5G-Small Cell Deployment Training Course

STUDENT WORKBOOK

Susan Harwood Grant SH-99035-SH0

NATE
THE COMMUNICATIONS INFRASTRUCTURE CONTRACTORS ASSOCIATION

NATE WIN
WIRELESS INDUSTRY NETWORK

COURSE OBJECTIVES

Enhance...
students' knowledge of the roles of OSHA and NATE.

Provide...
a course overview video of small cell deployment and highlight the future small cell buildout projections.

Enhance...
awareness and knowledge of potential small cell hazards and exposures.

Provide...
baseline knowledge of common types of PPE utilized in small cell construction and maintenance.

Enhance...
awareness in recognizing and documenting small cell hazards by applying control measures through pre-task planning and job hazard assessment(s).

Elevate...
awareness of traffic control and management processes related to work in the right-of-way (ROW) for small cell deployment and maintenance.

Provide...
a basic understanding of safe trenching and excavation practices.

Develop...
a basic understanding of potential electrical hazard identification and control measures.

Discuss...
basic considerations for working safely with fiber optics.

Enhance...
understanding of hazards associated with working at heights while working in a public ROW.

Understanding...
of radio frequency emissions, signage, use of a personal protection monitor, and control measures to ensure worker safety.

Develop...
and understanding of various types of confined spaces and their impact on small deployment and maintenance.

Create...
awareness of environmental hazards for small cell deployment and maintenance.

Understand...
the safety and professional aspects of working in the vicinity of the general public and within the public right-of-way.

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Credit: Presentation template courtesy SlidesCarnival

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U.S. Department of Labor - OSHA
Susan Harwood Grant
SH-99035-SH0

Acknowledgement

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After the completion of this course, please refer to your company policies and procedures.

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Training Topic Sections

- Section 1: Introduction to NATE and OSHA
- Section 2: State of the Industry
- Section 3: Potential Small Cell Hazards and Exposures
- Section 4: Personal Protective Equipment (PPE)
- Section 5: Pre-task Planning and Job Hazard Assessment
- Section 6: Temporary Traffic Control
- Section 7: Trenching and Excavation
- Section 8: Small Cell Electrical Hazard Identification

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Training Topic Sections

- Section 9: Fiber Optics Safety Basics
- Section 10: Working at Height
- Section 11: Radio Frequency Hazards
- Section 12: Confined Spaces
- Section 13: Environmental Concerns
- Section 14: The Challenges of Working Alone

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Course Objectives

- Section 1: Enhance students' knowledge of the roles of OSHA and NATE.
- Section 2: To provide a course overview video of small cell deployment and highlight the future small cell buildout projections.
- Section 3: Enhance awareness and knowledge of potential small cell hazards and exposures.
- Section 4: Provide baseline knowledge of common types of PPE utilized in small cell construction and maintenance.
- Section 5: Enhance awareness in recognizing and documenting small cell hazards by applying control measures through pre-task planning and job hazard assessment(s).

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Course Objectives

- Section 6: Elevate awareness of traffic control and management processes related to work in the right-of-way (ROW) for small cell deployment and maintenance.
- Section 7: Provide a basic understanding of safe trenching and excavation practices.
- Section 8: Develop a basic understanding of potential electrical hazard identification and control measures.
- Section 9: Discuss basic considerations for working safely with fiber optics.
- Section 10: Enhance understanding of hazards associated with working at heights while working in a public ROW.

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Course Objectives (continued)

- Section 11: Understanding of radio frequency emissions, signage, use of a personal protection monitor, and control measures to ensure worker safety.
- Section 12: Develop an understanding of various types of confined spaces and their impact on small deployment and maintenance.
- Section 13: Create awareness of environmental hazards for small cell deployment and maintenance.
- Section 14: Understand the safety and professional aspects of working in the vicinity of the general public and within the public right-of-way.

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Turning Point Technology

In this training you will utilize Turning Point interactive response software.

You will be asked questions and receive real-time feedback with handheld mobile devices. Results are instantly displayed on the screen and collected in detailed reports to ensure all participants are accounted for.

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Pancake : Griddle : Hamburger?

A. Lettuce
B. Grill
C. Bun
D. Ketchup

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What is your age?

A. 18-24
B. 25-34
C. 35-44
D. 45-54
E. 55-64
F. 65 and up

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What is the size of your employer?

A. I don't know
B. 1-10 employees
C. 11-50 employees
D. 51-100 employees
E. More than 150 employees

What primary sector do you service?

A. Wireless
B. Municipalities
C. Regulatory
D. Public Safety
E. Electrical
F. Utilities
G. Real Estate Owner/Manager or Maintenance

Introduction to NATE and OSHA

Section 1
Introduction to NATE and OSHA

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OSHA®

NATE and OSHA Topics

- Introduction to NATE and OSHA
- Importance of NATE and OSHA
- Responsibilities of the employer under OSHA
- Employee rights under OSHA

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About NATE

- Global leader in industry safety and best practices for 26 years;
- Voice of tower and communications infrastructure, construction, service, and maintenance industries; and
- Diverse membership make-up consisting of over 970 member companies.

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About OSHA

On December 29, 1970, President Nixon signed the **Occupational Safety and Health Act of 1970 (OSH Act)** into law. The OSH Act created the **Occupational Safety and Health Administration (OSHA)** to ensure safe and healthful working conditions for working men and women by setting and enforcing standards and by providing training, outreach, education, and assistance.

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What Does OSHA Do?

- Works with employers and employees to reduce workplace hazards through partnerships and alliances;
- Introduces new or improves upon existing safety and health programs;
- Utilizes consensus standards through an agreement with ANSI;
- Educates on safety and health rules that are designed to protect workers;
- Enforces the rules through inspection and citations;
- Monitors job-related injuries and illnesses through electronic records and reporting; and
- Conducts a variety of inspections to include: accidents, fatalities, complaints, and programmed inspections.

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Workers Have the Right to:

- Safe and healthful working conditions;
- File a confidential complaint with OSHA in regards to safety and/or health concerns in the workplace;
- Review records of work-related injuries and illnesses;
- Receive training regarding the OSHA standards that apply to their workplace;
- Report any injury or illness without retaliation or discrimination;
- Obtain copies of test results done to find hazards in the workplace; and
- Obtain copies of their medical records.

Source: OSHA 3021-09R 2011, www.osha.gov/workers

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Employers Must:

- Provide a workplace free from recognized hazards and comply with standards, rules and regulations issued under the OSH Act;
- Eliminate or reduce hazards by making feasible changes in working conditions;
- Not discriminate against employees who exercise their rights under the Act;
- Inform employees of hazards through training, labels, alarms, etc.;
- Train employees in a language/vocabulary employees can understand; and
- Keep accurate records of work-related injuries and illnesses.

Source: OSHA 3021-09R 2011, www.osha.gov/workers

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OSHA Whistleblower Protection

- Visit osha.gov/workers or call 800-321-OSHA;
- Be prepared to provide specific details regarding your company and the type of hazard or discrimination being reported;
- Keep a confidential record of all details; and
- Once a complaint is filed or reported, an investigation is normally warranted (see criteria on website).

Source: OSHA 3021-09R 2011, www.osha.gov/workers

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Section 1
Review Questions

What OSHA whistleblower statutes are designed to provide employees the freedom to report violations and protect employees from the following acts of retribution?

A. Being blacklisted
B. Demotion
C. Being denied promotion or overtime
D. Pay reduction
E. All of the above

Employees can report hazards and violations to OSHA through which mediums?

A. By phone: 800-321-OSHA

B. By website: osha.gov/workers

C. All of the above

D. None of the above

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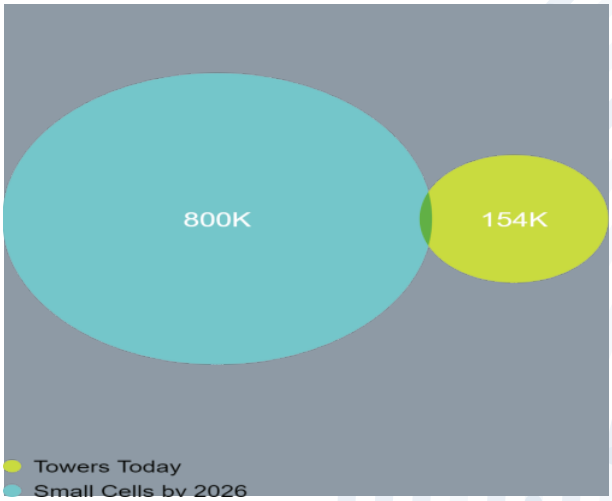
NOTES:

Section 2
State of the Industry

Industry Data – Small Cells



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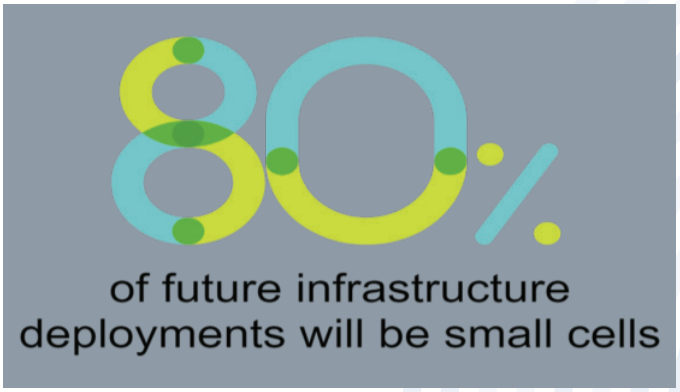
Future Infrastructure Deployments



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Small Cell Deployment Support

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Small Business Leaders

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5G Economy

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5G Investment

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5G Job Creation

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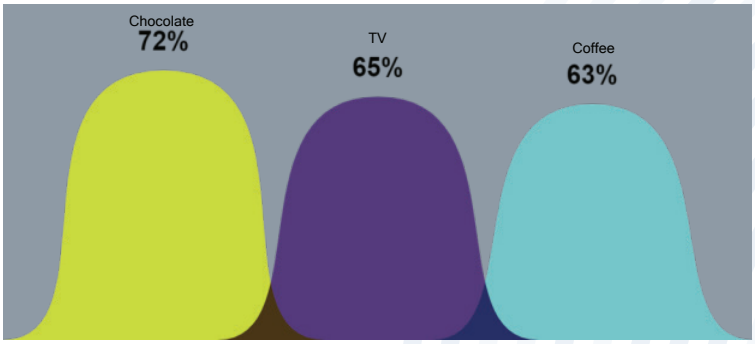
State of the Industry

What Consumers Would Give up for Their Smart Phone!



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What is a Small Cell

What is a Small Cell?

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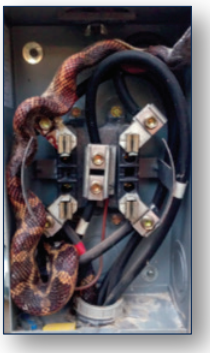
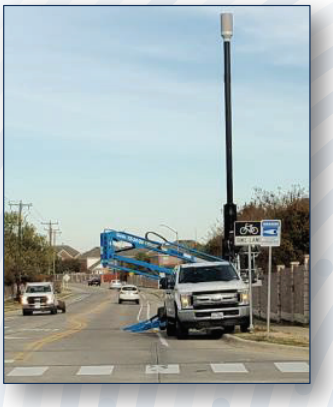
Section 3
Potential Small Cell Hazards and Exposures

Potential Small Cell Hazards and Exposures





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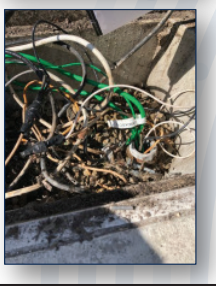
Potential Small Cell Hazards and Exposures

Potential Small Cell Hazards and Exposures (continued)



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Additional Risks

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RF Exposure/Electrocution/ARC Flash

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Section 3
Review Questions

Potential Small Cell Hazards and Exposures

Which is a factor beyond the employee's control that can be considered a hazard on a small cell site?

