Fall Protection Fundamentals

WCF

Course Objectives

In this program, you will be able to :

- Identify when/where Fall Protection is required.
- Describe what to do when a hazard is recognized.
- Describe the proper fitting, use and care of fall protection equipment
- Specific applications from OSHA Standard

Fall Protection ???

"Its just another regulation" !!!!

Or is it ????

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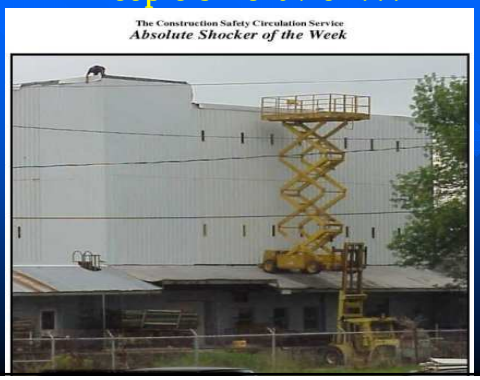
Why Fall protection ???

People's Behavior ???

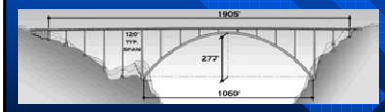


Hoover Dam Construction Facts - 1936

- 5 years to construct
- Height – 726 feet
- # of work related deaths = 104

Hoover Dam Bypass Bridge - 2004

- Began in 2004
- Longest concrete arch in North America
- # of work related deaths = 0



When Is Fall Protection Required?

When exposed to fall hazards:

– over four feet – OSHA General Industry
– over six feet – OSHA Construction
– any height over dangerous equipment

Fall Protection :

Did you know?

A fall from 6' = 20 miles per hour

- In 2000
  - 1154 construction workers died on the job
  - 32.4% or 373 resulting from falls
  - Falls repeatedly account for greatest number of fatalities
- Factors
  - Unstable working surface
  - Misuse of fall protection equipment
  - Human error- letting employees guess whether an anchor point is strong enough.
- Prevention
  - Guardrails
  - Covers, safety nets & permanent platforms
  - Personal Fall Arrest Systems

Fall Protection Is Required For:

- Unprotected sides and edges.
- Leading edge work.
- Ramps, runways, etc.
- Steep roofs.
- Holes.
- Within 6 feet of a roof edge.
- Extendable booms and bucket lifts
- Excavations
- Pits and shafts
- Hoist areas
- All walking/working surfaces not otherwise addressed
- Wall openings
- Over any ***dangerous*** Equipment

•This photo illustrates a framer installing floor sheathing.
•Alternative measures when followed from a plan may be substituted for conventional fall protection.

Main Categories of Fall Protection

- Guardrails
- Safety Nets
- Personal Fall Arrest Systems
  - Fall Restraint
  - Positioning devices
  - Suspension
  - Retrieval / rescue

Personal Fall Arrest

- Consists of :
  - Full body harness
  - Shock absorbing or retractable lanyard
  - Anchorage point & connector must support 5,000 lb. Impact force per person



Harness and Belts

- Body belts are *not permissible* for use in fall arrest systems

Harness

- Distributes the impact through the body - lessens impact on any individual part
- Allows for better circulation
- Keeps the body suspended upright
- Maximum rating 310 lbs (including tools)

D-rings and snaphooks

- 5000 lb. Tensile strength
  - Snap hooks must have double locking to prevent rollout

Snap Hooks

Never !!

- Attach two together
- Attach a snap hook directly to a lifeline
- Attach two or more snap hooks to one d-ring
- Attach a snap hook to a webbing loop or lanyard
- Attach a snap hook to an improperly sized d-ring, eyebolt or other attachment point

Lanyards

- *Two styles:*
  - Shock absorbing for fall arrest
  - Straight lanyard for fall restraint
- Inspect before each use
- Connect the harness to deceleration device or anchorage point.
- Rope, high-tensile strength webbing, or steel cable.
- Maximum free fall = 6 feet for fall arrest.

