Working at Heights

Understanding the Requirements of Fall Protection

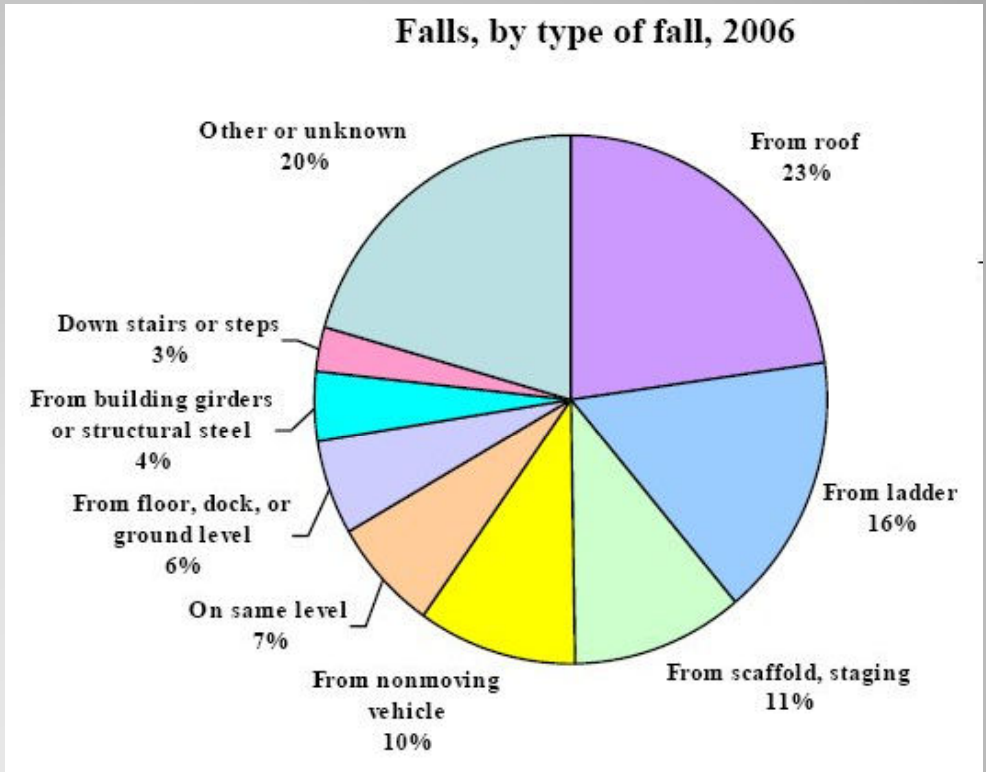
29 CFR 1926 Subpart M – Fall Protection

Objectives

- Describe the nature of the fall hazards in the work area.
- Understand the correct procedures for fall protection systems.
- Understand the use and operation of fall protection systems.
- Describe the requirements for employee rescue.
- Demonstrate the techniques for inspecting fall protection equipment.

Fall Protection is Critical

- Failure to have fall protection when six feet above a lower level is a top OSHA violation in the construction industry.
- In 2006, 809 fatalities for workplace related falls were reported.



Falls are the leading cause of death in the construction industry.

Fall Protection Training

- Employees must be taught by a competent person who is qualified in the following areas:
  - The nature of fall hazards in the 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 each employee in the safety monitoring system when this system is used.
  - The limitations on the use of mechanical equipment during the performance of roofing work on low-sloped roofs.
  - The correct procedures for the handling and storage of equipment and materials and the erection of overhead protection.
  - The role of employees in fall protection plans.
  - The OSHA Fall Protection Standards.

Fall Protection Training

- Fall Protection training must:
  - Enable each employee to recognize the hazards of falling.
  - Train each employee on the procedures to minimize these hazards.

Providing a Fall Protection System

- The employer must:

1. Determine if and where fall protection is required.
2. Provide safe work procedures.
3. Select and install proper fall protection systems.
4. Train workers to use the fall protection systems.

