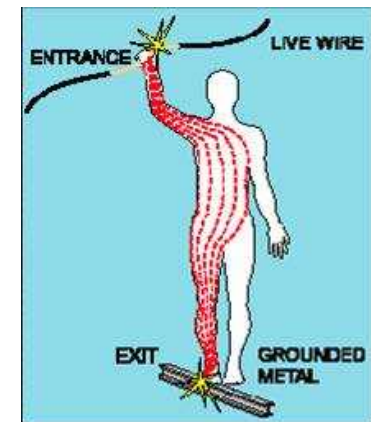




Top Four Hazards in the Construction Industry

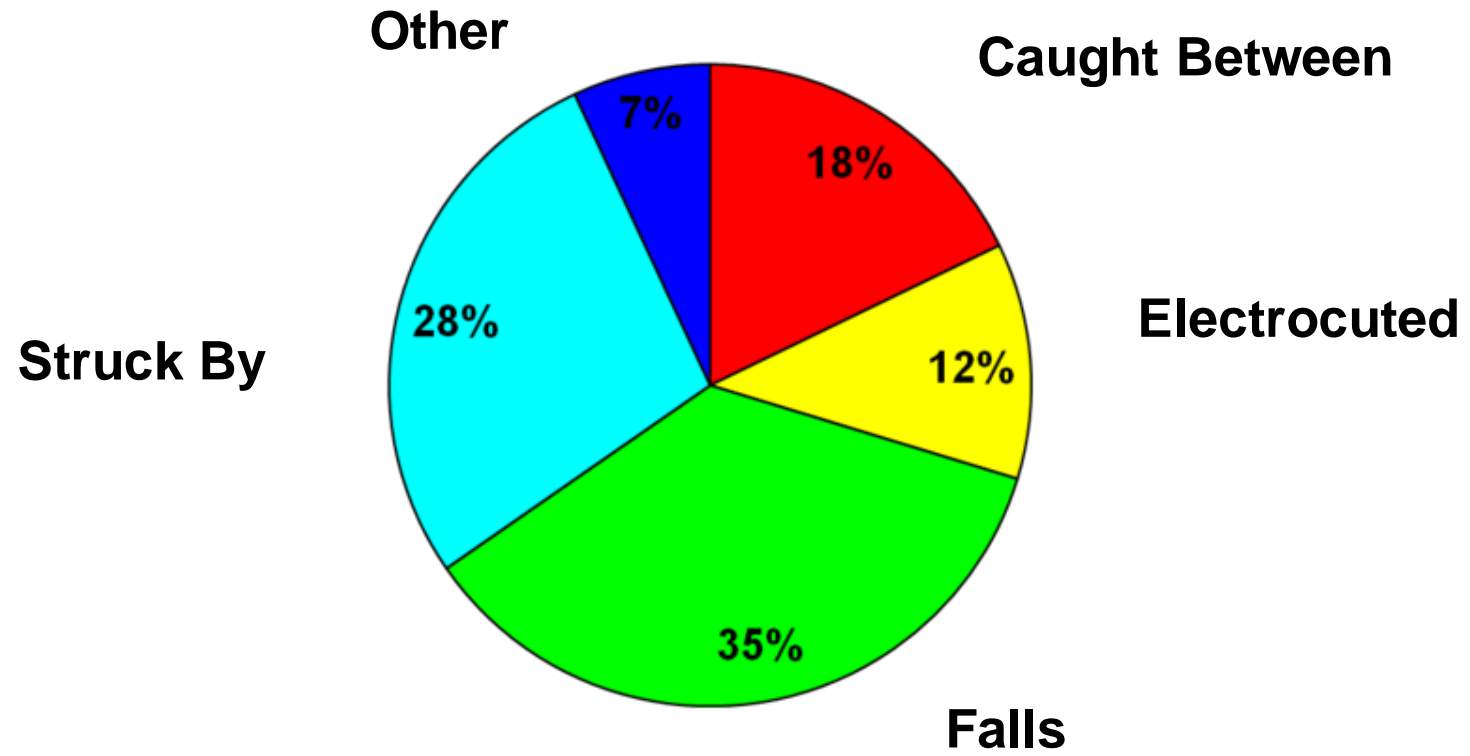
Objectives

- 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)