A. Wildlife
B. Foot traffic
C. Vehicular traffic
D. All of the above

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What type of traffic appears to be at risk when working in the ROW?

A. Marine traffic
B. Air traffic
C. Subterranean
D. Vehicle and pedestrian traffic

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Section 4
Personal Protective Equipment (PPE)

Examples of PPE

Body Part	Protection
Head	Hard hats
Eye	Safety glasses/goggles
Hands and arms	Gloves
Feet	Safety shoes/boots
Bodies	Protective clothing

Personal Protective Equipment

Hard Hats

- A hard hat is an important part of your PPE.
- It protects your head from potentially dangerous hazards.
- Any time there is a potential for a head injury a hard hat must be worn.
- Supervisory management may require the use of the hard hat any time they believe a potential hazard may exist.

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When to Use Hard Hats

- When conditions can result in a head injury from falling objects, moving objects, or striking an object.
- When it is possible to accidentally come in contact with an electrically energized object.
- When performing all kinds of work on and around poles, such as maintenance, testing and repair.
- While ascending or descending ladders.
- Working in the vicinity of construction apparatus or equipment.
- Working on ground level when work is going on overhead.

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When to Use Hard Hats (continued)

- Working in any area or enclosure where headroom is insufficient.
- Working at all sites where construction work is in progress.
- In any posted area requiring hard hats, or when otherwise required by law.
- While walking/working alongside major roads/highways to protect against flying objects.
- While loading/unloading or moving supplies/materials in or out of vehicles.
- Working aloft in a bucket truck.
- When there is a potential for head injury.

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Classes of Hard Hats – Class G

- Class G (General)
  - General service (e.g., building construction, shipbuilding, lumbering, and manufacturing).
  - Good impact protection.
  - Limited voltage protection (proof-tested at 2,200 volts).

Source: OSHA

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Classes of Hard Hats – Class E

- Class E (Electrical)
  - Electrical work.
  - Protect against falling objects.
  - Protect against high-voltage shock/burns (proof-tested at 20,000 volts).

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Classes of Hard Hats - Class C

- Class C (Conductive)
  - Designed for comfort and breathability.
  - Does not protect against electrical hazards.

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Determining the Hard Hat Class

- Check the labels to determine the class of hard hat.

Eye Protection

Types of Eye Protection

Protective Eyewear	
Splash Proof Goggles	
Impact Type Safety Goggles	
Face Shield	

- **Wrap around protective eyewear must be worn:**
  - Whenever working with hand tools.
  - While walking/working alongside roads/ highways to protect against flying objects.
- **Impact type safety goggles must be worn:**
  - Overhead work with loose material.
  - Using compressed air.
  - Whenever in close proximity to others performing above operations.

Corrective lenses and ordinary glasses do not provide the required protection! Protective eye-wear shall conform to ANSI Z87.

Eye Protection (continued)

- **When to Use Eye Protection**
  - When exposed to eye or face hazards from flying particles, liquid chemicals, acids, caustic liquids, chemical gas/vapors, light radiation or when using tools.
  - When performing operations requiring special eye protection, like goggles.
- **Reasons for Eye Protection**
  - Eye protection is worn to prevent eye injury due to flying objects, particles, or splashes.

NOTE: All safety markings for ANSI Z87.1 safety eyewear typically have Z87 stated on the frame or lenses. This marking requirement includes goggles and face shields as well as safety glasses.

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Hand Protection

Gloves are worn to protect the hands from scrapes, cuts, bruises, electrical hazards, and chemicals that can irritate skin.

- Kinds of hand protection and when they should be used:
  - **Leather Work Gloves** are used for general hand protection during work, such as handling ladders and line and/or winch.
  - **Cut Resistant (CR) Gloves** resist slicing, cutting, and puncture while removing cable sheath.
  - **Insulating and Leather Protector Gloves** protect against electric shock. Use when electrical hazards are present. Leather protectors provide protection from punctures and scraping from rough surfaces.

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Safety Footwear

Your safety footwear protects your feet and ankles from injury.

- **Characteristics of Safety Footwear**
  - Footwear that covers the entire foot and ankle with leather uppers or comparable materials.
  - Must meet American National Standards Institute (ANSI) Z41, 1999 or American Society for Testing and Materials (ASTM) F2413-05 design criteria for toe protection.
  - Well-defined heel with a minimum ½ inch and maximum 1½ inches in height measured from the sole of the boot.
  - Steel shank is recommended for arch support.
  - Selection of a slip resistant sole and heel is recommended.

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When and Why to Wear Safety Footwear

- To protect the feet and ankles from injury.
- To prevent punctures, twisted ankles or foot/leg sprains, and slips/trips/falls:
  - Look ahead to identify a path clear of hazards.
  - Before stepping down or as you walk, identify the condition of the ground.
- To protect you against impacts of up to 75 pounds and crushing forces of up to 2,500 pounds.
- When routinely handling materials, tools or equipment weighing 30 pounds or more, e.g. ladders, cable reels, etc. Use toe protected safety footwear meeting ANSI Z41 or ASTM F2413-05 design criteria. Either standard is acceptable.
- When climbing rung type ladders (extension, fixed, etc.), consider utilizing footwear that covers the ankle and has a well-defined heel at least ½ inch in height measured from the sole. Selection of a slip resistant sole and heel is recommended.

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Protective Clothing

- **General Clothing**
  - Wear comfortable clothes that fit well (**not** loose).
  - Do **not** wear jewelry, metal watch bands, or rings.
  - Wear clothes suitable for the type of weather.
- **Shirts**
  - Wear long-sleeved shirts, and do **not** roll up the shirt sleeves.
- **Leg Wear**
  - Wear long-legged pants, and keep the legs of the pants well down over the ankles.

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Retro-reflective Clothing

Retro-reflective clothing is necessary when working in the right-of-way (ROW) or in the vicinity of moving equipment.

- **2 Main classes of retro-reflective clothing for ROW use**
  - Class 2 – is the minimum requirement for working in the right-of-way during daylight hours.
  - Class 3 – recommended for high-speed roadways and nighttime work.
- **3 Types of garments**
  - Type O (Off-road)
  - Type R (Roadway)
  - Type P (Fire, Police, EMS)

Small Cell workers typically wear a Type R, Class 2 or 3 garment

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When to Wear Retro-reflective Clothing

- Anytime when working in a right-of-way (ROW).
- When performing duties as a flagger.
- Whenever working near moving equipment.

Section 4
Review Questions

Personal Protective Equipment

What hard hat class must be worn when working near power lines over 2,200 volts?

A. Class G
B. Class C
C. Class E
D. Class V

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Who must provide and pay for PPE?

A. The worker
B. OSHA
C. The employer
D. Your significant other

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Section 5
Pre-task Planning and Job Hazard Assessment

Pre-task Planning and Job Hazard Assessment

This section is designed to enhance awareness of hazards associated with construction and maintenance of small cell networks. A thorough process to define work scope, recognize and document hazards, and develop mitigation measures through pre-task planning and job hazard assessment is the foundation of safe work.

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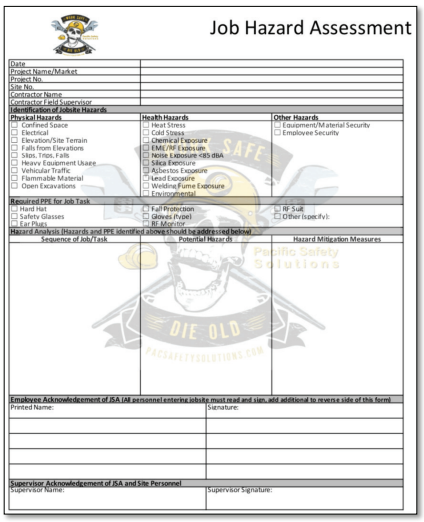
Pre-task Planning and Job Hazard Assessment

Job Hazard Assessment (JHA)



Job Hazard Assessment

Date	
Project Name/Market	
Project No.	
Site No.	
Contractor Name	
Contractor Field Supervisor	

Identification of Jobsite Hazards

Physical Hazards	Health Hazards	Other Hazards
☐ Confined Space ☐ Electrical ☐ Elevation/Site Terrain ☐ Falls from Elevations ☐ Slips, Trips, Falls ☐ Heavy Equipment Usage ☐ Vehicular Traffic ☐ Flammable Material ☐ Open Excavations	☐ Heat Stress ☐ Cold Stress ☐ Chemical Exposure ☐ EME / RF Exposure ☐ Noise Exposure <85 dbA ☐ Silica Exposure ☐ Asbestos Exposure ☐ Lead Exposure ☐ Welding Fume Exposure ☐ Environmental	☐ Equipment/Material Security ☐ Employee Security

Required PPE for Job Task

☐ Hard Hat ☐ Safety Glasses ☐ Ear Plugs	☐ Fall Protection ☐ Gloves (type) ☐ RF Monitor	☐ RF Suit ☐ Other (specify):

Hazard Analysis (Hazards and PPE identified above should be addressed below)

Sequence of Job/Task	Potential Hazards	Hazard Mitigation Measures

Employee Acknowledgement of JSA (All personnel entering jobsite must read and sign, add additional to reverse side of this form)

Printed Name:	Signature:

Supervisor Acknowledgement of JSA and Site Personnel

Supervisor Name:	Supervisor Signature:

- A Job Hazard Assessment must be conducted to address the potential hazards and methods to mitigate those hazards.
- A hazard assessment must be updated daily or whenever the tasks, hazards, personnel change during the construction and maintenance processes.

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Job Hazard Assessment

- A JHA is used to communicate the job tasks, hazards of the work tasks and control measures to:
  - Crewmembers
  - Subcontractors
  - Customers
  - Inspectors
- The JHA must be reviewed by affected employees:
  - Before commencement of work each day.
  - When subcontractor arrives.
  - When inspector arrives.
  - When customer representative arrives.
  - When conditions change.
  - When work conditions deviate from the original scope.
  - When an unidentified hazard surfaces.

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Scope of Work

- The scope of work is broken down into specific tasks, materials, required equipment, and tools.
- As each component is identified, lists can be made of the known and possible hazards and exposures associated with each respective task.

Pre-Job Meeting

- There should be an initial meeting between as many of the involved parties as possible and may include:
  - Building owner(s)
  - Engineer
  - General contractor and lower tier sub-contractor(s)
  - Municipality
  - Utility
- In this initial meeting, the attendees shall designate and/or verify each party's role and responsibilities.