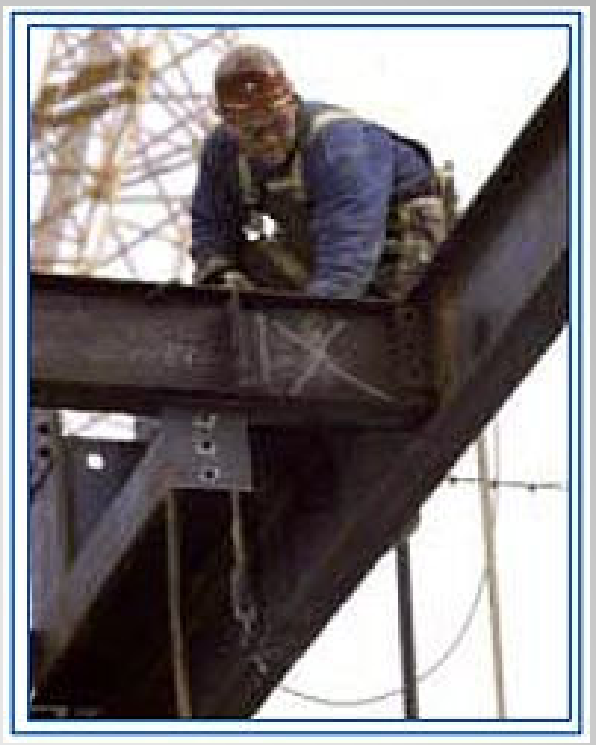
When is Fall Protection Required?

- Fall Protection is required for employees who are working:

  1. Six feet or more above a lower level. (Four feet in general industry.)

  2. When their is a hazard of falling into dangerous equipment.

  3. Other activities as required by OSHA and the company fall protection plan.



What fall hazards exist in you work area or job site?

The Fall Protection Hierarchy

1. Eliminate the fall hazard.
   - Perform work on the ground.
   - Engineer out the hazard.
2. Fall Restraint
   - Positioning Lanyards
   - Guardrails
3. Fall Arrest
   - Harnesses
   - Rescue Plan

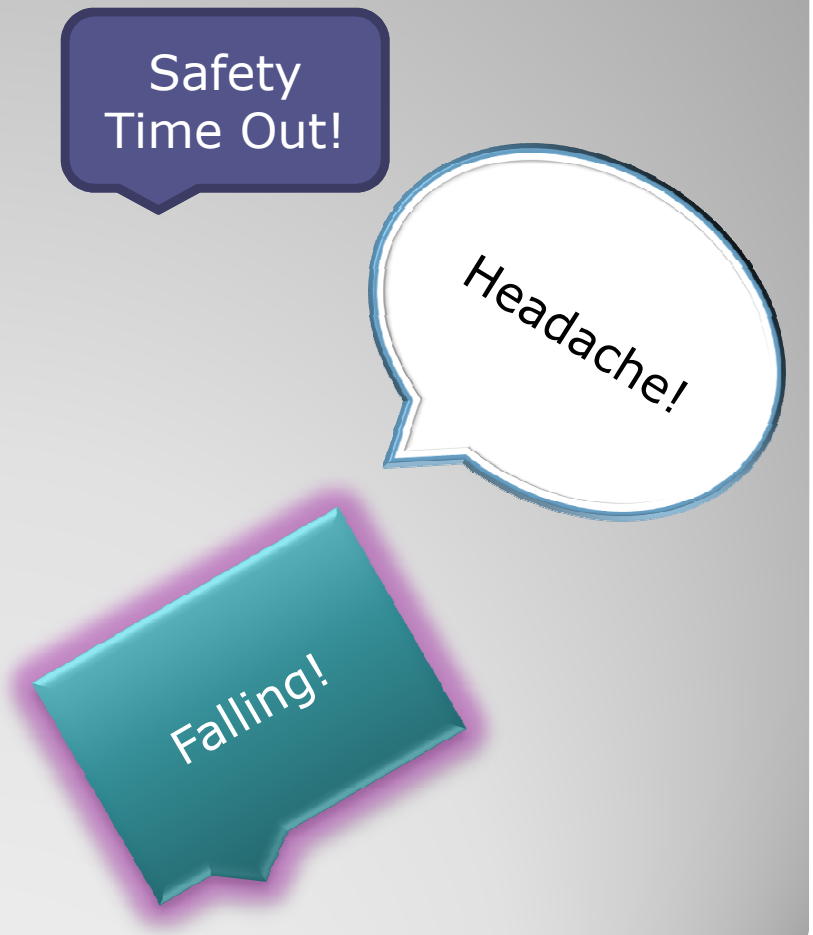
With careful planning, many fall hazards can be eliminated with engineering changes or completing work on the ground.