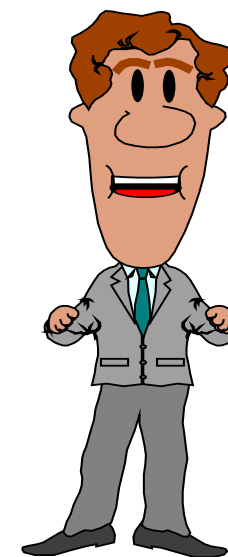


5-Year Total: 101 Fatalities

Subpart M – Fall Protection

1926.500-503

- 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



Subpart M – Fall Protection 1926.500(a)(1)

- 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'



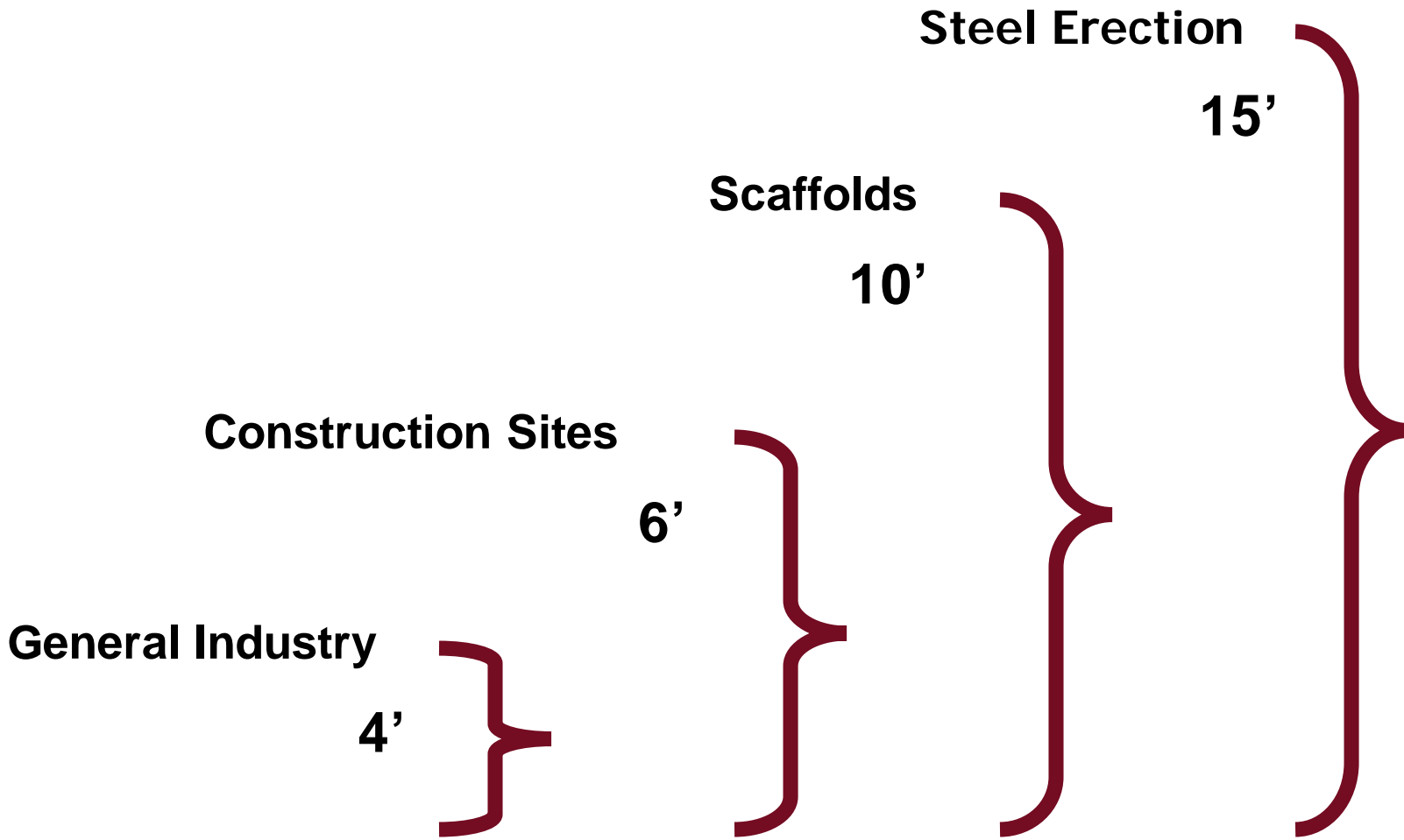
- **2008 Construction**

Est. fall exposure

- Drip edge = 23'
- Roof peak = 38'



Fall Protection Requirements





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

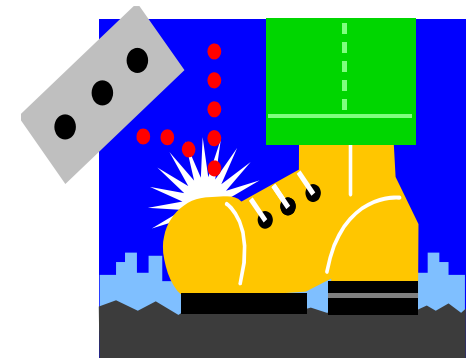
1926.501(b)(1)-(15)

- 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
-

Falling Objects

1926.501(c)

- 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

1926.502(a)(1)

- **Conventional methods**
 - Safety nets
 - Guardrails
 - Personal fall arrest systems (PFAS)



Safety net

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 Plans

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 erectors discuss the written Fall Protection Plan with their OSHA Area Office prior to going on a jobsite.

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 this job and; (b) to ensure that each employee is trained and made aware of the safety provisions which are to be implemented by this plan prior to the start of erection.

This 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:

- Connecting activity (point of erection).
- Leading edge work.
- Unprotected sides or edge.
- Grouting.

