolling ground should follow the same grounding source preference, system neutral, pole/structure ground bonded to the system neutral, if not available, driven, screw or anchor ground with barricades around the equipment and grounding source.

NOTE: Some manufacturers may allow the rolling ground to be placed in the belly of the stringing equipment as design allows. Always refer to the manufacturer's instructions.

- C. When pulling overhead insulated conductors where a rolling ground would be ineffective, ground the reel end of the conductor according to manufacturer recommendations by using a continuously rotating ground.
- D. Pulling and tensioning equipment, rolling grounds, and towing vehicles connected to the equipment must be connected to the same ground potential.
 - 1. All grounds should be attached to the system neutral if possible. If the system neutral is not available or ground placement creates a hazard in the work area, attach the ground to the pole/structure ground. A combination is acceptable (e.g., rolling ground to system neutral, trailer to pole ground).
 - 2. If a screw or driven ground is used, do not connect the rolling ground and the equipment ground to the same ground rod, unless an equipotential zone (EPZ) has been established. Install two separate ground rods that must be at least as far apart as they are deep.
 - 3. When using a screw ground, it is recommended to ground to a screw/driven ground and then bond to the pole/structure ground if within 50'.

- E. You shall barricade the tensioning and pulling equipment, establishing a safe work zone.
- F. The only time employees shall be in the barricaded work zone is during operation of the equipment.
- G. Equipment that is designed for the operator will require the operator to be on and stay on the equipment until pulling operations have been completed.
- H. Equipment that is operated from the ground will require the use of rubber gloves and di-electric mat, or insulating platform, or di-electric overshoes before touching any conductor or equipment.
- I. Never touch, lean, or sit on any equipment that has conductor in the air, unless authorized to do so and with proper PPE and other barriers installed.
- J. Before cutting conductors from grounded stringing equipment, protective grounds must be placed near the dead-end position, or the conductor must be treated as energized.
- K. Each bare conductor must be grounded in increments so that no point along the conductor is more than 2 miles from a ground.
 - 1. The grounds must be left in place until the conductor installation is completed between dead ends.
- L. Establishing an Equipotential Work Zone (EPZ). When establishing an EPZ, place pulling and tensioning equipment on an EPZ mat/grid or bond and ground all equipment inside an established barricade zone. The mat/grid will be bonded to the trailer and each corner of the EPZ mat/grid will be bonded to a properly driven ground rod. All appropriate line components and equipment within the work area should be bonded together.

NOTE: The Equipotential Work Zone should follow the grounding order of preference. If available bond to the: (1) system neutral (preference), or (2) remote ground “pole/structure bond”, and if neither are available a driven/screw ground.

- 1. The rolling ground attached to the conductor should be bonded to the EPZ zone either via a connection with the system neutral, pole/structure bond or driven/screw ground
- 2. A non-conductive barrier (Barricade) shall be placed around the work area to reduce step and touch potential, no matter the grounding source.
- 3. Grounding equipment should be selected and installed in a manner that will minimize the likelihood of cables striking personnel during fault conditions.
- 4. An insulated platform should be used to transition from earth to the grounding mat/grid.

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Motor Vehicle Safety

801 –General

- A. All Company drivers shall practice defensive driving.
- B. It is the responsibility of every person who drives a vehicle on company business to know and obey all applicable federal, state, local laws, and regulations in addition to company safety rules.
- C. Moving citations received while operating a company motor vehicle shall be reported by the operator to their supervisor by the end of the next business day.
- D. Seatbelts shall be worn by all occupants of any vehicle equipped with seatbelts being used for company business, at any time the vehicle is in motion.
- E. Vehicles used to transport employees shall have seats firmly secured and adequate for the number of employees to be carried.
- F. The operator shall see that the employees are properly seated and belted before starting the vehicle in motion.
- G. Employees shall not mount or dismount a vehicle or equipment, which is in motion.
- H. Employees shall maintain three points of contact with the equipment to assist in safe mounting/dismounting of vehicles.
- I. Employees shall not position themselves immediately in front of or behind a vehicle while it is being started.
- J. When a hydraulic unit is parked or set up for operation, Chocks shall be used, this is including all trailers.
- K. Employees should not idle vehicles inside enclosed structures or sit in idling vehicles for long periods with all the windows closed.
- L. Roll over protection shall be provided on off-road work vehicles.
- M. Before crossing railroad tracks, the driver of any vehicle shall reduce speed and take all precautions necessary to determine if it is safe to do so.

- N. Whenever possible, the driver shall position the vehicle to avoid the necessity of backing. Where practical, the driver shall park the vehicle to avoid backing upon departure. When returning to a parked vehicle, the driver shall perform the 360 Walk Around
- O. When backing a vehicle with an obstructed rear view:
 - a. A spotter shall be used, or the driver shall preform a 360 walk around prior to backing.
 - b. An audible backing alarm shall be used when backing.
- P. If the employee is alone, the employee may back to the dock or trailer without a spotter or using one-point backing.
- Q. Drivers of vehicles shall not permit anyone to ride on the running boards, fenders, or any part of the vehicle except on seats or inside the body walls. This includes riding in the back of pickup beds.
- R. Passengers shall not stand up in moving vehicles unless assigned to the job for the purpose of raising service wires along routes.
- S. The operator shall see that materials are loaded and secured on trucks to prevent shifting and loss of material while the vehicle is in motion.
- T. If there is an operational need that requires the vehicle engine to remain running, the emergency brake shall be set, and the employee shall remain in the immediate work area.
- U. If vehicles must park on the wrong side of a roadway at night, the headlights of the vehicle shall be turned off. Emergency flashers, strobe lights, and/or rotating lights shall be utilized in conjunction with all DOT requirements.
- V. If equipment is left unattended and night, adjacent to roadways must be place in area having appropriate lights or reflectors according to jurisdictional requirements.
- W. Portable fire extinguishers shall be mounted and maintained on all company vehicles / motorized equipment and shall meet the minimum requirements for that unit. The minimum rating for the fire extinguisher shall be UL rating of 5 B: C or more. [DOT Regulation 393.95]
- X. Lifts and jacks used for lifting vehicles and equipment shall be inspected prior to use.
- Y. Defective lifts or jacks shall be immediately taken out of service and tagged until repaired by qualified personnel.

- Z. Rigid supports shall be used under all vehicles when raised above the floor level and any part of the employee's body is under the vehicle.
- AA. When working in a service center yard or other congested parking areas, the unit being serviced or repaired shall be moved to a safe location out on of traffic congestion. If the unit cannot be moved to a safe location, the Fleet service unit shall be properly parked [per ANSI D15.1-1976 (A2.5) (A2.5.1)] and coned off in such a manner that designates the vehicle as a work zone as to protect the Fleet service unit, cones are to include all areas of the unit, including cab and service body doors when left in the open position.

802 – Daily Vehicle Inspections

- A. Drivers of company vehicles with a GVW rating of 10,001 lbs. or more shall perform a daily vehicle inspection as required by Federal Motor Carrier Safety Administration (FMCSA) Department of Transportation (DOT). This inspection shall be performed at the end of the tour of duty.
- B. The inspection log book shall remain with the vehicle until it is filled, at which time it is turned in to the appropriate equipment supervisor and a new one is issued. The inspection forms shall be kept for three months.
- C. Discrepancies found during the inspection shall be reported to the supervisor/qualified mechanic and a determination made if the repairs are immediately necessary for the safe operation of the vehicle, and the supervisor/qualified mechanic shall sign off on the form for the action taken. A "Do Not Operate" fleet management tag shall be installed if immediate repairs cannot be made.
- D. Operators of aerial lifts shall operate and visually check aerial lift booms at the beginning of the shift before being used as a man-lift device. This check can be done at the service center or on the job.
- E. Brakes, tires, lights, windshield wipers, turn indicators and steering mechanisms shall be inspected periodically. A driver shall also check these items before operating unfamiliar equipment.
- F. Tire air pressure shall be checked frequently. Proper inflation of tires ensures safety and long service.

803 – Winching Operation

- A. Ground personnel shall stay in the view of the operator and clear of the winch drum when winching.
- B. Personnel shall inspect rigging and winch prior to use. Defects shall be corrected immediately.
- C. The winch clutch shall not be disengaged under load.
- D. Personnel shall match winch line speeds to job conditions.
- E. Gloves shall be used when handling winch cables.
- F. A minimum of five wraps of cable around the drum shall be required to hold the load.
- G. The cable clamp shall not be relied on to hold load.
- H. Employees shall not attempt to handle winch cables when the hook end is not free.
- I. Employees shall keep all parts of the body and clothing clear of cable rollers and the winch drum.
- J. When winding winch cable on the drum, employees shall not attempt to maintain tension by allowing winch cable to slip through your hands. Employees shall always use the hand-over-hand method.
- K. Winch cables with the following problems shall not be used:
 - 1. Ten randomly distributed broken strands or five broken strands in one rope lay
 - 2. Wear or scraping of one-third the original diameter of outside individual wires.
 - 3. Kinking, crushing, bird caging or any other damage resulting in distortion of the wire rope structure.
- L. Welding shall not be performed on any part of the winch.
- M. Sudden shock loads or attempting to jerk load free is prohibited.
- N. Winch line load ratings shall not be exceeded. Winch lines shall be two-parted for loads exceeding the single line load rating.

- O. Winch lines shall never be wrapped around the object they are lifting. Steel or nylon slings of the appropriate size shall be used.

804 – Batteries and Jump-Starting Vehicles

- A. Make sure the vehicles do not touch. Set the parking brake and turn the ignition off on both vehicles.
- B. Add battery water, if needed, and replace caps. Do not attempt a jump-start if the battery fluid is frozen.
- C. Do not attempt a jump-start unless both batteries are the same voltage rating.
- D. Connect a jumper cable to the positive (+) pole of the dead battery. Then connect the cable's other end to the positive (+) pole of the good battery.
- E. Connect the second jumper cable to the negative (-) pole of the good battery. Then stand clear of the battery compartment and connect the cable's other end to a good ground on the disabled vehicle.
- F. Start the vehicle with the good battery; then start the disabled vehicle.
- G. Remove the cables in reverse order, taking care not to short-circuit them.

805 – Material Transporting

- A. Any employee transporting material shall be responsible for the proper loading, transporting, and unloading of that material.
- B. Care shall be taken that all employees and equipment are placed to minimize the danger of injury or damage should a load get out of control.
- C. Materials that extend more than four feet beyond the rear of the truck or trailer shall have red lights and red flags attached when transporting on public roads.
- D. When hauling materials all state DOT laws and regulations shall be followed.

- E. Equipment or materials shall not exceed 13 feet 6 inches in height or 8 feet 6 inches wide unless permitted. Employees shall be alert for low-lying bridges, overpasses, and narrow roadways when transporting material.
- F. Transporting of poles in the headache position will be limited to vehicles approved for this use. Materials shall not exceed 13 feet 6 inches in height, or 8 feet 6 inches in width, or more than four feet in front of vehicle, or more than 15 feet behind the vehicle or trailer unless permitted.
- G. Special attention should be paid to low-lying bridges or overpasses, and narrow roadways, which should be marked. These vehicles are subjected to all applicable DOT laws and regulations.

806 – Operating Motor Vehicles

A. Safe Driving Practices

1. The following practices are required for the safe operation of vehicles:
 - Obey all traffic laws, rules, and regulations.
 - Heed all traffic signs and signals.
 - Exercise good driving habits.
 - Exercise courtesy.
 - Practice defensive driving.
2. The principles of defensive driving are very effective preventatives of automobile accidents.
3. Defensive driving means that the drivers must not only observe all the principles of safe driving on their own part and look out for themselves, but they shall also protect themselves against the inadvertent acts of other drivers.

B. Operation of Vehicles

1. Employees shall observe state and local laws and regulations and be responsible for any fines or other penalties assessed against them.

2. Employees shall not operate a company vehicle unless they have a valid operator's license, of the proper class, in their possession.
3. Company vehicles shall be always operated within the legal speed limit and at lower speeds where conditions warrant. Adverse weather, traffic and road conditions may dictate speeds that are slower than the posted legal limit.
4. Windshields and windows shall be kept clean to always provide safe driving visibility.
5. Wheel chocks will be used on 1 Ton vehicles and above when Vehicles are parked.
6. Employees shall not follow another vehicle so closely that they cannot stop safely within the clear distance ahead. A good rule is stay back at least one vehicle length for each 10 miles of speed or drive at least three seconds driving time behind the vehicle ahead. Example: When the vehicle ahead of you passes a fixed object and you reach this same fixed object in less than three seconds, you are following too closely. Keep a greater following distance when pavement is wet, during poor driving conditions or when driving large vehicles.

C. General

1. When approaching (from either direction) a school bus that is displaying alternately flashing red lights stop and do NOT pass until:
 - The school bus has resumed motion.
 - The bus driver gives you a signal to proceed.
 - The red lights are no longer flashing
2. The driver of a vehicle need not stop when meeting or passing a school bus that is on a different roadway or on a controlled access highway where the school bus is stopped in a loading zone where pedestrians are not permitted to cross the roadway.

- D.** When parking a vehicle, apply the parking brake, turn the front wheels toward the curb, place the automatic transmission into the park position or the standard transmission into gear, turn the ignition switch off and remove the key

- E. Seat belts on all company vehicles and equipment shall be worn by the operator and passengers.
- F. Whenever practicable, park a vehicle so that it will not have to be backed away from its parking place. If the backing of a vehicle is necessary, observe the following precautions:
 - 1. Walk around the vehicle, checking the area on both sides and rear.
 - 2. Watch both sides of the vehicle.
 - 3. Do not depend entirely upon the rearview mirrors.
 - 4. Back slowly.
 - 5. Always enlist the help of another employee when available to serve as a guide.

807 –Utility Terrain Vehicle (UTV) / All-Terrain Vehicle (ATV) Safety

- A. Operation of UTV's and ATVs shall be permitted only after the individual has received appropriate training in the safe operation of the unit.
- B. Employees shall drive the UTV or ATV on the right of ways and company property.
- C. Employees shall not operate a UTV or ATV on public highways.
- D. Operators shall comply with all applicable Federal, State, local laws, and manufacturers' recommendations.
- E. Hard hats shall be worn when operating or riding on a UTV or ATV. If an employee requests a DOT helmet, one shall be provided.
- F. PPE required when operating a UTV/ATV:
 - 1. Eye and hand protection
 - 2. Work boots
 - 3. Long pants
 - 4. Long sleeve work shirt if there is a risk of brush entering the cab of the UTV/ATV
 - 5. UTV's and ATV's must be operated at a safe, slow speed to prevent accidents
 - 6. Seatbelts shall be worn.

- G. Personnel shall inspect the UTV/ATV prior to use. All maintenance and inspections shall be done in accordance with the manufacturer's recommendations and/or those set by the company.
- H. If the hazard assessment recognizes the possibility of rollover, the UTV/ATV shall not be used.
- I. Loads shall be balanced and properly secured before driving. Loads shall not exceed the weight limits of the vehicle.
- J. Feet, legs, hands, and arms shall be always kept inside the vehicle.
- K. Occupants shall not exceed the manufacturers' passenger seating capacity.
- L. A broken windshield on a UTV/ATV should be replaced.
- M. While crossing a waterway of sufficient depth to drown in using an amphibious vehicle, employees shall wear Type I personal floatation device (PFD).

808 – Forklift

- A. Operation of forklifts shall be permitted only after the employee has been qualified through training.
- B. The operator of the powered industrial forklifts shall inspect and document such inspections of the equipment at the beginning of each shift or prior to use to assure that the equipment and accessories are in safe operating condition and free of apparent damage that could cause failure while in use.
- C. The operator shall slow down and sound the horn at cross aisles, and other locations where vision is obstructed. If the load obstructs forward view, the operator shall travel with the load trailing and sound the horn prior to moving.
- D. Forklifts with rollover protection shall be equipped with an approved seat belt which, when installed, shall be always used by the operator.
- E. When a loaded forklift is descending an incline, the operator shall back down the incline. When ascending an incline, the operator shall drive forward up the incline.

- F. Sudden stops that might spill the load shall be avoided.
- G. When operating forklifts with internal combustion engines in an enclosed area, adequate ventilation shall be provided to prevent carbon monoxide buildup.
- H. Forklifts shall always be operated at a safe speed, dictated by surrounding conditions.
- I. When a forklift truck is moved, loaded or empty, forks shall be carried as low as possible but high enough to clear uneven surfaces.
- J. Overhead protection bars shall be inspected periodically, and defects promptly reported.
- K. When the forklift truck is not in use, the forks shall be fully lowered, brakes set, and the unit turned to the "OFF" position.
- L. Employees shall not stand or pass beneath the elevated forks, whether loaded or empty.
- M. Forklift trucks shall not be used as a jack to lift vehicles.
- N. Riding on forklift shall be restricted to the driver only. Employees shall not be permitted to ride on the load at any time.
- O. All forklifts shall be equipped with an operable back up alarm and shall be checked to ascertain that it is operable before each use.
- P. In conjunction with the use of forklifts, care shall be exercised with proper stacking of materials on pallets and storage racks.
- Q. Only loads which are securely and safely loaded and within the rated capacity of the truck shall be handled and the load rating shall be clearly indicated on the forklifts.
- R. When a forklift is being refueled, the engine shall be turned off.
- S. Only approved attachments to the mast or forks shall be used.

809 – Operation of Vehicles Using Hydraulic Equipment

A. Any employee required to operate hydraulic equipment shall be given training on the safe and proper operating procedures of that equipment. This is covered in the owner operator's manual from the manufacturer.

B. Visual Inspection for Mechanical Damage

1. The boom and boom extension shall be visually inspected and cleaned as needed.
2. Check all fiberglass booms for minute cracks around and in line with the boom, giving special attention to the area of the fiberglass boom at the end of the metal sleeve. Such cracks indicate the boom has been subjected to unusual stress and can result in mechanical failure of the boom.
3. Inspect the entire length of the fiberglass boom for crazed surfaces. The crazed (lighter color) surface indicates a surface that is separating between layers of fiberglass and may result in boom failure.
4. Inspect the hydraulic hoses for chafing and twisting and check the controls for proper adjustment.
5. Check the oil levels of the hydraulic reservoirs and refill as needed.
6. Periodic inspections shall be made on all structural components with emphasis on mounting bolts, braces, welds, etc. Corrections shall be coordinated with the shop.
7. Any time the boom or baskets receive a shock load or a severe impact, the shop shall be notified immediately, and the equipment removed from service.

C. Operation

1. A warm-up period is required at the beginning of the day's work to ensure that the equipment is functioning properly. A test operation using the lower controls shall be made following any work on the hydraulic system

and before any personnel are lifted. The trial run shall include moving the basket over the top. Consult manufacturer's manual regarding any special instructions on operation during cold weather.

2. Do not attempt to stop or locate leaks or deflect the flow of oil with the hands, feet, or body. The pressure of the hydraulic oil will cut through flesh and result in serious injuries. Hydraulic oil leaks are a potential fire hazard, especially in the vicinity of the truck engine, muffler, and any auxiliary combustion engine. Work should be stopped, the hydraulic pump disengaged, and repairs made by a qualified mechanic.
3. Do not attempt to stop or locate any leaks in the air system with the hands, feet, or body. The pressure of the air can blow small foreign objects into the flesh and can cause serious injuries.
4. The manufacturer's load limits of the boom, basket and material handling jibs shall be posted on the unit, and they shall not be exceeded. The load indicators shall be in good working order and load charts shall be readable. A load safely handled at a close radius may exceed the capacity ratings when moved to a greater radius and thereby affect the stability of the vehicle.
5. Before the boom is lowered and cradled, employees shall stand clear of the path of the basket and boom.

D. Parking on Jobsite

1. Park the truck at the jobsite in the best manner possible for stability, identifying uneven and soft terrain and avoid if possible. When the terrain is sloping five degrees or more, the truck may be unstable. The stability of the truck is based on the tires being properly inflated and all tires firmly on the ground. (Refer to the manufacturer's manual for proper set up.)
2. Set the handbrake and Mico brake or the airbrake.
3. The operator shall make certain that everyone is clear of the outriggers before extending or retracting.
4. The outriggers shall be extended before the boom is raised and shall not be retracted prior to stowing the boom in its cradle. An Outrigger pad shall

be placed beneath the outrigger foot to increase the support area. Outrigger pads shall be used every time the outriggers are extended.

5. If an outrigger foot rests on a curb or any other object preventing it from extending to its maximum distance from the centerline of the truck, take into consideration the shortened bearing or fulcrum point and reduce the maximum load accordingly.

E. Rooding the Vehicle

1. Employees required to drive a company vehicle shall receive proper instruction on the operation of the vehicle.
2. Before roading the vehicle, the boom must be properly stowed on its support and all outriggers retracted completely too traveling position. The auger on a boom tip digger shall be stowed and locked in its carrier on the side of the boom. Straps should be used to tie down the boom, if provided.
3. The overall height of the stowed unit shall be stenciled in the truck cab.

F. Operating and Maintaining Hydraulic Equipment Near Energized Lines

1. All hole diggers, boom trucks, motor cranes, and all other aerial lifting devices shall be effectively grounded and barricaded prior to working in proximity to energized conductors or equipment. If a trailer is connected, it shall be grounded to the vehicle and barricaded with the vehicle. Before any person makes contact with the vehicle, all work shall cease, and it shall be determined that the employee working in the bucket and the boom are not in contact with any energized equipment or conductors. Work shall not resume until all personnel are clear of the truck.
2. Mechanical equipment other than insulated aerial lift devices shall use a designated observer other than the equipment operator to ensure that the equipment does not encroach on the minimum approach distances to energized lines or parts.
3. When two or more employees are working on distribution voltages, either class 3 rubber gloves, and a rubber blanket, or an insulated mat shall be

laid out before work is started, should the need arise for an employee to contact the vehicle in an emergency.

G. Power Lift Gates on Trucks

1. When a lift gate is to be raised or lowered, an employee shall remain at the rear of the truck to see that everyone is clear of the lift gate.
2. After material is loaded on the truck, the lift gate should be raised to the up position.
3. Material trucks with power lift tailgates shall have the gates in the up or closed position while traveling.

Fleet Management Operations

810 – Working in Substations

- A. Prior to fleet auto/hydraulic technicians entering any work site, the technician shall review requirements with Lead person at worksite to ensure the technician understands the hazards and requirements of the task being performed by substation personnel. Fleet technician shall review and sign the Job Safety Hazard Analysis (JSHA) form and Tailboard.
- B. Fleet employees shall not work on a vehicle or piece of equipment in a substation unless a trained operator is present.
- C. Fleet Management employees shall not enter a substation without following the Fleet Management dielectric footwear process.
- D. Materials or tools shall not be carried on the shoulder when working around energized equipment. Employees carrying long materials (lumber, ladders, etc.) shall carry it in a horizontal position at waist level or below.
- E. Welding cables, temporary grounding cables, extension cords, and winch cables shall be used with caution. The cables should be installed or used in such a manner as to prevent accidental contact with energized equipment.

- F. Employees shall be aware of the potential for static and induced voltages in energized substations and lines, particularly 100 kV and above. When working from ladders or other elevated positions, employees shall be cautious for static and induced voltages.

811 – Inspection and Testing of Aerial Bucket Trucks

A. General

1. Employees who perform testing activities shall be trained in the safe work practices upon initial assignment and when changes are made, or when retraining is shown to be necessary by supervisory observations or inspection. [OSHA 1910.269(o)(2)(ii)]

B. Structural Inspection and Testing

1. Periodically, all aerial basket units designed to carry personnel aloft shall be inspected and structurally tested. This inspection will normally coincide with the scheduled unit dielectric testing according to the latest revision of ANSI 92.2.
2. Structural inspection and testing shall consist of a thorough visual inspection coupled with various non-destructive testing methods such as acoustic emission, ultrasonic, magnetic particle, dye penetrate, x-ray, and others.
3. Structural testing shall be performed under supervision of Fleet Management personnel
4. Non-scheduled testing may be performed as follows:
 - At the request of the equipment operator for bona fide concerns about machine structural integrity.
 - After the unit undergoes unusual mechanical stress that might have resulted in structural damage.
 - After maintenance on or replacement of structural components of the unit.

C. Hydraulic Oil Testing

1. Hydraulic oil used in the insulated portions of a derrick or other types of aerial basket equipment may be tested as needed to determine if the oil meets required dielectric criteria.
2. Only hydraulic oil of the type recommended and approved by the equipment manufacturer or Fleet Management should be used in any hydraulic equipment.

D. Unit Dielectric Test

1. Periodic dielectric tests shall be performed on all insulated aerial equipment designed to carry men aloft.
2. Additional dielectric test may be performed as follows:
 - At the request of the equipment operator for bona fide concerns about unit dielectric integrity.
 - After the replacement of any machine component that could affect the unit's dielectric integrity.

