

Maintain a Safe Position on Ladders, cont.

- Do not overreach when working from the ladder.
- Do not stand on the top two rungs of a stepladder.
- Do not allow another person on a ladder at any given time, unless you are using a double-cleated ladder that is intended for two-way traffic.

Scaffolding

A safe alternative to using ladders is to use:

- Interior and Exterior Scaffolding
- Aerial Lifts

...if OSHA requirements and safety practices
are followed.

We'll look at each of these in detail.



Pump Jack Scaffold



Interior and Exterior Scaffolding

- Job-built scaffolding that is improperly constructed is extremely hazardous.
- Various types and brands of interior and exterior scaffolding are commercially available.
 - Always, follow the manufacturer's safety instructions.

Masonry Blocks Are Not Acceptable



Interior and Exterior Scaffolding, cont.

- Scaffolding that is 10 ft. or higher must be equipped with guardrails.
- A competent person must supervise the set-up and take down of all scaffolding.
- Walls that support exterior scaffold must be capable of supporting, without failure, the weight of the scaffold and four times the maximum intended load on the scaffolding.
- Scaffolding must be fully planked, and planks must be secured so they cannot move.

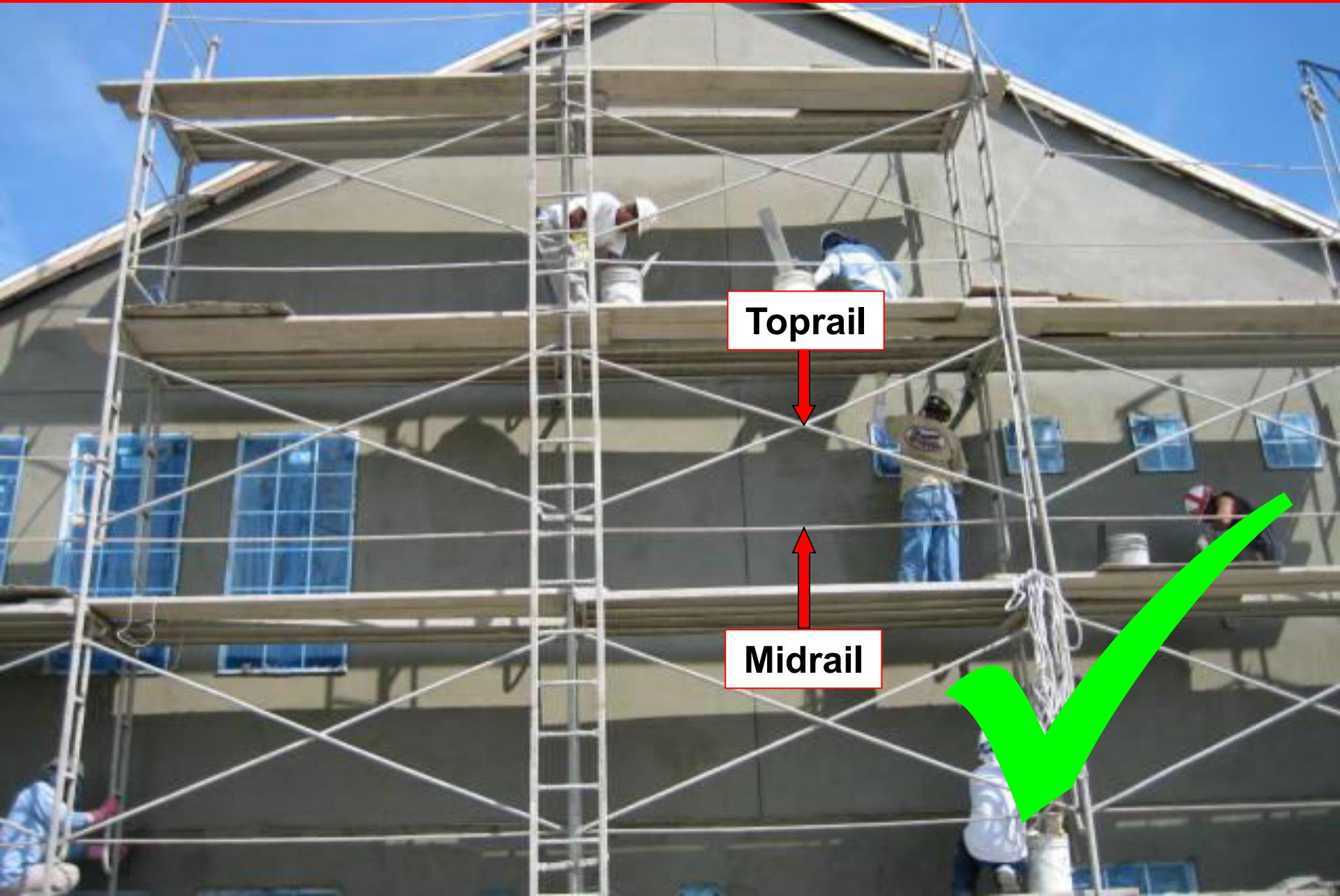
Will This Scaffold hold 4 times the Intended Load?



Guardrail Requirements- Scaffolds

- Toprails Between 38" and 45" High
- Guardrails to 200 Lbs/Midrails to min. 75 Lbs – 150 lbs depending on Toprail capacity.
- Cross Bracing OK as Guardrail if Between 20" and 30" for Midrail 38" to 48" for Toprail
- Protect from Falling Objects
 - All Workers on Scaffolds MUST Wear Hard Hats

Cross Bracing OK as Toprail



Scaffold Access

- Ladders Needed if Access More Than 2'
- Don't Climb Cross Braces
- Place Ladders Securely





Scaffold Access, cont.



Scaffold Grade Plank Stamps

SPID: DNS AND 65
KD19 S.DRY ⑦¹
SCAFFOLD PLANK

MILL 10
SEL STR
SCAF PLK
D. FIR S. DRY

A shield-shaped logo containing the letters "WC" on top and "LB" on the bottom.



Acceptable Planking?



Fully Planked?



Fully Planked

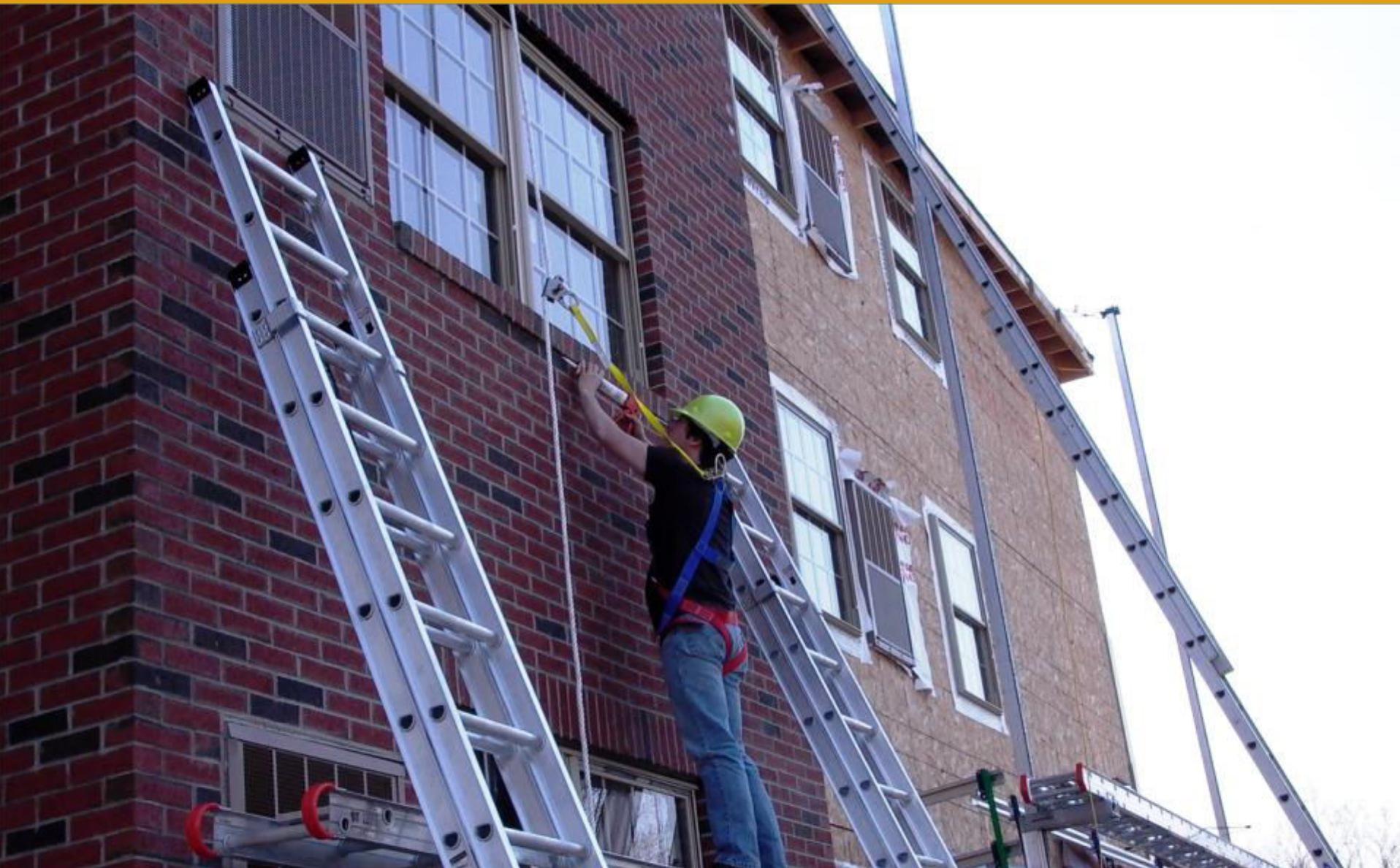








PFAS Used with Ladder Jack Scaffold













Aerial Lifts

- Aerial lifts (e.g., JLG boom lift) or approved personnel lift baskets on rough terrain forklifts is a safe alternative to working from:
 - Ladders, or
 - other types of scaffolding.
- An aerial lift can be used for the installations of:
 - windows
 - soffit
 - fascia
 - gutters
 - siding

Aerial Lifts, cont.



Aerial Lifts, cont.



Aerial Lifts, cont.

The **competent person** should:

- Restrict operation of aerial lifts or forklift vehicles to trained and authorized personnel.
- Use only commercially built personnel baskets designed for lifting workers.
 - Follow the American National Standards Institute's (ANSI) standards for using personnel lift baskets.
- Make certain that homemade boxes lifted by a forklift are not used—homemade boxes are unacceptable.

Aerial Lifts, cont.

When in the lift:

- Wear a full body harness.
- Attach the lanyard to the boom or an approved anchor point inside the basket.



17 3.13PH



17 3:13PM

Aerial Lifts, cont.

When in the lift:

- Always stand on the floor of the basket.
- Do not sit or climb on the edge of the basket, lean over the edge, or climb out of the basket.
- Do not use a ladder or other objects to increase reach.

Aerial Lifts, cont.

When operating the lift:

- Stay at the controls at all times.
- Do not move the vehicle while a person is in the elevated basket.
- Only use the equipment when it is on stable and level ground.
- Maintain the required minimum clearance of 10 ft. (3 m) from power lines carrying 50 kilovolts or less.

Saved By The Harness





Section 5

Ladders and Scaffolding

Learning Objectives: Section 5

- Determine the proper ladder to use based on weight capacity and height.
- Calculate the proper pitch of extension ladders for proper set-up, and identify how to secure and stabilize ladders.
- Identify how to maintain a safe position when using a ladder.
- Identify safety requirements and practices for scaffolding, including aerial lifts.

Ladder Training Requirements

- Each employee using ladders should be trained to recognize hazards related to their use. This includes:
 - Nature of the fall hazards in the work area
 - Correct procedures for placement, use, and maintenance
 - Maximum intended load-carrying capacities

Ladder or Scaffold?



Pick the Right Ladder

Before stepping onto a ladder, think about these things:

- Duty rating of the ladder—what capacity can it hold?
- Height of the ladder—too short or too tall?
- Condition of the ladder and instructions unique to the ladder selected.

We'll look at each of these in detail.

Proper Duty Rating/Capacity

OSHA Requirement

Ladders shall not be loaded beyond the maximum intended load for which they were built nor beyond their manufacturer's rated capacity.

Proper Duty Rating/Capacity, cont.

TYPE	DUTY RATING	USE	LOAD
1AA	Special Heavy Duty	Rugged	375 Lbs.
1A	Extra Heavy Duty	Industrial	300 Lbs.
1	Heavy Duty	Industrial	250 Lbs.
II	Medium Duty	Commercial	225 Lbs.
III	Light Duty	Household	200 Lbs.

Select a ladder with the proper duty rating for your weight and the materials you are handling.

Think About It

What do these materials weigh:

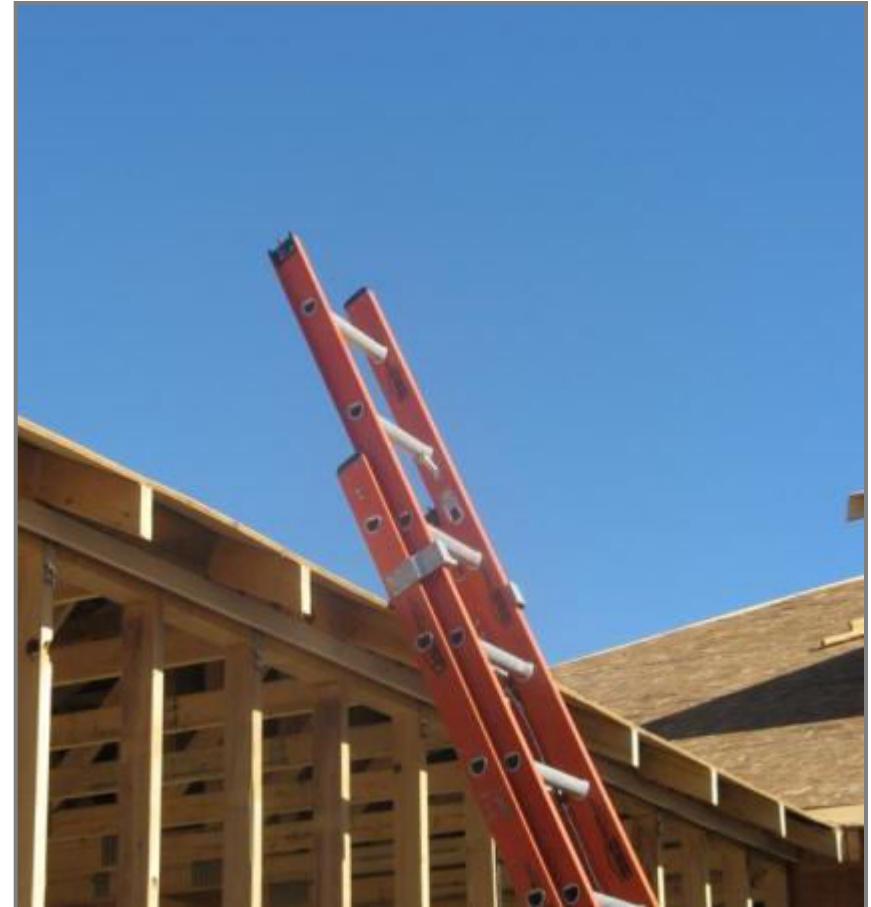
- A sheet of plywood
- A tool box with tools
- A bundle of shingles
- A 3 x 4 window



Remember: Select a ladder with the proper duty rating for your weight AND the materials you are handling.

Proper Height Extension Ladders

When using an extension ladder for access to another level, the ladder must extend at least 3 ft. (.9 m) above the landing to provide a hand hold for getting on and off the ladder.



Ladder Height Extension



Proper Height Extension Ladders, cont.

Height to Gutter or Top Support	Extension Ladder Height
9' max.	16'
9' to 13'	20'
13' to 17'	24'
17' to 21'	28'
21' to 25'	32'
25' to 28'	36'
28' to 31'	40'

Ladder heights are 9-11 ft. longer than the height to be reach to allow for the height/length lost when the ladder is positioned at an angle.

Proper Height Stepladders

Choose a stepladder that is no more than 4 ft. shorter than the height you want to reach.

Maximum Height You Need to Reach	Stepladder Height
7	3
8	4
9	5
10	6
12	8
14	10
15	11
16	12
18	14
20	16

Proper Condition and Instructions

- Inspect the ladder for visible defects.
 - Never use a ladder that is broken or otherwise damaged.
 - Remove damaged ladders from service and tag them as damaged.
- Review the safety labels on the ladder.
 - Always comply with the warnings and instructions.



Ladder Labels

- What type of information can be found on ladder labels?
 - Warnings
 - Capacity
 - Set-up



Determine Proper Ladder Set-up

- Consider placement and pitch of the ladder
- Secure and stabilize the ladder

We'll look at each of these in detail.

Placement Tips

- Avoid setting up a ladder in high traffic areas or barricaded areas.
- Do not use metal or aluminum ladders near electrical lines.
- Place ladders on stable and level surfaces.

Extension Ladders

- Extension ladders should be used at a 4 to 1 pitch (1.2 to .3 m).
- For every 4 ft. (1.2 m) in height, the bottom of the ladder should be 1 ft. (.3 m) away from the structure.

Example:

$$20 \text{ ft. (height)} \div 4 \text{ ft.} = 5 \text{ ft. pitch}$$



Correct Pitch?



Any Hazards?



Stepladders

- Stepladders are designed for use in an opened-and-locked position.
- Do not use a stepladder that is folded or in a leaning position



Higher Ceilings Require Taller Ladders



Job built ladder over a stair opening



Secure and Stabilize Ladders

- Extension ladders should be secured at the top or bottom to prevent movement.
- The base of an extension ladder must be secured in place by using the safety feet on the ladder or other effective means.

Secured at the Top



Secured at the Bottom



Secure and Stabilize Ladders, cont.

Slippery Surfaces

Never use a ladder on a slippery surface, unless it is secured to prevent movement.

- Wet or slippery surfaces may require a cleat.
- Ladder feet should dig into the ground, and the ladder should be secured at the bottom to prevent movement/slipping.

Loose Soil



Firm Base



Unstable Base



Secure and Stabilize Ladders, cont.

Uneven Surface

When the surface is not level, use a ladder leveler (accessory) to provide even contact points.



Maintain a Safe Position on Ladders

- Face the ladder when *ascending or descending* and maintain **three points of contact at all times.**
- Keep your body centered on the ladder.
- Never let your belt buckle pass either ladder siderail.



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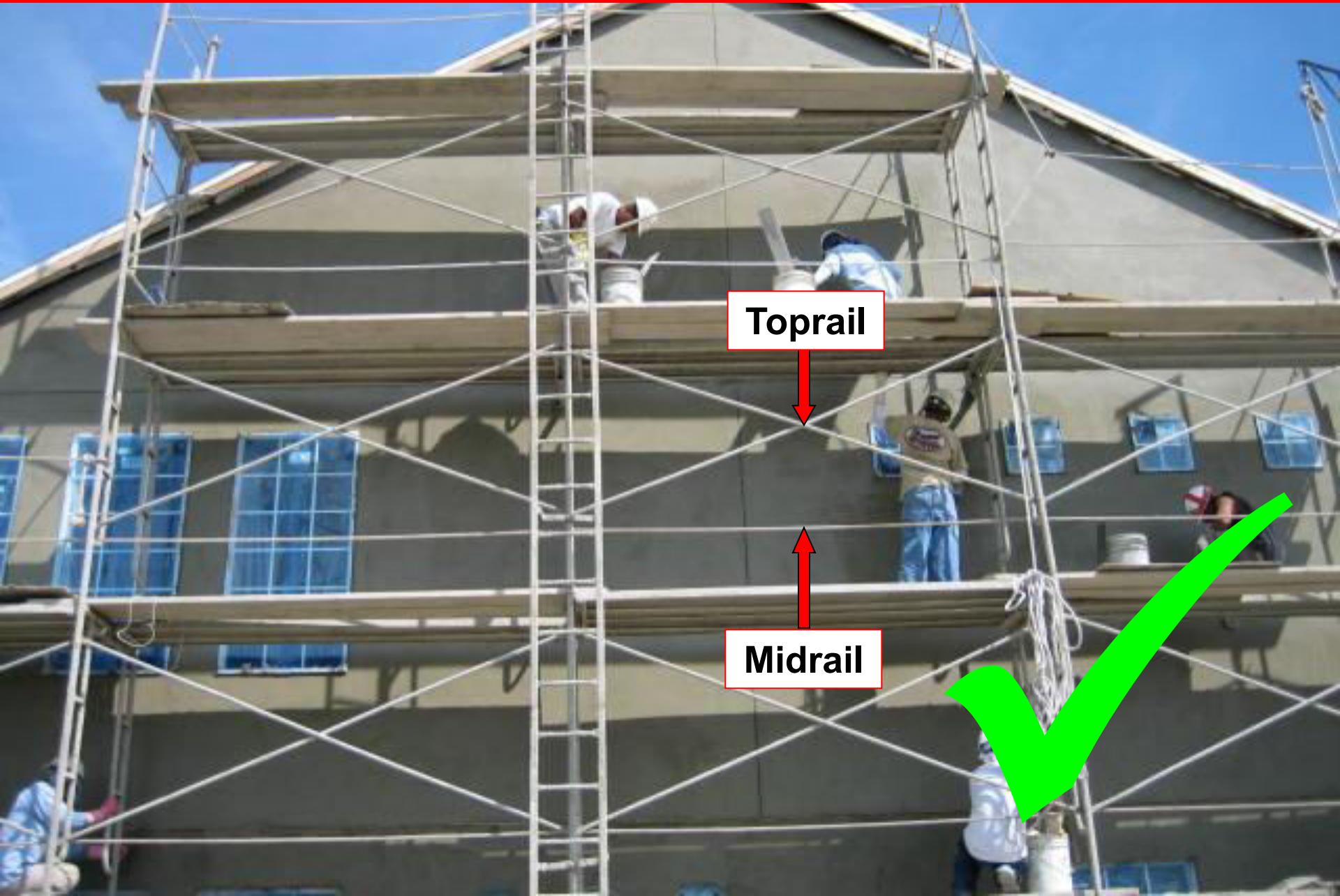
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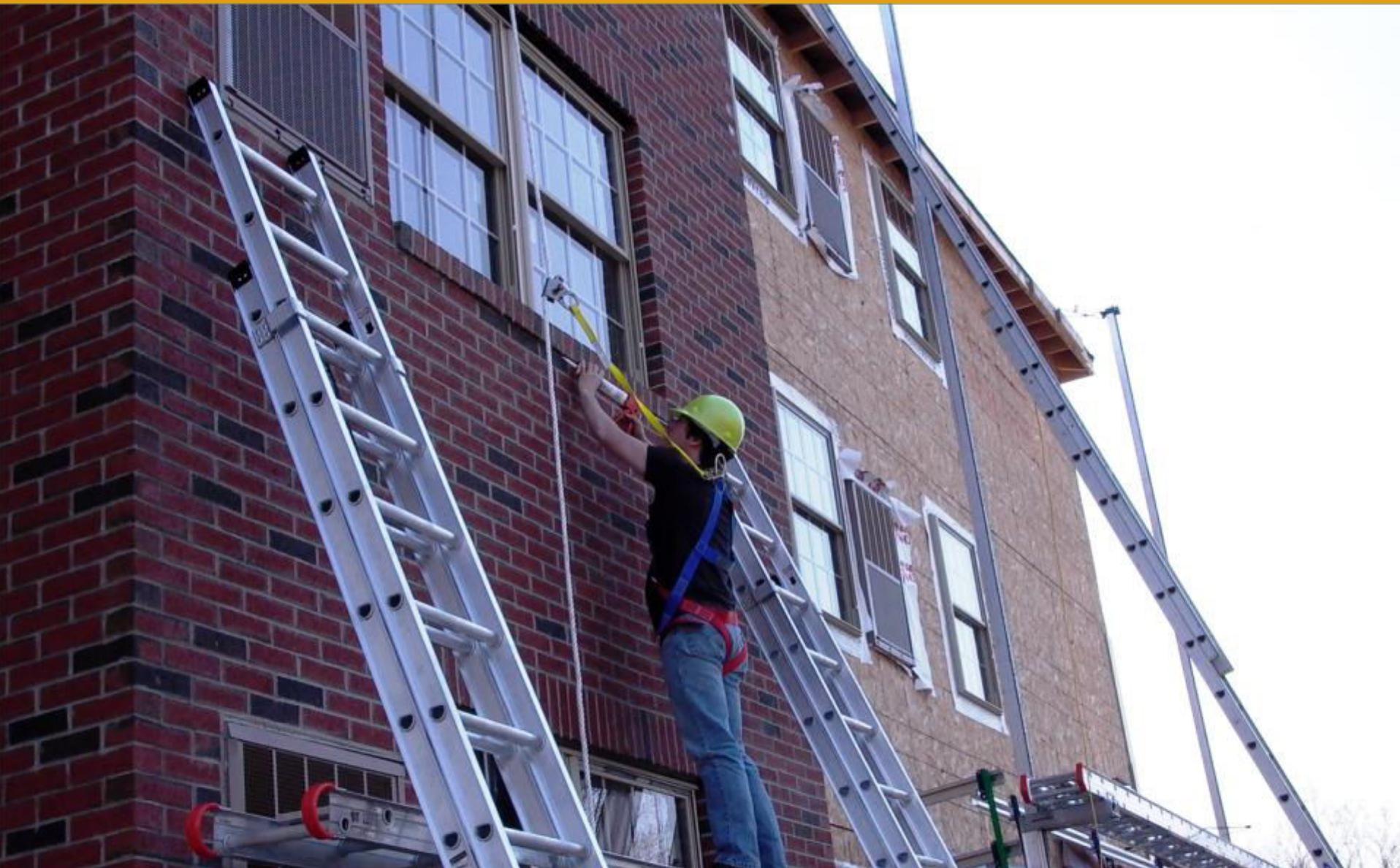








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Section 6

Alternative Fall Protection

Learning Objectives: Section 6

- Understand OSHA requirements to provide conventional fall protection during residential construction
- Evaluate the use of conventional fall protection systems and other work methods during residential construction
- Identify residential construction tasks that may require a fall protection plan that meets the requirements of §1926.502(k)

When is fall protection required?

- DUTY: in residential construction, workers must be protected by conventional fall protection (guardrails, safety nets, personal fall arrest system) if they can fall **6 feet** or more to a lower level.
- Residential Construction *Exception**
 - When employers can **demonstrate** that it is *infeasible or creates a greater hazard* to use “conventional” fall protection systems, they **must** develop and implement a **fall protection plan, as needed, in accordance with §1926.502(k)**!

*29 CFR 1926.501(b)(13)

What does “Infeasible” mean?

- Infeasible means:
 - Impossible to perform construction work using conventional fall protection **or**
 - It is technologically impossible to use conventional fall protection

Establishing “Infeasibility”

- Contractor attempting to establish infeasibility will be required to:
 - Establish the ***worksite-specific circumstances*** that preclude reliance on conventional fall protection to protect employees from fall hazards.
 - Establish that the available personal fall arrest systems ***cannot be used*** in a particular work area due to design or equipment constraints.

Source: Preamble to Final Fall Protection Rule, Section 3 - III.
Summary and Explanation of the Final Rule, August 9, 1994

Rev: 8-2011



Establishing “Infeasibility”, cont.

- The employer must indicate the particular problem, such as:
 - Inability to provide safe anchorage
 - Danger of lifeline entanglement
 - Likelihood that lifelines will be mired in grout
 - Likelihood that completion of work would be prevented
 - Inability of personal fall arrest system to function, due to configuration of work area

Source: *Preamble to Final Fall Protection Rule, Section 3 - III.
Summary and Explanation of the Final Rule, August 9, 1994*

Rev: 8-2011



Establishing “Infeasibility”, cont.

- Note: There is a presumption that it is feasible and will not create a greater hazard to implement one of the conventional fall protection methods (personal fall arrest system, guardrails, or safety nets); and accordingly the employer has the burden of establishing that it is appropriate to implement a fall protection plan that complies with 1926.502(k).
- OSHA has found that, as with the "infeasibility" defense, the "greater hazard" defense does not generally excuse an employer from protecting its affected employees with personal fall arrest systems. In particular, the Agency has found that careful planning of a construction project enables the employer to erect buildings/structures into which the necessary anchorage points for personal fall arrest systems have already been engineered.

Source: *Preamble to Final Fall Protection Rule, Section 3 - III.
Summary and Explanation of the Final Rule, August 9, 1994*

Rev: 8-2011



Establishing “Infeasibility”, cont.

- It will not be sufficient for the employer to merely assert that it is **impossible** to use fall protection equipment.
- OSHA does not consider "economic infeasibility" or "impracticality" to be a basis for failing to provide conventional fall protection for employees
- Non-mandatory **Appendix E** provides guidance regarding the kind of considerations employers would take into account in attempting to comply with OSHA's fall protection standard.

Examples of Infeasibility

- OSHA believes it would be unreasonable to expect a home builder to rent a crane when the jobsite is difficult to access (terrain or remote location) or when the home builder has only a single roof to raise.
- OSHA does not expect home builders to erect scaffolds around the entire perimeter of a house, or to take other extremely burdensome measures such as erecting separate structures (telephone poles, e.g.) and stringing a lifeline to use as an attachment point for personal fall arrest equipment.

Source: *Preamble to Final Fall Protection Rule, Section 3 - III.
Summary and Explanation of the Final Rule, August 9, 1994*

Rev: 8-2011



What does “Creating a Greater Hazard” mean?

- Hazards created by compliance with the standard are greater than those created by non-compliance.

Source: Preamble to Final Fall Protection Rule, Section 3 - III.
Summary and Explanation of the Final Rule, August 9, 1994

Rev: 8-2011



Establishing “Greater Hazard”

- OSHA is aware of construction situations where the installation of conventional fall protection systems could ***involve more risk***, due to the nature or duration of the exposure, than the work for which protection is required.
- On the other hand, “greater hazard” defense does not generally excuse an employer from protecting its affected employees with conventional fall protection systems.

Source: Preamble to Final Fall Protection Rule, Section 3 - III.
Summary and Explanation of the Final Rule, August 9, 1994

Rev: 8-2011



Establishing “Greater Hazard”, cont.

- OSHA acknowledges that, regardless of an employer's ability to preplan for fall protection, there may be cases where the installation or use of conventional fall protection systems poses a greater hazard than that to which employees performing the construction work would otherwise be exposed.
- OSHA expects an employer who seeks to make that case to ***indicate specifically how*** compliance with the requirement for conventional fall protection systems would pose a greater hazard.
- OSHA will assess each such case on its particular merits.

Source: Preamble to Final Fall Protection Rule, Section 3 - III.
Summary and Explanation of the Final Rule, August 9, 1994

Rev: 8-2011



OSHA Requirements (Fall Protection Plan)

- This option is available for those engaged in “residential construction” work who can establish that conventional fall protection is infeasible or creates a greater hazard.
- **Note:** It is OSHA’s presumption that conventional fall protection ***is feasible and will not*** create a greater hazard, and it is the employer’s burden to establish that it is appropriate to implement a fall protection plan.

Fall Protection Plan

- **Site-specific and written plan** that identifies and evaluates fall hazards on a jobsite, establishes the protection methods to be used, and assesses the ability of workers to follow related work rules and use equipment safely.

A qualified person develops the plan.

A competent person implements the plan.

Fall Protection Plan, cont.

- OSHA considers the implementation of a fall protection plan, outlining alternative fall protection measures, to be a “**last resort**”!
 - Allowed only where the other options for fall protection have been exhausted.

Source: Preamble to Final Fall Protection Rule, Section 3 - III.
Summary and Explanation of the Final Rule, August 9, 1994

Rev: 8-2011



Competent Person Responsibilities

- Competent person is responsible for **implementing** the fall protection plan, as needed, in accordance with §1926.502(k)

Qualified Person

- A qualified person:
 - Responsible for **preparing** and **approving** any changes to the fall protection plan in accordance with §1926.502(k) specifically for the site where the work is being performed.

Fall Protection Plan §1926.502(k)

- A fall protection plan that meets the requirements of §1926.502(k) must identify how and where fall protection will be used on the jobsite and also the safe work practices that will be used.

OSHA Regulations Standards

29 C.F.R. §1926
Safety and Health
Regulations for
Construction

NOTE: Prior to implementing a fall protection plan (1926.502(k)) the employer has the burden to establish why the use of conventional fall protection is infeasible or creates a greater hazard

Fall Protection Plan §1926.502(k)

- Documents reasons why the use of conventional fall protection systems are infeasible or their use creates a greater hazard
- Includes a written discussion of other measures that will be taken to reduce or eliminate the fall hazard.
- Identifies locations where conventional fall protection cannot be used and then classify these areas as *controlled access zones (CAZ)*.

Fall Protection Plan, cont.

- Must be **written and site specific**
- A written plan developed for the repetitive use for a particular style/model home would be considered **site-specific** with respect to a particular site only if it fully addresses all issues related to fall protection at that site

Fall Protection Plan, cont.

- Write it down & keep @ jobsite
- Must be kept current and up-to-date
- Implementation/supervision by designated individuals
- Must include:
 - Reasons “conventional” fall protection are infeasible or create greater hazard
 - Alternative measures to **reduce or eliminate fall hazards**
 - Location and who can work in Controlled Access Zone (CAZ)

Establishing a Controlled Access Zone (CAZ)

- Designated/restricted work area that may have increased hazards related to otherwise unprotected fall hazards and/or falling material
- Restricts access to processes found in this hazard category:
 - Leading Edges

Requirements for a CAZ

The competent person must:

- Determine where to place the boundaries of a CAZ
- Ensure that the requirements of the fall protection plan are in place before work begins in a CAZ
- Monitor workers while they are in a CAZ; correct any unsafe practices or conditions immediately

The CAZ must be:

- Posted at the perimeter in plain view
- Clearly visible to a person approaching the area
- Restricted to authorized personnel

CAZ Must Be Clearly Identified



Evaluation of Fall Protection Options

Activity #3

Evaluation Section

- The following section is meant to provide an open forum for discussion between attendees and instructors.
- Note: The practices and procedures shown **may or may not** meet the intent of OSHA's Subpart M-Fall Protection requirements, check with your Local OSHA Area Office prior to implementing alternative fall protection procedures.



