

# **Stairways and Ladders**

## **10-hour Construction Outreach**

# Introduction

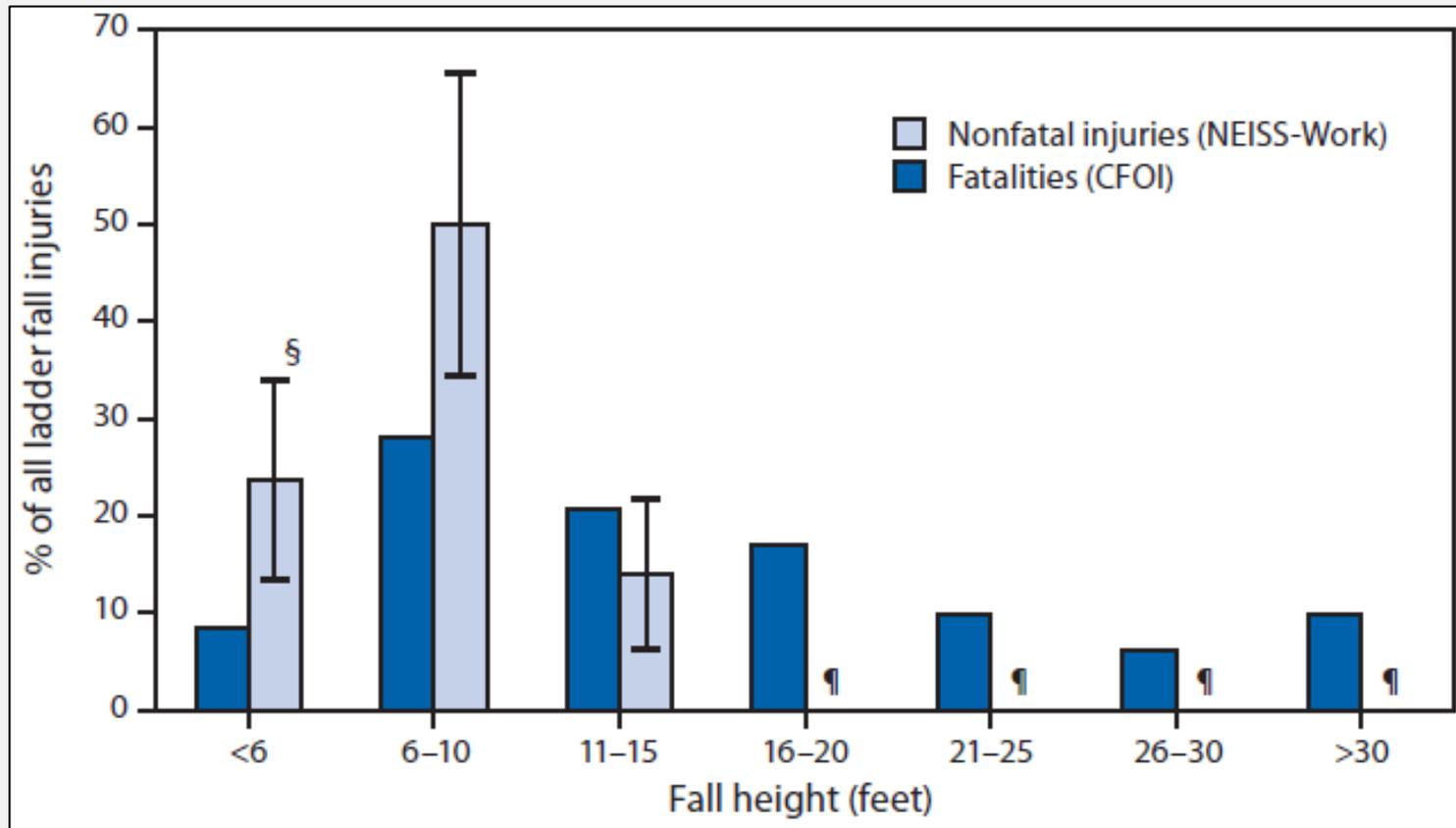
- Lesson Overview
  - Basic types of ladders and stairways
  - Stairs and ladders hazards
  - Methods to prevent stairway and ladder hazards.
  - Employer requirements

