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GOLD

SILVER

Ladder safety and fall protection

Presented by:
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Findorff
CHARACTER COMMUNITY CRAFTSMANSHIP

Nick Femal

Findorff

- Findorff Safety Director since 2017
- B.S. in Occupational Safety & Health from University of Wisconsin – Whitewater (2008)
- Spent 7 years with 2 construction firms in mid-Atlantic
- Certified Safety & Health Technician since 2010

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Agenda

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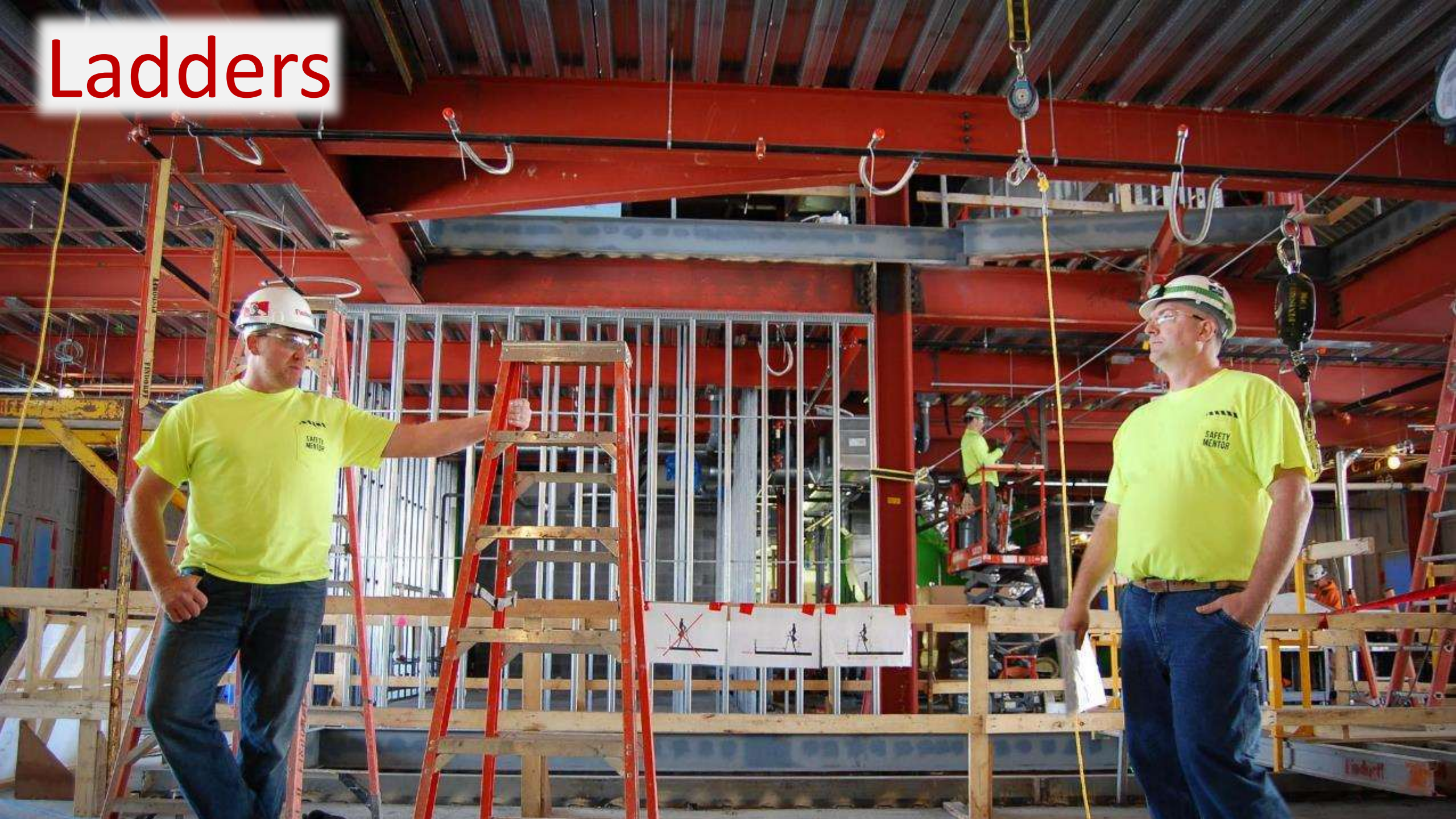
Ladders

- Why Ladder Safety?
- Choosing the Right Ladder
- Inspecting Your Ladder
- Safe Ladder Usage

Fall Protection

- Why Fall Protection?
- Fall Protection Systems
  - Guardrail Systems
  - Personal Fall Arrest Systems
  - Hole Covers

Ladders



Scope of the problem

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- 20% of fall injuries involve ladders
- 81% of fall injuries treated in ERs involve ladders
- Ladder related injuries have increased 50% in 10 years
- Ladder fall injuries increase with age

Case study

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Ladders last initiatives

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What causes ladder accidents?

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- Selecting the wrong ladder
- Using worn or damaged ladders
- Incorrect use
- Incorrect placement
- Falling from ladder
- Being knocked from ladder
- Pushing or pulling on ladder

What Not To Do

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What Not To Do

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What Not To Do

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What Not To Do

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Choosing the Right Ladder

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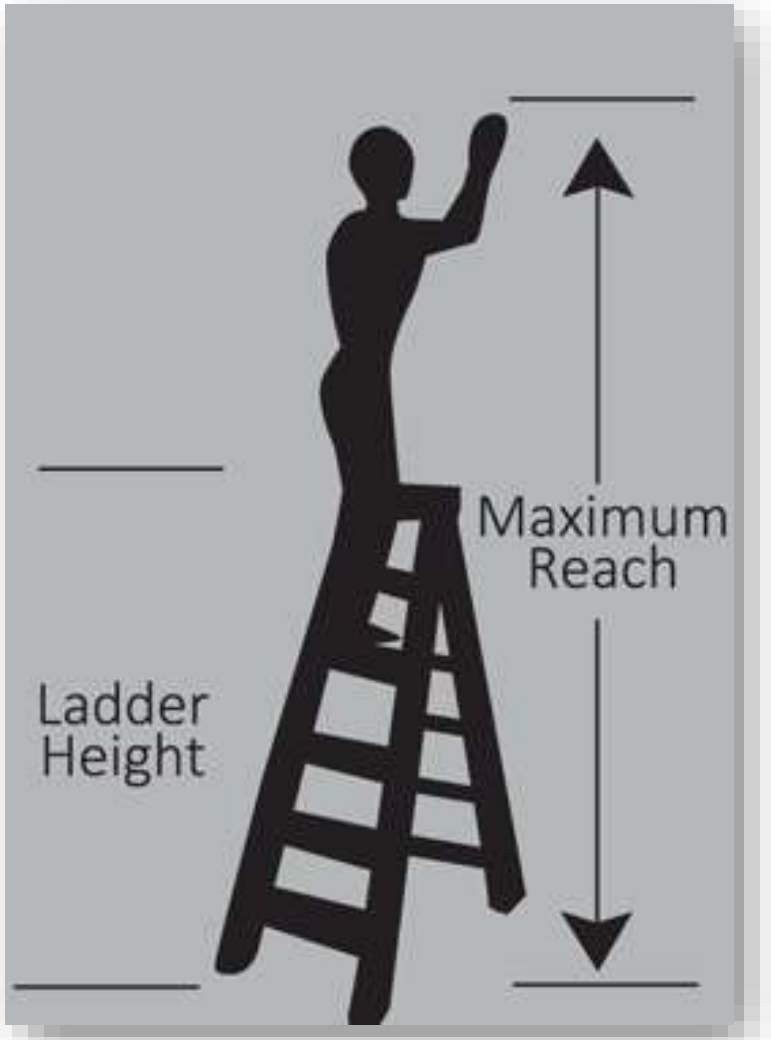
1. **Select the Proper Ladder Style**

2. **Select the Proper Height**

3. **Select the Proper Duty Rating** *(maximum safe load capacity)*

4. **Select the Right Material**



Source: https://www.grainger.com/content/safety-choosing-ladder

Select the proper ladder style

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- Step-ladder vs. extension

Lean-Safe Ladders

Platform or Podium Ladders

Other types of ladders

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Tripod Ladders

Articulating Ladders

CHOOSING THE RIGHT LADDER

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Job-made Ladders

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- Custom made to fit specific job situations
- Provide access and egress to work area
- Not to be used as a work station

Watch for trip hazards at base of ladders

Job-made Ladders

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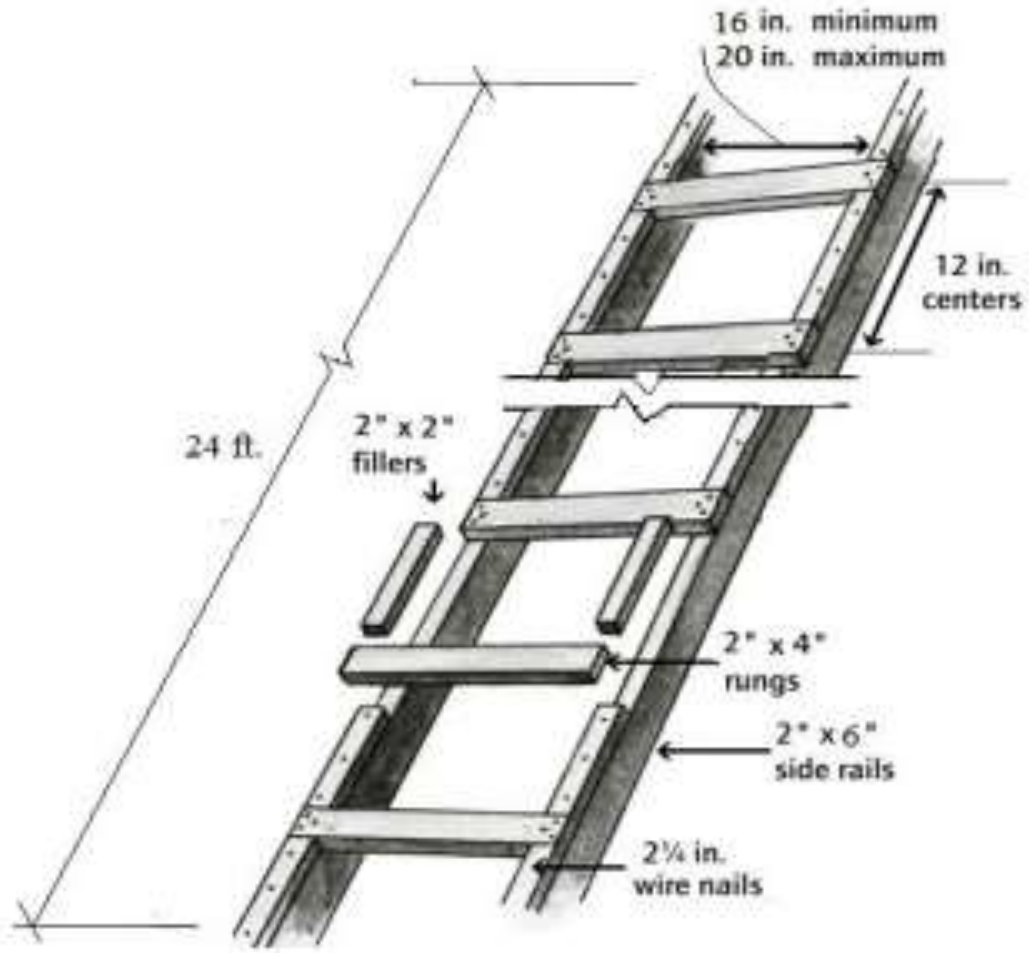