Video Demonstration

Deceleration Device

- Shock absorbing lanyard
  - Absorb and dissipate the arresting force
  - Must not exceed stopping distance of 3.5 feet
  - Absorbs up to 80% of the arresting force placed upon the body

Lifelines

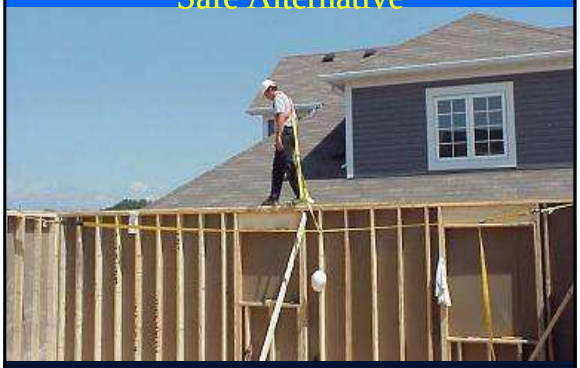
- Designed by a qualified person.
- Free fall maximum = 6 feet.
- Harness arrest force maximum 1,800 lb.
- No contact of lower level.
- Inspect prior to use.

Rope lifelines are most commonly used as vertical lifelines, but may also be used as horizontal lifelines. Vertical lifelines are generally used in conjunction with a Rope Grab, giving the employee freedom of movement up or down, while providing a passive fall arrest system.

Tie-off

- Preferred at or above the D-Ring on back of harness
  - reduces free fall distance
- No knots:
  - knots reduce strength of line by more than 80%
- Tie-offs around beams reduce strength by > 70%
  - use specially made beam straps
- Avoid:
  - rough/sharp edges, heat, chemicals or other destructive forces

Safe Alternative



Fall Protection - Residential Construction

In residential construction, you must be protected if you can fall more than 6 feet

Anchorage Point

- Needs to be determined by a competent person
- Installed and certified under specifications of a qualified person
- Support 5,000 lb per person attached

Example Anchor Points

Example Anchor point

Personal Positioning Device or System

1. Harness
2. Connecting Device
3. Anchorage Point
4. Allows wearer to hold themselves in place with hands free to perform a task

** System used in conjunction w/fall arrest*

Retrieval

Used mostly for confined spaces

Requires:

- Full body harness
- Connecting device
- Anchor point *i.E.* Tripod or other hoisting device
- Lifeline

Fall Protection for Scissors lifts

- Fall arrest is ***not*** required while operating from a scissors lift, unless leaving the confines of the installed railings.

Fall Protection in Boom Lifts/ Buckets

- Full body harness with lanyard
- Lanyard must be tied to the designated attachment point ***(not the guardrails !!)***
- Designed to keep you from being thrown from the basket.
- ***Anchoring to an adjacent pole, structure or equipment while working from an aerial lift is prohibited.***
- Lifts are designed with dual controls at the bottom to retrieve the operator in case of emergency or injury to the operator.

Fall Protection Includes guarding floor openings

Cleaning of Equipment

- **Basic care of equipment will prolong the usable life and contribute towards the performance of its vital function.**
- **Proper storage and maintenance is important. Also keeping the equipment free from dirt, corrosives, and other contaminants is critical.**
- **Storage areas should be dry and free from exposure to fumes or corrosive elements.**

Cleaning of Nylon & Polyester

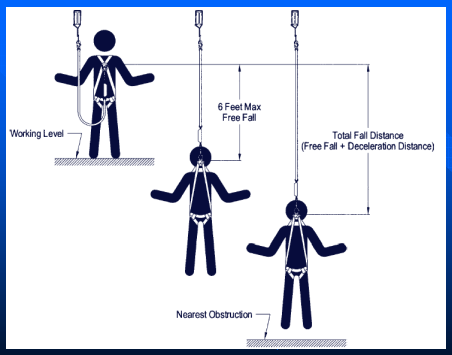
- **Wipe off all surface dirt with a sponge dampened in plain water.**
- **Squeeze the sponge dry and dip into a mild solution of soap and water.**
- **Work up a thick lather with a vigorous back and forth motion.**
- **Wipe with a clean cloth.**
- **Hang dry. Do not use excessive heat.**

Drying of Safety Equipment

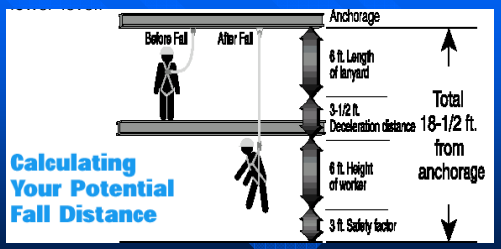
- **Equipment should dry thoroughly without close exposure to heat, steam or long periods of sunlight. Never store your equipment in direct sunlight as it will degrade the fibers and materials which may cause failure of the safety equipment over** time.

