Fall Protection

Potential Hazard Review

Physical Hazards

- Slips/fall: Bruise, contusion, sprain, strain, fracture from fall and impact
- Striking against: Laceration, puncture, abrasion
- Caught in/on/between; pinch points: Crush, amputation
- Electrical: Shock, burn, cardiac arrest, death

Related Safe Work Practices

- Aerial Lifts
- Ladders
- Scaffolds
- Tree Work
- Walking and Working Surfaces

Personal Protective Equipment

- Fall Protection Devices

Authority

- CCR Title 8 Sections 1632, 1670, 1671, 1724, 3209, 3210, 3212

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This safe work practice addresses fall hazards and is organized into the following areas:

A. Definitions
B. General
C. Specific Situations
   - Roofs
   - Temporary Roof and Floor Holes, Wall Openings, Stairways and other Unprotected Edges (other than roofs)
   - Steep Slopes

This SWP is dedicated to helping you avoid an injury or illness from known hazards. You are advised to follow these recommendations, read and follow this SWP and any related SWPs, complete any required or recommended training, and to obtain advice from a Qualified Person if you have any questions.

All tasks require that you:

- Use the equipment in accordance with the guidelines set forth by the manufacturer. This includes following all signs and labels, and reviewing any manufacturer's operating manuals.
  - If the instructions provided in the operating manual conflict with this SWP, then follow the instructions in the manual. The manufacturer's instructions prevail over this SWP.
- Review the safety data sheets (SDSs) for each chemical.
- Be trained on this SWP and those listed above as related. Training on SWPs must be completed before initial assignment. It is also recommended that you complete refresher training every two years.

A. Definitions

1. The following definitions are essential to understanding this Safe Work Practice:
   a. Authorized Person. A person assigned to perform duties at a location where the person will be exposed to a fall hazard.
   b. Authorized Rescuer: A person assigned to perform or assist in workplace rescues, who through experience and training have a working knowledge of and experience in the section, use, storage and care of all equipment necessary to perform a rescue.
   c. Competent Person. One who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees and who has authorization to take prompt corrective measures to eliminate those hazards.
      i. A Competent Person must have an additional 16 hours (2 days) of training.
   b. Competent Rescuer: A person who can anticipate the foreseeable potential for planned rescue and develop rescue procedures and methods accordingly before authorized persons start their workplace activities at heights. A competent rescuer shall have a working knowledge through experience and training of current fall protection and planned rescue regulations, standards, equipment and systems.
   d. Qualified Person. A person designated by the employer who by reason of training, experience or instruction has demonstrated the ability to safely perform all assigned duties and, when required, is properly licensed in accordance with federal, state, or local laws and regulations.

i. The Qualified Person shall be responsible for supporting the fall protection program. Areas of expertise may include system design, horizontal lifeline design, structural analysis, calculation of impact forces and clearances, testing, anchorage certification, methods of control, equipment selection, and compliance with applicable regulations and standards.
ii. The Qualified Person shall be knowledgeable of applicable fall protection regulations, standards, equipment and systems, physical sciences, engineering principles, and mandatory requirements for fall protection equipment and systems used by their employer.
iii. The Qualified Person shall supervise the design, selection, installation, and inspection of certified anchorages and horizontal lifelines.
iv. The Qualified Person must have an additional 40 hours (5 days) of training.

B. General

2. All employees engaged in fall protection will be trained and have the knowledge to:
   a. Recognize the fall hazards at their job sites.
   b. Understand the hazards associated with working near fall hazards.
   c. Work safely in hazardous area by utilizing appropriate fall protection measures.
   d. Understand and follow all components of this fall protection SWP.
   e. Identify and understand regulations that pertain to fall protection.

3. A Competent Person at minimum shall supervise any employee working at 6 feet or higher.

4. A Fall Hazard Assessment shall be prepared for each fall hazard to which an Authorized Person may be exposed.
   a. It shall identify one or more methods to eliminate or control each identified fall hazard.
   b. The limitations on use of the system when designing, selecting, and certifying a fall arrest anchorage shall be included, as determined by a Qualified Person.
   c. It shall be conducted by a Competent Person or a Qualified Person who is familiar with, and has access to, information about local work processes, environment, policy and best industry practices, and who collects input from the actual work team familiar with their workplace activities.