No side rails

Double-Cleated Ladder

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- Ladder with a center rail
- Provides simultaneous two-way traffic
- Great for areas with ≥ 25 employees
  (or provide multiple access ladders)

Select the proper height

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- Extension
  - Ladder should e 7-10 feet longer than highest support / contact point
    - Proper setup
    - Overlap of ladder sections
    - Height restrictions of highest standing level
  - Highest standing level = 4 rungs down from top

- Step-ladder
  - Safe reaching height is 4 feet higher than height of ladder
  - Highest standing level = two steps down from the top

Select the proper duty rating

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- Duty rating – maximum safe load capacity of ladder

Select the right material

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- Fiberglass
  - Stronger than aluminum
  - More weather resistant

- Aluminum
  - Very lightweight
  - Less expensive
  - Do not use around electricity

Inspecting your ladder

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- A competent person must inspect ladders for visible defects
- If a defective, destroy and put in dumpster

Inspecting your ladder

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Check all of the following:

- Rungs and rails
- Labels
- Spreader
- Rung locks and rope / pulley
- Safety shoes
- Hardware (hinges, rivets, bolts, etc.)

Inspecting your ladder

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Inspecting your ladder

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Inspecting your ladder

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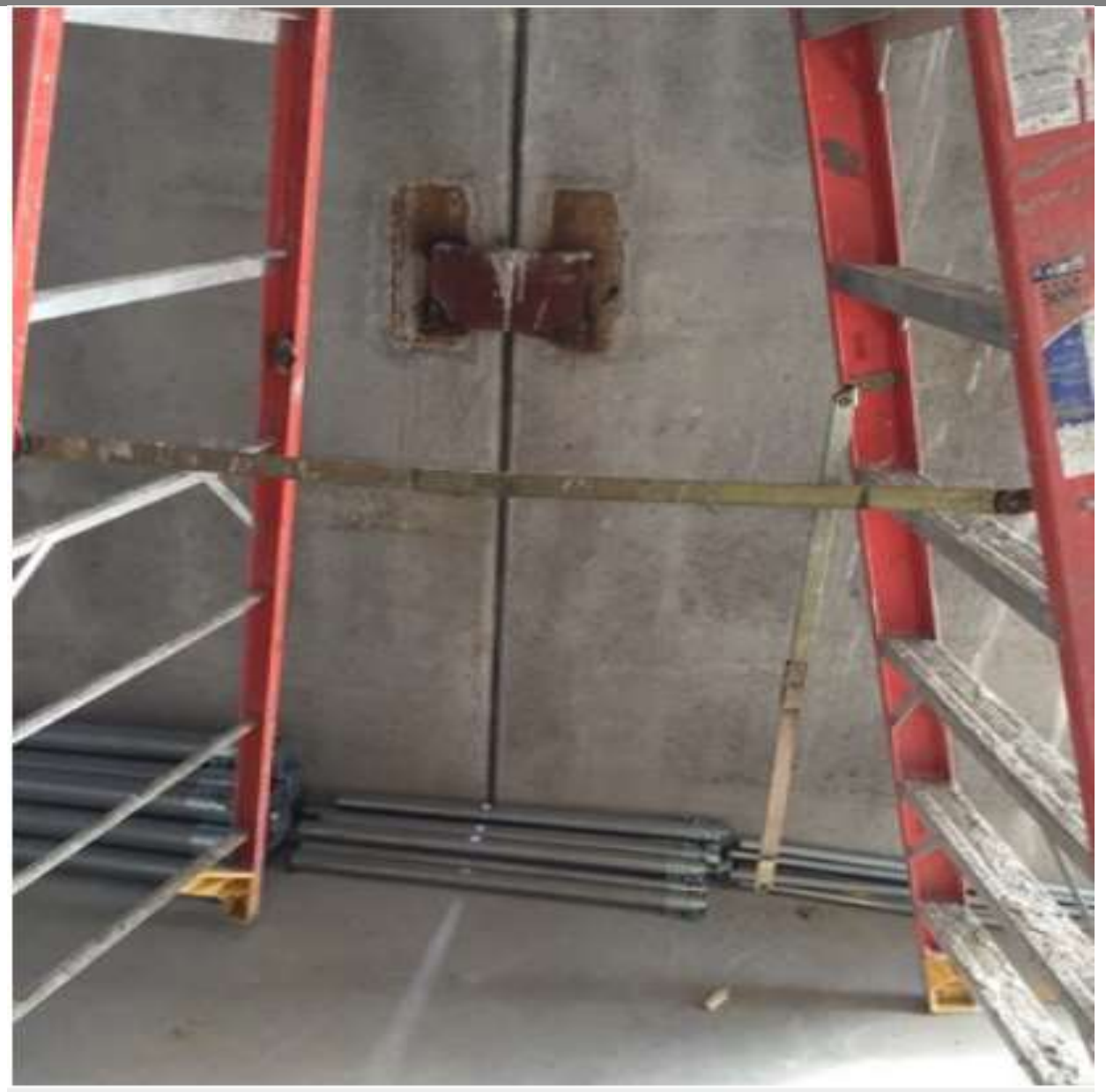

Painting Wood Ladders

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- **Don’t paint ladders**

Safe ladder usage

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- When to provide?
- Access ladders
- Climbing ladders
- Safe step-ladder usage
- Safe extension ladder usage
- Ladders near a fall exposure

When to provide?

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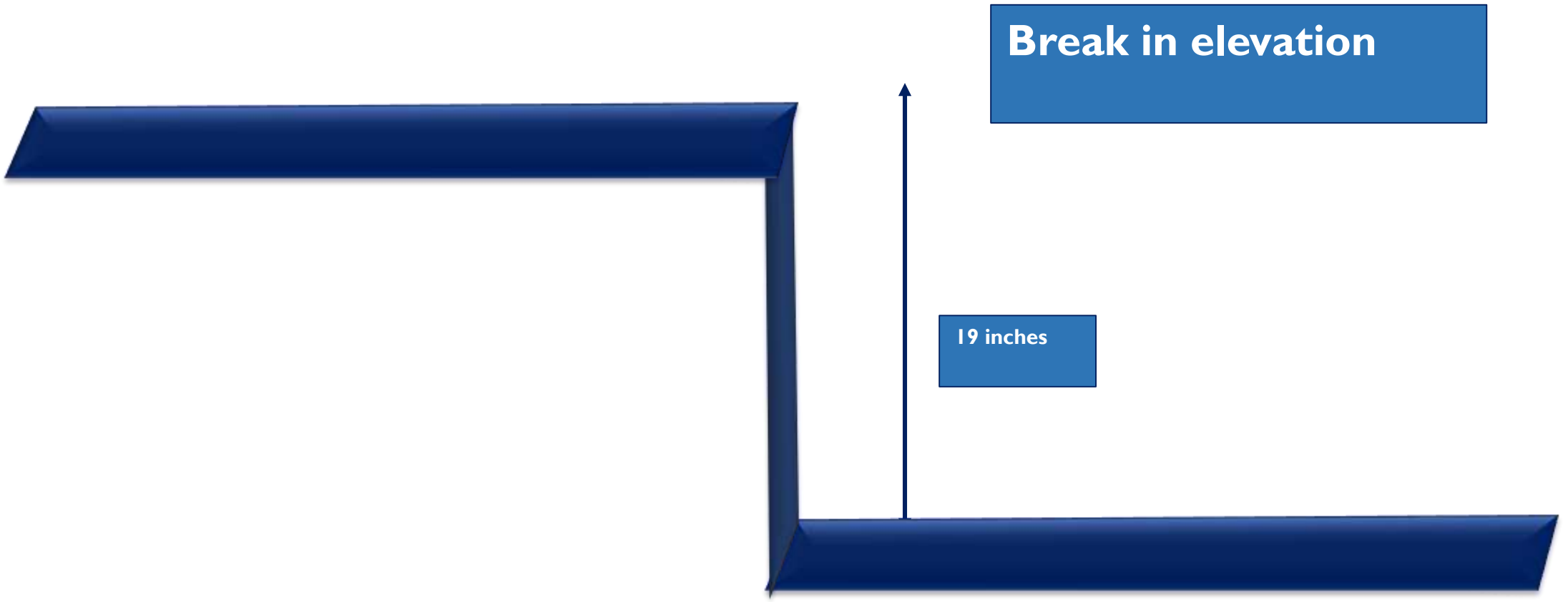

CASE STUDY

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Safe access ladders

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- Ladder angle
- Ladder rails must extend 3-feet above landing
- Secured at top and bottom
- Guardrail offsets at top
- Hoisting rope for material
- Softeners to protect the ladder