E. Tagout of Vehicle

1. Vehicle/equipment deemed immovable or unsafe to operate shall be tagged "OUT OF SERVICE" with a white tag prominently displaying the words "DANGER DO NOT OPERATE" in bold type with red lettering. All other lettering on the tag shall be black. Information on the tag shall reflect the vehicle/equipment number, date, discrepancy found, name of individual who determined vehicle's need to be tagged, a telephone and/or radio number where information may be obtained concerning the vehicle/equipment and a signature line of the person authorizing the removal of the tag.
2. The immediate Supervisor and/or Operator of the vehicle/equipment tagged "OUT OF SERVICE" shall be informed of the tag presence, discrepancy, and estimated downtime of repairs found either by the road service, shop mechanic, or other authorized personnel.

3. Once a tag has been placed on the steering wheel, the vehicle/equipment is then deemed "OUT OF SERVICE". No one shall operate the "OUT OF SERVICE" vehicle/equipment until appropriate repairs are made.

812 – Use of Trailers

- A. These rules apply to all types of trailers such as material trailers, pole trailers, transformer trailers, wire stringing trailers, trencher, and backhoe trailers, etc.
- B. Trailers that have a gross weight of 4,500 pounds or more shall be equipped with air or electric brakes. It is the operator's responsibility to see that the brakes are operating properly before using the trailer. When pulling trailers equipped with electric brakes, the emergency break-a-way device should be checked to see if it is operating properly before using the trailer. The cable must be securely attached to the towing vehicle.
- C. It is the operator's responsibility to see that all lights such as stop lights, clearance lights, and turn signals are operating properly.
- D. Trailers with adjustable tongue heights shall be adjusted to the towing vehicle so the trailer is level, and the weight is evenly distributed on all wheels.
- E. The load placed on a trailer should be distributed so there is equal weight on each axle to protect the springs and tires. Proper load placement will prevent the trailer from whipping when being pulled. If the trailer is properly loaded and whips during towing, the trailer shall not be towed, and the supervisor shall be notified. The tongue weight should not exceed ten percent of the total load.
- F. Before disconnecting a trailer from the towing vehicle, the operator should inspect the trailer for proper balance and lower the jacks, if the trailer is so equipped. If the trailer is on an incline, the wheels shall be chocked.
- G. Employees shall work a safe distance from the end of the trailer tongue when connecting the trailer to the truck.
- H. State law requires that a special reflective triangular type of symbol be placed on the rear of any moving vehicle which normally operates at 25 mph or less on any public street or highway (includes tractors, backhoes, ditchers, and some trailers).

- I. When loading and unloading backhoes, tractors, and trenching equipment, always park the trailer on level ground. Use only trailers designed for carrying this type of equipment.

Travel Guidelines

813 – Parking Lot Safety

A. Parking Lot Safety

1. Employees should exercise the following precautions when arriving at the parking lot:
 - If employees are unfamiliar with the parking lot, drive through and check first. If employees do not feel safe, go elsewhere, and wait for someone else to arrive.
 - Be aware of surroundings. Watch for suspicious people or activities.
 - Park in highly visible, well-lit areas. Back into the space, if possible, but do not back into angled parking spaces. Park near the elevator in a parking garage, if possible. Drivers of Primoris T&D vehicles shall always back into the space, if possible.
 - Always carefully note vehicle location when parking to reduce unnecessary time spent walking around a parking lot.
2. Employees should exercise the following precautions in parking lots:
 - Primoris T&D drivers shall yield to pedestrians in parking lots.
 - Primoris T&D pedestrians should use all caution while walking in parking lots, including using designated walkways, where provided.
3. Employees should exercise the following precautions when returning to their vehicle:
 - Do not present an easy target. Try to carry only a few packages.
 - Walk confidently with a purpose and observe others. If employees notice someone loitering near a car or acting suspiciously, return to the building and contact security. Assertive body language can help prevent an attack. Keep the head up.

- Have all attention and effort dedicated to surroundings and walking to one's vehicle.
- Have keys in hand to prevent the need to search for them while walking.
- When approaching one's car, look under and around it. Before getting in, look in the back seat and on the floor.
- When entering a vehicle, lock all doors and turn on headlights. This action will illuminate anyone outside in the dark.
- Employees who feel they are being followed should walk or run quickly to a lighted store or where crowds of people can offer help if needed.
- If carrying a purse, do not dangle it by the side so that a thief can run by and grab it. Carry the purse close to the body, preferably in front.
- Keep vehicles in good mechanical condition to prevent car trouble. Keep the tank filled with sufficient fuel.

814 - Airport Safety

- A. Employees should follow these practices to promote safety during air travel:
1. Keep picture identification/passport, money, and tickets on the employee's person and not in baggage.
 2. Always keep hand-carried luggage/bags in employee's possession.
 3. Do not go near unattended baggage or carry baggage for a stranger.
 4. Keep close watch on employee's baggage and valuables when clearing security checkpoints. Make sure employees have collected all possessions before leaving the checkpoint area.
 5. Be aware of nearby people and move away if feeling unsafe.
 6. If jostled when in a crowded walkway, check to make sure all money, picture identification, tickets, etc. are still in employee's possession.
 7. Be aware of surroundings when parking and walking to and from a vehicle.
 8. Always lock a vehicle when leaving it in a parking or stopping area.
 9. When returning to a vehicle, check under and inside before entering.
 10. Avoid isolated or poorly lighted areas.
 11. If employees feel they are in a potentially dangerous situation, do anything to attract attention and make others aware of the situation.

815 - Hotel Security

- A. Employees should follow these security precautions when staying in hotels:
1. Try to stay at hotels with doors leading to an inside hallway rather than directly outside to a parking area.
 2. Request an upper-floor room to decrease the chance for break-ins. Ensure the windows and doors are locked.
 3. Secure the deadbolt lock and safety chain whenever in the room.
 4. Know the locations of fire exits.
 5. Identify location of stairway in the unlikely event of a fire.
 6. Use the hotel main entrance when returning late in the evening.
 7. When checking in and out, keep a close watch on baggage, purses, camera bags, computer bags, etc. to avoid theft.

816- Rental Cars

- A. Employees should follow these safety precautions when renting cars:
1. Keep a copy of the rental car agreement in the car in case of emergencies.
 2. Make sure the vehicle registration paper is in the rental vehicle before leaving the lot.
 3. Become familiar with the rental vehicle before leaving the rental car company (i.e., location of the emergency lights button, the vehicle registration, light switch, windshield wiper switch, etc.).
 4. Adjust mirrors, seats, steering wheel, or other controls before moving the vehicle.
 5. Do not use cruise control on wet roads.
 6. Do not leave the keys in the vehicle or leave it running.
 7. Some rental agencies provide insurance coverage under a negotiated contract with Primoris T&D for vehicles reserved through the Travel Center. If a Primoris T&D driver reserves vehicles through means other than the Travel Center or with agencies that are not covered through the insurance agreement with the Travel Center, it is recommended that the driver purchase insurance through the rental agency.
 8. In the event of an accident in a rental vehicle, the Primoris T&D driver shall stop the vehicle and call the police and his/her supervisor to report the accident, even if it is minor.
 - Get the names of witnesses and the police item number.

- Report the accident to the rental company, Primoris T&D Claims Management, and to the safety coordinator.
- 9. Complete the Primoris T&D Vehicle Accident Report.
- 10. If the Primoris T&D driver receives a ticket for a moving violation, he/she may sign the traffic violation at the site as required by law, but do not plead guilty and do not sign the back of the copy of the ticket or pay a ticket until legal services has been contacted for guidance.

817– Convoy Guidance

- A. Motor vehicles shall not be driven unless the driver has ensured him/herself that the following parts and accessories are in good working order, nor shall any driver fail to use or make use of such parts and accessories when and as needed:
 - 1. Service brakes, including trailer brake connections
 - 2. Parking (hand) brake
 - 3. Steering mechanism
 - 4. Lighting devices and reflectors
 - 5. Windshield wiper or wipers
 - 6. Rear vision mirror or mirrors
 - 7. Coupling devices.
- B. Employees shall ensure all bin doors are locked before travel.
- C. The convoy shall be stopped at a safe place (i.e., roadside rest area) within the first 50 miles of travel to inspect all cargo to be properly stored and all tires are still in good shape. This process shall be repeated at approximately every three hours or if the vehicle has been driven 150 miles (whichever occurs first) after the initial inspection. [DOT Regulation 392.9(b)(2)]
- D. The convoy shall not travel faster than the posted speed. However, the road and weather conditions shall determine the speed of the convoy in inclement weather.
- E. The vehicles in the convoy shall be spaced to allow public vehicles to safely pass the convoy.
- F. The convoy shall use the center lane when in urban areas, when possible, to allow public traffic to safely merge.

- G. The four-way flashers shall not be used when the convoy is in motion unless under the direction of law enforcement. Headlights are to be used instead.
- H. Beacon lights shall not be used at night or while traveling unless hauling an oversized load.

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Section 9 – Work Area Protection

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Traffic Control

901 – Purpose

- A. The principles outline in the regulation apply to both rural and urban areas.
- B. This information is designed to acquaint employees with the minimum requirements for traffic warning devices.
- C. Although each situation must be dealt with individually, conformity with the guidelines is required. In situations not adequately covered by the provisions of these guidelines, the protection of the traveling public and of the workers on the scene will dictate the measures to be taken.
- D. If you work on or near highways, roads, or streets, you must learn and abide by these guidelines.
- E. Refer to the Manual on Uniform Traffic Control Devices (MUTCD). The manual is available upon request.

902 – General Guidelines

- A. Traffic safety shall be an integral part of planning on every job on or near roadways.
- B. Traffic control devices shall be set up prior to the start of construction or maintenance operations and shall be properly maintained during the time such conditions exist. They shall remain in place only if they are needed and shall be immediately removed thereafter. Where operations are performed in stages, only those devices that apply to the conditions immediately in effect during the present stage of progress shall be in place. Signs shall be removed, covered, or turned away from the view of the drivers at times they do not apply.
- C. Traffic cones used for channeling traffic shall be a minimum of 28 inches and shall be used on freeways and other high-speed roadways and on all facilities during the hours of darkness or whenever more conspicuous guidance is needed.
- D. The primary function of temporary traffic control is to provide for the reasonably safe and effective movement of road users through or around temporary traffic control zones while reasonably protecting road users, workers, responders to traffic incidents, and equipment.
- E. A temporary traffic control zone is an area of a highway where road user conditions are changed because of a work zone, an incident zone, or a planned

special event using temporary traffic control devices, uniformed law enforcement officers, or other authorized personnel. A work zone is an area of a highway with construction, maintenance, or utility work activities. A work zone is typically marked by signs, channelizing devices, barriers, pavement markings, and/or work vehicles. It extends from the first warning sign or high intensity rotating, flashing, oscillating, or strobe lights on a vehicle to the END ROAD WORK sign or the last temporary traffic control device.

F. Most temporary traffic control zones are divided into four areas:

1. Advance Warning Area

- Advance warning area is the section of highway where road users are informed about the upcoming work zone or incident area
- Typical distances for placement of advance warning signs on freeways and expressways should be longer because drivers are conditioned to uninterrupted flow. Therefore, the advance warning sign placement should extend on these facilities as far as ½ mile or more.
- On urban streets, the effective placement of the first warning sign in feet should range from 4 to 8 times the speed limit in mph, with the high end of the range being used when speeds are relatively high.

2. Transition Area

- The transition area is that section of highway where road users are redirected out of their normal path.

3. Activity Area

- The activity area is the section of the highway where the work activity takes place.
- It is comprised of the work space, the traffic space, and the buffer space.

4. Termination Area

- The termination area is the section of the highway where road users are returned to their normal driving path.

G. Traffic cones used at night shall be reflectorized or equipped with lighting devices. The reflectorized cones shall be provided by two white bands, one band six (6) inches wide, placed within three (3) inches of the top, second band four (4) inches wide placed two (2) inches below the first band.

H. Weather or traffic conditions may require additional warning devices.

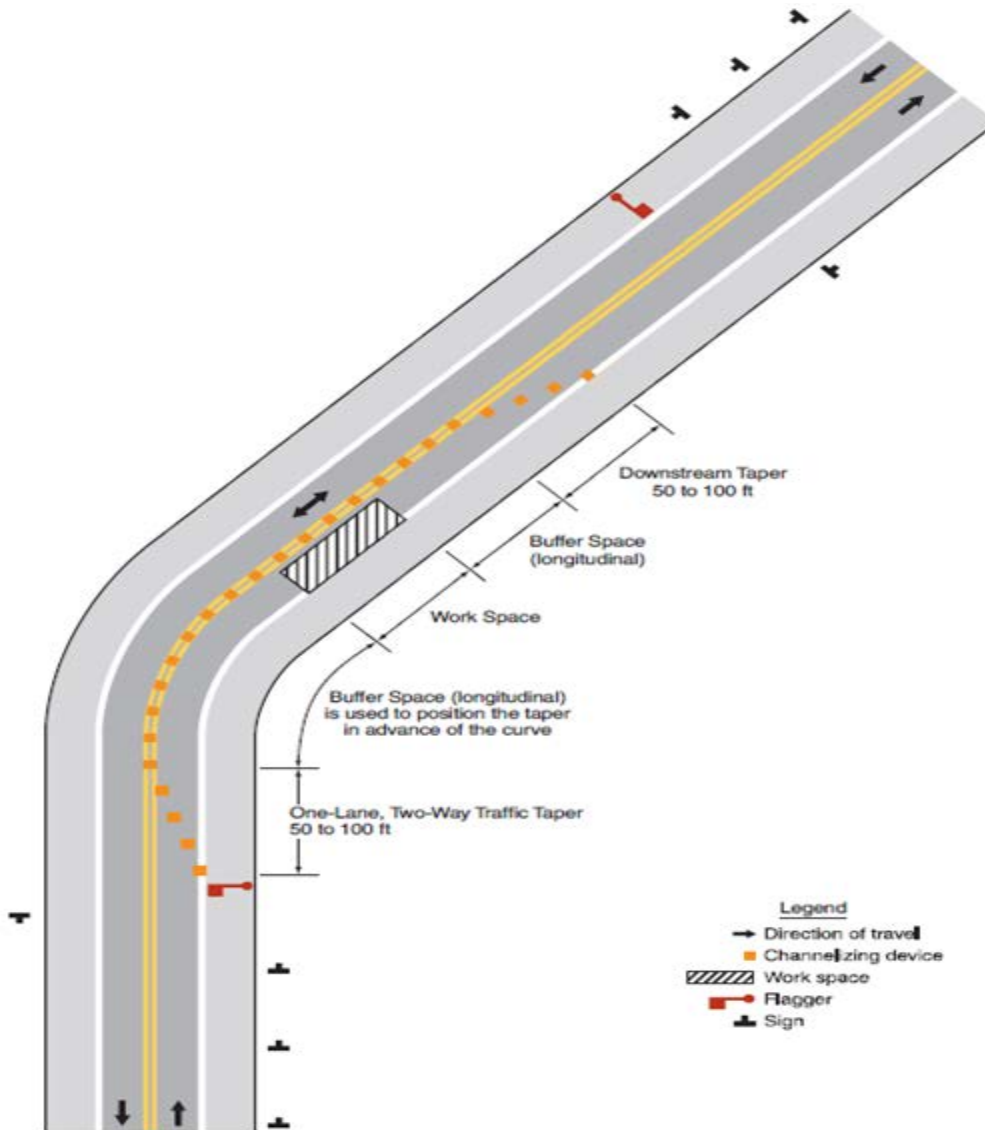
I. Motorist should be guided in a clear and positive manner while approaching and crossing work areas. This guidance should be provided by the proper use of

signs, channeling devices (cones) and flagging. The flagger shall wear a reflectorized vest with a silver-colored reflective coating.

J. Signs shall be a minimum of three feet in height.

903 – Example of Traffic Control

A. Example of a One-Lane, Two-Way Traffic Taper



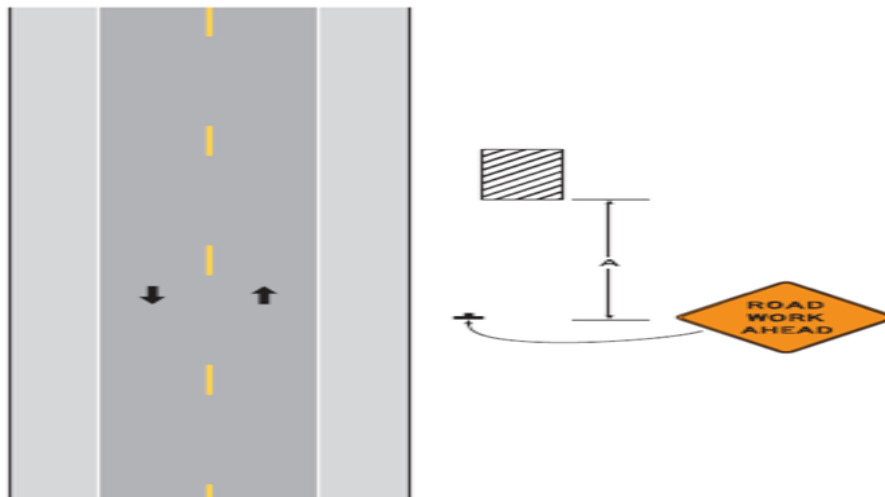
B. Stopping Distance Table

Table 6E-1. Stopping Sight Distance as a Function of Speed

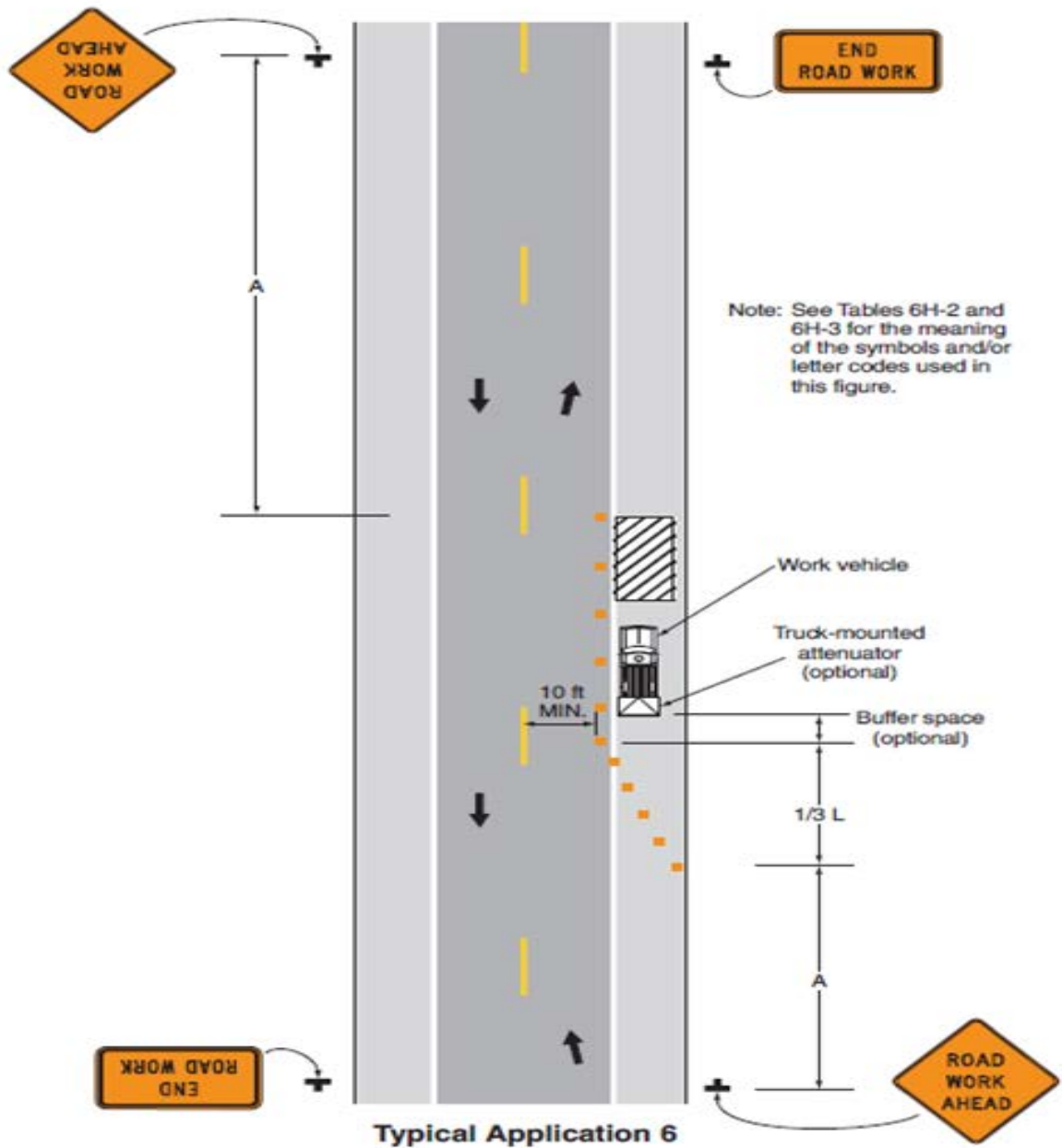
Speed*	Distance
20 mph	115 feet
25 mph	155 feet
30 mph	200 feet
35 mph	250 feet
40 mph	305 feet
45 mph	360 feet
50 mph	425 feet
55 mph	495 feet
60 mph	570 feet
65 mph	645 feet
70 mph	730 feet
75 mph	820 feet

* Posted speed, off-peak 85th-percentile speed prior to work starting, or the anticipated operating speed