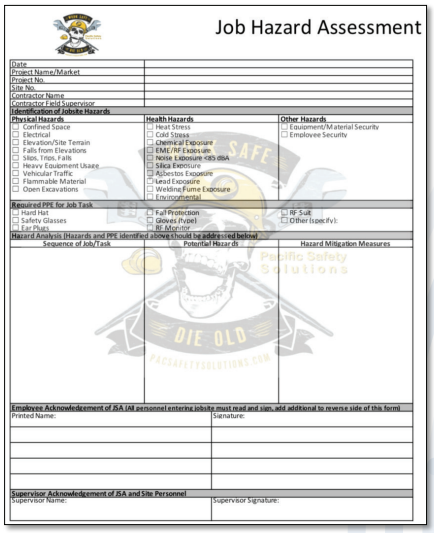
Pre-task Planning and Job Hazard Assessment

Emergency Information

Emergency Data Sheet			
SITE NAME:			
Job Number:			
SITE Latitude & Longitude:			
AMBULANCE #:			
FIRE DEPT #:			
POLICE #:			
R S& QA Name:			
R S&QA Phone Number			
Branch Office #:			
Site Address:			
Hospital Address			
Hospital #:			
Hospital Longitude & Latitude:			
Hospital/EMS Verification:	☐ Yes	Date:	
** Some facilities do not accept emergency calls so as a result all facilities with an older confirmation than 3 years must be confirmed before work starts. When facilities are confirmed, the date, address and phone number must be added to the database.*			
Directions for EMS crews to the Site:			
Directions from the Site to the Medical Facility:			

- The competent person should ensure emergency information is readily accessible.
- All information should be verified prior to the commencement of work.

Job Hazard Assessment Form


Job Hazard Assessment

Date
Project Name/Market
Project No.
Site No.
Contractor Name
Contractor Field Supervisor

Identification of Jobsite Hazards

Physical Hazards	Health Hazards	Other Hazards
☐ Confined Space	☐ Heat Stress	☐ Equipment/Material Security
☐ Electrical	☐ Cold Stress	☐ Employee Security
☐ Elevation/Site Terrain	☐ Chemical Exposure	
☐ Falls from Elevations	☐ EME/RF Exposure	
☐ Silos, Trips, Falls	☐ Noise Exposure <85 dbA	
☐ Heavy Equipment Usage	☐ Silica Exposure	
☐ Vehicular Traffic	☐ Asbestos Exposure	
☐ Flammable Material	☐ Lead Exposure	
☐ Open Excavations	☐ Welding Fume Exposure	
	☐ Environmental	

Required PPE for Job Task

☐ Hard Hat	☐ Fall Protection	☐ RF Suit
☐ Safety Glasses	☐ Gloves (type)	☐ Other (specify):
☐ Ear Plugs	☐ RF Monitor	

Hazard Analysis (Hazards and PPE identified above should be addressed below)

Sequence of Job/Task	Potential Hazards	Hazard Mitigation Measures

Employee Acknowledgement of JSA (All personnel entering jobsite must read and sign, add additional to reverse side of this form)

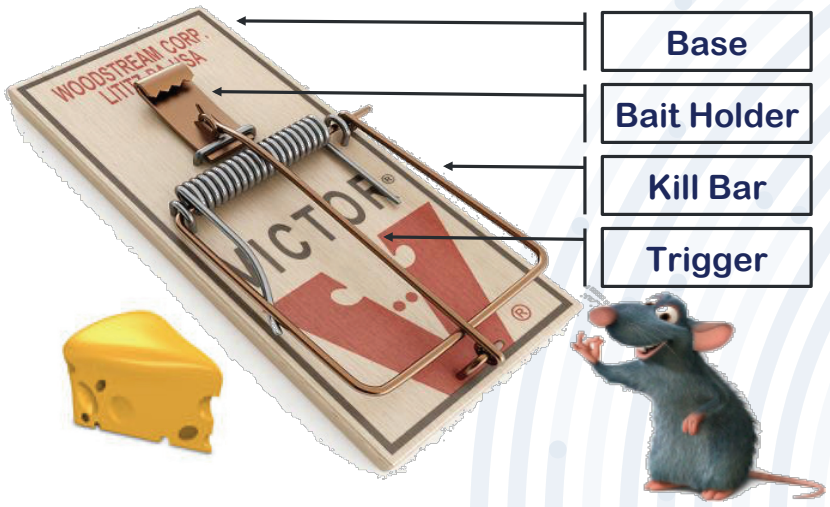
Printed Name:	Signature:

Supervisor Acknowledgement of JSA and Site Personnel

Supervisor Name:	Supervisor Signature:

Section 5 Activity
"The Mouse Trap"

Build a Mouse Trap



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Section 6
Temporary Traffic Control

Traffic Control Plan

- The Traffic Control Plan (TCP) is the use of traffic control devices to adequately safeguard and protect employees, pedestrians, motorists, and equipment.
- All TCPs must follow jurisdictional requirements and comply with both local and state traffic laws.
- TCP must be established prior to the commencement of work and must remain in place until after you have finished the work. Work hours defined within the TCP or based on jurisdictional or local city requirements.
- Ensure trained personnel are executing the plan onsite including all OSHA requirements.
- In addition to a TCP utilize a Job Hazard Analysis (JHA) to help establish a safe work area and emergency safety plan.

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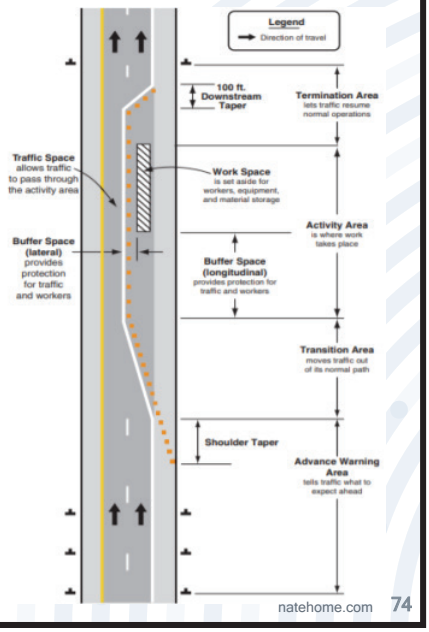
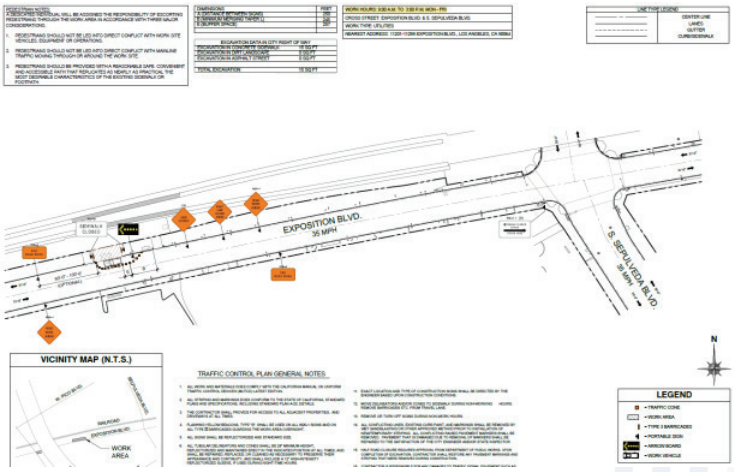
TCP Fundamentals

- Road user and worker safety in temporary traffic control zones is critically important.
- Plans should provide safety for drivers, bicyclists, pedestrians, and workers.
- Road user movement should be inhibited as little as practical.
- Drivers, bicyclists, and pedestrians should be guided in a clear and positive manner while approaching and traversing temporary traffic control zones.



TCP Example

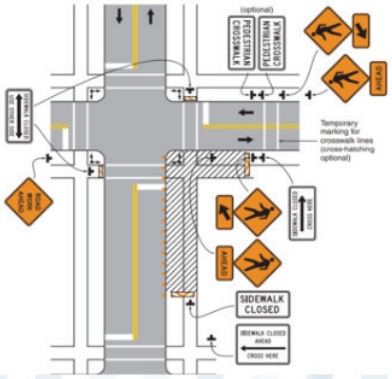


Ensure all safety signage and traffic channelizing devices are properly placed per TCP.

Pedestrian Traffic Considerations

- Determine whether pedestrian flow will affect work zone.
- Positive guidance.
- Crossing point to crossing point.
- ADA compliant.
- Not exposed to traffic hazards.
- Walk the site.
- Does not expose to overhead hazards (dropped objects).

Crosswalk Closures and Pedestrian Detours



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TCP Components

- Advanced warning signs such as work zone signs and guide signs.
- Barricades and cones for guiding and channeling.

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TCP Components (continued)

Other warning devices such as rotating beacons, strobe lights, arrow boards, flaggers, pedestrian barricades, and vehicle-mounted crash attenuator/cushions – the work vehicle with rotating beacon/strobe lights, when placed properly, can also be used to protect the work area.

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Vehicle Placement

Place the work vehicle between the work zone and oncoming traffic for protection. Make sure that wherever you position your vehicle, you have enough room to remove equipment and set it temporarily aside. Ensure that your vehicle is properly coned.

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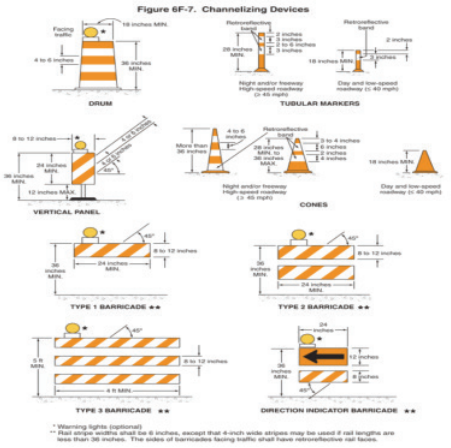
Channelizing Devices

- Channelizing devices such as traffic cones, drums, and barricades.



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Section 6
Review Questions

Which of the following is a key component of the TCP?

A. Concrete blocks
B. Antennas
C. Channelizing devices
D. Power poles

What is the name of the area where the work vehicle is deployed?

A. Right-of-Way
B. Work area/space
C. Termination area
D. Advance warning area

Section 7
Trenching and Excavation

Injuries and Fatalities

- Trenching and excavation activities can cause:
  - Cave-ins
  - Suffocation
  - Crushing
  - Causing loss of circulation
  - Struck by falling objects
  - Underground utility strikes
  - Vehicular accidents

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Injuries and Fatalities – Excavation

- Excavating is one of the most hazardous construction operations.
- Most accidents occur in trenches 5-15 feet deep.
- There is usually no warning before a cave-in.

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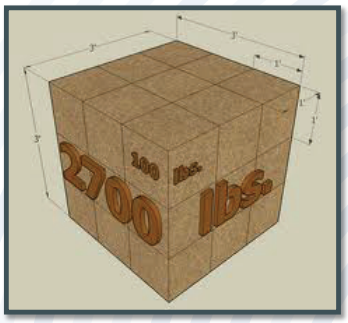
Injuries and Fatalities – Soil Weight

- Pure dry sand
  - 90 pounds per cubic foot
  - 2,400 pounds per cubic yard
- Saturated clay
  - 140 pounds per cubic foot
  - 3,700 pounds per cubic yard



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Injuries and Fatalities - Trenches

- Trench cave-ins are:
  - Predictable
  - Preventable
  - **NOT** accidents

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Utility Avoidance and Protection Plan

- Call 811 or equivalent One Call system and open a ticket.
- Review construction drawings to identify known underground utilities.
- Proposed trench path or excavation is to be marked on site.
- Field verify that the proposed trench path or excavation has been marked on site along with all known utilities.