Ladder Angle

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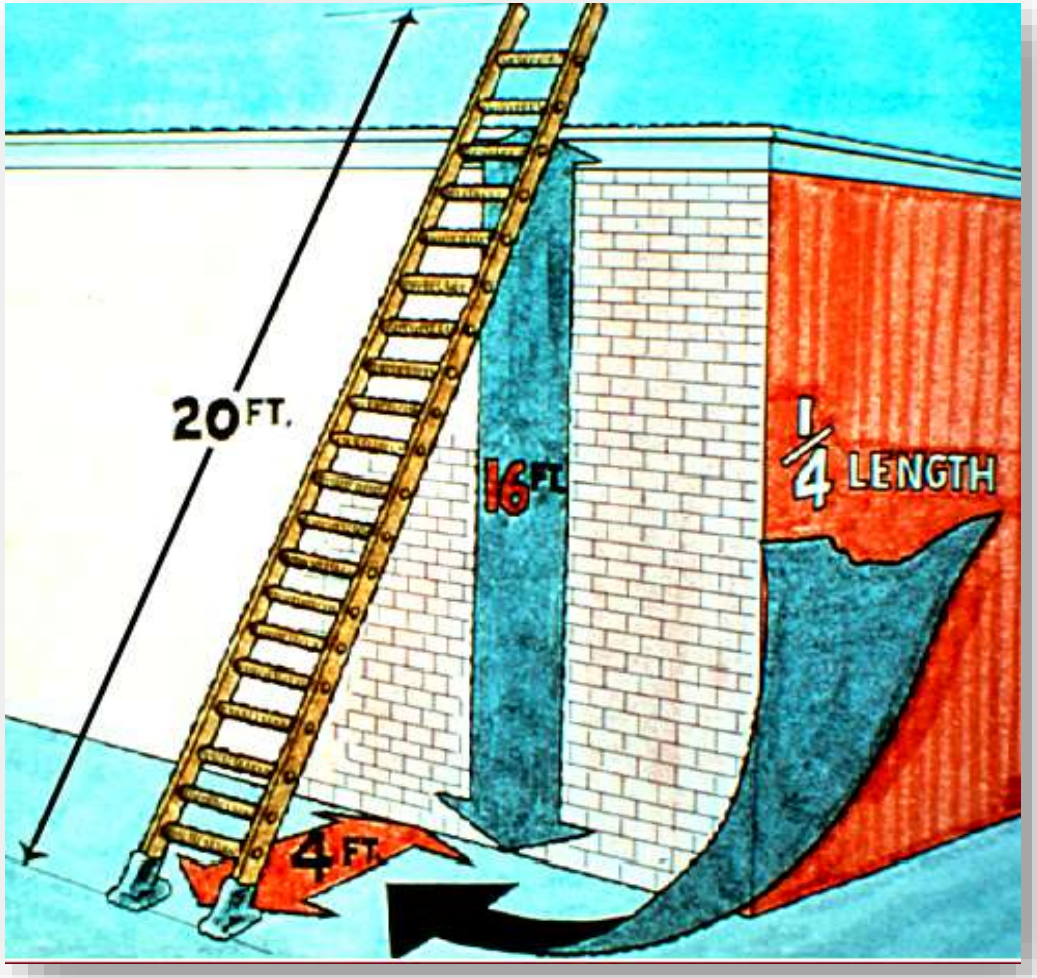
- 1:4 horizontal to vertical ratio
- **Quick test:** place feet at base of ladder and you should be able to barely grab a rung when holding arm out straight



Ladder Rail Extension

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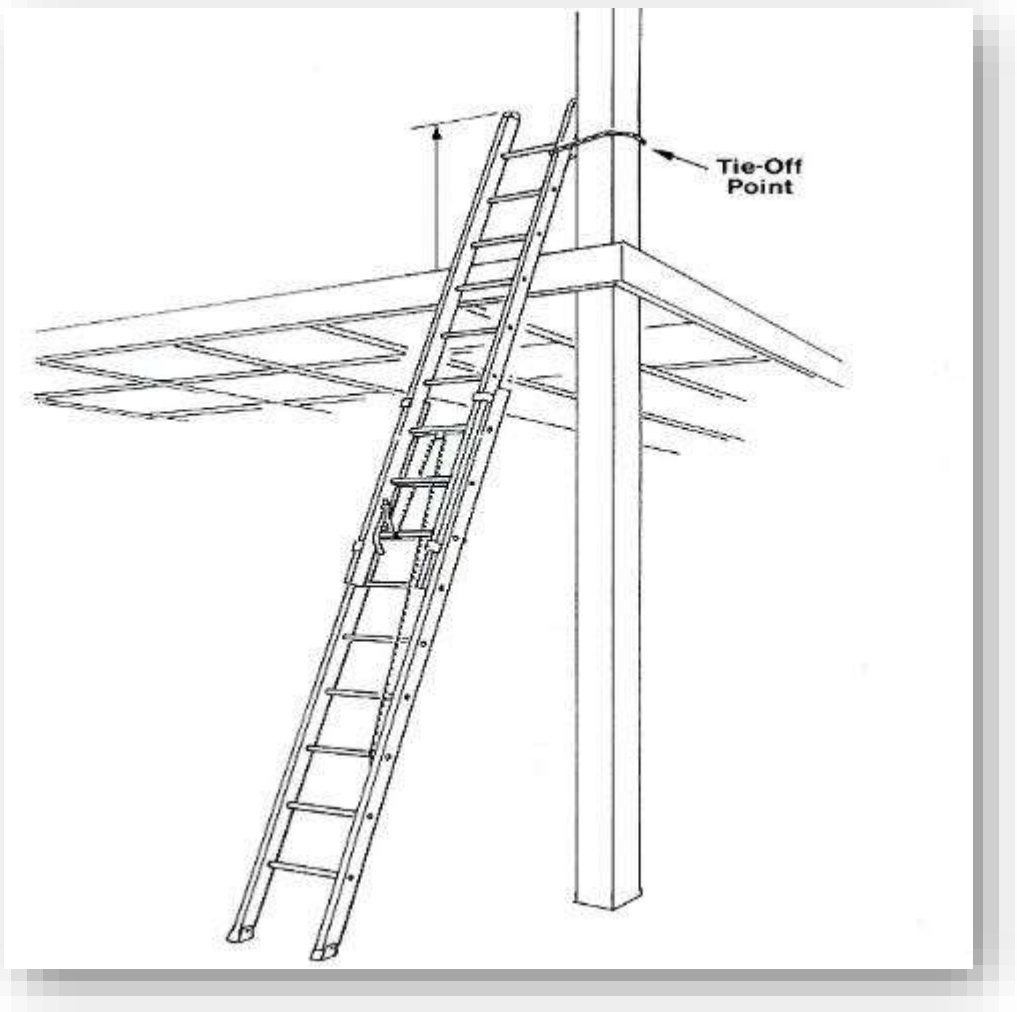
Side rails must extend at least 3 feet above landing



Ladder Rail Extension

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- Ladder extensions available through the Yard.

- Great for extension ladders used to access upper surfaces

Unsafe access

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Securing Ladders

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- Secure ladders to prevent displacement – top and bottom
- Do not setup on slippery surfaces
- Always use with slip-resistant feet

Unsafe access

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Missing LADDER OFFSET

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Missing LADDER OFFSET

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Missing LADDER OFFSET

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good LADDER OFFSET

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good LADDER OFFSET

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Missing hoisting hope

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Hoisting rope corrected

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Missing softeners

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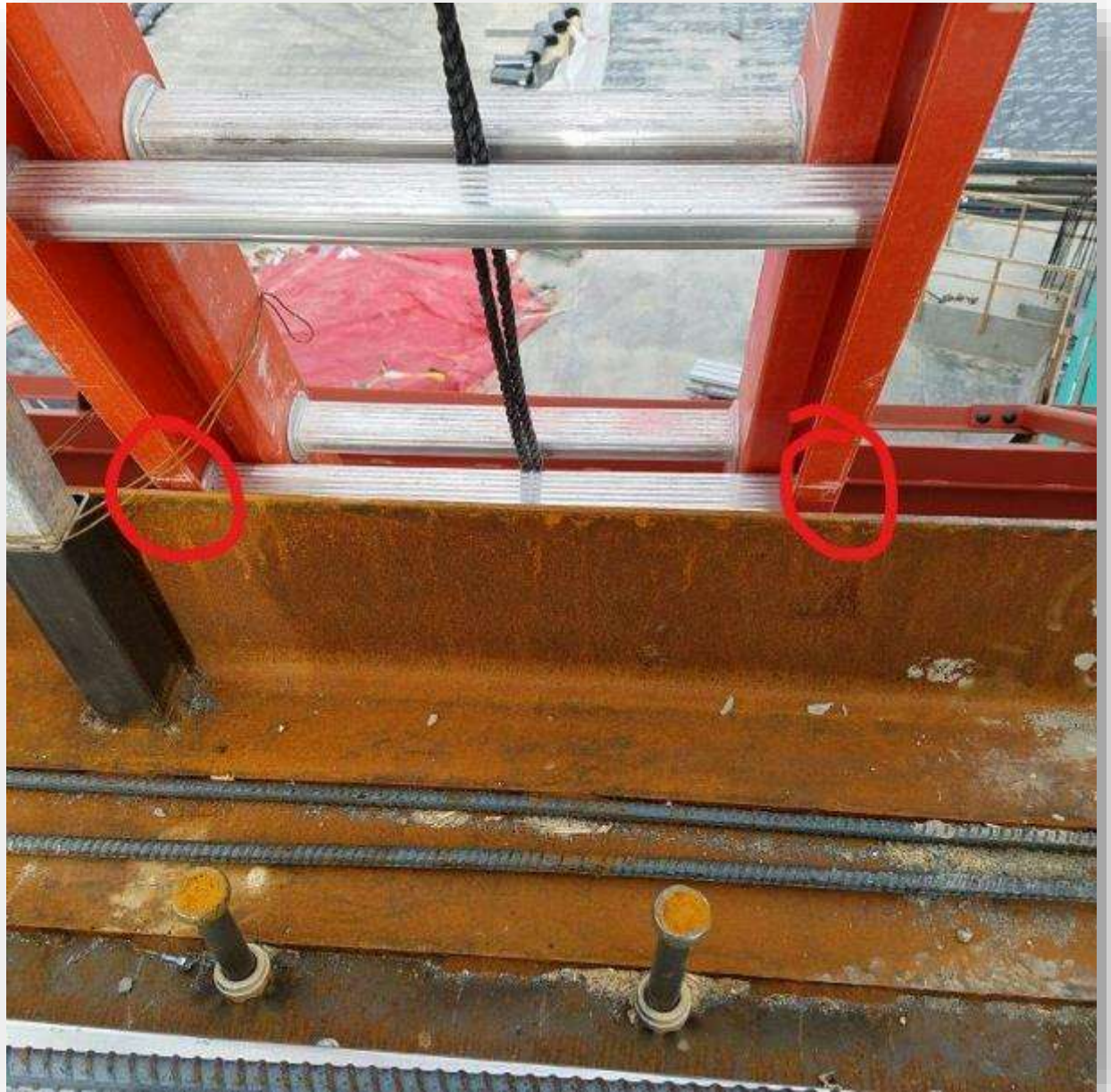