Safe Practices for Working at Heights

- Good Housekeeping
  - Keeping a work area free of debris and clutter will reduce tripping hazards, dangers from falling objects, and prevent falls.
- Work Slowly and Carefully
  - Your life is too important to risk it by working too fast.
- Avoid Dropping Objects
  - Use lanyards for tools and equipment to prevent dropping.

Good Communication Is Essential

- Make sure employees are able to communicate.
- Consider establishing "safe words."
  - What do people automatically do when they hear "Watch Out" or "Heads Up"?
  - Consider using a safe word, such as "Headache" to let people know something is falling. Then they know to square themselves under their hard hat and leave the area.



Preventing Hazards from Falling Objects

- Many options are available to reduce the risk of falling objects by safe work practices and use of overhead protection.

1. Use screens or panels on guardrails.
2. Use strong canopies that can catch falling objects.
3. Store materials at least six feet from an edge.
4. Use tool lanyards.
5. Always wear a hard hat.

What other things can you do to prevent falling object hazards?

Types or Workers

- Qualified Person
  - **Qualified person must have** a recognized degree, certificate, etc., or extensive experience and ability to solve the subject problems, at the worksite.
- Competent Person
  - Has been trained on fall protection usage, installation, monitoring and inspection.
  - Has authority to take action to eliminate fall hazards and stop work if the system is found to be ineffective.
  - Should be a work supervisor.
- Authorized User
  - An employee who has been trained on the use and inspection of fall protection.

Fall Protection systems must be designed and installed by a qualified person.

Warning Line Systems

- The purpose of the warning line system is to keep workers away from a hazardous edge.
- They consist of ropes, wire or chains. (Minimum strength of 500 lbs)
- They must be flagged every six feet.
- They must be erected at least six feet from the fall hazard.
- The supports for the warning line must be sturdy and not tip over easily.
- They must be 34 to 49 inches above the work surface.
- Workers must be trained to stay away.

Safety Monitoring System

- A Competent Person monitors the safety of the workers.
  - Competent Person – Capable of identifying existing and potential fall hazards.
- Safety Monitor must be on the same working level as employees and within sight.
- Must be close enough to communicate verbally.
- Monitor has no other responsibilities that monitoring safety of employees.

Workers must immediately comply with instructions of the safety monitor.

Safety Monitoring is only to be used as a last resort when no other forms of fall protection are feasible.

Controlled Access Zones

- A combination of a warning line system and a safety monitoring system.
- Only certain work, such as overhead bricklaying, may occur without the use of conventional fall protection systems.
- Lines must be 6 -25 feet from unprotected edge.
- Consult OSHA Regulation 1926.502(g)

Safety Net Systems

- Must be installed less than 30ft below workers.
- Must be installed under the working or walking surface.
- Must be installed with enough clearance to prevent the worker from striking a lower level after being caught in the net.
- Safety nets must be inspected once a week for wear.
- Objects that fall into the net must be immediately removed.

Before a safety net can be used for fall protection, it must be tested by dropping a 400 lb bag of sand from the highest level an employee is expected to be working above the net.

Guardrail Systems

- Top of the guardrail must be between 39 to 45 inches above the walking or working surface.
- There must be a midrail between the top and the working surface.
- Top rails must be able to withstand 200 lbs of force.
- The toe boards must be 3.5 inches tall and withstand a force of 50 lbs.

Personal Fall Arrest System

- There are four important components to any fall arrest system:
  1. Harness
  2. Connectors
  3. Anchorage
  4. Rescue Plan
- The system must:
  1. Allow no more than six feet of free fall.
  2. Have a maximum arresting force of 1,800 lbs.
  3. No more than 3.5 feet of deceleration distance
  4. Be designed to withstand at least twice the expected impact forces.

Harnesses

- Harnesses can be used for fall arrest, fall prevention and suspension.
- Body belts are not allowed to be used for fall arrest.
- The harness must the proper size for the employee.
- Do not write on the harness straps or webbing. Some inks can weaken the fabric. Write your name on the tag of the harness.