# Introduction

- Falls are the leading cause of fatalities in constructions
- Falls from ladders make up about one-third of these fatalities
- Approximately 25,000 injuries per year due to falls from stairways and ladders
- Falls are preventable

# Introduction

Percentage of ladder fall fatalities\* and nonfatal ladder fall injuries treated in emergency departments,† by fall height (when documented) — United States, 2011



Source: CDC

# Types of Ladders and Stairways

- Basic types of ladders



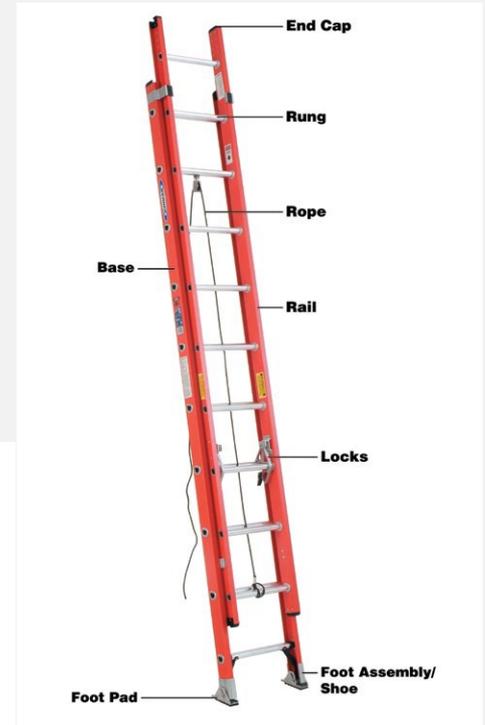
Source: OSHA



Source: TEEX Harwood

# Types of Ladders and Stairways

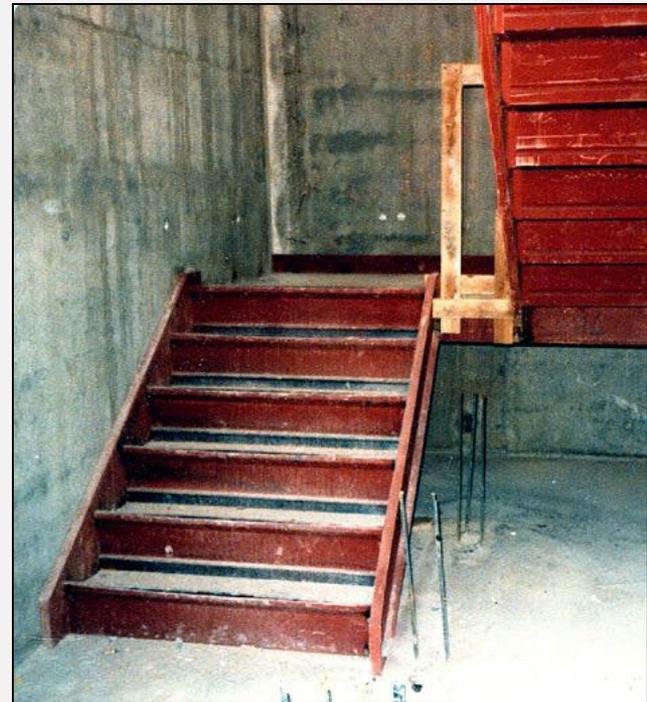
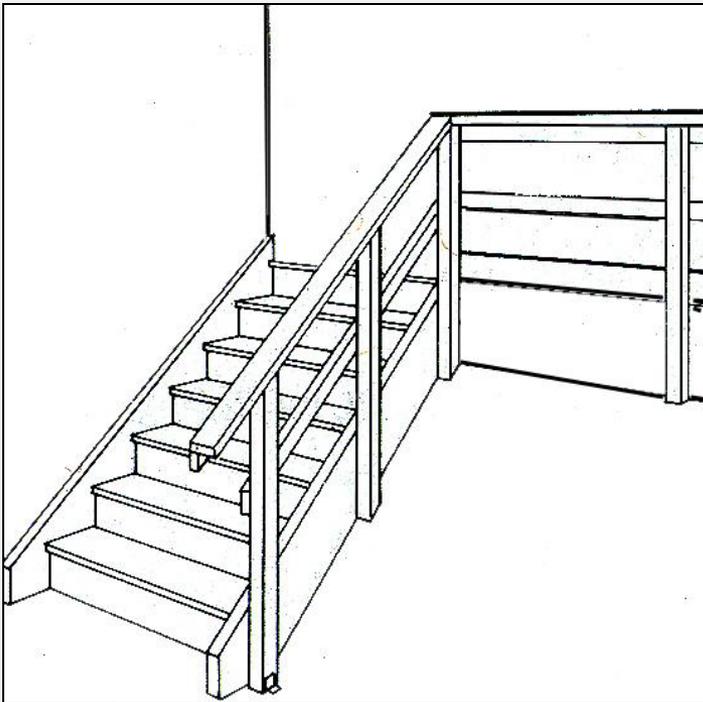
- Basic types of ladders



