Top Four Hazards in the Construction Industry
Objectives

- In this course, we will discuss the Top 4 Hazards in the Construction Industry:
  - Falls
  - Electrical
  - Struck-by
  - Caught between
Construction Fatalities (FY 2005-2009)

5-Year Total: 101 Fatalities

- Falls: 35%
- Struck By: 28%
- Caught Between: 18%
- Electrocuted: 12%
- Other: 7%
Subpart M – Fall Protection

Exception

- Covers all fall hazards *except* specific requirements found in:
  
  » Subpart L – Scaffolds

  » Subpart N – Certain cranes and derricks

  » Subpart R – Steel erection

  » Subpart S – Tunneling operations

  » Subpart V – Power transmission and distribution

  » Subpart X – Stairways and ladders
Exception

- The provisions of this subpart do not apply when employees are making an inspection, investigation, or assessment of workplace conditions prior to the actual start of construction work or after all construction work has been completed.
Fall Exposure: Then and now...

- **1969 Construction**
  
  Est. fall exposure
  - Drip edge = 11’
  - Roof peak = 16’

- **2008 Construction**
  
  Est. fall exposure
  - Drip edge = 23’
  - Roof peak = 38’
Fall Protection Requirements

Steel Erection

Scaffolds
10'

Construction Sites
6'

General Industry
4'
Duty to Have Fall Protection 1926.501(a)

- Employer required to provide fall protection systems.
- Employer shall determine if the walking/working surfaces on which its employees are to work have the strength and structural integrity to support employees safely.
Fall Protection Required  
1926.501(b)(1)-(15)

- Unprotected sides, edges
- Leading edges
- Hoist areas
- Holes
- Formwork, reinforcing steel
- Ramps, runways
- Excavations
- Dangerous equipment
- Overhand bricklaying
- Low-slope roofs
- Steep roofs
- Pre-cast concrete erection
- Residential construction
- Wall openings
- Other walking and working surfaces
Each exposed employee shall wear a hardhat.

Employer must take steps to prevent employees from being hit by falling objects.

- Erect toe boards, screens, or guardrail systems
- Erect a canopy structure
- Barricade the area
Methods of Fall Protection

- Conventional methods
  - Safety nets
  - Guardrails
  - Personal fall arrest systems (PFAS)
Methods of Fall Protection

1926.502(f)

- Other acceptable methods
  - Used under certain circumstances
    - Warning lines
    - Control access zones (CAZ)
    - Safety monitor
    - Fall protection plan

Sample Fall Protection Plan

The following Fall Protection Plan is a sample program prepared for the prevention of injuries associated with falls. A Fall Protection Plan must be developed and evaluated on a site by site basis. It is recommended that erected decks are treated in the written Fall Protection Plan with their OSHA Area Office prior to going on a job site.

I. Statement of Company Policy

[Company Name] is dedicated to the protection of its employees from on-the-job injuries. All employees of [Company Name] have the responsibility to work safely on the job. The purpose of this plan is: (a) To supplement our standard safety policy by providing safety standards specifically designed to cover fall protection on the job and (b) to ensure that each employee is trained and made aware of the safety procedures which are to be implemented by this plan prior to the start of erection.

The Fall Protection Plan addresses the use of other than conventional fall protection at a number of areas on the project, as well as identifying specific activities that require non-conventional means of fall protection. These areas include:

a. Connecting activity (point of erection).
b. Leaning edge work.
c. Unprotected sides of edge.
d. Digging.

This plan is designed to enable employers and employees to recognize the fall hazards on the job and to establish the procedures that are to be followed in order to prevent falls to lower levels or through holes and openings in walking or working surfaces. Each employee and his/her immediate personal and facility areas are identified. Each employee is to be trained in the safety procedures which are required, and this training is to be repeated periodically. If, in the case, the employee is to notify the supervisor of the concern and the concern addressed before proceeding.