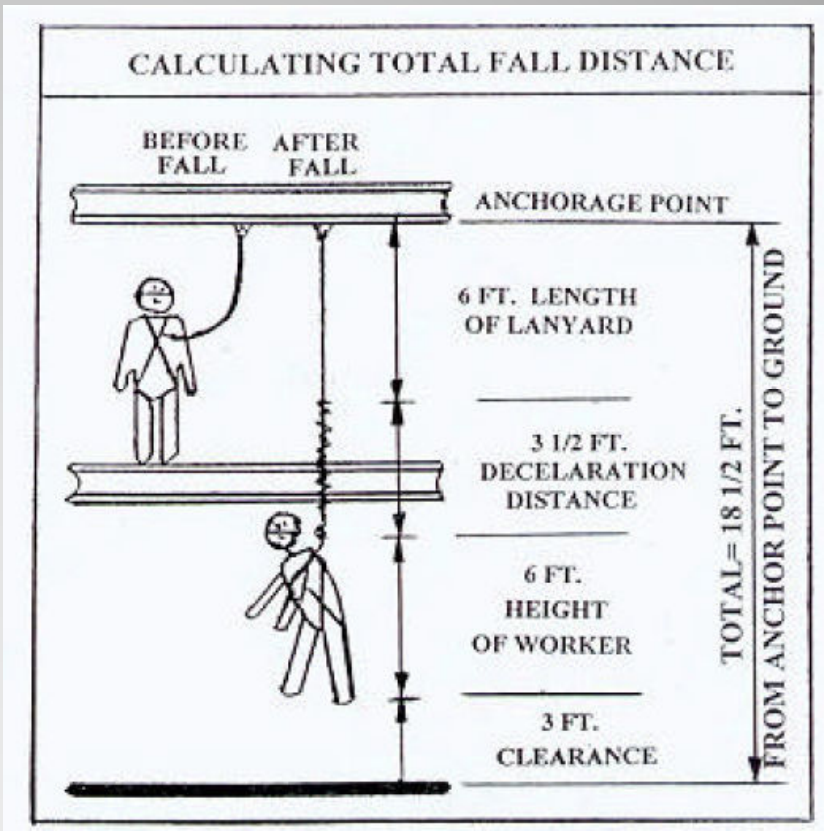
Harness Safety Check

- Once you have donned the harness, perform a safety check.

1. The chest D-Ring is centered on the chest above the sternum.
2. Pull your shoulder straps apart forcefully and make sure that they do not pass over the shoulders.
3. Flip you dorsal (back) D-Ring up and make sure the top does not reach above the middle of the neck.
4. Check you leg straps. You should be able to get a few fingers between your leg and your strap, but should not be able to make a fist.
5. Check your harness for loose straps, and make sure that they are all securely fastened.

Calculating Required Clearance

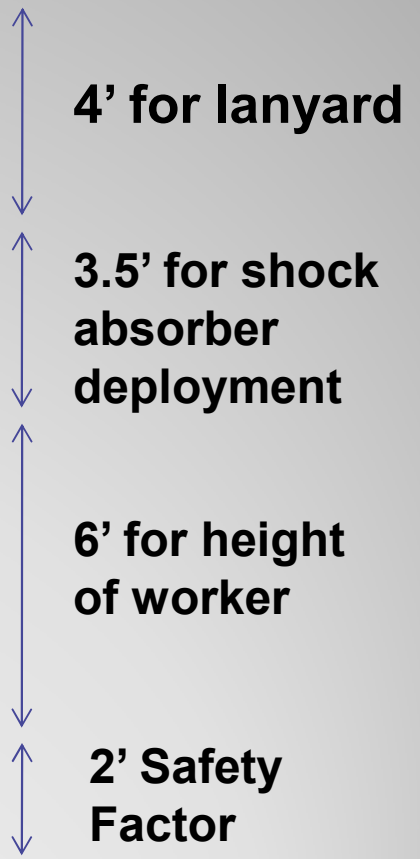
- A personal fall arrest system must ensure that the user does not contact a lower level in the event of a fall.
- This can require nearly 20 feet of clearance!



Required Clearance Problem

- George is anchored two feet above his head with a six foot lanyard. What is his required clearance in the event of a fall?