Missing softeners

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Climbing the Ladder

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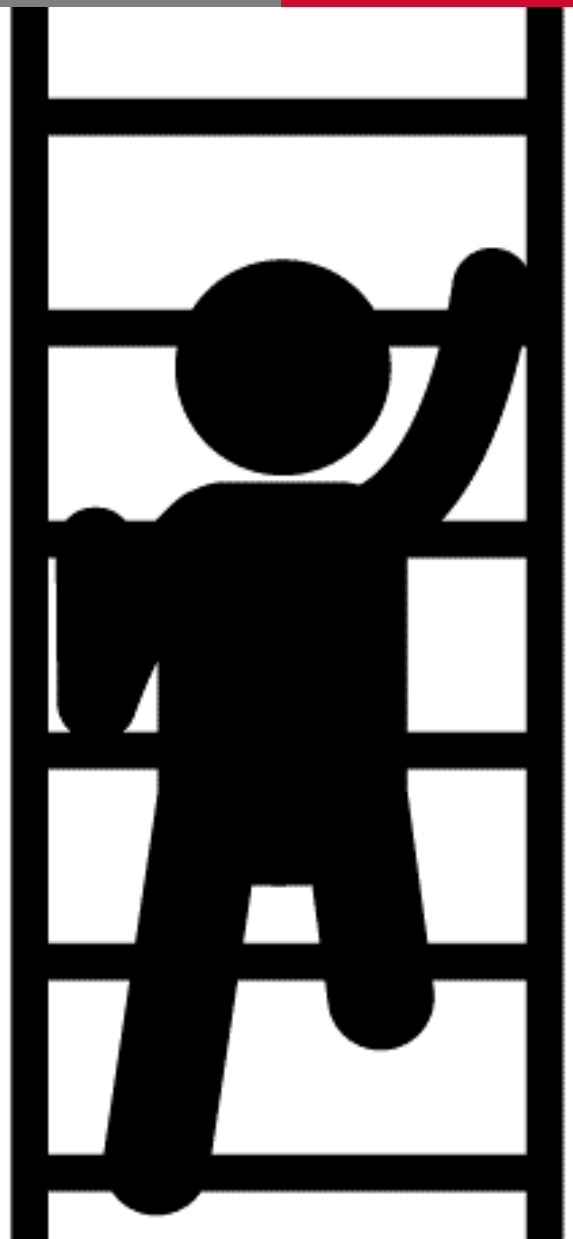
- Face the ladder when going up or down
- Use at least one hand to grab the ladder when going up or down
- Do not carry any object or load that could cause you to lose balance



Ladder Placement

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- Ground must be level and firm

- Do not place in front of doors that are NOT locked, blocked or guarded

unSafe Step-Ladder usage

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Must be Fully Open and the Braces Locked

unSafe Step-Ladder usage

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No standing on top or top step

Maintain 3-points of contact

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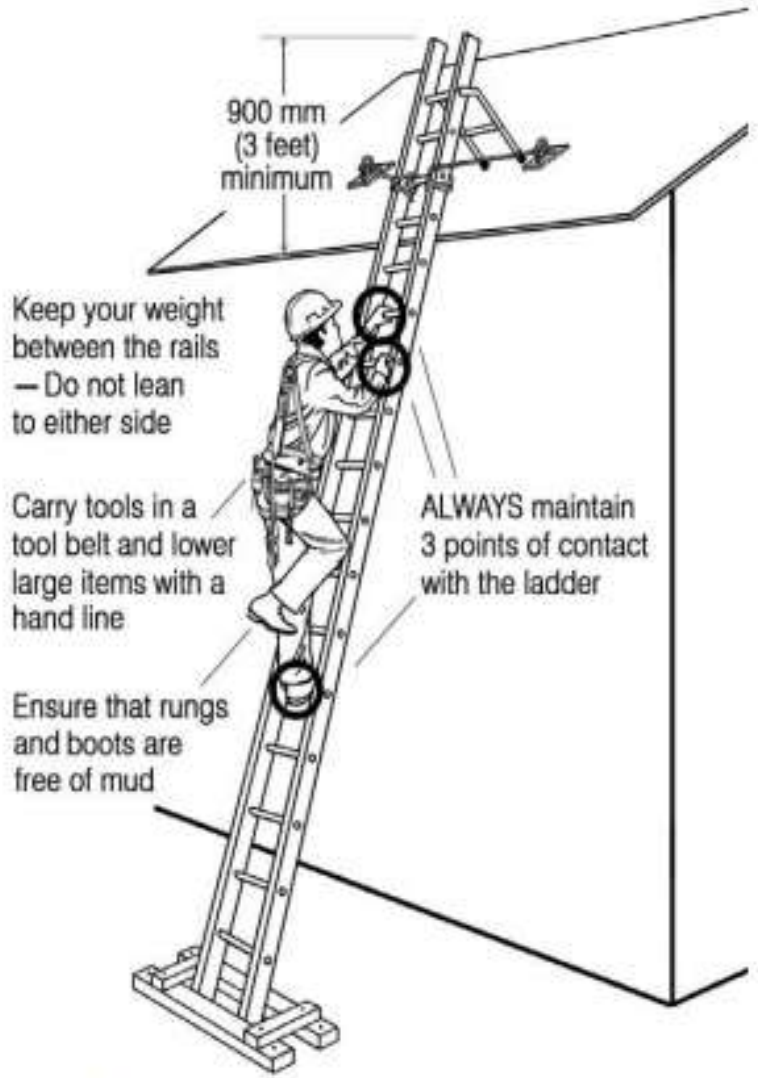

3-Point Contact for Ladders

Ladders near a fall exposure

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Q: How many feet from fall exposure should this employee be without fall protection?

A: 2 times the height of the ladder

Employee training

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Employee training must consist of:

- The nature of fall hazards in the work area
- The proper selection, inspection, and use all ladders
- The maximum intended load-carrying capacities of ladders

Fall protection

Scope of the problem

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- Leading cause of fatalities
- Most involve falling from open sided floors or through floor openings
- Falls from as little as 4 to 6 ft. can cause serious lost time, accidents or death

Did you know?
Falls from Elevation account for 1/3 of all deaths in construction

Scope of the problem

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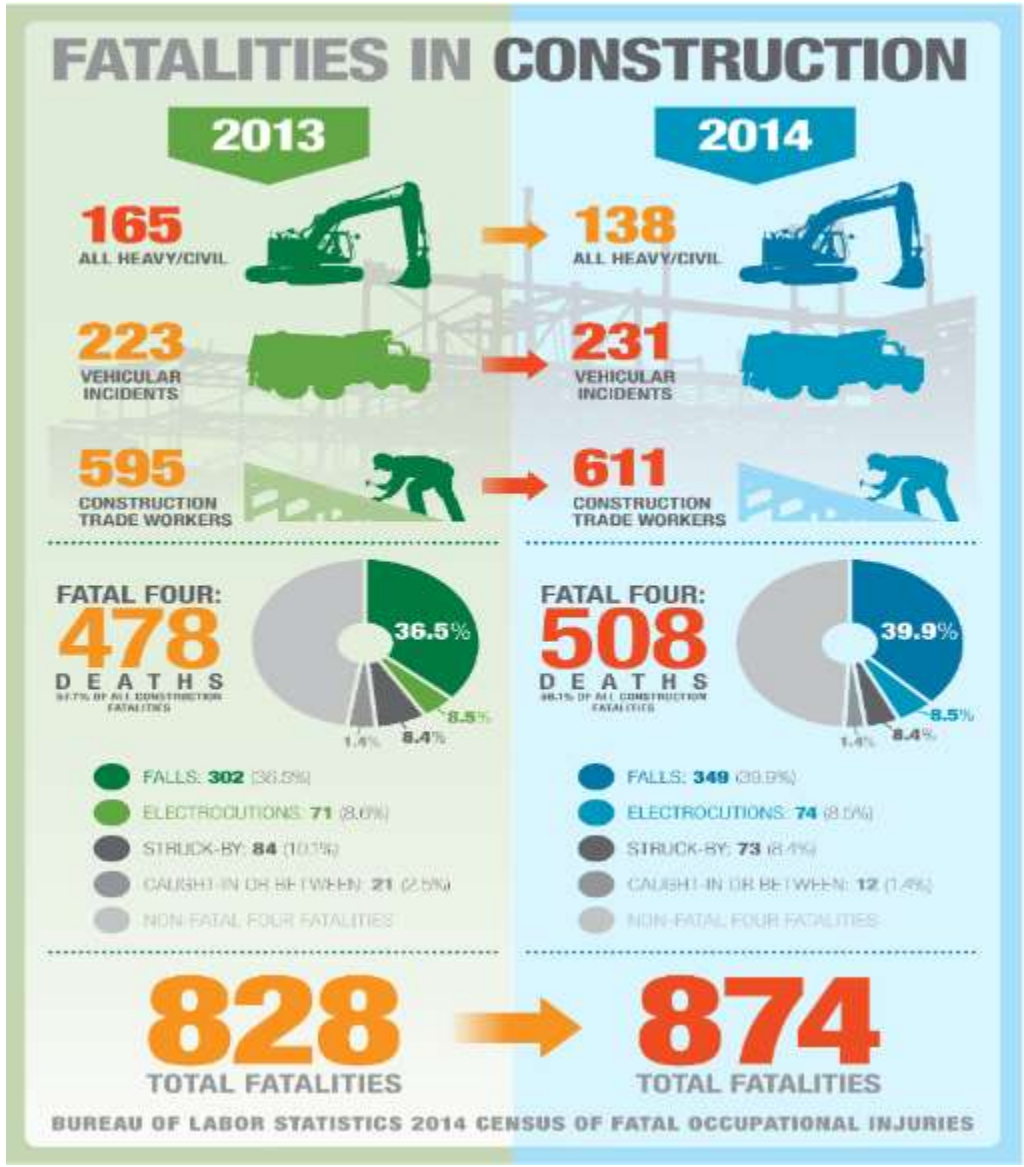

Where is Fall Protection Needed?