A photograph showing three construction workers on a roof under construction. The worker on the right is standing on a wooden beam, leaning over the edge. A red arrow points from a white text box at the top left towards this worker. The worker on the left is standing on a higher level of the roof. The worker in the background is standing on a lower level. The roof is made of wooden beams and shingles. In the background, there is a house and some trees. The sky is clear and blue.

Discuss: Is conventional fall protection required?

Discuss: Is conventional fall protection required?



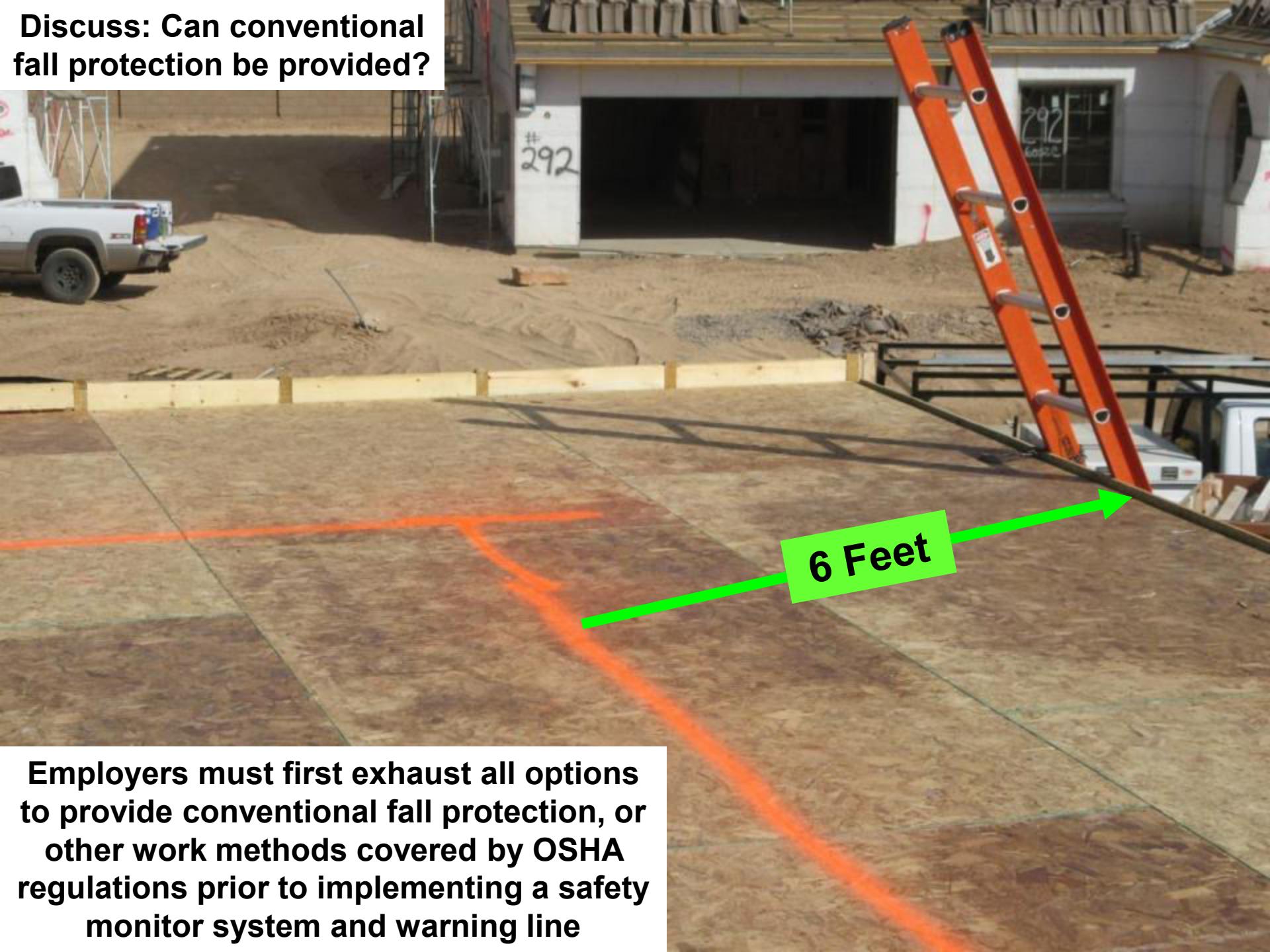




This picture shows the use of both conventional and alternative fall protection procedures, which still requires the use of a written, site-specific fall protection plan



Discuss: Can conventional fall protection be provided?



Employers must first exhaust all options to provide conventional fall protection, or other work methods covered by OSHA regulations prior to implementing a safety monitor system and warning line

Discuss: Can conventional fall protection be provided?



18 · 7:36AM



**This picture shows the use of
guardrails to protect against exterior
fall hazards**



Discuss: Can conventional fall protection be provided?

This picture shows the use of both conventional and alternative fall protection procedures, which still requires the use of a written, site-specific fall protection plan

Discuss: Can conventional fall protection be provided?



Employers must first exhaust all options to provide conventional fall protection, or other work methods covered by OSHA regulations prior to implementing alternative fall protection procedures

Discuss: Can conventional fall protection be provided?





This picture shows the use of conventional fall protection procedures, notice the personal fall arrest systems.

Discuss: Can conventional fall protection be provided?



Employers must first exhaust all options to provide conventional fall protection, or other work methods covered by OSHA regulations prior to implementing alternative fall protection procedures



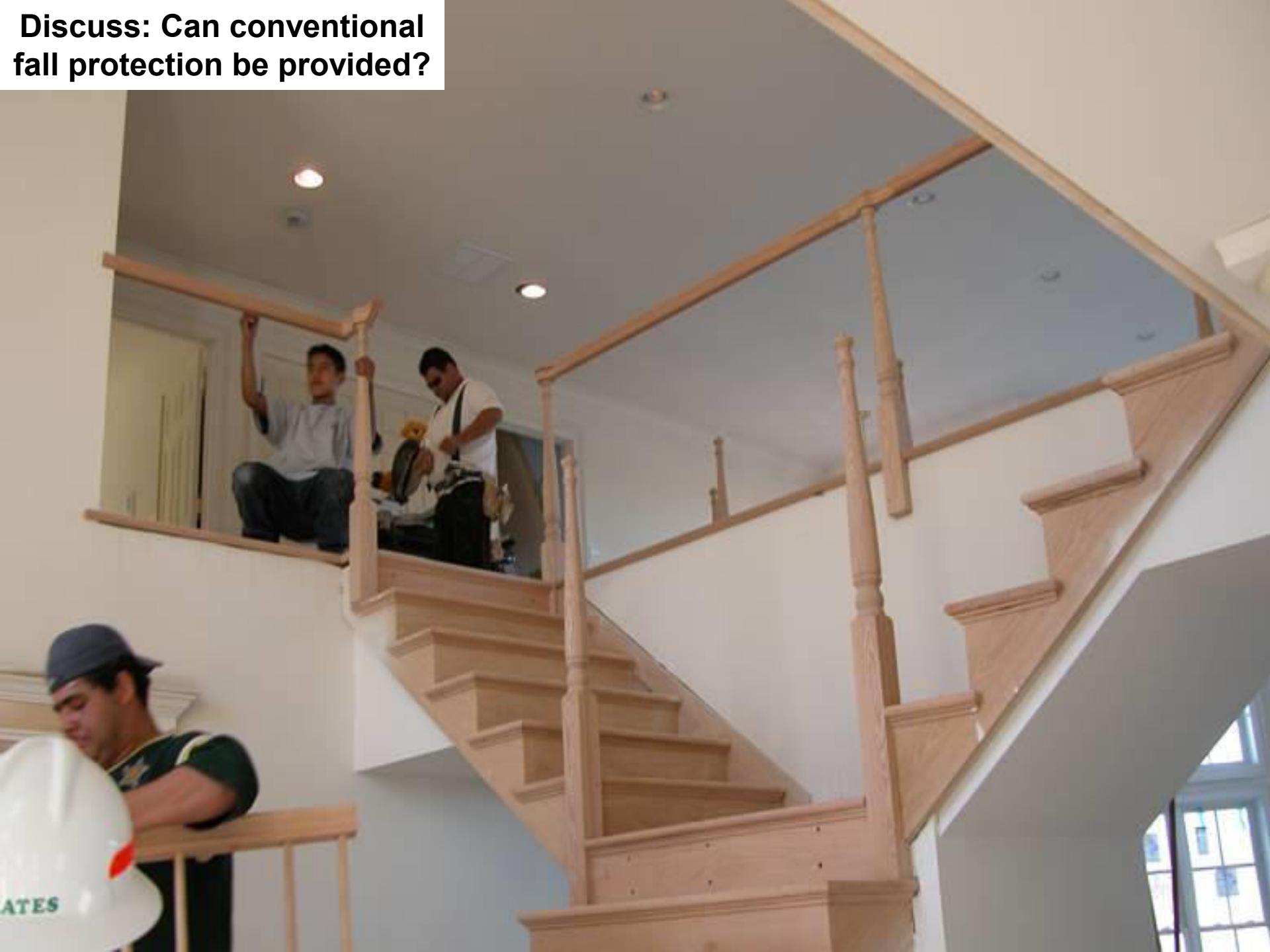
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Post-test and Review

Activity #4



MPSS

THE MILITARY, PUBLIC SAFETY
AND SECURITY DIVISION OF
FLORIDA STATE COLLEGE

Institute of Occupational Safety and Health

Safety Training Presentations

Construction Hazards

FY-11 OSHA Susan Harwood Grant Program



This material was produced under grant number **SH-22297-11** from OSHA. It does not necessarily reflect the views or policies of the U.S. Department of Labor, nor does mention of trade names, commercial products, or organizations imply endorsement by the U.S. Government

Objectives

- Participants will:
- Identify the four major hazards of construction and how to avoid them
- Describe ways to protect themselves from hazards
- Learn how to select and use Personal Protective Equipment (PPE)
- Apply safety procedures when working in or around Trenches, Electrical equipment, Scaffolds and Power Tools

Major hazards of construction

- Falls
- Electrocution
- Being struck by falling objects
- Trapped during excavation



Fall Protection

This section will discuss:

- Conditions that required use of fall protection
- Options available to protect workers

Fall Protection

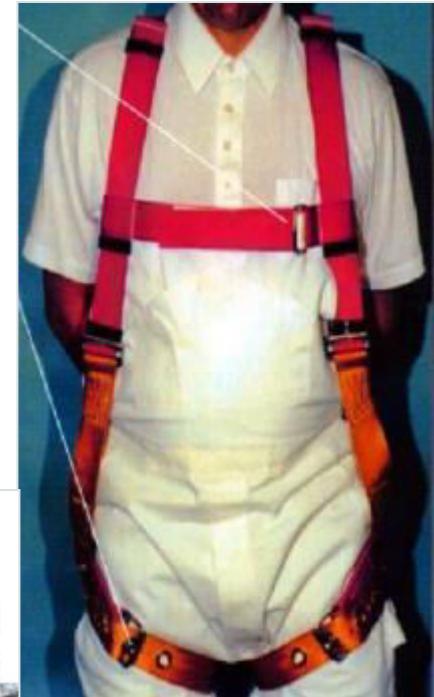
- Falls are the leading cause of fatalities in the construction industry
- Conditions that required use of fall protection
- A fall from as little as 4-6 feet
 - Can cause loss of work
 - In some cases death

When fall protection is needed?

- Walkways & ramps
- Open sides & edges
- Holes
- Concrete forms & rebar
- Excavations
- Roofs
- Wall openings
- Bricklaying
- Residential Construction

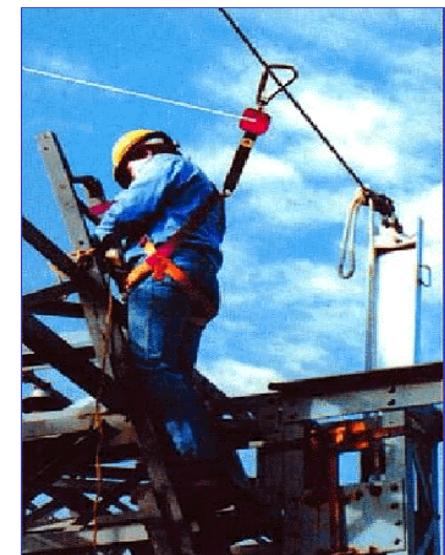
Fall protection and prevention options

- Safety Nets
- Hand Rails
- Safety Harness (PFAS)
- Equipment guards
- *Fall protection systems must be in place before work start*



Personal Fall Arrest System, PFAS

- Must be properly trained
- Key requirements
 - No free fall more than 6 feet
 - Must be inspected prior to use
 - Safety line must be able to support 5000 lbs



Guardrails

- Top rail between 39 to 45 inches tall
- Toeboards at least 3 inches tall

- Top rail
- Mid Rail
- Toe board



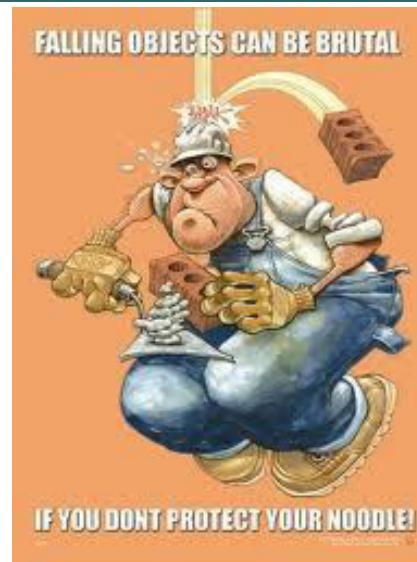
Safety Nets

- Used to catch falling workers
- Placed not more than 30 FT below work area
- Placed not more than 8-13 ft from edge of working area



Falling Objects

- Hardhats are required
- Use of canopies is authorized
- Barricade the area to prevent unauthorized entry



SUMMARY

- A fall of 6 ft or more protection is needed
- Use fall protection on:
- Walkways, ramps, open sides, edges, excavations,

Electrical Safety

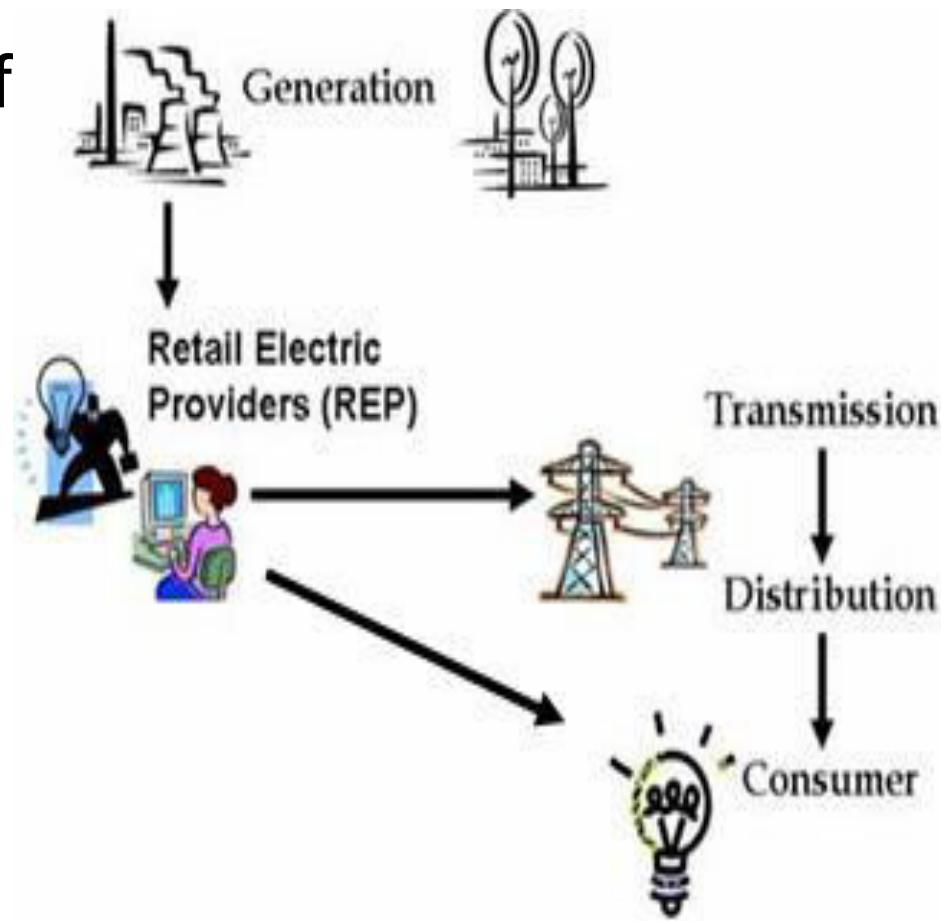
This section will discuss:

- Safety requirement
- Hazard prevention and control
- Most common injuries
- Personal Protective Equipment



How it works

- Electricity is the flow of energy from one place to another
- Requires a source of power (generating station, power station or portable generator)
- Travels in a close circuit



Electrical Safety

- Always assume that all overhead wires are energized
- Never touch a down power line
- Never operate electrical equipment while standing in water
- Coming in contact with an electrical voltage can cause current to flow through the body, resulting in electrical shock and burns. Serious injury **or even death** may occur.

ELECTRICAL ACCIDENTS

Most Frequent Causes

- Contact with Power Lines
- Lack of Ground Fault Protector
- Missing Ground on electric cords
- Improper use of equipment
- Improper use of electric cords

Electrical Hazards

- Electrical accidents are caused by a combination of three factors:
 - Unsafe equipment and/or installation,
 - Workplaces made unsafe by the environment, and
 - Unsafe work practices

Hazard: Exposed electrical parts

- Isolate electrical parts
- Use guards or barriers
- Replace covers



HAZARD:

Conductors entering boxes

- Shall be protected from abrasion
- All openings shall be closed to prevent access



HAZARD:

Overhead Power Lines

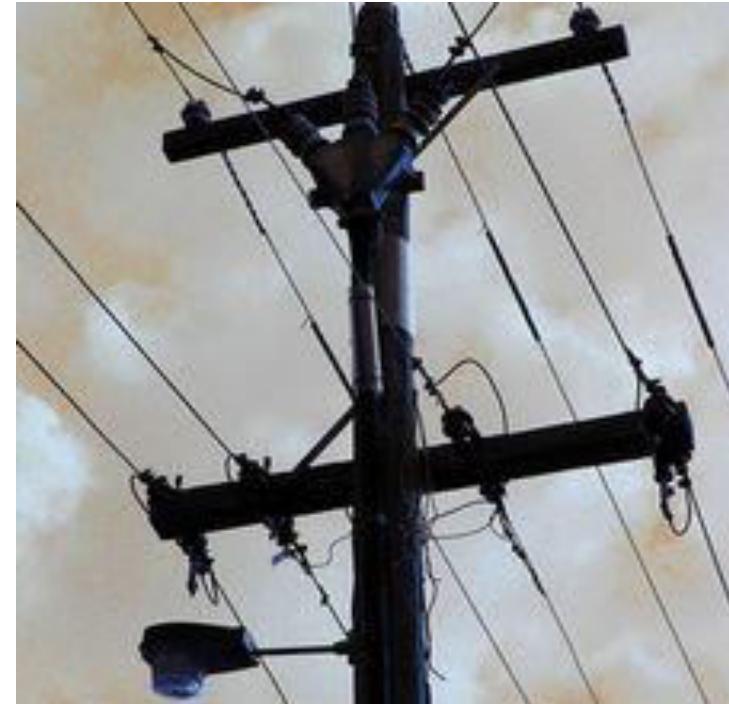
- Usually not insulated
- Carry extremely high voltage
- 80% of all lineman deaths were caused by contacting a live wire with a bare hand.



HAZARD:

Overhead Power Lines (Cont)

- Equipment that could contact power lines:
 - Cranes
 - Scaffolds
 - Ladders
 - Scissor lift



MOST COMMON INJURIES

DIRECT

- Electrocution or death
- Shock
- Burns

INDIRECT

- Falls

Most Common injuries

Electric shock/Electrocution

- Electric shock is received when electrical current passes through the body.
 - Can cause severe damage or death.
 - You will get an electrical shock if a part of your body completes an electrical circuit by...
 - Touching a live wire and an electrical ground,
 - Touching a live wire and another wire at a different voltage.

Most Common injuries: Burns

- Most common shock-related injury
- *Electrical Burns, Arc or Flash Burns, Thermal Burns
- Occurs when you touch electrical wiring or equipment that is improperly used or maintained
- Very serious injury that needs Immediate attention



Most Common injuries

Falls

- Caused by involuntary electric shock
- Occurs on personnel working in elevated locations (ladder, scaffolds, etc)
- May result in serious injury or death



PERSONAL PROTECTIVE: EQUIPMENT

- PPE should always be first line of defense
- Rubber gloves
- Rubber Insulated work boots,
Hoods, sleeves or blankets



SAFETY WORK PRACTICES

- Only qualified person should work on electrical equipment
- Use special insulated tools when working on fuses with energized terminals
- Don't use worn or frayed cords and cables
- Don't fasten extension cords with staples, hang from nails, or suspend by wire.

SAFETY WORK PRACTICES

- De-energize live parts before commencing work
- Lock or Tag out circuits (or both)
- Inspect extension cords
- Avoid contact with overhead lines
- Avoid wet conditions
- Check switches and insulation

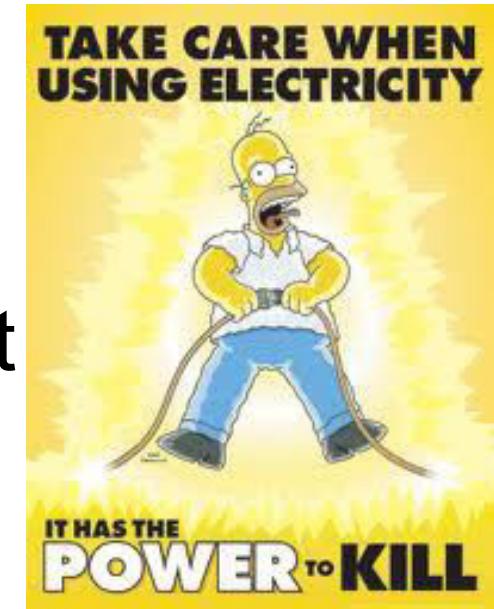
SUMMARY

Electrical equipment must be:

- Listed and labeled
- Free from hazards
- Used in the proper manner

If you use electrical tools you must be:

- Protected from electrical shock
- Provided necessary safety equipment



ARE YOU WORKING ON A TRENCH OR DIGGING YOUR GRAVE?



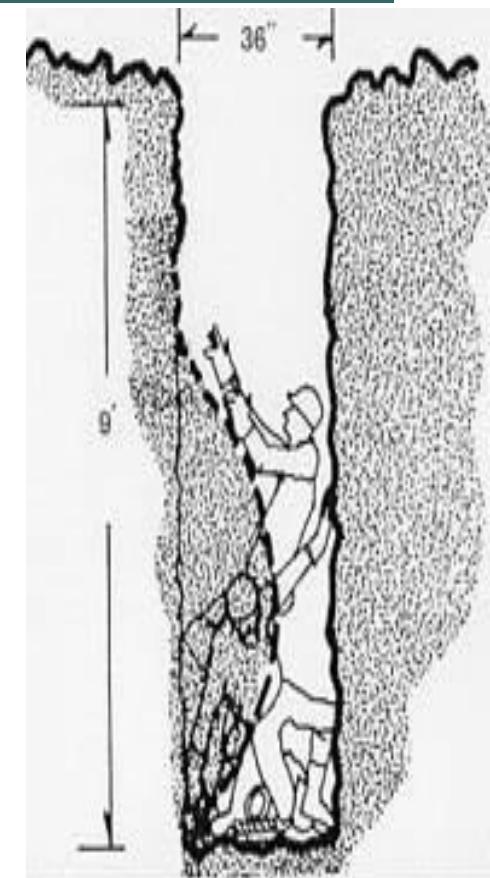
TRENCHING & EXCAVATION HAZARDS

- Risks of excavation
- How to protect employees from cave-ins
- Factors that pose a hazard to employees working in excavation
- Role of competent person

EXCAVATION HAZARDS

Risks

- Most hazardous construction operation
- Cave-ins are the greatest risk
- Most accidents occurred in 5-15 ft deep



EXCAVATION HAZARDS

Employee Protection

- Employees should be protected from caves-in by using a well designed protective system
- Systems must be able to support expected loads to the system

EXCAVATION HAZARDS

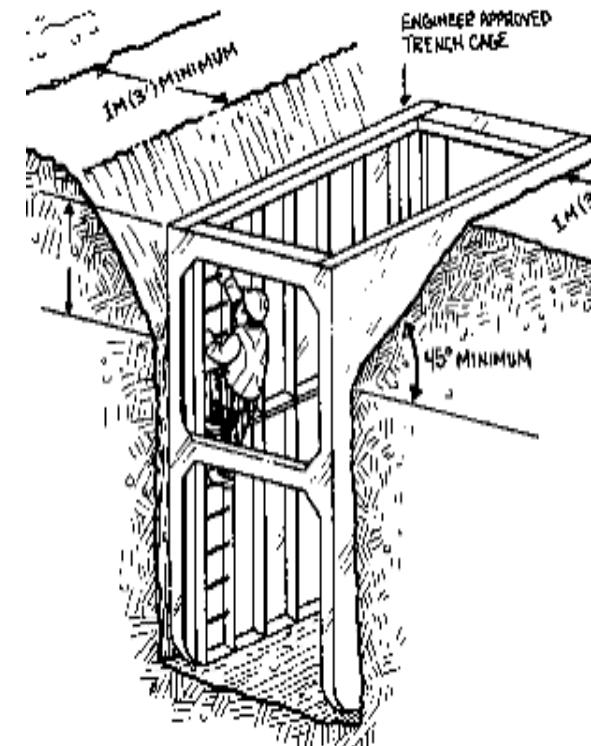
Protective System Design

- A well designed system will have a correct design of sloping and benching systems
- Correct design of support systems
- Handle materials and equipment

EXCAVATION HAZARDS

Employee Protection

- Protect employees from potential cave-ins
- Slope or bench sides of excavation
- Place shields between the side of the excavation and work area



Inadequate Worker Protection



Factors that pose hazards to employees

- Soil classification
- Depth of cut
- Water content of soil
- Changes due to weather and climate
- Other operations in the vicinity

Types of Protection

Trench Shield



A trench shield
was built around
this work area

Hydraulic Jacks



Hydraulic Jacks

- Easily dropped in place and adjusted
- Trench pins installed in case of hydraulic failure

Egress Systems

- A stairway, ladder, or ramp must be present in excavations that are 4 or more feet deep, and within 25 feet of the employees
- Must extend 3FT above excavation



EXCAVATION HAZARDS

Competent Person

- Must have had specific training in and be knowledgeable about:
 - Soils classification
 - The use of protective systems
 - The requirements of the standard
- Must be capable of identifying hazards, and authorized to immediately eliminate hazards

EXCAVATION HAZARDS

Competent Person

- A competent person must make daily inspections of excavations, areas around them and protective systems:
 - Before work starts and as needed
 - After rainstorms, high winds or other occurrence which may increase hazards
 - When you can reasonably anticipate an employee will be exposed to hazards.

SUMMARY

- The greatest risk in an excavation is a cave-in.
- Employees can be protected through sloping, shielding, and shoring the excavation.
- A competent person is responsible to inspect the excavation.
- Other excavation hazards include water accumulation, oxygen deficiency, toxic fumes, falls, and mobile equipment

OSHA Contact Numbers

To report Unsafe Working Conditions, Safety and Health Violations Contact OSHA @:

1-800-321-OSHA (6742) / TTY 1-877-889-5627

To File a Complaint Form:

To file an OSHA-7 report online, see how to file a complaint with OSHA (www.osha.gov)

For more information regarding your rights, see Worker Rights

References

- 29 CFR 1926 Safety and Health Regulations for construction
- 29 CFR 1926.Subpart E- Personal Protective Equipment
- 29 CFR 1926 Subpart K – Electrical
- 29 CFR 1926 Subpart L – Scaffold
- 29 CFR 1926 Subpart M – Fall Protection
- 29 CFR 1926 Subpart P – Excavations
- 29 CFR 1926 Subpart T - Demolition



MPSS

THE MILITARY, PUBLIC SAFETY
AND SECURITY DIVISION OF
FLORIDA STATE COLLEGE

Institute of Occupational Safety and Health

Safety Training Presentations

**Heavy Equipment Safety
Awareness**

FY-12 OSHA Susan Harwood Grant Program



This material was produced under grant number **SH22297-SH1** from OSHA. It does not necessarily reflect the views or policies of the U.S. Department of Labor, nor does mention of trade names, commercial products, or organizations imply endorsement by the U.S. Government.

Objectives:

- Participants will:
- Recognize potential hazards of various equipment
- Implement hazard prevention and controls
- Be familiar with OSHA's role and standards regarding heavy equipment hazards
- Prevent other potential hazards

Heavy Equipment Hazards

- Mobile heavy equipment at construction sites is a major cause of fatalities:
 - Electrocuted if equipment touches an overhead power line
 - Crushed if vehicle overturns
 - Run over by a backing vehicle
 - Crushed if caught between a wall or other vehicle or structure

Hazard Prevention and Controls

- Pre-Construction work site analysis.
- Spotters Provided for in-the-blind, backing machines and/or equipment.
- Perimeter Fencing, Enclosures, signs
- Temporary Barricades around Hazards.

Hazard Prevention and Controls

Pre-Construction site analysis

- Identify Potential Known Hazards.
- Employee Training?
- Job Conditions: Haul Roads, Access Points, Proper light if working at night
- Location of Storage Areas, office buildings.
- Tool, Storage and Change Trailers.

Hazard Prevention and Controls

Spotters

- Necessary around vehicles or equipment when:
 - A driver or operator does not have a full view of the intended path of travel
 - Backing with limited visibility or space
 - Backing or maneuvering trailers
 - Maneuvering with limited space

Spotters Hand Signals



Straight Back



Back Right



Back Left

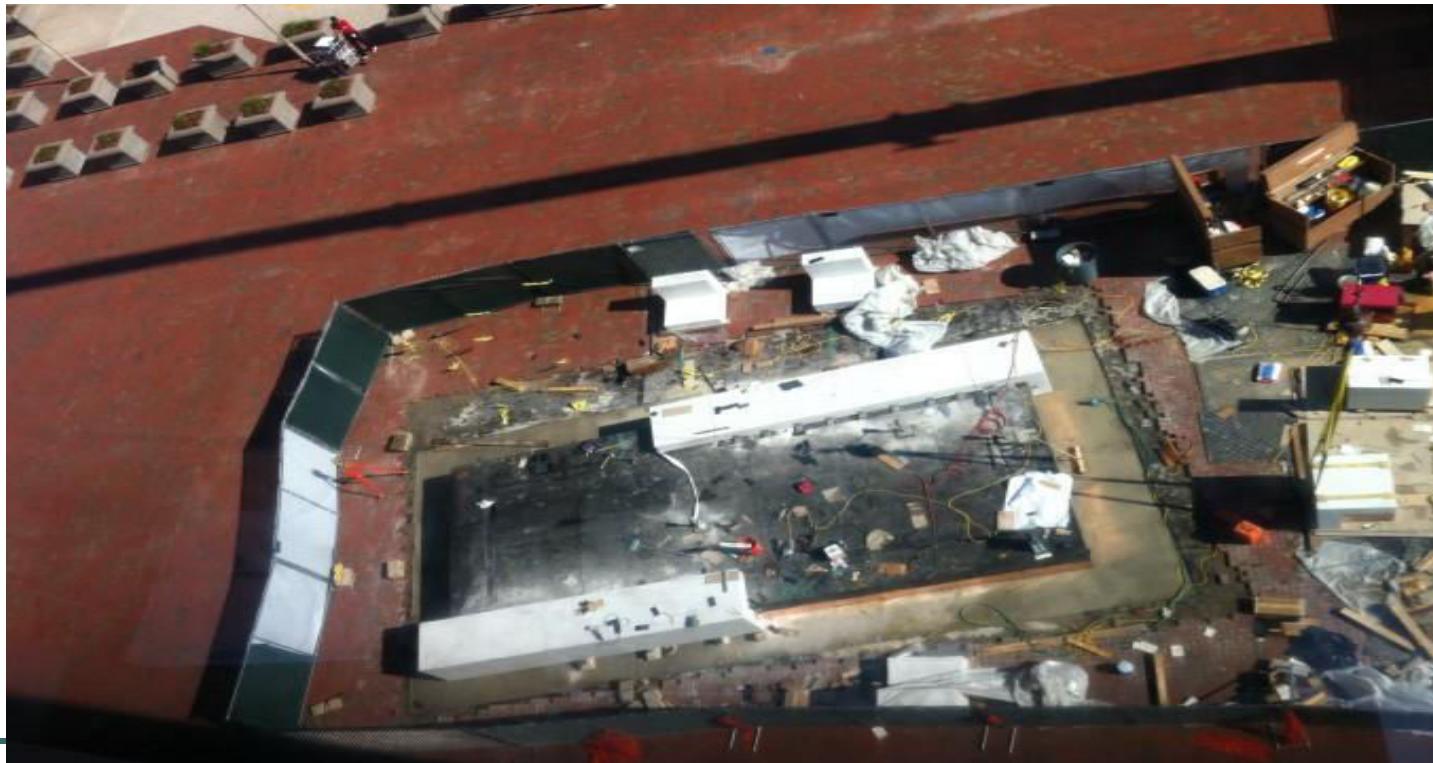


STOP

Hazard Prevention and Controls

Perimeter Fencing

- Necessary around vehicles or equipment to safeguard employees



Working Around power lines



Working Near Power Lines

- A spotter must be present
- Must have a clear view of the power line and the equipment operator, and be able to immediately inform the operator of any danger.
- A dedicated power line spotter may be required to watch distance to power lines.