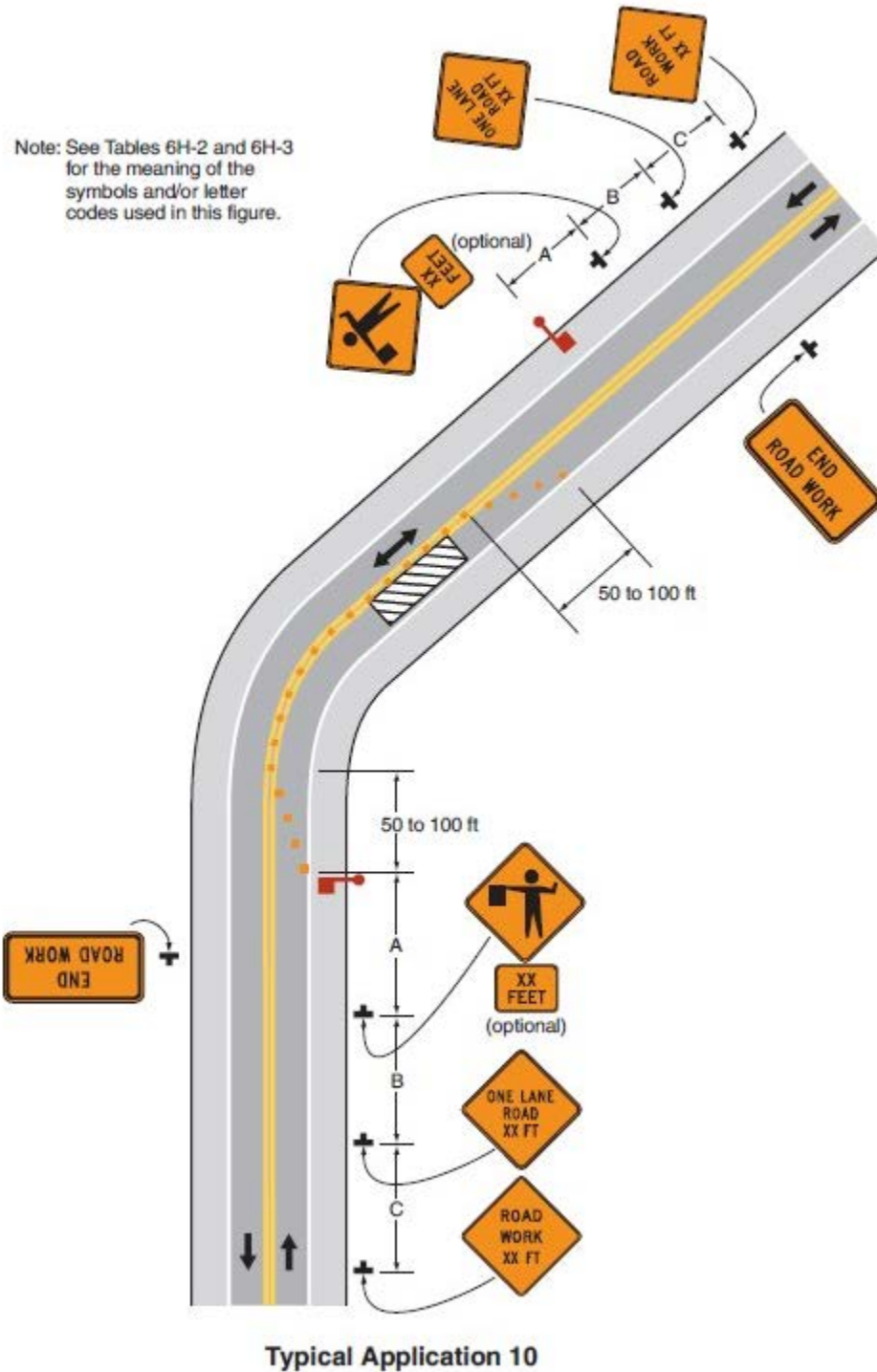
C. Work Beyond the Shoulder



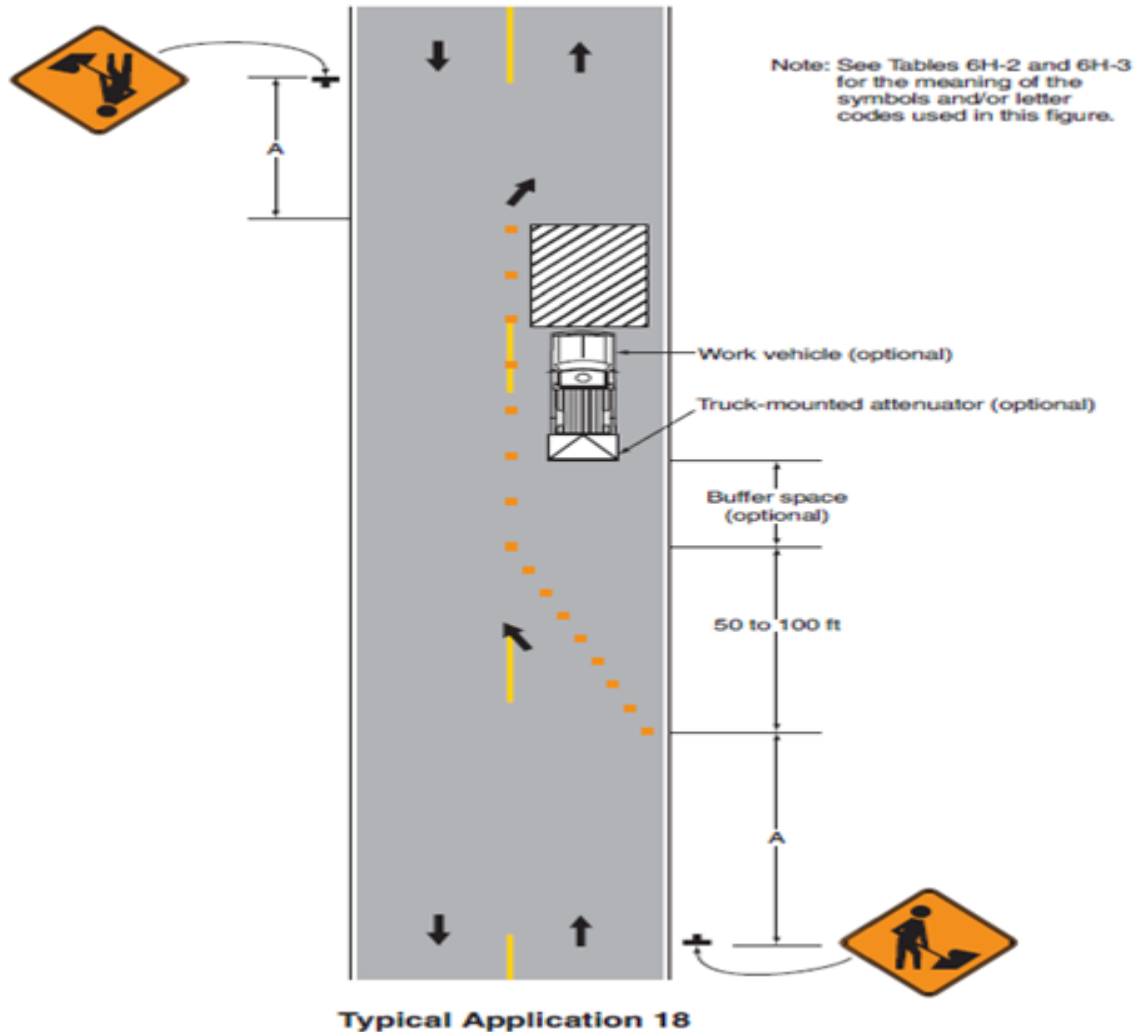
D. Shoulder Work with Minor Encroachment



E. Lane Closure on a Two-Lane Road Using Flaggers



F. Lane Closure on a Minor Street



904 - Flagger Control

A. Qualification of Flaggers

1. Flaggers should be able to satisfactorily demonstrate the following abilities:
 - Ability to receive and communicate specific instructions clearly, firmly, and courteously.
 - Ability to move and maneuver quickly to avoid danger from errant vehicles.
 - Ability to control signaling devices (such as paddles and flags) to provide clear and positive guidance to drivers approaching a TTC zone in frequently changing situations.

- Ability to understand and apply safe traffic control practices, sometimes in stressful or emergency situations; and
- Ability to recognize dangerous traffic situations and warn workers in sufficient time to avoid injury.

B. Flagger Stations

1. Flagger station shall be located such that approaching road users will have sufficient distance to stop at an intended stopping point.
2. The distances shown in Table 6E-1, (see below) which provides information regarding the stopping sight distance as a function of speed, may be used for the location of a flagger station. These distances may be increased for downgrades and other conditions that affect stopping distance.
3. Flagger stations should be located such that an errant vehicle has additional space to stop without entering the work space. The flagger should identify an escape route that can be used to avoid being struck by an errant vehicle.
4. Except in emergency situations, FLAGGER STATION SHALL BE PRECEDED BY AN ADVANCE WARNING SIGN or signs and flagger stations shall be illuminated at night.

C. High-Visibility Safety Apparel

1. For daytime and nighttime activity, flaggers shall wear high-visibility safety apparel that meets the Performance Class 2 or 3 requirements of the ANSI/ISEA 107–2004.
2. The apparel background (outer) material color shall be fluorescent orange-red, fluorescent yellow-green, or a combination of the two as defined in the ANSI standard.
3. The retro reflective material shall be orange, yellow, white, silver, yellow-green, or a fluorescent version of these colors, and shall be visible at a minimum distance of 1,000 feet.
4. The retro reflective safety apparel shall be designed to clearly identify the wearer as a person.

D. Hand-Signaling Devices

1. The STOP/SLOW paddle should be the primary and preferred hand-signaling device because the STOP/SLOW paddle gives road users more positive guidance than red flags.
2. Use of flags should be limited to emergency situations.
3. The STOP/SLOW paddle shall have an octagonal shape on a rigid handle. STOP/SLOW paddles shall be at least 18 inches wide with letters at least

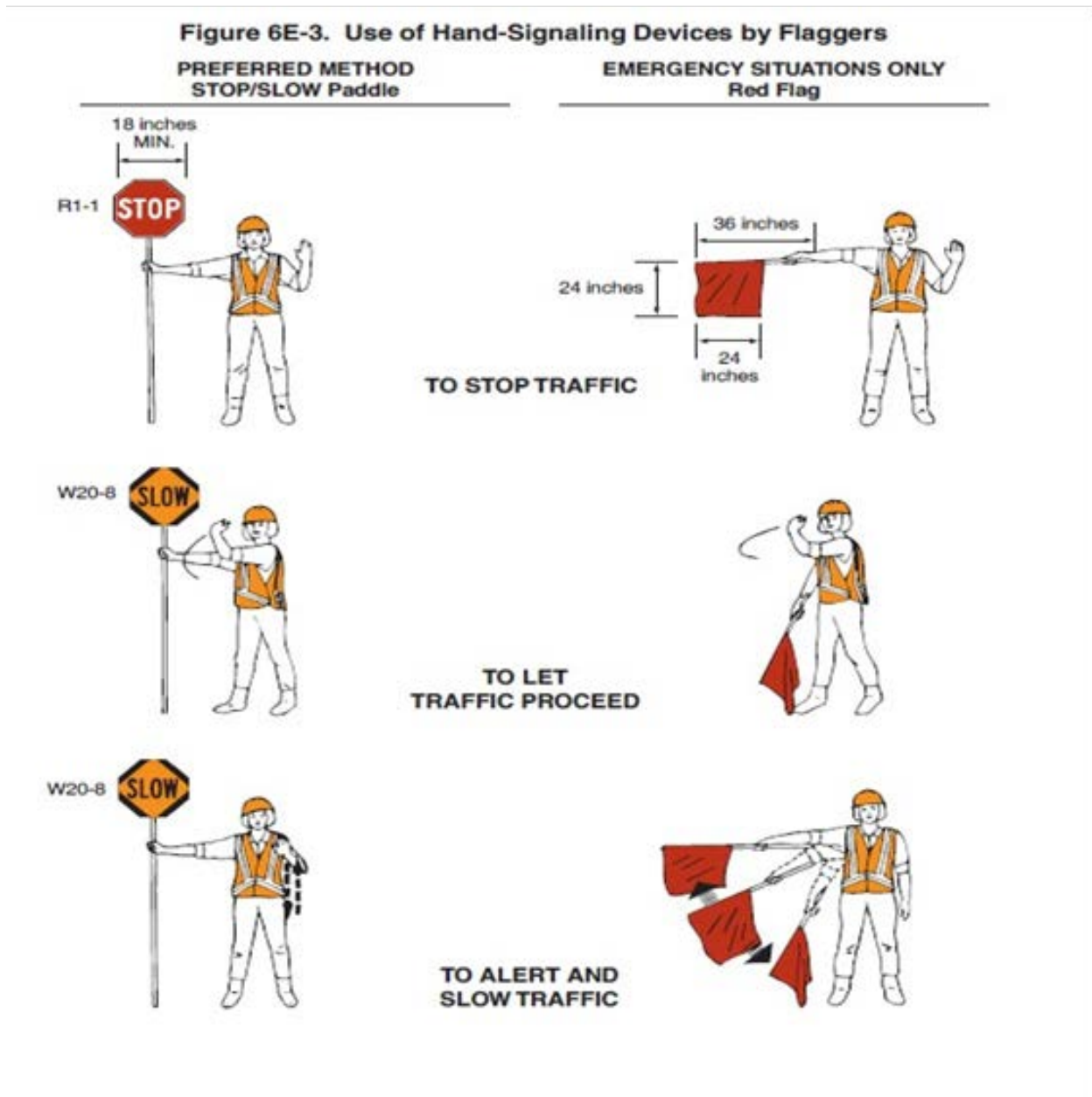
6 inches high. The STOP face shall have white letters and a white border on a red background. The SLOW face shall have black letters and a black border on an orange background. When used at night, the STOP/SLOW paddle shall be retro-reflectorized.

4. The optimum method of displaying a STOP or SLOW message is to place the STOP/SLOW paddle on a rigid staff that is tall enough that when the end of the staff is resting on the ground, the message is high enough to be seen by approaching or stopped traffic.
5. Flags, when used, shall be red or fluorescent orange/red in color, shall be a minimum of 24 inches square, and shall be securely fastened to a staff that is approximately 36 inches in length.
6. When used at nighttime, flags shall be retro-reflectorized red.
7. When flagging in an emergency at night in a non-illuminated flagger station, a flagger may use a flashlight with a red glow cone to supplement the STOP/SLOW paddle or flag.

E. Flagger Procedures

1. The following methods of signaling with paddles shall be used:
 - To stop road users, the flagger shall face road users and aim the STOP paddle face toward road users in a stationary position with the arm extended horizontally away from the body. The free arm shall be held with the palm of the hand above shoulder level toward approaching traffic.
 - To direct stopped road users to proceed, the flagger shall face road users with the SLOW paddle face aimed toward road users in a stationary position with the arm extended horizontally away from the body. The flagger shall motion with the free hand for road users to proceed.
 - To alert or slow traffic, the flagger shall face road users with the SLOW paddle face aimed toward road users in a stationary position with the arm extended horizontally away from the body.
2. The following methods of signaling with a flag shall be used:
 - To stop road users, the flagger shall face road users and extend the flag staff horizontally across the road users' lane in a stationary position so that the full area of the flag is visibly hanging below the staff. The free arm shall be held with the palm of the hand above shoulder level toward approaching traffic.
 - To direct stopped road users to proceed, the flagger shall face road users with the flag and arm lowered from the view of the road users and shall motion with the free hand for road users to proceed. Flags shall not be used to signal road users to proceed.
 - To alert or slow traffic, the flagger shall face road users and slowly wave the flag in a sweeping motion of the extended arm from

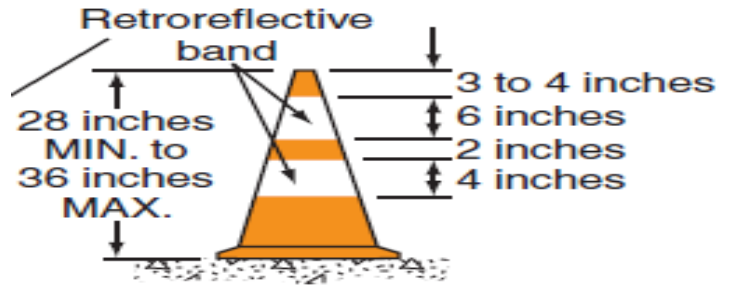
shoulder level to straight down without raising the arm above a horizontal position. The flagger shall keep the free hand down.



905 – Temporary Traffic Control Zone Devices

- A. Traffic control devices shall be defined as all signs, signals, markings, and other devices used to regulate, warn, or guide road users, placed on, over, or adjacent to a street, highway, private roads open to public travel, pedestrian facility, or bikeway by authority of a public body or official having jurisdiction.
- B. UTILITY WORK sign may be used as an alternate to the ROAD (STREET) WORK sign for utility operations on or adjacent to a highway
- C. FLAGGER SIGNS the flagger symbol sign should be used in advance of any point where a flagger is stationed to control road users.
- D. ONE LANE ROAD sign shall be used only in advance of that point where motor vehicle traffic in both directions must use a common single lane.
- E. LANE(S) CLOSED sign shall be used in advance of that point where one or more through lanes of a multi-lane roadway are closed.
- F. SHOULDER WORK SIGNS warn of maintenance, reconstruction, or utility operations on the highway shoulder where the roadway is unobstructed.
- G. All warning signs are 36 inches by 36 inches, except that work on expressways or freeways requires 48 inches by 48-inch signs.
- H. Signs should be properly maintained for cleanliness, visibility, and correct positioning. Signs that have lost significant legibility should be promptly replaced.
- I. Cones
 - 1. Cones shall be predominantly orange and shall be made of a material that can be struck without causing damage to the impacting vehicle.
 - 2. For daytime and low-speed roadways, cones shall be not less than 18 inches in height. When cones are used on freeways and other high-speed highways or at night on all highways, or when more conspicuous guidance is needed, cones shall be a minimum of 28 inches in height.
 - 3. For nighttime use, cones shall be retro reflectorized or equipped with lighting devices for maximum visibility. Retro reflectorized cones that are 28 to 36 inches in height shall be provided by a 6-inch-wide white band located 3 to 4 inches from the top of the cone and an additional 4-

inch-wide white band located approximately 2 inches below the 6-inch band.



Barricades and Barriers

906 – Barricade

- A. The use of temporary barricading ensures all personnel are excluded from areas where work activities, or conditions, present a hazard to employees or to the public. A strong Questioning Attitude should always be used when flagging or barricades are present.
- B. Sign Classifications
 - 1. Danger – Red, Black, and White shall be used where an immediate hazard exists. Only authorized entry is permitted.
 - 2. Warning – Orange & Black shall be used where a hazard exists. Entry is permitted provided special precautions are observed.
 - 3. Caution – Yellow & Black shall be used where there is a potential hazard. Entry is permitted upon recognition of the hazard and use of posted precautionary measures.
- C. Safety Ribbon /Tape
 - 1. Caution (yellow/black) – used to warn personnel of an area containing a possible hazard. A tag shall be attached to the ribbon with a clear description of potential hazard within the boundary if left unattended. Also, a legible contact name and phone number for the person in charge is to be on the tag. Personnel can pass through a ribbon boundary after heeding to the caution message and PPE requirements.
 - 2. Danger (red /black) – used to warn personnel of an eminent danger or hazard. Only personnel authorized to work within the red ribbon boundary

area are permitted to enter. All other personnel are required to STAY OUT of the area. A tag shall be attached to the ribbon with a clear description of the hazards within the boundary if left unattended. Also, a legible contact name and phone number for the person in charge is to be on the tag. (Permission to enter a “Danger” area may be granted by an authorized worker present in the area or the individual in charge of the work as specified on the tag. Additional tags may be used to identify the hazard and additional PPE that may be required due to that hazard over and beyond PPE normally required for that area.)

907 – Barriers

- A. Barriers are a solid obstruction positioned to deter the passage of persons or vehicles into a hazardous area or environment.
- B. The barrier typically will have a top- and mid-rail in its construction. The barrier shall be positioned to not tip or fall over.
- C. Only authorized personnel shall be permitted to pass into the hazardous area.
- D. These devices shall be positioned to provide a sufficient clear ‘safe’ area around the hazard.
- E. Physical barriers are preferred over the use of ribbon, when feasible.
- F. Do not tie ribbon, tape, rope, and lines to equipment that could be damaged or where the ribbon could be accidentally caught on moving parts.
- G. The responsible work group shall maintain the integrity of the barricade / safety ribbon /tape materials to ensure effectiveness of its intent.
- H. The responsible work group shall remove the barricade / safety ribbon /tape materials when the hazard no longer exists.

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Section 10 – Confined/Enclosed Space

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1001 – Purpose

To provide a uniform practice for Primoris T&D employees that protects their health and reduces the probability of injury while working in confined spaces and to provide guidelines for training to enter and work in confined spaces.

1002 – Definitions:**A. Acceptable Entry Conditions:**

1. Means the conditions that must exist in a permit space to allow entry and to ensure that employees involved with a permit-required confined space entry can safely enter in to and work within the space.

B. Confined Space:

1. A space that is enclosed, but large enough and so configured that an employee can bodily enter and perform assigned work.
2. Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults/manholes and pits, are spaces that may have limited means of entry).
3. Is not designed for continuous employee occupancy.

C. Entry:

1. Means the action by which a person passes through an opening into a permit – required Confined Space.
2. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into a permit required confined space.

D. Non-Permit Confined Space:

1. A confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm.

E. Permit-Required Confined Space:

1. A confined space that has one or more of the following characteristics:
 - Contains or has a potential to contain an atmospheric hazard.
 - Contains a material that has the potential for engulfing an entrant.
 - Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross-section.
 - Contains any other recognized serious safety or health hazard.

1003 – Permit System

- A. Each location shall establish and maintain the following:
 - 1. A list of permit entry spaces.
 - 2. Potential hazards associated with each permit space location.
 - 3. Special safety equipment required for entry.
 - 4. Testing and monitoring required, and a rescue plan for each permit space location.
 - 5. The list shall be expanded as new permit entry spaces are identified.
 - 6. Permit Entry Spaces shall be identified by use of signs, placards, or any other equally effective means.
- B. Entry into a permit entry space shall be by permit only (D-1 or D-2 to 1910.146 Confined Space Entry Permit). The permit certifies, in writing, that the space atmosphere has been evaluated and specifies that acceptable entry conditions exist. The entry supervisor shall be responsible for the completion of the entry permit, and the overall accountability for safe entry operations.
- C. Permit documentation shall be maintained at work location while active.
- D. Entry Supervisor
 - 1. A person Foreman or Crew Leader capable (by Education and/or Training) of anticipating, recognizing, and evaluating hazardous or unsafe conditions in a particular confined space. This person shall be responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, authorizing entry, overseeing entry operations, and terminating entry as necessary. An entry supervisor shall have received training in:
 - Respiratory Protection
 - Hazardous Materials
 - Confined Spaces
 - Atmospheric Testing/Monitoring Instrument Training
 - Rescue Practices
- E. Attendant
 - 1. An individual stationed outside one or more permit spaces that monitor and maintains an accurate account of the authorized entrants and performs all attendants' duties as specified in the permit space program. All attendants shall be trained in:
 - Respiratory Protection
 - Hazardous Materials
 - Confined Spaces

- Atmospheric Testing/Monitoring Instrument Training
- Rescue Practices

F. Authorized Entrant

1. An authorized entrant is an employee who is authorized by the entry supervisor to enter a permitted space. All authorized entrants shall receive training in:
 - Respiratory Protection
 - Hazardous Materials
 - Confined Spaces
 - Atmospheric Testing/Monitoring
 - Instrument Training
 - Rescue Practices

1004 – Testing, Monitoring and Ventilation

- A. Entry into a permit space shall be prohibited unless the atmosphere has been tested with a calibrated direct reading instrument for the following conditions in the order given:
 1. Oxygen content.
 2. Flammable gases and vapors.
 3. Potential toxic air contaminants.
- B. Monitoring of a permit entry space shall be done continuously or periodically as determined by the entry supervisor and documented on the entry permit.
- C. Non-permit entry space monitoring will also be done continuously or periodically as determined by the entry supervisor and documented.
- D. Oxygen shall never be used for ventilation.
- E. During emergency situations involving atmospheres immediately dangerous to life and health, entry shall be made with a positive pressure self-contained breathing apparatus or air line with escape pack. The attendant shall have suitable reserve equipment.
- F. Before cleaning the interior of any tank, the contents shall be drained off, and the cleanout doors shall be opened. All pockets in tanks or pits, where hazardous vapors can collect, shall be ventilated.
- G. If atmospheric tests indicate the atmosphere is combustible, entry shall not be made until the space is ventilated and the atmosphere is determined by test to be safe. Thereafter, continuous ventilation shall be provided, and continuous monitoring applied.



Section 10: Confined/Enclosed Space

- H. Except for emergency situations there may be no hazardous atmosphere within the space whenever any employee is inside the space.

1005 – Personal Protective Equipment

The environment and planned activities in a confined space will determine what type of personal protective equipment is needed to perform the work in a safe manner.

1006 – Lighting

- A. Any temporary lighting used in a permit entry space subject to potentially explosive atmospheres shall be an explosion proof type.
- B. Any temporary lighting in a permit entry space shall be 12 volts or less extension light or battery powered portable light or be served through a ground fault current interrupter.
- C. Each employee entering a confined space shall have a flashlight if loss of installed lighting poses a hazard.

1007 – Specific Permit Confined Space Requirements

- A. When an employee enters a permit entry space, a retrieval system consisting of a chest or full body harness with a retrieval line always attached, shall be worn by the authorized entrant unless the retrieval equipment would increase the overall risk of entry or would not contribute to the rescue of the entrant.
- B. An attendant shall be required to maintain communications (visual, voice or signal wire) with the authorized entrants and to monitor the activities inside and outside the space to determine if it is safe for the entrants to remain in the space.
- C. If an employee will be working in a vertical type of permit space more than 5' (Five) feet deep, a mechanical retrieval device shall be provided before work begins to enable the attendant to perform a non-entry rescue if necessary.

1008 – Work Generated Hazards

- A. A cylinder or welding power source used in a permit entry space shall be placed and secured outside of the space where work is being performed.



- B. When welding or cutting in a permit entry space, the torch valves and gas and oxygen supply valves outside the permit entry space shall be shut off overnight or any other prolonged period when work is suspended. Where practical, torches and hoses shall be removed from the permit entry space.
- C. When stick electrodes are used in a permit entry space and welding is suspended during any prolonged period, the electrode shall be removed from the holder and the machine shut off.
- D. Air Replacement - All welding and cutting operations carded on a permit entry space shall be adequately ventilated to prevent accumulation of toxic materials or possible oxygen deficiency. This applies not only to the welder but also to helpers and others in the immediate area.

1009 – Control of Energy Sources

The provisions of the "Safety Handbook" shall be implemented to control or eliminate energy sources that can reasonably be expected to create a hazard.

1010 – Access and Egress

- A. Adequate means shall be provided and used for safe access into and egress from non-permit and permit entry spaces such as approved ladders.
- B. Ladders used for entering or leaving a confined/enclosed space shall not be removed when workers are still in the space unless it is necessary to obtain working room. The ladder shall be readily available to be put back in place in the event of an emergency.

1011 – Transformers and Breakers

Transformers and breakers, if large enough and so configured that an employee can bodily enter and perform assigned work, are considered permit entry confined spaces. Any work or entry into a transformer or breaker shall be performed with the full permit-required confined spaces program.

1012 – Underground Vaults and Manholes

- A. Where practical, vehicles shall be parked on the downwind side of open manholes and vaults to prevent exhaust fumes from entering the work area. The same care shall apply to all types of gasoline or internal combustion engines such as generators, air compressors, blowers, welders, etc.