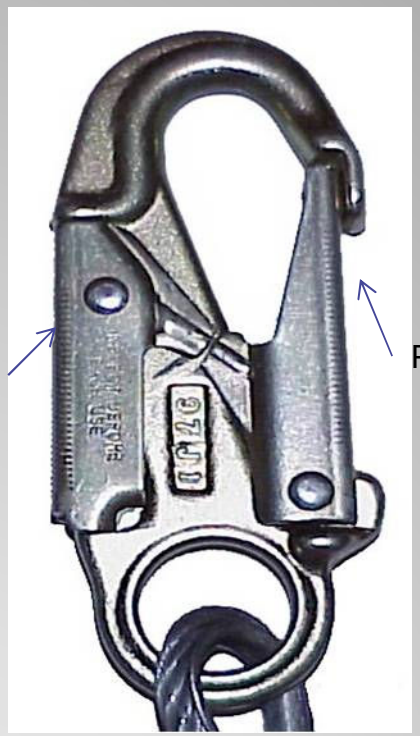
George would need 15.5 feet of clearance to avoid striking a lower level in a fall.



Connectors

- Load bearing parts of connectors must be rated to 5,000 lbs.
- Must be double-acting and self-locking.

- Must be compatible with equipment being used.



New ANSI standards require the gate and the gate sides to be rated to 3,600 lbs (up from 220lbs) Old connectors are not likely to be made to the standard. Be sure to check!

Deceleration Devices

- A 220 lb man falling six feet will generate over 5,000 lbs of force on the body!
- Deceleration devices are required to reduce that to less than 1,800 lbs.
- These devices cannot add more than 3.5 feet to fall distance.

Rip stitch pack devices tear open to dissipate force.

Linear shock absorbers are similar but do not have a shock pack.

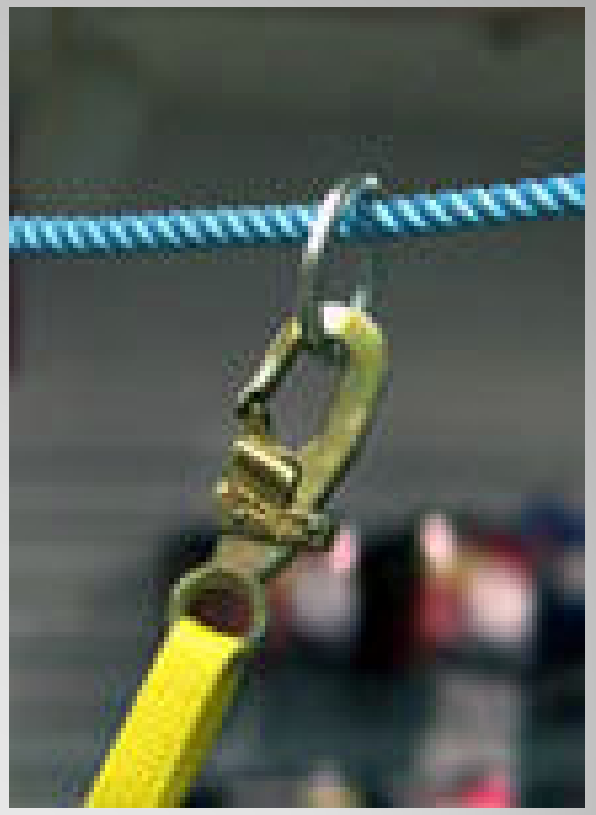
Lanyards

- The lanyards connect the harness to the lifeline or anchor point.
- Never tie knots in lanyards or use them over sharp corners or edges.
- Lanyards are an important part of determining your fall distance. Use shorter lanyards if fall distance would exceed six feet.
- Be sure to inspect lanyards prior to every use.

Never tie knots in a lanyard or use it for rigging!

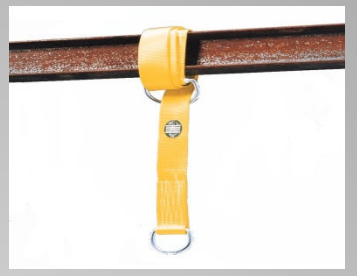
Lifelines

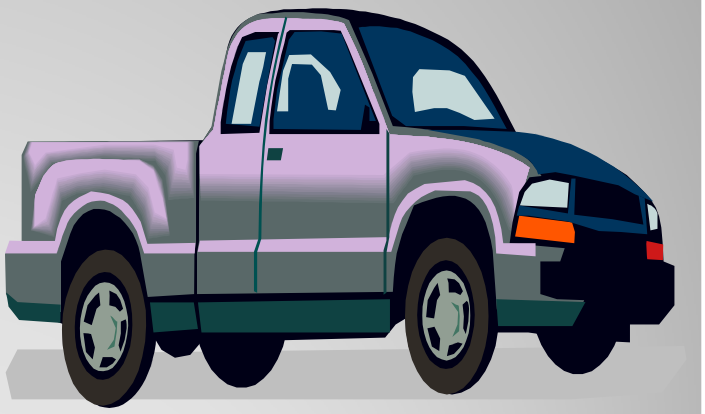
- A lifeline is used to connect a person to an anchorage that cannot be reached with their lanyard.
- Lifelines must be able to withstand 5,000 lbs of force.
- Lifelines should be tense enough to not add significant distance to the fall.
- They must be designed, installed, and supervised by a qualified person.