5. Use the hierarchy of fall protection as the preferred order of control to eliminate or reduce fall hazards (in order of most to least preferred):
   a. Eliminate the hazard. This is the preferred solution. Change in the procedure, practice, location or equipment may eliminate the hazard. This include designs which eliminate fall hazards.
   b. Passive fall protection. This prevents a fall in the first place, and is usually accomplished via guardrails.

c. Fall restraint. These are systems that prevent a fall and use PPE to restrict the worker's range of movement so they cannot physically travel to the fall hazard.
d. Fall arrest. These systems allow a fall to occur, but the fall is arrested within acceptable force and clearance distances.

6. Employees shall be required to use Cal-OSHA approved fall arrest systems as follows:
   a. When work is performed from the perimeter of a structure or through shaftways and openings exceeding 6 feet above the ground, water surface or floor level below;
   b. When work is performed on sloped roof surfaces steeper than 7:12 or other sloped surfaces steeper than 40 degrees;
   c. When work is performed from thrustouts or similar locations, such as trusses, beams, purlins or plates of 4-inch nominal width (or greater) at elevations exceeding 15 feet above the ground, water surface or floor level below; and
   d. Where temporary guardrail protection is impracticable.

7. Fall protection equipment must be:
   a. ANSI compliant and meet ANSI performance requirements.
   b. Inspected at the beginning of each shift. It shall also be conducted twice per year by a Competent Person. It is recommended that the inspection be documented. It shall be inspected for:
      i. Absence or illegibility of markings.
      ii. Absence of any elements affecting the equipment form, fit or function.
      iii. Evidence of defects in or damage to hardware elements including cracks, sharp edges, deformation, corrosion, chemical attack, excessive heating, alteration and excessive wear.
      iv. Evidence of defects in or damage to straps or ropes including fraying, unsplicing, unlaying, kinking, knotting, roping, broken or pulled stitches, excessive elongation, chemical attack, excessive soiling, abrasion, alteration, needed or excessive lubrication, excessive again and excessive wear.
      v. Alteration, absence of parts, or evidence of defects in, damage to or improper function of mechanical devices and connectors.
   c. Maintained and stored in accordance with the manufacturer's instructions:
      i. Unique issues shall be addressed with the manufacturer.
      ii. Equipment shall be stored in a manner as to preclude damage from environmental factors such as heat, light, excessive moisture, oil, chemicals and their vapors, or other degrading elements.

8. When inspection reveals defects in, damage to, or inadequate maintenance of equipment, the equipment shall be permanently removed from service or undergo adequate corrective maintenance before return to service.

a. Repairs to fall protection equipment must be authorized by the manufacturer. Any other repairs are to be done by persons trained and authorized by manufacturer.

9. When the work is of short duration (i.e., non-repetitive) and limited exposure and the hazards involved in rigging and installing the fall protection devices required equals or exceeds the hazards involved in the actual construction, these provisions may be temporarily suspended, provided adequate risk control is recognized and maintained under immediate, competent supervision.

10. Where the elevation is 25 feet or more above the ground, water surface, or continuous floor level below, and when the use of personal fall arrest systems, personal fall restraint systems, positioning device systems or more conventional types of protection are clearly impractical, the exterior and/or interior perimeter of the structure shall be provided with an approved safety net extending at least 8 feet horizontally from such perimeter and being positioned at a distance not to exceed 10 feet vertically below where such hazards exist, or equivalent protection provided safety nets shall extend outward from the outermost projection of the work surface as follows:

Vertical distance from working level to horizontal plane of net	Minimum required horizontal distance of outer edge of net from the edge of working surface
Up to 5 feet	8 feet
More than 5 feet up to 10 feet	10 feet
More than 10 feet but not to exceed 30 feet	13 feet

11. Where it can be shown that the use of conventional fall protection is impractical or creates a greater hazard, a fall protection plan can be implemented.
    a. The fall protection plan shall be prepared by a Qualified Person and developed specifically for the site where the work is being performed.
    b. The plan must be maintained up to date.
    c. The plan shall document the identity of the Qualified Person.
    d. A single site fall protection plan can be developed for sites where the operations are essentially identical.
    e. The fall protection plan must be implemented under the supervision of a Competent Person.
    f. A copy of the fall protection plan shall be maintained at the job site.
    g. The fall protection plan shall document the reasons why the use of conventional fall protection systems (guardrails, personal fall arrest systems, or safety nets) are infeasible or why their use would create a greater hazard.

h. 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 provided by conventional fall protection systems.