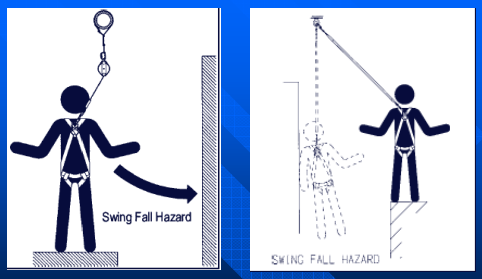
Fall Protection Harness

- How to properly fit and wear a fall protection harness.
- Steps that could *"SAVE YOUR LIFE"*

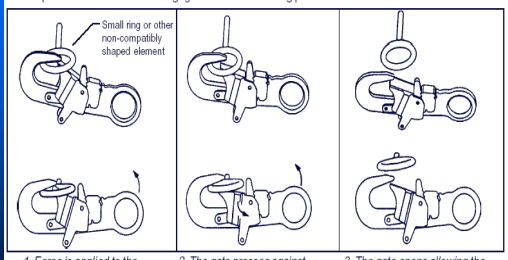


Calculating Total Fall Clearance Distance

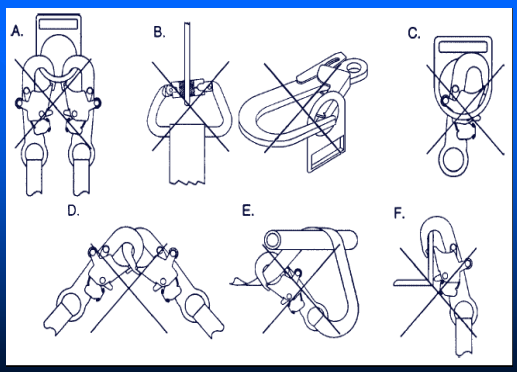




If the connecting element that a snap hook (shown) or carabiner attaches to is undersized or irregular in shape, a situation could occur where the connecting element applies a force to the gate of the snap hook or carabiner. This force may cause the gate (of either a self-locking or a non-locking snap hook) to open, allowing the snap hook or carabiner to disengage from the connecting point.



1. Force is applied to the snap hook.
2. The gate presses against the connecting ring.
3. The gate opens allowing the snap hook to slip off.



29 CFR 1926 Subpart M

- Duty to have fall protection – 1926.501
  - 1926.501(a)(1): Determine structural integrity of the walking/working surface

4. Fall Protection Plan

- Can only be used in:
  - Leading edge work
  - Precast concrete erection
  - Residential construction
- Must identify areas where conventional fall protection is not feasible.
  - CAZ
  - Safety Monitor

Fall Protection Plan
For Residential Construction

Occupational Safety and Health Bureau

Montana Department of Labor & Industry

Prepared for Montana Employers
by the

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SAMPLE

FALL PROTECTION PLAN
FOR RESIDENTIAL CONSTRUCTION ACTIVITY
(Modify, as necessary, to conform to site requirements)

_____
(Company Name)

This Fall Protection Plan is Specific for the Following Project:

Location of Job: _____

Date Plan Prepared or Modified: _____

Plan Prepared By: _____

Plan Approved By: _____

Plan Supervisor By: _____

The following Fall Protection Plan is prepared for the prevention of injuries associated with falls. Fall Protection Plans must be developed and evaluated on a site by site basis. (It is recommended that builders discuss the written Fall Protection Plan with their OSHA Area Office prior to going on a jobsite)

I. Statement of Company Policy

_____ is dedicated to the protection of its employees from on-the-job injuries. All employees of _____ have the responsibility to work safely on the job. The purpose of the plan is to supplement our existing safety and health program and to ensure that every employee who works for _____ recognizes workplace fall hazards and takes the appropriate measures to address these hazards.

This Fall Protection Plan addresses the use of conventional fall protection at a number of areas on the project, as well as identifies specific activities that require non-conventional means of fall protection. During the construction of residential buildings under 40 feet in height, it is sometimes infeasible or it creates a greater hazard to use conventional fall protection systems at specific areas or for specific tasks. The areas or tasks may include, but are not limited to:

a. Setting and bracing of roof trusses and rafters,

b. Installation of floor sheathing and joists,

c. Roof sheathing operations, and

d. Erecting exterior walls

In these cases, conventional fall protection systems may not be the safest choice for builders. This plan is designed to enable the company and it's employees to recognize the fall hazards associated with this job and to establish the safety 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 will 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 competent person of their concern and have the concern addressed before proceeding.