Crane Hand Signals (Spotters)



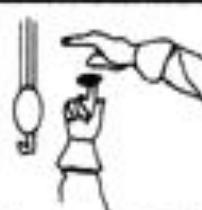
Main Hoist



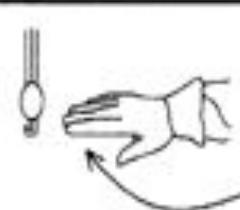
Auxiliary Hoist



Hoist Load



Hoist Load Slowly



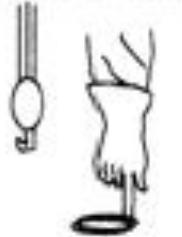
Stop



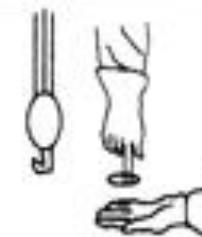
Raise Boom



Raise Boom & Lower Load



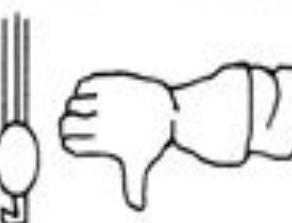
Lower Load



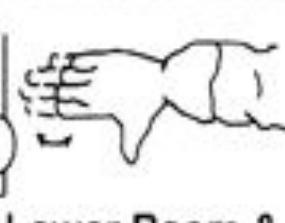
Lower Load Slowly



Emergency Stop



Lower Boom



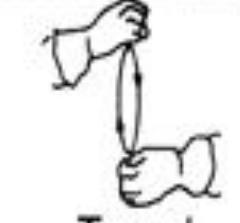
Lower Boom & Raise Load



Swing Boom



Swing Boom Slowly



Travel
(mobile eqpt)



Retract Boom
2 hands



Retract Boom
1 hand



Extend Boom
2 hands



Extend Boom
1 hand



Dog Everything

OSHA Prevention Videos (V-Tool)

- Struck by accidents – Vehicle Back up

OSHA Prevention Videos (V-Tool)

- Struck by accidents – Swinging Crane
- www.osha.gov

Prevention Videos

- Heavy Equipment and Crane Accidents

www.heavyconstructionacademy.com/certifications/

Summary

- Be aware of your surroundings
- Always use a spotter when backing up Heavy Equipment
- The use of spotters can save lives
- Safeguard working area by establishing a safety perimeter

Helpful OSHA Resources

- OSHA has many helpful programs, including assistance about safety and health programs, state plans, workplace consultations, voluntary protection programs, strategic partnerships, training and education, and more
- OSHA Heavy Equipment E-Tool:
<http://www.osha.gov/SLTC/etools/hurricane/heavy-equip.html>

OSHA Contact Numbers

To report Unsafe Working Conditions, Safety and Health Violations Contact OSHA @:

1-800-321-OSHA (6742) / TTY1-877-889-5627

To File a Complaint Form:

To file an OSHA-7 report online, see how to file a complaint with OSHA (www.osha.gov)

For more information regarding your rights, see Worker Rights

References

- [29 CFR 1926 Subpart O](#), Motor vehicles, mechanized equipment, and marine operations. OSHA.
- [29 CFR 1926.251](#), Rigging equipment for material handling. OSHA Standard.
- [29 CFR 1910.178](#), Powered industrial trucks. OSHA Standard.
- [29 CFR 1926](#),
- [29 CFR 1926.61 Retention of DOT Markings](#)



MPSS

THE MILITARY, PUBLIC SAFETY
AND SECURITY DIVISION OF
FLORIDA STATE COLLEGE

Institute of Occupational Safety and Health **Road Safety & Awareness Training**

Your “Right to Know” **29 CFR 1926 / DOT MUTCD**

This material was produced under grant number SH22297-SH1 from OSHA. It does not necessarily reflect the views or policies of the U.S. Department of Labor, nor does mention of trade names, commercial products, or organizations imply endorsement by the U.S. Government.

Objectives: Participants Will:

- Describe purpose of traffic control devices
- Interpret OSHA's role and standards regarding road safety / hazards
- Implement and define basic fundamentals of road safety
- Identify road hazards
- Recognize and implement safety methods to protect themself and co-workers from road hazards

Work zone Traffic Safety

- According to the Bureau of Labor Statistics, workers struck by vehicles or mobile equipment account for the highest number of fatal work injuries
- **844 killed from 1995-2002**



Traffic Control Devices

- Promote highway safety
- Notify road users of regulations
- Provide warning and guidance needed for the operation of the traffic stream
- Is intended to minimize crashes
- *Ref: MUTCD (Manual of Uniform Traffic Control Devices)*

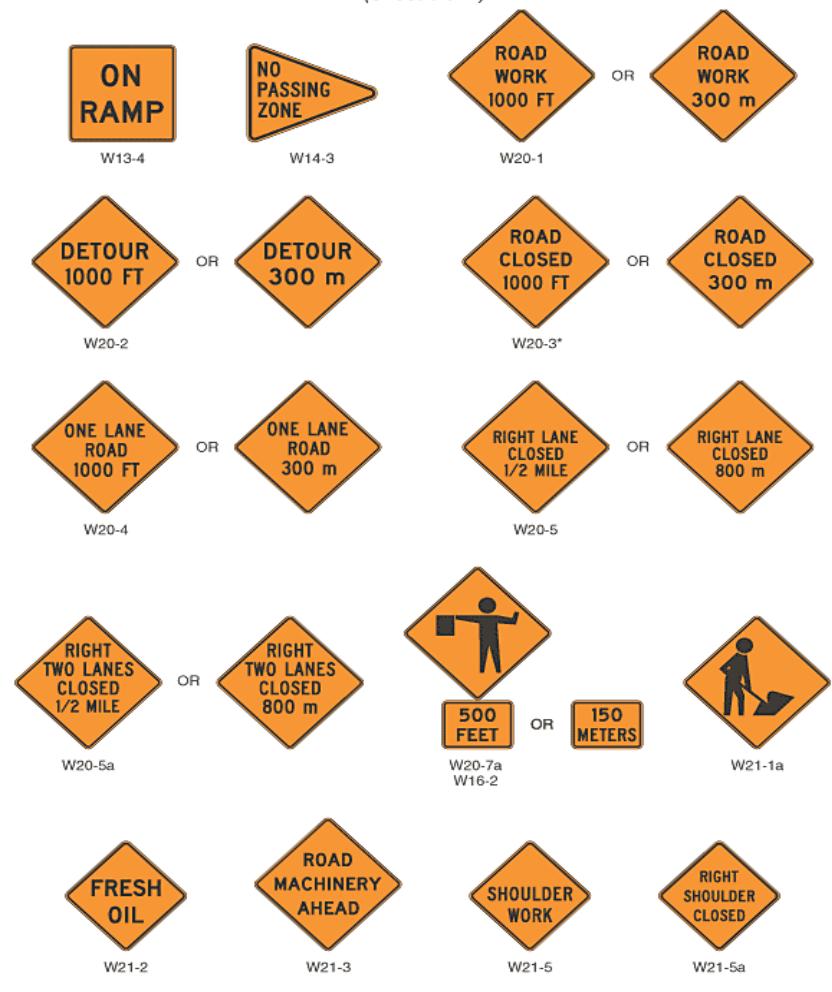
Flaggers



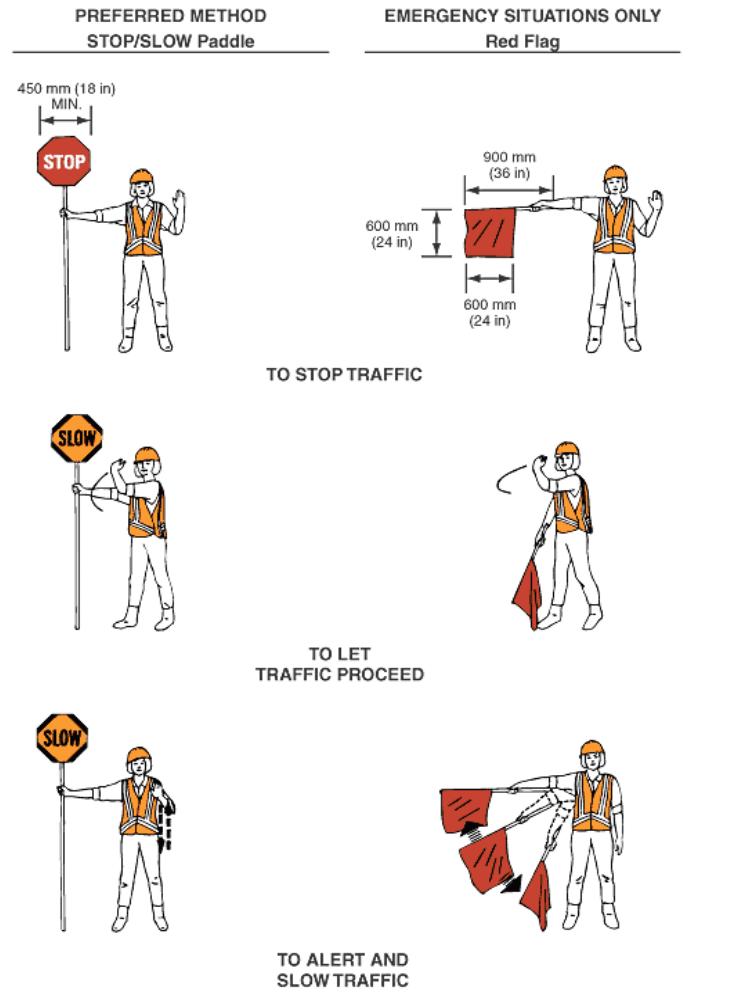
Signs and Signals

1926.201 and MUTCD Part VI

*Figure 6F-4. Warning Signs in Temporary Traffic Control Zones
(Sheet 3 of 4)*



* An optional STREET CLOSED word message sign is shown in the "Standard Highway Signs" book.



Flaggers

- Responsible for public safety
- Must received proper training
- Able to recognize dangerous traffic situations and warn workers
- Must not be assigned any other duties

Work Safety Consideration

Flagger Training

- All workers should be trained on:
 - Working safely adjacent to vehicular traffic
 - Work zone traffic control techniques
 - Device Usage
 - Safety devices
 - Traffic control devices
 - Placement of traffic control devices
- Relevant OSHA Regulation
 - 29 CFR 1926.21, Safety Training and Education

Flaggers

- Must stand in the closed lane/shoulder
- Exception: when road use have stopped
- When directing backing vehicles, flagger must remain visible to the driver



Flaggers

- Flaggers must not use devices which may distract the vision, hearing or attention
 - Cell phones
 - Pagers
 - Radios
 - Headphones

Single and Two Flagger Operations

- Single Flagger Operations
 - Low volume traffic (country roads, single lane)
- Two Flagger Operations
 - High volume roads
 - Intersections
 - Long Distance

Flaggers Safety Equipment

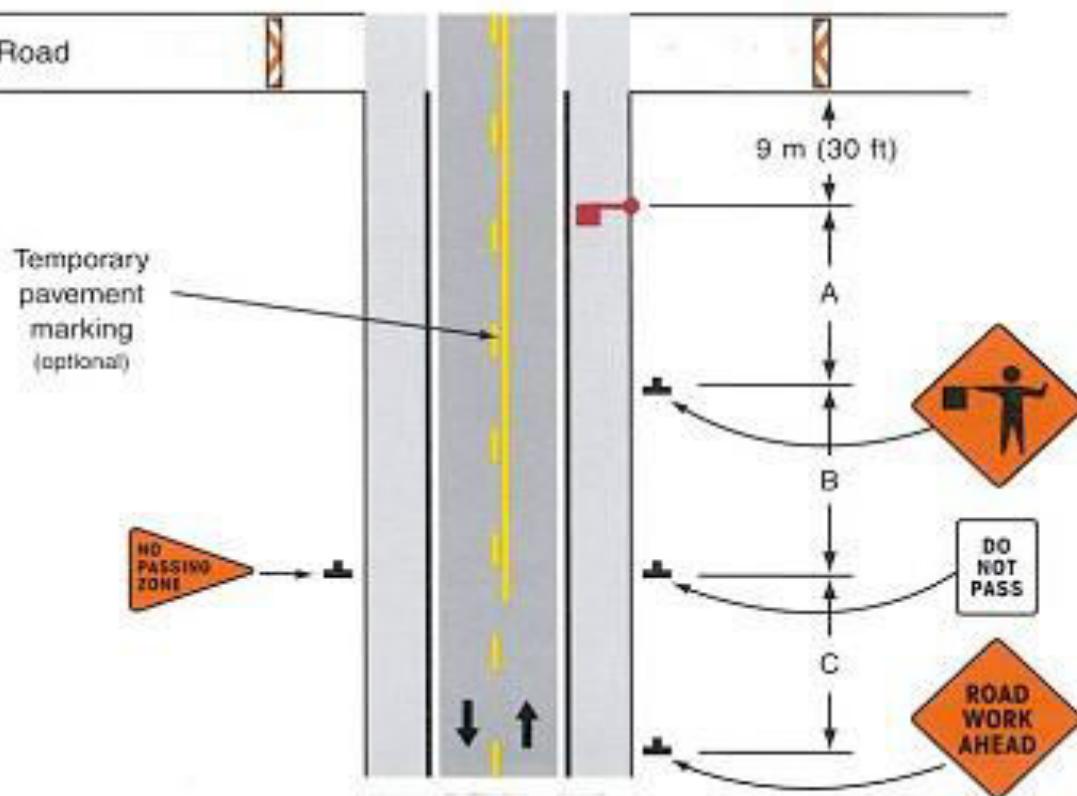


Work Zones

- Advance warning area
- Transition area
- Buffer space
- Activity area
- Termination area

Work Traffic Control

Haul Road



Termination

Buffer Space

Transitional Area

Warning Area

Advanced work zone Transition Area

- Temporary Traffic Control (TTC) Plan
- Barricades, Barriers and Vertical Panels
- Revised lane markings
- Signs
- Cones
- Flagger

Highway construction warning signs



- Must be visible
- Electronic signs must not be used to promote business



Warning Signs



CAUTION
LOOK OUT FOR
CONSTRUCTION
TRAFFIC



Summary

- Flaggers must be trained
- Only used when other methods (signs, signals and barricades) do not provide necessary protection
- Maintain situational awareness
- Protective clothing
- Additional information provided in the MUTCD

References

- 29 CFR 1926 – Signs , Signals & Barricades (1926.200)
- DOT Manual Uniform Traffic and Control devices 2009 edition
- 29 CFR 1926.21, Safety Training and Education

Fall Protection for the Construction Industry

Train the Trainer

Hispanic Contractors Association
de San Antonio/OSHA
Susan Harwood Training Grant
SH-22298-11-60-F-48

Prepared by SHORM Consulting



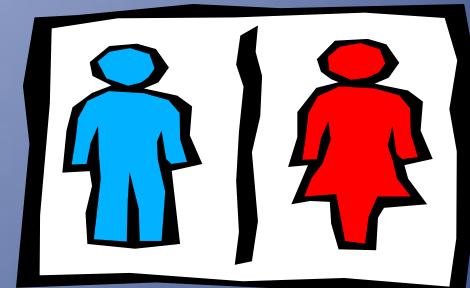
Disclaimer

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WELCOME/BIENVENIDOS

- IMPORTANT ITEMS:

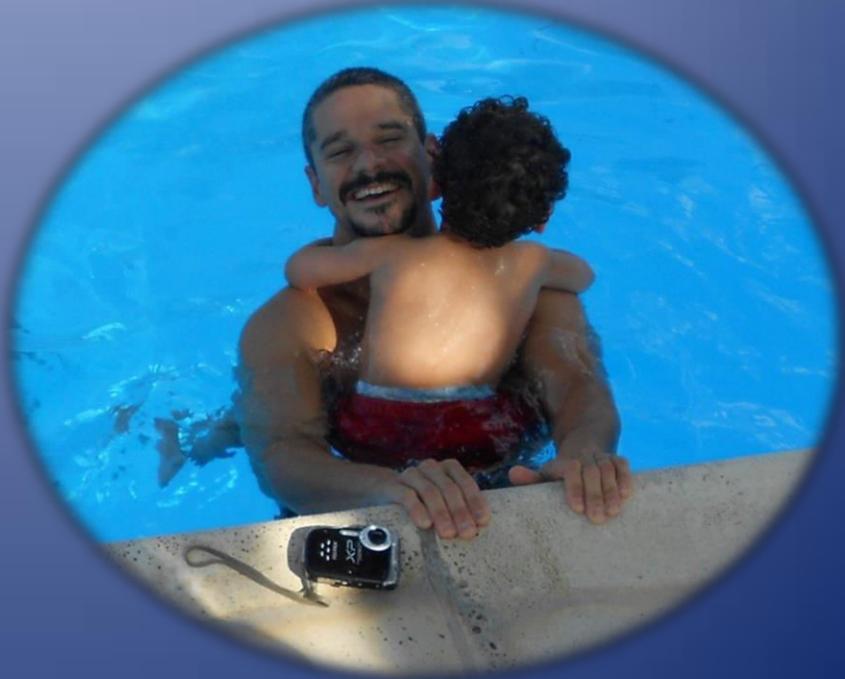


WHO ARE THESE TRAINERS?



NO, YOU!

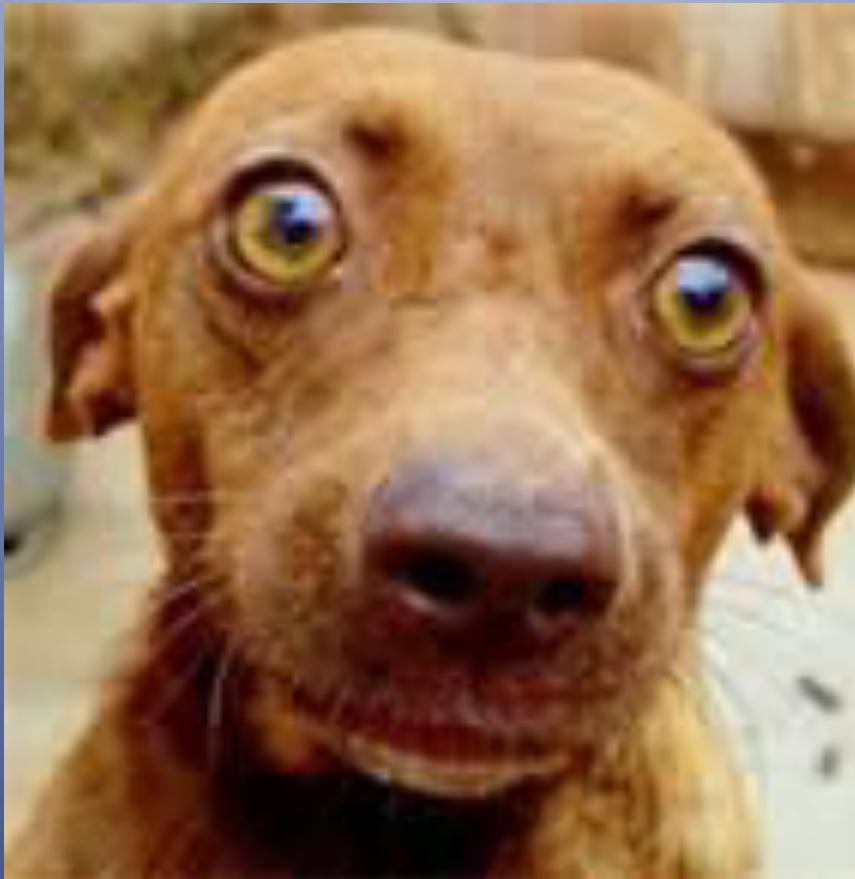
WHO ME?



TRAIN THE TRAINER? HOW?



TRAINERS NEED:



TO GRAB STUDENTS ATTENTION!

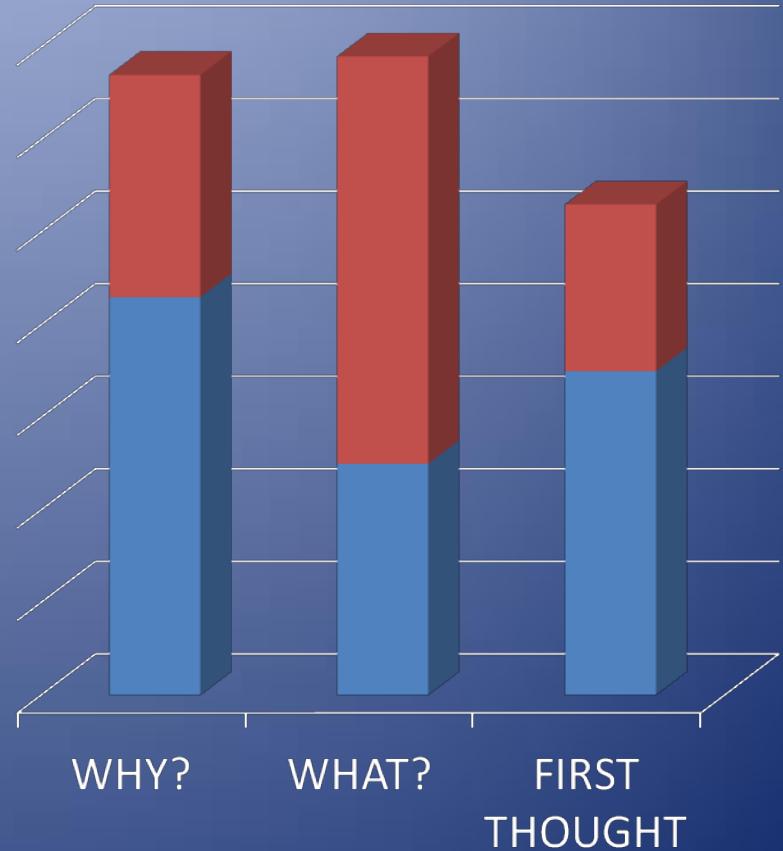
IF THEY DON'T, THEN:



SO WHY ARE YOU HERE?

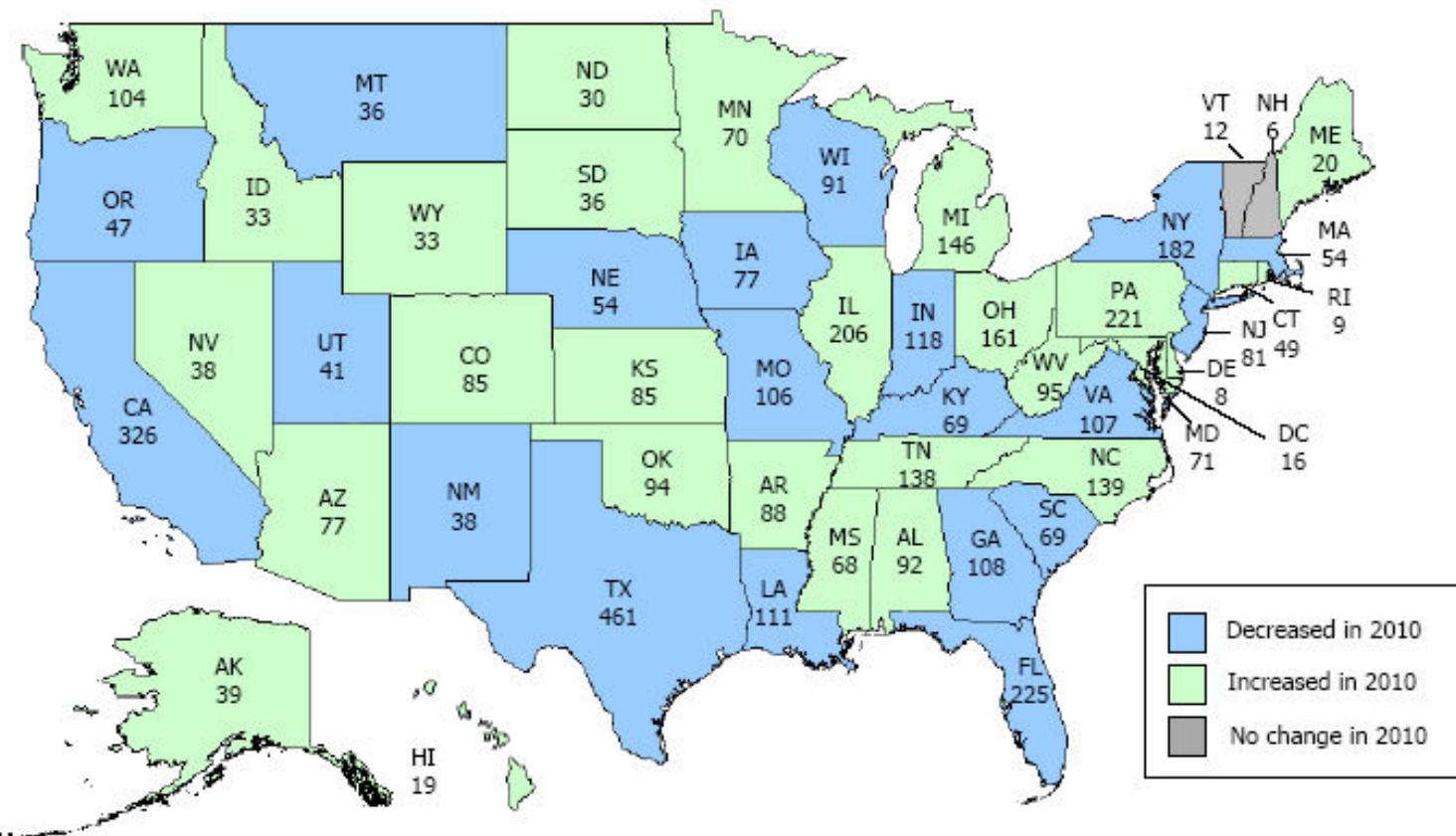
Write down 3 things:

1. Why are you here?
2. What about fall protection?
3. The first thing that comes up when you think about falls



SO WHY ARE YOU HERE?

Number of fatal work injuries, by State, 2010

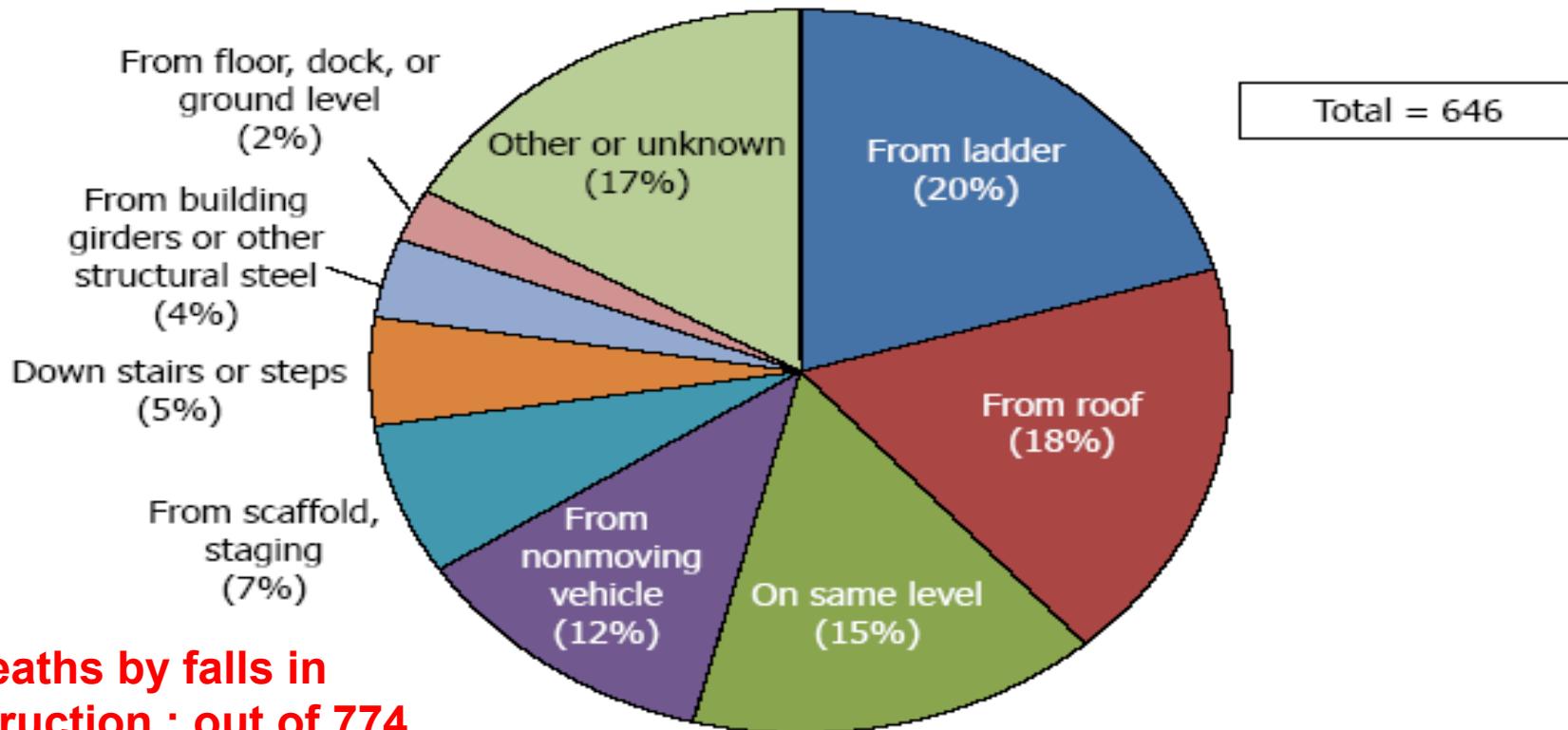


Twenty-eight states and the District of Columbia had more fatal injuries in 2010 than in 2009. Twenty states had fewer fatal workplace injuries in 2010 compared to 2009. New Hampshire and Vermont had the same number of fatal injuries in 2010 as in 2009.

SOURCE: U.S. Bureau of Labor Statistics, U.S. Department of Labor, 2012.

SO WHY ARE YOU HERE?

Work-related fatal falls, by type of fall, 2010



**264 deaths by falls in
Construction ; out of 774
total Industry fatalities.
2010.**

Of the 646 fatal falls in 2010, nearly two-fifths involved falls from ladders or roofs.

NOTE: Percentages may not add to totals because of rounding.

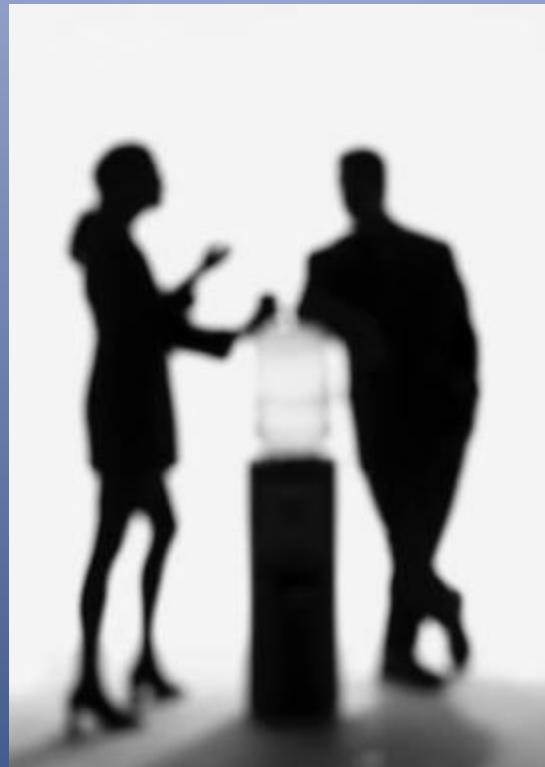
SOURCE: U.S. Bureau of Labor Statistics, U.S. Department of Labor, 2012.

SO WHY ARE YOU HERE?

NUMBERS DON'T LIE!

- Falls from Elevations by roofers cost approximately \$106,000 each (\$70K, for medical bills)
- Falls from Elevations by Carpenters cost over \$97,000 each (\$68K for medical bills)
 - Falls from ladders or scaffolds by roofers cost approximately \$68,000 each (\$43K, for medical bills)
 - Falls from ladders or scaffolds by carpenters cost nearly \$62,000 each (\$36K, for medical bills)
- The average cost of a fall from elevation for all other occupational classifications was under \$50,000

BREAK!