Effective policy and procedure on any one project cannot be administered, implemented, monitored, and enforced by any one individual. The total objective of a safe accident-free work environment can only be accomplished by a decision, commitment, effort by every individual involved in the project from management down to the last employee. Each employee must understand that value to the company the costs of accidents, both monetary, physical, and emotional, the objective of the safety policy and procedures, the safety rules that pertain to the safety policy and procedures, and what their individual role is in implementing, monitoring, and compliance of their safety policy and procedures. This applies to a more personal approach to compliance through discipline, understanding, and cooperative effort, rather than by strict enforcement. For any reasons an unsafe act persists, strict enforcement will be implemented.

It is the responsibility of [name of company officer] to implement this Fall Protection Plan. [Name of Company Officer] is responsible for conducting observation safety checks of the work operations and to enforce the safety policy and procedures. The foreman also is responsible to correct any unsafe acts or conditions immediately. It is the
Fall Protection Plan

- Only for specific area or jobs
  - Leading edge work
  - Precast concrete erection work
  - Residential construction work

- Used when conventional fall protection equipment is infeasible or creates a greater hazard

- Designed by qualified person

- Supervised by competent person
Subpart K- Electrical

- 1926.400 – Introduction
- 1926.402 – Applicability
- 1926.403 – General requirements
- 1926.404 – Wiring design and protection
- 1926.405 – Wiring methods, components, & equipment
- 1926.406 – Specific purpose equipment and installations
- 1926.407 – Hazardous (classified) locations
- 1926.408 – Special systems
- 1926.416, 417, 431, 432, 441 – Safety-related practices and maintenance
- 1926.449 - Definitions
Common Electrical Hazards

- Electric shock/electrocution occurs, when current flows through the body damaging the body.

- Electrical burns are caused by arc blast or hot conductors.

- Indirect falls from ladders, scaffolds or other walking and working surfaces.
Common Electrical Hazards

- Explosions can be caused when electricity provides a source of ignition for an explosive mixture in the atmosphere.

- Fires are caused by overloading a circuit or appliance or by current flowing through high resistance due to faulty wiring, setting fire to insulation and surrounding materials.
General Requirements

- Electrical equipment must be free from recognized hazards that can cause death or serious physical harm to employees.
  - Suitability for installation
  - Mechanical strength and durability
  - Electrical insulation
  - Heating effects under condition of use
  - Arcing effects
  - Classification by type, size, voltage, current capacity, specific use
Listed, labeled, or certified equipment must be installed and used in accordance with instructions included in the listing, labeling or certification.
General Requirements

1926.403(h)

- Each service, feeder, and branch circuit, at its disconnecting means or over current device, shall be legibly marked to indicate its purpose.
General Requirements

- Live parts of electric equipment operating at 50 volts or more shall be guarded against accidental contact by cabinets or other forms of enclosures, or by another suitable method.
General Requirements

1926.403(e)

Splices

- Splicing devices suitable for use
- Welding/brazing/soldering
- Mechanically/electrically secure before soldering
- Covered with insulation equivalent to that of the conductors
- Insulating device suitable for purpose
**Safety-Related Work Practices 1926.416(a)(1)**

- Employer must not permit an employee to work in such proximity to any part of an electric power circuit.
  - If employee could contact the power circuit, it must be de-energized or guarded.
Safety-Related Work Practices 1926.416(b)(2)

- Working spaces, walkways, and similar locations shall be kept clear of cords so as not to create a hazard to employees.
Safety-Related Work Practices

1926.416(e)

- Worn or frayed electric cords must not be used.

- Extension cords shall not be stapled, hung from nails or suspended by wire.
Who is the Competent Person?

- **Competent person**
  - “One who is capable of identifying existing and predictable hazards…”
DID YOU KNOW?
ONE IN FOUR "STRUCK BY VEHICLE" DEATHS INVOLVE CONSTRUCTION WORKERS, MORE THAN ANY OTHER OCCUPATION.
Struck By/Caught Between

- Trenching and excavation
- Construction equipment
- Tools and equipment
- Materials handling, storage, use, and disposal
- Rigging
- Motor vehicles
Trenching and Excavation

- Safety issues
  - Heavy vehicular traffic
  - Nearby train traffic
  - Nearby blasting
  - Rain; freezes and thaws
Trenching and Excavation

- What are the safety issues with:
  - Heavy vehicular traffic?
  - Nearby train traffic?
Trenching and Excavation