It is the responsibility of _____ as the competent person, to implement this Fall Protection Plan. Continual observational safety checks of work operations and the enforcement of the safety policy and procedures shall be regularly enforced. The crew supervisor or foreman, _____ is responsible for correcting any unsafe practices or conditions immediately.

It is the responsibility of the employer to ensure that all employees understand and adhere to the procedures of this plan and to follow the instructions of the crew supervisor.
It is also the responsibility of the employee to bring to management's attention any unsafe or hazardous conditions or practices that may cause injury to either themselves or any other employees. Any changes to the Fall Protection Plan must be approved by
_____, as a qualified person

II. Fall Protection Systems To Be Used On This Job

Installation of roof trusses/rafters, exterior wall erection, roof sheathing, floor sheathing and joist/truss activities will be conducted by employees who are specifically trained to do this type of work and are trained to recognize the fall hazards. The nature of such work normally exposes the employee to the fall hazard for a short period of time. This Plan details how _____ will minimize these hazards.

Controlled Access Zones

When using the Plan to implement the fall protection options available, workers must be protected through limited access to high hazard locations. Before any non-conventional fall protection systems are used as part of the work plan, a controlled access zone (CAZ) shall be clearly defined by the competent person as an area where a recognized hazard exists. The demarcation of the CAZ shall be communicated by the competent person in a recognized manner, either through signs, wires, tapes, ropes or chains.
_____ shall take the following steps to ensure that the CAZ is clearly marked or controlled by the competent person.

- All access to the CAZ must be restricted to authorized entrants.
- All workers who are permitted in the CAZ shall be listed in the appropriate sections of the Plan (or be visibly identifiable by the competent person) prior to implementation.
- The competent person shall ensure that all protective elements of the CAZ be implemented prior to the beginning of work.

Installation Procedures for Roof Truss and Rafter Erection

During the erection and bracing of roof trusses/rafters, conventional fall protection may present a greater hazard to workers. On this job, safety nets, guardrails and personal fall arrest systems will not provide adequate fall protection because the nets will cause the walls to collapse, while there are no suitable attachment or anchorage points for guardrails or personal fall arrest systems.

On this job, requiring workers to use a ladder for the entire installation process will cause a greater hazard because the worker must stand on the ladder with his back or side to the front of the ladder. While erecting the truss or rafter the worker will need both hands to maneuver the truss and therefore cannot hold onto the ladder. In addition, ladders cannot be adequately protected from movement while trusses are being maneuvered into place. Many workers may experience additional fatigue because of the increase in overhead work with heavy materials, which can also lead to a greater hazard.

Exterior scaffolds cannot be utilized on this job because the ground, after recent backfilling, cannot support the scaffolding. In most cases, the erection and dismantling of the scaffold would expose workers to a greater fall hazard than erection of the trusses/rafters.

On all walls eight feet or less, workers will install interior scaffolds along the interior wall below the location where the trusses/rafters will be erected. A sawhorse scaffolds constructed of 46 inch sawhorses and 2 x 10 planks will often allow workers to be elevated high enough to allow for the erection of trusses and rafters without working on the top plate of the wall.

In structures that have walls higher than eight feet and where the use of scaffolds and ladders would create a greater hazard, safe working procedures will be utilized when working on the top plate and will be monitored by the crew supervisor. During all stages of truss/rafter erection the stability of the trusses/rafters will be ensured at all times.

_____Company Name)_ shall take the following steps to protect workers who are exposed to fall hazards while working from the top plate installing tresses/rafters.

- Only the following trained workers will be allowed to work on the top plate during roof truss or rafter installation:

_____
_____
_____
_____
_____

- Workers shall have no other duties to perform during truss/rafter erection procedures;
- All trusses/rafters will be adequately braced before any worker can use the truss/rafter as a support;
- Workers will remain on the top plate using the previously stabilized truss/rafter as a support while other trusses/rafters are being erected;
- Workers will leave the area of the secured trusses only when it is necessary to secure another truss/rafter;
- The first two trusses/rafters will be set form ladders leaning on side walls at points where the walls can support the weight of the ladder; and
- A worker will climb onto the interior top plate via a ladder to secure the peaks of the first two trusses/rafters being set.

