

FALL PROTECTION PROGRAM

Last Reviewed Date: 9/2023

Last Revised Date: 9/2023

Effective Date: 1/2020

Applies To: Faculty, Staff, Students, Others

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1. Purpose

This program is established to protect University employees from being injured from falls. In keeping with the University's [Health and Safety Policy](#) to provide a healthful and safe environment, this program serves to maintain safe working conditions through effective workplace controls against fall hazards and follows the requirements of the Occupational Safety and Health Administration (OSHA) Fall Protection Standards.

2. Scope

This program applies to all University employees at the Storrs, regional and Law School campuses who are exposed to the following fall hazards:

- Work performed on surfaces with unprotected sides or edges of surfaces that present a fall hazard of four feet or more to a *lower level*. (Exceptions: working near the exposed perimeters of loading docks and entertainment stages.)
- Work on surfaces where floor *holes* or wall *openings* exist.
- Working on *ladders, industrial stairs or aerial lifts*.
- Working on *scaffolds* or mobile *scaffolds*.
- Working at the edge of an excavation that is deeper than 6 feet.

Additionally, the Fall Protection Program shall apply to all employees in order to minimize slips, trips and falls on the same elevation. All employees shall control fall hazards in their *work area* by maintaining good housekeeping and shall report conditions that may lead to slips, trips and falls to the appropriate facilities maintenance unit.

Contractors required to perform elevated work tasks for the University of Connecticut are required to comply with all applicable OSHA regulations, the University of Connecticut [Contractor EHS Manual](#) and shall have their own fall protection program.

Fall hazards must first be controlled through engineering controls if feasible. When engineering controls are not feasible, then *personal fall arrest systems*, administrative controls and training must be instituted.

3. Policy Statement

As stated in the University's Health and Safety Policy, the University of Connecticut is committed to providing a healthful and safe environment for all activities under its jurisdiction and complying with federal and state health and safety standards. As such, to minimize exposures to falls and to

comply with the OSHA Fall Protection and Walking and Working Surfaces Standards, this Fall Protection Program shall be implemented at the University of Connecticut.

4. Enforcement

Violations of this program may result in appropriate disciplinary measures in accordance with University Laws and By-laws, General Rules of Conduct for All University Employees, applicable collective bargaining agreements, and the University of Connecticut Student Code.

5. Duties and Responsibilities

5.1 Deans, Directors, and Department Heads

- 5.1.1** Designate and empower individuals who will be responsible for the preparation and implementation of the Fall Protection Program in their respective departments;
- 5.1.2** ensure that employees who perform elevated work are adequately trained;
- 5.1.3** provide administrative and financial support for this program within their individual departments; and
- 5.1.4** ensure the Fall Protection Program is implemented and adhered to within the department.

5.2 Supervisors

- 5.2.1** Ensure that employees are informed, trained, and provided with the appropriate fall protection systems and equipment to be protected from potential fall hazards associated with job tasks;
- 5.2.2** coordinate the correction of fall hazards brought to their attention by employees; and
- 5.2.3** Inform EHS (at 6-3613) within 8 hours whenever an employee falls 4 feet or more regardless if they are injured or not; and
- 5.2.4** complete a "[First Report of Injury](#)" report and produce any additional documentation needed to investigate any work-related injuries and illnesses.

5.3 Employees

- 5.3.1** Comply with the Fall Protection Program and any further safety recommendation provided by the supervisor and/or EHS regarding fall protection;

- 5.3.2 complete fall protection training requirements and request further instruction or guidance from EHS if unclear;
- 5.3.3 conduct assigned tasks in a safe manner and use/wear all assigned personal protection equipment; and
- 5.3.4 report any unsafe or unhealthy work conditions and job-related injuries or illnesses to the supervisor immediately.

5.4 Environmental Health & Safety

- 5.4.1 Provide expertise and guidance to University departments;
- 5.4.2 Assist departments in implementing an effective fall protection program;
- 5.4.3 provide and/or coordinate fall protection instruction as needed;
- 5.4.4 investigate reported accidents that are related to fall hazards, recommending corrective actions; and
- 5.4.5 perform periodic review and revise the Fall Protection Program, as needed, for compliance with applicable regulations.

5.5 University Planning, Design and Construction

- 5.5.1 Maintain and update design guidelines requiring that projects be designed according to current OSHA standards and that engineering controls for fall protection such as guardrails and anchorage points for occupant use and maintenance work be designed into projects.