What are the safety issues with nearby blasting?
Trenching and Excavation

- What are the safety issues after rain, snow or other event (thawing, freezing)?
Trenching and Excavation

- Safe work practices:
  - Inspections conducted after any event that increases the risk of a hazardous condition (trench collapse)
  - Adequately slope or bench sides, or use an appropriate protective system
  - Enforce employee safe work procedures
Construction Equipment

- Safety issues
  - Overhead hazards
  - Low visibility
Construction Equipment

- Safe work practices:
  - Vehicle(s) used to haul material and loaded by cranes, power shovels, loaders or other such equipment, must have a cab shield or canopy that protects the driver from falling materials.
Construction Equipment

- Safe work practices:
  - Do not drive a vehicle in reverse gear with an obstructed rear view, unless it has an audible reverse alarm, or another worker signals that it is safe.
Tools and Equipment

- Safety issues:
  - Improper work procedures
  - Use of defective equipment
Tools and Equipment

- **Safe work practices:**
  - Provide adequate training in work procedures before tools and equipment are used.
Tools and Equipment

- What are the safety issues?
Tools and Equipment

What are the safety issues?
Tools and Equipment
Materials Handling

- Safety issues:
  - Improperly stored materials
  - Incorrectly cutting ties or other securing devices
  - Improper loading and unloading
Materials Handling

- Safe work practices:
  - Establish and enforce proper work practices, equipment, and controls
Materials Handling

- What safety issues do you see?
Materials Handling

- What are the safety issues?
Materials Handling

What safety issues do you see?
Rigging

- Safety issues:
  - Using defective rigging equipment
  - Excessive loading
  - Lack of communication
Rigging

● Safe work practices

  – Load should not exceed rated capacity
  – Protect sling from sharp corners
  – Know center of gravity of load
  – Inspect the rigging
  – Keep personnel clear
  – Never leave load unattended
  – Wear hardhats when lifting

### Table H-1. Rated Capacity (Working Load Limit), Pounds

<table>
<thead>
<tr>
<th>Chain size, inches</th>
<th>Single branch</th>
<th>Double sling vertical angle (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>90 deg.</td>
<td>30 deg.</td>
</tr>
<tr>
<td>Loading (60 deg.)</td>
<td>45 deg.</td>
<td>(30 deg.)</td>
</tr>
<tr>
<td>1/4</td>
<td>3,250</td>
<td>5,560</td>
</tr>
<tr>
<td>3/8</td>
<td>6,600</td>
<td>11,400</td>
</tr>
<tr>
<td>1/2</td>
<td>11,250</td>
<td>19,800</td>
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<td>16,500</td>
<td>28,500</td>
</tr>
<tr>
<td>3/4</td>
<td>23,000</td>
<td>38,800</td>
</tr>
<tr>
<td>7/8</td>
<td>28,750</td>
<td>49,500</td>
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<tr>
<td>1</td>
<td>35,750</td>
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<td>116,000</td>
</tr>
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<td>1 1/2</td>
<td>80,000</td>
<td>139,000</td>
</tr>
<tr>
<td>1 3/4</td>
<td>100,000</td>
<td>172,000</td>
</tr>
</tbody>
</table>
Rigging

- What are the safety issues?
Rigging

- What are the safety issues?
Motor Vehicles

- Safety issues:
  - When vehicle safety practices are not observed, there is a risk of being pinned, caught between and/or struck by vehicles.
Motor Vehicles

- Safe work practices
  - Provide an area of separation between traffic flow and work area
Motor Vehicles

- Safe work practices
  - All workers exposed to the risks of moving roadway traffic or construction equipment should wear high-visibility safety apparel.
Preventing Struck By/Caught Between Injuries

- **Comprehensive Safety Program**
  - Development, implementation, and enforcement of program for workers
    - Includes training in the recognition and avoidance of unsafe work conditions and instruction in safe work practices
      - If a multilingual workforce, instruction should be in the language understood by the worker
    - Ensures appropriate PPE and usage
Summary

In this course, we discussed the Top 4 Hazards in the Construction Industry:

- Falls
- Electrical
- Struck-by
- Caught between
Thank You For Attending!

Final Questions?
Handouts

Place all handouts at the end of this presentation.