Train the Trainer

Fall Protection

- The Players
 - Occupational Safety & Health Administration (OSHA)
 - The Employer/Supervisor
 - The Employee

Fall Protection Training

IMPORTANT ITEMS TO COVER:

- RIGHTS & RESPONSIBILITIES
 - (EMPLOYER/EMPLOYEE)
- CONVENTIONAL vs. NON-CONVENTIONAL
- ARREST vs. POSITIONING/RESTRAINT
- OSHA STANDARDS/REGULATIONS

Rights & Responsibilities

- **EMPLOYERS**
 - Provide a workplace free from recognized hazards and comply with OSHA standards
 - Provide training
 - Protect all employees
 - Provide the necessary Personal Protective Equipment (PPE)
- **EMPLOYEES**
 - Have a safe and healthful workplace
 - Receive training
 - Obey and comply with OSHA
 - Identify and report safety hazards
 - Request hazard correction



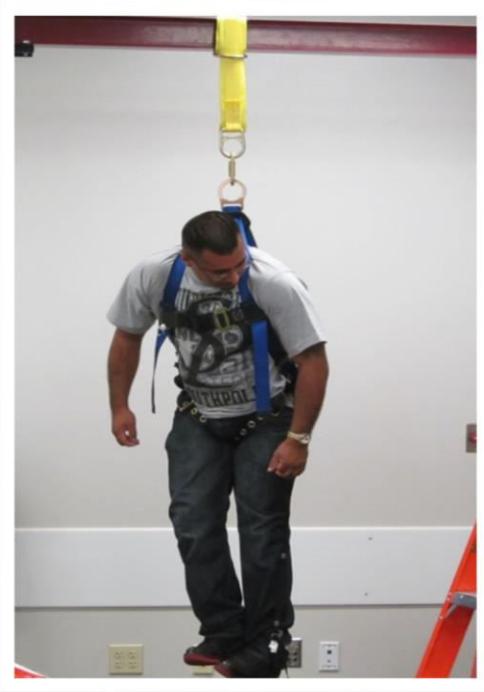
Fall Protection

CONVENTIONAL

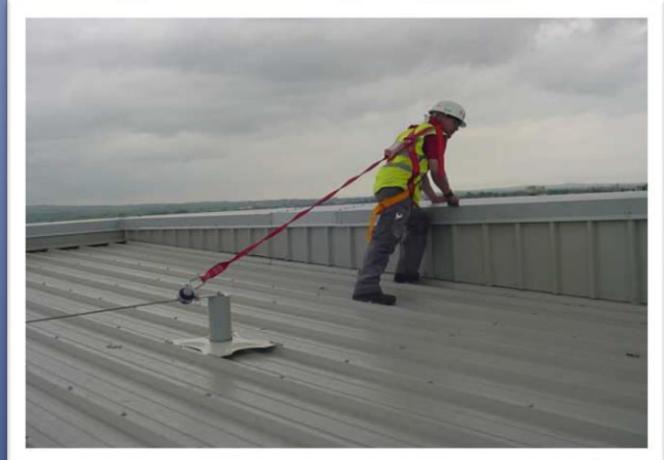
Vs.

NON-CONVENTIONAL

Fall Protection



ARREST
Vs.



POSITIONING/RESTRAINT

FALL PROTECTION IN CONSTRUCTION

- **6 Ft.** GENERAL FALL PROTECTION- *Subpart M*
(1926.500 – 1926.503)
- **10 Ft.** Scaffolds – *Subpart L*
(1926. 450 – 1926.454)
- **15 – 30 Ft.** Steel Erection – *Subpart R*
(1926.750 – 1926.761); Non-CDZ & Inside CDZ
- **+30 in.** Stairways & Ladders – *Subpart X*
(1926.1050 – 1926.1060)
- *New Residential Guidance 1926.501*

Train the Trainer

Safety Meeting or Safety Training?

- Who can conduct a safety meeting or training session?

YOU CAN!

- SAFETY MEETING
 - Informal
 - Specific Reason or General Issue
 - Imparts Knowledge
 - Expect Cooperation from Attendees
 - Attendees should be able to ask questions
 - Sign-in for Attendance Documentation



- SAFETY TRAINING
 - Required Documented Training
 - Expected Outcome (Objectives)
 - Method of Training
 - Classroom Lecture/Demonstration
 - Video and/or PowerPoint Presentation
 - Testing
 - Written – Oral – Performance Evaluation



Trainer

- KNOW YOUR AUDIENCE
 - Who are they? (age, length of employment, type of work, experience; supervisor / non-supervisor)
 - What do they need to know?
 - How will they receive the information?
 - Will they understand the data?
 - Testing
 - **LANGUAGE: MUST BE DONE IN THE EMPLOYEE'S LANGUAGE (English, Spanish, Other)**

Trainer

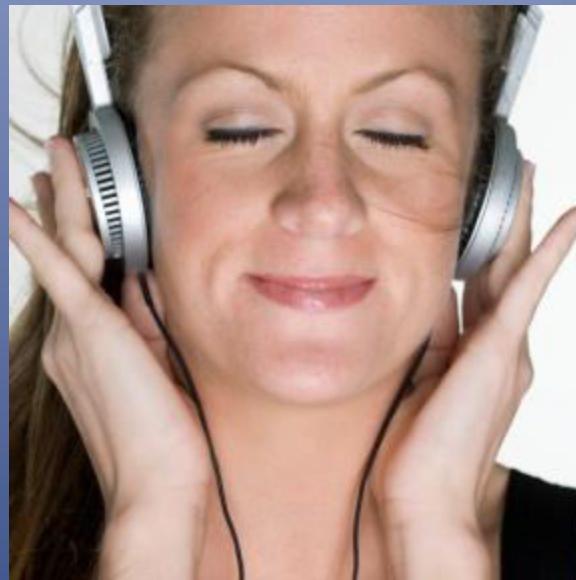
- MEETING DAY DECISIONS:
 - Length of Training
 - Handouts
 - Location for Meeting (No Disturbances)
 - Standing Up or Sitting Down
 - Proper equipment/supplies on hand
 - Sign-In Sheet (Individual or Group)

Trainer

- SUBJECT OF MEETING/TRAINING:
 - Be familiar with the subject
 - Organize presentation in logical format
 - Be prepared to answer questions
 - What would you ask?
 - Practice, Practice & Practice
- What do you want your audience to know?

Trainer

- Remember the 3 types of learning:



and, The Adult Learning Theory!

QUESTIONS?



Online Resources

- <http://www.osha.gov/>
- <http://www.osha.gov/stopfalls/index.html>
- <http://www.osha.gov/as/opa/spanish/index.html>
- [http://www.osha.gov/dcsp/compliance assistance/spanish dictionaries.html](http://www.osha.gov/dcsp/compliance_assistance/spanish_dictionaries.html)
- <http://stopconstructionfalls.com/>
- <http://www.cdc.gov/niosh/construction/stopfalls.html>
- <http://bls.gov/iif/>
- <http://www.tdi.texas.gov/wc/txcomp.html>
- <http://www.texasmutual.com/safety/safety.shtml>
- <http://www.millerfallprotection.com/>
- http://solutions.3m.com/wps/portal/3M/en_US/PPESafetySolutions/PPESafety/PersonalProtectiveEquipment/Construction/
- <http://en.capitalsafety.us/>

Fall Protection Training

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CONTACT INFORMATION:

Please contact the Department of Construction Management, University of Washington if you have any questions or comments about the materials.

All information available at

[http://cm.be.washington.edu/Research/SHARE/
2011OSHA/index.html](http://cm.be.washington.edu/Research/SHARE/2011OSHA/index.html)

FALLS FROM LADDERS, SCAFFOLDS AND ROOFS CAN BE PREVENTED!

Fall Protection Safety Training Suite

Department of Construction Management, University of Washington



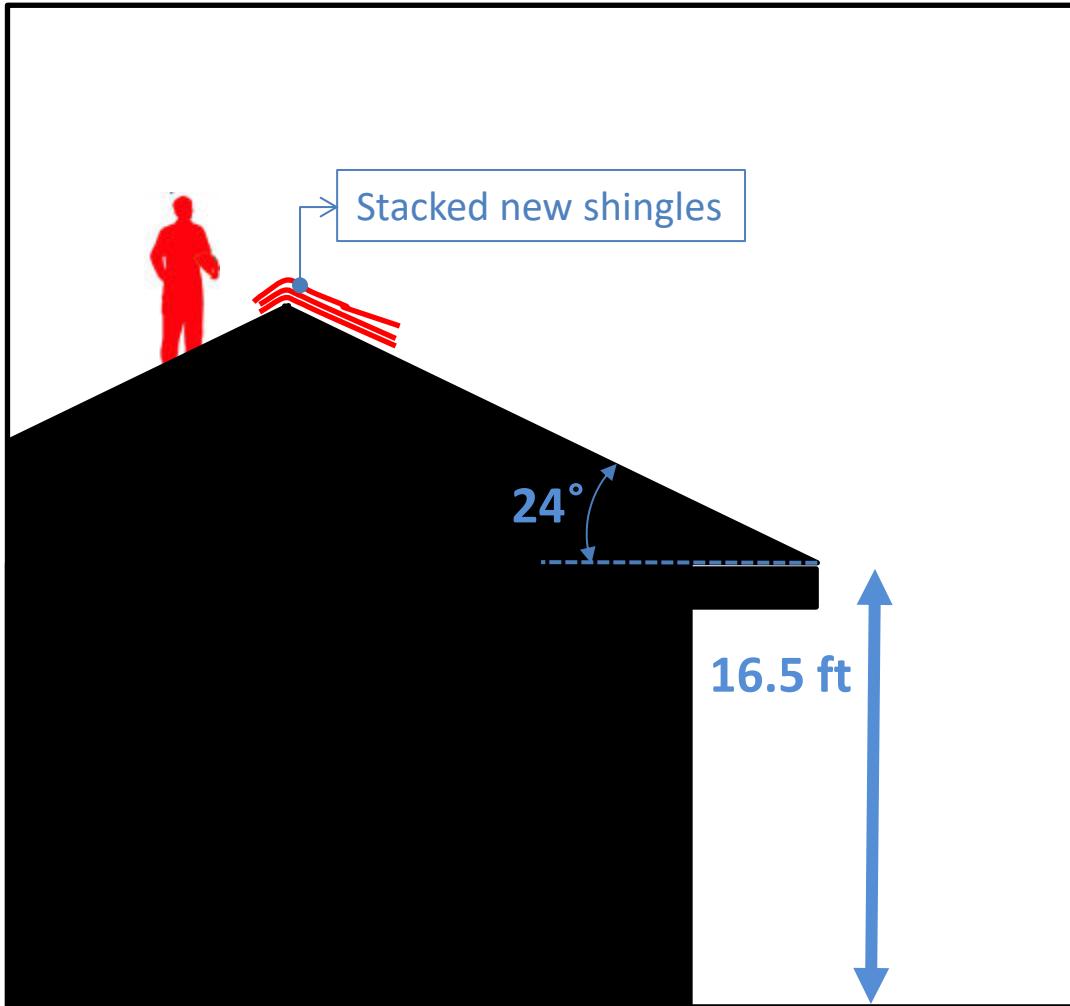
English **Español**

About **unity**

Case 1

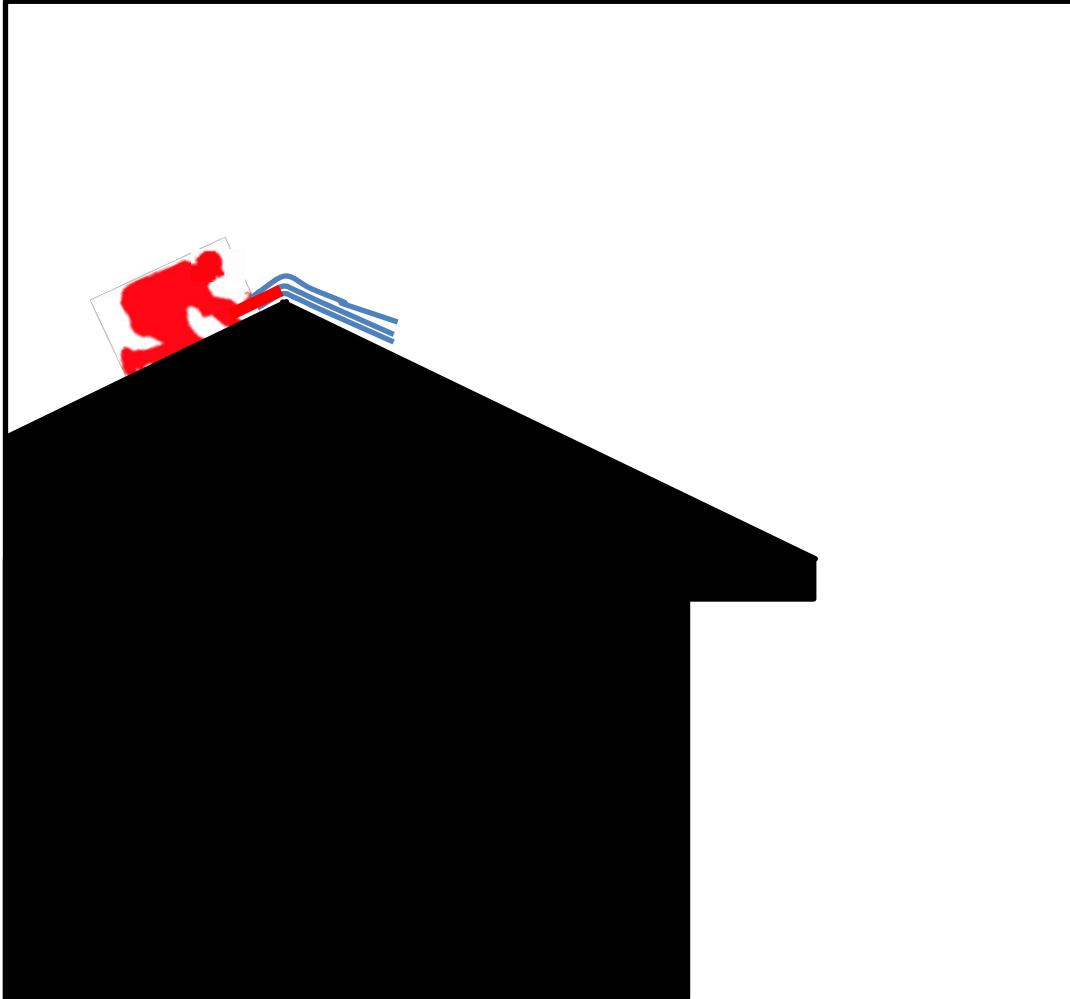
When removing old shingles at the peak of a pitched roof of a residential building, a roofing helper struck with his body the new stacked bundle of shingles located next to him. The victim chased the shingles to stop them from falling off the roof, lost his balance and fell 16.5 feet.

1

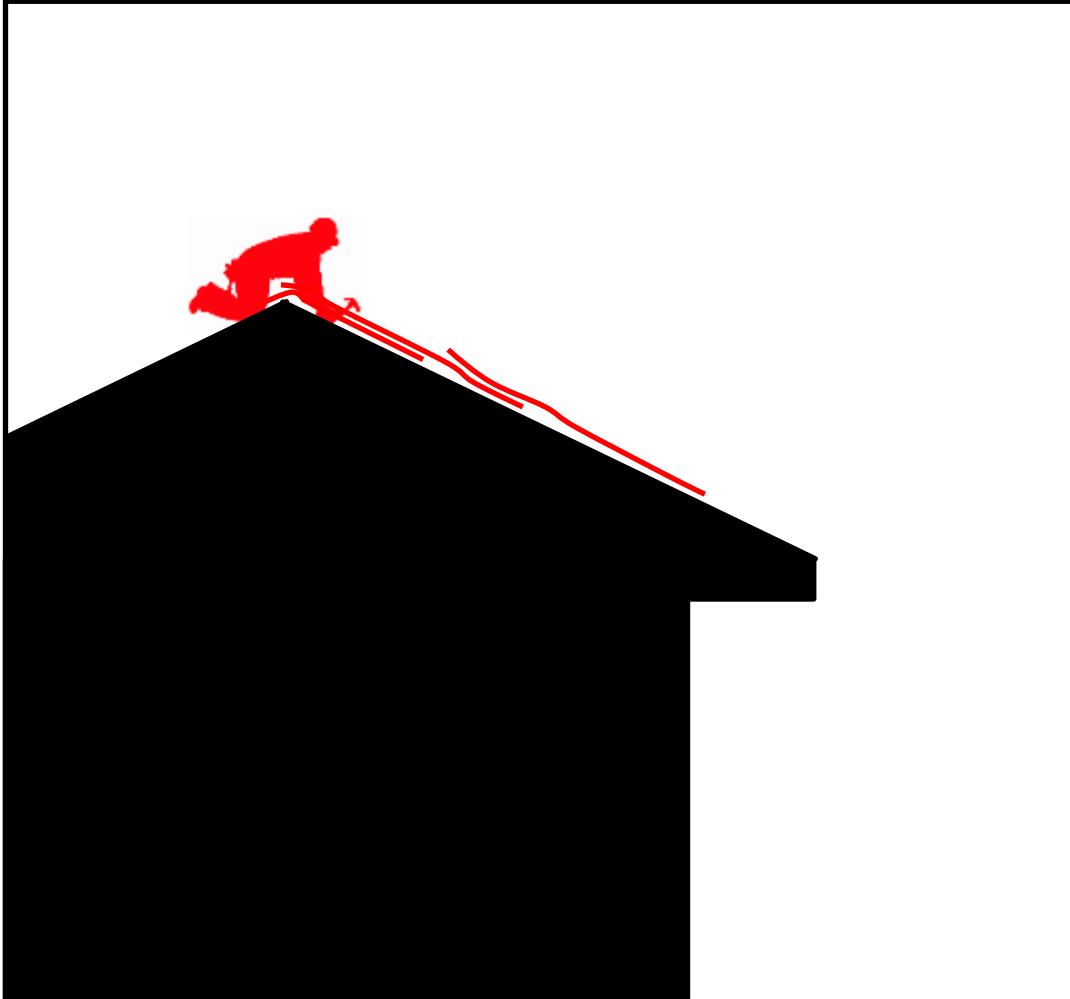


“Remove old shingles and install new ones.” (3-tab asphalt composite roofing shingles (1’*3’*4”))

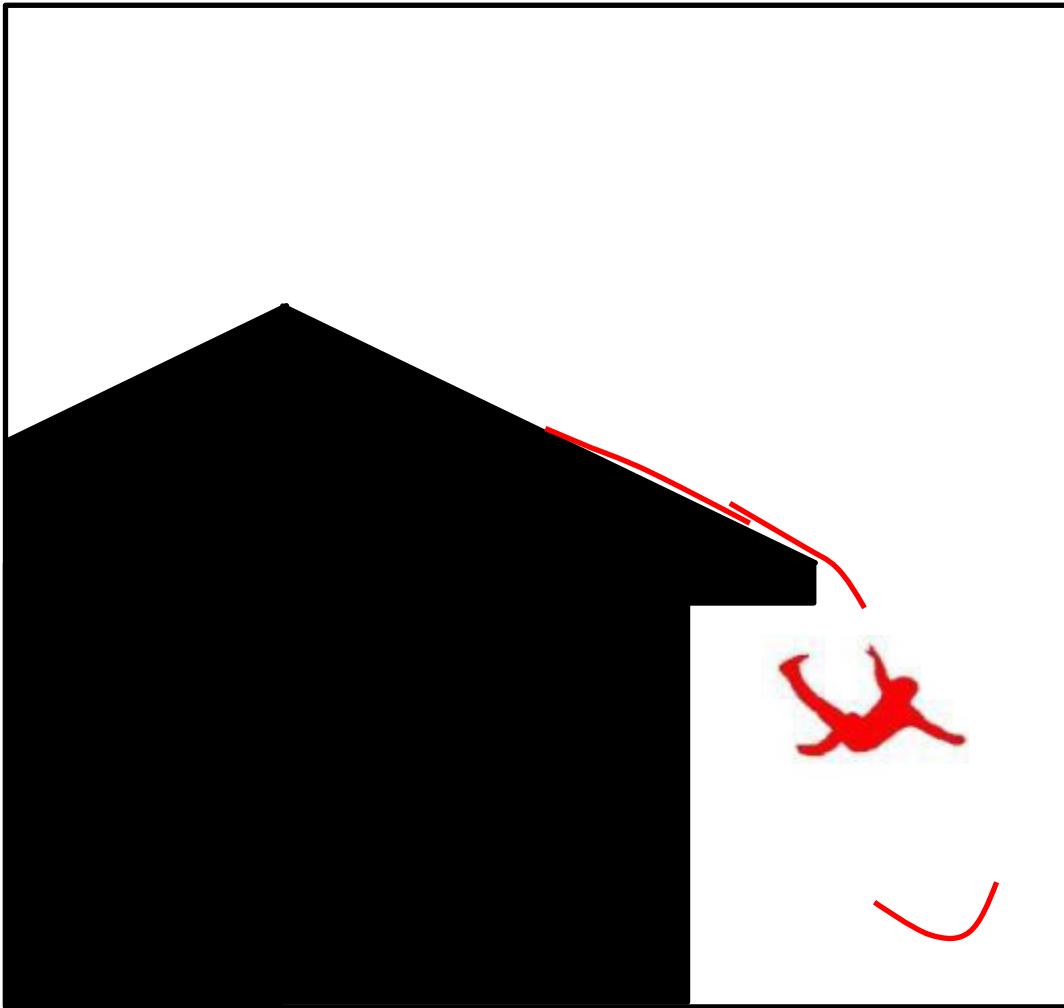
2



“Let’s get started.”

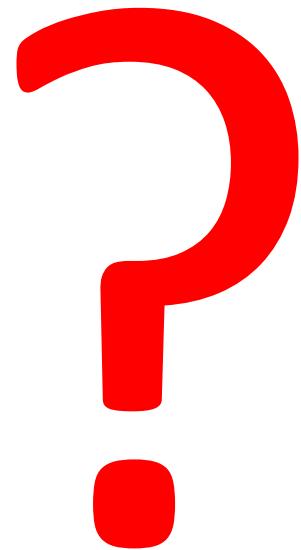


“Oops! I should stop the shingles.”



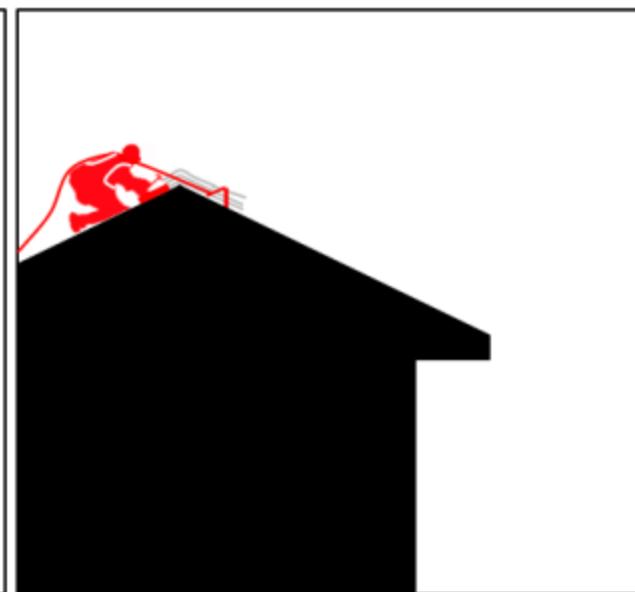
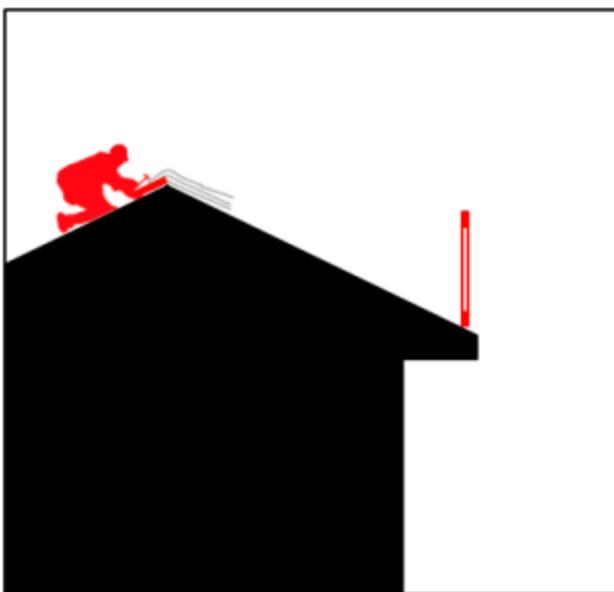
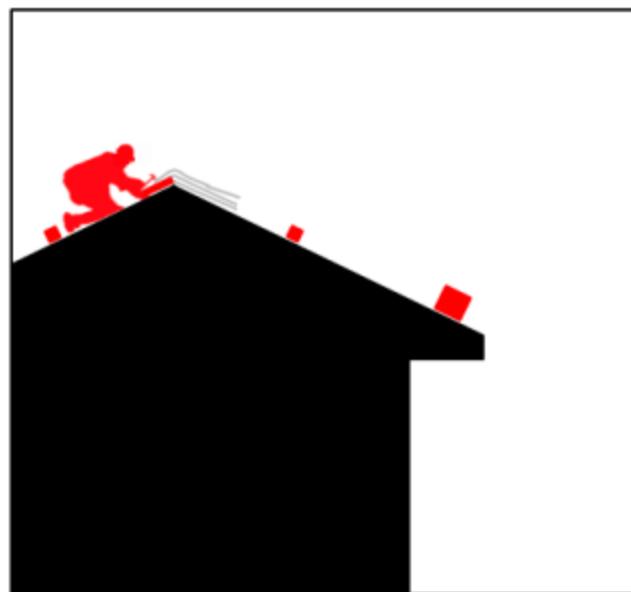
“Helpaaaaaaaaaaaa.”

5



What could I have done differently before my death?

1. Why was the method used to perform the task in this example unsafe?
2. Which is the correct, or safe, way of performing the task?



“Add slide-guard?”

“Add guardrail on the sloped roof?”

“Wear harness and use lifeline?”

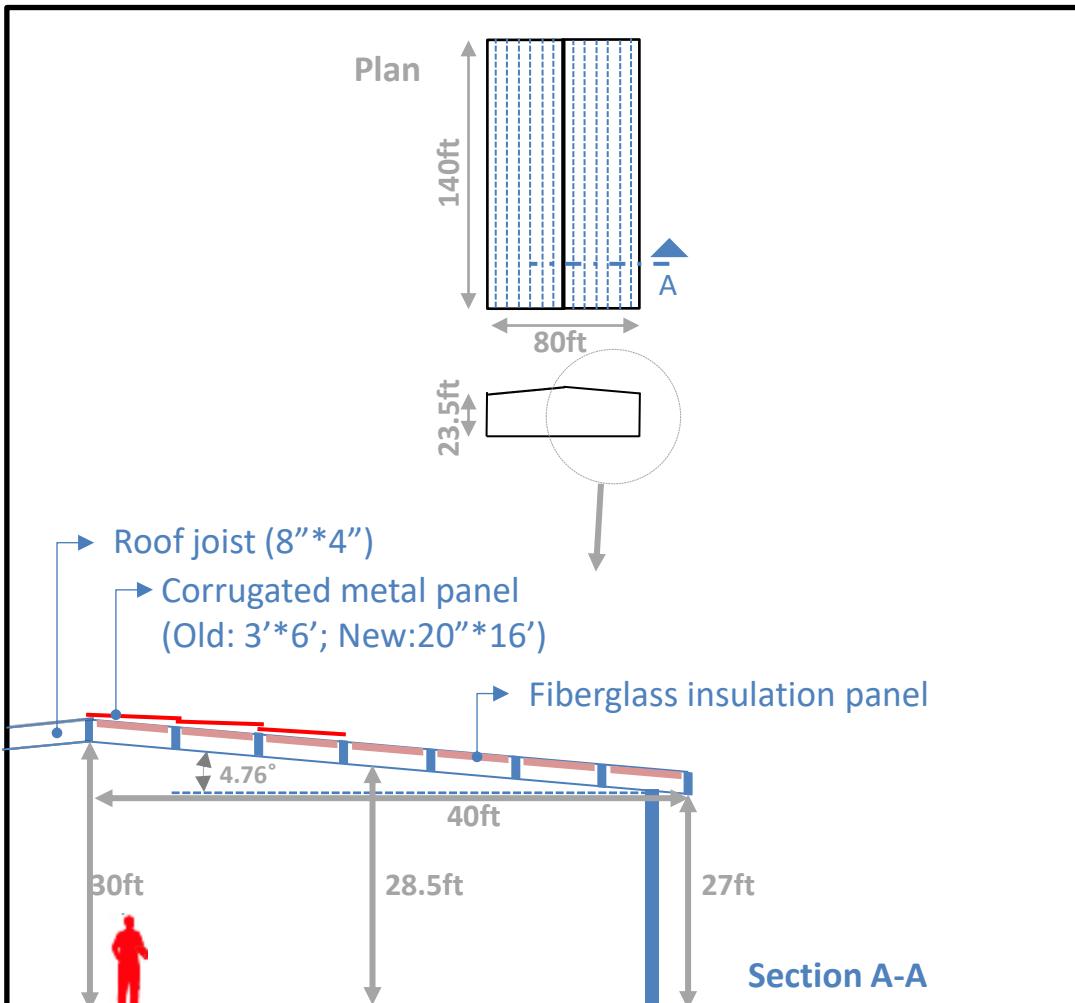
A

B

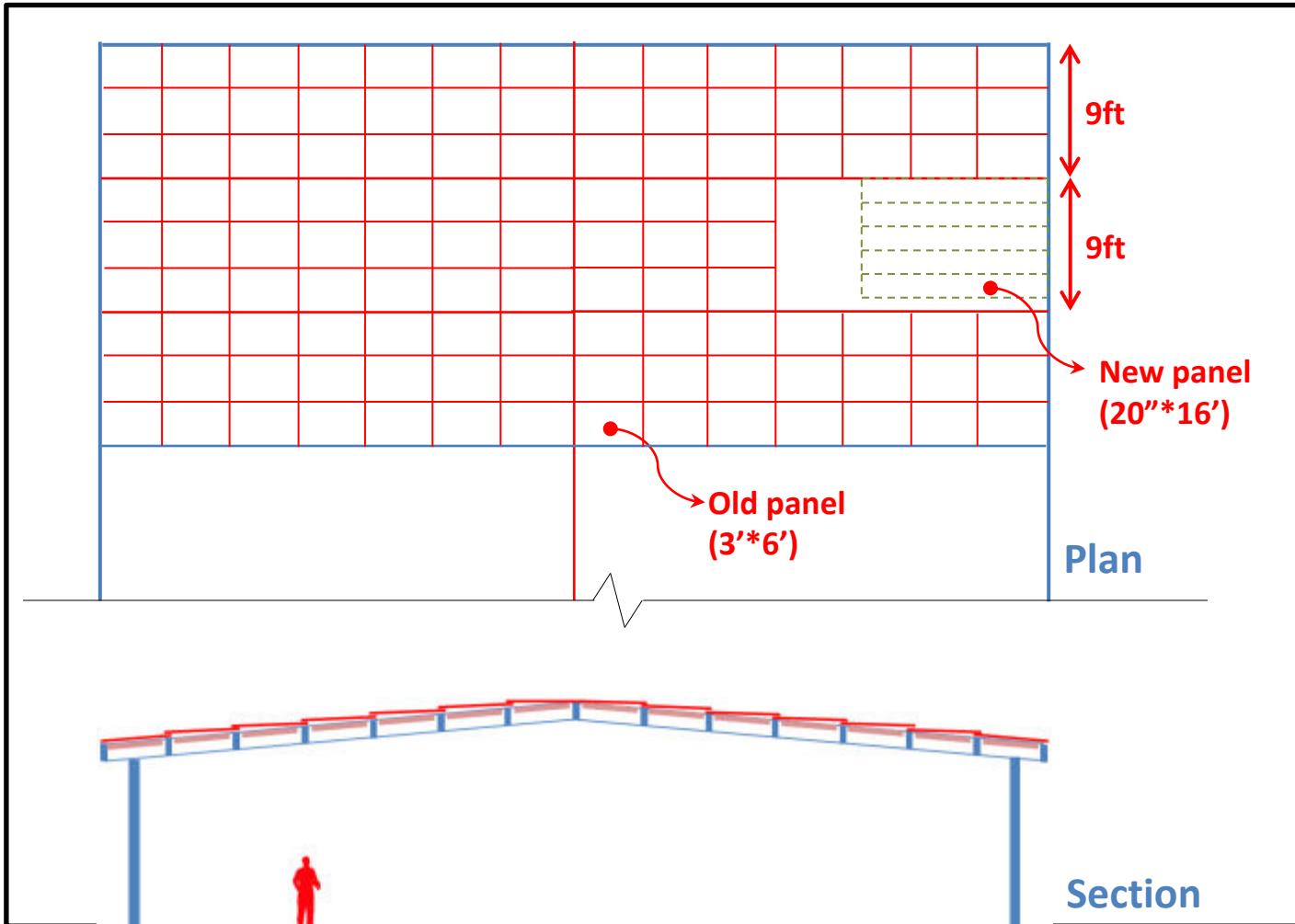
C

Case 2

The workers were assigned a job to remove the old metal panels of a church roof and replace them with the new ones. The victim, a sheet metal mechanic, removed the screws that attached an old metal roof panel to the roof joists. The worker then stood up and stepped backward into a roof opening which was covered only with fiberglass insulation. The worker fell 30 feet to the hardwood floor inside the church and died.