12. Employees who fall shall be promptly rescued:
    a. Size up the situation and implement the rescue procedures identified in the Fall Hazard Assessment as needed.
    b. Call 911 for back up assistance.
    c. Rescues must be conducted by Authorized and Competent Rescuers.

B. SPECIFIC SITUATIONS

Roofs

13. Employees shall be protected from falls from roofs of a height of more than 20 feet by use of one or a combination of the methods in this section. Whenever felt laying machines or other equipment that is pulled by an operator who walks backwards is being used, this provision shall apply regardless of the height:
    - Unless conditions prohibit, headers consisting of sheets of roofing or other roofing materials shall also be laid parallel to the edges of the roof to warn employees that they are approaching the edge of the roof.

14. When working on roofs that are single unit with a slope greater than 4:12 **and** over 20 feet from the ground (at the lowest point), protect workers by one or more of the following:
    a. Parapets 24 inches or higher
    b. Personal fall protection
    c. Catch platforms: When catch platforms are used, they shall be installed in close proximity below the eaves below roof work areas, extend at least 2 feet horizontally beyond the projection of the eaves, and be provided with standard railings and toeboards. The platforms shall be fully planked.
    d. Scaffold platforms: When built-up scaffold platforms are used to protect workers from falls from the edges of roofs, they shall be installed and maintained in accordance with the Cal OSHA scaffolding requirements (see Scaffolding SWP). A fully planked platform shall be provided near the eave level.
    e. Eave barriers: When a system of eave barriers is provided to prevent falls from roofs, the barrier, unless of solid construction, shall be in accordance with the Cal OSHA requirements for standard railings:
        i. Railings shall be constructed of wood or in an equally substantial manner from other materials, and shall consist of the following:

A. A top rail not less than 42 inches or more than 45 inches in height measured from the upper surface of the top rail to the floor, platform, runway or ramp.
B. A mid-rail shall be halfway between the top rail and the floor, platform, runway or ramp when there is no wall or parapet wall at least 21 inches (53 cm) high.
    1. Screens, mesh, intermediate vertical members, solid panels or equivalent members, may be used in lieu of a mid-rail subject to the following:
        - Screens and mesh, when used, shall extend from the top rail to the floor, platform, runway or ramp and along the entire opening between top rail supports.
        - Intermediate vertical members (such as balusters), when used between posts, shall be installed such that there are no openings greater than 19 inches (48 cm) wide.
        - Other intermediate members (such as solid panels, or equivalent members) shall be installed such that there are no openings that are more than 19 inches (.5 m) wide.

ii. Wood railings.
A. Selected lumber, free from damage that affects its strength, shall be used for railings constructed of wood.
B. Wood posts shall be not less than 2 inches by 4 inches in cross section, spaced at 8-foot or closer intervals.
C. Wood top railings shall be smooth and of 2-inch by 4-inch or larger material.
    - Double, 1-inch by 4-inch members may be used for this purpose, provided that one member is fastened in a flat position on top of the posts and the other fastened in an edge-up position to the inside of the posts and the side of the top member.
    - Mid-rails shall be of at least 1-inch by 6-inch material.
D. The rails shall be placed on that side of the post which will afford the greatest support and protection.

iii. All railings, including their connections and anchorage, shall be capable of withstanding without failure, a force of at least 200 pounds applied to the top rail within 2 inches of the top edge, in any outward or downward direction, at any point along the top edge.
A. When the 200 pound test load is applied in a downward direction, the top edge of the guardrail shall not deflect to a height less than 39 inches above the walking/working level.

iv. Mid-rails, screens, mesh, intermediate vertical members, solid panels, and equivalent members shall be capable of withstanding, without failure, a force of at least 150 pounds (666 N) applied in any downward or outward

direction at any point along the mid-rail, screen, mesh, or other intermediate member.

v. Railings exposed to heavy stresses from employees trucking or handling materials shall be provided additional strength by the use of heavier stock, closer spacing of posts, bracing, or by other means.

vi. The ends of the rails shall not overhang the terminal posts, except where such overhang does not constitute a projection hazard.

vii. Railings shall be so surfaced as to prevent injury to an employee from punctures or lacerations, and to prevent snagging of clothing.

