ELEVATED WORK
Falls

- Falls are the leading cause of fatalities in the construction industry.
- An average of over 300 fatal falls occurred over each of the last 5 years.
- Zero tolerance of fall protection violations
Prevention

- Select fall protection systems that is appropriate for given situations.
- Use proper construction and installation of safety systems.
- Supervise employees properly.
- Use safe work procedures.
- Train workers in the proper selection, use, and maintenance of fall protection systems.
Definitions

• Full-Body Harness: straps which will distribute the fall arrest forces over at least the thighs, pelvis, waist, chest and shoulders with means for attaching it to other components of a personal fall arrest system.
Definitions

• Guardrail System: a barrier erected to prevent employees from falling to lower levels.
Definitions

• Personal Fall Arrest System (PFAS): a system used to arrest / suspend an employee in a fall from a working level.
  – It consists of an anchorage, connectors, a full-body harness, a lanyard, deceleration device, lifeline, or suitable combinations of these.

• Positioning Device System: a body-belt or body-harness system designed to allow an employee to be supported on an elevated vertical surface, such as a wall, and work with both hands free while leaning.
Lanyard

- Lanyard: a flexible line of rope, wire rope, or strap which generally has a connector at each end for connecting the body-harness to a deceleration device, lifeline, or anchorage point.
Lanyard

- Cannot be made of natural fiber rope.
- Must be protected against damage by cuts or abrasions.
- Tying knots in lanyards to shorten them is not permitted.
- Lanyards must have a minimum breaking strength of 5,000 pounds.
- Snap hook can not be secured back to the lanyard
- Keep lanyard from becoming a tripping hazard.
Lanyard

Example 2.

Anchorage/Anchorage Connector (beam anchor)

Body Wear (full-body harness)

Connecting Device (self-retracting lifeline)
Deceleration Distance

- Deceleration Distance: Is the additional vertical distance a falling employee travels, excluding lifeline elongation and free fall distance before stopping. From the point at which the deceleration device engages, the fall should travel no more than 3.5 Feet (1m)

- Shock-absorber deceleration device ... designed to dissipate energy and limit deceleration forces.
- Always connect shock-absorber closest to body.
Free Fall Distance

• Free Fall Distance: Is the vertical displacement from the fall arrest attachment point on the employee's body harness between the onset of the fall and just before the system begins to apply force to arrest the fall.

• It is important to limit the free fall distance
Shock-Absorbing Lanyards - Before and After Deployment

- **Undeployed Lanyard**: Inner core smoothly expands up to 42" (1.1m) to reduce fall arrest forces.
- **Unique warning flag** indicates lanyard activated.

- **Deployed Lanyard**: Inner core smoothly expands up to 42" (1.1m) to reduce fall arrest forces.
- **Heavy-duty back-up strap**
Snaphooks

- Snaphooks are generally one of two types:
  - The locking type with a self-closing, self-locking keeper which remains closed and locked until unlocked and pressed open for connection or disconnection.

- Snaphooks shall not be engaged:
  - Directly to webbing, or rope.
  - To each other.
  - To a D-ring to which another snaphook or other connector is attached.
• Wall Openings: That are 6 feet (1.8 m) or more above lower levels with the inside bottom edge of the wall opening being less than 39 inches (99 cm) above the walking or working surface, FPS is required.
Walking and Working Surfaces

• Walking and working surfaces on which employees are to work must have the strength and structural integrity to support them safely.
Hoist Areas

- Hoist areas must be protected by an FPS
- If guardrail section(s) are removed and worker must lean into opening, a PFAS is required.
Formwork & Rebar

• Workers must be protected by FPS above 6 feet (1.8 m)
• Or when working on any temporary work platform
Ramps, Runways & Walkways

• Must protect workers with guardrail systems.
Excavations

• Use guardrails, fences or barricades around all excavations. Fall protection is required when working at the edge of an excavation 6 ft (1.8 meters) or deeper.
Dangerous Equipment

- Workers must be protected with guardrail systems or by equipment guards.
Leading Edge Work

- Each employee on a walking/working surface with an unprotected side or edge which is 6 feet or more above a lower level shall be protected from falling by the use of guardrail systems, safety net systems, or personal fall arrest systems.
Hole Covers

• Must withstand twice the expected load.
• Marked with words “HOLE” or “COVER”.
• Must be secured when installed so as to prevent accidental displacement by wind, equipment, or employees.
Falling Objects

• Must wear hard hats ... other Protection includes:
  – Toe-boards
    Must be capable of withstanding 50 pounds of downward & outward force.
    At least 3 1/2 inches high.
  – Screens
    Extending up to the top rail to eliminate falling object hazard.
  – Canopy
    Structure to keep potential falling objects from striking workers or pedestrians below.
  – Barricade
    Designed to protect employees by prohibiting entrance into an area.
Ladder Safety