The workers responsible for detaching trusses from cranes and/or securing trusses at the peaks traditionally are positioned at the peak of the trusses/rafters. There are also situations where workers securing rafters to ridge beams will be positioned on top of the ridge beam.

_____Company Name_____ shall take the following steps to protect workers who are exposed to fall hazards while securing trusses/rafters at the peak of the trusses/ridge beam:

- Only the following trained workers will be allowed to work at the peak during roof truss or rafter installation:

_____
_____
_____
_____

- Once truss or rafter installation begins, workers not involved in that activity shall not stand or walk below or adjacent to the roof opening or exterior walls in any area where they could be struck by falling objects;
- Workers shall have no other duties than securing/bracing the trusses/ridge beam;
- Workers positioned at the peaks or in the webs of trusses or on top of the ridge beam shall work from a stable position; either by sitting on a 4edge seat or other equivalent surface that provides additional stability or by positioning themselves in previously stabilized trusses/rafters and leaning into and reaching through the trusses/rafters;
- Workers shall not remain on or in the peak/ridge any longer than necessary to safely complete the task.

Roof Sheathing Operations

Workers typically install roof sheathing after all trusses/rafters and any permanent truss bracing is in place. Roof structures are unstable until some sheathing is installed, so workers installing roof sheathing cannot be protected from fall hazards by conventional fall protection systems until it is determined that the roofing system can be used as an anchorage point. At that point, employees shall be protected by a personal fall arrest system.

Trusses/rafters are subject to collapse if a worker falls while attached to a single truss with a harness. Nets could also cause collapse, and there is no place to attach guardrails.

All workers will ensure that they have secure footing before they attempt to walk on the sheathing, including cleaning shoes/boots of mud or other slip hazards.

To minimize the time workers must be exposed to a fall hazard; materials will be staged to allow for the quickest installation of sheathing.

_____Company Name_____ shall take the following steps to protect workers who are exposed to fall hazards while installing roof sheathing:

- Once roof sheathing installation begins, workers not involved in that activity shall not stand or walk below or adjacent to the roof opening or exterior walls in any area where they could be struck by falling objects;
- The competent person shall determine the limits of this area, which shall be clearly communicated to workers prior to placement of the first piece of roof sheathing.
- The competent person may order work on the roof to be suspended for brief periods as

necessary to allow other workers to pass through such areas when this would not create a greater hazard.

- Only qualified workers shall install roof sheathing;
- The bottom row of roof sheathing may be installed by workers standing in truss webs;
- After the bottom row of roof sheathing is installed, a slide guard extending the width of the roof shall be securely attached to the roof. Slide guards are to be constructed of no less than nominal 4-inch height capable of limiting the uncontrolled slide of workers. Workers should install the slide guard while standing in truss webs and leaning over the sheathing.
- Additional rows of roof sheathing may be installed by workers positioned on previously installed rows of sheathing. A slide guard can be used to assist workers in retaining their footing during successive sheathing operations; and
- When strong winds (above 40 miles per hour) are present, roof sheathing operations are to be suspended unless windbreakers are erected.

Installation of Floor Joists and Sheathing

During the installation of floor sheathing/joists (leading edge construction), the following steps shall be taken to protect workers;

- Only the following trained workers will be allowed to install floor joists or sheathing;

_____
_____
_____
_____

- Materials for the operations shall be conveniently staged to allow for each access to workers;
- The first floor joists or trusses will be rolled into position and secured either from the ground, ladders or sawhorse scaffolds;
- Each successive floor joist or truss will be rolled into place and secured from a platform created from a sheet of plywood laid over the previously secured floor joists of trusses;
- Except for the first row of sheathing which will be installed from ladders or the ground,

workers shall work from the established deck; and

- Any workers not assisting in the leading edge construction while leading edges still exist (e.g., cutting the decking for the installers) shall not be permitted within six feet of the leading edge under construction.

Erection of Exterior Walls

During the construction and erection of exterior walls, employers shall take the following steps to protect workers:

- Only the following trained workers will be allowed to erect exterior walls;

_____
_____
_____
_____

- A painted line six feet from the perimeter will be clearly marked prior to any wall erection activities to warn of the approaching unprotected edge;
- Materials for operations shall be conveniently staged to minimize fall hazards; and
- Workers constructing exterior walls shall complete as much cutting of materials and other preparation as possible away from the edge of the deck.