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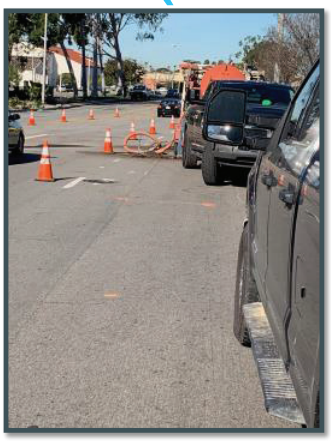
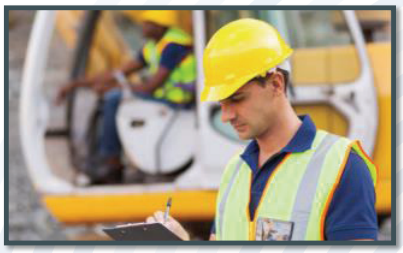
Utility Avoidance and Protection Plan (continued)



- Use non-conductive tools/hydro-vac to pothole within the utility safe tolerance zone to verify and locate underground utilities.
- Once the underground utilities have been identified and verified mechanical excavating or directional boring may commence.

Competent Person

- Must have had specific training in and be knowledgeable about:
  - Soil classification.
  - The use of protective systems.
  - The requirements of applicable regulations.
- Must be capable of identifying existing and/or predictable hazards and has the authority to correct them.



Inspection of Excavations

- If the competent person finds evidence of a possible cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous condition:
  - Exposed employees must be removed from the hazardous area.
  - Employees may not return until the necessary precautions have been taken.

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Visual Test

- The competent person should check for:
  - Cracks parallel to the edge of the trench;
  - Signs of existing utilities that indicate the soil has been previously disturbed;
  - Layered soils;
  - Signs of soil bulging or sloughing; and/or
  - The presence of water.

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Manual Test

The competent person should perform a manual test to assist in identifying soil type using but not limited to the following soil testing equipment:

Pocket Penetrometer

Torvane Shear

Thumb Test

Soil Ribbon

Protection of Employees

- Employees should be protected from cave-ins by using an adequately designed protective system.
- Protective systems must be able to resist all expected loads to the system.

Trenching and Excavation Hazards

- Protection from vehicles
  - Install barricades;
  - Hand or mechanical signals;
  - Grade soil away from trenches; and
  - Fence or barricade trenches left overnight.

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Trenching and Excavation Hazards

- Access and egress hazards
  - Knee sprain
  - Ankle sprain
  - Lower back sprain

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Section 7
Discussion

What is wrong in this picture?

If you were the competent person on this site how many deficiencies can you identify?

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Section 8
Small Cell Electrical Hazard Identification

Disclaimer

This awareness training does not qualify you to handle electrical power lines and power company equipment. You must be an electrically qualified person to work on electrical lines and equipment.

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Potential Electrical Hazards

- Potential electrical hazards can be created by electrical lines which may come in contact with the telecommunications plant or that do not maintain sufficient clearance to allow employees to work safely.
- In addition, special circumstances such as storm-related restoration work, accidental impact of a motor vehicle with a pole, overgrowth of vegetation, equipment failure, or improperly configured installations can increase the risk from energized telecommunications equipment.

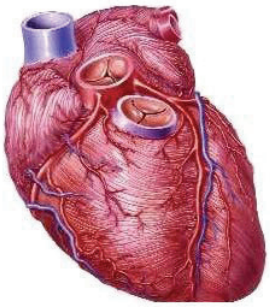
Hazards of Electrical Power Line Proximity and Contact

- Electrical energy can travel though any conductive material including the human body.
- Hazards of contact with energized electrical lines and equipment:
  - Shock
  - Burns
  - Falls

Small Cell Electrical Hazard Identification

How Electricity Can Harm You

- Effects on your body
  - Nervous system effects
  - Damage to the heart and other organs
- Falls



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Dalziel's Table

Body Effect	Gender	60 HZ AC
Slight sensation at point(s) of contact	Men	.0004 Amps
	Women	.0003 Amps
Pain with voluntary muscle control maintained	Men	.009 Amps
	Women	.006 Amps
Pain with loss of voluntary muscle control	Men	.016 Amps
	Women	.0105 Amps
Severe pain and breathing difficulty	Men	.023 Amps
	Women	.015 Amps
Possible heart fibrillation after 3 seconds	Men	1/10 Amps
	Women	1/10 Amps

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480V Arc Flash

Arc-blasts occur from high-amperage currents arcing through air.

Indirect contact with power can also result in a serious injury or death. An electrical arc can jump or “flash” between an energized object and a ground in the vicinity of an individual causing a severe flash burn to the exposed skin and clothing. The corresponding arc may also cause a flow of current through the tissue, resulting in the same type of injury as described previously.

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Electrical Potential

Electricity flows when two objects with different electrical potentials touch. Just like water running downhill, electricity flows from a high potential, which is voltage pressure, to a low potential, which is ground. A current flows between the two points, from high potential to low potential. If you are caught between these two objects, an electric shock will result.

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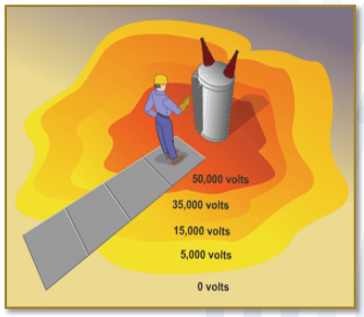
Small Cell Electrical Hazard Identification

Step and Touch Potential

- The potential difference between two points on the earths surface, separated by the distance of one pace (3 feet) in the direction of the maximum potential.
- Potential difference between a grounded metallic structure/object and a point on the earths surface equal to the normal maximum horizontal reach of a person (approximately 3 feet).



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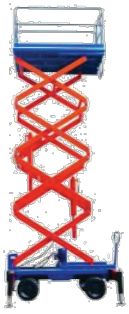
Aerial Equipment

- Aerial equipment
  - Path to ground



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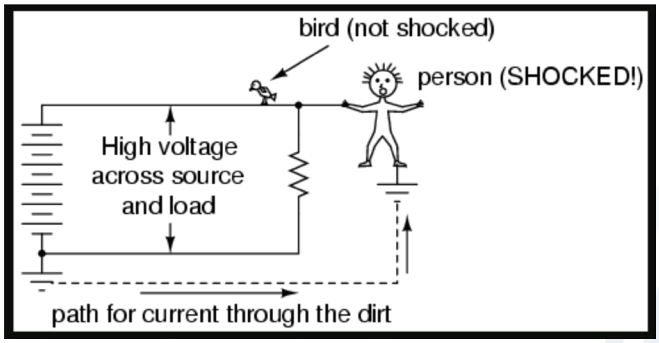
Bonding

Bonding is electrically connecting two or more pieces of communication hardware, or connecting communication hardware to hardware belonging to another utility to maintain a common electrical potential. Bonding conductors must be of sufficient gauge to carry anticipated current in the event of a power contact.

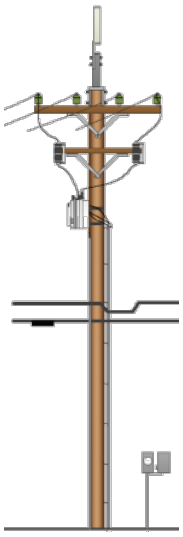
Grounding



Electrically connecting communication hardware to an effective electrical ground.

Small Cell Electrical Hazard Identification

Joint-Use Poles



POLE EXTENSION
Non-conductive structure used to elevate the antenna above the primary lines to achieve minimum separation requirements.

PRIMARY INSULATOR
Used to insulate (separate) the high voltage wire from the structure, cross arm, or pole.

FUSE
Protective device used to insulate (separate) the equipment from the high voltage wires and protect from large power surges.

TRANSFORMER
Used to step down primary voltage power to secondary voltage power (120/240v or 120/208v).

COMMUNICATION LINES
Cable TV, Telecom Fiber, Phone Lines, used to transmit voice and data from the customer to the service provider's network.

GROUND MOULDING
Non-conductive product used to cover the ground wire along the length of the pole usually strapped or stapled to pole structure.

RISERS / U GUARD
Used to insulate (primary / secondary) cables from pedestrians and the structure.

AC METER AND DISCONNECT
Device used to measure power consumption of the customer and to provide for emergency shut off. Required by NEC to be 4-6 AGL.

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Minimum Approach Distances (MAD)

- Higher voltages can arc over several inches or even feet under some conditions, so greater distances need to be maintained when working in the vicinity of primary conductors.
- MAD can be found in 1910.268 Table R2.

Voltage Range (phase to phase, RMS)	Approach distance (inches)
300 V and less	Avoid Contact
Over 300V, not over 750V	12
Over 750V not over 2 kV	18
Over 2 kV, not over 15 kV	24
Over 15 kV, not over 37 kV	36
Over 37 kV, not over 87.5 kV	42
Over 87.5 kV, not over 121 kV	48
Over 121 kV, not over 140 kV	54

Note: *An approach distance is the distance which you can approach the energized conductor with either your body or any object which you are in contact with. Secondary conductors which are used to supply power to a residence are below the 300v phase to phase voltage. For this reason DO NOT come in contact with secondary voltage lines. Primary voltage which is normally above 300v phase to phase requires a minimum distance to approach. If primary voltage is present in your workspace, do not proceed and notify your supervisor immediately.*

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Be Aware of Hazards on Adjacent Poles

- Check these poles for any potential electrical hazards that may affect the workspace that you are working in.
- Electrical hazards can travel along conductors such as strand, guy wires, cable or any conductor which travels to your workspace.
- A potential hazard at an adjacent pole can also be a potential hazard at your workspace.

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Voltage Detectors

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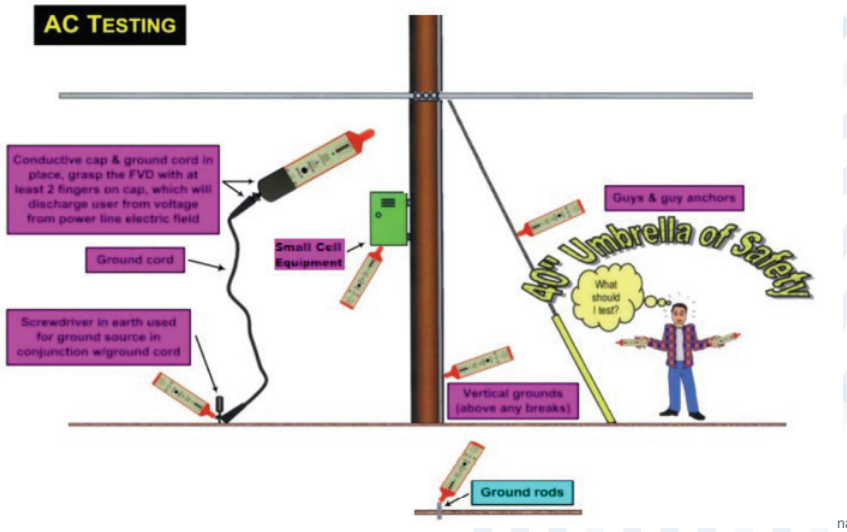
Small Cell Electrical Hazard Identification

AC Testing



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Additional Considerations

- Depending on the scope of work, you may be required by regulation to utilize additional protective equipment including but not limited to:
  - Rubber insulated gloves/blankets
  - Fire Retardant (FR) clothing
  - Insulated tools

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Isolating Energy Sources

- Lockout/Tagout (LOTO) Program
  - LOTO procedures remove hazardous sources of electricity from circuit parts that will be worked on by employees.

- Employer Responsibilities
  - Provide equipment necessary to LOTO program.
  - Provide training on LOTO procedures.
  - Regularly audit LOTO program.