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- Walkways & ramps
- Open sides & edges
- Holes
- Concrete forms & rebar
- Excavations
- Aerial Lifts
- Roofs
- Wall openings
- Scaffolding
- Hoist/Material Handling Areas

The Hierarchy of Hazard Controls

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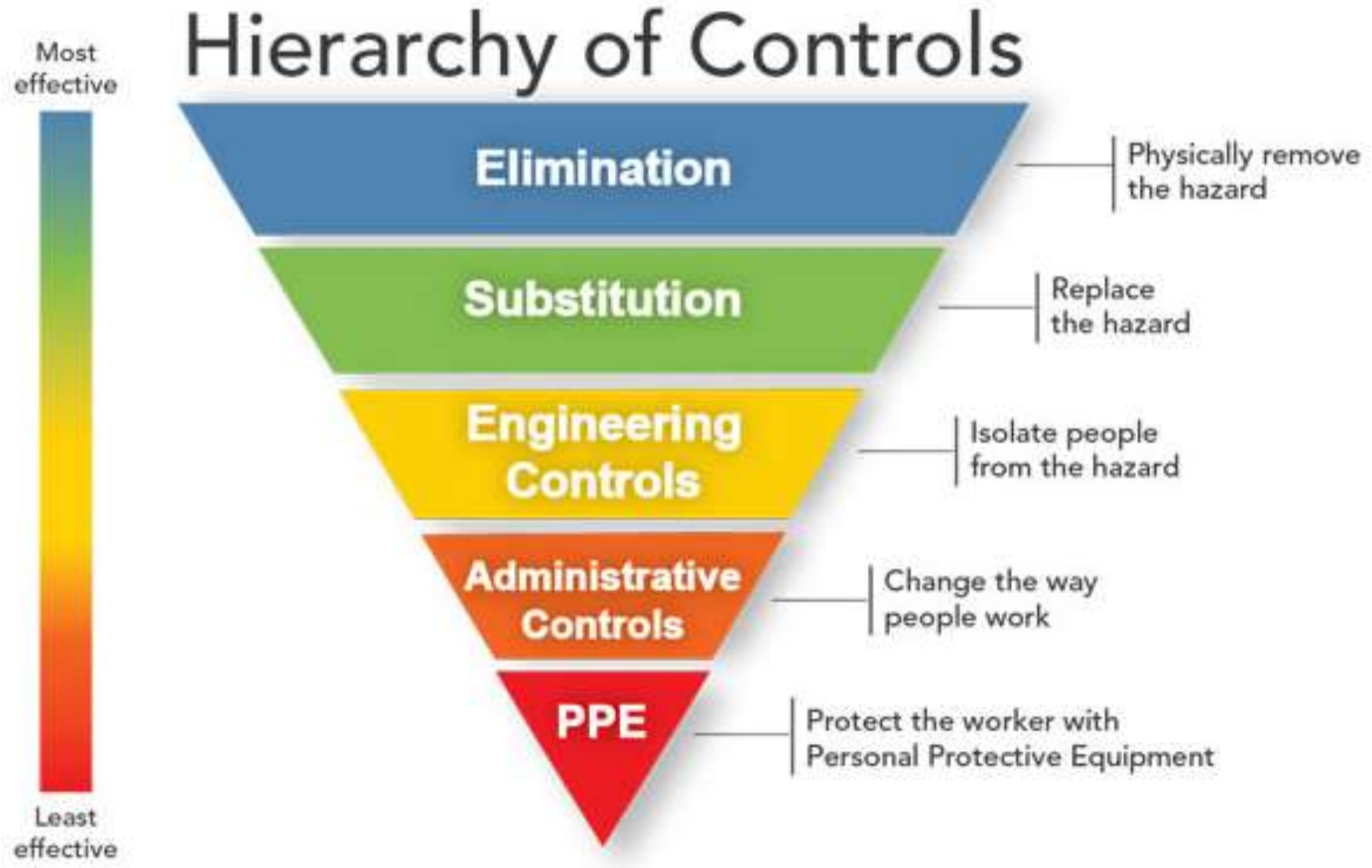

Fall Protection Systems

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- Guardrail systems
- Fall Arrest / Fall Restraint
- Safety Nets
- Warning Lines
- Safety Monitors
- Hole Covers

Guardrail Systems

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- Top rails between 39 and 45 inches
- Mid Rails in between
- Toe boards - 3 ½ “ minimum
- Capable of withstanding 200# of force in any direction
- Surfaced to prevent injuries such as punctures or lacerations

Guardrail Systems

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Guardrail Systems

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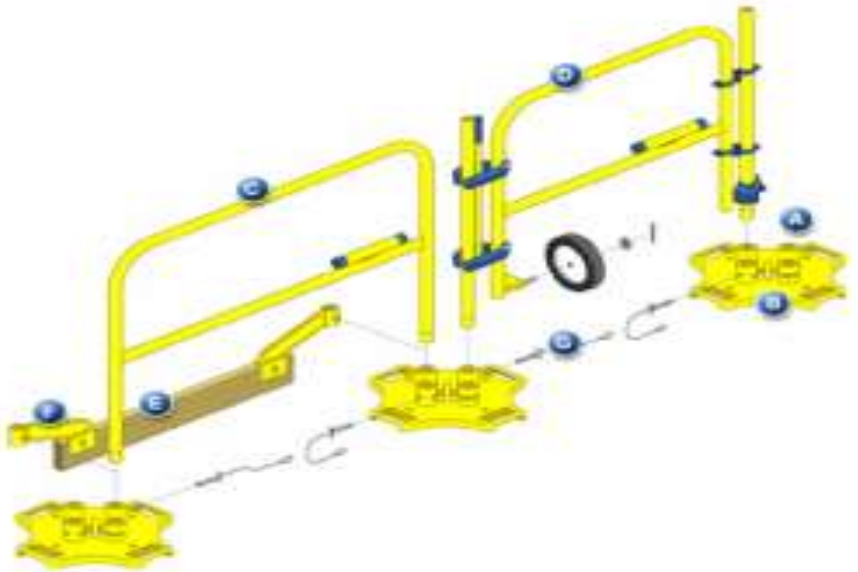

Guardrail Systems

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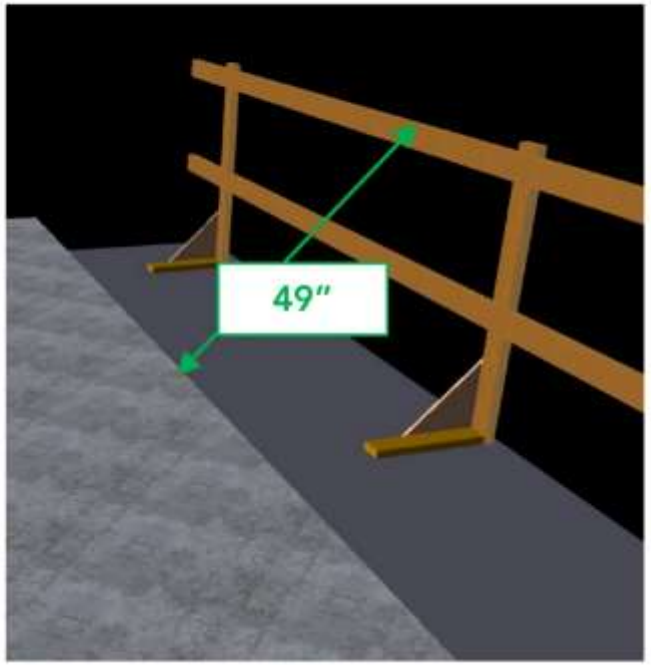
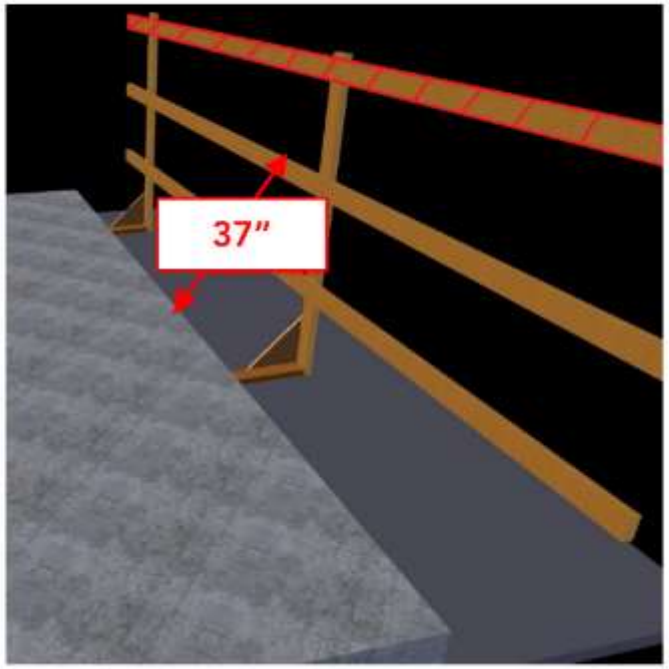
To account for the arc of travel and to ensure the guardrail meets the employee above their center of gravity, measure the distance from the outer edge of the upper elevation to the top of the lower elevation's top rail. If this is less than 39 inches, raise the top rail or add a third guardrail to achieve this distance. Remember, 39 inches is OSHA's minimum -- 42 inches is optimal guardrail height and what we should shoot for. If you measure 39 inches or more, technically, you don't need another guardrail.