III. Enforcement

Constant awareness of and respect for fall hazards, and compliance with all safety rules are considered conditions of employment. The crew supervisor or foreman, as well as individuals in the Safety and Personnel Department, reserve the right to issue disciplinary warnings to employees, up to and including termination, for failure to follow the guidelines of this program.

IV. Accident Investigations:

All accidents that result in injury to workers, regardless of their nature, shall be investigated and reported. It is an integral part of any safety program that documentation take place as soon as possible so that the cause and means of prevention can be identified to prevent a reoccurrence.

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In the event that an employee falls or there is some other related, serious incident occurring, this plan shall be reviewed to determine if additional practices, procedures, or training need to be implemented to prevent similar types of falls or incidents from occurring.

V. Changes to Plan

Any changes to the plan will be approved by ____Name of Qualified Person___. This plan shall be reviewed by a qualified person as the job progresses to determine if additional practices, procedures or training needs to be implemented by the competent person to improve or provide additional fall protection. Workers shall be notified and trained, if necessary, in the new procedures. A copy of this plan and all approved changes shall be maintained at the jobsite.

NOTE!!

This sample plan outlines the elements that must be addressed in any fall protection plan. The reasons outlined in this sample fall protection plan are for illustrative purposes only and are not necessarily a valid, acceptable rationale (unless the conditions at the job site are the same as those covered by this sample plan) for not using conventional fall protection systems for a particular precast concrete or residential construction worksite. However, the sample plan provides guidance to employers on the type of information that is required to be discussed in a fall protection plan.

This Fall Protection Plan option is available only to employees engaged in residential construction work or leading edge work (See 1926.501(b)(2) and (b)(13)) **who can demonstrate that it is feasible or it creates a greater hazard to use conventional fall protection equipment.**

The Fall Protection Plan must conform to the following provisions.

(1) The fall protection plan shall be prepared by a qualified person and developed specifically for the site where the leading edge work, precast concrete work, or residential construction work is being performed and plan must be maintained up to date.

(2) Any changes to the fall protection plan shall be approved by a qualified person.

(3) A copy of the fall protection plan with all approved changes shall be maintained at the job site.

(4) The implementation of the fall protection plan shall be under the supervision of a competent person.

(5) The fall protection plan shall document the reasons why the use of conventional fall protection systems (guardrail systems, personal fall arrest systems, or safety nets systems) are

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infeasible or why their use would create a greater hazard.

(6) The fall protection plan shall include a written discussion of other measures that will be taken to reduce or eliminate the fall hazard for workers who cannot be provided with protection from the conventional fall protection systems. For example, the employer shall discuss the extent to which scaffolds, ladders, or vehicle mounted work platforms can be used to provide a safer working surface and thereby reduce the hazard of falling.

(7) The fall protection plan shall identify each location where conventional fall protection methods cannot be used. These locations shall then be classified as controlled access zones and the employer must comply with the criteria in paragraph (g) of this section.

(8) Where no other alternative measure has been implemented, the employer shall implement a safety monitoring system in conformance with ' 1926.502(h).

(9) The fall protection plan must include a statement which provides the name or other method of identification for each employee who is designated to work in controlled access zones. No other employees may enter controlled access zones.

(10) In the event an employee falls, or some other related, serious incident occurs, (e.g., a near miss) the employer shall investigate the circumstances of the fall or other incident to determine if the fall protection plan needs to be changed (e.g., new practices, procedures, or training) and shall implement those changes to prevent similar types of falls or incidents.

- Additional slide guards shall be securely attached to the roof at intervals not to exceed 13 feet as successive rows of sheathing are installed. For roofs with pitches in excess of 9-in-12, slide guards will be installed at four-foot intervals.
- When wet weather (rain, snow, or sleet) are present, roof sheathing operations shall be suspended unless safe footing can be assured for those workers installing sheathing.

