FALL PREVENTION & PROTECTION

Prepared by the University Environmental Health and Safety Office
Learning Goals: Fall Prevention

- Recognize potential fall hazards
- Identify strategies for fall prevention
- Understand the requirements for the safe use of:
  - Ladders
  - Mechanical lifts
  - Roof work
  - Fall Arrest Systems
Why a Policy for Fall Prevention?

- Preliminary 2011 Bureau of Labor Statistics Fatality Data:
  - Fatal Falls, Slips, Trips = 666
  - 14% of Total 2011 Workplace Fatalities
  - Falls to Lower Levels = 514
  - Falls on the Same Level = 108
  - Roughly 25% of Reported Cases Were From 10 Feet or Less
Chart 1. Fatal occupational injuries by major event, 2011*

- Transportation incidents 41%
- Roadway incidents 23%
- Violence and other injuries by persons or animals 17%
- Homicides 10%
- Contact with objects and equipment 15%
- Falls, slips, and trips 14%
- Falls to lower level 12%
- Exposure to harmful substances and environments 9%
- Fires and explosions 3%

Total = 4,609

*Data for 2011 are preliminary.
NOTE: Event data for 2011 are not comparable to prior years due to the implementation of the revised Occupational Injury and Illness Classification System (OICS) 2.01. See http://www.bls.gov/osh/notice11.htm. Percentages may not add to 100 due to rounding.
Fatal falls, by type of fall, 2009*

- From roof: 18%
- From ladder: 20%
- From scaffold, staging: 9%
- From nonmoving vehicle: 12%
- On same level: 13%
- From floor, dock, or ground level: 5%
- From building girders or structural steel: 3%
- Downstairs or steps: 3%
- Other or unknown: 17%

Total falls = 617

Of the 617 fatal falls in 2009, over one-third involved falls from roofs or ladders.

*Data for 2009 are preliminary.
NOTE: Percentages may not add to totals because of rounding.
Where do we need Fall Protection?

- When employees are exposed to a fall of 4 ft. or more.

- 29 CFR 1926 section 501 tells us
  1926.501(a)(2) Walking working surfaces
  1926.501(b)(1) Unprotected sides and edges which are 6 ft or more above a lower level
Where else?

- Excavations > 6 ft
- Roofing work > 6 ft.
The University of Southern Maine
Fall Protection Program
Objective

- Eliminate and prevent exposure to falls.
- Bring worker to a safe stop in the event of a fall.
Scope

- This policy applies to management, supervisors, and employees working at elevations of four feet or higher
  
  - Above a lower level
  - Leading edge
  - Floor or Wall opening
USM TARGET GROUPS

- Grounds
- Telecommunications
- Electricians
- Painters
- Athletics
- Mechanical Trades
Responsibilities: EH&S

- Develop, maintain, and review the USM Fall Protection Program.
- Provide guidance, training, and technical assistance to USM departments.
- Conduct periodic audits of departments where employees are exposed to fall hazards.
Responsibilities: Supervisors

- Identify areas where fall hazards may exist.
- Ensure employees receive training.
- Ensure required fall protection equipment is provided and maintained.
- Ensure employees are conducting equipment regular inspections.
- Remove equipment that is in poor condition.
Responsibilities: Employees

- Become familiar and comply with the USM Fall Protection Program.
- Attend required training.
- Inform your supervisor if not provided with the appropriate training and/or equipment.
- Maintain fall protection equipment.
- Conduct visual inspection of equipment before use and report any problems.
- Properly document equipment inspections.
Control Factors

- Maintain uncluttered walking/working surfaces.
- Erecting guardrails and walls.
- Using approved scaffolds and lifts.
- Encourage equipment maintenance & inspection.
Fall Prevention Procedures

- Ladders
- Mechanical Lifts
- Staging
- Roof Tops
- Personal Fall Arrest Systems
- Watertower
- Power Lines
Ladders (Portable, Step)