Source of photos: OSHA

# Types of Ladders and Stairways

- Basic types of stairways



Source of graphics: OSHA

# Hazards Associated with Stairs and Ladders

- Slips
- Trips
- Falls



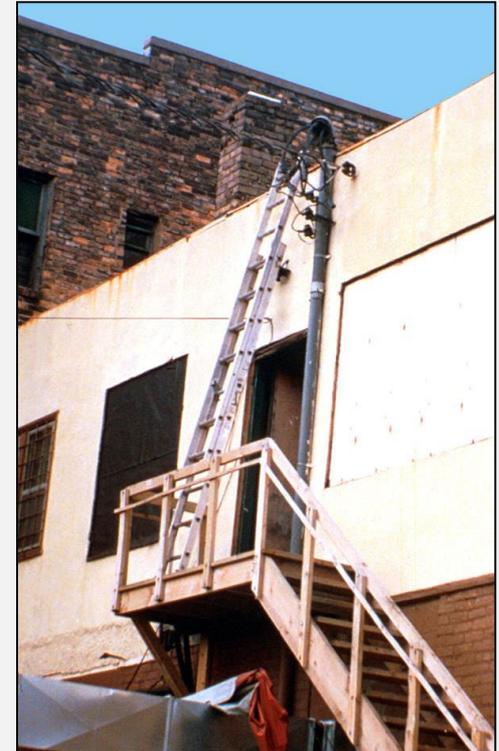
Source of photos: OSHA



Improper use of the top rung of a step ladder

# Hazards Associated with Stairs and Ladders

- Electrical Hazards
- Falling Objects
- Protruding objects, sharp edges, or rough spots



This is an unsafe condition.

Source: OSHA

# Reducing or Eliminating Hazards

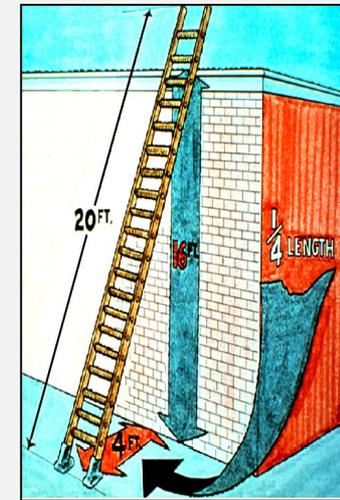
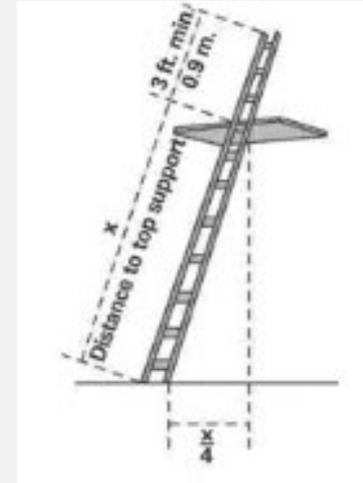
- Ladders
  - Safe practices
  - Ladder requirements
  - Structural defects



Source: OSHA

# Reducing or Eliminating Hazards

- Ladder-use practices
  - Extend side rails 3 feet above the upper landing surface
  - Don't exceed load/capacity
  - Use only as designed
  - Angle ladder so the horizontal distance of bottom is  $\frac{1}{4}$  the working length of the ladder



Source of graphics: OSHA

# Reducing or Eliminating Hazards

- Pitch fixed ladders no more than 90 degrees from the horizontal
- Avoid use of ladder on surfaces that are:
  - Unstable
  - Not level
  - Slippery
- Secure ladders to prevent movement



This ladder is not on a stable surface and is not properly positioned.