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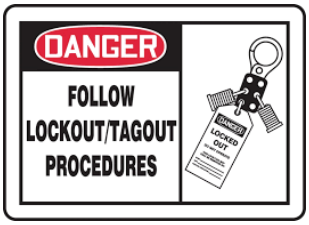
Lockout/Tagout Principles

- **Control of Energy:** All energy sources must be controlled so that employee exposure to electrical hazards is minimized.
- **Electrical Circuit Interlocks:** Drawings or diagrams must be reviewed to ensure interlock devices are present which might re-energize the circuit.



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Forms of Control of Hazardous Electrical Energy

- Simple Lockout/Tagout
- Complex Lockout/Tagout

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Section 8
Review Questions

When does electrical current flow between two objects?

A. One object has high electrical potential and the other has low electrical potential.

B. Both objects have high electrical potential.

C. Both objects have low electrical potential.

D. Both objects have identical electrical potential.

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What hazard is present when a person touches an object with a difference in electrical potential?

A. Electrical potential

B. GFCI

C. Electric shock

D. Nothing

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Section 9
Fiber Optic Safety Basics

Fiber Optic Safety

- When working with fiber optics or lasers:
  - Wear safety glasses or goggles when handling fibers or chemicals.
  - Work on a dark surface if splicing fiber.
  - No eating, drinking, or smoking while splicing fiber.
  - Always wash you hands after splicing fiber.
  - Do not touch your eyes until after you have washed your hands.
  - Pick up cleaved fiber ends with a piece of adhesive tape. Count them to be sure you find all of them and dispose of them. They are sharp, hard to find, and easily penetrate the skin.

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Fiber Optic Safety (continued)

- Never smoke or have open flames near splicing areas.
- Use a Fiber Inspection Probe Kit or other approved device to view fiber connectors.
- Never use optical magnification or stare directly into an open or broken unterminated fiber.
- Power down and lock out network laser sources before servicing equipment within enclosures.

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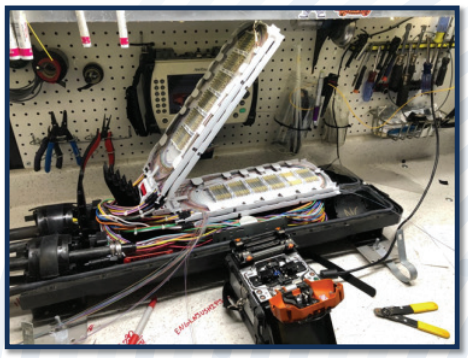
More Fiber Optic Safety Tips

- Only work on unenclosed powered laser sources if you are trained and authorized to do so.
- A disposable apron can prevent you from taking broken glass home.
- Never look into the end of a fiber strand or cable. Unless you are positive no light source is connected.
- Clean up well!



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Tools and PPE

- Use the right tools for the job
  - Stripping tool – no utility knives
- Required PPE
  - Wear nitrile gloves when using cleaning agents, solvents or other chemicals. Be sure to follow the chemical manufacturer's instructions.
  - Appropriate safety glasses.
  - Other work gloves.

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Section 9
Review Questions

What activity or activities should you NOT do while splicing fiber?

A. Eat
B. Drink
C. Smoke
D. All of the above

How should you secure loose fiber?

A. You could place it into a designated container.
B. Leave it alone on the table.
C. Tape could be used to stick the cut strands to.
D. Both A & C.

Section 10
Working at Height

Bucket Truck/Mobile Elevated Work Platform (MEWP)
Dropped Objects
Ladders

Bucket Truck/Mobile Elevated Work Platform (MEWP)

Types of MEWP

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Bucket Truck – Potential Hazards

- The following is a list of potential hazards associated with working aloft in an aerial basket:
  - Faulty equipment.
  - Falling from the bucket.
  - Contact with electrical power.
  - Exposure to traffic.
  - Unintentional movement of the vehicle.

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Bucket Truck – Aerial Lift

- Aerial lift operators must be trained on the specific type of lift they are to operate.
- Operators of aerial lifts must become familiar with the manufacturer's specific recommendations for safe entry and exit procedures from the basket.
- Keep the basket access area free of loose items that may pose a trip hazard.

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Bucket Truck - Inspections

- Before flying the basket, operators must perform manufacturer recommended pre-use inspections.
- Before entering the aerial lift ensure all required PPE is available.
- Extra caution should also be used when wet or icy conditions are present.

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Basket Steps

- Once you have safely entered the basket the following steps are required:
  - Immediately attach the full-body harness safety lanyard to the boom anchor.
  - If equipped, close the basket door and visually ensure the latch and/or chain are secured before going aloft.
  - Always stand with both feet on the floor. Never sit or stand on the edge of the basket to reach your work. If necessary reposition the basket.

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Basket Steps

- The aerial lift Interlock Safety Switch is provided to avoid accidental movement of the boom.
- This safety switch must be used in connection with the other bucket controls to maneuver the bucket.
- These safety controls **MUST NOT BE BYPASSED or OVERRIDDEN** for any reason.

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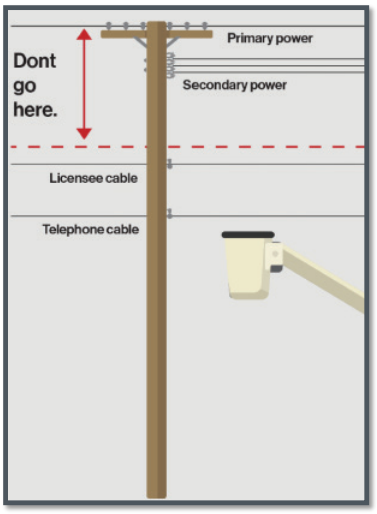
Electrical Safety



- Be sure to conduct a thorough pre-job survey for all hazards including any possible electrical hazards.
- Maintain a safe approach distance for the voltages to be encountered. Test all items in your work space with a voltage detector before making contact.
- Be sure to follow all safety precautions related to working in the vicinity of power (approach distance, clearance and separations, bonding and grounding procedures, etc.).

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Work Area Protection

- Ensure placement of appropriate traffic cones, flags, warning signs, etc. (per State/DOT Requirements).
- Be sure to protect the entire work area, especially where the boom may extend into vehicular traffic.
- Pedestrian traffic must be managed.

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Other Safety Tips

- Ensure the aerial device controls are labeled correctly and clearly.
- Never overload the maximum basket weight capacity (your body weight, tools, hardware, and material).
- If the vehicle is equipped with outriggers, they must be used during stationary work operations.
- To prevent vehicle tip over when extending the basket to the side, the "maximum" safe working slope is 5 degrees.

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Unit Setup

- If operating in the vicinity of an overhead crane, take steps to ensure that there is no possibility of collision between it and your unit.
- Take a moment to observe wind and weather conditions and decide if it is appropriate to continue.
- Determine the hazard potential posed by any flammable, explosive and/or toxic materials that may be in the area and/or atmosphere. Avoid operating in hazardous locations/ atmospheres.

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Slope Warning System

A system that activates an audible and/or visual alarm whenever the base goes off level by more than five degrees or a lesser amount specified by the manufacturer.

Maximum slope rating, counterweight uphill (gradeability):

Maximum slope rating, counterweight downhill:

Maximum side slope rating:

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Unit Setup - Wheel Chocks for Bucket Trucks

Place the vehicle automatic transmission in ”park,” (or in gear if it is a manual transmission), then properly engage the parking brakes and place a minimum of two (2) chocks.

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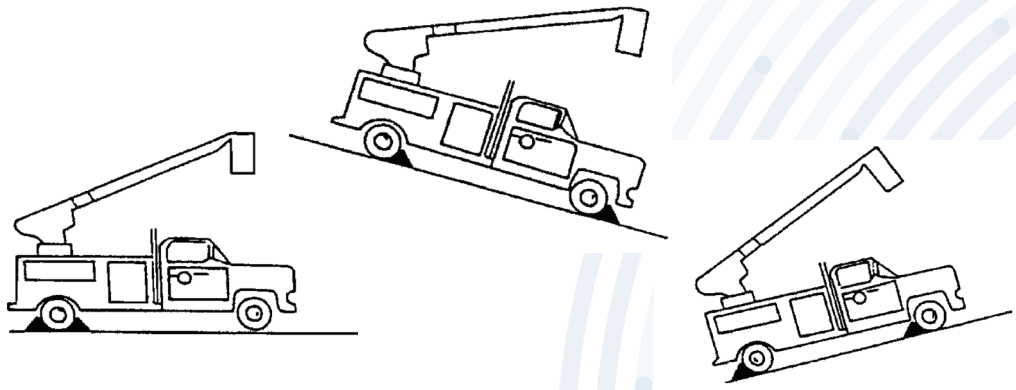
Unit Setup – Wheel Chocks for Bucket Trucks



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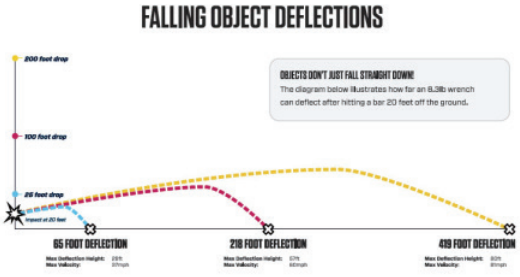
Dropped Objects

Dropped Objects

- Objects at height pose a hazard to workers and by-standers on the ground.
- In 2016, the Bureau of Labor Statistics reports there were 255 fatalities and 47,920 reported injuries from **dropped objects** in the United States, making this the third leading cause of injuries on the jobsite, according to OSHA.

Dropped Objects (continued)

- Objects generally don't fall straight down.
- An object in free fall experiences an acceleration of -9.8 m/s2.
- A 10 pound tool dropped from 10 feet would have a striking force of 106 lbs. travelling at 35 mph.



Dropped Object Prevention System

Here are some examples of different components of a dropped object prevention system.

Ladders

Ladders

- The load rating of the ladder must accommodate the total weight of the user plus the weight of what is carried.
- If the load rating is insufficient, don't use it! A type 1A fiberglass ladder or step stool with a load capacity of 300 pounds is recommended. Type 1AA has a load capacity recommendation of 375 pounds.
- If there is a need for another type of ladder, contact your manager. Metal ladders must not be used if you are performing any electrical work or in the vicinity of energized lines or parts.

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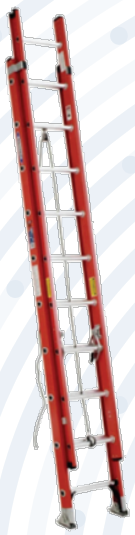
Ladder Inspection

- Inspect the ladders for:
  - Cracks, splits, splinters, decay, protruding nails, and loose rivets.
  - Loose, bent or broken braces, tie rods, guide irons, and pulleys.
  - Broken, worn or defective spurs and pads, frayed or badly worn ropes.
- Ladders with defects should not be used and should be reported to your Supervisor immediately.
- Check the ladder for weight bearing rating before use.
- Inspect wooden ladders when dry because moisture absorption may cause swelling and conceal defects.