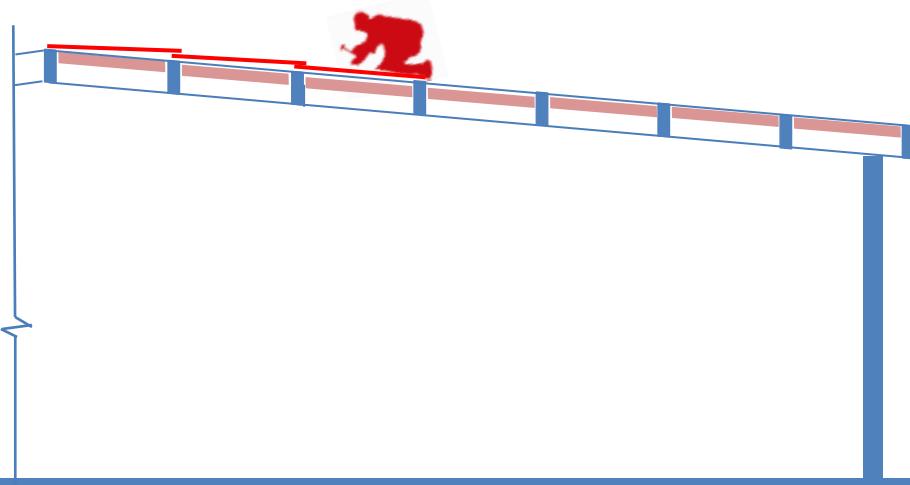


"Remove screws of roof metal panels." (Old panels:
corrugated metal panels of 3'*6')

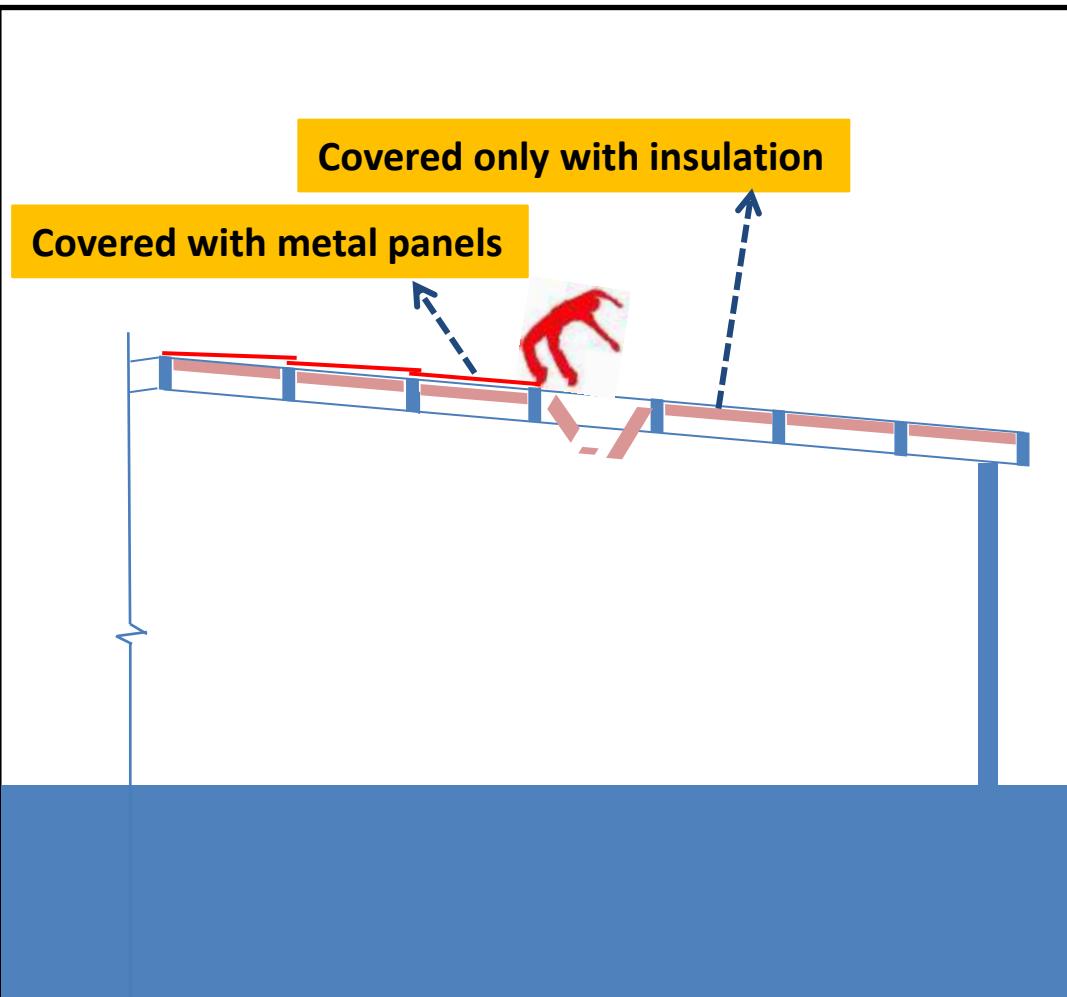


“Remove screws of roof metal panels.” (Old panels: corrugated metal panels of 3'*6')

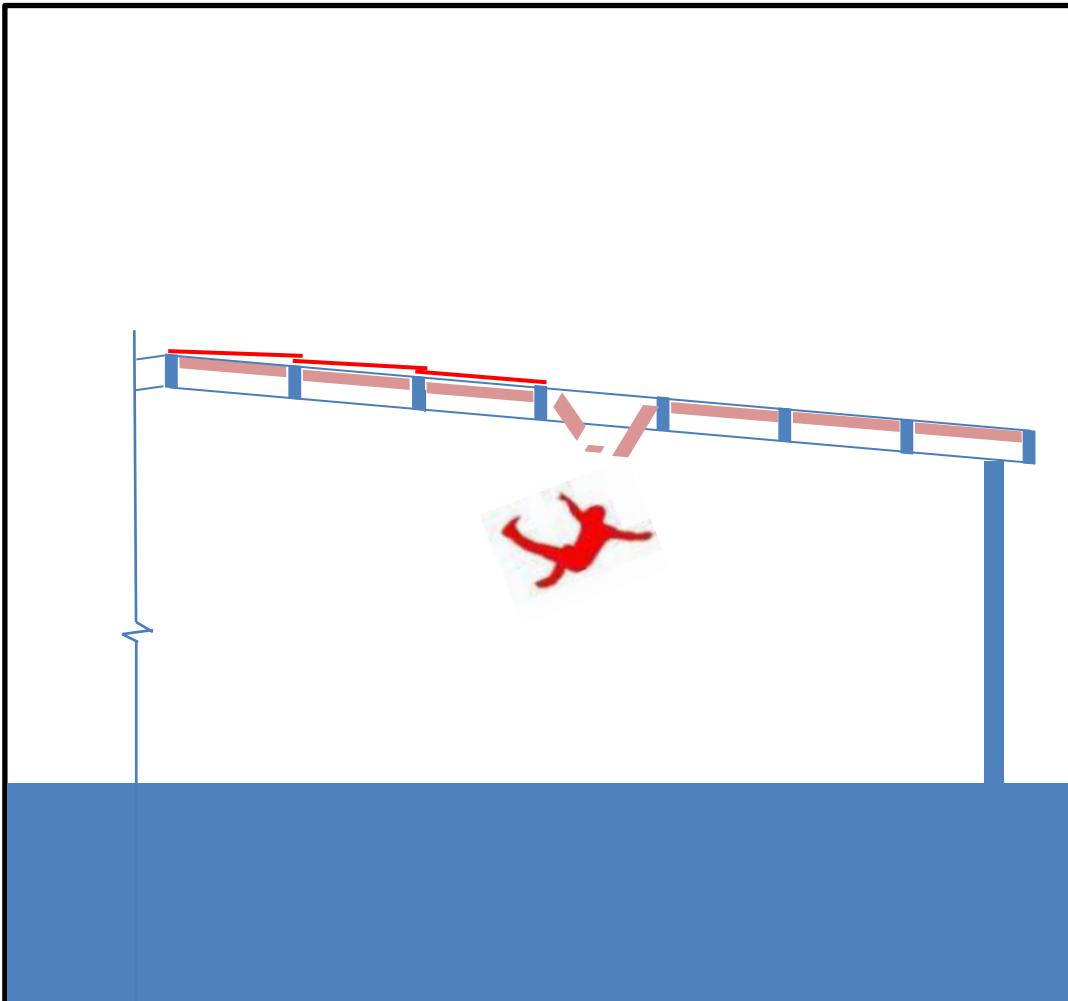
3



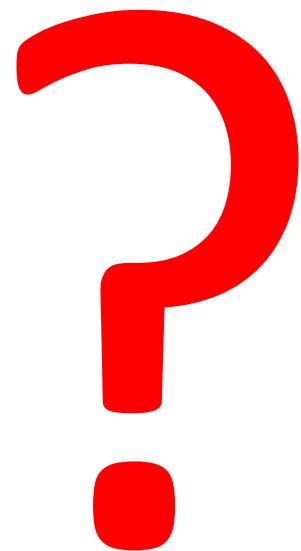
“Let’s get started.”



“Oops! This part of roof was covered just with insulation.”

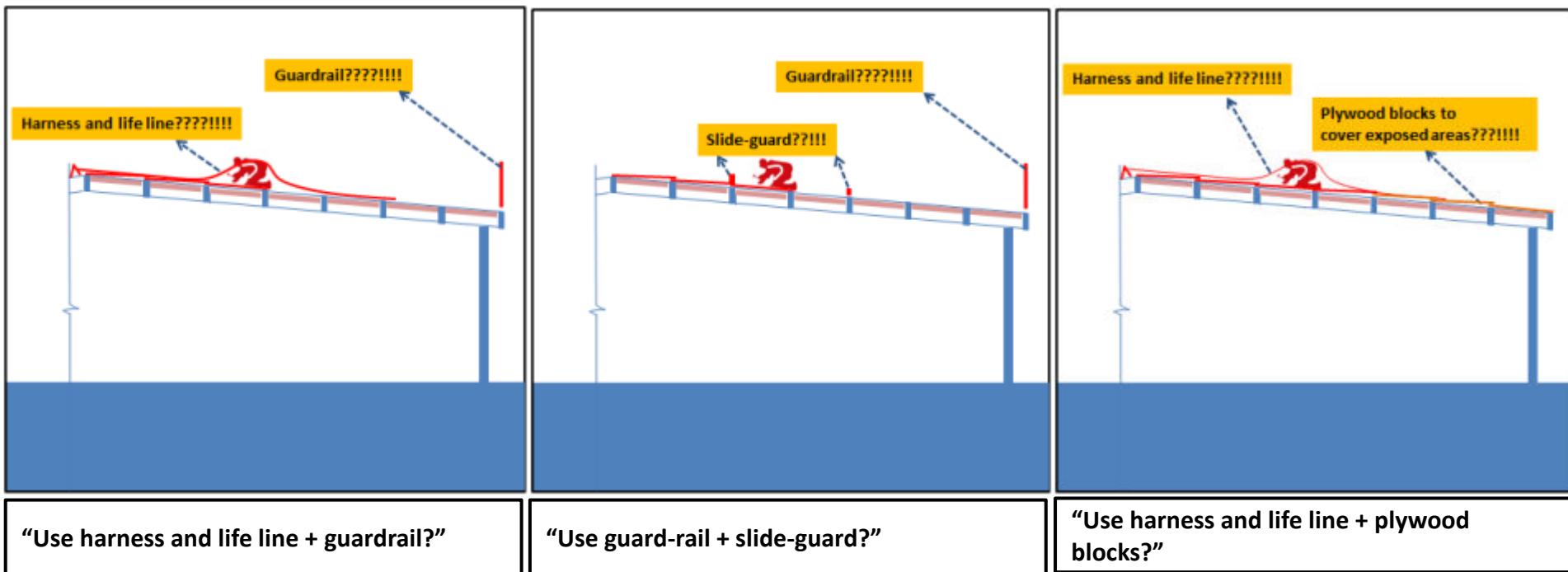


“Ауууууууууууууууууу!”



What could I have done differently before my death?

1. Why was the method used to perform the task in this example unsafe?
2. What is the safest way of performing the task?



A

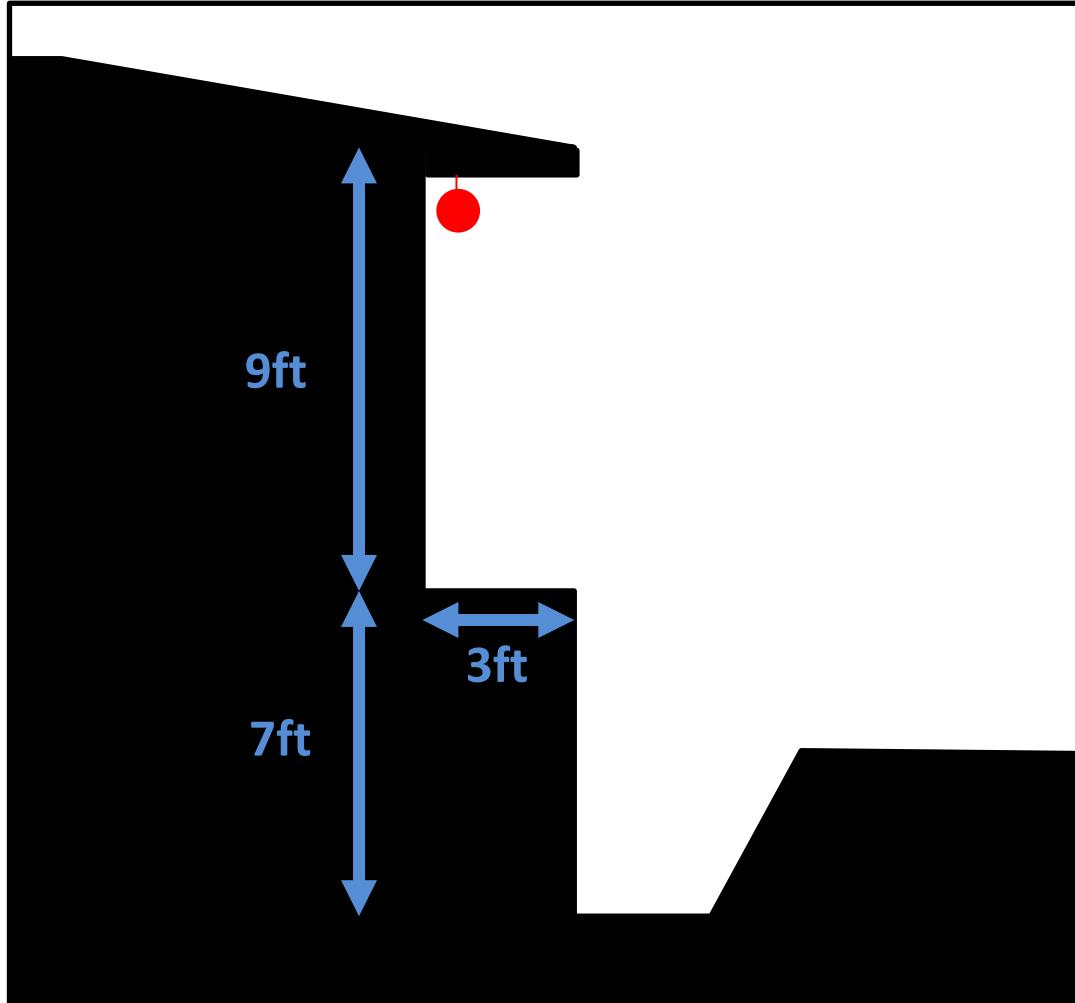
B

C

Case 3

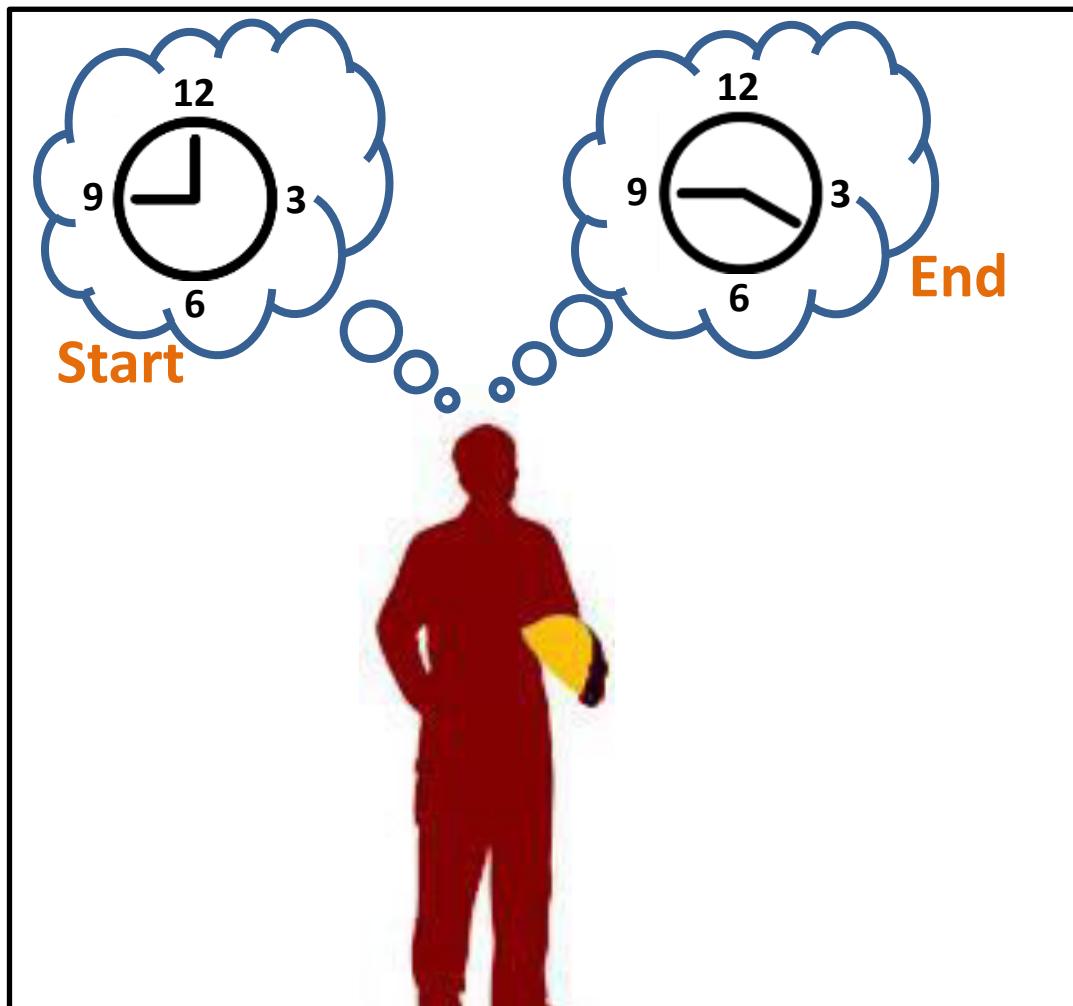
When installing a light bulb on top of a step ladder, a worker lost his balance and fell off the ladder through the unprotected open-sided edge of a porch. He hit his head on the concrete block retaining wall across the porch and died.

1



“Change light bulb in the balcony.”

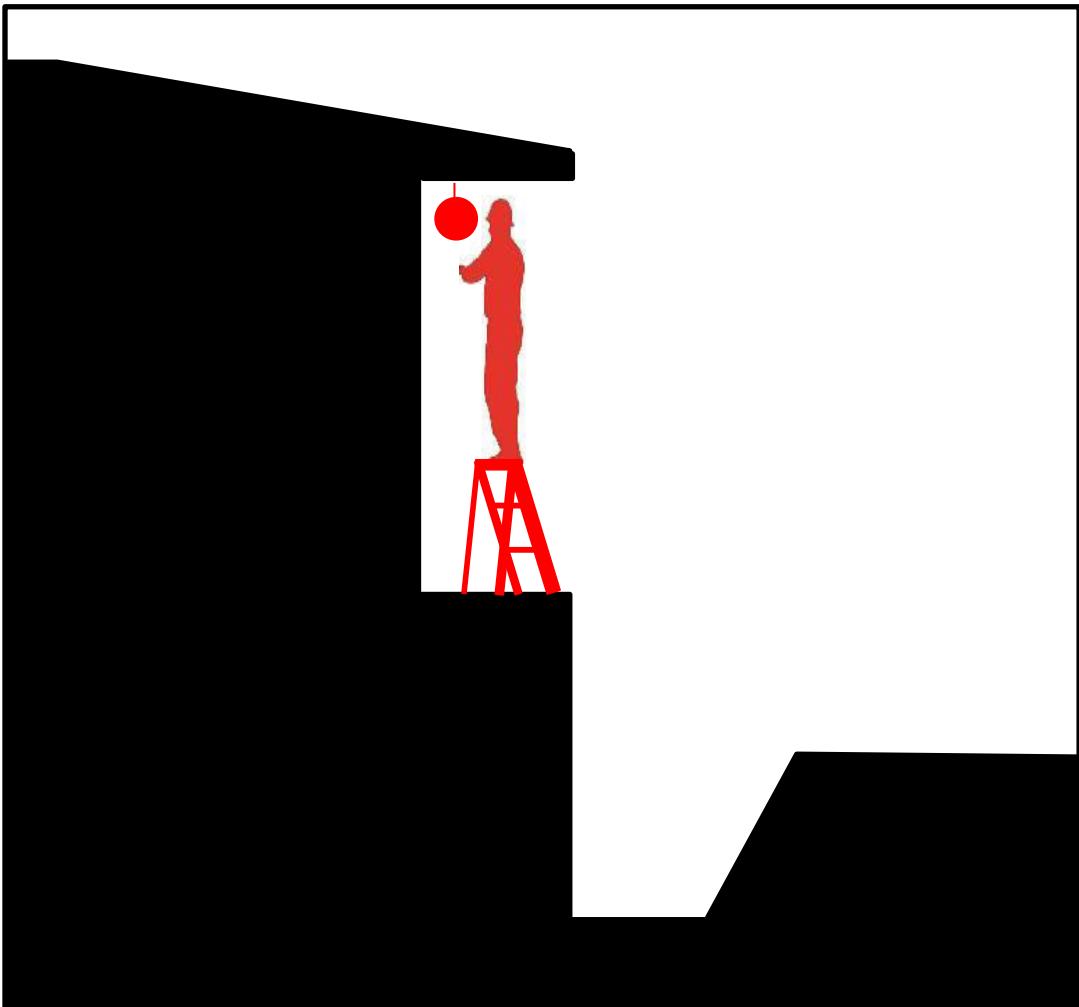
2



How much time do I have to do the task?

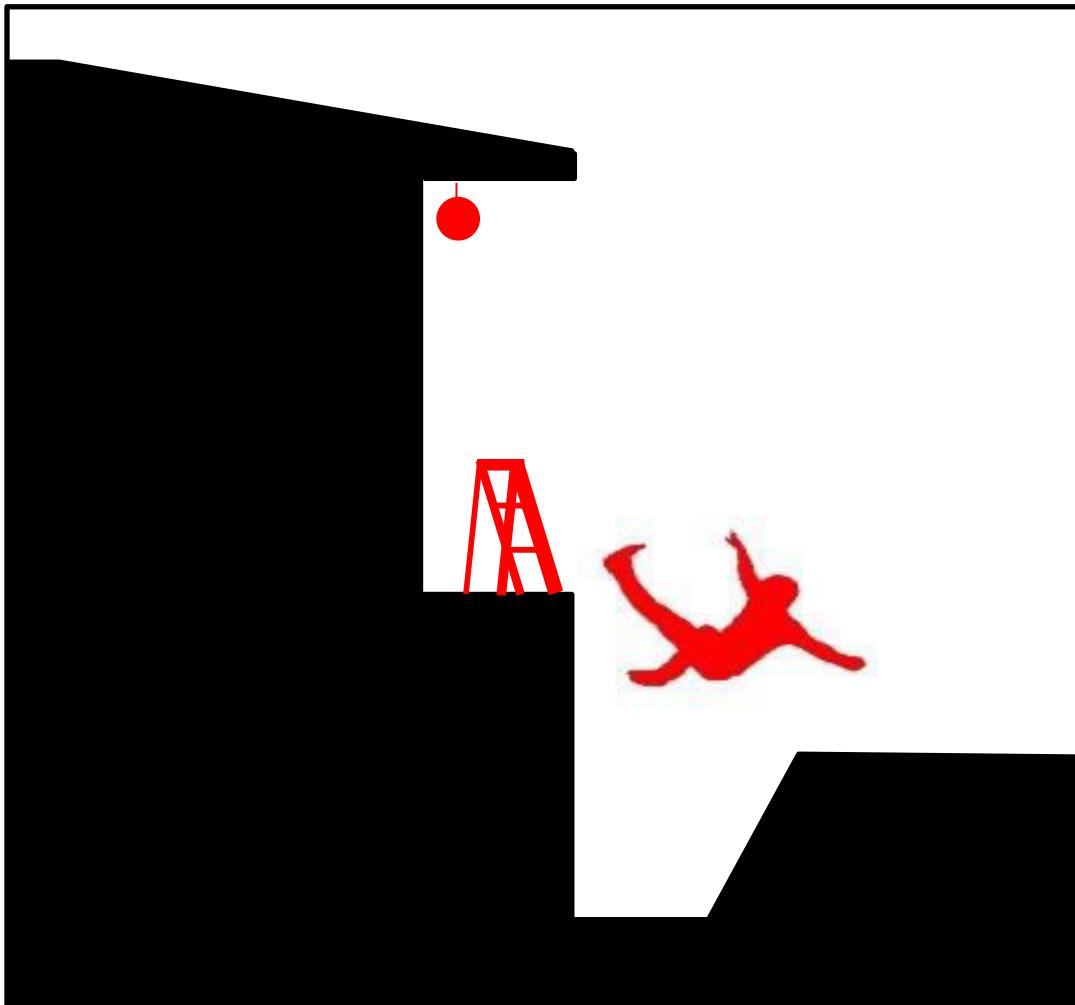


What should I use to reach the light bulb? (Extension ladder, swivel chair, Stacked buckets, step ladder)
Where should I put the tool? (ditch, balcony floor)

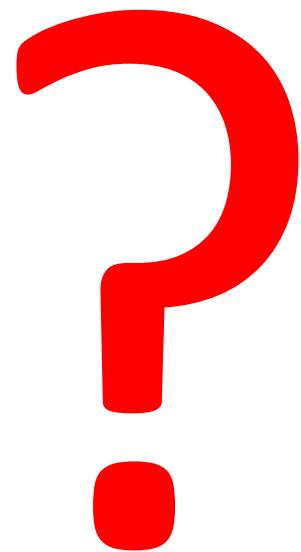


Let's get started. (The worker decided to use the 3-foot step ladder and put it on the unprotected balcony floor.)

5



Oops! (He fell off the ladder into the ditch and got injured.)



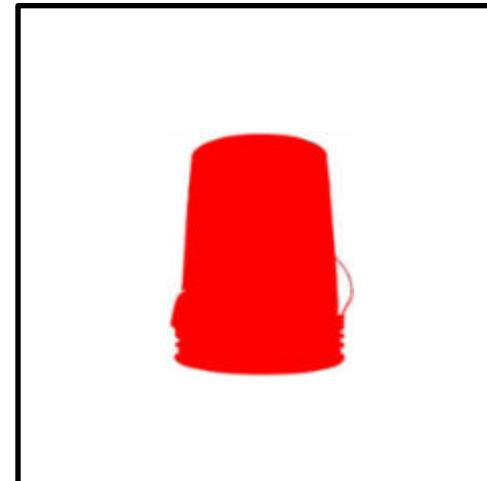
What could I have done differently before my death?

1. Why were the methods available to perform the task in this example unsafe?



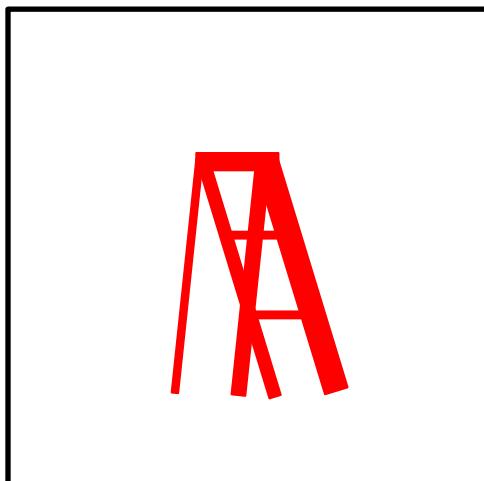
A

Use a swivel chair.



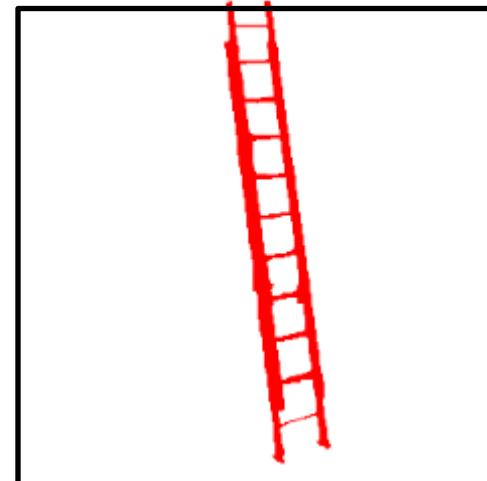
B

Use a bucket.



C

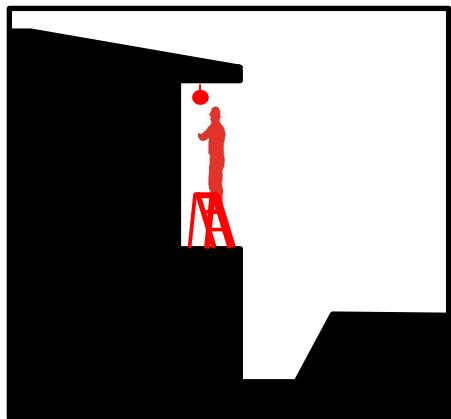
Use a stepladder.



D

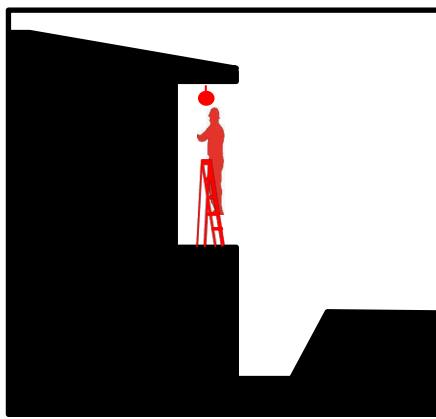
Use the extension ladder.

2. Which is the correct, or safe, way of performing the task?



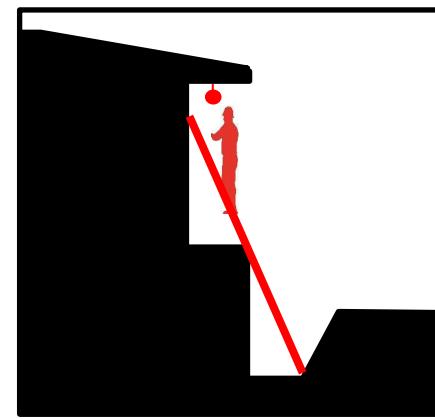
Use a shorter ladder?

A



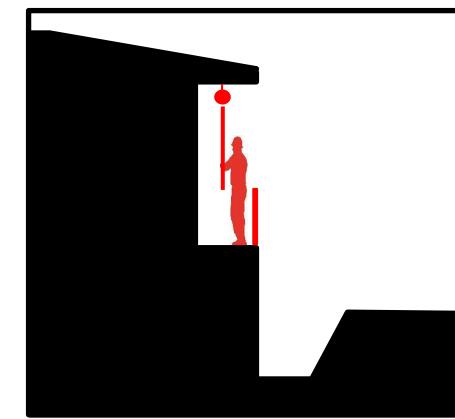
Use a longer ladder
and rotate it?

B



Use an extension ladder?

C



Protect the open edge
and use an extension
pole?

D

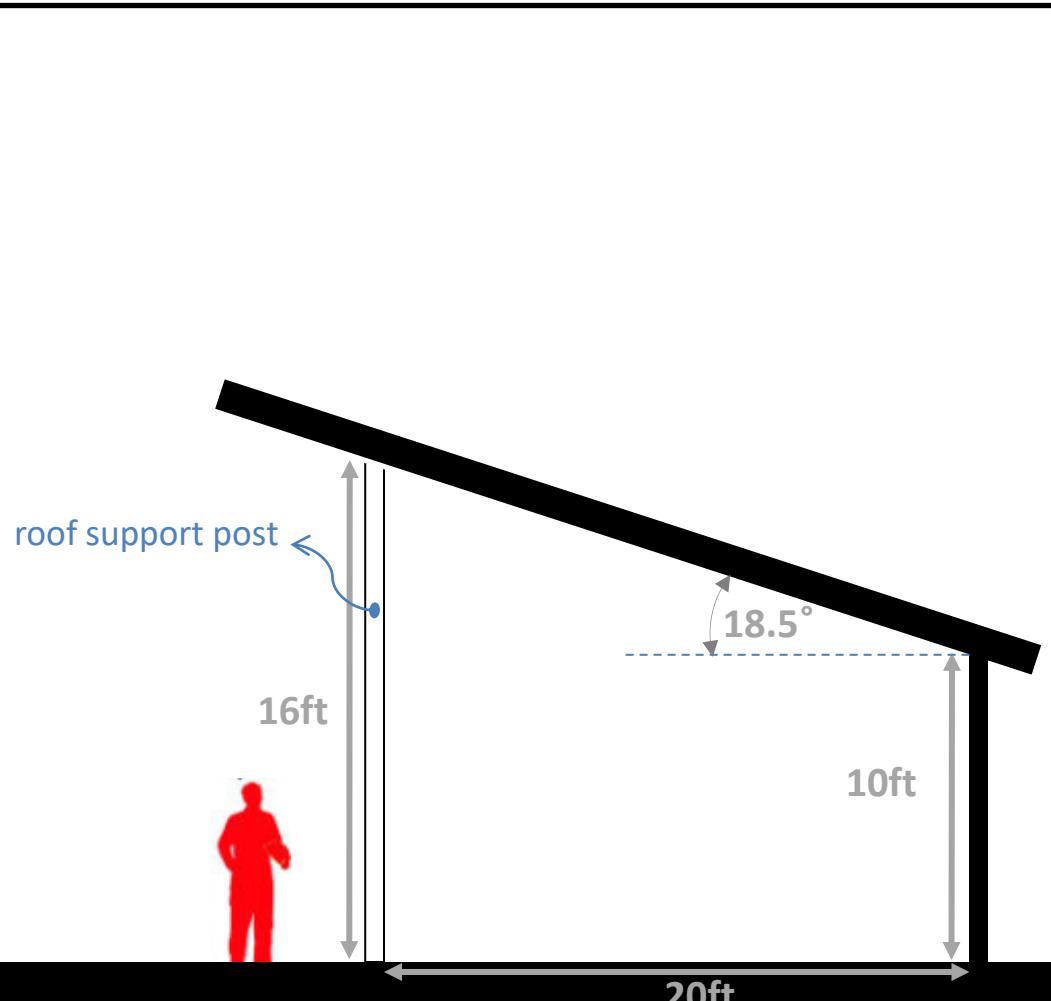
3. You can avoid the hazards identified in the scenario by making sure you follow the safeguards listed below:

- Stay behind a guardrail,
- Find the right tool to do the task.