- Inspect for broken components
- Read instruction labels on the ladder
  - No ladder is to be used if the labels are missing
- Open stepladders fully and secure locking devices
- Position on a stable base
Portable Ladder Use

- Portable ladder side rails shall extend at least 3 feet above the landing surface.
- Free of oil grease and slipping hazards.
- (b)(3) not loaded beyond the manufacturer`s rated capacity.
- (b)(4) used only for the purpose for which they were designed.
Portable Ladder Use

- The area around the top and bottom of the ladder shall be kept clear.
- The top or top step of a step ladder shall not be used as a step.
- Rear section of stepladders shall not be used for climbing.
Ladders (Extension)

- Extend ladder 3 feet past the surface being accessed.
  - Do not over extend in height

- Secure both ends when possible.
  - Or use a designated spotter
  - A climb > 20 feet requires a team of 2

- Use the 1 to 4 principle (arms length).
Ladders (Extension)

- Inspect the ladder.
- Read the labels.
- Engage the locking devices.
- Climbs over 20 feet require two people.
Ladders (Extension)

- Never over reach while working.
- Maintain three point contact.
- Hands empty when ascending/descending.
- Use a rope and or mechanical device to lift materials up to or down from work area.
- When working in or around energized power lines follow proper procedures.
Mechanical Lifts

- Manufacturers instructions are to be followed when using this equipment.

- Training and corresponding documentation are mandatory before an employee can operate a powered lift.

- Operate only on a level surface.
Mechanical Lifts

- Lock/chock wheels where possible.

- When working around electrical lines follow proper procedures.

- A team of two workers is required when moving the lift between buildings.
Aerial Lifts

Specific Requirements

• Extensible and articulating boom platforms
  • Lift controls shall be tested each day
  • Only authorized persons shall operate a lift
  • Belting off to an adjacent pole, structure or equipment shall not be permitted
**Staging**

- Level position. Wheels locked.
- All cross bracing in place with pins, clips etc. in locked position.
- Planking minimum 2 X 8 staging grade or aluminum decking planks.
- Railings; 200lbs, 2 x 4 guardrails, 42” top with mid-rail and 4 “ toe board.
Staging

- Do not over load the platform.
- When working around power lines follow the Power line Procedure.
- Suspension Scaffolds are not to be used by USM employees!
Roof Tops

- Only workers who have been trained shall be allowed onto a roof.
- Inspect roof surface for hazards prior to starting work.
- Identify fall hazards including holes and skylights.
- Appropriate foot wear should be worn.
Roof Tops

- Flat Roofs (<= 4 in 12 slope)
  - Minimum of 2 workers
  - Warning lines minimum of 6 ft from the edge
  - Inspect roof surface
  - Be aware of openings
  - Wear appropriate footwear
  - Use a safety monitor with the warning line/guard rail system
Roof Tops

- **Steep Roofs**, having a slope greater than 4 in 12 (vertical to horizontal)
  - Must be tied off securely before work begins
  - Do not tie off to:
    - Roof hatch openings
    - Vent pipes, stacks, or chimneys
    - Benches or planters
    - Any item not securely fastened to the structure

  ➢ Check with FM Engineering

1/14/2013
Personal Fall Arrest System

- Safe use of the system.
- Application limits.
- Proper anchoring and tie off points.
- Estimation of free fall distance.
- Inspection.
- Storage.
Retraining

- When dangers in the workplace change.
- Changes in fall protection systems.
- When the employer has reason to believe that an employee who has already been trained does not have the understanding and skill required by the training requirements to perform their work safely.
Always calculate the fall clearance prior to working.

Calculating the Total Fall Clearance:

- (+) 6 ft, length of lanyard
- (+) 3.5 ft deceleration distance
- (+) 6 ft height of worker
- (+) 3 ft safety factor
- 18.5 ft from the anchor point
Minimize the fall force

3 Ways to minimize the arresting force:

- (a) Minimize the fall distance
- (b) Minimize the working weight
- (c) Maximize the Stopping Distance
Minimize the Free Fall Distance

As the free fall distance increases, the arresting force increases:

- Use a shorter lanyard
- Anchor higher up
- Use a retractable (SRL)
Minimize the Working Weight

- As the working weight increases, the arresting forces also increase:
  - Carry less tools
  - Rope and bucket or mechanical aid
Maximize the Stopping Distance

- As the stopping distance (deceleration distance) increases, the arresting force will decrease:
  - Use a shock absorbing lanyard
  - Use a self retracting lifeline (min)
Don’t do Stupid Stuff!