• Inspect ladder prior to use
• Extension Ladders must be secured
• Stepladders must be locked fully opened and set level
• Always face ladder when climbing or descending (use 3 point contact)
• Use a rope & bucket to pull materials to the working surface
• Never stand on top platform or top rung of stepladder
• Use 4:1 rule to ensure proper straight ladder angle
Ladder Safety

• Top of straight ladder must extend at least 3 feet beyond the supporting object if the ladder is to be used as access to an elevated work area

• If working 6 ft and above, or working in awkward position, full body harness and shock-absorbing lanyard required

• Maintain a minimum a 25 foot separation from electrical lines

• Metal ladders must never be used when conducting electrical welding operations or when working near any electrical lines
Scaffold Safety

- Ensure training prior to using scaffold
- Scaffolds must be inspected daily by a competent person
- Read scaffold tag before climbing and visually inspect scaffold prior to use
- Use scaffold ladder for access and egress
- Maintain a minimum 25 foot separation from electrical lines
- Never alter scaffold
- Never store excess material on scaffold
Fall Protection Systems (FPS)

- Safety Net
- Guardrail
- Personal Fall Arrest System
Guardrail System

- Guardrail systems consist of a top rail, mid-rail, and toe-board.
- Top rail should be approx. 42" (1.1m) ...plus or minus 3 inches (7.6 cm).
- If wire rope is used as top railing, it shall be flagged at not more than 6 ft. (1.8 m) intervals with high-visibility material.
- Mid-rails are required approximately 21" (53 cm) high ... installed midway between top rail and working level. Screens & mesh run along entire opening.
- Toe-board minimum 3 1/2 inches (8.9 cm) high.
Guardrail System

- Must withstand **200 lbs. of force in downward or outward direction**
- No projection hazard at rail ends.
- Thickness of all rails must be at least ¼ inch (0.64 cm).
Safety Nets

• Installed a maximum of **30 feet (9.1m)** below working level
• **400 pound (180 kg)** drop test or certified by employer or Competent Person
• Extends sufficiently from outer edge
• Inspected weekly
• Objects removed within shift
• Border rope strength of **5000 pounds (22.2 kg)**
Personal Fall Arrest Systems (PFAS)

Inspect each time prior to use

- Fiber: Inspect belt fiber by bending in an inverted "V" with hands six to eight inches apart. Look for frayed edges, broken fibers, pulled stitches, cuts and chemical damage. Pay special attention to the webbing around the buckles and D-ring.
- D-rings: Check for distortion, sharp edges, burns, cracks or worn parts.
- Rivets: Tightly embedded without any fraying around the rivet edge. Bent rivets will fail under stress.
- Ensure proper fit of full-body harness.
- Store properly ...hang in a clean dry location out of direct sunlight.
Inspection is Key

FAILURE
IS NOT AN OPTION!

Adopt a Smart Policy...
WHEN IN DOUBT, THROW IT OUT!
Personal Fall Arrest Systems (PFAS)

- Always wear fall protection when utilizing a mobile aerial lift.
- Lift has designated tie off points
Anchorage

• Anchorage: a secure point of attachment for lifelines, lanyards or deceleration devices.

• Anchorages used for attachment of personal fall arrest equipment shall be independent of any anchorage being used to support or suspend platforms and capable of supporting at least 5,000 pounds per employee attached.
Overhead Power Lines

- Up to 50KV 15ft/4.5m minimum clearance required
  - Additional clearance required for higher voltages
- Baskets are **NOT** insulated
- When working around power lines maintain clearance **OR**
- De energize power lines
Anchorage Points
Horizontal Lifelines

• Horizontal lifelines shall be designed, installed, and used, under the supervision of a qualified person, as part of a complete personal fall arrest system.

• Devices used to connect to a horizontal lifeline which could become vertical must be capable of locking in both directions on the lifeline.
Attachment Point

- Attach lanyard at center of wearers back ... and preferably to overhead anchorage point to minimize fall distance.
Rescue Plan

- It’s critical to ensure a rescue plan is in place to prevent suspension trauma due to poor blood flow.
Conclusion

- Fall Protection Systems prevent injury ... and have saved many lives.
- Continued diligence is needed to train and supervise workers to ensure Fall Protection Systems are installed and utilized safely.
- All phases of fall protection need to be *Pre-Planned* and examined for each particular application.
- Workers and emergency response personnel must be trained to recognize the risks of suspension trauma, and plan for fall rescue.
- *Take every reasonable precaution necessary to promote fall prevention awareness!*