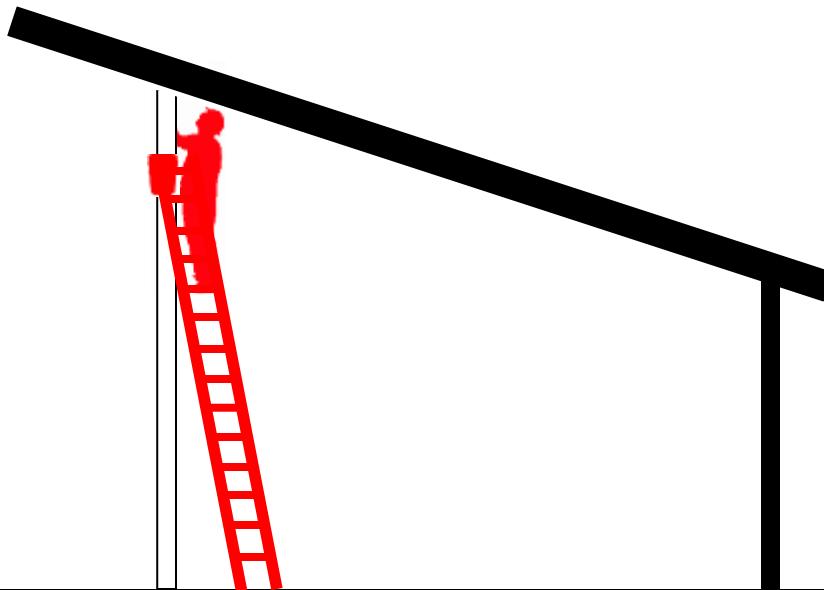
Case 4

The victim was working on the top of an unstable steep extension ladder doing touch up paintings and installing metal roof tie-downs when the ladder with the victim on tipped over backward. As a result, the worker struck his head on the concrete floor and died due to injuries.

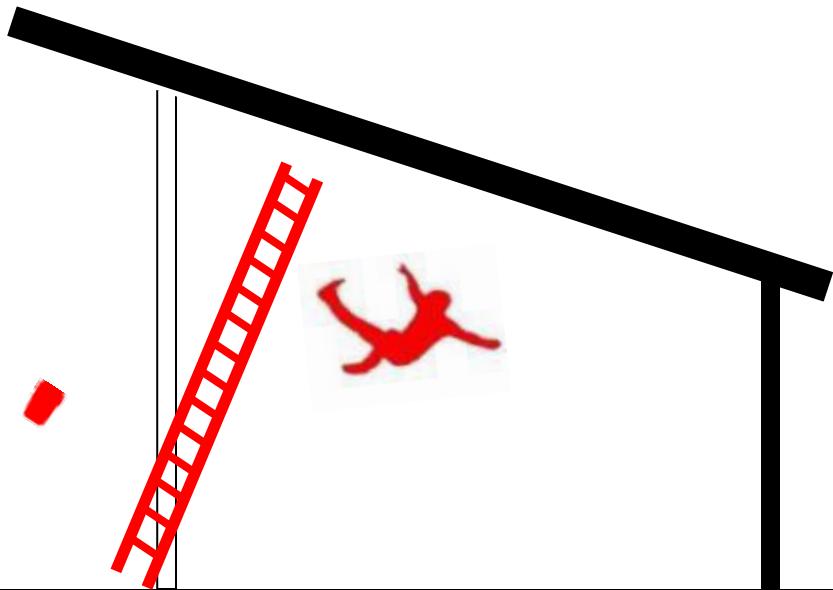
1



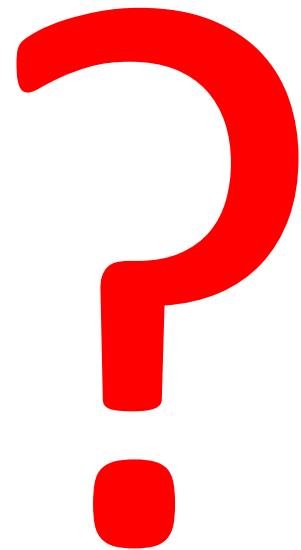
"Do touch up paintings and install roof tie-downs."



“Let’s get started with an extension ladder.”

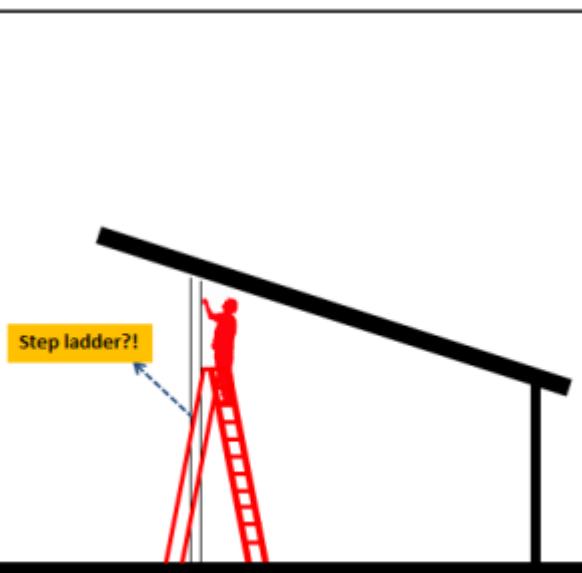


“Oops! The ladder tipped over.”



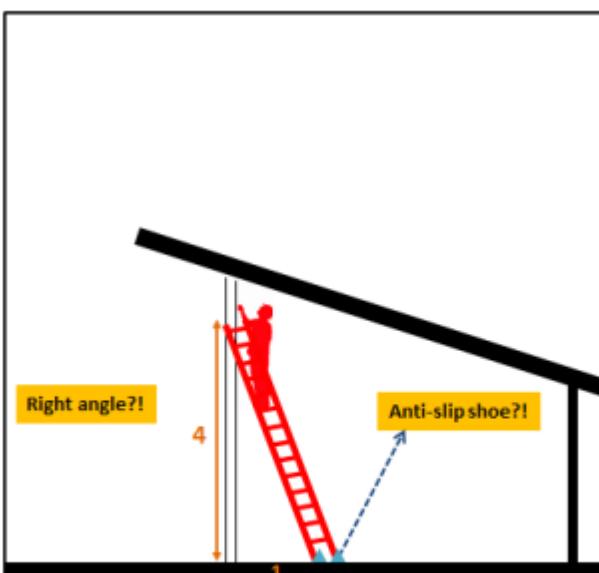
What could I have done differently before my death?

1. Why was the method used to perform the task in this example unsafe?
2. Which is the correct, or safe, way of performing the task?



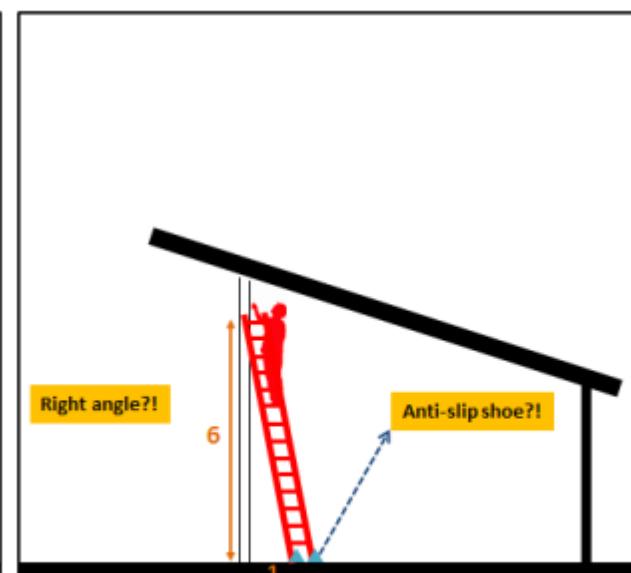
Use a step ladder.

A



Rest an extension ladder on the column at the 4:1 angle?

B



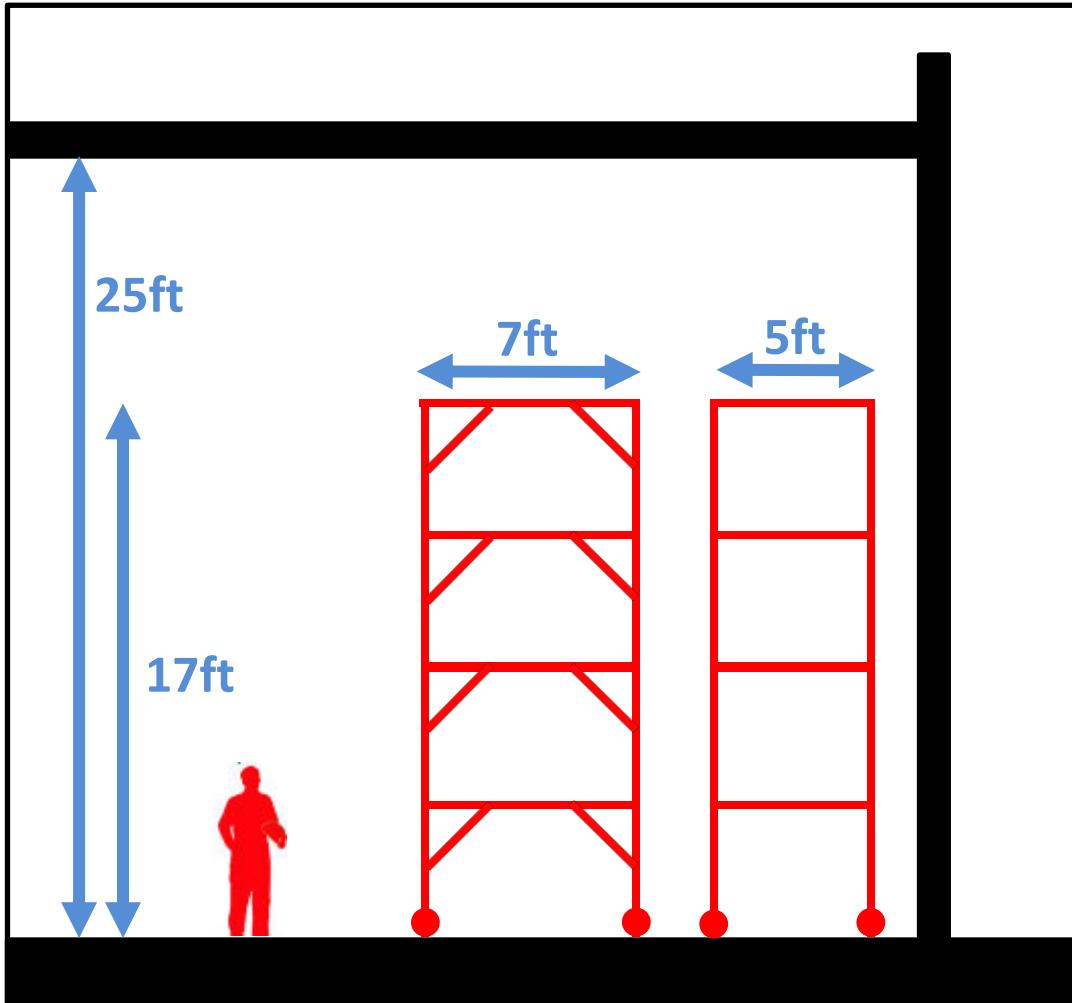
Rest an extension ladder on the column at the 6:1 angle?

C

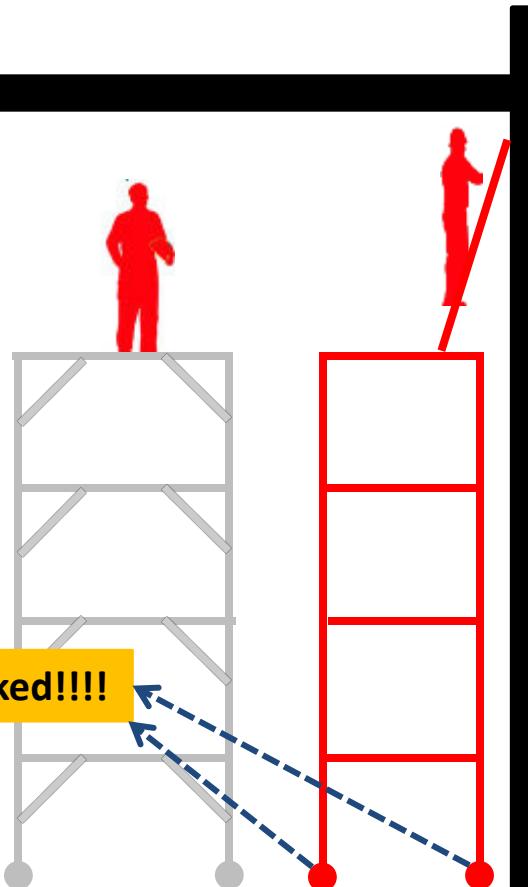
Case 5

A drywall finisher was assigned a finishing task at the upper part of a wall. To do that, he positioned a step ladder on top of the platform in a rolling scaffold and leaned the top of the ladder against the wall. When the victim climbed the ladder, the scaffold rolled as a result of the force applied at the ladder's foot. The victim fell 19 feet and died.

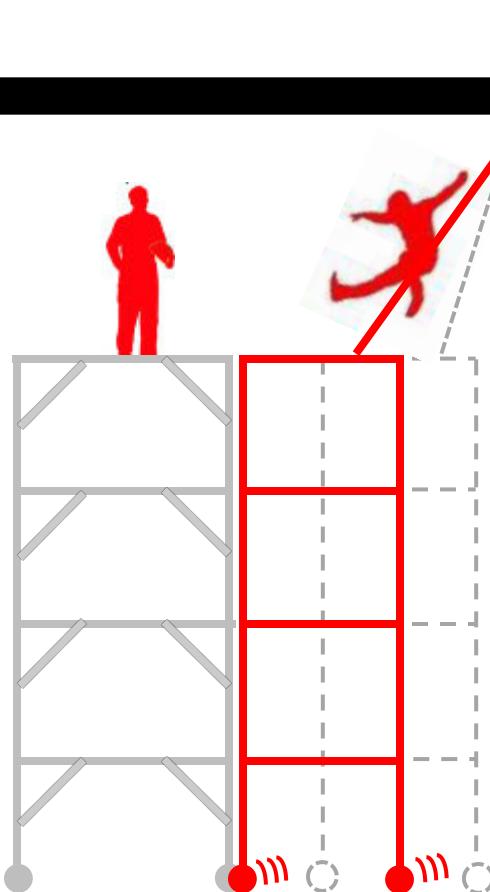
1



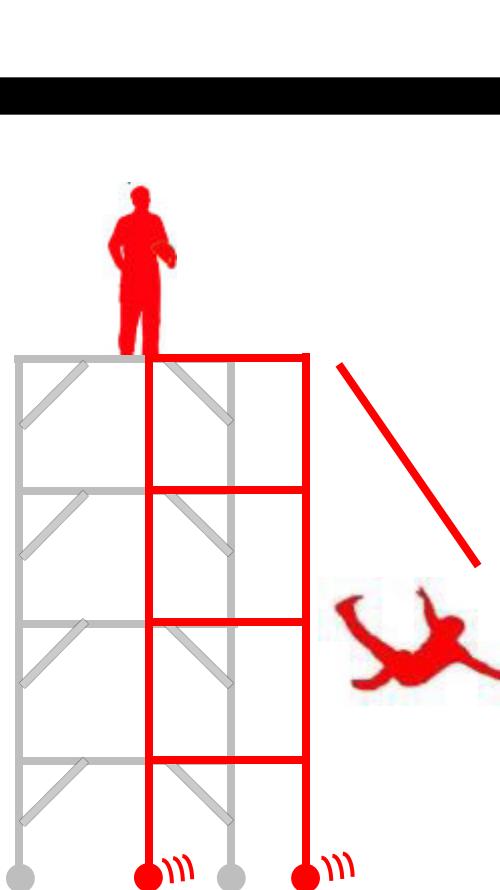
**“Fill the heads of screws, at the upper section of the wall,
with the filler compound.”**



"Let's get started."

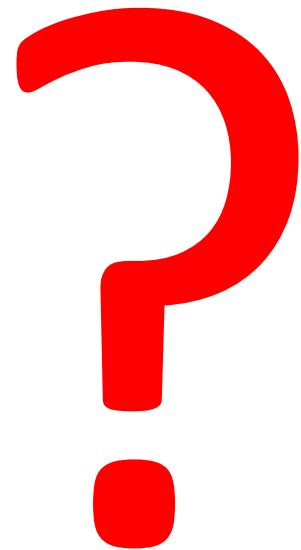


“Oops! The scaffold is rolling.”



"Helpaaaaaaaaaaaa!"

5



What could I have done differently before my death?

1. Why was the method used to perform the task in this example unsafe?
2. Which is the correct, or safe, way of performing the task?

Bucket????!!!!

Wheels locked!!!!

guardrail!!!!

Safe ladder!!!!

Wheels locked!!!!

"Use a bucket instead of a ladder and lock the wheels?"

"None of the options (above)?"

A

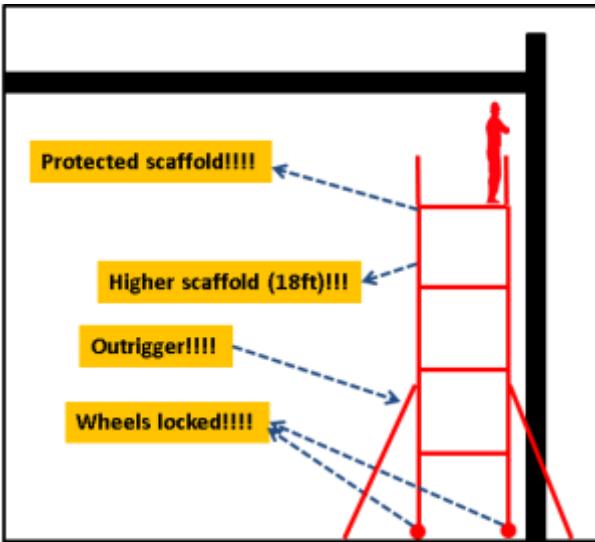
B

C

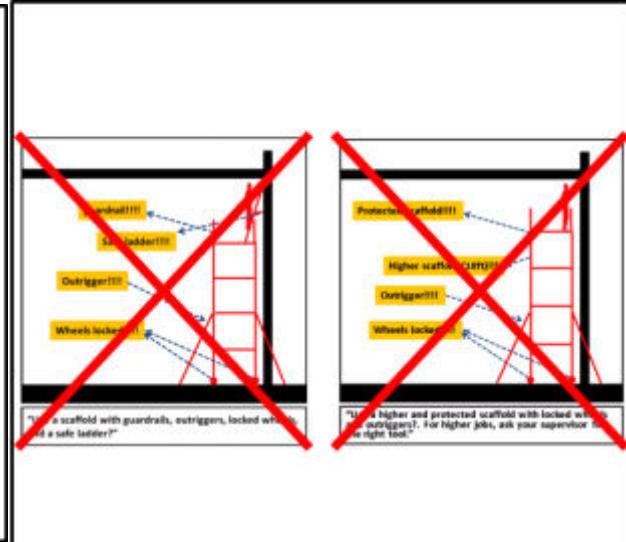
3. Of the following, which is the correct, or safe, way of performing the task?



"Use a scaffold with guardrails, outriggers, locked wheels, and a safe ladder?"



"Use a higher and protected scaffold with locked wheels and outriggers?. For higher jobs, ask your supervisor for the right tool."



None of the options (above).

A

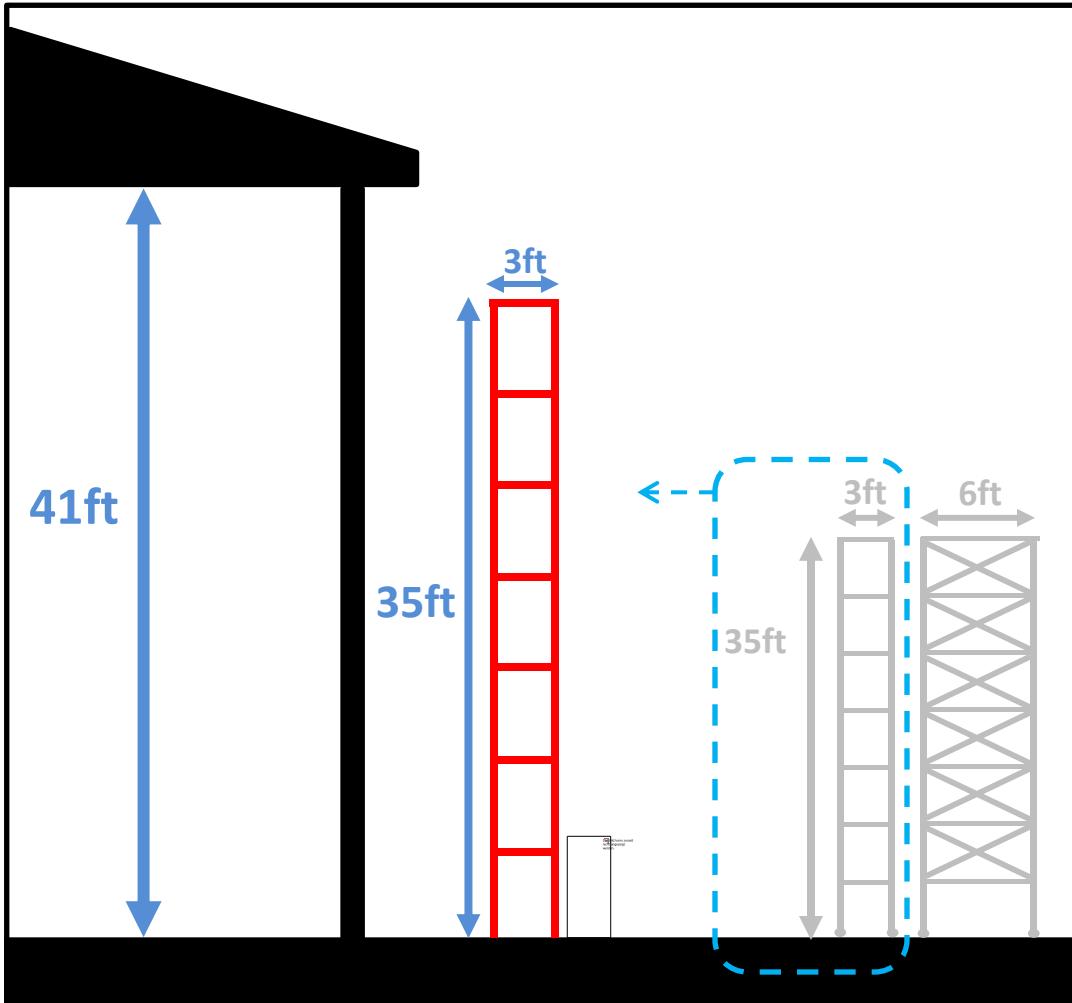
B

C

Case 6

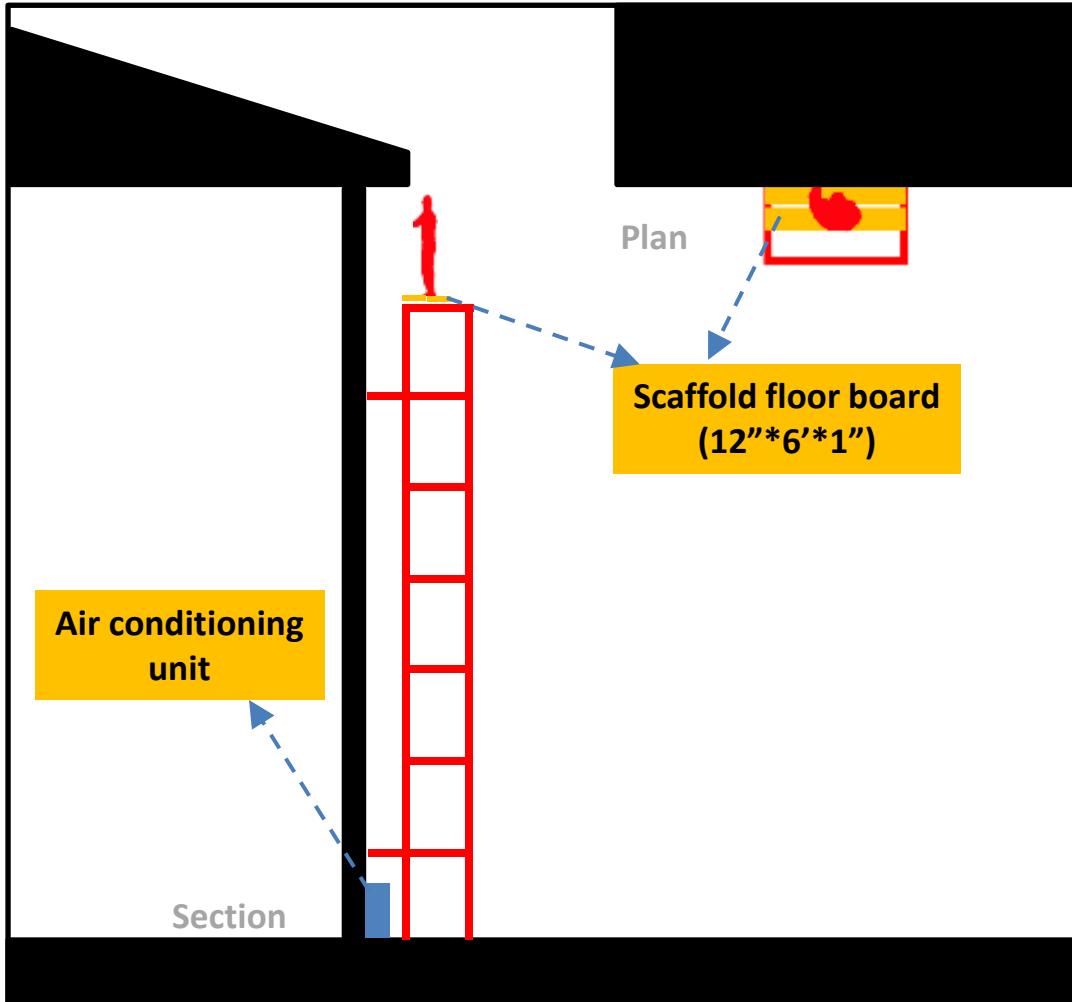
Working on top of the scaffold to scrape the roof eaves, a worker fell 15 feet through the gap between the floor board and scaffold rails, struck the scaffold cross brace, was flipped to the outside of the scaffold and fell additional 20 feet before hitting an air conditioning unit. He died later due to the injuries.

1



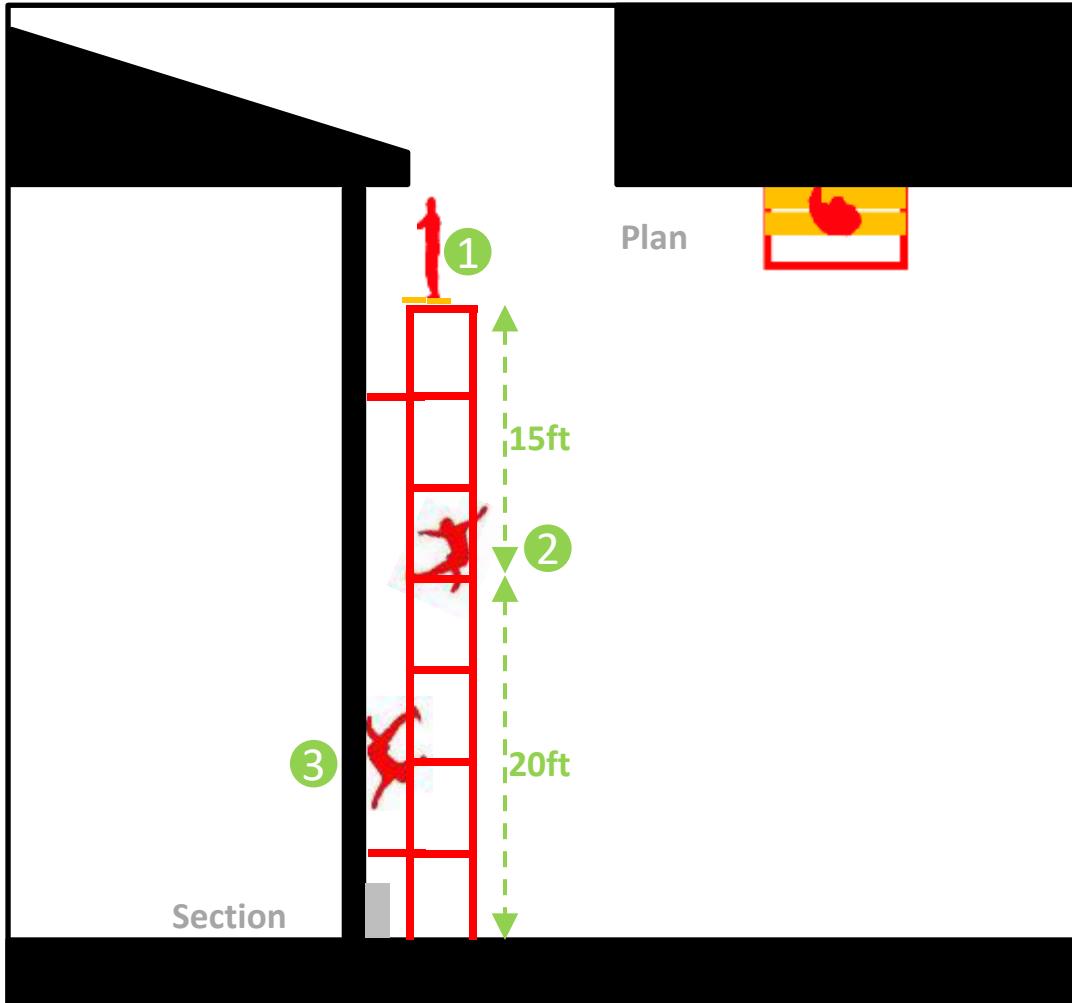
"Scrape the roof eave."

2

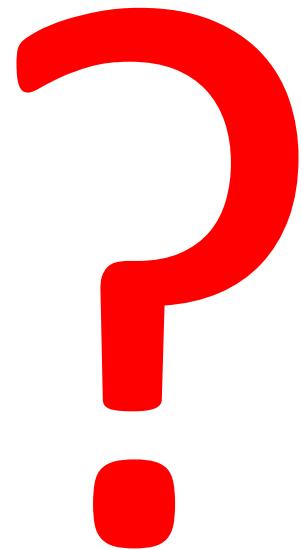


“Let’s get started.”

3

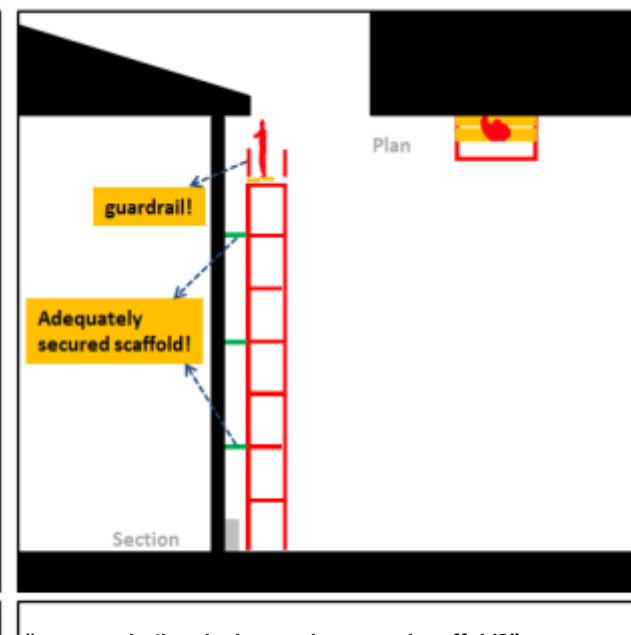
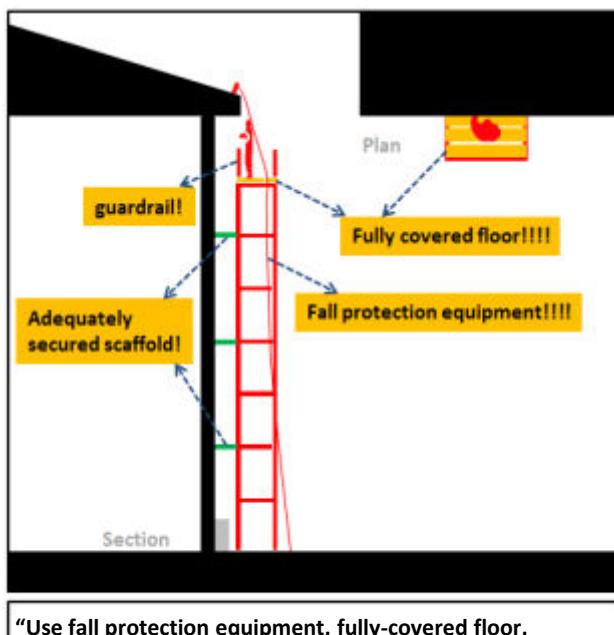
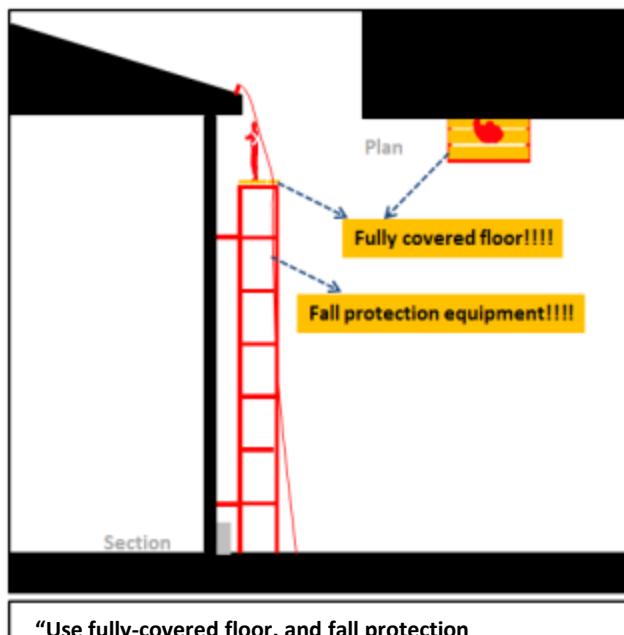


“Oops! I fell through the gap within scaffold floor.”