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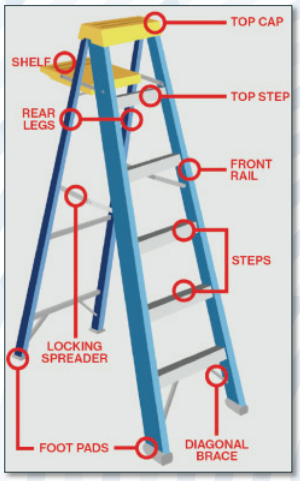
Stepladders

- Set up the ladder on a firm, level base.
- Open the ladder completely and lock both spreader braces.
- Place tools and equipment on the ladder shelf before climbing, or use a tool belt.
- Be sure the ladder is rated for its intended load.
- Face the ladder and maintain three points of contact when climbing or descending.
- Never lean beyond the side rails; reposition the ladder instead.
- Never sit or stand on the top step or shelf of the ladder or the second step from the top.



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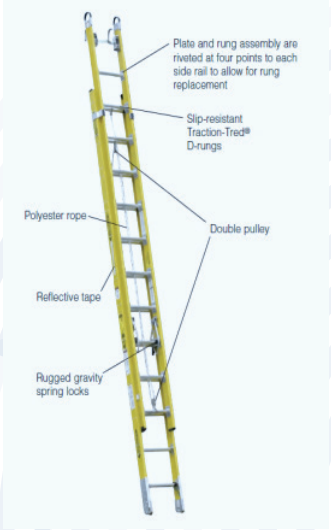
Extension Ladders

- Ensure the ladder is on solid ground and has level footing.
- Use a 4:1 ratio (about a 75° angle) when placing extension ladders. Perform the “Firefighters’ Check” or use the NIOSH app to ensure positioning.
- Secure the ladder when setting up on a pole.
- Maintain three points of contact when ascending and descending.
- While utilizing an extension ladder follow your company’s fall protection requirements.



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Section 10
Review Questions

When inspecting extension ladders you should check for the following; side rails for chips, cracks, dents, fractures, gouges, splits, scratches, and scuffs.

A. True

B. False

Contact with _____ is one of the hazards associated with using an MEWP.

A. Electrical power
B. Trees
C. Motor vehicles
D. All of the above

The third leading cause of injuries on the jobsite in the United States, according to OSHA is?

A. Dropped objects
B. Ice skating
C. Rock climbing
D. Dog walking

Working at Height

Who is directly responsible for ensuring that all platform occupants are wearing the required fall protection gear?

A. Employer

B. Operator

C. Engineer

D. Manufacturer

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If you encounter a serious problem with your MEWP, or ladder during a pre-use inspection, you should?

A. Do not take it to a mechanic or repair person.

B. Operate it very slowly.

C. Tag it out and report the problem to a supervisor.

D. Fix the problem before operating the unit.

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Section 11
Radio Frequency Hazards

Is 5G Safe?
CTIA - 5G, Health and Safety Video

5G, Health and Safety

Radio Frequency Hazards

What do the Experts Say?

"The FCC regulates RF emissions, including millimeter waves from 5G devices and equipment, and has adopted the recommendations of expert scientific organizations that have reviewed the science, including dozens of studies focused specifically on millimeter waves, and established safe exposure levels. **In December of 2019, the FCC reaffirmed – on a unanimous and bipartisan basis – these safety standards."**

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World Health Organization

"Recent surveys have indicated that RF exposures from base stations and wireless technologies in publicly accessible areas (including schools and hospitals) are normally thousands of times below international standards . . . From all evidence accumulated so far, **no adverse short- or long-term health effects have been shown to occur from the RF signals produced by base stations."**

World Health Organization

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U.S. Food & Drug Administration

"Based on our ongoing evaluation of this issue, the totality of the available scientific evidence continues to **not support adverse health effects** in humans caused by exposures at or under the current radiofrequency energy exposure limits."

U.S. FOOD & DRUG ADMINISTRATION

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National Institutes of Health

"… although many studies have examined the potential health effects of non-ionizing radiation from radar, microwave ovens, cell phones, and other sources, **there is currently no consistent evidence that non-ionizing radiation increases cancer risk in humans."**

NIH National Institutes of Health

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Radio Frequency Hazards

American Cancer Society

"At ground level near typical cellular base stations, **the amount of RF energy is thousands of times less** than the limits for safe exposure set by the US Federal Communication Commission (FCC) and other regulatory authorities … Some people have expressed concern that living, working, or going to school near a cell phone tower might increase the risk of cancer or other health problems. **At this time, there is very little evidence to support this idea."**

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New Orleans City Council

"Typical exposure to 5G devices–such as small cells attached to phone poles or the sides of buildings - **is far below the permissible levels and comparable to Bluetooth devices and baby monitors."**

New Orleans City Council Meeting (December 2019)

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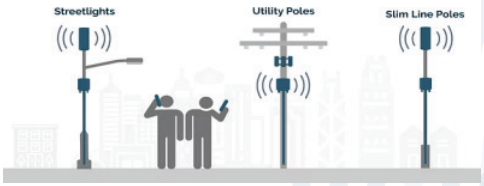
Physical Hazard

Because **RF (Radio Frequency)** energy is recognized as a ***physical hazard***, you must consider both the worker's and the public's exposure when planning deployment and/or maintenance activity on a Small Cell Node or any location where RF energy may be present.



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Radiation Types

- Ionizing
  - Typical cultural reference for "radiation."
  - Can have many adverse long-lasting health consequences.
- Non-Ionizing
  - Spectrum below "visible light."
  - Normally associated with "signal" including radio waves and microwaves.

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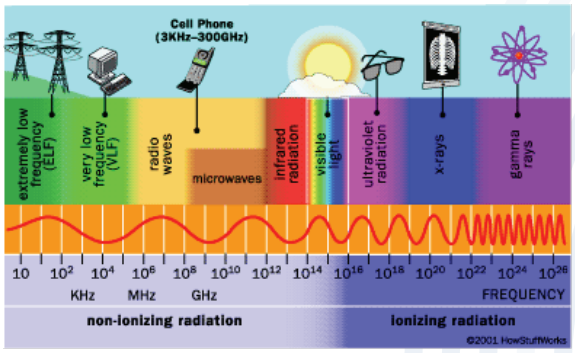
Radio Frequency Hazards

What is Non-Ionizing Radiation?

Non-ionizing radiation is described as a series of energy waves composed of oscillating electric and magnetic fields traveling at the speed of light.



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General Population/Uncontrolled Exposure Level - Not Trained

- Applies to situations in which the public may be exposed or persons who are exposed as a part of their employment (workers).
- They may have not been made fully aware of the potential for exposure or cannot exercise control over their exposure.

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Controlled Exposure

Controlled Environments: locations where there is exposure that may be incurred by persons who are made **"fully aware"** of the potential for exposure **and can exercise control** over their exposure.

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Personal Protection Monitors

- Personal monitors can be useful tools.
- Care must be used in selecting a monitor that is **appropriate for the range of potential frequencies** of the exposure fields and which responds appropriately to the RF field.
- In addition, training on appropriate use of personal monitors and their limitations (such as **frequency response and detection angles**) is important if monitors are to be used effectively.

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Radio Frequency Hazards

RF Site Signage

- Shall use the ANSI symbols and colors.

- Shall be used as an integral part of an overall site compliance plan.
- Be aware of signage as this indicates RF is on the site.

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Section 11
Review Questions

What type of radiation is radio frequency?

A. Ionizing
B. Gamma ray
C. Non-ionizing
D. None of the above

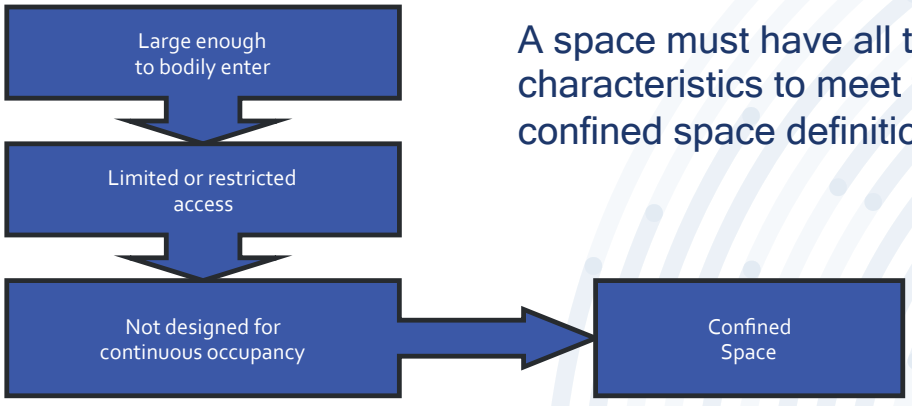
What type of ANSI signage is blue in color?

A. Notice
B. Caution
C. Warning
D. Beware of dog

Confined Spaces

Section 12
Confined Spaces

Confined Space



A space must have all three characteristics to meet the confined space definition.

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Permit-Required Confined Space

Has or has the potential to contain a hazardous atmosphere?

- Oxygen deficient (19.5% or less)
- Oxygen enriched (23.5% or more)
- Flammable (10% Lower Explosive Limit (LEL) or more)
- Toxic (above Permissible Exposure Limit (PEL))
- Combustible dust (at or above LEL)
- Other Immediately Dangerous to Life and Health (IDLH)

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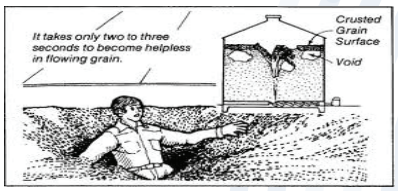
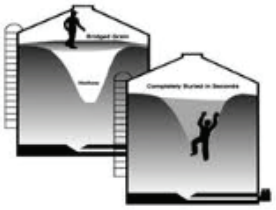
Potential Engulfment

Has the potential for engulfment?

Engulfment may occur by materials being introduced or removed from the space or by an entrant being drawn down into materials.





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Confined Spaces

Internal Configuration Hazard

Internal configuration hazard?

Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross section.

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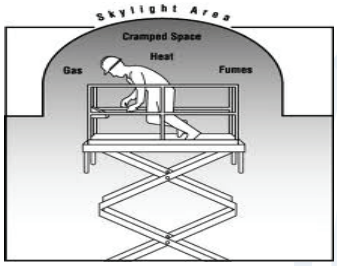
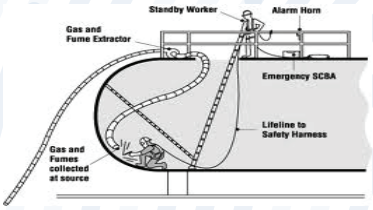
Other Hazards

Any other recognized serious safety or health hazard?

Other hazards capable of causing death, serious physical harm, or interfering with the entrants ability to escape.





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Examples of Confined Spaces

- Tanks
- Manholes
- Boilers
- Furnaces
- Sewers
- Silos
- Hoppers
- Vaults
- Pipes
- Trenches
- Tunnels
- Ducts
- Bins
- Pits

Hazards in Confined Spaces

- **Oxygen Deficiency**
  - <19.5% or >23.5% oxygen concentration
- **Combustibles**
  - Methane
  - Hydrogen
  - Acetylene
  - Propane
  - Gasoline fumes
- **Toxic Materials**
  - Carbon Monoxide
  - Hydrogen Sulfide
  - Welding fumes
  - Corrosives
- **Electricity**
- **Mechanical Hazards**
  - Mixers
  - Crushers

Testing the Atmosphere

In this Order:

- **Check for Oxygen Content:**
  - At least 19.5% and less than 23.5%.
- **Check for Combustibles:**
  - Less than 10% of the LEL.
- **Check for Toxic Gasses:**
  - Most commonly carbon monoxide (PEL <35 ppm) and H2S.
  - Most multi-gas monitors automatically test in this order.