Source of photos: OSHA

# Reducing or Eliminating Hazards

- Prevent movement/displacement
  - Secure
  - Barricade
- Keep clear areas around top and bottom.
- Equally support rails of non-self-supporting ladder at the top.



Source of photos: OSHA



# Reducing or Eliminating Hazards

- Ascending or descending ladder
  - Maintain 3-point contact
  - Face ladder
  - Stay inside side rails
  - Never carry tools/objects in hands
  - Be extra careful getting on or off



Source: OSHA



Source: OSHA

# Reducing or Eliminating Hazards

- Don't move, shift, or extend while in use.
- When exposed to energized electrical equipment, use nonconductive side rails.
- Don't use the top step of a stepladder.
- Don't climb the cross-bracing on the rear section of a stepladder.



Source: TEEX – Harwood

# Reducing or Eliminating Hazards

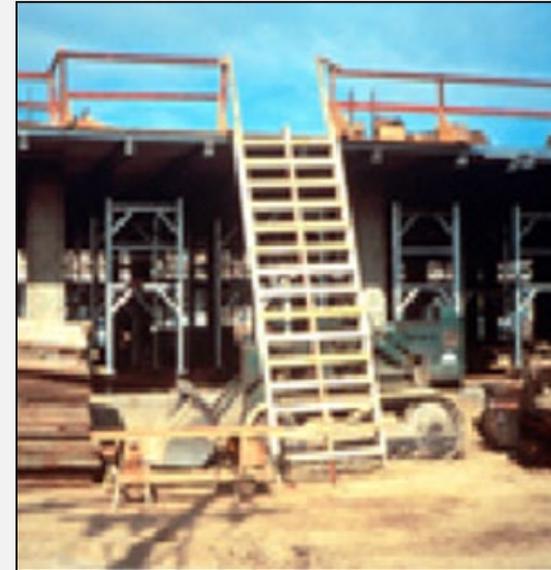
- Don't use single-rail ladders.
- Inspect (competent person)
  - visible defects periodically
  - and after any incident
  - that could affect their safe use.



Source of photos: TEEX - Harwood

# Reducing or Eliminating Hazards

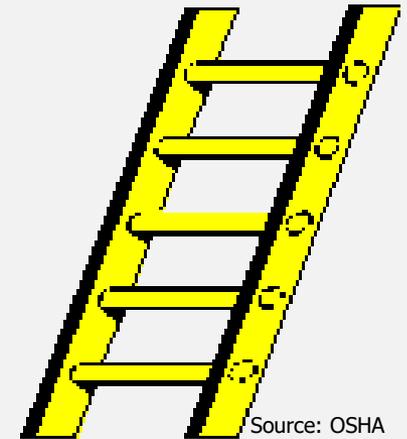
- Ladder requirements:
  - Provide double-cleated ladder or two or more ladders:
    - when having 25 or more employees using as only means of access to work area;
    - when serves two-way traffic.



Source: OSHA

# Reducing or Eliminating Hazards

- Rungs, cleats, and steps:
  - Parallel, level, and uniformly spaced
  - Spacing
    - Along portable or fixed ladder side rails – 10 to 14 inches apart
    - Between center lines on step stools – 8 to 12 inches apart
    - Between center lines on extension trestle ladders – 8 to 18 inches apart; extension section 6 to 12 inches



# Reducing or Eliminating Hazards

- Don't tie or fasten together to create longer sections, unless design allows
- Side rail of spliced side rails must have strength equal to one-piece side rail
- Stepladder must have a metal spreader or locking device to hold in open position.