What could I have done differently before my death?

1. Why was the method used to perform the task in this example unsafe?
2. Which is the correct, or safe, way of performing the task?



A

B

C

You have the **RIGHT** to:

1. Ask OSHA to inspect your workplace. (1-800-321-OSHA)
2. Exercise your rights under the law without retaliation and discrimination.
3. Receive information and training about hazards, methods to prevent the harm, and OSHA standards that apply to your workplace. The training must be in a language you can understand.
4. Get copies of test results done to find hazards in your workplace.
5. Review records of work-related injuries and illnesses.
6. Get copies of your medical records.

Roofing Industry Fall Protection from A to Z

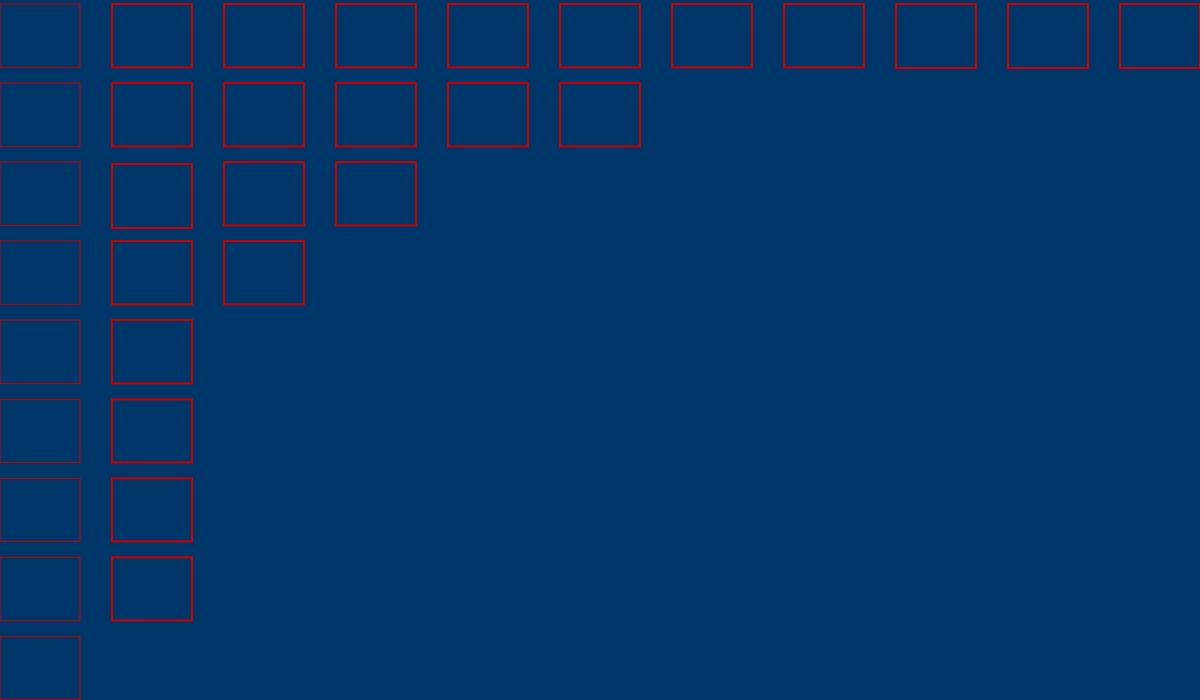
This material was produced under grant number **SH-26317-SH4** from the Occupational Safety and Health Administration, U.S. Department of Labor. It does not necessarily reflect the views or policies of the U.S. Department of Labor, nor does mention of trade names, commercial products or organizations imply endorsement by the U.S. Government.

Course Objectives

By the time you are finished with this class, you should be able to:

1. Know where to find applicable citations within the OSHA fall-protection standard
2. Define the regulatory text
3. Apply fall-protection regulations to jobs

Pre-Test



Introduction to Roofing Fall Protection

Skill, Craftsmanship and ...



In 2013, there were 796 fatal work injuries
in construction—
294 of those were from falls.

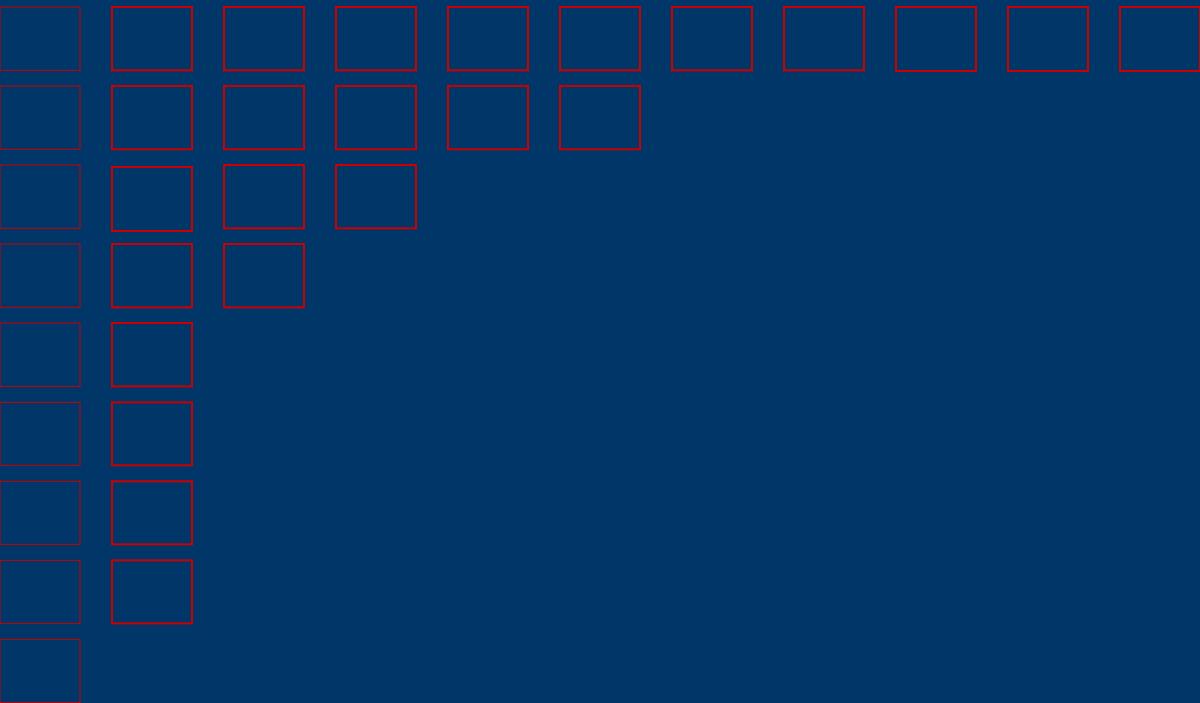


In 2012, roofing company fatalities accounted for 77
of them— 64 from falls.

Scope of Fall Protection

Fall-protection requirements are found in several other subparts besides M:

- L – Scaffolds, guardrail systems
- CC – Cranes and derricks
- R – Steel erection
- S – Tunneling
- V – Constructing electrical transmission lines
- X – Stairways and ladders



What is OSHA?

What is OSHA?

Occupational
Safety and
Health
Administration



Responsible for worker safety and
health protection

OSHA Act



“To assure safe and healthful working conditions for working men and women; by authorizing enforcement of the standards developed under the Act; by assisting and encouraging the States in their efforts to assure safe and healthful working conditions; by providing for research, information, education, and training in the field of occupational safety and health; and for other purposes ...”



“Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be cited as the “Occupational Safety and Health Act of 1970.”

Alaska
Arizona
California
Connecticut
Hawaii

Illinois

Indiana

Iowa

Kentucky

Maryland

Michigan

Minnesota

Nevada

New Jersey

New Mexico

New York

North Carolina

Oregon

Puerto Rico

South Carolina

Tennessee

Utah

Vermont

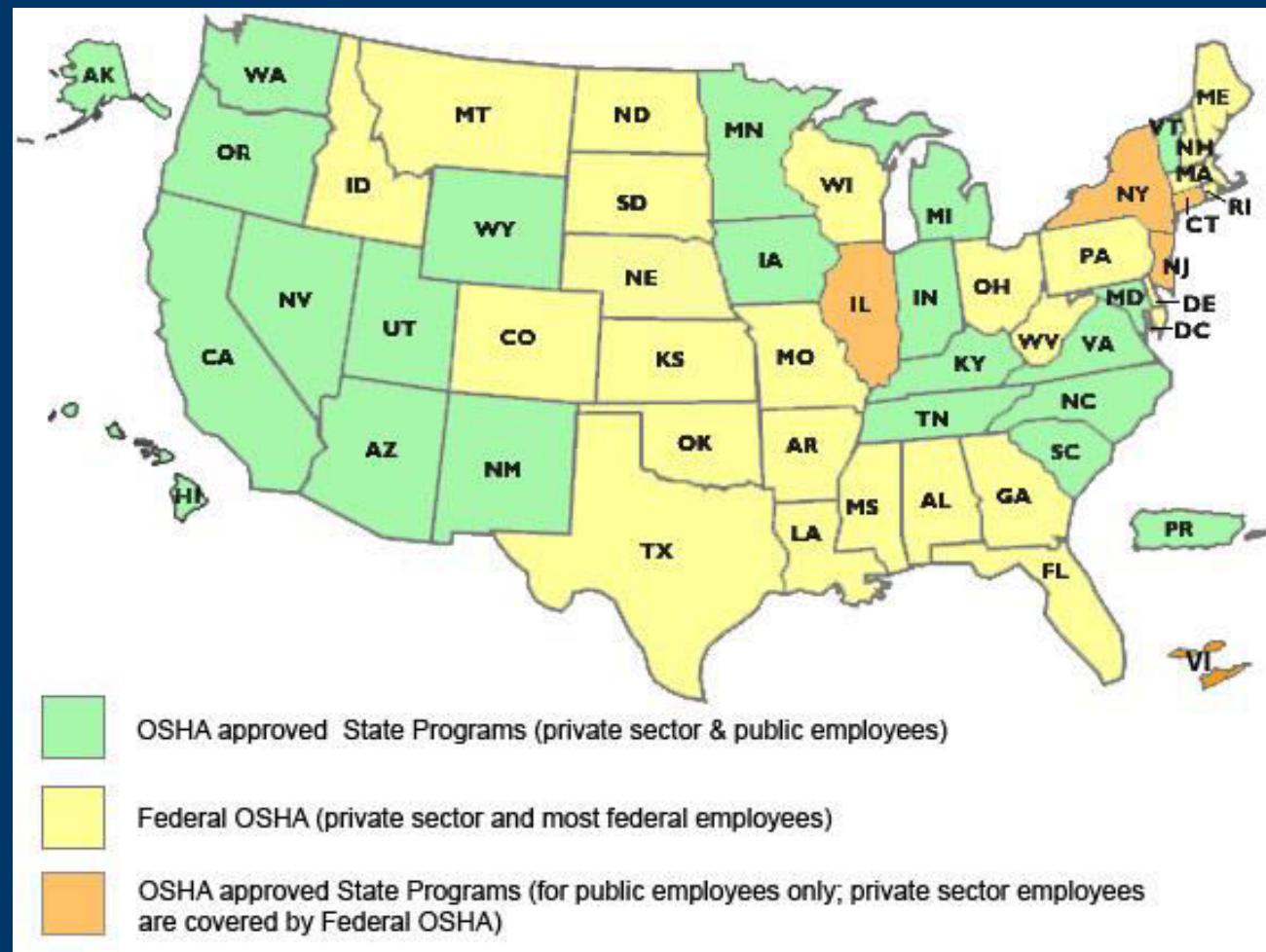
Virgin Islands

Virginia

Washington

Wyoming

OSHA Approved State Plans



What Does OSHA Do?

- Encourages employers and employees to reduce workplace hazards and implement safety and health programs
- Develops and enforces mandatory job safety and health standards
- Monitors job-related injuries and illnesses
- Provides assistance, training and other support programs to help employers and workers

OSHA Standards

OSHA develops and enforces standards that employers must follow.

Where OSHA does not have standards, employers are responsible for following the OSH Act's General Duty Clause.

Each employer "shall furnish ... a place of employment which is free from recognized hazards that are causing or are likely to cause death or serious physical harm to employees."

Workers Have the Right To...

- Safe and healthful working conditions
- File a confidential complaint with OSHA to have workplace inspected
- Review records of work-related injuries and illnesses
- Receive training, methods to prevent harm, and the OSHA standards that apply to their workplace
- Use their rights under the law without retaliation or discrimination
- Obtain copies of test results done to find hazards in the workplace
- Obtain copies of their medical records

Employers Must...

- Provide a workplace free from serious recognized hazards and comply with standards, rules and regulations issued under the OSHA 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
- Keep accurate records of work-related injuries and illnesses

Whistleblower Protection

Protects workers from being discriminated against by their employers for exercising the rights under the act and against:

- Being fired or laid off
- Being blacklisted
- Demotion
- Being denied promotion or overtime
- Pay reduction
- Reassignment
- Benefits denial

How To File A Complaint

- Go to www.osha.gov/workers.html or call 800-321-OSHA
- Be prepared to provide specific details about yourself, your company and the type of hazard or discrimination being reported
- Note: A signed complaint is necessary, even if originally phoned in
- Keep a confidential record of all details
- Once a complaint is filed or reported, an inspection is normally warranted (see criteria on website)

Has OSHA Made a Difference?

Yes!

- In 1970, an average of 38 workers died every day. In 2012, an average of 12 workers died every day—***a decrease of nearly 70 percent***
- Workplace **injuries and illnesses** decreased from about 11 per 100 workers to about 3 per 100 workers



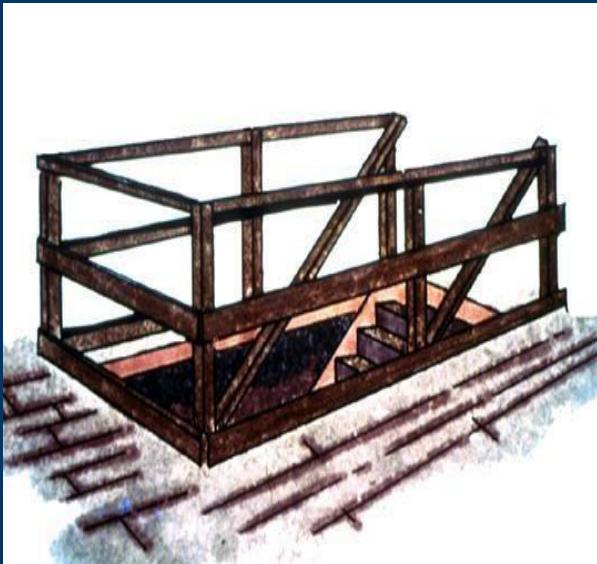
Duty to Have Fall Protection



- Employees must be protected whenever they are 6 feet or more above a lower level.
- Employees not only must be protected from falls but also from having objects fall on them.
- The surface on which work will be performed must be examined and deemed structurally safe.

Protection Devices

Workers on unprotected surfaces and edges 6 feet or more above a lower level should be protected by:



Guardrail system



Safety-net system



PFA system

Low-slope Roofs

Unique to low-slope roofing work (4:12 or less), it is additionally allowed to:

- Use a warning line and guardrail
- Use a warning line and safety net
- Use a warning line and PFA system
- Use a warning line and safety-monitoring system
- Use a safety-monitoring system only on roofs 50 feet wide or narrower (29 CFR 1926.501[b] [10] and see Appendix A to Subpart M)

Unprotected side or edge



A side or edge of a roof or other surface without
a parapet or railing of at least 39 inches

Hoist Areas

- Each employee in a hoist area shall be protected from falling 6 feet or more by guardrail or PFA systems.
- If a guardrail system or an opening barrier is removed, and the worker must lean through an opening—the employee should be protected with a PFA system.



Holes and Skylights

- Holes and skylights (6 feet or more)
 - PFA system
 - Guardrail
 - Cover
- Also, protect workers below from objects falling through holes or skylights.



General Rule – All Trades Steep-slope Roofs

Slopes greater than 4:12

6 feet or more above ground or lower level

Protect with:

- Safety net
- PFA system
- Guardrail system with toe boards

Fall-protection Plan

In residential construction, if conventional fall-protection is shown to be not possible or creates a greater hazard, a written plan that addresses fall protection issues may take the place of conventional systems if requirements are met, including:

1. Written, site-specific or by style/model and maintained on site
2. Prepared by a qualified person; maintained by a competent person
3. Discussion of measures to address fall hazards

Exception to Subpart M

Subpart M does not apply when workers are inspecting, investigating or assessing a workplace:

- Before work has started
- OR
- After work has been completed

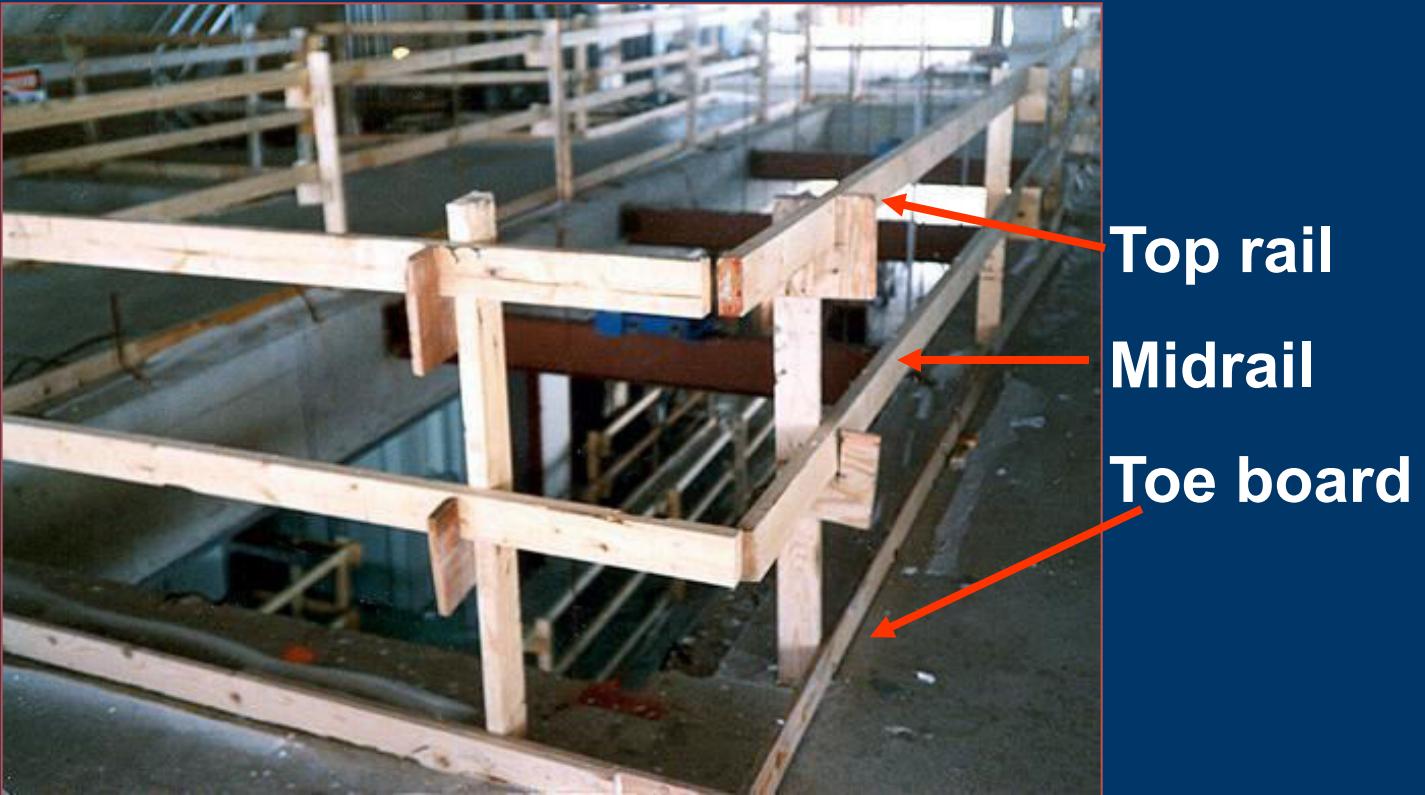


You are in the middle of reroofing a large home with a clay tile roof system. You have contracted with a local supplier to load materials to the roof. You show up at your job and notice the supplier is loading the roof using no fall-protection. You tell the supplier this is not acceptable, and he says OSHA says it's OK.

Should you be concerned? Why?



Guardrails



- Top rails between 39 and 45 inches tall
- Midrails midway between top rail and working surface
- Toe boards at least 3 1/2 inches high

Roof Opening—Not Guarded



Roof Opening—Guarded



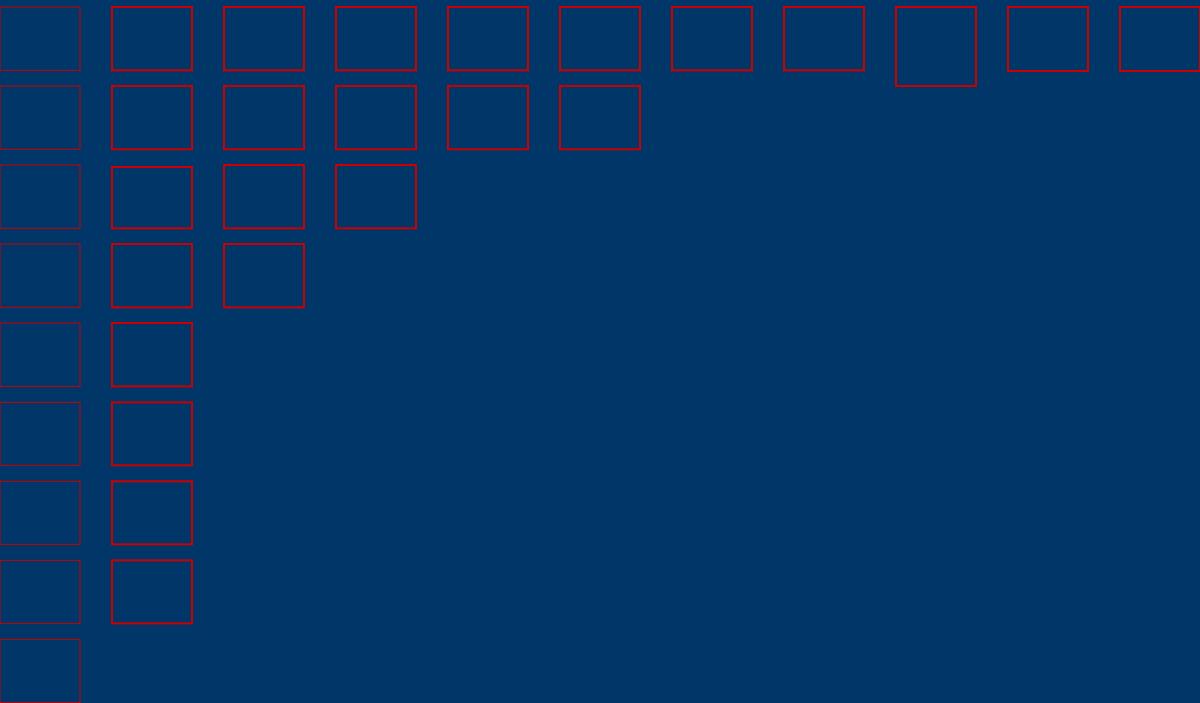
Criteria for Safety Nets

- As close as possible below work surface—no more than 30 feet

Extend out:

- 8 feet out for up to 5 feet down
- 10 feet out for 5 to <10 feet down
- 13 feet out for 10 to 30 feet down





Warning Lines

Warning Lines

Definition:

A barrier erected on a roof to warn workers they are approaching an unprotected roof side or edge. Warning lines contain an area inside in which roofing work may take place without fall-protection systems.



1926.500 (b)

Criteria for Warning Lines

- Locate 6 feet from the roof edge (when no mechanical equipment is being used)
- Erected around all sides of roof work areas
- When mechanical equipment is used, lines should be not less than 6 feet from the roof edge parallel to equipment use and not less than 10 feet from the roof edge perpendicular to equipment use
- Flagged at no more than 6-foot intervals - Height at 34-39 inches
- Tip-over force must be at least 16 pounds
- Minimum tensile strength of 500 pounds

Criteria for Safety Monitors

The monitor's function is to warn a worker when it appears the employee is unaware of a fall hazard or is acting unsafely. A safety monitor must:

- Be a competent person
- Be at same level
- Be within sight
- Be able to communicate
- Not have other responsibilities that could distract from monitoring



Criteria for Hole Covers

- Capable of supporting two times the weight of employees, materials and equipment that may be imposed
- Secured
- Color coded or marked “Hole” or “Cover”



This hole needs a guardrail or strong cover.

You are the foreman of a crew working on a low-slope roof, and you need a safety monitor to watch the work on the gravel stop. Able, your usual safety monitor, is sick, so you ask Baker to put on the vest and act as the safety monitor. Baker dons the vest and continues about his work assisting the installation of the gravel stop. An OSHA compliance officer happens to stop by and notices and compliments you on your warning lines and safety monitor being in place. During your conversation with him, he asks whether he can go on the roof.

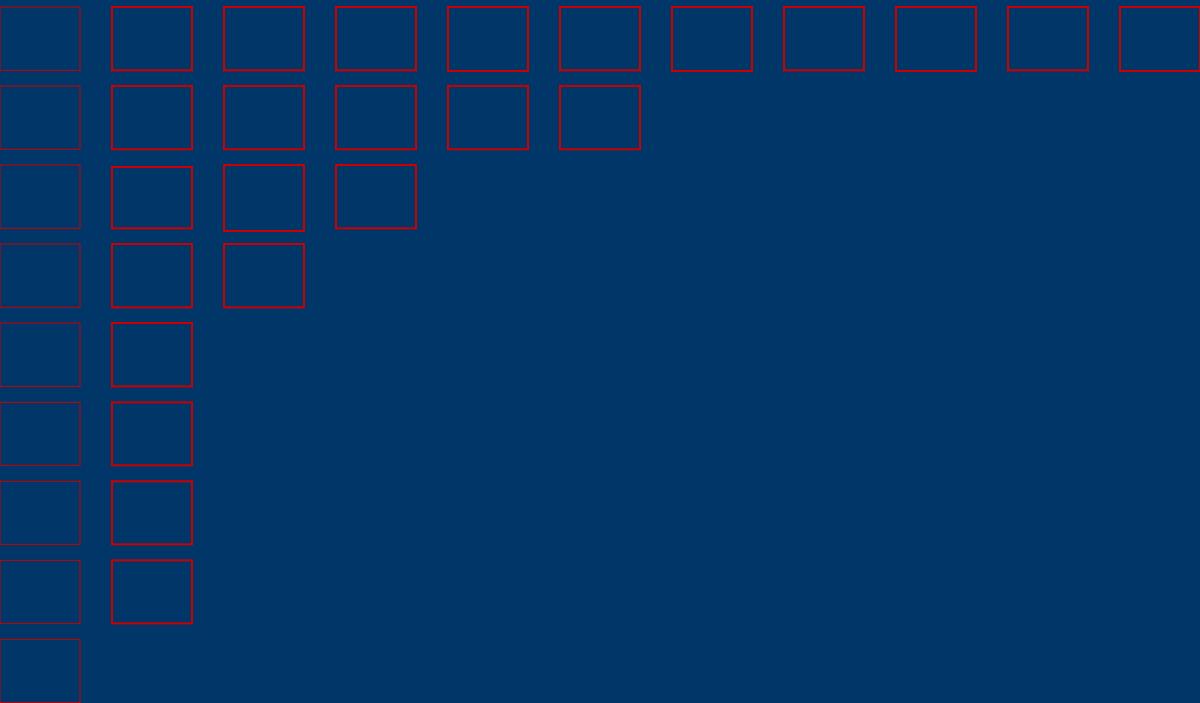
Continued on the next slide →



Once on the roof, the compliance officer walks up to Baker and asks him what he is doing. Baker says: "I'm the safety monitor." The compliance officer asks how he can monitor while he's working. Baker responds: "Well, Able, our usual safety monitor, is sick today, so the foreman assigned me the job. And I've got to help because it's a two-man job."

Are you in compliance with OSHA regulations?





Personal Fall Arrest Systems (PFAs)

Criteria for PFA systems

- Must use body harness
Each employee connected to separate lifeline
- Lanyards and vertical lifelines minimum 5,000-pound strength
- Self-retracting lifelines limiting fall to 2 feet must have minimum strength of 3,000 pounds
- Must limit free fall to 6 feet maximum
- Ropes and straps must be synthetic



Lanyards

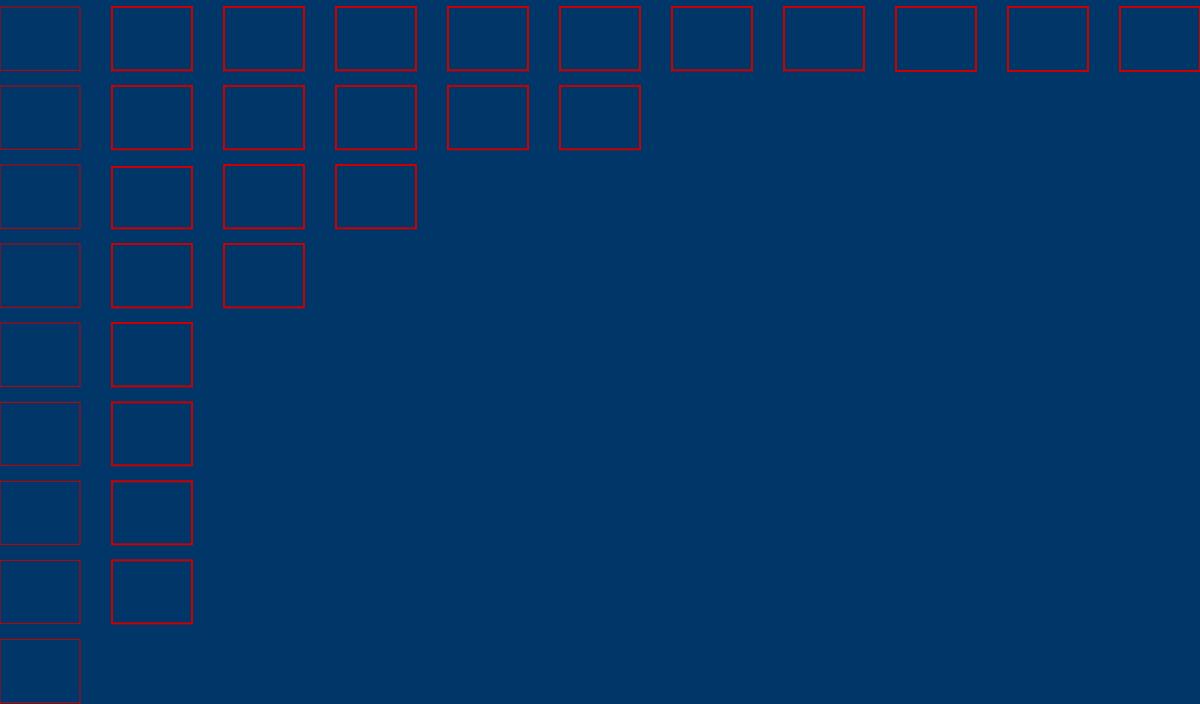


Lanyard with shock absorber



Elements of PFA Systems

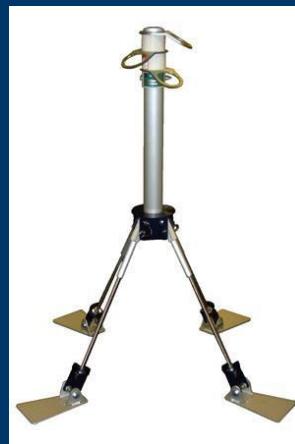




Anchors

Anchors

Anchors for PFA equipment must be capable of supporting at least 5,000 pounds per worker attached.



Anchors Must Also...

- Be independent of systems used to support or suspend platforms
- Be designed, installed and used as part of a complete fall-arrest system
- Be designed, installed and used under the supervision of a competent person



Manufacturer's Installation Instructions

- Anchors must be installed following the instructions from the manufacturer.
- Only the type of fasteners described by the manufacturer for use with the anchor may be used.
- The quantity of fasteners described by the manufacturer for use with the anchor must be installed.

Locating Roof Anchors—Residential

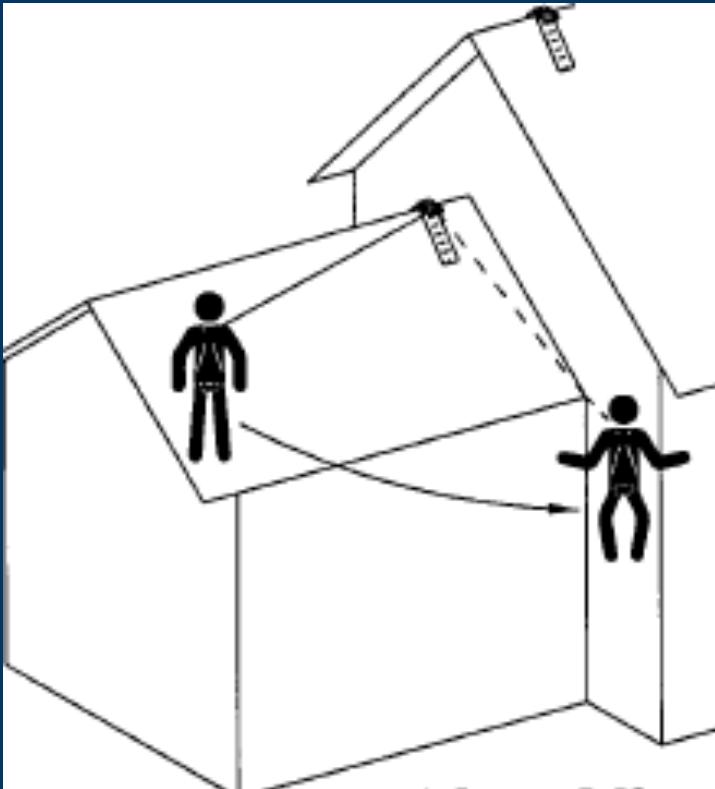
Some General Guidelines

- Locate at roof peak when possible and at least 6 feet from any exposed roof edge.
- DO NOT install roof anchors on unsupported roof structures, such as eaves or gable overhangs.