5.6 Facilities Operations

- 5.6.1 Accept reports of hazards through the Operations Center and either process work orders to correct the hazard or direct the request to another appropriate unit.

6. Definitions - *Italicized words in this document are defined in this section*

- 6.1 **100% Tie-off:** a term used to indicate that workers are required to facilitate the use of personal fall protection 100% of the time when moving at heights or transitioning between anchor points or life lines. Double *lanyards* or double retractable *lanyards* are usually used to facilitate *100% tie-off*.
- 6.2 **Aerial lift:** means equipment such as powered platforms, vehicle-mounted elevated and rotating work platforms, extensible boom platforms, aerial *ladders*, articulating boom platforms, vertical towers and powered industrial truck platforms. (*Scissors lifts* are defined as mobile *scaffolds* by OSHA and fall under different standards than *aerial lifts*).

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- 6.3 *Aerial Lift Operation and Safety Training:*** is practical operator training that covers operational and safety aspects of lift operation and includes hands-on use of the type of lift the operator intends to use.
 - 6.4 *Anchor point:*** a secure point of attachment for lifelines, *lanyards* or deceleration (grabbing) devices. An anchor point, whether improvised or permanent dedicated anchor shall be capable of supporting at least 5,000 pounds per employee attached, or shall be designed, installed and used as part of a complete fall arrest system which maintains a factor of two and under the supervision of a *Qualified Person*.
 - 6.5 *Body belt:*** a strap with means both for securing it about the waist and for attaching it to a *lanyard*, lifeline, or deceleration (grabbing) device. The use of *body belts* are prohibited.
 - 6.6 *Connector:*** a device that is used to connect parts of a *personal fall arrest system* together (i.e. D-rings, carabineers and *snaphooks*).
 - 6.7 *Competent person:*** a person who is capable of recognizing existing and predictable hazards and has the authority to take corrective action. Additionally, a person who is capable of identifying hazardous or dangerous conditions in the *personal fall arrest system*, or any component thereof, as well as in their application and use with related equipment.
 - 6.8 *Deceleration device:*** any mechanism, such as a rope, grabbing device, rip-stitch *lanyard*, specially woven *lanyard* or automatic *self-retracting lifeline/lanyard*, which serves to dissipate a substantial amount of energy during a fall arrest, or otherwise limits the energy imposed on an employee during fall arrest.
 - 6.9 *Deceleration distance:*** the additional vertical distance a falling person travels, excluding lifeline elongation and free fall distance, before stopping, from the point at which a *deceleration device* begins to operate. It is measured as the distance between the location of a person's body harness attachment point at the moment of activation of the *deceleration device* during a fall, and the location of that attachment point after the person comes to a full stop.
 - 6.10 *Designated area:*** a space which has a perimeter barrier erected to warn employees when they approach an unprotected side or edge, and serves also to designate an area where work may be performed without additional fall protection.
 - 6.11 *Dockboard:*** means a portable or fixed device that spans a gap or compensates for a difference in elevation between a loading platform and a transport vehicle. *Dockboards* include, but are not limited to, bridge plates, dock plates, and dock levelers.

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- 6.12 Familiarization Training:** is training related to operational use of a specific *aerial lift*, scissors or mast lift. Training emphasis is placed on familiarizing a user with the lift's controls and operating characteristics of a specific make and model machine. Instruction must be performed by the lift manufacturer representative, lift company dealer, or an accredited training facility and be documented.
- 6.13 Fixed ladder:** a *ladder*, including individual-rung ladders that is permanently attached to a structure, building, or equipment. It does not include ship's stairs or manhole steps.
- 6.14 Full body harness:** an interconnected set of straps that is secured about a person in a manner that distributes the fall arrest forces over at least the thighs, pelvis, waist, chest, and shoulders with a means for attaching the *full body harness* to other components of a *personal fall arrest system*.
- 6.15 Guard rail or (Standard Railing):** a vertical barrier erected along exposed edges of a floor *opening*, wall *opening*, ramp, platform, or runway to prevent falls of persons. Railings normally consist of a top rail, mid-rail and toeboard. Railings must be able to withstand 200 pounds off force in any direction at the top rail.
- 6.16 Hole:** a gap or void 12 inches or more in its least dimension in a floor, *roof*, or other *walking/working surface*.
- 6.17 Horizontal lifeline:** a flexible line between two horizontal fixed anchorages to which a fall arrest device is connected.
- 6.18 Industrial Stairs:** stairs that are an integral part of machinery, generally used to provide access to equipment, machinery, tanks etc.
- 6.19 Infrequent:** refers to the task or job performed only on occasion, when needed (e.g., equipment breakdown), on an occasional basis, or at sporadic or irregular intervals. *Infrequent* tasks include work activities such as annual maintenance or servicing equipment, monthly or quarterly replacement of batteries, or HVAC filters, and responding to equipment outage or breakdown.
- 6.20 Ladder:** a device typically used to gain access to a different elevation consisting of two or more structural members crossed by rungs, steps, or cleats.
- 6.21 Ladder Safety System:** a system designed to eliminate or reduce the possibility of falling from a *fixed ladder*. A ladder safety system usually consists of a carrier, safety sleeve, *lanyard*, *connectors*, and body harness. Cages and wells are not ladder safety systems.
- 6.22 Lanyard:** a flexible line of rope or strap that generally has a *connector* at each end for connecting the *full body harness* to a *deceleration device*, lifeline or anchor point.