This plan is designed to enable employers and employees to recognize the fall hazards on this 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/working surfaces. Each employee will be trained in these procedures and strictly adhere to them except when doing so would expose the employee to a greater hazard. If, in the employee's opinion, this is the case, the employee is to notify the foreman of the concern and the concern addressed before proceeding.

Safety 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 dedicated, concerted effort by every individual involved with the project from management down to the last employee. Each employee must understand their 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 apply to the safety policy and procedures; and what their individual role is in administering, implementing, monitoring, and compliance of their safety policy and procedures. This allows for a more personal approach to compliance through planning, training, understanding and cooperative effort, rather than by strict enforcement. If for any reason an unsafe act persists, strict enforcement will be implemented.

It is the responsibility of (name of competent person) to implement this Fall Protection Plan. (Name of Competent Person) is responsible for continual observational safety checks of their 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

1926.502(k)

- 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

1926.400-449

- 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

1926.403(b)(1)

- 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



General Requirements

1926.403(b)(2)

- 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

1926.403(i)

- 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.

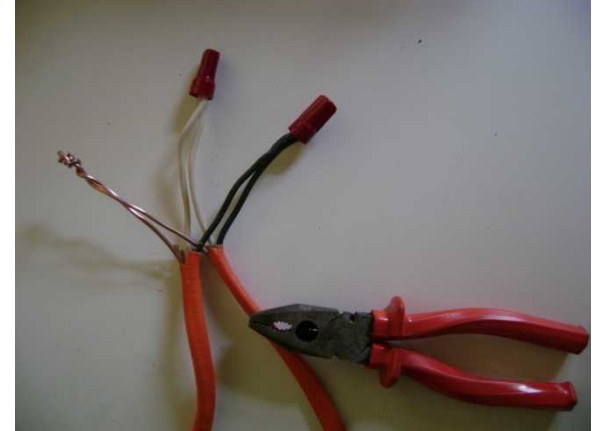


General Requirements

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)