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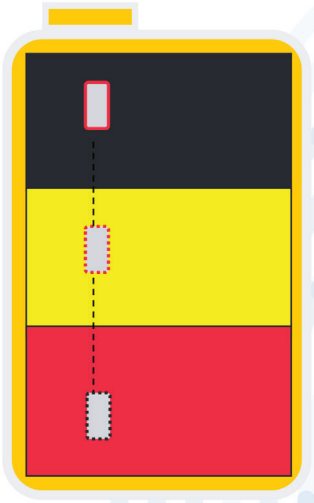
Testing the Atmosphere

- Always test the air at various levels to be sure that the entire space is safe.
- Good air near the opening does NOT mean there is good air at the bottom!



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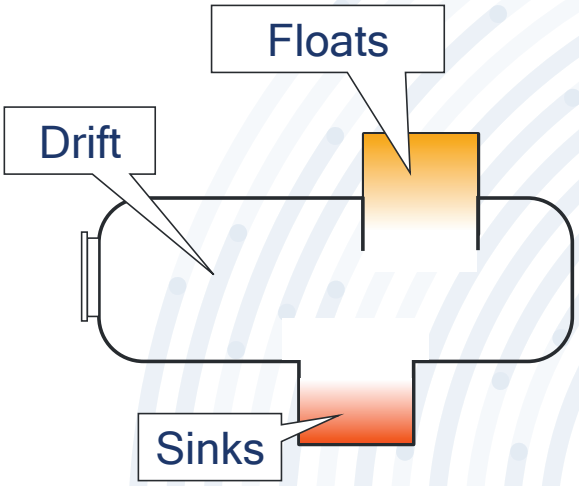
Gas Behavior in Trenches

- Stratification
- Pocketing
- Floating



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Testing for Contaminants

- Multi-Gas Atmospheric Testing Equipment
  - Bump test before each use
  - Calibrate monitors per manufacturer specifications

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Confined Space Entry

- The act by which a person intentionally passes through an opening into a permit required confined space.
- Any part of the body passing through the opening is considered entry.

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Non-Permit Confined Space Entry

- Test
- Purge
- Ventilate
- Enter

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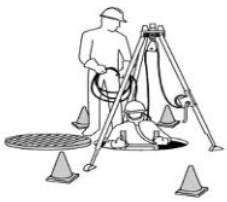
Completing the Entry Permit Form

- Permit must be completely filled out prior to entry.
- Permits are activated by Entry Supervisor's signature.
- No entry is allowed without a valid permit.
- The duration of the permit may not exceed the time required to complete the work.
- When work is completed, permit should be retained by the employer.
- Cancelled permits must be kept on file for at least one year.

Permit Required Confined Space Entry

- When a space is designated as a permit space employers must:
  - Designate the persons who are to have active roles:
    - Attendant
    - Entrant
    - Supervisor
  - Establish procedures for rescuing entrants from permit spaces and train accordingly.
  - Develop a system for the preparation, issuance and cancellation of entry permits.



Confined Spaces

PPE and Equipment

- The company shall provide the following equipment at **no cost to the employees**:
  - Testing and monitoring equipment
  - Ventilating equipment
  - Communications equipment
  - PPE
  - Lighting equipment
  - Barriers and shields
  - Ladders
  - Rescue and emergency equipment
  - Any other equipment for safe entry into or rescue from

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Fall Protection and Barricades

- Barriers to prevent passers-by and the curious from falling into the opening must be put in place.
- Holes and openings must be closed or guarded when not attended.

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Warning Signs

- Place warning signs where pedestrians can see them.
- Signs must state the hazard and the required action.

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Telecomm Exemption- 29 CFR1910.268(O)

- If the following conditions are met, the employer may use alternate procedures to enter into a permit space and may be exempt from the requirements of a traditional permit space when working on underground lines in manholes, street openings, and vaults:
  1. Protection from falling or falling objects.
  2. Availability of first aid assistance where there is reason to believe that safety hazards, unusual water hazards, and operations in manholes used jointly by a telecommunication utility and by an electric utility are present; and
  3. Testing the atmospheres of manholes and unvented vaults prior to employee entry and, where atmospheric hazards are detected, ventilating and taking any other measures necessary for safe entry.

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Telecomm Exemption- 29 CFR 1910.268(O) (continued)

- Atmosphere is only hazard.
- Ventilation can make space safe.
- Monitoring data.
- Data available to employee.

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Ventilation for Alternate Procedures

- **Use mechanical ventilation**
  - Fans
  - Air rams
- **Ventilate at the rate of at least four (4) volumes per hour**
  - Larger spaces require more ventilation
- **Make sure air supply is not contaminated**
  - Ventilation air supply must be from fresh air uncontaminated with flammables, toxins, etc.

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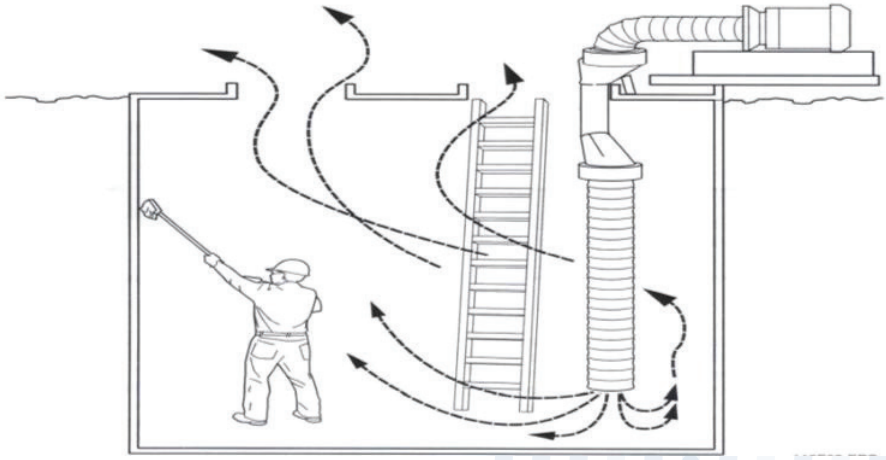
Space Ventilation



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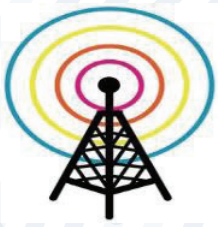
Confined Space Entry Rescue

Means of emergency rescue must be readily available to the confined space entry attendant for emergency rescue of entrants.



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Training Requirements

- The employer must provide training it its employees to acquire the understanding, knowledge, and skills necessary for safe performance in confined spaces.

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Section 12
Review Questions

What must be performed prior to any confined space entry?

A. Nothing, jump right in.
B. Test the atmospheric conditions.
C. Find the smallest person on the crew to volunteer them to enter.
D. None of the above.

When is a confined space considered entered?

A. When any part of the body crosses the plane of the opening.
B. Only when the head enters.
C. As soon as the cover is removed.
D. Only after someone is fully inside and the opening is closed.

Confined Spaces

Where should you test the air inside a confined space?

A. Near the opening.

B. In the middle.

C. In the area you will be working.

D. All of the above.

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NOTES:

Section 13
Environmental Concerns

Working Outdoors

- Most of us know that when we are outdoors, exposure to the mix of heat, humidity, and sun can lead to serious heat-related illnesses. But a number of other problems can occur from sunburns to insect bites and stings. They include:
  - Natural or man-made terrain hazards on the jobsite;
  - Dermatitis from poisonous plants;
  - Severe weather conditions;
  - Sunburn, heat stress, heat exhaustion, or heat stroke; and
  - West Nile virus, Lyme disease, and other insect-borne diseases.

Environmental Concerns

Air Quality

- Conditions that affect air quality:
  - Fires
  - Ozone
  - Pollen
  - Production by-products (smoke stacks)

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Carbon Monoxide

- Confined space work near roadways.
- Propane powered heaters and blowers.
- Leakage into a splicing vehicle from the vehicles exhaust:
  - Some vehicles may be equipped with CO monitors.
  - Ensure they are in working order prior to work beginning.

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Lead

- Lead can still be found in some manholes as communications cables.
- Work practices and control measures when working on or around lead sheathed cables include, but are not limited to:
  - Proper use of all required PPE.
  - Following hygiene practices when exiting the work environment.
  - Following practices to reduce migration of lead particulate from the work environment.
  - Promptly reporting of personal symptoms which may indicate lead exposure.

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Noise

- Road traffic can make it difficult to communicate with coworkers.
- Noise in an urban environment can approach regulated levels.

	DECIBEL - dB(A)	EQUIPMENT
Double protection recommended above 105 dB(A)	112	Pile driver
	110	Air arcing gouging
	108	Impact wrench
	107	Bulldozer - no muffle
	102-104	Air grinder
	102	Crane - uninsulated cab
	101-103	Bulldozer - no cab
	97	Chipping concrete
	96	Circular saw and hammering
	96	Jack hammer
	96	Quick-cut saw
	95	Masonry saw
	94	Compactor - no cab
Hearing protection recommended above 85 dB(A)	90	Crane - insulated cab
	87	Loader/backhoe - insulated cab
	86	Grinder
	85-90	Welding machine
	85	Bulldozer - insulated cab
	60-70	Speaking voice

Table 1: Some typical noise levels found on construction sites

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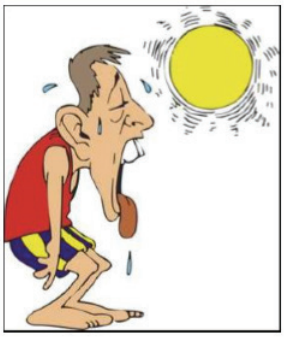
Environmental Concerns

Weather Concerns

- Weather changes can happen quickly.
- In cities the weather may differ and have different effects than it does in the country.
- Some municipalities have restrictions on when/how you can work under certain weather conditions.
- It is always a good practice to be prepared for changing weather conditions by having additional clothing and gear to protect you from the elements.

Heat Illness Prevention



- Be sure to drink water throughout the day to stay hydrated. If you wait until you are thirsty, its too late.
- Avoid beverages containing caffeine or alcohol.
- Take frequent breaks. Rest in the shade or find an air conditioned truck or building.
- Wear lightweight, light colored, and loose fitting clothing.

Cold Weather Safety

- Wear the right clothing:
  - Base layer of lightweight wool or synthetic material;
  - Middle layer wool sweater or fleece shirt;
  - Outer wind/waterproof layer;
  - Hat and gloves; and
  - Footwear that keeps your feet dry.
- Protect exposed areas of the skin.
- Take frequent breaks in a dry, warm area to allow your body to warm up.
- Eating warm food and drinking hot drinks can help you stay warmer.
- Caffeine reduces blood flow to your extremities which can increase the possibility of frostbite.

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Poison Ivy, Sumac, Oak, and Giant Hogweed

Environmental Concerns

Summary

- A bothersome rash and intense itching after working in or around wooded areas can be an allergic reaction to poison ivy, oak, sumac, or giant hogweed.
- The tissues of all these plants contain poisonous oil.
- This oil is extremely irritating to the skin.
- It may be brushed onto the clothing or skin of people coming in contact with the plants.
- Poison ivy, oak, sumac, and giant hogweed grow almost everywhere in the United States, except Hawaii, Alaska, and some desert areas in the Western United States.