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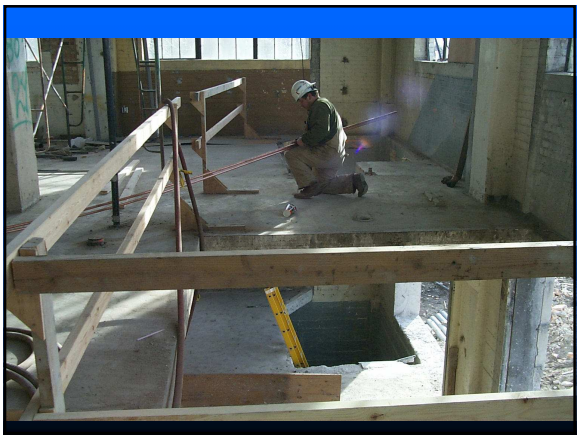
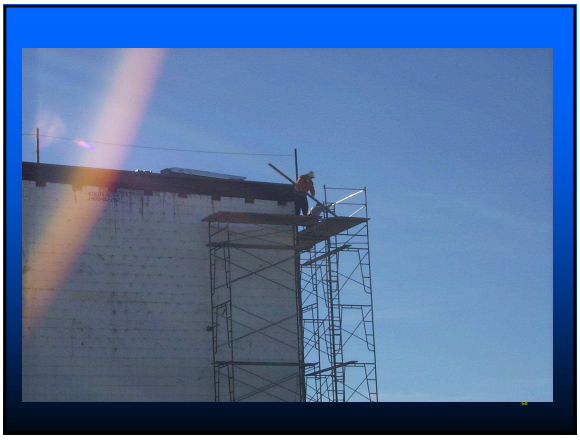
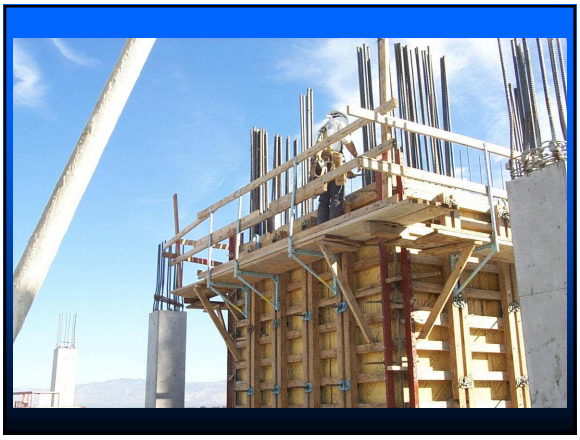
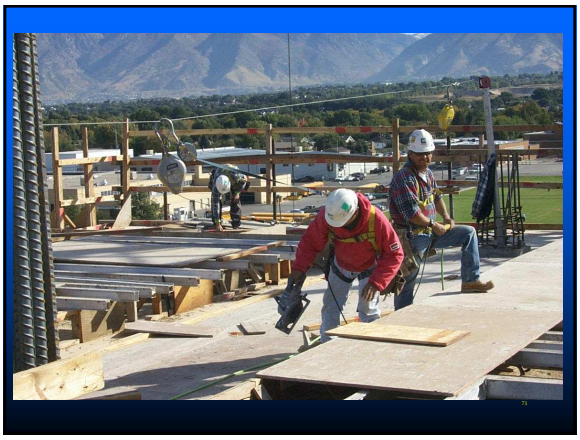
Training – 1926.503

- Training program
- Trained by competent person
  - Nature of fall hazards
  - Erection and use of all fall protection controls.
  - Their part in the Fall Protection Plan
  - Fall protection standards
- Re-training
- Certification

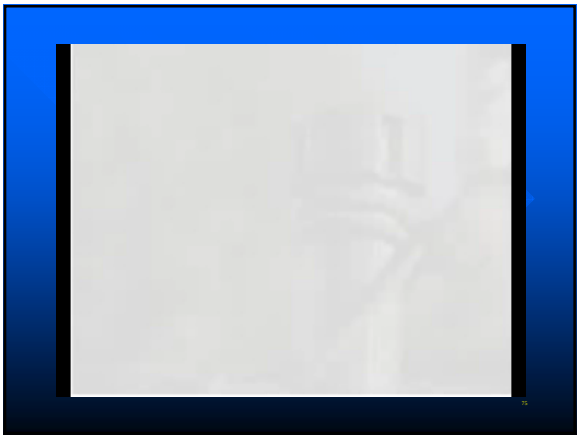









bobcat




A fall is a high price to pay !!
Don't Fall Short of a Safe Day !!