- B. High level warning flag devices and traffic cones by day and elevated amber flasher lights by night shall be placed at all open manholes located on public right-of-way or where exposed to traffic of any kind. The warnings shall be placed in such a manner as to give persons or vehicles ample time to avoid the obstruction.
- C. When a tool cart is used, it should be placed on the side of the manhole away from traffic so that the employee will be able to face the manhole and oncoming traffic and see approaching danger. Carts should not block sidewalks, driveways or entrances to homes or businesses.
- D. Before an underground enclosure is opened, all unauthorized persons shall be required to leave the work area.
- E. Never use a flame to melt ice around a manhole cover. There is always danger of igniting explosive gas that may be in the manhole.
- F. When removing and replacing manhole covers, adequate help shall be obtained. Proper tools shall be used to lift manhole or vault covers. Employees shall be aware of the position of their feet and hands during the operation.
- G. Open manholes and vaults shall be barricaded.
- H. When entering or exiting a manhole or subsurface vault that is more than 5' (Five) feet in depth, a ladder or other approved climbing device shall be used. No employee may climb into or out of a manhole or vault by stepping on cable or hangers. Lowering or removing an employee into or out of a manhole or vault with a winch truck is prohibited.
- I. Before entering a manhole, the atmosphere of the manhole shall be checked with an oxygen/combustible gas analyzer. The oxygen content shall be checked first and shall be at least 19.5 percent and not more than 23.5 percent. The combustible gas shall not be more than 10 % of the LFL (Lower Flammable Limit).
- J. When Test's indicate the presence of more than 10 percent of the LFL combustible gas, or if the oxygen tests less than 19.5 percent or more than 23.5



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percent, the space shall be ventilated to remove the hazard, and continuous ventilation and continuous monitoring is required throughout the occupancy.

- K. Test instruments used to monitor atmospheres in confined/enclosed spaces shall be kept in calibration, with a minimum accuracy of ± 10 percent of the LEL.
- L. Immediately after entering the manhole, tests shall be made in corners, conduit openings and other nooks with the oxygen/combustible gas analyzer to determine if pockets of gas or dead air are trapped.
- M. Continuous forced air ventilation shall be provided while work, such as use of open flames and solvents or welding (which may cause a hazardous atmosphere), is being performed in manholes or unvented vaults. Employees may enter a manhole or unvented vault for brief periods of time without continuous forced air ventilation, for the purpose of inspection, housekeeping, taking readings or other similar duties, after tests indicate it is safe to do so.
- N. Any work that could cause a change in the atmosphere of the manhole, such as removing conduit plugs, shall require immediate retesting of the atmosphere.
- O. When open flames are used or if smoking is permitted in manholes, the atmosphere shall be continuously monitored and added ventilation provided if necessary.
- P. After employees have entered a sidewalk entrance vault, the screen grate should be closed, or barricades placed.
- Q. When pumping out vaults or manholes containing energized equipment, a nonconductive hose shall be used, and caution taken in lowering the hose into the vault or manhole. When a submersible hydraulic pump is used, the same precautions shall be observed.
- R. Entry of employees into atmospheres "immediately dangerous to life and health" (IDLH) is permit entry and the permit required confined space procedure shall be followed.
- S. Before starting work, an inspection shall be made to determine if there are any dangerous conditions such as burned or cut cables, loose or defective ladders, etc.

- T. When work in any manhole or vault brings the employee in proximity to live parts, rubber blankets or other suitable insulating devices shall be installed to prevent accidental contact.
- U. If a cable is damaged or a splice is swollen or leaking, it shall be de-energized before any employee may work in the manhole or vault.
- V. If load conditions require the cable to remain energized, employees may work in the manhole or vault provided they are protected from the possible effects of a cable failure by providing shields or other devices that can contain the adverse effects of a cable failure.
- W. When work is being performed in manholes, an attendant shall be available in the immediate vicinity of the entrance to render emergency assistance.
Exception: An attendant may not enter the manhole if there is reason to believe that a hazard may exist because of traffic patterns in the opening used for entry.
- X. Equipment used to lower materials and tools into manholes or vaults shall be capable of supporting the weight to be lowered and shall be checked for defects before use. Before hot solder or other hot compounds are lowered into the opening of a manhole or vault, employees working in the manhole or vault shall be clear of the area directly under the opening.
- Y. Periodic ventilation and continuous monitoring are required throughout the occupancy of the confined space.

1013 – Rescue Plan

- A. Each location shall make arrangements for the use of either an on-site or off-site rescue service.
- B. Procedures shall be developed and implemented for summoning those services.
- C. Location's that adopt the use of an on-site rescue service shall assure adequate rescue equipment is available and that enough personnel are properly trained in rescue techniques, first aid and CPR.
- D. Non-entry rescue shall be conducted.



E. The following rescue equipment shall be readily available for immediate use:

1. Fire extinguisher (30 lb. multi-purpose dry chemical)
2. Hand line
3. Flash jacket (Nomex or equivalent), hood and face shield (not required for manholes containing only control cables or de-energized equipment.
4. Rescue harness and lifeline shall be worn in manhole and vault while work is in progress by all personnel.
5. A rescue lifting device, manhole guard and safety ring or toe board shall be placed over the opening before entry and reliable communication such as two-way radio or other equivalent means shall be maintained among all employees on the job.

1014 – Appendix A

A. Entry into a permit-confined space by the alternate procedure may be accomplished under the conditions outlined below provided that:

1. The only hazard posed by the space is an actual or potential atmospheric hazard.
2. It can be demonstrated that continuous forced air ventilation alone is sufficient to maintain the space safe for entry.
3. Monitoring and inspection data are developed that support A and B above.
4. If initial entry is required to obtain the above data, it shall be performed in full compliance with the permit space entry program.
5. All determinations and supporting data are documented and made available to each employee who enters the permit space.
6. Entry into the permit space is performed in accordance with the following requirements:
 - Any conditions making it unsafe to remove an entrance cover shall be eliminated before the cover is removed
 - All openings shall be promptly guarded by a railing or other temporary barrier that will prevent an accidental fall through the

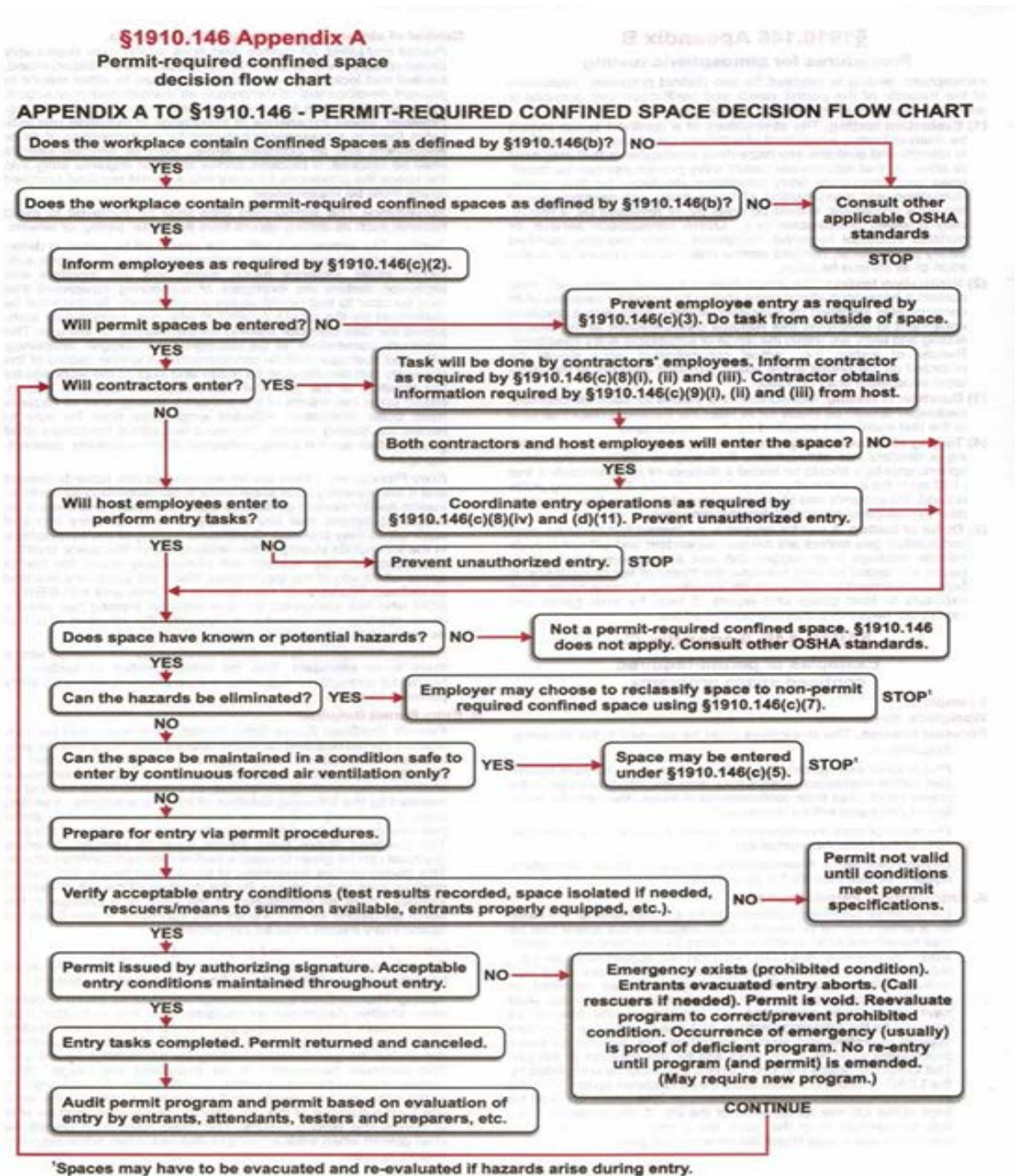
opening and that will protect the employee working in the space from foreign objects entering the space.

- The internal atmosphere shall be tested prior to entry with a calibrated direct reading instrument in the following order:
 - Oxygen level
 - Flammable gases and vapors
 - Potential toxic air condiments
- There may be no hazardous atmosphere in the space while being occupied by an employee.
- Continuous forced air ventilation must be used as follows:
 - Forced air ventilation must remove any hazardous atmosphere prior to entry.
 - Forced air ventilation shall be so directed as to ventilate the immediate area in which the employee is working and shall continue until all employees have left the space.
 - The air supply shall be from a clean source and shall not increase the hazards within the space.
- The atmosphere within the space shall be periodically tested as necessary.
- If a hazardous atmosphere is detected during entry:
 - The space shall be evacuated immediately.
 - The space shall be evaluated to determine how the hazardous atmosphere developed.
 - Measures shall be implemented to protect employees from the hazardous atmosphere before any subsequent entry.
- The entry supervisor shall verify that the space is safe for entry and that all measures required by this appendix have been taken. A written certification that contains the date, location of the space and signature of the person providing the certification shall be made available to each employee entering the space prior to entry.



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APPENDIX A TO 1910.146 – PERMIT – REQUIRED CONFINED SPACE DECISION FLOW CHART





1015 – Appendix B

A. Reclassification of a permit-confined space to a non-permit confined space may be accomplished by the following procedures:

1. If the permit space poses no actual or potential atmospheric hazard and if all hazards within the space have been eliminated without entry into the space, the space may be reclassified as a non-permit space for as long as the non-atmospheric hazards remain eliminated.
2. If it is necessary to enter the permit space to eliminate the hazards, the entry shall be performed in compliance with the permit space entry program.
3. Control of atmospheric hazards by forced ventilation does not constitute elimination of hazards.
4. The basis for determining that all hazards have been eliminated shall be documented through a certification that contains the date, location of the space and signature of the person making the determination. This certification shall be made available to each employee entering the space.
5. If hazards arise within a permit space that has been declassified to a non-permit space, all employees shall immediately exit the space. The space shall then be re-evaluated to determine whether it must be reclassified to a permit space.



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1016 – Appendix D – Confined Space Entry Permit

PERMIT VALID FOR 8 HOURS ONLY, ALL PERMIT COPIES REMAIN AT SITE UNTIL JOB COMPLETED.

_____/_____/_____ SITE LOCATION/DESCRIPTION: _____
DATE

PURPOSE OF ENTRY

SUPERVISOR(S) in charge of crew's

Type of crew

Phone #

_____/_____/_____
_____/_____/_____

COMMUNICATION PROCEDURES

RESCUE PROCEDURES (PHONE NUMBERS AT BOTTOM)

***BOLD DENOTES MINIMUM REQUIREMENTS TO BE COMPLETED AND REVIEWED PRIOR TO ENTRY ***

REQUIREMENTS COMPLETED	DATE	TIME
Lock out /De-energize / Try out	____/____/____	____:____ AM / PM
Line (s) Broken - Capped Blank	____/____/____	____:____ AM / PM
Purge – Flush and vent	____/____/____	____:____ AM / PM
Ventilation	____/____/____	____:____ AM / PM
Secure area (Post and Flag)	____/____/____	____:____ AM / PM
Full Body Harness w / D "ring "	____/____/____	____:____ AM / PM
Emergency escape retrieval equipment	____/____/____	____:____ AM / PM
Lifelines	____/____/____	____:____ AM / PM
Fire Extinguisher	____/____/____	____:____ AM / PM
Lighting (Explosion Proof)	____/____/____	____:____ AM / PM
Protective Clothing	____/____/____	____:____ AM / PM
Respirator (s) (Air Purifying)	____/____/____	____:____ AM / PM
Burning or Welding Permit	____/____/____	____:____ AM / PM

Note: Items that do not apply enter N/A in the blank.

**** Record Continuous Monitoring every 2 hours****

Continuous Monitoring**	Permissible	Entry Level
Test (s)	19.5% to 23.5%	____
Percent of Oxygen	Under 10%	____
Lower Flammable Limit	+ 35ppm	____
Carbon Monoxide	+1ppm *5ppm	____
Aromatic Hydrocarbon	*4 ppm	____
Hydrogen Cyanide (Skin)	+10 ppm * 15 ppm	____
Hydrogen Sulfide	+2 ppm * 5 ppm	____
Sulfur Dioxide	* 35 ppm	____
Ammonia		____

* Short Term Exposure Limit: Employees can work in the area up to 15 minutes

* 8hr Time weighted average: Employees can work in area 8hrs (longer with appropriate respiratory protection)



Primoris Section 10: Confined/Enclosed Space

Remarks:

Gas testers Name	Instrument(s) used	Model and/ or Type	Serial and / or Unit #
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SAFETY STANDBY PERSON IS REQUIRED ON ALL CONFINED SPACE WORK:

Safety Standby Person(s)	Crew #	Confined Space Entrant(s)	Crew #	Confined Space Entrant(s)
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Supervisor Authorization – All Conditions Satisfied:

Department:

Phone #

 /

 /

Emergency:

Ambulance/EMT

Fire Dept.

Safety

Gas Coordinator

RETURN TO SAFETY DEPARTMENT AT THE END OF THE EACH DAY!



1017 –Training Requirements

- A. The employer shall provide training so that all employees acquire the understanding, knowledge, and skills necessary for the safe performance of the duties. [OSHA 1926.1207]
- B. Training shall be provided to each affected employee before:
 - 1. The employee is first assigned to enter a confined or enclosed space.
 - 2. There is a change in permit space operations that presents a hazard about which an employee had not previously been trained.
 - 3. Whenever employer believes there are deviations from entry procedures or there are inadequacies in employee's knowledge or use of procedures.
- C. The training shall establish employee proficiency for entry into to a confined or enclosed space and shall introduce new or revised procedures, as necessary. [OSHA 1926.1208]
- D. The employer shall certify the training. This certification shall contain each employee's name, the signatures or initials of trainers, and the dates of training.
- E. The employer shall ensure that all authorized entrants and attendants have been trained in Confined Space Entry and rescue procedures, CPR, and First Aid.
- F. The employer shall ensure that all authorized entrants and attendants know the hazards that may be faced, including information on mode, signs, symptoms, and consequences of exposure.
- G. The employer shall ensure that all authorized entrants and attendants know how to use any equipment necessary for safe entry into and rescue from the space. Equipment includes but is not limited to: testing and monitoring equipment, ventilating equipment, communication equipment, lighting, barriers and shields, PPE, and ladders for safe ingress and egress.
- H. Supervisors who authorize entry into a space shall be trained and knowledgeable about confined space procedures and specific hazards present.
- I. Contract employees, as well as outside rescue personnel who may be asked to enter a confined space, shall be provided information about the hazards.



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1101 – General

- A. The appropriate personal protective equipment shall be worn when using tools and equipment.
- B. Approved tools and equipment shall only be used for their intended purpose.
- C. Tools shall not be altered in any way (i.e., handles lengthened or shortened, insulation removed or added).
- D. The hazards of exposed cutting edges, sharp points, catch or pinch points, live electric parts, or other hazards, shall be guarded against using shields, covers, location, storage, and other appropriate means.
- E. Tools shall not be left where they present the hazards of falling or contacting electric equipment.
- F. Defective tools and equipment shall not be used, and shall be tagged, marked, or stored so they will not be used until repaired or replaced.
- G. Metal tapes or rulers shall not be used near energized equipment.
- H. Safety guards, attachments, and systems shall be properly used when tools and equipment are in use.
- I. When operating a manual jack hammer or rock drill, goggles, face shields, shoe shields and ear protection shall be used.
- J. Impact tools such as chisels, drills, punches, and wedge hammers shall be dressed and kept free of mushroomed head.
- K. Machines designed for a fixed location shall be securely anchored to prevent walking or moving.
- L. Where injury to the operator might result if motors were to restart after power failures, provisions shall be made to prevent machines from automatically restarting upon restoration of power.
- M. When the blades of a fan are less than seven feet above the floor or working level, the blades shall be guarded. The guard shall have openings no larger than one-half inch.

1102 Care, Inspection, and Testing of Rubber Goods

- A. Rubber gloves and sleeves shall be stored in the appropriate bags provided for them. Gloves or sleeves shall not be folded when stored.
- B. Rubber gloves and sleeves shall be kept clean and should be washed regularly.
- C. Rubber gloves and sleeves shall be carefully inspected prior to use. Visually inspect and air-test rubber gloves before use.

- D. All rubber goods and cover-up shall be carefully inspected as required, properly used as needed, and properly cared for and stored.
- E. Visually inspect rubber blankets and line hose for flaws before use.
- F. Minimum intervals for dielectric testing rubber protective equipment:
 - 1. Gloves shall be tested at least every six months
 - 2. Sleeves shall be tested at least every twelve months
 - 3. Blankets shall be tested once a year
- G. Employees should avoid touching or leaning against rubber protective devices covering conductors or apparatus.
- H. If the rubber protective equipment does not have an issue date stamped, then the test date shall become the issue date.
- I. Rubber line hose, blankets and insulator hoods shall be washed as needed with approved cleaning agents to remove foreign substances and shall be wiped clean of oil, grease, or other damaging substances as soon as possible after use.
- J. Line hose, blankets and insulator hoods shall not be dropped from poles.
- K. Line hose, blankets, and insulator hoods, when stored in compartments, shall be placed so that no part is strained or distorted. Storage areas shall be kept clean and dry.
- L. Rubber blankets shall not be folded when stored.
- M. Before rubber blankets are stored, the surface shall be wiped clean to prevent dirt from becoming embedded in the surface of the rubber.
- N. Any line hose, blanket or insulator hood which is found to have punctures, deep cuts, or severe corona or ozone cutting, contamination from injurious materials, or has lost its normal elasticity, shall be destroyed, and discarded. Minor surface corona cuffing, or

ozone checking need not be cause for rejection. Hose may be used in shorter lengths if the defective portion is cut off.

1103 – Care of Insulated Sticks

- A. Insulating protective equipment shall be stored in such a manner as to protect it from light, temperature extremes, excessive humidity, ozone, and other harmful substances and conditions.
- B. Insulated hot line tools shall be dielectrically tested at least every two years.
- C. Insulated protective equipment shall be wiped clean of any dirt, creosote, grease, or any other contaminant before use.
- D. Insulated protective equipment with excessive contamination buildup, surface blisters, excessive nicks, or deep scratches should be removed from service for repair, refinishing, or discarded.

1104 - Axes, Picks and Sledgehammers

- A. Employees shall carry axes by holding the handle near the head with the head forward. Carrying an axe or brush hook on the shoulder is prohibited.
- B. Employees shall allow sufficient room to swing axes, picks, and sledgehammers.
- C. Cutting edges of axes and picks shall be kept sharp and the handles shall be smooth, securely fastened and not split.
- D. Axes and picks shall be stored in such a manner to prevent injuries to employees.

1105 – Knife

- A. Employees shall only use company approved knives and cutting tools while performing work activities.
- B. Wear cut resistant gloves. Specialty gloves protect your hands and arms from cuts and punctures. Smart workers wear this protection consistently.
- C. Use a knife that fits properly in your hand.
- D. Always keep the cutting edge sharp.
- E. Cut in a direction away from your body, fingers, hands, arms, and legs.
- F. Use your knife in a well-lighted work area.
- G. Focus on the task at hand when using a knife. Stop using the knife if you need to look away.
- H. Always carry your knife folded or in its sheath.
- I. Learn how to safely open and close your knife. Be sure your fingers are away from the edge and the edge of the space the blade closes into. Practice opening and closing your knife, so you feel comfortable knowing how it works and feels. Close the blade with the palm of your hand.
- J. Keep your knife clean and dry. Wipe the blade clean after using it.

- K. Regularly clean the blade with mild soap and water and apply a light coat of machine oil.
- L. Periodically lubricate the blade pivot area of any folding knife.
- M. Periodically check the tightness of the blade pivot area and the frame fasteners of a folding knife.
- N. Use the right knife for the job you're performing. A good sharp knife should cut without difficulty, allowing you to get the job done safely.
- O. Always ask yourself, "If the knife accidentally slips, where will it go?" If the answer is "into my hand or part of mine or someone else's body," then change your position.
- P. Always pass a knife handle first to the other person with the sharp edge of the blade facing away from the palm of your hand.

1106 – Chains

- A. All chains should be visually inspected before use for defects and wear.
- B. Employees shall avoid sudden or abrupt application of loads to chains.
- C. When handling extra heavy loads, employees shall not fasten chains over sharp edges without padding them.
- D. Employees shall not kink or bolt a chain to alter its length.
- E. Employees shall not use a chain if inspection shows a flaw, insecure weld, fracture, or other defect.
- F. Roller link or bicycle type chains shall be cleaned before inspecting for wear since the accumulation of grease and dirt may hide a badly worn link. Replacement may also be considered based on usage or age.
- G. Rigging chains must be tagged to identify safe working load limits.
- H. Rigging chains should not be used for general use due to the requirements of testing, tagging, inspecting and record keeping requirements.
- I. Before moving a load, determine that cables, chains, slings, and other attachments are properly applied, that the load is properly balanced, and the chain is free from entanglement and that no one is in danger from the movement of the load or line.
- J. Seat the load properly in the bowl of the hook.

1107 - Chisels, Bars, Drills and Ground Rods

- A. Chisels, bars, drills, and ground rods that are held by one employee while being struck with a hammer by another shall be held with holding tools or other suitable devices.
- B. Chisels, bars, drills and ground rods with mushroomed heads or dull cutting edges shall be removed from service until properly repaired.
- C. Exercise caution when digging near energized facilities. When digging within locates, proper PPE should be worn.

1108 – Propane Torches

- A. Only competent employees who are familiar with the use of propane torches shall be permitted to use them.
- B. Propane torches shall be kept in good condition. Leaking or otherwise defective torches shall be removed from service and repaired or replaced.
- C. When propane torches are used in confined spaces, adequate ventilation shall be provided to support combustion and breathing air.
- D. Employees shall never leave a lighted propane torch unattended.
- E. Employees shall not use cold or wet ladles when handling molten materials. The ladle shall be preheated and dried.

1109 - Electrical Tools and Cords

- A. All power tools shall be used in accordance with manufacturer guidelines.
- B. Electric tools such as drills, grinders, etc., nominally rated at 120 volts or higher, except double insulated tools, shall be equipped with a three-conductor cord, polarized plugs

and grounded case or use a ground fault circuit interrupter (GFCI). If three-wire grounded tools are used, they shall be used only with three-wire extension cords.

- C. Always inspect electric tools before use.
- D. Extension cords shall be made of three-conductor cord with appropriate polarized plugs and receptacles. An extension cord that supplies portable electric tools such as drills, or saws shall be equipped with a third wire for grounding the frame of the tool.
- E. Broken or defective extension cords shall never be spliced. It is permissible to cut into shorter lengths and re-terminate or discard.
- F. Extension lights shall be equipped with a shield around the lamp. The shield shall be non-metallic or grounded to a third wire.
- G. When small pieces of work are being drilled, they shall be securely anchored to prevent slipping.
- H. Check the lower half of the guard on a portable circular saw for free operation before use.
- I. When working in an area where explosive dust or vapors may be present, use equipment that is designed for these conditions.
- J. Do not raise and lower equipment with the extension cord connected to the equipment.
- K. Do not fasten extension cords with staples, nails, etc., or hang them in a fashion that could damage the outer jacket, insulation, or conductors.
- L. Be sure your hands are dry when plugging or unplugging extension cords.

1110 – Use of Power Saws

- A. Only employees who are properly instructed shall be assigned to operate a power saw.
- B. When using a power saw on the ground, cut resistant chaps are required.
- C. All gasoline-powered saws shall be equipped with a control that will return the saw to idling speed when released and it shall be equipped with a clutch and be adjusted so that the clutch will not engage the chain drive at idling speed.
- D. Care shall be taken in making the finish cut, that the power saw is not bound in the cut, or that the saw is not kicked back into the operator.
- E. Power saw operators shall position their legs, feet, and hands in order to prevent injury.
- F. Operators shall not carry a power saw with the engine running.
- G. Employees not engaged in operating a power saw shall maintain a safe distance back from work.