Anchor Points

- Anchors must be able to hold 5,000 lbs per person attached.
- Anchor points may only be used for fall arrest.
- They should be located directly above user to minimize swing fall.





Could the anchor point you selected hold the weight of a pickup truck? If not, it is probably not a good anchor point to use.

Equipment Inspection

- Personal Fall Arrest systems must be inspected before every use.
- They also must be inspected routinely by a competent person other than the user.
- If there is any sign the equipment has been impact loaded, remove it from service immediately.

Inspections are important. Equipment in poor condition does not protect employees.

Inspection Tips – Metal Hardware

- Inspect hardware for cracks, deformity, and corrosion.
- Ensure metal parts can move freely.
- Hardware that is "out of round" can indicate it has been impact loaded.

It is important for markings to be legible on hardware, so that proper rating can be assured.

Inspection Tips – Webbing

- Inspect webbing for fraying, cuts, and abrasion.
- Check for UV damage.
- Harnesses should be free of oil, paint, and other chemicals, which can degrade the webbing.

This webbing has been heavily damaged.

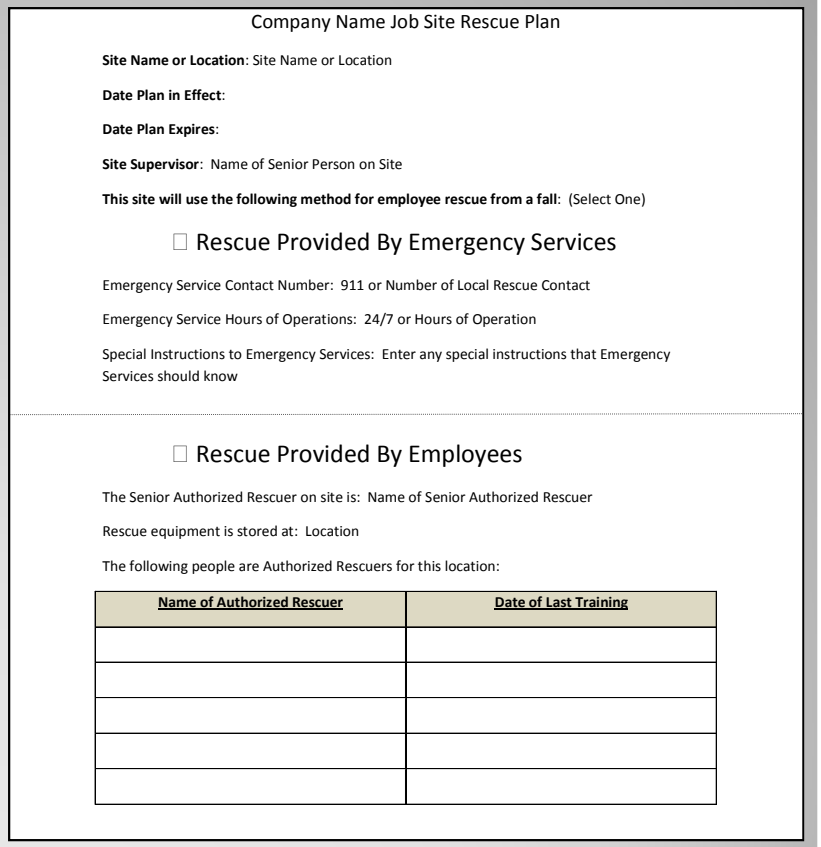
Inspection Tips – Labels

- Labeling on fall protection equipment must be legible.
- If it not legible, it must be removed from service, regardless of the condition of the equipment.

Labels on all equipment must be legible.