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- 6.23 Lower level:** those areas or surfaces to which an employee can fall. Such areas include, but are not limited to, ground levels, floors, platforms, ramps, runways, excavations, pits, tanks, water, equipment, *roofs*, structures, or portions thereof.
 - 6.24 Low-slope roof:** means a *roof* having a slope less than or equal to 4 in 12 pitch (vertical to horizontal).
 - 6.25 Opening:** a gap or void 30 inches or more high and 18 inches or more wide in a wall or partition, through which personnel can fall to a *lower level*.
 - 6.26 Positioning device:** means a *full body harness* system rigged to allow an employee to be supported on an elevated vertical surface, such as a wall, and work with both hands free while leaning backwards.
 - 6.27 Personal fall arrest system:** means a system used to arrest an employee in a fall from a working level. It consists of an anchorage, *connectors*, *full body harness* and may include a *lanyard*, *deceleration device*, lifeline, or suitable combinations of these.
 - 6.28 Qualified person:** a person who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience has successfully demonstrated the ability to solve or resolve problems related to the subject matter, the work, or the project.
 - 6.29 Restraint line:** a device which is attached between the employee and an anchorage to prevent the employee from walking or falling off an elevated surface.
 - 6.30 Roof:** means the exterior surface on the top of a building.
 - 6.31 Roofing work:** means the hoisting, storage, application, and removal of roofing materials and equipment, including related insulation, sheet metal, and vapor barrier work, but not including the construction of the *roof* deck.
 - 6.32 Rope grab (grabbing device):** A *deceleration device* that travels on a lifeline and automatically, by friction, engages the lifeline and locks to arrest a fall.
 - 6.33 Scaffold:** means any *temporary* elevated or suspended platform, and its supporting structures, used for supporting employees or materials or both.
 - 6.34 Scissors lifts:** are work platforms that can elevate vertically to position workers at various levels. *Scissors lifts* can employ extendable platforms that can allow reach beyond the lifts wheelbase and can be self-propelled. Scissor lifts are not addressed by the *aerial lift* provisions of OSHA Subpart L. They do however meet the OSHA definition of a *scaffold* (§1926.451 - general requirements for *scaffolds*) and are considered mobile *scaffolds* and must meet the specific requirements of (§1926.452(w) - mobile *scaffolds*).

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- 6.35 Self-retracting lifeline/lanyard:** a *deceleration device* containing a drum-wound line which can be slowly extracted from, or retracted onto, the drum under minimal tension during normal movement and which, after onset of a fall, automatically locks the drum and arrests the fall (usually within two feet or less).
- 6.36 Steep roof:** means a *roof* having a slope greater than 4 in 12 (vertical to horizontal).
- 6.37 Snap hook:** a *connector* consisting of a hook-shaped member with a normally closed keeper, or similar arrangement, which may be opened to permit the hook to receive an object and, when released automatically closes to retain the object. **Only self-locking snap hooks are permitted.**
- 6.38 Suspension trauma:** serious medical effects from immobilization in a vertical position, e.g., suspended in a *full body harness*. The trapping of blood in the legs can lead to toxic shock and death. Maximum tolerable suspension time is 15 minutes.
- 6.39 Temporary:** refers to the duration of the task the worker performs is brief or short. *Temporary* and brief or short tasks generally include those a worker is able to perform in less time than it takes to install or set up conventional fall protection.
- 6.40 Toe board:** a low protective barrier that prevents material and equipment from falling to *lower levels* and can ensure secure footing along edges to *lower levels*.
- 6.41 Tie-Off:** a procedure of connecting directly or indirectly to an anchorage point.
- 6.42 Tread depth:** the horizontal distance from front to back of tread including nosing when used.
- 6.43 Unprotected sides and edges:** means any side or edge (except at entrances to points of access) of a *walking/working surface* that is 4 feet or more in height, e.g., floor, *roof*, ramp, or runway where there is no wall or protective guardrail system, (loading docks and theatrical performance stages are exempted).
- 6.44 Vertical lifeline:** a component consisting of a flexible line for connection to an anchor point; by employing a *rope grab* device on the line, safe vertical ascending or descending can be provided.
- 6.45 Walking/working surface:** means any surface, whether horizontal or vertical on which an employee walks or works including but not limited to, floors, *roofs*, ramps, runways, form work and concrete reinforcing steel but not including *ladders*, vehicles, or trailers, on which employees must be located in order to perform their job duties.
- 6.46 Work area:** means that portion of a *walking/working surface* where job duties are being performed.