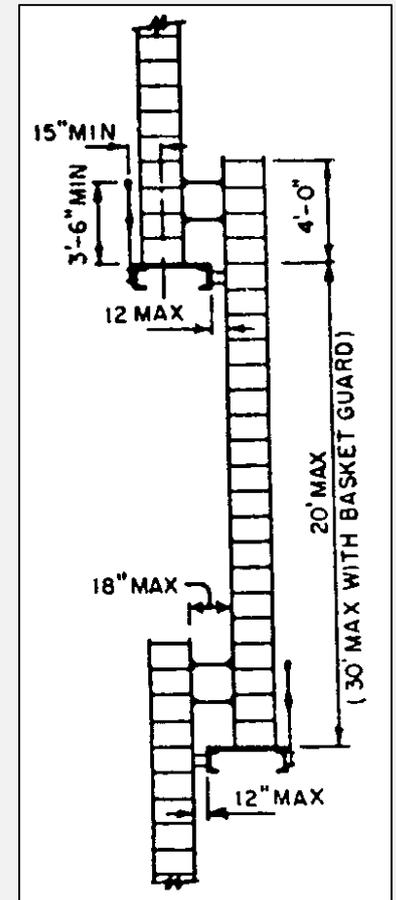
Source: OSHA



Source: OSHA

# Reducing or Eliminating Hazards

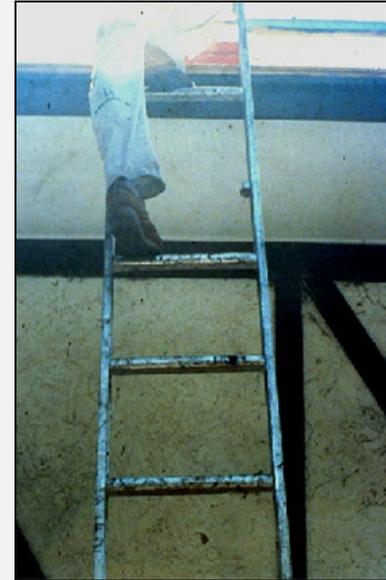
- Platforms or landings - offset two or more separate ladders used to reach an elevated work area.
- Ladder surface - free of projections, sharp edges, or abrasive materials that could puncture or cut user, or snag clothing.
- Wood ladders - not coated with any opaque covering, except for identification or warning labels only on one face of a side rail.



Source: OSHA

# Reducing or Eliminating Hazards

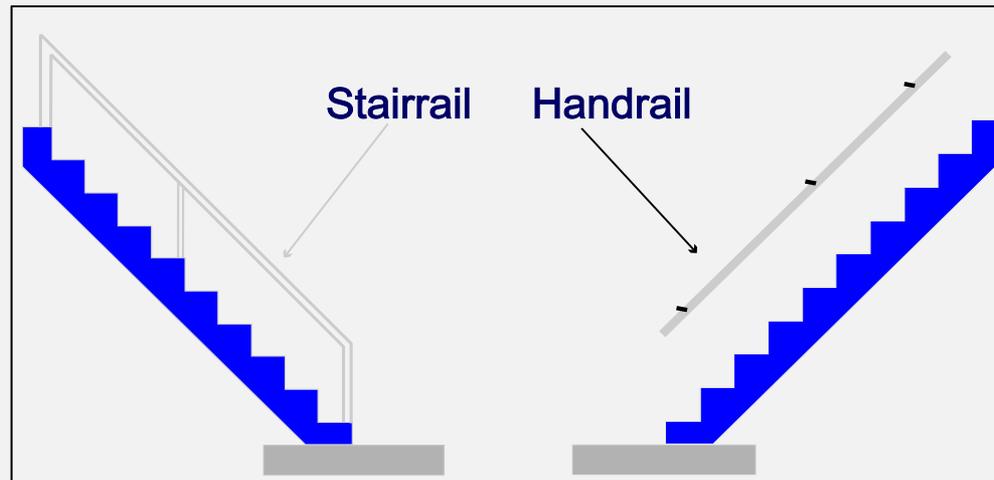
- Remove defective ladders from service
  - Broken or missing parts
  - Corrosion
  - Other faulty or defective components
- “Do Not Use”
- Repair to original design criteria



Source: OSHA

# Reducing or Eliminating Hazards

- Stairs
  - Handrails
  - Stair rail systems
  - Stair requirements
  - Temporary pan stairs