viii. Steel banding and plastic banding shall not be used as top rails or mid-rails.

ix. The barrier system shall be securely anchored at eave level or supported by ropes securely tied to substantial anchorages on the roof.

x. If the barrier system is to be moved from one work area to another, employees performing the moving operation shall be protected by the use of safety belts and lines.

f. Standard toeboards and railing

15. Ramps or runways erected and used exclusively for the purpose of loading or unloading roofing materials at elevations above ground, or other level below, not exceeding 20 feet in height shall be at least 40 inches in width.
    a. At those elevations exceeding 20 feet in height, standard guardrails shall be installed and maintained on both sides of the ramp or runway.
    b. A 10-inch wide horizontal opening is permitted between the railing and the ramp or runway platform.

Temporary Roof and Floor Holes, Wall Openings, Stairways and other Unprotected Edges (other than roofs)

16. Guardrails shall be required at locations where there is a routine need for any employee to approach within 6 feet of the edge of a roof.
    a. When intermittent work is being done safety belts and lanyards, or an approved fall protection system may be provided in lieu of guardrails.
    b. For the purpose of this requirement, routine need means more than four times a year and intermittent work means work not exceeding four times a year.

17. Guardrails shall be provided on all open sides of unenclosed elevated work locations, such as: roof openings, open and glazed sides of landings, balconies or porches, platforms, runways, ramps, or working levels more than 30 inches above the floor, ground, or other working areas of a building.
    a. Where overhead clearance prohibits installation of a 42-inch guardrail, a lower rail or rails shall be installed.

b. The railing shall be provided with a toeboard where the platform, runway, or ramp is 6 feet or more above places where employees normally work or pass and the lack of a toeboard could create a hazard from falling tools, material, or equipment.

18. The unprotected sides of elevated work locations that are not buildings or building structures where an employee is exposed to a fall of 4 feet or more shall be provided with guardrails.
    a. Where overhead clearance prohibits installation of a 42-inch guardrail, a lower rail or rails shall be installed.
    b. The railing shall be provided with a toeboard where the platform, runway, or ramp is 6 feet or more above places where employees normally work or pass and the lack of a toeboard could create a hazard from falling tools, material, or equipment.

19. Wherever guardrail protection is required, the following standards shall be adhered to except that other types and arrangements of guardrail construction will be acceptable where the height, surface and end projection of the top rail complies with the standard specifications and the closure of the vertical area between the top rail and floor, platform, runway, or ramp provides protection at least equivalent to that afforded by a mid-rail.
    a. A standard guardrail shall consist of top rail, midrail or equivalent protection, and posts, and shall have a vertical height within the range of 42 inches to 45 inches from the upper surface of the top rail to the floor, platform, runway, or ramp level.
        i. The permissible tolerance on height dimensions is one inch.
        ii. The top rail shall be smooth-surfaced throughout the length of the railing.
        iii. The midrail shall be approximately halfway between the top rail and the floor, platform, runway, or ramp. The ends of the rails shall not overhang the terminal posts, except where such overhang does not constitute a projection hazard.
    b. All guardrails and other permissible types, including their connections and anchorage, shall be designed for a live load of 20 pounds per linear foot applied either horizontally or vertically downward at the top rail.
    c. Where toeboards are required, they shall be constructed of wood, concrete, metal, or other suitable material.
        i. Where constructed of metal grille, mesh shall not exceed 1-inch.
        ii. The top of the toeboard shall be not less than 3 1/2 inches above the platform, walkway, or other working level and the bottom clearance shall not exceed 1/4-inch.
        iii. Where materials are piled, higher toeboards, or paneling from floor to intermediate rails or top rail shall be provided where necessary for safety.

20. Every floor and roof opening shall be guarded by a cover, a guardrail, or equivalent on all open sides.
    a. While the cover is not in place, the openings shall be constantly attended by someone or shall be protected by guardrails.
    b. Toeboards shall be installed around the edges at openings where persons may pass below the opening

21. Floor and roof opening covers shall be designed by a Qualified Person and be capable of safely supporting the greater of 400 pounds or twice the weight of the employees, equipment and materials that may be imposed on any one square foot area of the cover at any time.
    a. Covers shall be secured in place to prevent accidental removal or displacement, and shall bear a pressure sensitized, painted, or stenciled sign with legible letters not less than one inch high, stating: “Opening--Do Not Remove.”
    b. Markings of chalk or keel shall not be used.