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Poisonous Vegetation

Poison Ivy	Poison Oak	Poison Sumac	Giant Hogweed
			
			

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Hazardous Wildlife and Insects

Inspect Your Work Area

- As you are surveying your work area for hazards take a moment to:
  - Look for evidence of insects/animals that might be in your area (i.e. snake skins, feces, animal parts) (Squirrels like small cell shrouds).
  - Listen for signs of insect or animal presence.
  - Examine areas where you plan on putting your hands (or feet) before you put your hands there.

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Environmental Concerns

Insects, Snakes, and Spiders

- In telecommunications operations, a wide variety of arthropod hazards are present.
- Contact can occur in many locations:
  - Outside
  - Crawl spaces
  - Garages
  - Shrouds
  - Hand-holes
  - Light posts

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What Hazards are Present?

- Bites
- Stings
- Infections
- Disease
- Allergic reactions
- Falls

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Vector-Borne Illnesses

- Vector-borne illness results from an infection transmitted to humans and other animals by blood-feeding arthropods, such as:
  - Mosquitoes
  - Ticks and fleas
- Examples of vector-borne diseases include:
  - Dengue fever
  - West Nile virus
  - Lyme disease
  - Malaria

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Section 13
Review Questions

Environmental Concerns

_____ can still be found in some manholes, as communication cables.

A. Lead sheathed cable
B. Left-over lunch
C. Pirate treasure
D. Car parts

Conditions that affect air quality are?

A. Fires
B. Rainbows
C. Pollen
D. Both A & C

The _____ of poisonous plants is extremely irritating to the skin.

A. Wool
B. Leaf
C. Berry
D. Oil

Hazards of animal interactions include?

A. Bites
B. Diseases
C. Infections
D. All of the above

Environmental Concerns

West Nile virus and _____ are types of Vector-borne illness.

A. The common cold
B. Lyme disease
C. Influenza
D. COVID-19

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NOTES:

Section 14
The Challenges of Working Alone

Working Alone

- Individuals are considered to be working alone when they are working by themselves in an office, vehicle, laboratory, workshop, or field site.
- A job hazard assessment should be completed and shall address hazards and identify control measures in order to minimize risk associated with working alone. Individually and collectively, supervisors and workers are required to assess the conditions or circumstances.

The Challenges of Working Alone

When Working Alone is Prohibited

- Confined space entry.
- Working on energized electrical conductor or equipment.
- Power line hazards: Use of a vehicle, crane, or similar equipment near a live power line where it is possible for any part or the equipment or its load to make contact with the live power line.
- View obstruction: A vehicle, crane, mobile equipment, or similar material handling equipment where the operator does not have full view of the intended path of travel.
- The use of fall arrest equipment and scaffolds.
- Quick-acting, acutely toxic material as described by the Safety Data Sheet (SDS).
- Use of supplied air respiratory equipment or self-contained breathing apparatus.
- Risk of drowning.
- Welding operation where a fire watcher is required.
- Tasks which, based on the risk assessment conducted by the supervisor in consultation with the employee and EH&S are deemed to require more than one person.

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What Steps Can be Taken

- Avoid working alone whenever the job has a higher recognized risk.
- Assess the hazards of your workplace.
- Discuss the hazards with your Supervisor, get their input about the work and possible solutions.
- Understand the job risks and be realistic about your abilities (your safety is the most important factor).
- Take corrective action to prevent or minimize the potential risks of working alone.

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What Steps Can be Taken (continued)

- Report all situations, incidents or 'near misses' where being alone increased the severity of the situation. Analyze this information and make changes to company policy where necessary.
- Verify your work practice outline check-in procedure. Make sure that regular contact is kept with your supervisor, or co-workers.
- Before ending your shift, make sure you have received a positive response from your employer (verbal or written).
- Schedule higher risk tasks to be done during normal business hours, or when another worker capable of helping is onsite.

Example of a Check-in Procedure

- Decide if a verbal check-in is adequate, or if the worker must be accounted for by a visual check.
- Make sure your plan is appropriate for both regular business hours as well as after main office hours.
- For most lone workers, the telephone will be the main source of contact. If using cell phones, always be sure that it is close by and charged. If cell phone service is unreliable in your area, be sure to have alternative methods of communication available (such as use of cameras, automated warning/duress devices, global positioning systems (GPSs), two-way radio, site visits or satellite technology).
- When travelling out of the office, the main contact person should know the following details:
  - Destination.
  - Estimated time of arrival.
  - Return time or date.
  - Contact information.
  - Mode of travel (public transit, car, plane, etc.).
  - Alternate plans in the event of bad weather, traffic problems, etc.

The Challenges of Working Alone

Communication and Extra Equipment

- Have with you and test all appropriate communication devices:
  - Satellite phone,
  - Two-way radio,
  - Cell phone,
  - GPS emergency locator, and
  - 406 MHz Emergency Position Indicating Radio Beacon (known as an EPIRB).
- Ensure the site or vehicle is equipped with emergency supplies such as a basic survival kit, extra food and drinking water, as well as a first aid kit.
- Ensure you are properly dressed for current and expected conditions. Have extra clothes and weather gear.
- Carry some or all of the emergency supplies when leaving the vehicle in case of unexpected weather conditions.
- Conditions may change rapidly, know the current and forecasted weather prior to beginning work.

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Situational Awareness

- Situational awareness is important in understanding how and when you need to react if conditions take a turn for the worse. While this cannot be taught in the traditional sense, your instinct and first natural response is usually the best.
  - Identify objects around you
  - Notice other people
  - Identify entry and exit points
  - Stay vigilant
  - Trust yourself

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Escort

- A security escort is a private security officer who is assigned to an individual to help ensure they travel safely to their destination.
- There are a wide variety of scenarios when this might be needed:
  - Current political climate;
  - Areas reporting higher than normal crime rates;
  - Work after dark;
  - Protecting vehicle, tools or other company assets; and
  - Access to secure areas of a facility.

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Be Visible

- Wear identifying materials like:
  - Company ID
  - Hard hat
  - High visibility vest
- Park your vehicle conspicuously and use cones.
- Use beacons and flashes on vehicle (if equipped).
- Park in illuminated areas of a facility and close to the entrance.
- Use sidewalks and other well lighted areas to and from the work area.

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The Challenges of Working Alone

Personal Accountability

- Knowing and understanding hazards empowers you to make informed decisions regarding your safety.
  - Know the environment you will be working in;
  - Know company policy regarding the different examples;
  - Understand those policies;
  - Take the appropriate action prior to beginning work;
  - Ask questions; and
  - Stop work.

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Work Safe – Die Old!

- Account for any pre-existing medical conditions that may increase the risk.
- Request and complete the adequate levels of training:
  - First-aid/CPR/AED;
  - Communication systems;
  - Vehicle and equipment operation; and
  - Company policy and procedure.
- Know and be aware of your surroundings.

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What to Tell Them

- You must follow your company's (or the prime company's) public relations guidelines.
- Have company contact information readily available.
- Have your company's plan for the worker in the field, what the company line is.
- Check company guidelines on how to respond or what to do during civil unrest.
- Be courteous and respectful.
- Do not engage in conversations regarding politics, or topics that could cause a strong reaction.

Section 14
Review Questions

The Challenges of Working Alone

Understanding the job risks and being realistic about your abilities is one method of ensuring your safety while working alone.

A. True

B. False

What details should the main contact person know when you are traveling out-of-the-office?

A. Destination

B. Best spot for lunch

C. Return time or date

D. Both A & C

The Challenges of Working Alone

Your instincts and first natural response is usually the best when helping provide you with situational awareness?

A. True

B. False

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A _____ is someone assigned to an individual to help ensure they travel safely to their destination.

A. Security escort

B. Supervisor

C. Somebody's uncle

D. None of the above

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The Challenges of Working Alone

Which of the following help you understand hazards and empowers you to make informed decisions regarding safety?

A. Know the environment you will be working in.

B. Know company policy regarding the different examples.

C. Understand those policies.

D. Take the appropriate action prior to beginning work.

E. All of the above.

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When someone approaches you and asks what it is that you are doing, you should?

A. Strike up a conversation, talk about the weather, politics, and sports.

B. Be courteous, respectful, and state that you are here working on communications equipment.

C. Refer them to a company representative.

D. Ignore them and continue to work.

E. Both B & C.

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Thank You!
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THE COMMUNICATIONS INFRASTRUCTURE CONTRACTORS ASSOCIATION
NATE
WIN
WIRELESS INDUSTRY NETWORK
U.S. Department of Labor - OSHA
Susan Harwood Grant
SH-99035-SH0

NOTES:

Definitions

Confined space - means a space that:

1. Is large enough and so configured that an employee can enter and perform assigned work; and
2. Has limited or restricted means for entry or exit; and
3. Is not designed for continuous employee occupancy.

Permit-required confined space (PRCS) or permitted space - means 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 to engulf 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; or
4. Contains any other recognized serious safety or health hazard.

Reclassification of PRCSs -
If a permit required confined space poses no actual or potential atmospheric hazards and if all hazards within the space are eliminated without entry into the space, the permit space may be reclassified by a qualified and trained individual to not require a permit for as long as the hazards remain eliminated.

Permit-required confined space program -
means an organization's overall written program for controlling, and, where appropriate, for protecting its employees from, permit-required confined space hazards and for regulating entry into permitted spaces.

Entry Permit -
means the written or printed documentation to allow and control entry into a permit required confined space.

Minimum Approach Distance –
the closest distance an employee is permitted to approach an energized or a grounded object.

Job Hazard Analysis

Date	
Project Name/Market	
Project No.	
Site No.	
Contractor Name	
Contractor Field Supervisor	

Identification of Rooftop Hazards

Can any of the work be performed on the ground? ☐	**Work location requires controlled descent to access?**	**Are certified anchor points being used?** ☐ No ☐ Yes
Is there a parapet wall? ☐ Yes ☐ No *Height: (<39" is considered unpr*	☐ No ☐ Yes: *Controlled descent plan required.*	**Has the certification been verified?** ☐ No ☐ Yes
Work within 15' of roof edge or skylight? ☐ **Yes** ☐ **No:** ***Action**: Set up flagging minimum spacing 6', height >34", <39".*	**Does the work location require a ladder?** ☐ No☐ Yes *Ladder Height:* **RF has been identified?** ☐ Yes ☐ No	

Required PPE for Job Task

☐ Hard Hat	☐ Gloves (type)	☐ Other (specify):
☐ Safety Glasses	☐ RF Monitor	
☐ Ear Plugs	☐ RF Suit	

Fall Protection System	**Fall Protection Equipment**			
☐ Guardrails/Parapet wall >39".	☐ Full Body Harness	☐ Rope grab	☐ Fall Arrest Lanyard	
☐ Fall Restraint	☐ Descent device	☐ Anchor straps	☐ Rope	☐ SRD
☐ Fall Arrest	☐ Work Positioning System		☐ Other (specify):	

Roof Condition, Documentation and Protection

Mandatory Roof Protection Measures - Keeping on designated walkways whenever possible. - ABSOLUTELY no roof penetrations. - Tether all "sharp" tools to avoid any accidental punctures.	**Roof Condition:** ☐ Unsafe ☐ Poor ☐ Fair ☐ Good *Action: make detailed notes on any roof condition not rated "Good." Include photographs for any deficiencies found.*

Hazard Analysis (Hazards and PPE identified above should be addressed below)

Sequence of Job/Task	Potential Hazards	Hazard Mitigation Measures

Employee Acknowledgement of JHA (All personnel entering jobsite must read and sign, add additional to reverse side of this form)

Printed Name:	Signature:

Supervisor Acknowledgement of JSA and Site Personnel

Supervisor Name:	Supervisor Signature: