Fall Protection – Working at Heights

Goal

The goal of this handout is to provide an overview of the OSHA Construction Standards, 29 CFR 1926.500 - 1926.503, Fall Protection, and the OSHA General Industry Standard, 29 CFR 1910.23, Guarding Floor and Wall Openings and Holes.

Employer Responsibilities

- Employers must provide fall protection if their employees are required to work at situations outlined in these standards.
- Employers must determine if the walking/working surfaces their employees must work on have the strength and structural integrity to support employees safely.
- When employees are on walking/working surfaces with an unprotected side or edge which is **6 feet or more** above a lower level, they must be protected from falling by the use of guardrail systems, safety net systems or personal fall arrest systems.
- Employers must train employees who might be exposed to fall hazards. Employees must be trained in:
  - the nature of the fall hazards in their work area;
  - the correct procedures for erecting, maintaining, disassembling, and inspecting the fall protection systems to be used;
  - the use and operation of guardrail systems, personal fall arrest systems, safety net systems, warning line systems, safety monitoring systems, controlled access zones, and other protection to be used;
  - the role of employees in the safety monitoring system;
  - limitations on the use of mechanical equipment, and
  - the correct procedures for handling, storing equipment and materials and erecting overhead protection.

Definitions

- **Body Harness** – straps which may be secured about the employee in a manner that 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.
- **Controlled Access Zone (CAZ)** – an area in which certain work (e.g. overhand bricklaying) may take place without the use of guardrail systems, personal fall arrest systems, or safety net systems and access to the zone is controlled.
- **Fall Hazard Exposure** – any floor opening, unprotected side or edge, or wall opening which an employee approaches within 6 feet without a guardrail system, floor opening cover, personal fall arrest system, or safety net system.
- **Floor Hole or Opening Cover** – a cover which completely covers the floor hole or opening, is secured against dislodgement, and is capable of supporting at least twice the maximum anticipated load without failure.
- **Guardrail System** – a top rail 42 + 3 inches high, a toeboard 4 inches high, and a midrail located between the top rail and toeboard. A guardrail system must be capable of withstanding a force of 200 pounds in any outward or downward direction on the toprail and a force of 150 pounds in any outward or downward direction on the midrail without failure.
- **Hole** – a gap or void of 2 inches or more in its least dimension, in a floor, roof or other walking/working surface.
- **Lanyard** – a flexible line of rope, wire rope, or strap which generally has a connector at each end for connecting the body belt or body harness to a deceleration device, lifeline, or anchorage.
- **Leading Edge** – the edge of a floor, roof or formwork for a floor or other walking/working surface (such as the deck) which changes location as additional floor, roof, decking, or formwork sections are placed, formed, or constructed. A leading edge is considered to be an “unprotected side and edge” during periods when it is not actively and continuously under construction.
- **Opening** – a gap or void 30 inches or more high and 18 inches or more wide, in a wall or partition, through which employees can fall to a lower level.
- **Personal Fall Arrest System** – a system used to arrest an employee in a fall from a working level. It consists of an anchorage, connectors, a body harness and may include a lanyard, deceleration device, lifeline, or suitable combinations of these. All lanyards and other fall arrest devices must have locking snaphooks.
- **Safety Monitoring System** – means a safety system in which a competent person is responsible for recognizing and warning employees of fall hazards.

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- **Safety Net System** – Safety nets must be installed as close as practicable under the walking/working surface on which employees are working, but not more than 30 feet below such surface. Safety nets must extend outward from the outermost projection of the work surface as follows:

Vertical distance from working level to horizontal plane of net	Minimum required horizontal distance of outer edge of net from the edge of the working surface
Up to 5 feet	8 feet
More than 5 feet, up to 10 feet	10 feet
More than 10 feet	13 feet

  Safety nets must be installed with sufficient clearance under them to prevent contact with the surface or structures below when subjected to an impact force.

- **Unprotected Side or Edge** – a walking/working surface side or edge 6 feet or more above a lower level which does not have a guardrail system at least 39 inches high.

- **Walking/Working Surface** – a surface on which an employee walks or works, including, but not limited to, floors, roofs, ramps, bridges, runways, formwork, concrete reinforcing steel and walkways.

- **Wall Opening** – an opening in any wall or partition which is less than 39 inches above the walking/working surface, is at least 30 inches high, and is at least 18 inches wide, and has an outside bottom edge which is 6 feet or more above a lower level.

Protection from Falling Objects:

When employees are potentially exposed to falling objects, employers must provide hard hats and must implement one of the following:

- Toeboards or screens.
- Erect a canopy structure to catch falling objects.
- Barricade the area under the working area to keep employees (and others) away from the fall hazards.

Guard Rails:

- Top edge height of top rails must be 42 inches + 3 inches above the walking/working surface.
- Guardrail systems must be able to withstand a force of at least 200 pounds (applied within 2 inches of the top edge) in any outward or downward direction.
- Steel or plastic banding cannot be used at top rails or midrails. If wire rope is used for top rails, it must be flagged at every 6-foot intervals with highly visible material.
- Midrails (or equivalent) must be at least 21 inches.
- If midrails are not used, screens or mesh must be able to withstand a force of at least 150 pounds applied in any downward or outward direction at any point along the midrail.
- Guardrails must have supports (or posts) every 8 feet.
- Toeboards must be a minimum of 3 ½ inches from their top edge to the level of the walking/working surface, and must not be more than 1/4 inch clearance above the walking/working surface.

Personal Fall Arrest Systems:

- All personal fall arrest system components must be kept in good operating condition.
- Personal fall arrest components must be thoroughly inspected by the user prior to each use.
- Defective personal fall arrest system components must be removed from service immediately and repaired or discarded.

Belts, Lanyards an Lifelines:

- Body belts are no longer acceptable as part of a personal fall arrest system. (However, the use of a body belt is acceptable in a positioning device system.)
- Full body harnesses, lanyards and lifelines must be worn by all employees working 6 feet or more above a lower level, if guardrails or safety net systems are not used for fall protection.
- Body harnesses must be equipped with Dee-rings and locking snap hooks that have a minimum tensile strength of 5,000 pounds.
- Lanyards and lifelines must have a minimum breaking strength of 5,000 pounds.
- Lanyards must not be used for anything other than fall protection.
- There must be one vertical lifeline for each person.

Warning Lines and Controlled Access Zones:

- Warning lines must be erected no less than 6 feet nor more than 25 feet from the unprotected or leading edge. This designates a “Controlled Access Zone”. The control (or warning) line must extend along the entire length of the unprotected or leading edge.
- When the control line is used to control access to areas where overhand bricklaying is being conducted, the controlled access zone shall be defined by a control line erected not less than 10 feet nor more than 15 feet from the working edge. It must extend for a distance sufficient for the controlled access zone to enclose all working employees.

Safety Monitoring System:

A competent person must be designated to monitor the safety of other employees and the employer must ensure that the safety monitor:

- Is competent to recognize fall hazards;
- Will warn employees of fall hazards or if employees are acting in an unsafe manner;
- Will be on the same walking/working surface and be within sight of the employees that are being monitored;

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- Will be close enough to communicate orally with employees;
- Will not have other responsibilities which could take the monitor's attention from the monitoring function.

Floor Covers:

- Must support twice the weight of people, equipment and materials that might be on the cover at any one time.
- Must be secured to prevent displacement by the wind, employees or equipment.
- Must be marked with the word "HOLE" or "COVER" to provide warning of the hazard. (This does not apply to manhole covers or grates used on streets or roads.)

Uncovered Floor Holes:

- A hole is defined as a gap of 2 inches or more in its least dimension on a floor, roof or other walking/working surface.
- Employees must be protected from falling through holes more than 6 feet above the lower level by personal fall arrest systems, covers, or guardrails erected around the holes.
- If the drop from the hole is less than 6 feet, but the floor hole is above dangerous equipment, guardrails must be on all sides of the hole OR the equipment must be guarded.

Wall Openings:

If the wall opening is less than 39 inches above the walking/working surface, at least 30 inches high, and at least 18 inches wide, and has an outside bottom edge which is 6 feet or more above a lower level:

- It must be guarded by guardrails unless a safety net or a personal fall arrest system is used.
- If a safety net is used, it cannot be greater than 30 feet below the walking/working surface.

Excavations:

Excavation fall hazard exposures must be eliminated by either:

- a guardrail system,
- a fence or barricade which restricts access to the excavation area,
- a solid and substantial excavation covering capable of supporting the maximum anticipated load without failure, or
- the use of personal fall arrest systems.

Scaffolds:

- All scaffolds more than 10 feet above the ground must be equipped with guardrail systems, which include top rails, midrails and toeboards. (29 CFR 1926.451)
- Overhead protection, such as decking or a debris net, is required when working:
  - beneath ongoing work or
  - in areas where debris may fall.

Personal fall arrest systems must be used on all mechanical lifts and sky climbers. (29 CFR 1910.67)

Ladders:

- Permanent, or fixed, ladders over 20 feet in length and ladders at elevated locations must be equipped with caging and strapping in compliance with 29 CFR 1910.27.
- Portable extension ladders must extend 3 feet above the upper working level and must be tied off or held by an employee when in use to prevent dislodgement.

Fixed Ladderway Openings:

- All fixed ladderway openings must be equipped with swing gates or chains.

Hoist Wells:

- Must have guardrails on all sides
- 2 sides can be removable,
- A personal fall arrest system must be used also, if leaning is required.

Overhand Bricklaying and Related Work:

- Employees performing overhand bricklaying work 6 feet or more above a lower level, must be protected by guardrails, safety nets, personal fall arrest systems or must work in a controlled access zone. The controlled access zone must be defined by a control line not less than 10 feet or more than 15 feet from the working edge.
- When employees have to reach greater than 10 inches below the level of the walking/working surface on which they are working, they must be protected from falling by guardrails, safety nets, or personal fall arrest systems.

Roofing Work on Low-sloped Roofs:

When the leading edge is greater than 6 feet above the ground (or the lower level):

- Employees must be protected by a guardrail, safety net, personal fall arrest system, OR a combination of:
- Warning line and guardrail, OR
- Warning line and safety net, OR
- Warning line and personal fall arrest system.

When roofs are 50 feet or less in width, the use of a safety monitoring system alone is permitted.

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Whenever a safety monitoring system is used, the employer must have a FALL PROTECTION PLAN that includes:

- Documentation of why the use of conventional fall protection systems (guardrails, personal fall arrest systems, or safety nets) are not feasible or why their use would create a greater hazard;
- A written discussion of other measures that will be taken to reduce or eliminate the fall hazards for employees who cannot be provided with protection from the conventional fall protection systems. Example: the employer must discuss how scaffolds, ladders, or vehicle-mounted work platforms will be used to provide a safer working surface and thereby reduce the hazard of falling.
- The locations where conventional fall protection methods cannot be used must be identified.These locations must be classified as controlled access zones.
- Safety monitoring systems must be implemented where no other alternative measure has been implemented.
- The name or other method of identification for each employee who is designated to work in the controlled access zones. No other employees can enter the controlled access zones.

General Industry Standard

The OSHA General Industry Standard, 29 CFR 1910.23, Guarding Floor and Wall Openings and Holes, states that:

- Every open-sided floor or platform 4 feet or more above the floor or ground level must be guarded by a standard railing on all open sides except where there is entrance to a ramp, stairway, or a fixed ladder.
- In addition to the railing, toeboards must be provided wherever persons can pass underneath or there is moving machinery or equipment in which falling materials could create a hazard.
- Every runway must be guarded by a standard railing on all open sides 4 feet or more above floor or ground level. Wherever tools, machine parts, or materials are likely to be used on the runway, a toeboard must also be provided on each exposed side.
- Where there is the potential for persons who enter runways to become exposed to machinery, electrical equipment, or dangers other than a falling hazard, additional guarding may be essential for protection.

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