No Guardrail Needed



Third Rail Needed



Cable Guardrails

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- Flagged every 6ft. with highly visible flagging.
- No more than 3 inch sag between supports.
- Maximum distance between uprights is 8 feet

What's Wrong?

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What's Wrong?

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What's Wrong?

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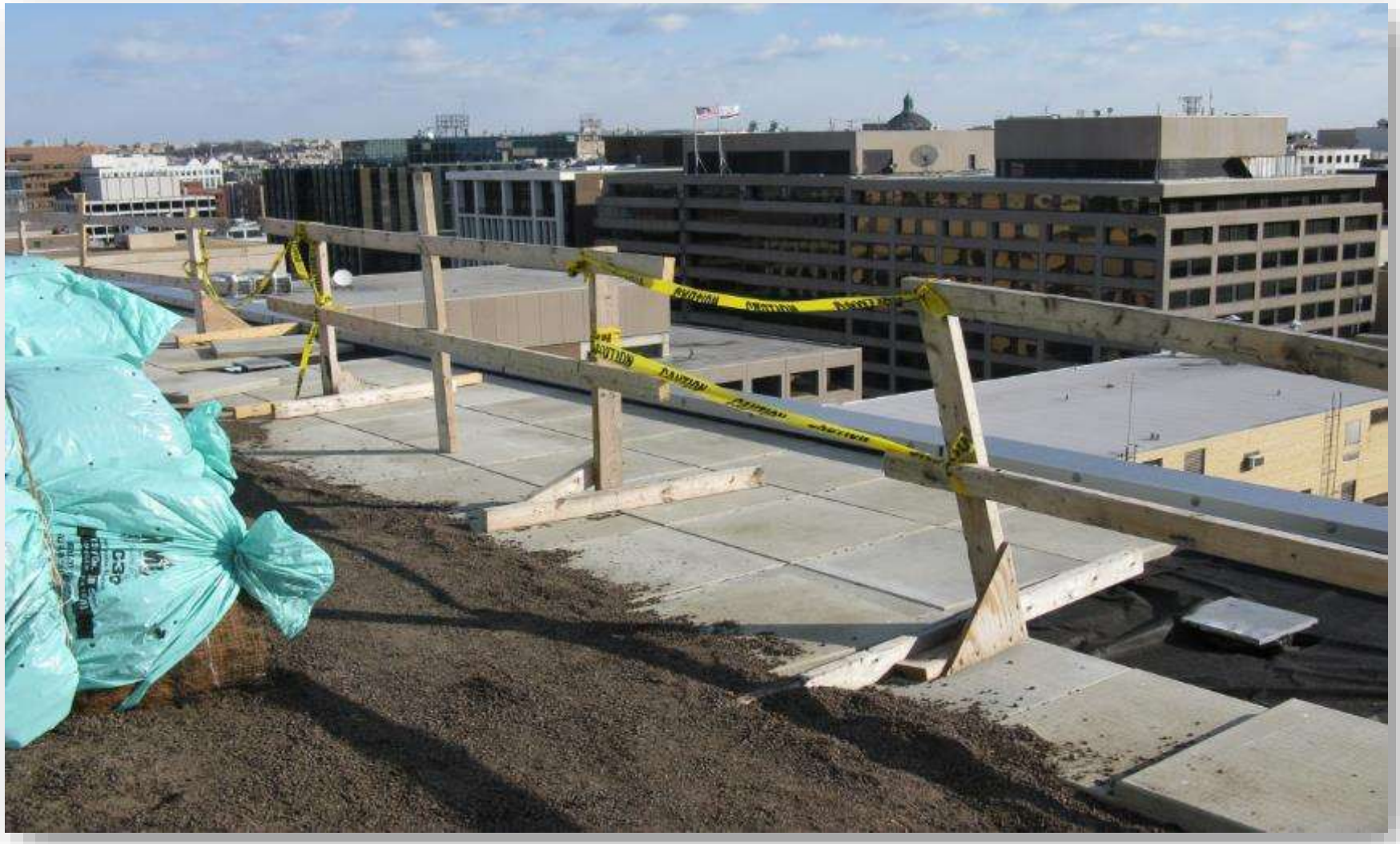

ABC's of Fall Protection

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A **Anchorage:** Minimum of 5,000 lbs

B **Body Harness:** Engineered/User Inspection

C **Connection:** Shock Absorbing/Free Fall Distance

Anchorage / Fall Arrest Systems

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- You're only as safe as the weakest link!
- Each piece of equipment (from a reputable manufacturer) meets minimum requirements.
- Users responsibility to read, understand and abide the manufacturers instructions and warnings.
- Be aware of the limitations of your equipment.

Anchorage Systems – Structural Steel

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Must be capable of withstanding 5,000 pounds per worker

Anchorage Systems – concrete

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4077 SafeClaw
- Rated to 10000 lbs.
- Requires 1" Hole, 4.5" deep
- Easy to remove and reuse

4075 SafeClaw
- Rated to 5000 lbs.
- Requires 3/4" Hole, 3" deep
- Easy to remove and reuse

Anchorage Systems – other

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Anchorage Systems – other

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Anchorage Systems – other

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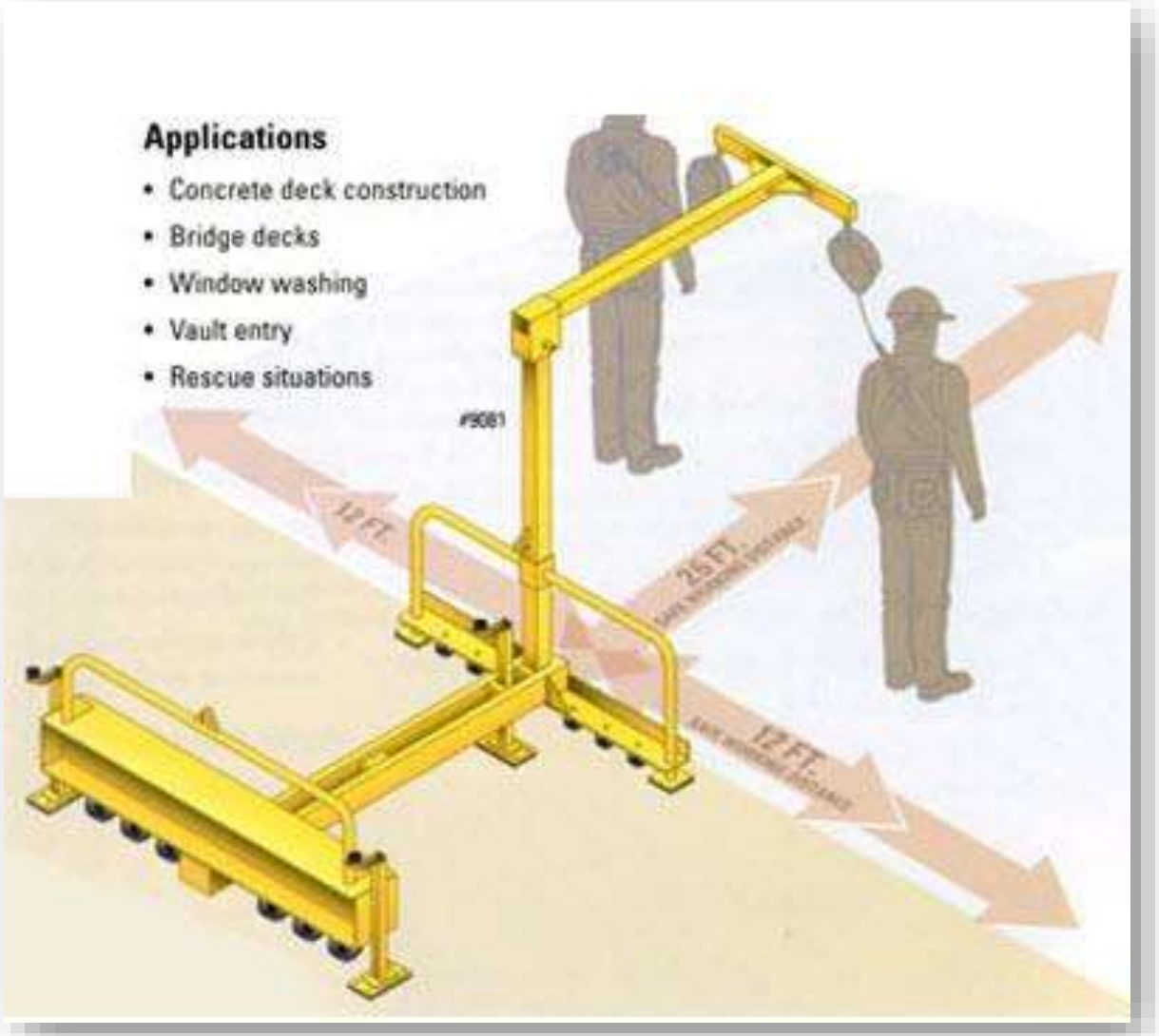