- H. Approved hydraulic circular saws, chain saws and limb loppers may be used when trimming trees from aerial baskets.
- I. During maintenance on hydraulic tree trimming equipment, the hydraulic hoses shall be disconnected from the tool circuit.
- J. Gasoline powered saws shall be equipped with a muffler.

1111 – Grinders

- A. Use proper personal protective equipment.
- B. Utilize manufacturer's safeguards.
- C. Portable grinders shall be equipped with constant pressure control switches.
- D. Keep grinding wheels properly dressed and turning true. Use the correct grinding wheel.
- E. Inspect grinding wheels before use.
- F. Immediately before mounting, all wheels shall be closely inspected and sounded by the user (ring test) to make sure they are not damaged.

- G. Secure bench grinders properly. Adjust work rest to within 1/8 inch to the grinding wheel. Adjust tongue guard to no more than 1/4 inch between wheel and guard.
- H. Drills, grinders, and sanders shall not be placed on work surfaces or handed to another employee until the equipment has stopped rotating

1112 – Machine Guarding

- A. Before starting work using powered machinery or tools, ensure that guards:
 - 1. Are in place to prevent contact with dangerous, moving parts by any part of the body or clothing
 - 2. Are firmly secured to the machine, if appropriate, and are made of durable material that will withstand the conditions of normal use
 - 3. Are appropriate for the equipment
- B. Do not create new hazards by having a shear point, jagged edge or an unfinished surface that can cause a laceration.
- C. Report any broken or missing guards to your supervisor. Do not use the tool until repairs have been made.
- D. When working around machinery with rotating or moving parts:
 - 1. Assure gloves, ties, loose clothing, and long hair do not become entangled in equipment.
 - 2. Tie back long hair.
 - 3. Button or properly roll up long sleeves, and tuck in shirttails.
 - 4. Do not wear jewelry.
 - 5. Wear badge straps of a breakaway-type of material.
- E. Mechanical guards shall not be removed or made inoperative.
- F. Mechanical guards shall be maintained in safe working condition.
- G. Machines in motion shall not be stopped by placing hands on moving parts.
- H. Machining operations shall not continue if the work or cutting tool becomes loose.

1113 – Chain Saws

- A. Chain saws shall only be used by a qualified operator.
- B. Employees operating chain saws on the ground shall wear cut resistant chaps.
- C. Employees shall never cut toward their body. Always positioned to cut away from the body.
- D. The chain shall be maintained sharp and properly tensioned in accordance with the manufacturer's operating manual.
- E. Chain saw fuel shall be transported and stored in an approved DOT container.

- F. The immediate work area shall be kept clear to ensure that brush will not interfere with the saw or operator.
- G. Chain saws shall be operated with two hands at all times.
- H. Chain saws shall not be used directly over the operator's head.
- I. Each chain saw shall be equipped with a control that will return the saw to idling speed when released.
- J. Each chain saw shall be equipped with a clutch and shall be adjusted so that the clutch will not engage the chain drive at idling speed.
- K. Chain saws shall be equipped with a working chain brake.
- L. A chain saw shall be started on the ground or where it is otherwise firmly supported.
- M. Drop starting of saws is permitted outside of the bucket of an aerial lift only if the area below the lift is clear of personnel.
- N. Chain saws shall be stored in a provided location covered with approved blade sheath, holster, or case.
- O. Chain saws shall not be hung outside the bucket.
- P. When cutting poles, caution shall be taken and ground wires, nails, and any other foreign matter shall be removed from the pole to prevent saw kickback

1114 – Gasoline Powered Equipment

- A. Gasoline-powered equipment shall not be refueled when the engine is running or when hot. Before starting the engine, all employees shall be clear of the equipment.
- B. Prior to adjusting (other than carburetor adjustments), inspections or repairs, the equipment shall be turned off.
- C. When refueling the equipment, fuel shall not be poured from one container into another or into the fuel tank of the equipment within 50 feet of a source of ignition.

1115 – Circular Table and Reciprocating Saws

- A. When a new saw blade is installed, it shall be in compliance with manufacturer's recommendations.
- B. The correct saw blade shall be used for the type of material being cut.
- C. A push stick, block, or similar safe device shall be used for all cutting operations close to high-speed cutting edges.
- D. Spreaders or anti-kickback devices shall be used on all bench or radial type circular saws.

- E. Saws shall be equipped and operated with properly designed and functioning blade guards or hoods.
- F. The operator shall stand to one side of the saw blade to avoid material that may be ejected.
- G. Material shall be kept flat on the saw table while being cut.
- H. Materials being cut on circular saws shall rest firmly against the guide fence before the cut is started.

1116 – Hand Tools

- A. Employees shall use a tool suitable for the job being done. Hand tools shall be inspected before each use.
- B. Tools shall be kept on tool boards, tool racks, or in toolboxes when not in use.
- C. Tools shall not be left on ladders or elevated places where they might fall.
- D. Hand tools shall not be used on moving machinery.
- E. Employees shall not use tools with mushroomed heads.
- F. Hammers and screwdrivers with metal shanks that extend all the way through the handle shall not be used.
- G. All hand and power tools shall be maintained in safe condition, whether supplied by the company or if they are personal tools.

1117 – Personal Tools

- A. Tools, safety devices, and other equipment shall be inspected before each use.
- B. Metal chains, keepers, wire hooks or other metal parts shall not be attached to tools or body belts. In their place, leather or rawhide strings with hard wood or fiber keepers shall be used.
- C. Body belts, safety belts or climber straps that have any of the following defects shall not be used until they are repaired or replaced.
 - 1. Cracked, dry or rotten leather.
 - 2. Leather or cord that is worn thin.
 - 3. Cuts or worn places that are of sufficient depth to weaken the leather.
 - 4. Broken stitches or loose rivets at buckles, D-rings, or snaps.
 - 5. Snaps that have weak springs behind the tongue, loose rivets which hold the tongue or defective tongues. "Caution" snaps shall be inspected to see that the tongue has not been bent or sprung so that it will hang in the open position.
 - 6. Loose tongues in buckles.
 - 7. Buckles, D-rings, or snaps that show considerable wear or which have been cracked or bent
- D. Only approved skinning knives shall be used and shall be closed or placed in a fully enclosed scabbard when not in use.

- E. Climbers shall not be worn when working on the ground, walking through underbrush, rough country, or riding on trucks or in cars.
- F. Follow the manufacturers' instructions for sharpening gaffs. Gaff gauges are available from each manufacturer that shows the proper dimension of the gaff at various points along its length.
- G. Use a sharp file. Never grind to a point on any kind of wheel because heat will spoil the temper of the gaff.
- H. Climbers shall not be used after the gaffs are worn or filed to 11/4" long measured on the underside of the gaff. When climbers get in this condition, they should be re-gaffed or replaced.
- I. Gaffs shall be protected by gaff guards when not in use.

1118 – Ladders

- A. When the use of a ladder becomes necessary, the ladder shall be selected based on the type of work to be performed, and the type and quality of ladder that will permit the work to be performed safely.
- B. Ladders shall be used only for the purposes for which they were designed.
- C. Ladders shall be inspected for defects prior to use and at frequent, regular intervals.
- D. Employees shall "feel" with their gloved fingertips for any raised spots in the fiberglass and remove any debris along the side rails in the areas where the rungs are crimped to check for small cracks or splits (See below for areas to examine).
- E. Ladders shall be maintained free of oil, grease, and other slipping hazards.
- F. Defective or broken ladders shall not be used. Ladders that can be repaired shall be tagged "out of service" and removed from the area until repaired. Ladders that cannot be repaired shall be destroyed.
- G. Ladders used for field work shall meet at a minimum ANSI Type 1.

ANSI Ladder Type	Load Rating (lbs.)
1	250
1A	300
1AA	375

- H. Ladders shall not be loaded beyond the manufacturer's rated capacity. Maximum load ratings are for the combined weight of user, materials, and tools.
- I. All ladders should have a ladder identification label attached to the side of the ladder.
- J. If the ladders identification label is missing, employees should replace the label.
- K. Ladders shall extend at least 36 inches above the upper support level if employees are to leave or mount the ladder at that level.
- L. Metal ladders are prohibited.
- M. Fiberglass hook ladders for energized transmission line work shall be kept free of paint, reasonably clean and be returned to designated storage area when not in use.
- N. When working from a portable ladder, the ladder shall be securely placed, held, or tied when possible and otherwise made secure to prevent slipping or falling.
- O. A ladder shall always be carried in a horizontal position when in a substation or an area where energized conductors are low enough to be contacted by the ladders.
- P. When using a ladder, the base shall be set back a safe distance from the vertical - approximately one-quarter of the working length of the ladder.
- Q. The top two rungs on a straight ladder nor the top two steps of a stepladder shall not be used for standing or climbing.
- R. Work may be performed from the top two rungs of a podium ladder or stepladder, provided the stepladder is equipped with railings. If the employee is above four feet, the employee shall wear appropriate PPE.
- S. Employees shall always face the ladder when moving up and down and use both hands while maintaining three points of contact.
- T. While working from a ladder you should keep your belt buckle between the rails of the ladder.
- U. Ladders shall not be moved, shifted, or extended while occupied.
- V. Employees shall not dismount ladder and access roof to perform required work unless the ladder is held and attended by another employee.
- W. A positioning strap or similar approved device shall be used while working from a straight ladder that is tied off at the top and the employee's feet are at a level of four feet or more above the ground.
- X. Ladders shall not be placed in front of doors opening toward the ladder unless the door is open, locked, or guarded.
- Y. Portable ladder feet shall be placed on a substantial base.
- Z. The area around the top and bottom of the ladder shall be kept clear.

AA. Ladders carried on vehicles shall be adequately supported to avoid sagging and securely fastened in position to minimize chafing and the effects of road shock.

1119 – Scaffolding

- A. Scaffolding shall be erected, moved, dismantled, and altered only under the direction of a competent person.
- B. Scaffolding components shall be maintained in safe condition and inspected before erection of scaffolding. Any broken, bent, altered, or otherwise structurally unsound frames or support members shall not be used.
- C. When scaffolds must be erected on soft or filled ground, sufficient sills or underpinnings shall be used to insure stability.
- D. The legs or uprights of scaffolding shall be plumb and securely and rigidly braced to form a stable work platform. Braces shall not be forced to make them fit.
- E. Adjusting screws, rather than blocking, shall be used to compensate for uneven ground.
- F. Whenever practical, scaffolding shall be secured to a building or structure. When this is impractical, outriggers or guying shall be used. For mobile scaffolds, casters and wheels shall be locked with positive wheel and swivel locks or equivalent means to prevent movement of the scaffold.
- G. All open sides of platforms more than four feet above the ground or floor shall be protected by guard rails and toe boards. Where guard rails cannot be installed fall protection shall be used by employees while working on the platform.
- H. When work is being performed over employees working on a scaffold, overhead protection shall be provided on the scaffold.
- I. Barricades and warning signs shall be used to keep employees from passing beneath scaffolds. When employees must work or pass under scaffolds, provisions shall be taken

to protect those below from the hazard of falling tools or material. Some options to consider are debris netting, toe boards, screens, tool lanyards, etc.

- J. A ladder or equivalent means of safe access shall be provided to the platform.
- K. Only "Scaffolding Grade" lumber shall be used for platform planking. Planks shall be laid solid. Planking shall extend beyond end supports by at least six inches but not exceed 18 inches.
- L. Scaffold shall not be moved horizontally when occupied by employees.
- M. Materials, tools, or debris shall not be allowed to accumulate on scaffolds and create a hazard.
- N. Employees on scaffolds shall work on the platform and shall not use ladders or makeshift devices to gain added height.
- O. Ladders shall not be placed in the horizontal position for use as scaffolding.
- P. Scaffolds and their components shall be capable of supporting without failure at least four times the maximum intended load.
- Q. Caster brakes on rolling scaffolds shall be locked before employees climb them.
- R. Scaffolds shall not be used as material hoist towers or for mounting derricks.
- S. Inspections:
 - 1. Inspections shall be performed before, during and after each assembly and by a competent person. This inspection shall constitute a careful and critical examination of all components of the scaffold.
 - 2. After assembly, periodic inspection shall be made to ensure proper stability and integrity is maintained.
- T. Training:
 - 1. The employer shall have each employee that performs work while on a scaffold trained by a person qualified in the subject matter to recognize the hazards associated with the type of scaffold being used and to understand the procedures to control or minimize those hazards.
 - 2. The training shall include the following areas, as applicable.
 - The nature of any electrical hazards, fall hazards, and falling object hazards in the work area.
 - 3. Retraining is required in at least the following situations:
 - Where changes at the worksite present a hazard about which an employee has not been previously trained

- Where inadequacies in an affected employee's work indicates that the employee has not retained the requisite proficiency.

1120 – Jacks, Hoists and Load Binders

- A. Employees shall center the jack properly under the load.
- B. Employees shall never leave a jack standing under load with the handle in socket.
- C. Employees shall never rely on jacks or hoists alone to support the load that they are working under; instead, they shall use substantial blocking.
- D. Hoists and load binders shall not be loaded more than their rating. If the strain requires the use of handle extensions on chain or nylon strap type hoists, they are overloaded.
- E. Extension handles or cheaters on break over boomers shall be used with caution and stay clear of line of fire.

1121 – Pneumatic Tools

- A. Each employee using a pneumatic tool shall carefully examine the tool to make sure it is in good condition before attempting to use the tool. Tools shall be inspected for wear, weak spots, leaks, etc., each time the tool is used.
- B. Before operating a pneumatic tool, make sure the air hose is in good condition and that the fittings are properly fastened. Give particular attention to connections with Chicago universal style (twist-type) coupling. This type of connection must have a locking pin installed before use.
- C. Lubricators should be installed ahead of the power tools for best performance and long equipment life.
- D. Be sure that the air supply pressure does not exceed the rating of the tool and the hose.
- E. All hoses exceeding the 1/2-inch inside diameter shall have a safety device at the source of supply or branch line to reduce pressure in case of hose failure.
- F. Portable pneumatic power tools shall be equipped with a constant pressure switch that will shut off the air supply to the tool when the switch pressure is released.
- G. Always turn off the air supply and bleed air pressure before disconnecting tools or hoses except when using quick disconnecting type couplings.
- H. Pneumatic power tools shall be secured to the hose by some positive means to prevent the tool from becoming accidentally disconnected. Do not leave tools connected to air hose when not in service.

- I. Air hoses shall not be used to hoist or lower pneumatic tools.
- J. When performing maintenance on the tool or changing cutting blades, grinding wheels, drills, etc., air supply shall be removed, and the pressure bled off.
- K. Air operated grinders, wire wheels, reciprocating saws, files, and circular saws shall be equipped with suitable guards.
- L. Wear face shields, safety goggles or safety glasses when operating any air tool.
- M. Never turn on compressed air to a hose with an open end (no tool or air valve connected).
- N. Do not use compressed air to clean clothing or blow dust or dirt out of the hair.
- O. When cleaning with compressed air, never point an air gun or open hose at a person. The pressure nozzle of the air hose shall reduce the pressure to 30 psi or less.
- P. When a paving-breaker, air drill, etc. is being used near energized equipment, the frame of the tool shall be grounded.
- Q. Pneumatic tools and connecting hoses, used where it may contact exposed energized parts shall be designed and maintained for such use.
- R. A pneumatic tool used on energized electrical lines or equipment or used where it may contact exposed energized parts shall provide protection against the accumulation of moisture in the air supply.

1122 – Hydraulic Tools

- A. Hydraulic operated tools shall be thoroughly inspected prior to use.
- B. All hoses, fittings, seals shall be inspected, and any worn or defective parts shall be replaced.
- C. Hydraulic pressure shall be released before connecting or disconnecting.
- D. Hoses shall never be kinked.
- E. Employees shall not use any part of the body to locate or attempt to stop a hydraulic leak.
- F. Appropriate PPE shall be used when working with hydraulic tools.
- G. Hydraulic tools and connecting hoses used near exposed energized parts shall be designed and maintained for such use.

1123 - Thermally Welded Connectors

- A. Extreme caution shall be taken when handling these type connectors.
- B. Eye protection shall be worn.
- C. Employees shall position themselves to avoid extreme heat and fumes.
- D. Appropriate PPE shall be used when handling and igniting connectors.
- E. Work area must be clean of debris and dry foliage.
- F. Connectors should be stored in a dry area and should not be ignited in wet conditions.
- G. Only approved strikers shall be used to ignite the weld.

1124 – Powder Actuated Tools

- A. All such tools must be used with the correct shield or muzzle guard supplied by the manufacturer.
- B. No employee shall use such a tool unless he is wearing safety goggles or safety glasses and has been trained in the operation of that tool.
- C. Tools shall not be loaded until just prior to the intended firing time.
- D. Never point a loaded or unloaded tool at any person.
- E. Keep hands and feet clear of open barrel end.
- F. Never use tools in an explosive or flammable atmosphere.
- G. Tools should be properly stored when not in use.
- H. Never leave a loaded tool unguarded.
- I. Use the appropriate powder load for each application.
- J. Correct maintenance of powder-actuated tools is necessary to ensure safe operation
 - 1. The employee shall inspect and test the tool before using it to determine that it is clean, all moving parts operate freely, the barrel is free of all obstructions, and that all safety devices are in proper working condition.
 - 2. Any tool not in proper working order shall be removed from service until repaired.

- K. When using such tools, precautions must be observed.
1. In case of misfire, the operator shall hold the tool in the operating position for at least 15 seconds, keeping the muzzle against the work surface. This position shall be maintained until the tool can be disassembled and the powder load removed.
 2. Fasteners shall not be driven into very hard or brittle materials such as cast iron, glazed tile, surface hardened steel, glass block, face brick or hollow tile.
 3. Driving fasteners into soft materials shall be avoided unless they are backed by a substance that will prevent the pin from penetrating the material and creating a flying missile hazard.
 4. Never drive a fastener into a spalled area, in which an unsuccessful fastening has been attempted.
 5. Fasteners shall not be driven directly into materials such as brick or concrete closer than 1/2-inch from an unsupported edge or corner unless a special guard fixture or jig is used.
 6. Fasteners shall not be driven through existing holes unless a positive guide is used to secure accurate alignment.

1125 – Handlines and Droplines

- A. Handlines shall be made of a 3-inch single sheave block with at least 1/2-inch approved rope.
- B. Hasp on handline block must be present and operable
- C. Do not exceed the working load limit of the handline block or hook.
- D. A dropline used for service work and transmission line inspection shall be made up of at least 1/4-inch approved rope.

1126 – Safety Snaps

- A. All tackle blocks and open-end hook devices shall be equipped with safety snaps.

1127 – Ropes and Slings

- A. Ropes and slings shall be inspected for defects before use.
- B. Protect ropes and slings against sharp bends, hardware, rocks, and broken insulators.
- C. Handlines should never be dragged behind trucks for any reason.
- D. Use sheaves that are of the correct size for the rope in use and in good condition.
- E. Keep ropes free from oil or grease and acid or strong alkaline solutions.

F. A frozen rope shall not be disturbed until completely thawed; otherwise, the frozen fibers will be broken.

G. Employees shall not put any strain on a rope with a kink in it.

H. All rope used around energized equipment shall be made of nonconductive material.
Note: nonconductive materials may become conductive when wet or dirty.

I. Rope shall not be subjected to high temperatures.

J. Only use approved ropes on capstan hoists due to high frictional heating.

K. Inspection of Rope

1. Rope shall be examined carefully for cuts, fraying, worn spots, kinks, acid stains and burns.
2. Run hand along the length of the rope to identify inner broken strands.
3. If any of the above conditions exist, the rope shall be replaced.

L. Care of Wire Ropes and Wire Slings

1. A kink will damage wire rope. For this reason, it should always be stored on reels. It should be unreeled and not removed in loops from one end of the reel.
2. The turns of wire rope should never be allowed to overlap on a drum or winch.
3. When wire rope is used with sheaves, the diameter of the sheave should never be less than 20 times as great as the diameter of the wire rope. The groove of the sheave should not be so large as to allow excessive play.
4. Short bends over hard edges or sharp-edged surfaces shall be avoided or edge softeners shall be used.
5. Wire rope shall be spliced only by qualified personnel.

M. Inspection of Wire Rope and Wire Slings

1. Before use, employees shall inspect wire slings and wire rope for defects:
 - The loss or lengthening of its lay is an indication of overload.
 - Broken wire on two sides of the rope. This indicates the sheave groove is worn to a diameter smaller than the wire rope. A sheave groove becomes smaller, not larger, through use.
 - Distortion of the strands and broken wires. This indicates a heavy load was applied to a wire rope with a kink in it.
2. Wire rope shall not be used:
 - when the outside strands are worn down to half their original diameter

- when there are numerous broken wires
- when there are any other indications, the wire has been kinked or subjected to excessive strain.

N. Care and Inspection of Synthetic Slings

1. Synthetic slings shall be inspected before use to identify tears, ripped stitching and other defects that may affect the capacity of the sling.
2. Synthetic slings shall be tagged to identify the maximum safe loading.
3. Synthetic slings with missing or illegible tags shall be destroyed and removed from service.

1128 – Rigging Material Handling

- A. Rigging Material shall be inspected prior to use and on each shift and as necessary during its use to ensure that it is in good operating condition,
- B. Defective equipment shall not be used and removed from service immediately.
- C. Rigging equipment shall not be used more than its recommended safe working load and load identification shall be attached to the rigging.
- D. Rigging equipment not in use shall be removed from the immediate work area.
- E. Tag lines shall be used to control suspended loads.
- F. Hooks on ball assemblies, lower load blocks, or other attachment assemblies shall be of a type that can be closed and locked.
- G. All employees shall be kept clear of loads about to be lifted and of suspended loads.

1129 – Backyard Machine

- A. Any employee required to operate the backyard machine shall be instructed on the safe and proper operating procedures. The operating procedures are covered in the manual from the manufacturer.
- B. Employees shall exercise extreme caution when loading and unloading the backyard machine from the trailer.
- C. When driving the machine, the following rules shall be observed:
 1. Tracks must be fully extended at all times during operation except when retraction is needed for clearance such as maneuvering through gates. If tracks or wheels do not extend, care should be taken on all grades.
 2. Extendable tracks must be fully extended when the unit is loaded on the trailer.

3. Boom must be stowed at all times unless the outriggers are deployed. If material is to be hauled on the unit, it cannot prevent the boom from being completely stowed.
 4. Outriggers must be used with outrigger pads or cribbing and fully extended and pinned in place. (Under NO circumstances shall machine be used without outriggers pinned!)
 5. Machine must be barricaded when operated in the primary zone. (Minimum Approach Distances must be maintained if the unit is not barricaded.)
 6. Do not transport poles with the machine unless it is designed with this capability. If a pole is needed at the location, it can be dollied in with pole dollies or dragged by the machine.
 7. When maneuvering machine, make slow turns and avoid quick movement.
 8. All employees, except the driver, shall keep clear of the machine.
 9. Do not position yourself between the machine and a fixed object.
 10. The load to be transferred shall be secured to the machine.
 11. Exercise caution when on a slope or uneven terrain.
 12. Always retract the boom and align parallel to the center line of the machine.
 13. No employee shall ride on the machine unless the machine is designed to accommodate the operator.
- D. Before lifting any load with the boom, set all outriggers. When using machine in any location outrigger pads shall be used.
- E. The back yard machine shall be grounded when operating in proximity to exposed energized conductors or equipment.
- F. Visual Inspection of the Boom
1. The boom shall be visually inspected for damage prior to each use.
 2. Periodic inspections shall be made on structural components with emphasis on mounting bolts, braces, welds, etc.
 3. Any time a boom receives a shock load or a severe impact, fleet shall be notified immediately, and the equipment removed from service.
- G. Operation of the Boom
1. In the event of a hydraulic leak, work should be stopped, the hydraulic pump disengaged, and repairs made by a qualified mechanic.
 - Do not attempt to stop or locate leaks or deflect the flow of oil with the hands, feet, or body.
 - Hydraulic oil leaks are a potential fire hazard.

2. The manufacturer's load limits of the boom shall be posted on the unit, and they shall not be exceeded. Note: A load safely handled at a close radius may exceed the capacity ratings when moved to a greater radius and thereby affect the stability of the dolly.

H. Winch line load ratings shall not be exceeded.

I. Employees shall stand clear of the path of the boom.

1130 – Powered Industrial Trucks (Forklifts)

A. Operation

1. Only trained and authorized operators shall be permitted to operate a powered industrial truck.
2. Before operating any powered industrial truck, the operator must determine that the truck is in a safe operating condition. If any defect is found, note on the daily inspection form, and report it to the supervisor.
3. Only the operator shall be permitted to ride on powered industrial trucks. No part of an employee's body shall extend beyond the running lines of the truck
4. No person shall stand or pass under the elevated portion of any truck whether loaded or empty.
5. Brakes shall be set, and wheel chocks shall be in place to prevent movement of trucks, trailers and railroad cars while loading or unloading.
6. The flooring of trucks, trailers and railroad cars shall be checked for breaks or weakness before being driven upon.
7. Sufficient headroom shall always be maintained when operating a powered industrial truck under overhead obstructions.
8. An overhead guard shall be used on each powered industrial truck to protect the operator from falling objects.
9. When traveling with a powered industrial truck, loaded, or unloaded, the forks shall always be kept low to the surface being traveled.
10. Grades shall be ascended or descended slowly; loaded trucks shall be operated with the load upgrade. Unloaded trucks should be operated on all grades with the forks downgrade.