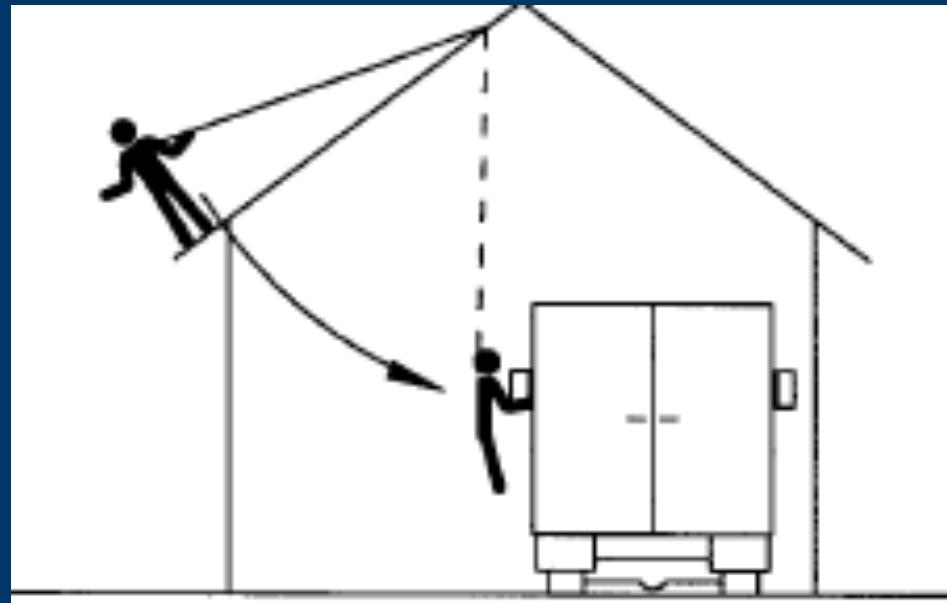
Locating Roof Anchors—Residential Some General Guidelines

- Hip roofs may require a roof anchor at each hip face.
- Reduce swing fall hazards on long roof faces by using multiple roof anchors installed at least 6 feet from the rake edge.
- Best anchor position is directly above worker.

Swing Fall Hazards



Swing Fall Hazard



Gable End Swing Fall

Swing Fall Hazard



Common Roof Anchors



Wood and Metal Deck



Standing-Seam Roof



Anchor Quiz

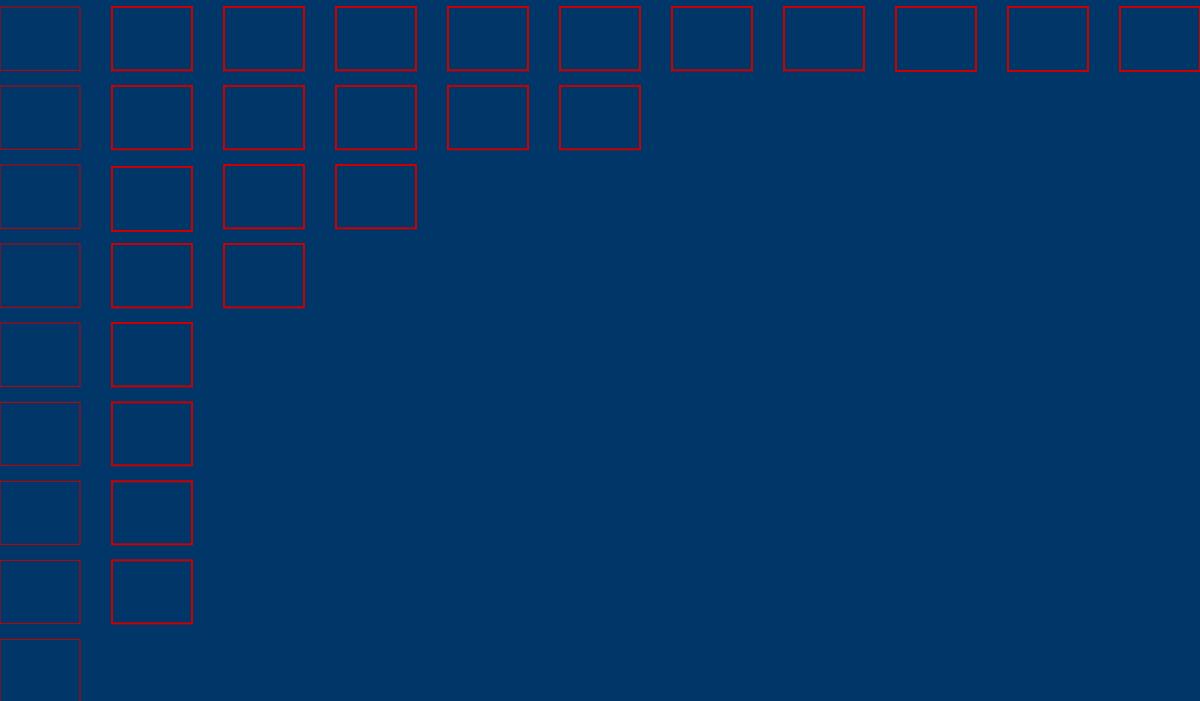
Can a crane's hook or load line be used as an anchor point for a PFA system?



New Subpart CC Addresses

29 CFR §1926.1423(j). A PFA system is permitted to be anchored to a crane's hook or other part of the load line if all of the following are met:

- 1) Capable of supporting 5,000 pounds
- 2) Operator must be at work site and informed of the use
- 3) No load is suspended from the load line



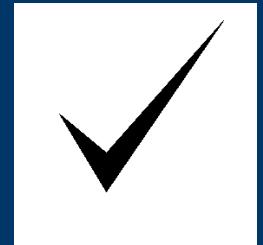
Rescue

OSHA Standard

the "... employer shall provide for prompt rescue of employees in the event of a fall or shall assure that employees are able to rescue themselves."

29 CFR 1926.502(d)(20)

Fall Rescue Plan



- ✓ Rescue should be addressed in your company safety program as part of its fall-protection plan.
- ✓ OSHA's 1926 Subpart M envisions post-fall rescue as a preplanned event.
- ✓ Workers should be trained in available rescue equipment and specific techniques, along with the hazards of a rescue operation.

Single Workers

- A single worker needs a way to call for help.



But he or she may be injured after a fall and unable to perform self rescue—or even call for help. A better policy is not to have workers work alone.



First Step, Call 9-1-1

- After a fall, call 9-1-1
 - But many rescue workers are not trained in high-angle rescue
 - High-angle rescue involves rescuing people from places that can't be reached by aerial ladders
- Implement your rescue plan



Harness-induced Injury or Death

Suspension Trauma

(a.k.a. orthostatic intolerance, orthostatic incompetence or orthostatic shock)



**Some researchers say death
can occur after a short time
suspended in a harness!**

Suspension Trauma

1. Fall arrested by a harness
2. Blood flow impeded by leg straps and gravity
3. Blood collects in large leg muscles
4. Blood return to heart decreases
5. Heart rate increase and hormone release from pain and danger response
6. Heart pumping action reduced because of decreased blood return
7. More blood collects in legs
8. Heart rate and blood pressure decrease
9. Blood flow to brain decreases
10. Victim loses consciousness
11. Blood flow to brain continues to decline dangerously
12. Brain damage
13. Death



- Can occur when legs don't move and legs are lower than the heart
- May be complicated by other injuries from a fall, such as a neck trauma, broken bones, cuts, etc.

Signs of Suspension Trauma

- Fainting
- Shortness of breath
- Nausea
- Dizziness
- Sweating
- Hot flushes
- Paleness
- Narrowing of field of vision or loss of vision
- Increased heart rate



Rescue

Two basic elements of rescue:

- ① Delay orthostatic shock
- ② Bring the fallen worker to a supporting surface

Rescue Equipment

- Equipment already on-site:
ladders, scaffolds,
personnel lifts
- Pulleys, winches or
descending devices



Other rescue equipment



Self-rescue Strategies

- Cell phone or two-way radio
- Self-rescue lanyard
- Suspension trauma straps and slings
- Lifeline loop and prussic loop
- Foot wrap



Self-rescue



Self-rescue Lanyard



Suspension Trauma Relief

Self-rescue



Prussic Loop

Making a Lifeline Loop



1.



2.



3.



4.

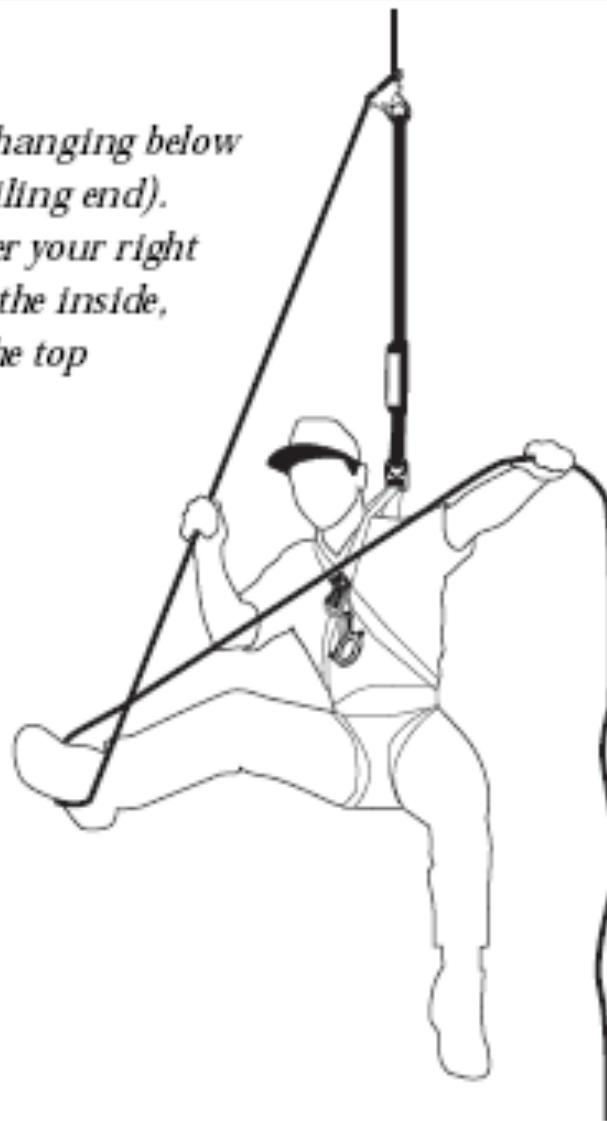


Self-rescue – Foot Wrap

Step 1

Fig. 1

Grasp the lifeline hanging below you (that's the trailing end). Wrap it once under your right foot starting from the inside, then loop it over the top of the foot.

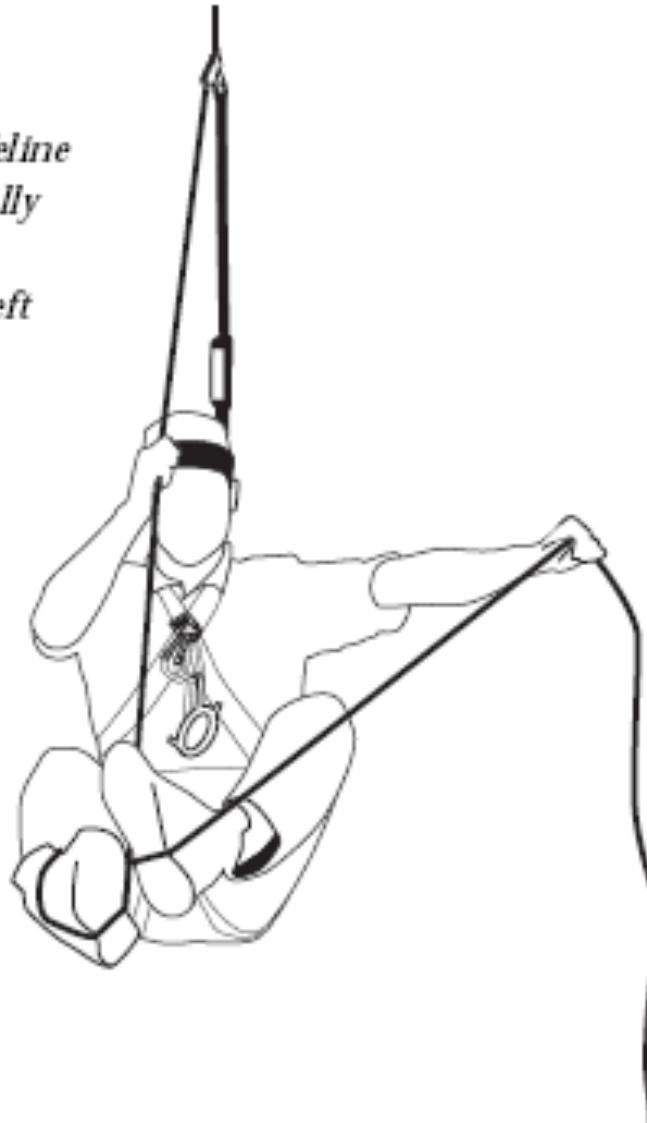


Self-rescue – Foot Wrap

Step 2

Fig. 2

Stretch the lifeline out horizontally and step into it with your left foot.



Self-rescue – Foot Wrap

Step 3

Fig. 3

Raise the trailing end of the lifeline and bring both parts together. You have now created a loop that will allow you to stand.



Self-rescue – Foot Wrap

Step 4

Fig. 4

Continue to hold on to the lifeline with both hands and stand up. This will relieve the pressure on your upper legs. When you get tired, you can shift back to a sitting position. While waiting for help, alternate between sitting in the harness and standing in the loop. You can also distribute weight between your feet and the harness. To climb up or down short distances, slide the rope grab up (to climb up) or down (to climb down); sit back down, grasp another bite of rope, then repeat the process.



Never Cut Lanyard or Lifeline



After a Fall – First Aid

- **Do not recline the rescued worker**
 - The quick release of pooled blood from the legs can cause cardiac arrest.
- A **sitting position** on the ground and for transport to hospital is recommended.
- Administer oxygen if available.



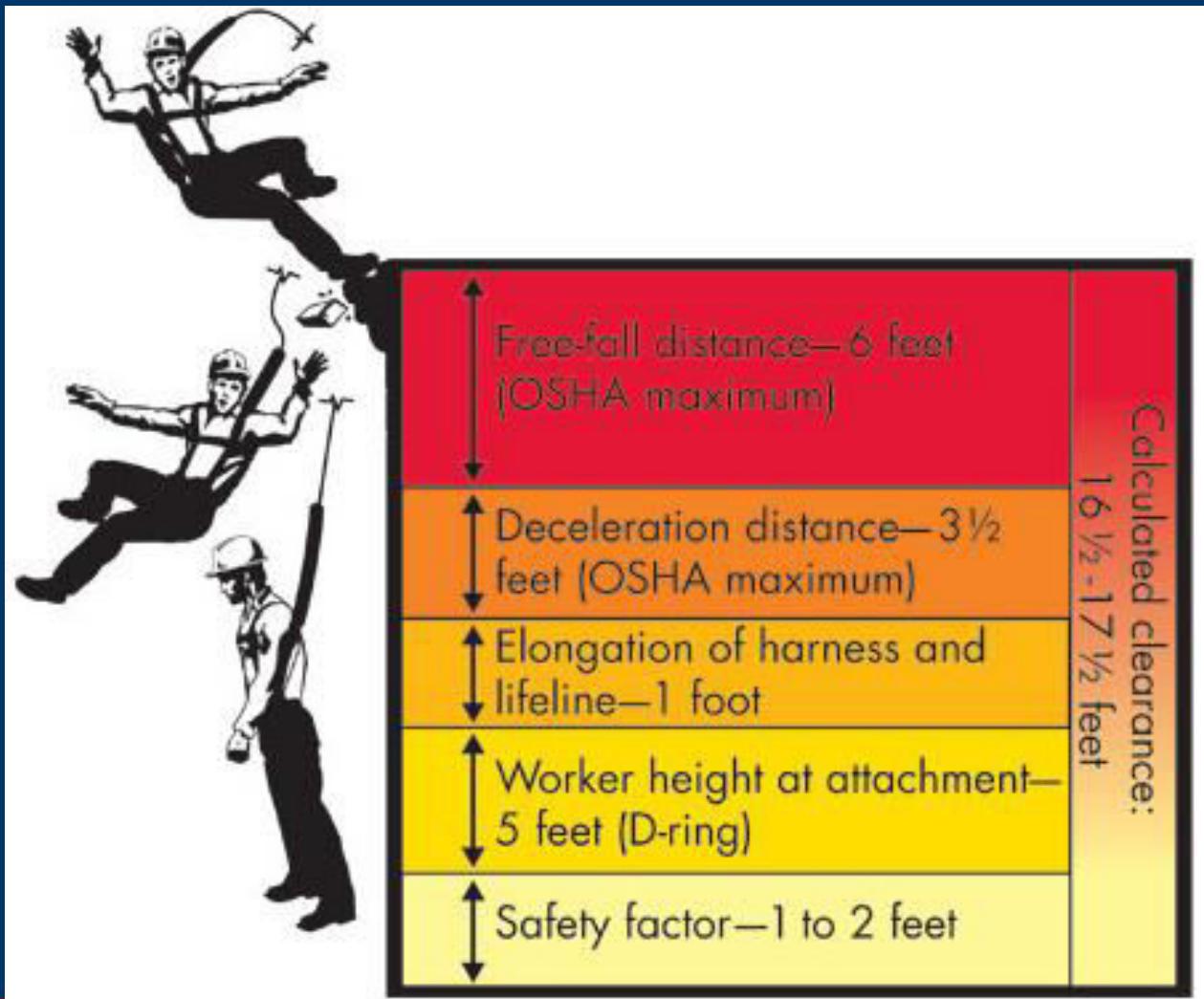
Take Equipment Out of Service

- OSHA requires that PFA equipment that has been subjected to “impact loading”—subjected to forces like those during a fall—must be immediately removed from service and not be used again until inspected by a competent person and determined to be undamaged and suitable for reuse.

(29 CFR 1926.502(d)(19))

Use Backup Training Systems During Rescue Training

Calculated Clearance





CONFINED SPACES IN CONSTRUCTION

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OBJECTIVES

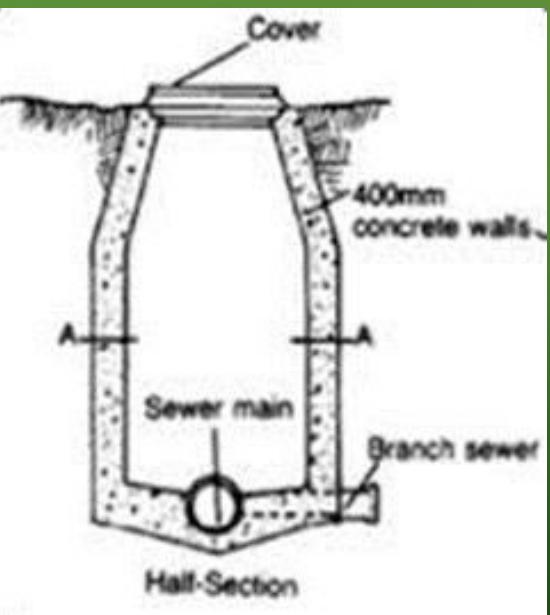
- Identify the characteristics of confined spaces
- Identify the characteristics of permit required confined spaces (PRCS)
- Identify the differences between General Industry and Construction confined space
- Look at expected injury reduction associated with confined space in construction rule
- Identify the key components of a confined space plan
- Identify the duties of the entrant, attendant, and supervisor

OBJECTIVES (CONTINUED)

- Identify the hazards in a confined space
- Understand eliminating hazards using Lock-out/Tag-out (LOTO)
- Understand ventilation practices
- Understand rescue preparation
- Understand employee rights

CONFINED SPACE FATALITY

7/10/2010 Speedy Rooter Inc.,
North Sioux City, SD 57049

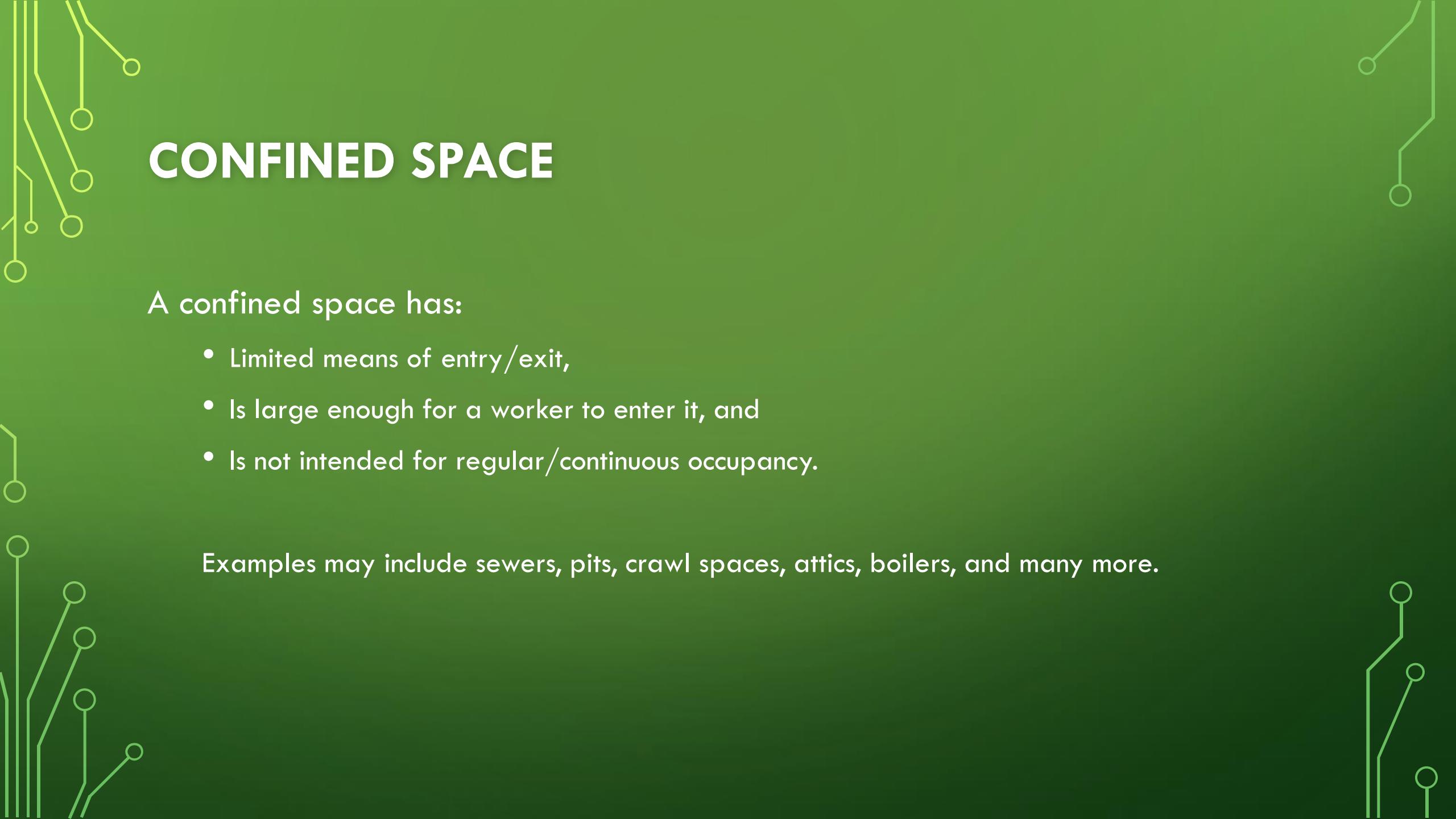


Two workers were fixing a clogged sewer and were overcome by sewer gases. One worker fatality and one worker was hospitalized.



WHAT CONFINED SPACES DO YOU HAVE IN YOUR WORK ENVIRONMENT?

- Has there ever been an accident in an confined space at your work?
 - How could accidents been avoided?
 - What percentage would-be rescuers die trying to perform rescue operations without proper training or procedures?
- 
- 



CONFINED SPACE

A confined space has:

- Limited means of entry/exit,
- Is large enough for a worker to enter it, and
- Is not intended for regular/continuous occupancy.

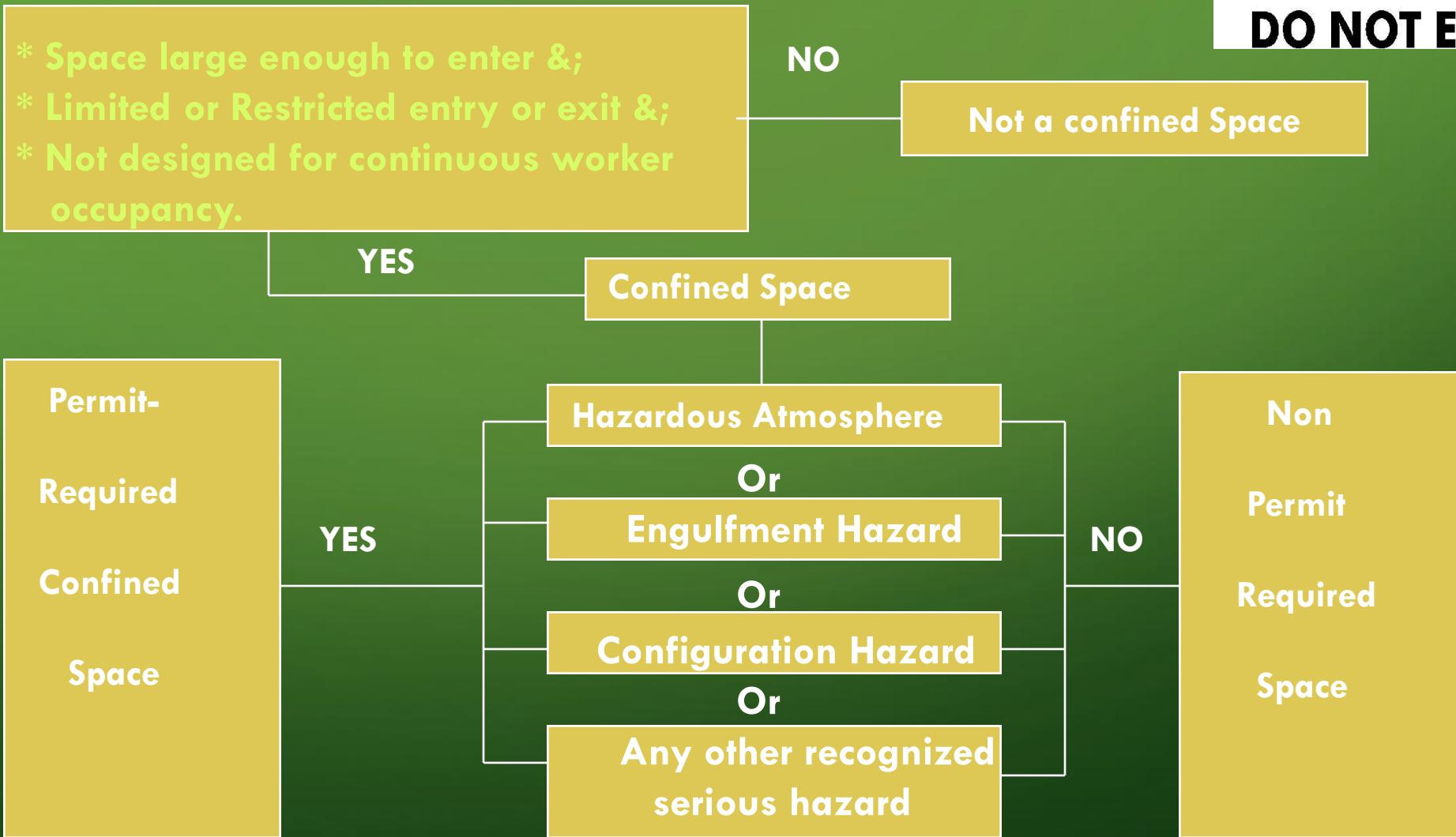
Examples may include sewers, pits, crawl spaces, attics, boilers, and many more.

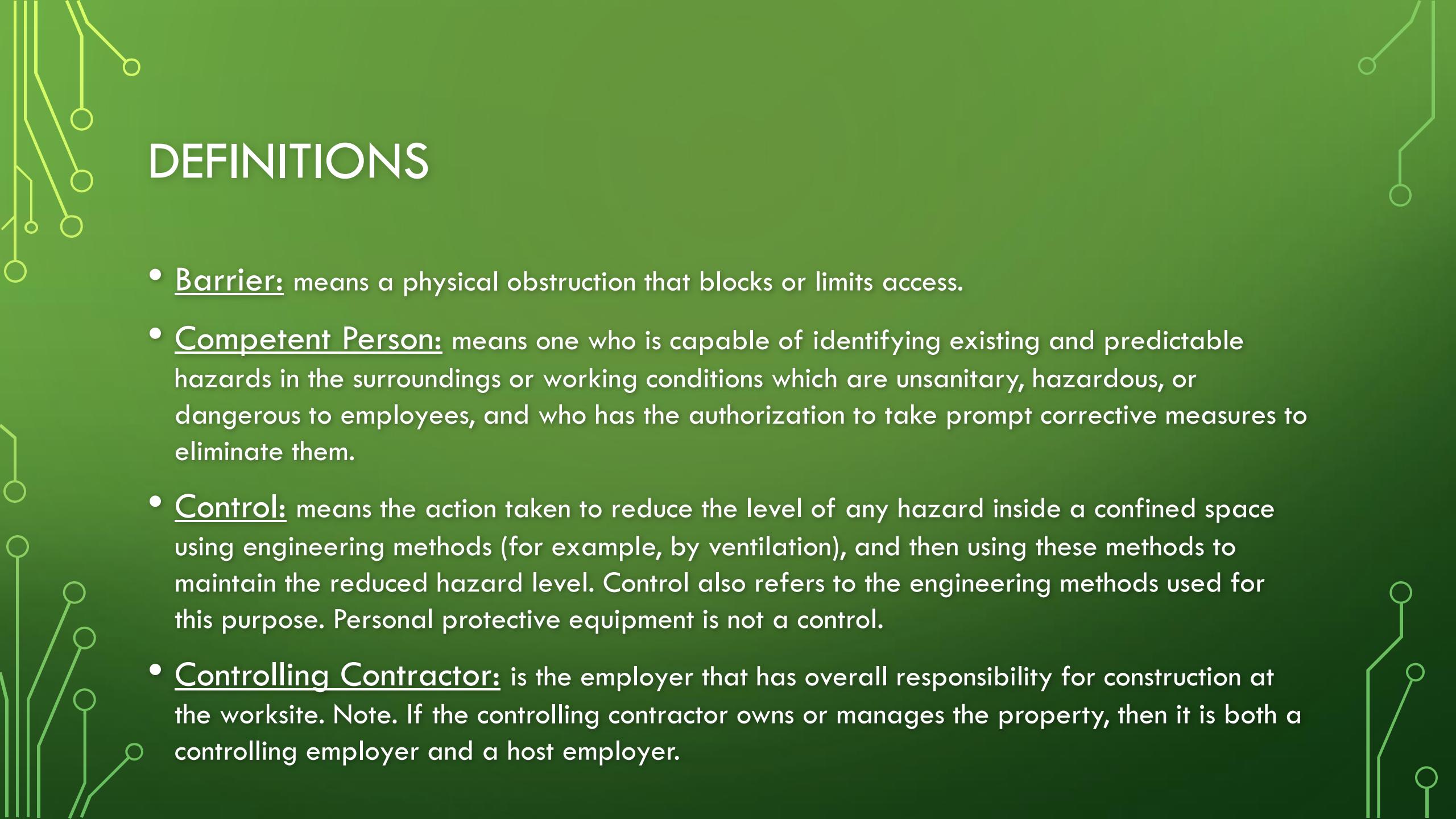
PERMIT-REQUIRED CONFINED SPACES

Permit-required confined spaces have one or more of these characteristics:

- Contains or has the potential to contain a hazardous atmosphere;
- Contains a material with the potential to engulf someone who enters the space;
- Has an internal configuration that might cause an entrant to be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross section; or
- Contains any other recognized serious safety or health hazards.

CATEGORIZING WORK SPACE





DEFINITIONS

- **Barrier**: means a physical obstruction that blocks or limits access.
- **Competent Person**: means one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has the authorization to take prompt corrective measures to eliminate them.
- **Control**: means the action taken to reduce the level of any hazard inside a confined space using engineering methods (for example, by ventilation), and then using these methods to maintain the reduced hazard level. Control also refers to the engineering methods used for this purpose. Personal protective equipment is not a control.
- **Controlling Contractor**: is the employer that has overall responsibility for construction at the worksite. Note. If the controlling contractor owns or manages the property, then it is both a controlling employer and a host employer.

DEFINITIONS (CONTINUED)

- Early-Warning: system means the method used to alert authorized entrants and attendants that an engulfment hazard may be developing. Examples of early-warning systems include, but are not limited to: alarms activated by remote sensors; and lookouts with equipment for immediately communicating with the authorized entrants and attendants.
- Entry Employer: means any employer who decides that an employee it directs will enter a permit space.
- Entry Rescue: occurs when a rescue service enters a permit space to rescue one or more employees.
- Host Employer: means the employer that owns or manages the property where the construction work is taking place.

FLOW CHART OF RESPONSIBILITIES