Horizontal Life Lines

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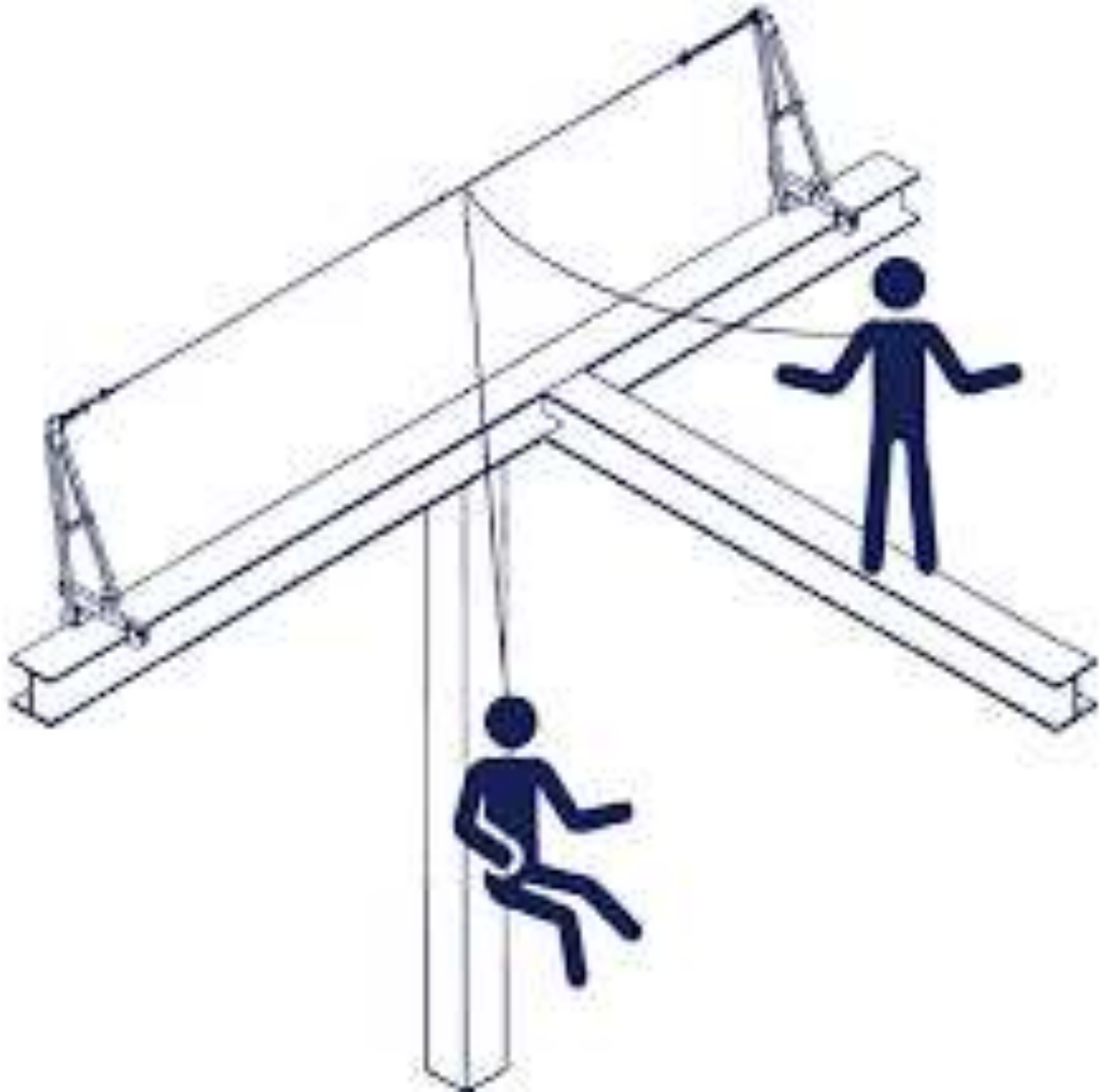
- Provide maneuverability.
- Must be designed, installed and used under the guidance of a qualified pers



Fall Safe Horizontal Lifeline

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Fall Safe Horizontal Lifeline

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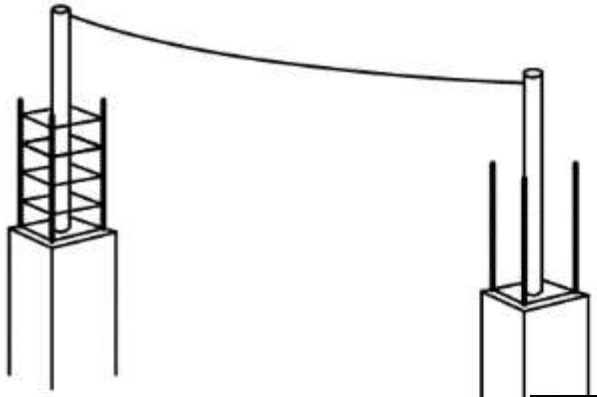
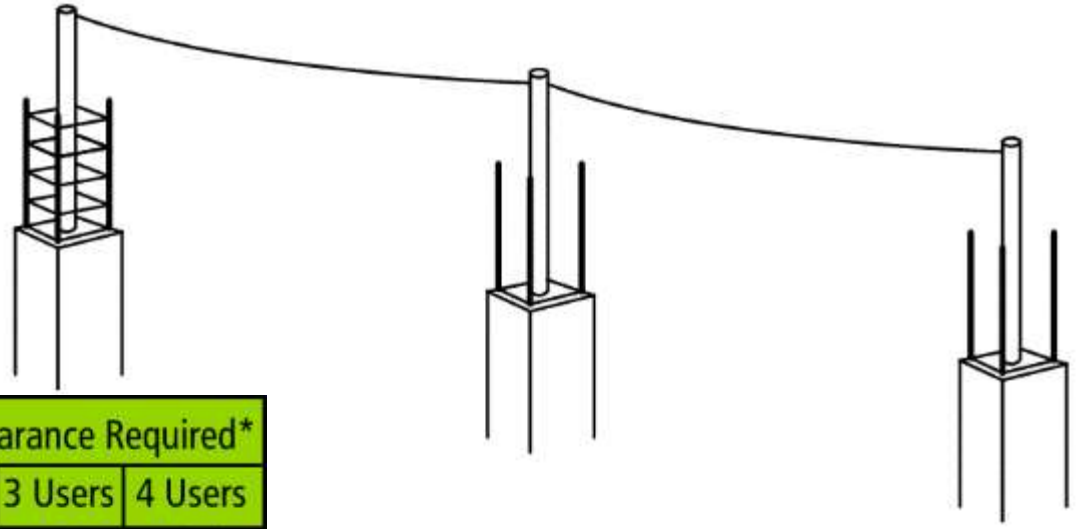
Single Span



Multiple Spans



Lifeline Span	Minimum Fall Clearance Required*			
	1 User	2 Users	3 Users	4 Users
15 ft	7'0"	7'0"	7'0"	7'6"
20 ft	7'0"	7'0"	7'4"	7'8"
25 ft	7'0"	7'4"	8'0"	8'4"
30 ft	7'0"	7'8"	8'4"	8'8"
35 ft	7'9"	8'5"	9'1"	9'5"
40 ft	8'5"	9'1"	9'9"	10'2"
45 ft	9'2"	9'11"	10'8"	11'0"
50 ft	9'11"	10'7"	11'3"	11'8"
55 ft	10'6"	11'2"	12'0"	12'4"
60 ft	10'10"	11'10"	12'6"	12'11"
65 ft	11'10"	12'6"	13'0"	13'6"

DBI Ez-Line Horizontal Lifeline

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Spider Horizontal Lifeline

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Rope Grab System

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- Lanyards and vertical lifelines shall have a minimum breaking strength of 5,000 lbs.

- Lifelines should be protected from sharp edges.

Personal Fall Arrest Systems

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Harnesses

Inspecting Harness

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Inspect Before Every Use

- **What to inspect:**
  - Webbing / straps for excessive wear, cuts or burns
  - Stitches for missing or loose threads
  - Buckles / d-rings for damage, rust or corrosion
  - Impact indicator (if equipped) is intact
  - Label in place, legible and within 5 years of manufactured date

Harness Fitting

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Harness must be sized for the worker

Proper snugness shoulder to hips

Chest strap tightened at mid chest

Leg straps snug but not binding

"D" ring between shoulder blades

Butt strap supports the load

Proper Adjustment

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“Rules of Thumb”:

- **Four fingers flat**
- **Chest strap across chest/breastbone**
- **No knots or twists**

Proper Adjustment

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D-ring in CENTER of shoulder blades

Proper Adjustment

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Incorrect Harness Fit

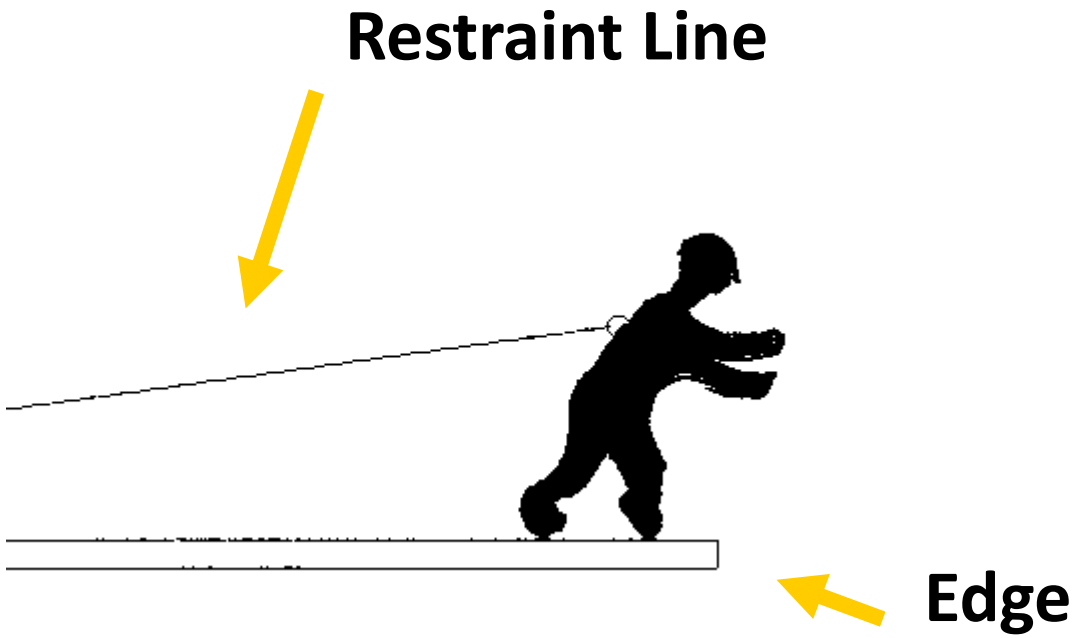
Chest strap positioned incorrectly. Should be located at mid-chest to keep shoulder straps snug. Leg straps are too loose.