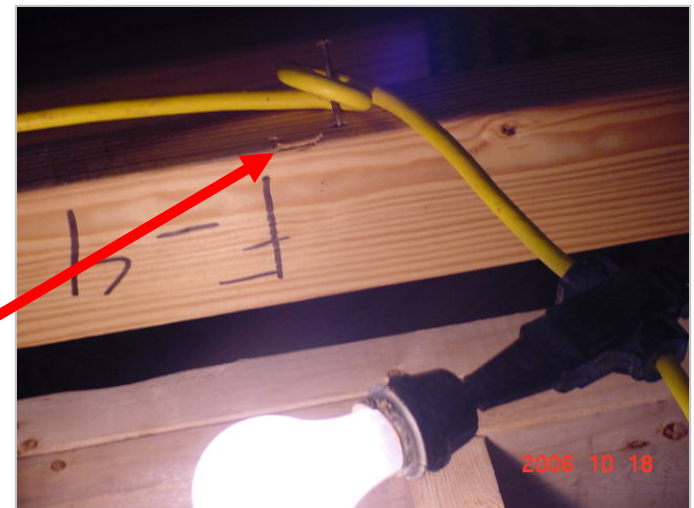
- Working spaces, walkways, and similar locations shall be kept clear of cords so as not to create a hazard to employees.



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.



Struck By/Caught Between

29 CFR 1926



Who is the Competent Person?

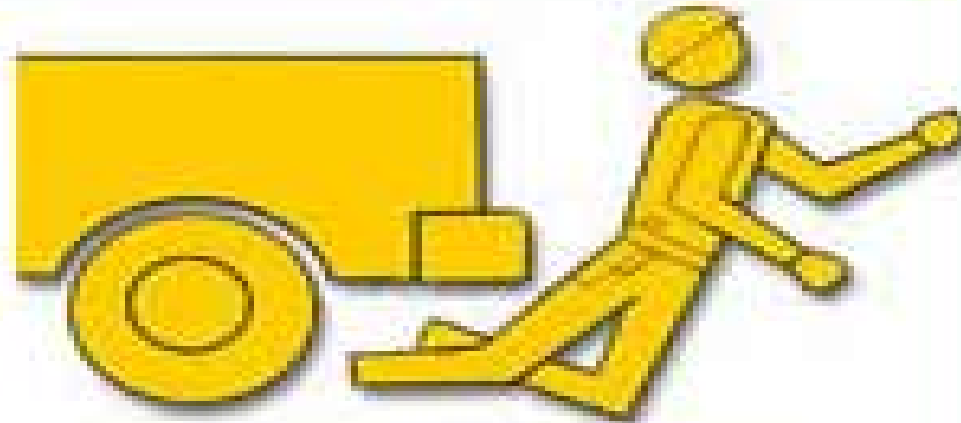
1926.32 (f)

- **Competent person**

- “One who is capable of identifying existing and predictable hazards...”



Struck By/Caught Between



**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



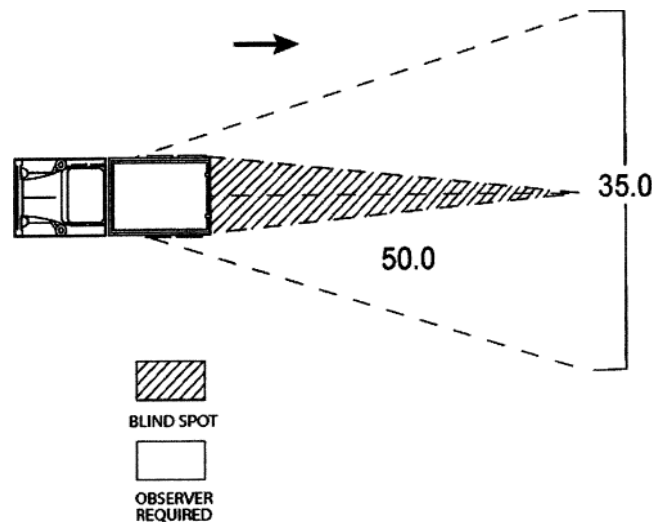
Construction Equipment

- 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.