11. When a powered industrial truck is left unattended, the forks shall be fully lowered, controls in neutral, power shut off and brakes set. Wheels shall be chocked if the truck is parked on an incline.
12. When a powered industrial truck is used for lifting employees to a work location or position aloft, a safety platform firmly secured to the lifting carriage or forks shall be used. This safety platform shall be designed for this use only and shall have a permanent guardrail attached.
13. All dock boards or bridge plates shall be properly secured before being driven over and the rated capacity shall never be exceeded.
14. Seat belts shall be worn when operating a power industrial truck.

1131 - Use of Bulldozers, Backhoes, Tractors, Trenchers & Mowers

- A. Only trained workers will be assigned to operate construction equipment.
- B. Bulldozers, backhoes, tractors, and trenchers shall be equipped with all safety features (guards, rotation projectors, etc.) as well as roll-over protection systems set forth in Federal Standards.
- C. Seat belts shall be worn when operating equipment.
- D. Bi-directional equipment with an obstructed view to the rear will be equipped with an operational backing alarm.
- E. Employees must be properly instructed before operating tractor type mowers.
 1. The operator shall be seated, and seatbelt fastened before starting the engine and shall be the only employee on the tractor.
 2. Two employees may be on the tractor briefly during operation for instruction purposes.
 3. Before dismounting the tractor, the power take-off must be disengaged, the blades stop rotating and the tractor brakes properly set.
 4. While mounting or dismounting, employees shall maintain 3 points of contact on any machinery being used.
 5. Prior to starting the mower, the operator must see that all employees and the public have moved to a safe distance. During operation, proper guards shall be in place on the mower.
 6. Before any work is attempted on the underside of the mower, the mower housing shall be blocked to prevent falling.
 7. Do not attempt to raise the mower when on a steep incline because the tractor could rear up.

- 8. If anyone needs to communicate with the mower operator, he must signal the operator and have him stop before approaching the mowing equipment.
- F. The operator will be properly seated at the controls before starting or moving the equipment.
- G. Only the operator will be permitted on the machine while it is in motion.
- H. The machine will not be serviced or repaired until the engine is stopped.
- I. All workers must be clear of heavy construction equipment while it is in operation.
- J. Inspect all equipment daily. Maintain all equipment in good working condition.
- K. All drive chains, sprockets, gears, drive belts and open shafts will be properly guarded, and the guards kept in position while the machine is in operation.
- L. Park construction equipment in a safe and secure location overnight.
- M. Do not attempt to unhitch equipment while it is being towed.
- N. Lower blades, booms, and buckets when equipment is not in use.
- O. Make sure all employees are clear before operating the machine.
- P. Keep all people, including employees and the public, clear of the conveyor and digging wheel while they are in motion.

1132 - Cranes, Digger Derricks, Aerial Buckets, and Hoisting Equipment

- A. Only qualified personnel shall operate, digger derricks, aerial buckets, alley machines, and hoisting equipment.
- B. Only certified personnel shall operate cranes. Crane operators in training must be under the observation of a certified crane operator.
- C. **An observer shall be used when moving cranes, backing of equipment or when the movement of the equipment is obstructed from the operator.**
- D. The manufacturer's specifications and limitations applicable to the operation of all cranes and hoisting equipment shall be followed. Load limits specified by the manufacturer shall not be exceeded.
- E. All controls shall be inspected and checked daily to see that they operate properly prior to use.
- ~~F. All areas considered critical to the safe operation of the boom shall be inspected daily~~

- F. Before operating the equipment, the operator shall ensure that the parking brake is engaged and all outriggers, if equipped, are in the down position.
- G. On equipment with extendible axles or outriggers, the extendible axles or outriggers shall be used to level and stabilize the vehicle before the boom is lifted.
- H. Outriggers shall not be extended or retracted outside of the clear view of the operator unless all employees are outside the range of possible equipment motion.
- I. The outrigger shall be placed on pads and the footing checked for stability before a load is lifted.
- J. A designated observer shall be placed to observe the distance from exposed energized lines or equipment.
- K. If, during operation of a non-insulated boom by a qualified employee, the equipment could become energized, the employees shall comply with the following:
 - 1. The energized line section or equipment exposed to incidental contact shall be covered with insulating protective cover.
 - 2. Each employee shall be protected from the hazards that might arise from contact with energized equipment.
- L. Personnel shall not be permitted to ride the hook, sling, ball, or attached load of any hoisting equipment (an approved Boatswain's chair, personnel platform, etc. are not considered attached load).
- M. While using a Boatswain's chair from hoisting equipment, the employee shall wear an approved body harness and lanyard attached to a point above the hook and/or the ball.
- N. Personnel shall not stand or work near a cable, chain, or rope under tension whenever possible.
- O. Employees shall not be permitted underneath loads handled by lifting or digging equipment. Employees shall be required to stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials.
- P. Operators may remain in the cabs of vehicles being loaded or unloaded when the vehicles are equipped with a cab shield and/or canopy adequate to protect the operator from shifting or falling materials.
- Q. Operators of cranes, hoists, and hoisting equipment shall take signals from only one person during operation except for emergency stop situations.
- R. Taglines shall be attached to heavy objects to prevent swinging or twisting of load.

- S. Operators shall not leave the controls of cranes, hoist, derricks, or similar lifting equipment while the load is suspended or supported.
- T. The operator of a pole setter/digger derrick may leave the controls if the load is no longer suspended and is only being supported or held in place by the equipment.
- U. Vehicles with booms or derricks shall not be moved from one location to another with the equipment in any position other than the stored position. All extended booms, jibs, and outriggers shall be in the fully retracted position. Note: This requirement does not include JLG man lifts or other similar equipment.
- V. All personnel in the aerial lift shall wear an approved safety harness with the lanyard attached to the proper attachment point.
- W. Belting off to an adjacent pole, structure, or equipment while working from an aerial lift shall not be permitted.
- X. Employees shall always stand firmly with both feet on the floor of the bucket and shall not sit or climb on the edge of the bucket or use planks, ladders, or other devices for a work position.
- Y. Employees shall not climb out of the basket onto a structure (pole, tower, or fixture) unless the basket is designed with entrance/exit gate and 100 percent fall protection can be maintained.
- Z. The operator may carry hand tools and material in the basket to expedite the work, but the weight of the operator plus these tools and material shall not exceed the basket capacity specified by the manufacturer.
- AA. Tools and material shall not be stored or carried in the control level compartment.
- BB. Only one person shall work from a single basket.
- CC. The hoist line shall not be wrapped around a load or attached back to itself.
- DD. Jib arms on material handling bucket truck shall not be used with side strain.
- EE. The employee shall ensure that hydraulic hoses, tools, and material shall not become entangled with the control levers that operate the boom.
- FF. Climbers shall not be worn while “working” in aerial buckets.

GG. The employee shall disconnect air or hydraulic operated tools from supply when they are not in use or shall de-activate the supply circuit to prevent inadvertent tool operation.

HH. Work using an aerial device shall cease when a wind of such velocity that one or more of the following hazards are present:

1. The wind could blow an employee from an elevated location.
2. The wind could cause an employee or equipment handling material to lose control of the material.
3. The wind would expose an employee to other uncontrolled hazards.
4. Follow manufacturers recommendations for wind speed limits operation.

1133 – Care of Aerial Baskets

- A. All basket liners shall be removed at least monthly for cleaning of dirt and debris and for visual inspection. The liner shall be replaced if cuts, punctures, or splits are visible in the liner below the bucket lip area.
- B. The area around the base of the boom shall be kept clear of debris, tools, and material to avoid bridging the lower boom insert on units so equipped.
- C. Surfaces of fiberglass booms and jibs shall be cleaned by the operator on a regular basis to insure that insulating portions are free of dirt, oil, or other contaminants that might degrade dielectric integrity.

Section 12 – First Aid/CPR and Respiratory Protection

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CPR and First Aid

First aid services and provisions for medical care shall be made available by the employer for every employee covered by these regulations. Regulations prescribing specific requirements for first aid, medical attention, and emergency facilities are contained in subpart D of this part. {1926.23}

1201 – PSC Goal

- A. Our primary goal in first aid training is to give employees the necessary tools and information they need to care for and render aid to an ill or injured employee, until advanced help arrives.

1202 – Training

- A. All employees shall demonstrate and maintain proficiency on first aid and cardiopulmonary resuscitation (CPR), within 90 days of hire date. All employees shall receive refresher training every 2 years.
- B. Cardiopulmonary resuscitation and first aid training, when employees are performing work on or associated with exposed lines or equipment energized at 50 volts or more, persons trained in first aid including cardiopulmonary resuscitation (CPR) shall be available as follows:
 - 1. For field work involving two or more employees at a work location, at least two trained persons shall be available. However, only one trained person need be available if all new employees are trained in first aid, including CPR, within 3 months of their hiring dates.
 - 2. For fixed work locations such as generating stations, the number of trained persons available shall be sufficient to ensure that each employee exposed to electric shock can be reached within 4 minutes by a trained person. However, where the existing number of employees is insufficient to meet this requirement (at a remote substation, for example); all employees at the work location shall be trained.

1203 – Getting Emergency Equipment to Employees

- A. During any emergency, you must call 911 and the Clients Distribution center (DOC).
- B. All employees shall familiarize themselves with their exact location and ensure clear direction is communicated with community emergency services as well as

with the Clients Distribution Operating Center (DOC). If in a remote location you should use landmarks, cross streets, mile markers etc. ensuring emergency services arrive to the incident site promptly. You may have to send someone out to the road to direct emergency vehicles to the incident site.

- C. If your location changes at any time, you must inform the Clients Distribution Operating Center. All vital information must be added to the Emergency Action Plan and on the Pre-Job-Brief.
- D. If you are in the field, you should call 911 and notify the DOC (Distribution Operating Center) of the client we are working for. That is why it is very important that we call the Distribution Operating Center on every job, letting them know our exact location. If we change locations, the DOC needs to know.
- E. In our manhole rescue, bucket truck rescue, pole top rescue and **Medic 1st aid**, give the exact location of where you are located. If you are in a field or behind an office building or in an addition, always send someone out to a main road so they can take the emergency equipment to the accident scene.

1204 – First Aid Equipment and Kits

- A. Employees shall familiarize themselves with the contents and location of their First Aid Kit, Blood Borne Pathogen kit and AED (if available).
- B. First-aid kits shall be stored in weatherproof containers with individually sealed packages and shall be readily accessible at all T&D work locations.
- C. For line crews, first-aid kits shall be inspected at least annually and refilled when applicable. At construction sites, first-aid kits shall be inspected weekly.
- D. The minimal requirements of the first-aid kit are listed below and should be adequate for small work sites, consisting of approximately two to three employees. When larger operations or multiple operations are being conducted at the same location, additional first-aid kits shall be provided at the work site or additional quantities of supplies shall be included in the first-aid kits:
 - 1. Gauze pads (at least 4 x 4 inches).
 - 2. Two large gauze pads (at least 8 x 10 inches).
 - 3. Box adhesive bandages (Band-Aids).
 - 4. One package gauze roller bandage at least 2 inches wide.

5. Two triangular bandages.
6. Wound cleaning agent such as sealed moistened towelettes.
7. Scissors.
8. At least one blanket.
9. Tweezers.
10. Adhesive tape.
11. Latex gloves.
12. Resuscitation equipment such as resuscitation bag, airway, or pocket mask.
13. Two elastic wraps.
14. Splint.

1205 – Bloodborne Pathogens

A. **Definition:** Bloodborne Pathogens are pathogenic microorganisms that are present in human blood and can infect and cause disease in humans. These pathogens include, but are not limited to, hepatitis C virus (HCV), hepatitis B virus (HBV) and Human immunodeficiency virus, (HIV).

B. If employees are exposed to or handle blood, the employee must wear the appropriate PPE, examples of PPE are listed below:

1. Nitrile exam gloves
2. Eye protection /Face shield / mask
3. CPR mask / mouthpiece or other ventilation devices.

C. Potentially infectious materials are, any bodily fluid that is visibly contaminated with blood, all body fluids in situations where it is difficult or impossible to differentiate between body fluids, such as blood, tears, saliva, and urine.

D. Bloodborne Pathogen Awareness training shall be provided to all employees annually. (Refer to the Bloodborne Pathogens in OSHA 1910.1030).

Heat and Cold Stress

1206 – Heat Strain and Heat Stress Management:

- A. The body's natural way to keep the core body temperature from rising to unhealthy levels is through an increase in heart rate and sweating. When these are not enough to keep the core body temperature from rising, the result is heat-

related illness or death. Elevated core body temperatures may cause the following illnesses:

1. Heat stroke
2. Heat exhaustion
3. Heat cramps
4. Heat rash
5. Heat syncope (fainting)
6. Rhabdomyolysis (external heat stroke, convulsions, coma, or death may occur). Temperatures more than 104 degrees Fahrenheit.

B. Heat Illness Prevention Program:

1. PSC is committed to the safety of our employees and has implemented the “Heat Illness Prevention Program” reference [osha.gov/heat](https://www.osha.gov/heat). The program is designed to mitigate any heat related illnesses and injuries.
2. Industries most affected by heat-related illness are construction; trade, transportation, and utilities; agriculture; building, grounds maintenance; landscaping services; and support activities for oil and gas operations.
 - To prevent heat related illness and fatalities:
 - Staying Hydrated is key! (See table below)
 - Rest in the shade to cool down.
 - Wear a hat and light-colored clothing.
 - Learn the signs of heat illness and what to do in an emergency.
 - Monitor workers for signs of heat illness.
 - (Acclimatization) If workers are new to working in the heat or returning from more than a week off, and for all workers on the first day of a sudden heat wave, implement a work schedule to allow them to get used to the heat gradually.
 - Three key words to remember: Water, Rest, and Shade. Taking these precautions can mean the difference between life and death.

Hydration Guidelines:

Temperature	Work Level	Maximum Minutes Worked Between Hydration Breaks	Hydration Target
<80	Normal		8-12oz / hour
80 - 85	Normal		8-16oz / hour
86-90	Normal	50	12-20oz / hour
91-95	Normal	45	16-24oz / hour
>96	Normal	40	24-32oz / hour

C. Guide to Heat Index Chart

1. Outdoor workers who are exposed to hot and humid conditions are at risk of heat-related illness. The risk of heat-related illness becomes greater as the weather gets hotter and more humid. This situation is particularly serious when hot weather arrives suddenly early in the season before workers have had a chance to adapt to warmer weather.
2. For people working outdoors in hot weather, both air temperature and humidity affect how hot they feel. The "heat index" is a single value that takes both temperature and humidity into account. The higher the heat index, the hotter the weather feels since sweat does not readily evaporate and cool the skin. The heat index is a better measure than air temperature alone for estimating the risk to workers from environmental heat sources.

NOAA's National Weather Service

Heat Index

Temperature (°F)

Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution

Extreme Caution

Danger

Extreme Danger

1207 – Cold Stress Management

B. Cold Stress

1. Anyone working in a cold environment may be at risk of cold stress.
Some workers may be required to work outdoors in cold environments and for extended periods. The following frequently asked questions will help workers understand what cold stress is, how it may affect their health and safety, and how it can be prevented.
3. What constitutes extreme cold? What effects can vary across different areas of the country? In regions that are not used to winter weather, near freezing temperatures are considered "extreme cold." A cold environment forces the body to work harder to maintain its temperature. Whenever temperatures drop below normal and wind speed increases, heat can leave your body more rapidly.
4. Wind chill is the temperature your body feels when air temperature and wind speed are combined. For example, when the air temperature is 40°F, and the wind speed is 35 mph, the effect on the exposed skin is as if the air temperature was 28°F.
5. Cold stress occurs by driving down the skin temperature and eventually the internal body temperature (core temperature). This may lead to serious health problems, and may cause tissue damage, and possibly death.

B. Body Reaction to Cold Stress

1. In a cold environment, most of the body's energy is used to keep the internal core temperature warm. Over time, the body will begin to shift blood flow from the extremities (hands, feet, arms, and legs) and outer skin to the core (chest and abdomen). This shift allows the exposed skin and the extremities to cool rapidly and increases the risk of illness or injury.
2. The most common cold induced illnesses/injuries are:
 - Hypothermia
 - Frostbite
 - Trench Foot (Immersion Foot)
 - Chilblains

C. Cold Stress Prevention

1. Monitor yours and your coworkers' physical condition.
2. Wear appropriate clothing.
3. Wear several layers of loose clothing for insulation. (Tight clothing reduces blood circulation to extremities).
4. Be aware that some clothing may restrict movement resulting in a hazardous situation.
5. Protect the ears, face, hands, and feet in extremely cold or wet weather.
 - Wear a hat or hood to help keep your whole body warmer. Hats reduce the amount of body heat that escapes from your head.
 - Boots should be waterproof and insulated.
 - Use insulated gloves to protect hands (water resistant if necessary).
6. Move into warm locations during breaks; limit the amount of time outside.
7. Carry underwear, extra socks, gloves, hats, jackets, blankets, a change of clothes, and a thermos of hot liquid.
8. Include chemical hot packs in your first aid kit.
9. Avoid touching cold metal surfaces with bare skin.
10. Use proper engineering controls, safe work practices, and personal protective equipment (PPE) provided by your employer.

New Wind Chill Chart

		Temperature (F)																	
	Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5		36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10		34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15		32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20		30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25		29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30		28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35		28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40		27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45		26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50		26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55		25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60		25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite occurs in 15 minutes or less

Respiratory Protection

1208 – Purpose of respiratory protection

- A. Respiratory Protective Equipment is used to protect employees from occupational airborne contaminants and oxygen deficient atmospheres. This equipment shall be used when employees must work in these atmospheric conditions and when effective engineering control measures are not feasible or while they are being instituted or evaluated.
- B. The purpose of this section is to provide information on the selection and maintenance of respiratory equipment and the training of personnel in the use of proper respiratory equipment to safeguard each employee.
- C. While many types of respiratory protective devices are available, it is important that the selection is made with care to ensure that the proper protection is provided. Only equipment approved by the National Institute for Occupational Safety and Health (NIOSH) shall be utilized.
- D. Employees shall not be assigned jobs requiring the use of respirators unless it has been determined that they are physically able to perform the work while using respiratory equipment. (Medical evaluation)
- E. Respiratory protective equipment has no effect on reducing the hazard in the atmosphere. If the device fails to provide protection, the employee will be exposed to the hazard.
- F. This section is not intended to be all-inclusive in content or scope. It is primarily designed to provide basic information relative to selecting the appropriate respiratory equipment for the environment in which it is to be used, and training employees in respiratory equipment usage.

1209 – Air Contaminants

- A. Airborne contaminants can enter the body three different ways.
 - 1. The most common way is through the respiratory system when air is inhaled during breathing.
 - 2. Air contaminants can also be ingested into the digestive system and be absorbed into the blood stream.
 - 3. Toxic and irritant substances may enter the body through skin absorption.
- B. Proper respiratory protective equipment can prevent air contaminants from entering the body via the inhalation and digestive systems. Proper use of protective clothing, hygiene procedures, and caution on the part of the worker will reduce the skin absorption possibility when dealing with air contaminants. Direct contact of chemical agents with the skin should be avoided because skin irritation or even more serious consequences of systemic poisoning may develop.

1210 – Respiratory Hazards

Respiratory hazards can be placed in four distinct classes:

- A. Oxygen deficiency (less than 19.5 percent oxygen).
- B. Gas and vapor contaminants (carbon monoxide, ammonia, etc.).
- C. Particulate contaminants (coal dust, dirt, etc.).
- D. A combination of particulates with gas and vapor contaminants (spray painting).

1211 – Guidelines for Selection of Respiratory Equipment

- A. When selecting a respirator, consideration should be given to these factors:
 - 1. Type and concentration of hazard
 - 2. Duration of exposure
 - 3. Work requirements and conditions
 - 4. Limitations of the respirators
 - 5. Medical Factors
- B. When feasible, the need for respiratory equipment should be eliminated by engineering controls or adequate ventilation. When this cannot be achieved, a conscientious effort shall be made to determine what type of respiratory equipment is adequate for safe use under a particular set of conditions.

- C. It is of utmost importance to identify the hazard and know the concentration before a proper selection of respiratory equipment can be made. When a hazardous condition is known to exist and the contaminant cannot be identified or concentration determined, an air-line unit or self-contained breathing apparatus shall be used.

1212 – Types of Respirators

Respiratory protection provided to employees shall be of a type approved for the intended use by NIOSH. Respiratory protective equipment falls into three basic categories.

A. Air Purifying Respirators

1. Particulate – This type offers protection against airborne particulate matter as limited by approval labels.
2. Gas and Vapor – This type offers protection against gases, vapors, acid gases and organic vapors in concentrations limited by the approval labels.
3. Combination of Particulate and Gas Vapor and Chemical – This type is used where both particulate matter (not less than a Time Weighted Average [TWA] concentration generally of 0.05 mg/m³) and chemical vapors or gases are present (limited by the approval labels).

B. Supplied Air Respirators

1. Air Line Respirator Supplies Class D breathing air from an outside source to the wearer.
2. Hose Mask & Blower Supplies air from an outside source to the wearer.

C. Self-Contained Breathing Apparatus

- A. Cylinders of breathing quality air are carried on the wearer's back and the air flow is controlled by a regulator, orifice, or diaphragm (pressure demand type). Contaminated environments, where concentrations are unknown, require the pressure demand type approved for use in environments immediately dangerous to life and health.

1213 – Respirator Selection

- A. When selecting the proper respirator for any given situation, consider the following factors:
1. Type and concentration of hazard
 2. Duration of hazard
 3. Work requirements and conditions
 4. Characteristics and limitations of the respirators
 5. Medical Factors.
- B. All permanently assigned respirators shall be durably and legibly marked to indicate to whom it is assigned. The date of issuance shall be recorded, and record list shall be maintained in a central file.



Half Facepiece



Full Facepiece



**Air Line Unit
with Emergency Egress**



**Self-contained
Breathing Apparatus**

1214 – Self-Contained Breathing Apparatus (Backpack)

- A. Written procedures covering the safe use of self-contained breathing apparatus shall be available. These procedures shall be posted near the equipment or inside the storage case with the equipment. Personnel shall be familiar with the procedures for safe use of any self-contained or other type of emergency breathing apparatus. It is essential that all employees exposed to its use be trained in the proper use and care of the equipment.
- B. Self-contained breathing apparatus shall be inspected before each use, monthly, and a record of monthly inspection dates and findings maintained.

1215 – Air-Line Unit

- A. An air-line unit is a unit that provides air to the wearer through a length of airline. This allows the air supply to be located at a convenient place that is remote from the work environment. The breathing air can be supplied from a single cylinder, a bank of cylinders through a manifold or a compressor designed for this purpose. The airline shall not exceed three hundred feet in length.
- B. Air is supplied to the wearer through a regulator that is worn on a belt. The unit is also equipped with a small cylinder that contains approximately five minutes of air supply to allow the wearer to escape in case of airline failure.
- C. These units will allow employees to work for extended periods of time in hazardous atmospheres when equipped with properly sized cylinders or compressors.

1216 – Respiratory Protective Equipment for Contaminated Atmosphere with Adequate Oxygen Available

Employees in an atmosphere containing amounts of particulate matter that does not exceed 10 times the Threshold Limit Values for a half mask or 50 times the Threshold Limit Values for a full mask may use mechanical filter respirator. An atmosphere where amounts of gases or vapors are encountered as mentioned above may be controlled by chemical cartridge type respirators. An environment that contains both particulate and chemical vapors or gases can be controlled by using Combination Mechanical and Chemical respirators.

1217 – Mechanical Filter Respirators

Mechanical filter respirators offer respiratory protection against airborne particulate matter including dusts, mists having a Time Weighted Average (TWA) not less than 0.05 milligrams per cubic meter (mg/m³) and metal fumes (if specifically approved for metal fumes and mists). They consist essentially of a soft resilient face piece to which is directly attached a mechanical filter of some fibrous material which removes the harmful particles by physically trapping the particles as air is inhaled through the material. Gaseous matter will pass through the filter, but solid or liquid particles are trapped. Mechanical filter respirators do not provide protection against gases, vapors, or oxygen deficiency, and are not approved for material having TWA concentrations less than 0.05 mg/m³. The approval is noted on the manufacturer's package and cartridge or canister.