Incorrect Harness Fit

Chest strap positioned too high and too loose. Leg straps are positioned improperly.

Fall Restraint

- Preferred over fall arrest
- Prevents worker from reaching the edge
- Used when fall clearance is limited
- Requires lower anchorage point strength



Use of Restraint Cables

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RESTRAINT CABLE

Use of Safety Nets

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- Assumes a fall will occur
- Requires testing

Nets

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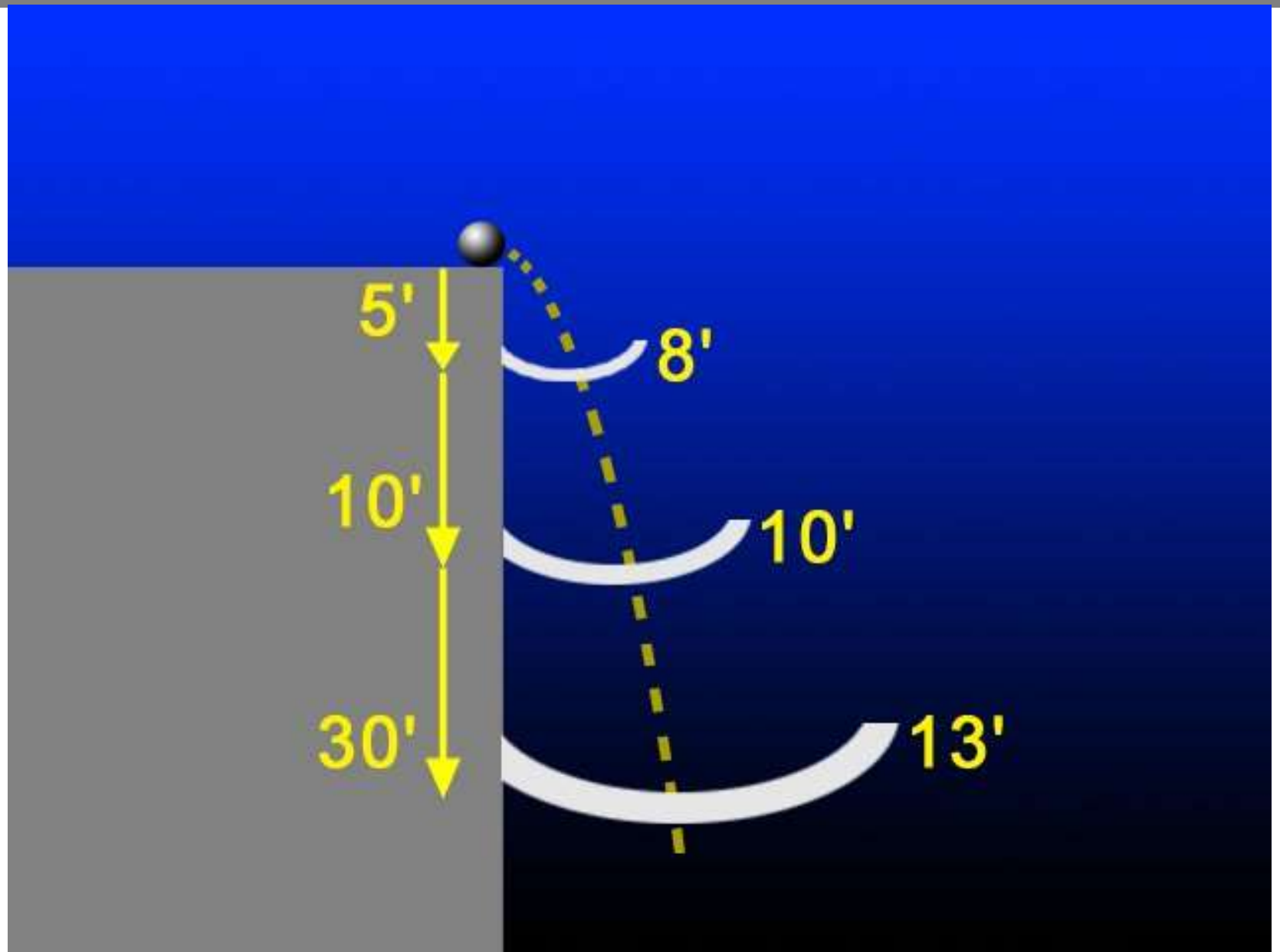

Roof Warning Lines

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- 6’ back from the unprotected edge (roofers)
- 15’ back from the unprotected edge (Non-roofers)
- 200 lbs. tensile strength
- High-visibility material flagged every 6’
- 34” – 39” high
- 16 lbs. tip-over force at stanchions
- 100% tie-off beyond warning line

Roof Warning Lines

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Warning lines must be installed
34” - 39”

What's Wrong?

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What's Wrong?

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Methods of Roof Fall Protection

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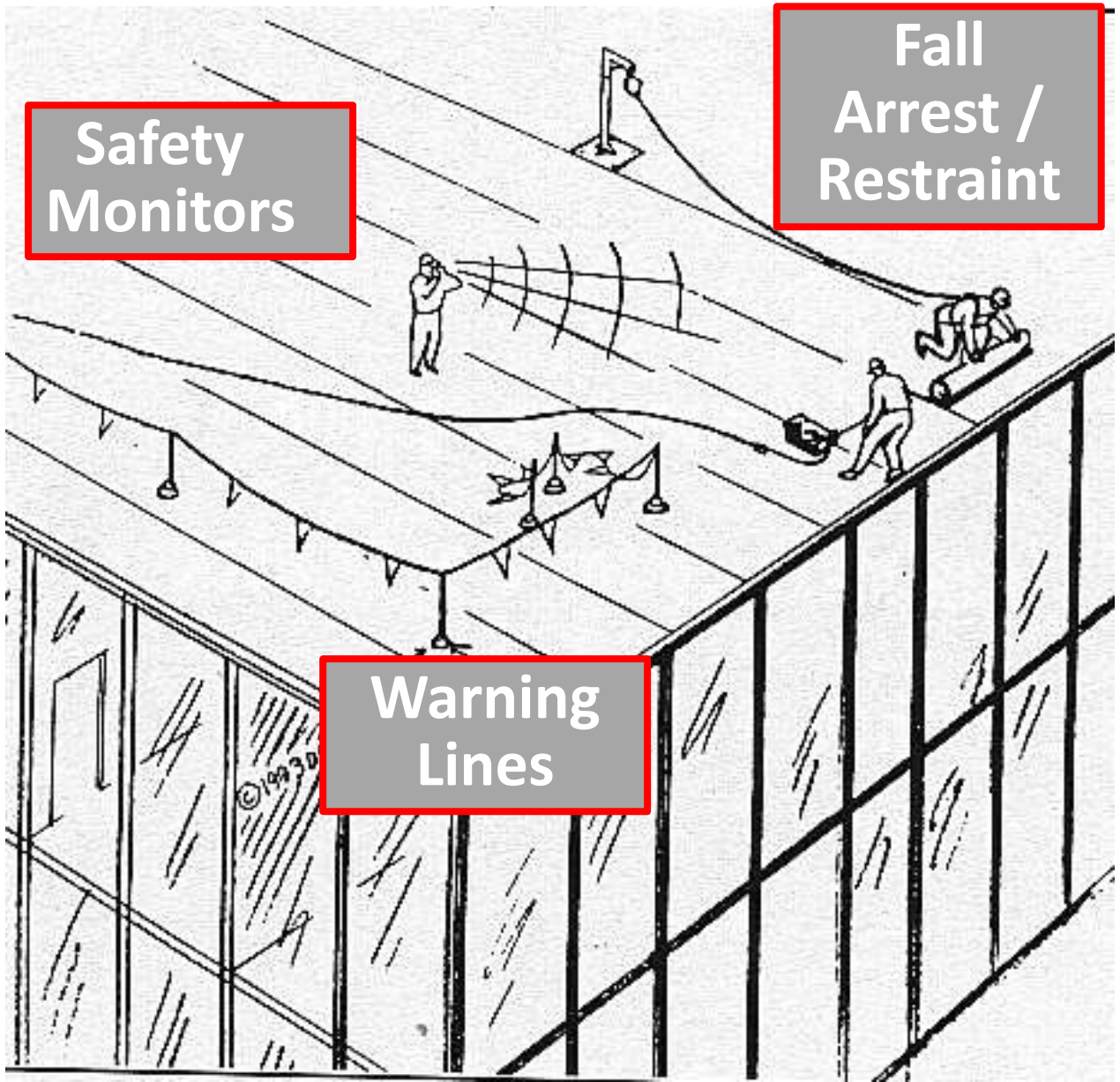

Safety Monitor

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- Oversees work outside warning lines
- Recognizes fall hazards
- Within visual sighting distance
- Close enough to communicate
- No other work besides monitoring

Hole Covers

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- Hole means a gap or void 2 inches or more in its least dimension, in a floor, roof, or other walking/working surface.

- Floor hole covers must be secured, labeled and able to support twice weight of the largest intended load.

Skylights

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MUST BE PROTECTED

Is this hole properly covered?

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Is this hole properly covered?

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Is this hole properly covered?

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Fall Protection Plans

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When can a fall protection plan be used?

- Infeasible or may create a greater hazard to use conventional fall protection for a specific task.
- Fall protection plan must complies with 29 CFR 1926.502(k)
- The employer has the burden of establishing that it is appropriate to implement a fall protection plan instead of implementing conventional fall protection systems.

Ask yourself am I in danger?

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Are there any unprotected:

- Sides
- Edges
- Wall Opening
- Holes

How do I avoid hazards?

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Use the proper fall protection systems whenever exposed to a fall of 6 feet or more above a lower level

How do I avoid hazards?

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- Survey site on existing structures before working and continually audit as work continues.

- Better to use fall *prevention* systems, such as guardrails, than fall *protection* systems, such as safety nets or fall arrest devices.

Discussion and Questions

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