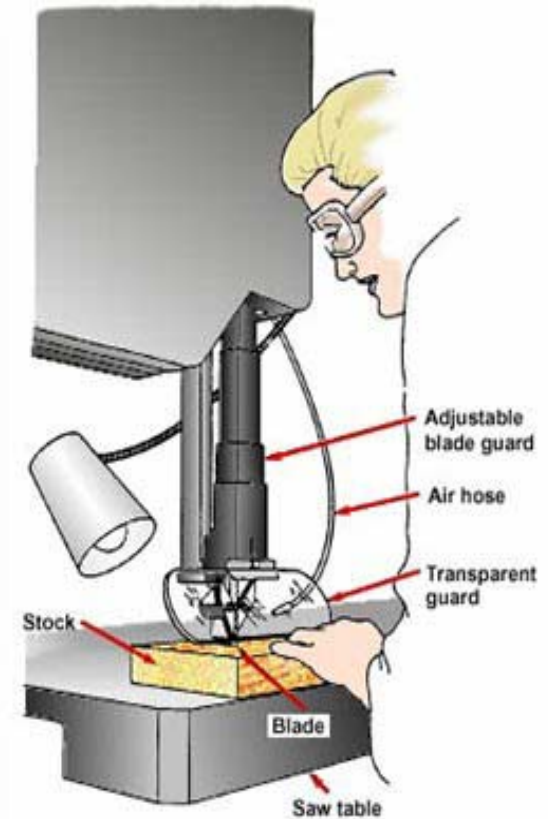
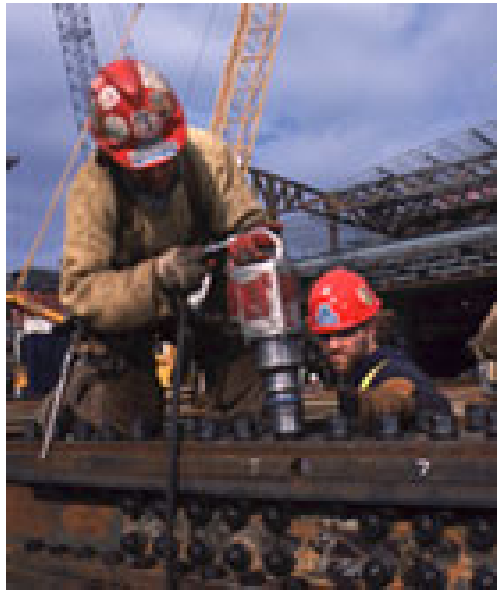
Construction Equipment