1218 – Chemical Cartridge Respirators

- A. Chemical cartridge respirators afford protection against concentrations of certain acid gases, alkaline gases, and organic vapors by utilizing various chemical absorbents to purify the inhaled air. These respirators use small cartridges containing chemicals to remove harmful gases and vapors. These respirators should never be used in confined space or where there is not enough oxygen to support life (at least 19.5 percent). The most used cartridges are as follows:
1. Organic Vapor: For protection against organic vapors.
 2. Acid Gases and Organic Vapors: For protection against certain acid gases and/or organic vapors for concentrations up to 50 ppm. Examples are sulfur dioxide and hydrogen chloride.
 3. Ammonia and Methylamine Cartridge: For protection against not more than 300 ppm ammonia or 100 ppm methylamine.
- B. Chemical Cartridge Respirators are non-emergency respiratory protective devices and should never be used in atmospheres immediately dangerous to life or health, except for escape purposes. There are many gaseous materials for which chemical cartridge respirators should not be used for protection regardless of concentration or time of exposure; a partial list of these contaminants is as follows:

Acrolein
Methyl Bromide
Acrylonitrile
Methyl Chloride

Aniline
Nickel Carbonyl
Arsine
Nitro Compounds

Bromine	Hydrogen Fluoride
Nitrobenzene	Phosgene
Carbon Disulfide	Hydrogen Selenide
Nitrogen Oxides	Phosphine
Carbon Monoxide	Hydrogen Sulfide
Nitroglycerin	Phosphorous
Dimethyl Sulfate	Methyl Alcohol
Nitromethane	Trichloride
Hydrogen Cyanide	Sulfur Chloride
Ozone	Toluene Diisocyanate

1219 – Combination Mechanical-Chemical Cartridge Respirators

Combination mechanical filter-chemical cartridge respirators utilize filters to trap particulate matter including dust, mist, or metal fumes, and a chemical cartridge to remove gases or vapors for dual or multiple exposures.

1220 – Medical Considerations

- A. Employees should not be assigned work requiring the use of respirators unless health screening has been performed to determine they are physically able to wear the respirator and have been fit-tested by a qualified person.
- B. Every respirator wearer shall also receive fitting instructions including demonstrations and practice in how the respirator should be worn, how to adjust it and how to determine if it fits properly.
- C. Respirators shall not be worn when conditions prevent a good face seal. Such conditions may be a growth of beard, sideburns, and a skull cap that projects under the face piece, or temple pieces on glasses.
- D. Hard contact lens shall not be worn while wearing a full-face piece respirator.

1221 – Training of Respirator Users

- A. To ensure the safe use of any respirator, it is essential that every user be properly instructed in its proper selection, how it works, its capabilities and how it is serviced. Competent instructors shall train respirator users and their supervisors. Training should include, but not be limited to, the following:
 - 1. Instruction in the nature of the hazard, whether acute, chronic, or both, and an appraisal of what may happen if the respirator is not used.
 - 2. A discussion of why this is the proper type of respirator for the particular purpose.

3. A thorough review of the capabilities of the respirator, its construction, operating principles, and limitations.
 4. Instruction in the care of the respirator, cleaning methods, inspection prior to use, changing canisters and filters, and proper storage.
 5. Instruction and training in actual use of the respirator (especially a respirator for emergency use) and close supervision to assure that it continues to be properly used.
 6. Classroom and field training to recognize and cope with emergency situations.
- B. The trainee should be provided with an opportunity to handle the respirator, have it fitted properly, test its face piece-to-face seal, wear it in normal air and wear it in a test atmosphere.
- C. All training courses should be fully documented as to the dates of training, information covered, names of trainees, and names of the instructors.

1222 - Inspection of Respiratory Protective Equipment

- A. All respiratory protection devices, including those kept for emergencies shall be inspected monthly. Equipment used daily shall be cleaned and inspected daily.
- B. The inspection shall include a check of the tightness of connections and the conditions of the face piece, headbands, valves, connecting tube, gaskets and canisters and proper component labeling conspicuously designated on each component of the complete respirator assembly. Rubber or elastomer parts shall be inspected for pliability and signs of deterioration.
- C. A complete record shall be kept of inspection dates and findings. Leak testing shall be done by both of the following methods:
1. Positive pressure test Close the exhalation valve and exhale gently into the face piece. The face fit is considered satisfactory if a slight positive pressure can be built up inside the face piece without any evidence of outward leakage of air at the seal.
 2. Negative pressure test Close off the inlet opening of the canister or cartridge by covering with the palm of the hand or by replacing the seal, inhale gently so that the face piece collapses slightly into a collapsed condition and no inward leakage of air is detected; the tightness of the respirator is satisfactory.

1223 – Repair of Respiratory Protective Equipment

Repair or replacement of parts shall be done only by trained persons with parts designed for the respirator. No attempt shall be made to replace components or to make adjustment or repairs beyond the manufacturer's recommendations. Valves and regulators shall be returned to the manufacturer or to a trained technician for adjustment or repair. All replaceable parts for a particular brand of respirator must be purchased from the original manufacturer. Respirators having interchangeable components from several manufacturers are not approved for use.

1224 – Cleaning, Disinfecting and Storing of Respiratory Protective Equipment

- A. Respirators shall be regularly cleaned and disinfected. Those issued for the exclusive use of one worker shall be cleaned after each day's use, or more often if necessary.
Those used by more than one worker shall be cleaned and sanitized after each use.
- B. Daily cleaning shall include immersing the face piece thoroughly in a sanitizer (sanitize means cleaning and disinfecting). Heavy soil may require use of a small hand brush and a mild detergent solution. Rinse with clean, warm water. Air dry and store in a clean protected location.
- C. At least once every six (6) months, all respirators shall be cleaned and sanitized according to the following procedure:
 - 1. Remove any filters, cartridges, canisters, or air cylinders.
 - 2. Wash the face piece and breathing tube in cleaner-sanitizer.
 - 3. Rinse completely in clean, warm water, not exceeding 120 degrees Fahrenheit.
 - 4. Air-dry in a clean area.
 - 5. Clean other respirator parts as recommended by the manufacturer.
 - 6. Inspect valves, head straps and other parts. Replace with new parts, if defective.
 - 7. Insert filters, cartridges, canisters, or air cylinders, and make sure a seal is achieved.
 - 8. Place in a plastic bag or container for storage.
 - 9. Never use oil as a lubricant on self-contained respiratory protective equipment.

1225 – Oxygen Deficient Atmospheres

- A. The normal concentration of oxygen in the air is 20.9 percent (by volume).
Oxygen concentration below 19.5 percent (by volume) is considered unsafe for human exposure because of the harmful effects on bodily functions, mental processes, and coordination.
- B. The first signs of oxygen deficiency are an increased rate and depth of breathing. Oxygen concentrations less than 16 percent by volume cause dizziness, rapid heartbeat, and headache. Oxygen-deficient atmospheres may cause an inability to move and a semiconscious lack of concern about the imminence of death. In cases of entry into areas containing little or no oxygen, the individual usually has no warning symptoms but suddenly loses consciousness and has no recollection of the incident. The senses cannot be relied upon to alert or warn an individual of atmospheres deficient in oxygen.
- C. Oxygen deficiency can occur when air is displaced by other gases and vapors or by means of oxidation processes such as chemical or biological reactions of fires.

1226 – Respiratory Protective Equipment for Oxygen Deficient Atmospheres

- A. Only self-contained breathing type apparatus, or an air-line respirator unit, each with suitable rescue equipment, shall be used in an atmosphere deficient in oxygen.
- B. Self-contained breathing apparatus provides complete respiratory protection in any concentration of toxic gases and under any condition of oxygen deficiency.
- C. The wearer's breathing is independent of the surrounding atmosphere since the wearer is breathing in a system in which no outside air is admitted, and the oxygen or air supply of the apparatus provides all respiratory requirements.
- D. Such devices enable employees to work in places where they normally would not be able to live.

1227 – Lack of Oxygen

- A. **WARNING:** Do not wear cartridge respirators in atmospheres immediately dangerous to life or health (IDLH) or that contains less than 19.5 percent or greater than 23.5 percent oxygen.

- B. WARNING: Wear self-contained breathing apparatus or a full-face airline unit with an egress emergency air supply in any IDLH atmosphere.
- C. Prior to entry, all manholes, unvented vaults, and enclosures shall be tested for oxygen content

Section 13 – Office & Facility Safety

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1301 – General Office Safety

Employee shall keep floor area clean and unobstructed. Immediately pick up object on the floor that presents a potential hazard.

- A. Employee shall wipe up spilled liquids promptly.
- B. Wet floors may be slippery. Walk on them with extra care.
- C. Walk - never run. The time you save by rushing is not worth the risk of injury.
 - 1. Avoid reading while walking.
 - 2. Keep to the right, particularly at corners where you cannot see someone approaching.
 - 3. Approach doors cautiously. There may be someone approaching from the other side.
 - 4. When working directly behind a closed door, lock it.
- D. Employees should be aware of weather conditions when entering or leaving work. Sidewalks and parking lots may be slippery from rain, humidity, sleet, or ice. Wipe feet when going from a wet surface to a dry indoor walking surface.
- E. Passageways should be kept clear of tripping hazards such as wastebaskets, cartons, electric cords, open drawers, ladders, luggage and personal belongings.
- F. Torn carpets, loose or curled mats, spilled liquids, inadequate lighting, failure of lights or other conditions that may cause tripping or slipping should be reported immediately.
- G. High heels increase the risk of a fall; low heel shoes are preferred.
- H. Shoes shall be worn at all times in your work area.
- I. Protruding nails should be removed or turned down.
- J. Turn lights on before entering a dark room or dark corridor.
- K. Before using any chemical, read the label carefully and follow the instructions. SDS is accessible on all chemicals.

1302 – Seating

- A. Employees shall not use a chair, stool, or bench as a ladder. Employees shall never stand in a chair for any reason.

- B. Employees should always keep one foot on the floor while seated.
 - 1. Avoid leaning sideways from a chair to pick up objects on the floor. Employees shall keep all chair legs on the floor. They should not lean back in a straight chair or lean back excessively in a tilting chair, as they could lose their balance and fall. Employees shall not sit with your feet up on another surface such as a desk or table.
- C. Employees shall not propel a chair across the floor while sitting in it. The wheels may lock, sending the employee flying out of the chair.
- D. Employees should inspect chairs regularly for broken springs, broken welds, loose screws, or loose casters and to assure that all parts are in good condition.
- E. To ensure ergonomically correct workstations for all employees, all chairs and office equipment should be adjustable to fit the individual using it.
- F. Employees shall sit properly in a chair; sitting on the edge of a chair is dangerous.
- G. Employees shall not sit in a damaged chair. Attach a sign to the chair warning potential users and report the damage to the supervisor.
- H. All chairs with casters shall have five legs to ensure proper balance.
 - 1. Employees should use extra caution when using chairs with casters. The chair may slip out from under someone when he/she is trying to sit.

1303 – Electrical Equipment

- A. Electric cords present a potential trip hazard. All cords shall be securely wrapped together, placed underneath the work desk and away from foot and chair areas.
- B. Employee should be cautious of electric outlet boxes on the floor that pose tripping hazards.
- C. Post Caution signs where the cord presents trip or other hazards.
- D. Unprotected electrical cords shall be routed so they do not cross aisles or passageways.
- E. Electrical equipment shall be properly grounded or double insulated to prevent shock. Use approved three conductor extension cords with a ground.
- F. All electrical devices shall be inspected for safety prior to use, and periodically thereafter.
- G. Electrical extension cords that are badly worn or damaged shall be repaired or discarded.

- H. Electrical cords shall not be spliced.
- I. Material and supplies shall not be stored in a manner that blocks access to electrical panels.
- J. Stationary equipment shall be grounded and on a Grounded Fault Interrupter circuit if it is located in a hazardous or wet location, or if it is a certain type (air conditioners, refrigerators, etc.).
- K. Power strips with built-in circuit breakers are preferred over extension cords. Employees shall not “daisy chain” power strips by plugging one power strip into another power strip.
- L. Employees shall not use electric equipment that appears to be damaged in any way (e.g., frayed cords, cracked outlets, broken plug adapters, etc.).
- M. All electric switches and receptacle plates shall be in good working condition.
- N. Only qualified personnel shall make repairs to equipment.
- O. Defective equipment shall be reported to a supervisor immediately and tagged out of service.
- P. When power operated machines become jammed, the power source shall be disconnected prior to clearing machine.
- Q. Extension cords shall not be fastened by staples or otherwise hung in such a fashion that could damage the outer jacket or insulation.
- R. All electrical appliances shall be UL rated.

1304 – Filing Cabinets and Shelves

- A. Filing cabinets and shelves can be a pinching, cutting, crushing, or tipping hazard. Employees should be cautious when working near them.
- B. Use caution when opening the top drawer of a file cabinet; it is the one likely to cause the cabinet to topple. Use special caution when opening file cabinets you do not normally use on a regular basis.

- C. Arrange the contents in file cabinets so that the load is evenly distributed. File cabinets shall be loaded from the bottom to the top. This action will prevent the cabinet from toppling if a drawer is fully extended.
- D. Avoid having more than one drawer of a file cabinet extended at one time.
- E. Employees shall never leave open file drawers unattended.
- F. Employees should stack items neatly inside cabinets and shelves. Keep frequently used items within easy reach.
- G. Employees shall not store sharp or hazardous materials above the mid-level shelf or store materials on top of high cabinets or shelves.
- H. Employees should store heavy objects on shelves at mid-level, between hip and shoulder height, to minimize lifting or bending.
- I. Employees shall never climb on file drawers.
- J. File cabinets should be placed away from doors or passageways so they do not interfere with the office or work area exits.

1305 – Stairways

- A. Employees shall keep stairways clean and unobstructed.
- B. Employees shall keep at least one hand free and use it on handrails when ascending or descending stairways.
- C. When using stairways, employees should walk with nothing in their hands or arms that would cause a hazard in the use of the stairs.
- D. Employees shall walk stairs one step at a time.
- E. Employees shall promptly report any worn treads and broken or loose stairs to their supervisor.
- F. Employees shall make sure the stairways are well lit. Advise Facilities Management if there is not enough illumination. Report broken or non-functioning lights immediately.
- G. Do not store or throw anything on steps or stairways. Even a piece of paper, a paper clip, cellophane wrapping from a cigarette package or a match can create a slipping hazard.

1306 – Office Equipment

- A. Office equipment such as computers should be placed far enough back from the edges of a desk or other working surface so that it will not fall or be brushed off accidentally.
- B. Employees should refer to the equipment instruction manual for troubleshooting guides to resolve operating problems.
- C. Never put fingers or objects other than paper (like paper clips or staples) into the shredder feed opening.
- D. Keep jewelry, long hair, loose clothing, ties, lanyards, etc. away from the paper shredder feed opening.
- E. Feed the recommended amount of paper smoothly into the shredder; do not force the paper in.
- F. If there is a shredder paper jam, never attempt to dislodge the paper with your hand.
- G. If the shredder motor overheats, turn off the shredder for at least 15 minutes, allowing the motor to cool before using again.
- H. Locate the paper shredder and its power cord outside of foot traffic areas.
- I. Machines with exposed moving parts must have appropriate guards in place.
- J. Operation and maintenance of office machines shall be done by qualified personnel only.
- K. Paper cutters of proper construction and in good condition require two commonsense precautions: keep your fingers away from the knife; keep the knife in the down position when not in use. Loose springs or guards should be repaired immediately.
- L. When using or refilling staplers, keep fingers away from the operating part.

1307 – Paper

- A. Use caution when folding or handling paper, to avoid paper cuts.
- B. When using staples to fasten paper, be sure staples are fully closed.
- C. Use a staple remover to remove staples. When removing large machine-applied staples, cup your free hand around the staple to protect your eyes against flying fragments if the staple breaks.

1308 – Fire Prevention and Protection

- A. Smoking is prohibited inside all Primoris facilities and vehicles. Employees shall use outdoor cigarette urns that are provided in designated smoking areas to dispose of matches, cigarettes, cigars, etc.
- B. Employees shall not throw any smoking materials into wastebaskets, shrubbery, or mulch.
- C. Each employee shall be responsible for recognizing fire hazards, eliminating the fire hazards when possible, and reporting those over which the employee has no control to the supervisor.
- D. Employees shall be familiar with the location of emergency exits and emergency procedures. Do not use elevators in case of fire.
- E. Boxes, paper, and other combustible materials shall not be stored near office equipment that could overheat or spark and cause the material to ignite.
- F. Oily rags and other combustible materials shall be placed in approved containers.
- G. Open flames from candles, incense, etc. are prohibited in the office or cubicle environment.
- H. Open flames or spark-producing tools shall not be used in any area where combustible gas vapors or dust may exist unless proper precautions are taken. Such areas shall be posted with appropriate warning signs.
- I. Open flames and smoking are prohibited in all areas where flammable liquids or gases are stored or being used. Such areas shall be posted with appropriate warning signs.
- J. Space heaters should not be used unless all other options have been exhausted. If an employee's supervisor approves the use of a space heater, the unit shall be equipped with the automatic tip-over cutoff in working condition. Space heaters can overheat in confined areas such as under desk, in cabinets, etc. Keep combustible or flammable materials at least five feet away from a space heater. Never use space heaters to dry garments. Space heaters shall be connected directly into wall outlets and shall never be plugged into office modular furniture outlets that have wiring sized for lighting and light loads such as computers.
- K. Radiant and fuel-burning heaters are not permitted in the office.

- L. All required fire protection equipment such as detection, alarm, extinguishing systems and equipment, fire doors, exit lighting, etc. shall be inspected as required and maintained in proper operating condition; inspections must be documented.
- M. Fire extinguishers shall be inspected monthly to ensure that they are in their designated location, to ensure that they have not been activated or tampered with, and to detect any obvious physical damage, corrosion, or other impairments. The inspections shall be documented.
- N. Fire extinguishers shall be inspected and tagged annually by a certified vendor.
- O. Extinguishers removed for service shall be replaced with spare extinguishers of the same type and size.
- P. Portable fire extinguishers shall be mounted and maintained on all motorized company vehicles and equipment and shall meet the minimum requirements for that unit.
- Q. Extinguishers not visible shall be properly identified with appropriate signage.
- R. Access to fire extinguishers and other fire protective equipment shall not be obstructed.
- S. Extinguishers shall be kept at their designated location on a hanger or in a cabinet when not in use. Extinguishers not visible (inset in walls) shall be properly identified with appropriate signage.
- T. Fire extinguishers that are not in the fully charged position shall not be placed back in service, but shall be promptly tagged and removed from service. The discharged extinguisher shall be replaced as soon as possible.

1309 – Emergency Action Plan

- A. All facilities and field work sites shall have an emergency action plan in place that includes an escape route and assembly area.
- B. Exit routes shall be kept clear of all obstructions.
- C. Fire exits and escape routes shall be clearly identified and regularly checked to ensure they are free from obstructions.
- D. All exit doorways shall be properly marked with “EXIT” signs.
- E. Each exit route shall be adequately lighted so that employees can see along the exit route.

- F. Each exit route door shall be free of decorations or signs that obscure the visibility of the exit route door.
- G. When employees are present, never lock doors that might need to be used in an emergency or as an emergency exit.
- H. Approach doors, especially swinging doors, with caution.
- I. When opening a door toward you, stand clear in case someone suddenly opens it from the other side.
- J. Emergency phone numbers (fire, medical, police) shall be posted on or near all phones.
- K. Each facility shall have access to personnel trained in First Aid/CPR.
- L. Each facility shall have a First Aid box located in a prominent position and accessible to employees. The First Aid box shall be regularly checked and stocked.
- M. All employees shall be trained on emergency procedures (fire, storm, etc.).
- N. Employees shall evacuate the building when the appropriate alarm is sounded, assisting any visitors or any employee in need of assistance along the approved evacuation routes to a safe area.
- O. Employees shall stay in designated safe area until told to report elsewhere or that the building is safe to re-enter.
- P. Each applicable facility shall have a procedure to assist people who may become trapped in the elevator.

1310 – Ergonomics

- A. Workstations should be set up to allow employees to perform tasks safely and efficiently. Each workstation should be fully adjustable to meet individual employee needs.
- B. Employees should have enough space under the desk to swivel knees 90 degrees in each direction. Improper posture or equipment setup could increase employee's risk for body aches and strain, often referred to as musculoskeletal disorders.
- C. Employees should avoid frequently reaching outside of the neutral posture while working. Position telephone, keyboard, and other frequently used equipment and files within optimal reach. Use of keyboard trays, document holders, etc., may be helpful.

- D. Take frequent posture relief breaks to stretch muscles, joints, spinal discs, arms, and legs to help combat adverse effects of sitting for long periods. Stretching also maintains flexibility to help combat muscle fatigue and the reduction of blood flow to extremities that is prevalent in prolonged office work. A good rule of thumb is the 30/30 rule: For every 30 minutes of constant work, employees should stretch for 30 seconds. Employees should not work more than two hours straight without taking a posture relief break.
- E. Employees should change tasks periodically, if possible, to avoid using the same muscle group over an extended period.
- F. Do not cradle telephone - use ear piece/headset rather than placing phone between ear and shoulder.
- G. When working on a computer, employees should adjust posture and the equipment according to the following guidelines:
 - 1. Keep the first line of a document on employee's monitor at eye level, or slightly lower. Monitors should be set at optimal individual viewing distance. (Bi-focal users may need to adjust their monitor lower to get optimal focus.)
 - 2. Use the optimum work zone, which is having elbows bent at about a 90-degree angle when typing.
 - 3. Relax wrists and keep them straight, not angled up or down.
 - 4. Avoid typing while wrists, arms, or elbows are in contact with any part of the desk or chair which causes a reduction in blood flow to the hands and fingers resulting in numbness and/or pain and tingling to those affected areas.
 - 5. Keep back in a neutral posture with the employee's head, chin, neck, and back in line with the hips.
 - 6. Rest the feet flat on the floor or on a footrest if needed. Thighs should be parallel to the floor.

1311 – Housekeeping

- A. Good housekeeping is a basic requirement of a safety program and it results in a safe and efficient work environment.
- B. Employees shall keep work areas, vehicles, and facilities clean and orderly.
- C. Except for temporary jobs, such as using vacuum cleaners, portable hand tools, etc., extension cords, unless covered or elevated shall not be strung across aisles or walkways.

- D. Storage areas shall be kept free from accumulation of materials that constitute hazards from tripping, fire, explosion, or pest haborage.
- E. Vegetation control will be exercised when necessary.
- F. Material stored in quantity should be arranged so that the weight is evenly distributed and not top heavy.
- G. Objects with sharp edges or points shall be kept in protective containers or pointed down when not in use.
- H. Do not leave sharp objects loose in desk drawers (e.g., razor blades, scissors, thumbtacks, knives). The knives of paper cutters shall be left in the down position and locked when not in use, if equipped.

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1401 – General

- A. The following Hazard Communication Program (HAZCOM) has been established to ensure compliance with all directives pertinent to Code of Federal Regulations (29 CFR 1910.1200). It is the intent of this program to provide all Primoris T&D employees with a reference guide to working with Hazardous Chemicals.
- B. Type of business: transmission and distribution of utility contractor.

1402 – Location of Hazard Communication Plan

- A. The written Hazard Communication Plan is available for review by all company employees and is in the following central locations:
 1. Office of the manager of safety and training
 2. HSE website
 3. Safety Handbook

Note: Copies of the plan may be obtained from the above at the request of any personnel.

1403 – Designated Personnel

- A. The following personnel have been designated as responsible for updating and maintaining the hazard communication program, employee training, labeling, and ensuring that SDS forms are obtained / maintained.
 1. Hazard Communication Program:
 - The manager of safety and training has the overall responsibility to maintain the Hazard Communication Program
 2. Employee Training:
 - Training will be conducted by manager of safety and training or a designated safety representatives or supervisors as appropriate. After completion of initial training, it will be the responsibility of individual supervisors to provide on the job safety training to all newly hired personnel. When new chemicals or chemical products are introduced, additional training by supervisory personnel will be required.
 3. Labeling Containers:
 - It will be the responsibility of the warehouse to insure proper labeling of containers. This is to be consistent with the information contained in the appropriate SDS.
 - Common nomenclature must be stated on the label.
 4. Labeling on Shipped Containers:

- It will be the responsibility of the warehouse to ensure all boxes, containers, and cartons which are suspected of containing chemicals are appropriately labeled. Shipments that show damage/leak/or spill are to be refused.

5. Obtaining/Maintaining Safety Data Sheets (SDS):

- A central file of SDS will be obtained by and maintained within the office of manager of safety and training. All employees may obtain an SDS for any chemical by following this link on their computers.
- <http://hq.SDSonline.com/infrastruxtdsl>

1404 – Updating and Evaluating the HAZCOM Program:

- A. At least once per year, the manager of safety and training will review and update the program. The update will consist of each of the following elements of the HAZCOM program:

1. Hazard assessment
2. Assessment of applicable regulations
3. Written plan(s)
4. Company Policies
5. Company Discipline/procedures
6. Training
7. Inspection Audits
8. Designated employee accountability

1405 – Container Labels:

Container Labels will be in accordance with current and accepted OSHA and NFPA Standards.