7. Training Requirements

- 7.1** New employees should complete an [Employee Safety Training Assessment \(ESTA\)](#) with your supervisor using your area's [Workplace Hazard Assessment \(WHA\)](#) as soon as possible to learn which safety training courses are appropriate for your new position. Assistance will be provided by EHS to any department or individual requesting guidance, training, or information on training providers to satisfy implementation of this program.
- 7.2 All University employees who use *ladders*** with a working height of six feet or more shall at a minimum have received EHS Fall Protection I Training and be knowledgeable of the following:
- 7.2.1** how to inspect *ladders* for visible defects; and
 - 7.2.2** how to use *ladders* properly.
- 7.3 University Employees who use *personal fall arrest systems*** to control fall hazards in their *work area*, shall have attended EHS Fall Protection II Training and be knowledgeable in the following:
- 7.3.1** the application limits of the equipment;
 - 7.3.2** the proper hook-up, anchoring and *tie-off* techniques including determination of elongation and *deceleration distance*;
 - 7.3.3** methods of use; and
 - 7.3.4** inspection and storage of equipment.
- 7.4 University Employees who use *Aerial Lifts, Scissor lifts or Vertical Mast Lifts***: shall have attended EHS Fall Protection II Training as well as have documented *Aerial Lift Operator Training*. Additionally, for any different model lifts (that are subsequently rented, leased or purchased) *familiarization training* is required to familiarize users to different control characteristics of different models a user maybe required to operate (normally provided by the manufacturer representative, lift dealer or supplier), and the operator must be knowledgeable of the following:
- 7.4.1** the manufacturer's operating instructions;
 - 7.4.2** performing and documenting a pre-start inspection of the lift;
 - 7.4.3** inspection of the *work area* for dangerous conditions such as uneven surfaces, overhead obstructions such as power lines, overhead encumbrances and severe weather;
 - 7.4.4** load capacities of the equipment;
 - 7.4.5** how to safely move the equipment;

- 7.4.6 the requirements of sections 7.4 and 15.0 of this document;
- 7.4.7 how to prevent falls from lifts and use appropriate fall protection personal protective equipment; and
- 7.4.8 minimum safe approach distances to energized power lines.
- 7.4.9 Employees must be given adequate time to acclimate to a lift's controls and its response characteristics and allowed to practice initial use in an open area, free of overhead encumbrances.
- 7.4.10 The use of crane-supported man- baskets to hoist employees is prohibited except where it can be demonstrated that the erection, use, and dismantling of conventional means of reaching the *work area*, such as a personnel hoist, *ladder*, stairway, *aerial lift*, elevating work platform, or *scaffold*, would be more hazardous, or is not possible because of the project's structural design or worksite conditions.
- 7.5 **University Employees who use *Scaffolds*:** Must have attended EHS Fall Protection II Training and users must be aware of:
 - 7.5.1 The proper use of the particular *scaffold*, and the proper handling of materials on the *scaffold*; and
 - 7.5.2 how to determine the maximum intended load and the load carrying capacities of the *scaffold*.
 - 7.5.3 Employees required to erect or disassemble *scaffolding* greater than 10 feet high (measured at the platform/planks) are required to receive *Scaffold Competent Person* training using proper procedures for dealing with electrical hazards and for erecting, maintaining, and disassembling the fall protection systems and falling object protection systems being used. Each department utilizing *scaffolding* must have a *competent person* with proper training.
- 7.6 **University Employees Assigned as *Scaffold Competent Persons*:** Individuals who act as the *competent person* in the use of *scaffolding* shall be additionally trained and certified through a *scaffold competent person* training program (provided by outside training companies, call EHS for guidance) to be qualified and knowledgeable of the following:
 - 7.6.1 determine the feasibility and safety of providing fall protection for employees erecting or dismantling *scaffolding*.
 - 7.6.2 the proper selection of *scaffold* for the task based upon the type of work to be conducted and the working load to be supported;

- 7.6.3 the correct procedures for the erection of *scaffolds*;
- 7.6.4 the correct procedures for the dismantling of *scaffolds*;
- 7.6.5 the correct procedures for the moving of *scaffolds*;
- 7.6.6 the correct procedures for the altering of *scaffolds*; and
- 7.6.7 the associated OSHA standards.