22. Covers shall not project more than one inch above the floor level and all edges shall be chamfered to an angle with the horizontal of not over 30 degrees.
    a. All hinges, handles, bolts, or other parts shall set flush with the floor or cover surface.

23. Every ladder way floor opening or platform with access provided by ladder way shall be protected by guardrails with toeboards on all exposed sides except at entrance to the opening.
    a. The opening through the railing shall have either a swinging gate or equivalent protection, or the passageway to the opening shall be so offset that a person cannot walk directly into the opening.

24. Wall openings, from which there is a drop of more than 4 feet, and the bottom of the opening is less than 3 feet above the working surface, shall be guarded as follows:
    a. When the height and placement of the opening in relation to the working surface is such that either a standard rail or intermediate rail will effectively reduce the danger of falling, one or both shall be provided.
    b. The bottom of a wall opening, which is less than 4 inches above the working surface, regardless of width, shall be protected by a standard toeboard or an enclosing screen either of solid construction or as specified in this section.

25. Any employee approaching within 6 feet of any skylight shall be protected from falling through the skylight or skylight opening by any one of the following methods:
    a. Skylight screen:
        i. The design, construction, and installation of skylight screens shall meet the strength requirements equivalent to that of covers specified above.

ii. They shall also be of such design, construction and mounting that under design loads or impacts will not deflect downward sufficiently to break the glass below them.
iii. The construction shall be of grillwork, with openings not more than 4 inches by 4 inches or of slatwork with openings not more than 2 inches wide with length unrestricted, or of other material of equal strength and similar configuration.

b. Guardrails
c. The use of a personal fall protection system
d. Covers installed over the skylights
e. Skylight screens installed below the skylight. Existing screens (i.e. burglar bars) shall meet the following requirements if they will be relied upon for fall protection:
   i. Screens installed at the same level or higher than the walking/working surface shall meet the standard strength requirements.
   ii. Screens installed within 2 feet of the walking/working surface shall meet the strength requirements with increased strength based on the fall distance below the walking/working surface as determined by a Qualified Person.
      - In no case shall the strength of the screen below the skylight be less than the strength requirements.
      - A screen more than 2 feet below the walking/working surface shall not serve as fall protection.
   iii. A screen shall not be used for fall protection f the broken skylight glazing will pose an impalement hazard to a worker who has fallen through the skylight and is lying on top of the screen. Skylights containing tempered, laminated, or plastic glazing, or similar materials shall not be considered to impose an impalement hazard.
   iv. The screen construction shall be of grillwork, with openings less than 12 inches in the least horizontal dimension.

Steep Slopes[i]

26. Steep slopes may need special consideration for alternative work practices. Generally, steep slopes are those exceeding a grade of 33% (4:12 rise/run ratio this ratio comes from the Cal OSHA definition of a steep roof, and is used in the Walking Working Surfaces SWP and here, so that everyone has a consistent guide to follow). The following is meant to provide you guidance only, and is not required in all situations. Situations in which you should consider alternative work practices may include:
    a. When using power tools (e.g. string trimmer)
    b. If the ground is unstable, or slippery
    c. Other circumstances which may create an unsafe working condition

27. Examples of alternative work practices include:
    a. If weed management is an issue, consider using IPM to develop a weed management plan.
    b. Use of fall protection, such as ropes access (which is a way to steady oneself on a steep slope using ropes), or portable fall protection anchoring systems.

28. For assistance in determining if alternative work practices might be needed, or in developing alterative work practices, contact EHS (415-831-2780).

For any questions, please contact EHS at 415-831-2780.

References:

1. ANSI/ASSE A10.1 – 10.47 Construction Series, various years.
2. ANSI/ASSE Z359.1 – Z359,14 Fall Protection Code, various years.
3. Roofing Safety: Slips and Falls. Tailgate/Toolbox Topics, Cal OSHA, TT-4: Feb. 2006.
4. Worker Deaths by Falls: A Summary of Surveillance Findings and Investigative Case Reports, National Institute for Occupational Safety and Health, NIOSH Publication No. 2000-116, November 2000.
5. Fall Protection Competent Person Certification for San Francisco Recreation and Parks, June 7-8, 2017. Provided by Enviro Safetech.

[i] Section developed based on project 5401, Working on Steep Slopes, Coleridge Mini Park