1406 – Materials Received:

- A. All containers received for use are to be properly and clearly marked in at least English with the following:
1. Contents of container
 2. Hazard of the specific target organ
 3. Name and address of the Manufacturer

1407 – Materials Shipped:

Any hazardous substance leaving the warehouse must be accompanied by the data listed in paragraph 2.1 of this document. In addition, if a material is shipped, an SDS is to be included.

Chemical waste will be shipped via a contracted vendor, in compliance with EPA, OSHA, and DOT regulations. Records will be maintained in the office of the manager of safety and training.

1408 – Missing Labels:

Missing, defaced or illegible labels will be replaced immediately with clean, properly marked ones.

1409 – Portable Containers:

Portable containers into which hazardous chemicals are transferred from labeled containers, and which are intended only for the immediate use of the employee who performs the transfer are not required to be labeled. All other portable containers are to be labeled with the content and hazard of the specific target organ.

1410 – Safety Data Sheets:

- A. An SDS for each hazardous chemical is maintained in office of the manager of safety and training. They will be available for review by all employees during working hours
- B. Online at: www.msdsonline.

1411 – Location of SDS:

- A. A master file of all SDS will be kept within the Office of the manager of safety and training.
- B. SDSs obtained from manufacturer, Primoris T&D Services utilizes the services of an online SDS system. This system has the capacity to cross reference by chemical Name, Trade Name, CAS Number, OHS Number, and other reference factors.
- C. Employees requesting an SDS will normally receive the SDS provided via this system as they will normally be more detailed and specific than SDS from the manufacturer.
- D. SDS provided via this system will contain CERCLA and NFPA ratings which may or may not be provided by manufacturer.
- E. chemical Name, Trade Name, CAS Number, OHS Number, and other reference factors.
- F. Employees requesting an SDS will normally receive the SDS provided via this system as they will normally be more detailed and specific than SDS from the manufacturer.
- G. SDS provided via this system will contain CERCLA and NFPA ratings which may or may not be provided by manufacturer.

1412 – Hazard Determination:

- A. SDS will be requested for all incoming hazardous substances.
- B. Primoris T&D will rely on both furnished SDS and those produced via SDS online.

1413 – SDS Information:

- A. The designated person will ensure that all SDS have complete information in each of the following categories:

1. Identities used on label
2. Chemical and Common Names
3. Physical and chemical characteristics
4. Physical Hazards
5. Health Hazards
6. Primary routes of entry
7. Air exposure limits (PELs, TLVs)
8. Carcinogenicity
9. Precautions for safe handling
10. Control Measures
11. Emergency and first aid procedures
12. Date of preparation of SDS
13. Name/address/phone number of SDS preparer or distributor

1414 – Missing SDS:

The office of the manager of safety and training will contact suppliers for any missing SDS or missing SDS category information. Contacts will be documented. If the requested information is not received within 30 days, the Company may file a complaint with OSHA, or find a new supplier. Documentation of requests will be maintained.

1415 – Initial Employee Training

Prior to beginning work with hazardous chemicals, and as part of new employee orientation each employee will be required to attend a hazard communications training class. They will view a video presentation concerning HAZCOM. Supervisors will ensure that new employees are trained, and that the training is documented.

1416 – Retraining of Employees

- A. Additional training will be conducted by supervisors when new chemicals are introduced into the work area.
- B. Retraining is not required if the new chemical contains hazard like previously existing chemicals for which training has already been conducted.

1417 – Record Keeping of Training

The trainer or supervisor will require all employees attending the Hazard Communication Course to sign a sheet verifying their attendance.

1418 – Training Format

- A. Each employee attending the safety course will receive a lecture and Audio-Visual Training. Training to include the following:
 - 1. The location and availability of the written Hazard Communication Program and SDS.
 - 2. Training on the physical and health hazards of the chemicals in the work area.
 - 3. How to reduce or prevent exposure to these hazardous chemicals through proper work practices, engineering procedures, emergency procedures and personal protective equipment to be used.
 - 4. What the company has done to reduce or prevent the workers exposure to chemicals.
 - 5. Procedures to follow if they are exposed to chemicals.
 - 6. Methods and observations used to verify the presence or release of a hazardous chemical.
 - 7. Explanation of the details of the program, labeling, the SDS, and how employees can obtain and use appropriate information.

1419 – Hazardous Non-Routine Task:

- A. Primoris T&D Policy
 - 1. It is Company policy that no employee will begin work or any non-routine task without first notifying the appropriate supervisor or instructor.

1420 – Specific Training for Non-Routine Task

- A. Any non-routine task will require specific training concerning the hazards associated with the task. This training will include information on:
 - 1. Specific Chemical Hazard
 - 2. Protective/safety measures that the employee can take.
 - 3. Measures that the company has taken to reduce hazards, to include, administrative controls, engineering controls, and personal protective equipment (PPE) required.

1421 – Non-Routine Task

Due to the nature of the companies work, chemical use must be considered routine.

1422 – Primoris UTD Policy:

Company policies set forth in this Hazard Communication Plan shall be adhered to by all employees. Employees found to be knowingly violating the policies set forth will be subject to disciplinary actions, up to and including immediate termination.

A

Accident: An unplanned or unexpected event caused by an unsafe acts and unsafe conditions. It may or may not result in injury or property damage.

Activate: Install all sources of power required to open, close or operate a device.

Aerial Device: Any piece of equipment utilizing a bucket or platform to place worker(s) at an elevated worksite.

Aerosols: Fine liquid droplets or solid particles in the order of 0.01 to 100 microns effective diameter that remains dispersed in the air for a period of time.

Affected Employees: An employee whose job requires him to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout or Tagout, or whose job requires him to work in an area in which such servicing or maintenance is being performed.

Air-Line Unit: A respirator attached to an airline or hose whereby breathable air is supplied to the wearer by means of a flow control valve, orifice, or diaphragm to govern the rate of air flow, and the exhaled breath is vented to the ambient atmosphere.

Anchorage: A secure means of attachment for lifelines, lanyards, and straps.

ANSI: American Nation Standards Institute.

Approved: The term “approved” when used in connection with methods, tools, or equipment; refers to the methods, tools, or equipment approved by the company through committee, departmental actions, or safety rules.

Attendant: An employee assigned to remain outside the entrance to an enclosed or other space to render assistance as needed to employees inside the space.

Authorized Respirator User: A person who has been trained in the proper use of the respirator provided for the job, under-goes periodic health screening to assure physical fitness, and under-goes initial and periodic qualitative fit tests for the respirator to be used.

Authorized Employee: An employee to whom the authority and responsibility to perform a specific assignment has been given by the employer.

Authorized Person: A person to whom the authority and responsibility to perform a specific assignment has been given by the employer.

Automatic Circuit Recloser: a self-controlled device for interrupting and reclosing an alternating current circuit with a predetermined sequence of opening and reclosing followed by resetting, hold-closed, or lockout operation.

B

Backreamer: A down hole tool that increases the diameter of a pilot bore hole to accommodate the size of the product being pulled.

Backyard Machine: A self-propelled, four-wheeled, machine (dolly) equipped with hydraulic winch and boom capable of hauling and setting poles, primarily used to set transformers and poles in locations inaccessible to trucks.

Barricade: A physical obstruction intended to provide a warning and limit access to a hazardous area.

Barrier: A physical obstruction intended to prevent contact with energized lines or equipment or to prevent unauthorized access to a work area.

Benching (Benching System): A method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near vertical surfaces between levels.

Body Harness: Straps that are secured about an employee in a manner that distributes the arresting forces over at least the thighs, shoulders, and pelvis with provisions for attaching lanyard, lifeline or deceleration device.

Bond: The electrical interconnection of conductive parts designed to maintain a common electrical potential.

Bracket Grounds: Two or more set of 2/0 copper cables which connect all three phases. They are installed between the work area and all sources of energizing. The bracket grounds shall be capable of conducting the maximum fault current that is available for the time necessary to clear the fault.

Bus: A conductor or a group of conductors that serve as a common connection for two or more circuits.

C

Cable: A conductor with insulation or a stranded conductor with or without insulation and other coverings, or a combination of conductors insulated from one another.

Cable Sheath: A conductive, protective covering applied to cables. A cable sheath may consist of multiple layers of which one or more is conductive.

Capacitor—Used to the correct power factor in a circuit; Corrects inductive current caused by opening a circuit under load.

Cartridge: A small circular canister. Cartridges are approved for use in concentrations of contaminants less than 0.1 percent or 1,000 ppm by volume.

Catastrophic Release: A major uncontrolled emission, fire, or explosion involving one or more highly hazardous chemical that presents serious damage to employees and public.

Certification: A statement or document attesting to the successful fulfillment of the basic requirements to perform a specific skill or practice in a specific field.

Certified: Confirmation (as with a certificate) that a person has fulfilled the requirements of a course or study or practice to perform a specific skill or perform in a specific field.

Check Open/Check Closed: Make all mechanical, visual and electrical checks to ensure all three phases of the equipment are in correct position and locked.

Chemical Cartridge Respiration: A half-mask or full-face air purifying mask utilizing containers of activated chemical absorbencies for removing concentrations of certain organic vapors and gases less than 0.1 percent of 1,000 ppm by volume.

Circuit: Conductor or system of conductors through which an electric current is intended to flow.

Clear Hot Stick Distance: The minimum distance for the use of live-line tools held by lineman when performing live-line work.

Clearance: The written order issued only after there is a clear understanding that all steps have been taken by the dispatcher and the switchman to assure that all sources of power to equipment are opened and tagged, the equipment is de-energized, ready to ground and safe to work on.

Clearance (for work): Authorization to perform specified work or permission to enter a restricted area.

Clearance (between object): The clear distance between two objects measured surface-to-surface.

Conductor: - A material, usually in the form of a wire, cable or bus bar, suitable for carrying an electric current.

Combustible Liquids: Any liquid having a flash point at or higher than 140 degrees and less than 200 degrees.

Competent Person: One who is capable of identifying existing and predictable hazards in the surrounding or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has the authorization to take prompt corrective measures to eliminate them.

Covered Conductor: A conductor covered with tested and rated rubber protective removable devices like, line hoses, blankets, and hoods.

Confined Space: A space that is large enough and so configured that an employee can bodily enter and perform assigned work; and has limited or restricted means for entry or exit (for example tanks, vessels, silos, storage bins, hoppers, vaults/manholes and pits, are spaces that may have limited means of entry); and is not designed for continuous employee occupancy.

Contaminate: To make inferior, impure, or unfit for use by introduction of unwholesome or undesirable elements from an outside source.

Contaminated Atmosphere: Any atmosphere containing a sufficient concentration of gases, vapors, dusts, fumes, or mists which may cause harmful health effects.

CPR (Cardiopulmonary Resuscitation): A procedure involving the application of artificial ventilation (mouth-to-mouth breathing) and external heart compression to victims who have experienced sudden death.

Cutout: a device used to provide protection from excessive currents in an electrical circuit. (Also called a disconnect)

D

De-Activate: Remove source of power used to open, close or operate a device.

De-energized: Free from any electrical connection to a source of potential energy and from electric charge; not having a potential difference from that of the earth. The term is used only with reference to current carrying parts that are sometimes energized.

Designated Employee: An employee who is designated by the employer to perform specific duties and who is knowledgeable in the hazards involved.

Designated Person: A person designated by the employer to perform specific duties, e.g., factory representative, contractor, etc., and who is knowledgeable in the hazards involved.

Directional Boring Machine: A steerable, horizontal boring machine that allows trenchless installation of underground utilities.

Disciplinary Action: Administrative action taken by the employer against the employee; may vary from verbal reprimand to dismissal.

Disconnect: A switch with provisions for opening an electrical circuit by use of an insulated stick or operating mechanism.

Disconnect: To remove from an electrical circuit by use of a removable jumper or by operation of a disconnect switch, air switch, or by other means.

Disengage: The air break switch motor operator is mechanically disengaged from the operation rod. The coupling should be locked in the open position and checked to ensure that if the motor operator operated, that the coupling will clear and the air switch will not operate.

Dispatcher: A qualified employee designed to operate or coordinate the operation of the system under his/her area of responsibility.

Distribution System—the system of conductors and devices that begin in a substation and supply power to the customer's equipment.

Drop Line: A 1/4 inch or larger rope carried by workers who are working in elevated locations and used to raise larger lifting devices such as a handline, or small objects such as hand tools in a canvas bag.

Dust: Mechanically produced solid particles in the air varying in size from 0.1 to 25 microns.

E

Effectively Grounded: Intentionally connected to earth through a ground connection or connections of sufficiently low impedance and having sufficient current-carrying capacity to prevent the buildup of voltages that may result in undue hazard to connected equipment or to persons.

EHV: Extra High Voltage – greater than 130 kv.

Emergency: an emergency occurs when an unusual condition exists that endangers life and/or property.

Employee: in the broad sense, any person employed by or representing Willbros. IN general usage, a person employed by Willbros and below the level of supervisor in the chain of command.

Enclosed: Surrounded by a case, cage, or fence, which will protect the contained equipment and prevent accidental contact of a person with live parts.

Energized: Electrically connected to a source of potential difference or electrically charged so as to have a potential difference from that of earth or another object.

Energy Source: Any electrical, mechanical, hydraulic, pneumatic, chemical, nuclear, thermal, or other energy source that could cause injury to personnel.

Excavations: Any man-made cut, cavity, trench, or depression in an earth surface formed by earth removal.

Exposed: (a) in such a position that in case of failure of supports or insulation, contact with another circuit or line may result. (b) An object or device that can be inadvertently touched or approached nearer than a safe distance by any person. Applied to objects not suitably guarded or situated. Not isolated or guarded.

Exposure: Exposure occurs whenever and wherever a person is subject to electric, magnetic, or electromagnetic fields or to contact current other than those originating from physiological processes in the body and other natural phenomena.

F

Fall Arrest System: The assemblage of equipment such as a full body harness in conjunction with a deceleration device and an anchorage to limit the forces a worker experiences during a fall from one elevation to another.

Fall Protection Program: A program intended to protect workers from injury due to falls when working at elevations.

Fall Prevention System: A system intended to prevent a worker from falling from one elevation to another. Such system includes devices, guardrails, barriers, and restraint systems.

F/CC - Fibers per cubic centimeter of air.

Fibrosis Producing Dust: Dusts or particles of mineral and metallic origin producing pathological changes in the tissues of the lungs.

First Aid: The immediate care given the victim of an accident or sudden illness at the scene of the incident until the arrival of qualified medical assistance.

Flammable Liquid: Any liquid having a flash point less than 140 degrees F and having a vapor pressure not exceeding 40 pounds per square inch at 100 degrees F.

Fog: A mist of sufficient concentration to obscure vision.

Foreman or Supervisor: Any person, regardless of classification, who is directly in charge of a specific job or specific jobs. This person may be a lead man, working foreman, general foreman, supervisor, or general superintendent.

Fumes: Extremely small solid particles generated by condensation from the gaseous state generally from the volatilization form molten metals, usually in the order of less than 1.0 microns in diameter.

G

Gases: Fluids that have neither independent shape nor volume, and can be changed to the liquid or solid state only by combined effect of increased pressure and decreased temperature.

Ground: The process of applying personal protective grounds to electrical lines or equipment.

Grounded: Connected to earth or to any conducting body that serves in place of the earth.

Guard: To protect by means of covering, fencing, barricading, blocking, etc. to minimize the possibility, under normal conditions, of dangerous approach or accidental contact by persons or objects.

H

Handline: A single sheave block of at least three inches in diameter equipped with 1/2 inch or larger rope. A handline is to be used to raise and lower tools and equipment. It may also be used to rescue injured employees.

Handhold: An access opening provided in equipment or in a below-the-surface enclosure in connection with underground lines into which workers may reach but do not enter, for the purpose of installing, operating, or maintaining equipment.

Hazard: An unsafe condition that has the potential to lead to injury of persons or damage to equipment.

Hazardous Atmosphere: An atmosphere presenting a potential for death, disablement, injury, or acute illness from gases, vapors, mists, dusts, oxygen deficiency or saturation, or substance concentrations that exceed permissible exposure limits.

Hazard Communication Program: Company program to ensure that information concerning hazardous chemicals (material) is transmitted to employees through the use of warnings, procedures, Material Safety Data Sheets (MSDS), and employee training.

Hazardous Material (substances): Any substance that is a physical hazard or a health hazard. A substance is a physical hazard when there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, or flammable, organic peroxide, an oxidizer, pyrophoric, unstable (reactive), or water reactive. The substance is a health hazard when it is determined to be a carcinogen, a toxic or highly toxic agent, a reproductive toxin, irritant, corrosive, sensitizer, hepatotoxic, nephrotoxic, neurotoxin, an agent that acts on the hematopoietic system, or an agent that damages the lungs, skin, eyes, or mucous membranes.

Highly Hazardous Chemical: A substance possessing toxic, reactive, flammable, or explosive properties that are listed in OSHA Standard 29 CFR 1910.119.

Hazardous Operation: an operation that involves or exposes one to risk.

Hazwoper: Hazardous Waste Operations and Emergency Response Plan.

HEPA Filter: High efficiency particle air filter - a filter capable of trapping and retaining at least 99.97 percent of all mono-dispersed particles of 0.3 micrometers or larger in diameter.

High Power Tests: Tests that use fault currents, load currents, magnetizing currents and line dropping currents to test equipment either at rated voltage or at a lower voltage.

High Voltage Tests: Tests that use voltages of approximately 500 volts or more.

Hold: The written order issued only after there is a clear understanding that all steps have been taken by the dispatcher and the switchman to assure that the equipment will not be operated. This in no way infers that the equipment is de-energized.

Hold Cards (Hold Tags): A card or tag type device, usually having a predominant color of white or red, which warns or cautions against the operation of a particular switch, device, circuit, tool, machine, etc. The use of such tags must be respected; equipment or items so tagged must not be activated or used without full and proper authority from a responsible person.

Hot-Line Tools and Ropes: Those tools and ropes that are especially designed for work on energized high voltage lines and equipment. Insulated aerial equipment especially designed for work on energized high voltage lines and equipment shall be considered
(Hot – Line)

HV: High Voltage greater than 35 kV and less than or equal to 138 kV.

I

Immediately Dangerous to Life and Health: (IDLH): Any atmosphere that poses an immediate threat to life or that may result in acute or immediate severe health effects.

Insulated: Separated from other conducting surfaces by a dielectric (including air space) offering a high resistance to the passage of current.

Isolated: To make readily inaccessible to persons unless special means of access are used.

J

Jobsite: The point where the employees are assembled to perform work.

L

Lanyard: a flexible line used to secure a harness to a lifeline or directly to a point of anchorage.

Lifeline: A line provided for direct or indirect attachment to a workers body belt, body harness, lanyard, or deceleration device. Such lifelines may be horizontal or vertical in application.

Live-Line Bare Hand: A work method wherein the employee is insulated from ground and is at the same potential as the energized part.

Live-Line Tools: Those tools that are especially designed to provide safe insulating qualities and strength for the conditions of work for which they are used, usually on high voltage electric lines.

M

Manhole: A subsurface enclosure that personnel may enter and which is used for the purpose of installing, operating and maintaining submersible equipment or cable.

Manhole Opening: AN opening through which persons may enter into a confined or enclosed space.

Mechanical Filter Respirator: A half-mask or full-face air-purifying respirator with a filter usually made of cellulose or felt to trap particulate matter.

MG/ML: Milligrams per cubic meter of air.

Minimum Approach Distance: The closest distance an employee is permitted to approach an energized or ground object.

Mist: Liquid condensation particles ranging in size from 0.1 to 10 microns.

N

Near-Miss: An unintended, unplanned, or unexpected event that could have, but did not, result in personal injury or property damage.

Nominal Voltage: The voltage value assigned to a system or circuit of a given voltage class for the purpose of convenient designation. The operating voltage of the system may vary above or below this value.

Non-Permit Confined Space: A confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm.

Nuisance Dust: Generally referred to as innocuous dust, and not considered a direct contributory factor in causing lung disease.

O

Opening and Tagging: The procedure of opening a switching device and attaching a danger tag as per orders of a dispatcher.

OSHA (OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION): Created by the Occupational Safety and Health Act of 1970 and serves as the enforcement agency for safety and health in the workplace.

Oxygen Deficiency: Anywhere the oxygen concentration is below 19.5 percent.

Oxygen Deficient Atmosphere: Any atmosphere containing less than 19.5 percent oxygen.

P

Pad-Mount: Transformer or equipment in a surface-mounted enclosure normally worked from ground level.

PCB's – Polychlorinated Biphenyls –well-known class of synthetic organic chemicals.

PEL - Permissible exposure limit as stated by OSHA.

Permit Required Confined Space: A confined space that has one or more of the following characteristics:

1. Contains or has a potential to contain a hazardous atmosphere.
2. Contains a material that has the potential for engulfing an entrant.

3. Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross section.
4. Contains any other recognized serious safety or health hazard.

Person in Charge (PIC): see supervisor

Pesticide: A chemical that controls, prevents, destroys, repels, or regulates forms of pest life. Insecticides, herbicides, fungicides, and rodenticides are pesticides.

PPM - Parts per million.

Primary Voltage: Any electrical circuit that normally operates at more than 600 volts.

Primary Area: The area in which the employee can encroach upon the safe working distances for distribution voltages (see Rule 201) by overreaching, slipping, falling or by handling any conductive object in the employee's possession.

Protective Footwear: Footwear containing a protective toe box that is specially designed and manufactured to meet the performance requirements of ANSI Z41.1 1991 Standard and providing both impact and compression protection.

Q

Qualified Employee: One knowledgeable in the construction, operation and maintenance of transmission and distribution equipment involved, along with the associated hazards.

R

Respirator: A device equipped with the appropriate cartridge or filter and worn over the mouth and nose to prevent the inhalation of harmful substances or vapors.

Rubber Protective Equipment: Gloves, sleeves, blankets, line hose, etc. constructed of rubber that has been designed: insulated, and tested to withstand a specific level of voltage.

S

Safety Can: An approved closed container of not more than 5 gallon capacity having a flash – arresting screen, spring closing lid, and spout cover and designed so that it will safely relieve internal pressure when subjected to fire.

Safety Rule: A positive rule requiring compliance by all employees concerned. Deviation from safety rules is not permitted and is subject to disciplinary action.

SCBA (SELF-CONTAINED BREATHING APPARATUS): A self-contained breathing device with an independent breathing supply.

SDS (SAFETY DATA SHEET): Provided upon request by the manufacturer of a product to indicate the hazardous ingredients, physical data, health hazards, reactivity, fire and explosion data, protection data and special precautions for the product.

Shall: A term used in safety rules or regulations to indicate the rule requires mandatory compliance. No exceptions are allowed except with the approval of a supervisor.

Short Circuit: A low resistance connection made between points of different potential.

Should: A term used to indicate a strong recommendation when used in a safety rule or statement.

Supervisor: The person who is directly in charge of employees and work being done, regardless of their usual title.

Switch: (Noun): A device for opening and closing or for changing the connection of a circuit.

Switch (Verb): The act of operating (either manually or remotely) disconnects, air switches, circuit breakers, etc. (i.e., from open to closed or from closed to open).

Switching and Tagging Order Form: The official document used by dispatchers and switchmen to record switching and tagging procedures.

T

Tag (Noun): Signs or cards of distinctive appearance, indicating that the equipment or lines so marked are out of service, being worked on, or in a position other than normal. A system or method of identifying circuits, systems or equipment for the purpose of alerting persons that work is being performed on the circuit, system or equipment.

Tag (Verb): The term used by the dispatcher for the act of placing a danger or attention tags on a piece of equipment.

Tag Line: A 1/2" or larger non-conducting rope used for guiding suspended equipment or material over and around obstacles.

Tailboard Safety Talk: A short discussion of the work to be performed and the safety measures to be incorporated. Normally conducted by the Forman. These are sometimes called tailgate talks, toolbox talks, or job briefings.

TLV (THRESHOLD LIMIT VALUE): The Time Weighted Average (TWA) atmospheric concentration of contaminant to which workers can be exposed for an eight-hour period, 40-hour workweek, without anticipated adverse effects. The TLVs represent only guidelines.

Trained: Successfully completed a course of instruction through which a trainee becomes qualified and proficient to perform a specific skill or task.

Trainee: One who is being trained to perform a specific task, skill or job.

TWA (TIME WEIGHTED AVERAGE): A method expressing exposures usually based on an 8-hour work day and 40-hour work week.

V

Vapors: The gaseous form of substances that are normally in the solid or liquid state at room temperature and pressure.

Vault: An enclosure, above or below ground, which personnel may enter and which is used for the purpose of installing, operating, or maintaining equipment or cable.

Vault (Vented): A vault that has provision for air changes using exhaust flue stacks and low level air intakes operating on differentials of pressure and temperatures providing for airflow which precludes a hazardous atmosphere from developing.

Vault (Forced Vent): A vault that utilizes a fan to force air in an intake or exhaust direction.

Voltage: The effective potential difference between any two conductors or between a conductor and ground. Voltages are expressed in nominal values unless otherwise indicated.

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