Source: OSHA

# Reducing or eliminating hazards

- Install handrail on stairways
  - 4 or more risers
  - 30 inches of rise

# Reducing or eliminating hazards

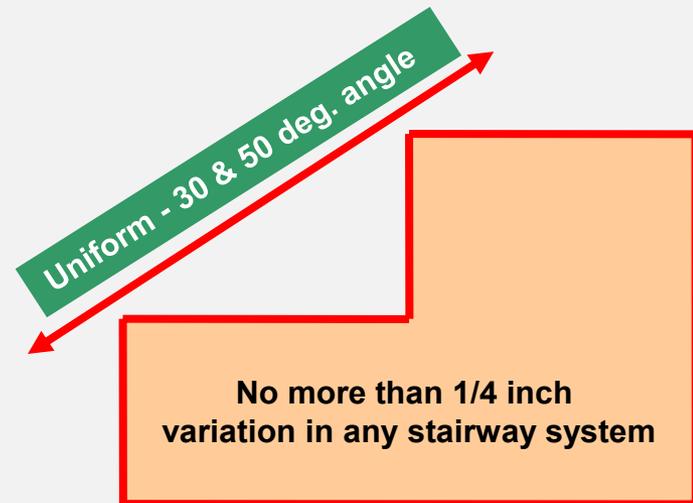
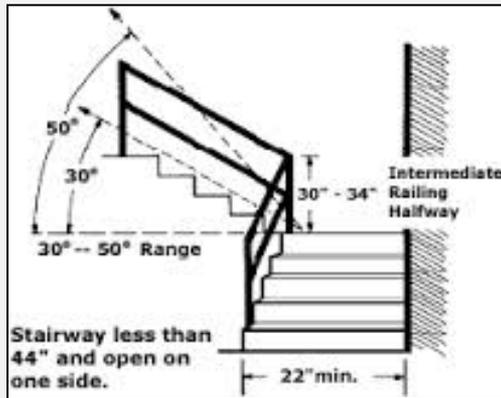
- Install stair rail system
  - Toprail, mid-rail, and sometimes a toeboard
  - Unprotected sides and edges of stairs with rise of 6 or more feet

# Reducing or eliminating hazards

- Build/maintain stairs that meet OSHA requirements
  - Uniform riser height and tread depth
  - 30 to 50 degrees angle
  - Landings every 12 feet
  - Remove projections
  - Correct slippery conditions



Source: OSHA



Source: OSHA

# Reducing or eliminating hazards

- Temporary pan stairs
  - Secure in place before filling
  - Fill to top edge
  - Replace worn treads and landings



Source: OSHA

# Employer requirements

- Comply with OSHA standards related to stairs and ladders
  - Training
  - Inspection
- Comply with manufacturers' requirements and recommendations for all ladders.

# Hazard Recognition - Ladders

- Identify ladders hazards and solutions



Source: TEEX – Harwood



Source: OSHA

# Hazard Recognition - Stairs

- Identify stairs hazards and solutions



Source: Luis Diaz



Source: OSHA

# Summary

- Key components for ladder safety:
  - A competent person must inspect
  - Use the correct ladder for the job
  - Use the correct angle, supports, treads, cross braces, and rails
  - Don't overload
  - Your employer must train you in proper use of a ladder

# Summary

- Key components for stairway safety
  - Treads
  - Rails
    - Handrails
    - Stair rails
    - Guardrails
  - Landings and Platforms

# Knowledge Check

1. When portable ladders are used for access to an upper landing surface, how many feet above the upper landing must the side rails extend?
  - a. 2 feet
  - b. 3 feet
  - c. 4 feet
  - d. 5 feet

**b. 3 feet**

# Knowledge Check

2. You can use metal ladder around power lines or exposed energized electrical equipment.
    - a. True – but only if there isn't any other option to get the work done.
    - b. False – you should never use a metal ladder in this circumstance.
- b. False – never use a metal ladder in this circumstance**

# Knowledge Check

3. Handrails must be able to withstand, without failure, how many pounds of weight applied within 2 inches of the top edge in any downward or outward direction?
- a. 300 pounds
  - b. 250 pounds
  - c. 200 pounds
  - d. 175 pounds

**c. 200 pounds**

# Knowledge Check

4. Stairways that have four or more risers **MUST** have a stair rail.
- a. True
  - b. False

**a. True**

# Knowledge Check

5. A non-self-supporting ladder should be set up at \_\_\_\_ (horizontal distance/working length of ladder).
- a. 90 degree angle
  - b. 30 degree angle
  - c. 1:2 angle
  - d. 1:4 angle

**d. 1:4 angle**