Rescue Plan

- "The employer shall provide for prompt rescue of employees in the event of a fall or shall assure that employees are able to rescue themselves."
- Every job site must have a rescue plan.
- If the employer relies on emergency services, they must ensure that:
  - They can arrive quickly.
  - They are trained and have the equipment to perform rescue.



Company Name Job Site Rescue Plan

Site Name or Location: Site Name or Location

Date Plan in Effect:

Date Plan Expires:

Site Supervisor: Name of Senior Person on Site

This site will use the following method for employee rescue from a fall: (Select One)

☐ Rescue Provided By Emergency Services

Emergency Service Contact Number: 911 or Number of Local Rescue Contact

Emergency Service Hours of Operations: 24/7 or Hours of Operation

Special Instructions to Emergency Services: Enter any special instructions that Emergency Services should know

☐ Rescue Provided By Employees

The Senior Authorized Rescuer on site is: Name of Senior Authorized Rescuer

Rescue equipment is stored at: Location

The following people are Authorized Rescuers for this location:

Name of Authorized Rescuer	Date of Last Training

It is important that every job site has a rescue plan specific to that location.

Emergency Services Rescue

- In order to rely on emergency services for rescue, you should ensure they:

1. Can reach the location of the worker in a timely manner. (15 minutes or less)
2. Must be on duty the entire time work is being performed.
3. Must have the equipment and training required to reach the worker.
4. Have backup capacity to respond in the event another emergency is occurring.
5. Are informed of the hazards of suspension trauma.

Always check with emergency services before deciding to rely on them for rescue.

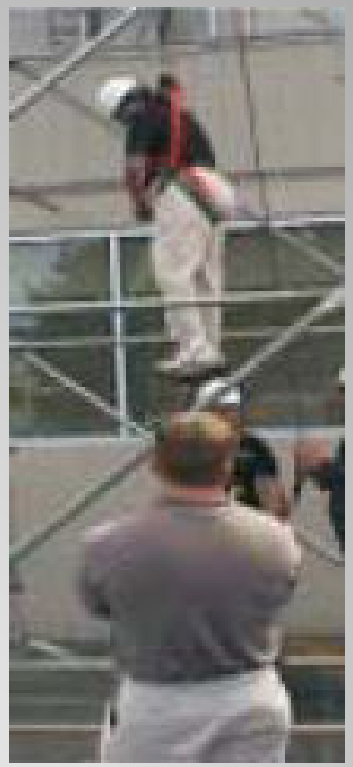
Employee Trained Rescue

- If the company relies on employees to perform rescue, they should:
  - Designate an experienced Competent Rescuer who is an individual designated by the employer who, by training, knowledge and experience is capable of the implementation, supervision and monitoring of the employer's fall protection rescue program.
  - Designate Authorized Rescuers who have been trained by a Competent Rescuer on rescue equipment and procedures.

Authorized Rescuers should be listed on the job site Rescue Plan.

Suspension Trauma

- Suspension trauma is caused when blood collects in the legs as a result of prolonged suspension.
- Suspension trauma can cause unconsciousness and even death.
- Symptoms include:
  - Faintness
  - Nausea
  - Dizziness
  - Graying or loss of vision
  - Unconsciousness



Suspension Trauma is a serious hazard.

Ways to Prevent Suspension Trauma

- Frequently pump and move the legs to prevent blood pooling.
- Try to push off nearby objects to reduce weight in the harness.
- Use harnesses with suspension straps that allow standing in the harness.
- The Reflow Syndrome can be fatal when collected blood in the legs suddenly rushes back into the body.
  - To minimize this, do not allow a person suspected of suspension trauma to lie horizontal. Place them in a seated position on the ground, with legs in front of them.

Employee Fall Response

1. Activate your company rescue plan.
2. Evaluate employee for injuries and, if necessary, call 911.
3. Report the incident using your companies incident report process.
4. Investigate the cause of the fall and adjust your fall protection system to prevent a future occurrence.

Summary

- Fall Protection is required when:
    1. Workers are six feet or greater above a lower level.
    2. There is a danger of falling into hazardous equipment.
    3. Other situations as called for by OSHA and the company fall protection plan.

- A Fall Arrest System consists of:
    1. Harness
    2. Connectors
    3. Anchorage
    4. Rescue Plan

- Employers must provide prompt rescue for employees or ensure that employees are able to rescue themselves.

- Fall Arrest equipment should be inspected before every use and routinely by a competent person other than the user.

Questions?