- 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

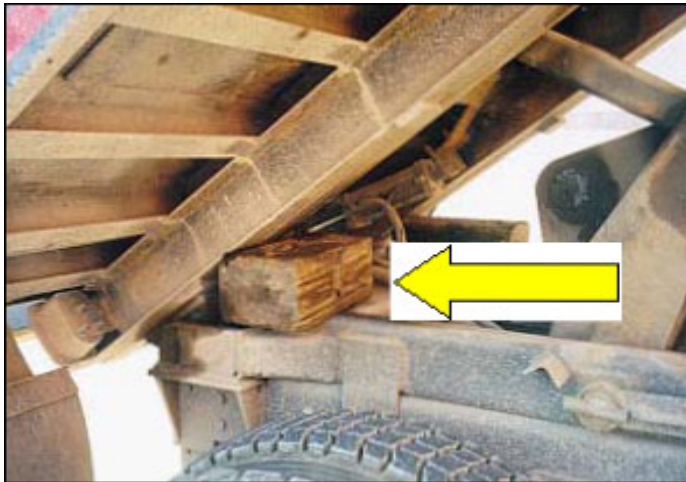


Figure 1



Figure 2

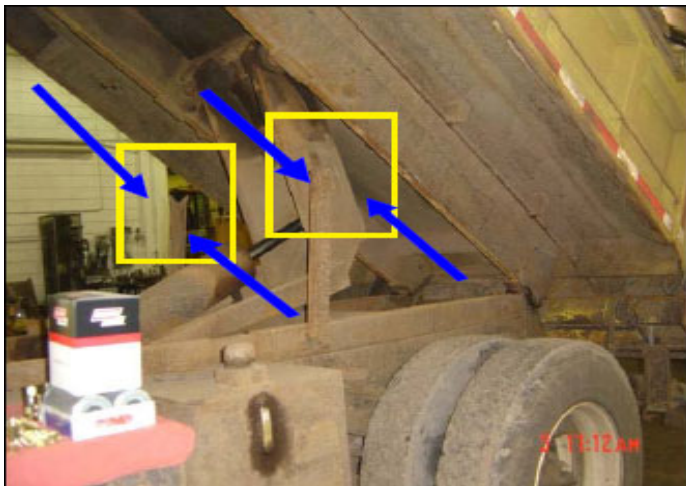


Figure 3



Figure 4

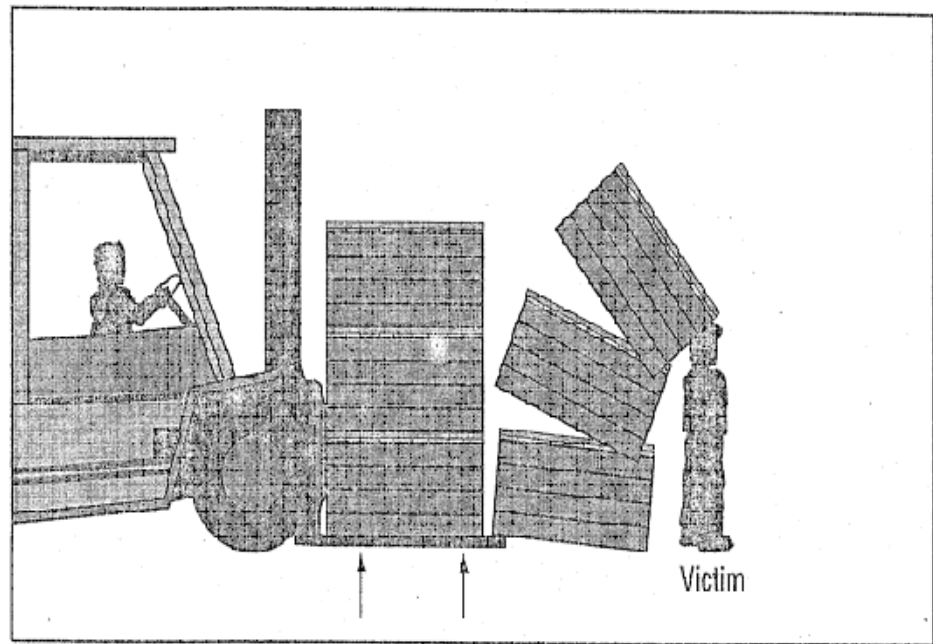
Materials Handling

- 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?