- Have you planned your work?
- Do you have a rescue plan?
What to Wear

- Personal Fall Arrest System
- The “ABC`s”

- Anchor
- Body wear
- Connecting device
A = Anchor Point

- Capable of supporting at least 5000 lbs per employee attached. Why 5000 lbs?
- 2x the intended load or maximum arresting force as determined by a qualified person.
Anchor Point

- Shall be independent of any anchorage being used to support or suspend platforms.
- Shape must be compatible with connectors.
- Located directly above the worker; swing.
- Accessible; to facilitate rescue.
B = Body Harness

- All components must have a minimum tensile strength of 5000lbs.

- Maximum working weight of 310 lbs, combined person and tool, unless otherwise specified on the label.

- Distributes the arrest forces to the major muscle groups. Limit 1800 lbs.

- Hold the employee during and after the fall. (15 minutes, orthostatic intolerance)
C = Connecting Devices

- Lanyards
- Retractables
- “D” rings and Snap hooks
Connecting Devices

- **Lanyards**
  - Web, rope, wire
    - Note; ropes and straps (webbing) used in lanyards, lifelines, and strength components of body belts and body harnesses shall be made from synthetic fibers.
    - Minimum breaking strength of 5000 lbs
  - Limit max arrest force to 900 lbs
  - Limit max free fall distance to 6 ft
  - Limit max deceleration distance to 3.5 ft
Snaphooks

Unless the snaphook is a locking type and designed for the following connections, snaphooks shall not be engaged:

- Directly to webbing rope or wire;
- To each other;
- To a D ring to which another snap hook is attached; or
- To a horizontal lifeline.
Connecting Devices

- Retractables: SRL`s
  - Web and Cable
  - Lengths from 9 to 95 feet
  - Max free fall of 2 ft shall be able to sustain a minimum tensile load of 3000lbs
  - Max free fall > 2 ft but less than 3.5 ft (rip stitch, tearing) shall be able to sustain a minimum tensile load of 5000lbs
How does it look?

- Inspecting your Personal Fall Arrest Equipment.
Personal fall arrest equipment must be inspected prior to each use

- Hardware
- Webbing material
- Stitching
- Labels
- Operation/Function
Inspecting your equipment

- **Hardware**
  - Distortions, dimples, cracks, corrosion or pitted surfaces.

- **Web Material**
  - Impact label
  - Frayed material, loose stitching
  - Cuts, snags, breaks
  - Swelling, discoloration, cracks, charring (signs of chemical or heat damage).
  - Do not write on the webbing, straps, or other material.
Inspecting your equipment

- **Shock absorber/soft stop**
  - Examine outer pack/covering for:
    - burns,
    - tears,
    - discoloration,
    - frayed stitching,
    - deterioration.
Inspecting your equipment

- Labels
  - Present
  - Legible
    - Instructions
    - Model number
    - Date of Manufacture
Inspecting your equipment

**Operation/function**

- All components shall be size to be compatible with the member to which they are connected. Components must engage freely and interlock securely. Triple check the double locking snap hooks.

- Buckle tongue and grommets must fit securely.

- Interlocking rectangular buckles must be free of distortion and lock securely.

- Thimbles must be firmly seated in the eye on all lanyards.

- Splices
  - No loose or cut strands
  - No sharp edges, distortions or cracks
Rescue Procedures

- Dial 911 or 780-5211.
- Attempt communication with the victim.
- Try to assess victims condition.
- Do not move victim.
- Direct first responders.
- Contact the employees supervisor.
Thank you