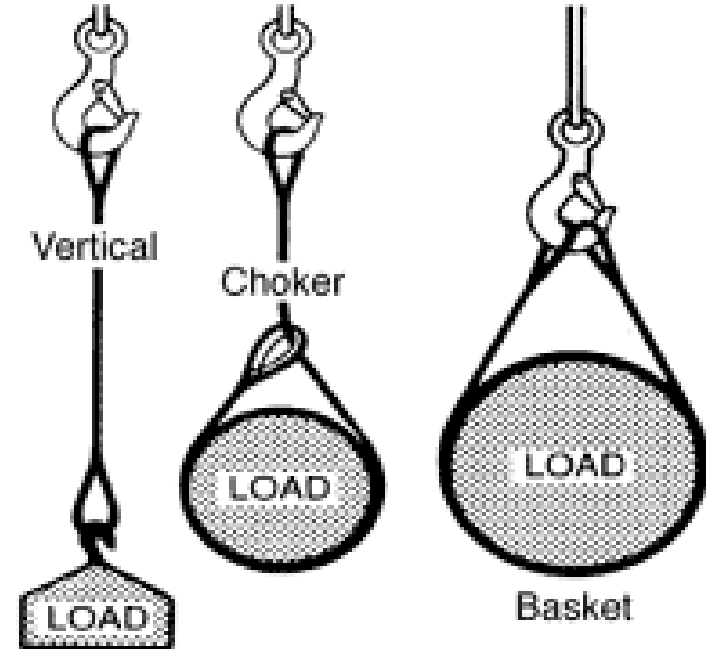
Materials Handling

- 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),
FOR ALLOY STEEL CHAIN SLINGS (1)

Rated Capacity (Working Load Limit), Pounds
[Horizontal angles shown in parentheses] (2)

Chain size, inches	Single branch sling-- loading	Double sling vertical angle (1)		
	90 deg.	30 deg. (60 deg.)	45 deg. (45 deg.)	60 deg. (30 deg.)
1/4.....	3,250	5,560	4,550	3,250
3/8.....	6,600	11,400	9,300	6,600
1/2.....	11,250	19,500	15,900	11,250
5/8.....	16,500	28,500	23,300	16,500
3/4.....	23,000	39,800	32,500	23,000
7/8.....	28,750	49,800	40,600	28,750
1.....	38,750	67,100	54,800	38,750
1 1/8...	44,500	77,000	63,000	44,500
1 1/4...	57,500	99,500	81,000	57,500
1 3/8...	67,000	116,000	94,000	67,000
1 1/2...	80,000	138,000	112,900	80,000
1 3/4...	100,000	172,000	140,000	100,000



Rigging

- What are the safety issues?





Rigging

- What are the safety issues?



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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

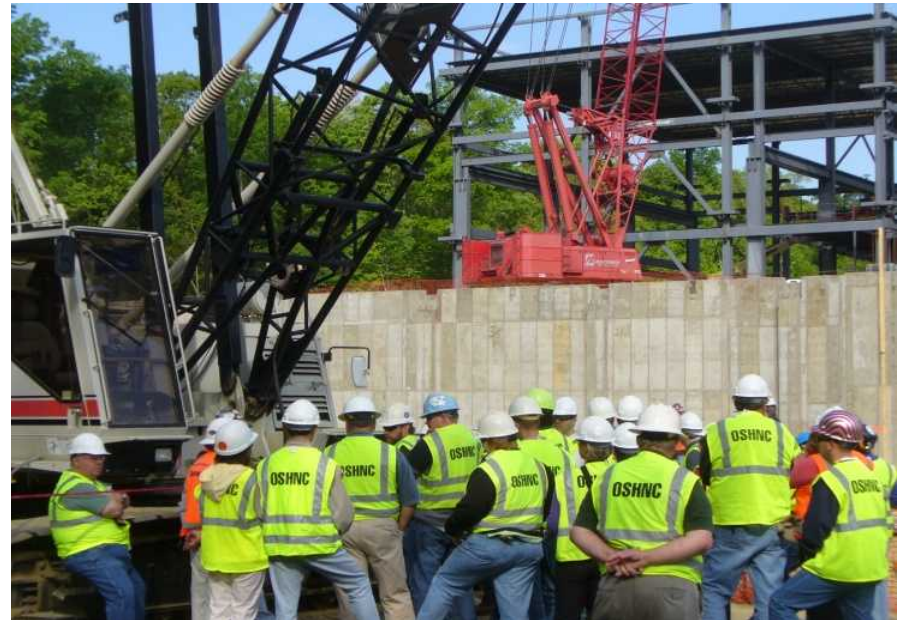
- If a multilingual workforce, instruction should be in the language understood by the worker

- » 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.