7.7 Persons Working in or near to Loading Dock Areas

- 7.7.1 Persons working in close proximity to loading dock areas should complete [EHS Fall Protection I Training](#) includes fall protection training in loading dock areas.

8. Fall Hazards

Each department shall be responsible to identify potential fall hazards in their workplaces and establish a safe means for their employees to perform their work. Technical assistance is provided by EHS for specific instances upon request.

- 8.1 Falls may be classified into three general categories:
 - 8.1.1 slips, trips and falls on the same level;
 - 8.1.2 falls on stairs; and
 - 8.1.3 falls from elevations.
- 8.2 Slips and trips are generally caused by a lack of good housekeeping and inadequate maintenance of *walking/working surfaces*. Employees should keep their *work area* clean and orderly. If they are not equipped to eliminate a hazard, they should contact the appropriate maintenance personnel to correct the problem or report it to their supervisor for corrective action. These hazards may include icy sidewalks, wet floors, torn floor coverings and stair treads, and missing or broken hand rails or *guard rails*.
- 8.3 Fall hazards from elevations include, but are not limited to, *unprotected sides and edges* of *roofs*, excavations, skylights, floor *holes*, wall *openings*, and all other walking or working surfaces where personnel can possibly fall four feet or more to a *lower level*.
- 8.4 Employees should alert their supervisors to potential fall hazards not already identified and controlled. The following are fall hazards which require protection:
 - 8.4.1 open sided floors, platforms, and runways four feet or more in height;
 - 8.4.2 open sided floors, ramps, walkways, etc. that are adjacent to or above dangerous operations must be guarded regardless of height;
 - 8.4.3 wall *openings* from where there is a drop of more than 4 feet;

- 8.4.4 open windows from which there is a drop of more than 4 feet, where the bottom of the window is less than 3 feet above the floor or platform;
- 8.4.5 hatchways, chutes and floor *openings*;
- 8.4.6 any *opening* more than 4 feet in elevation where a significant portion of the body is leaning over or through to perform work;
- 8.4.7 skylights that are flush or near-flush with the *roof* surface, or that may otherwise serve as a *walking/working surface*;
- 8.4.8 *scaffolds* over 6 feet; and
- 8.4.9 *aerial lifts* and *scissors lifts*.
- 8.5 Protection from overhead falling hazards must be provided. This includes:
 - 8.5.1 placement of *toe boards* and the use of hard hats shall be required;
 - 8.5.2 equipment shall not be stored within four feet of an unprotected edge;
 - 8.5.3 canopy structures may be required in high traffic areas;
 - 8.5.4 the area to which objects could fall must be barricaded and individuals not equipped with hard hats prohibited from entering.

9. Engineering Controls for Fall Hazards From Elevations

Departments shall, whenever possible, use engineering controls to eliminate or lessen the hazard of the *work area* or job site. Engineering controls shall be provided where possible to minimize fall hazards. Engineering controls of fall hazards from elevations consist of the following:

- 9.1 **Guardrails and Toeboards:** These requirements apply to *temporary* controls on job sites as well as permanent fixtures in general *work areas*.
 - 9.1.1 The *standard railing* consists of a top rail, mid rail, and posts and is 42 inches high from the top of the rail to the floor, platform, runway or ramp. Nominal height of the mid rail is 21 inches;
 - 9.1.2 standard *toe boards* must be a minimum of 4 inches high, no more than 1/4 inch clearance to the floor. If materials are piled higher than 4 inches, they must be protected from falling. If a mesh material is used, the *opening* must be less than 1 inch;
 - 9.1.3 the anchoring of posts and framing of members for railings of all types must be of such construction that the completed structure is capable of withstanding a load of 200 pounds applied in any direction at any point on the top rail;

- 9.1.4 guardrail systems have a surface that prevents injuries such as punctures and lacerations and prevents snagging of clothing; and
- 9.1.5 when guardrail systems are in hoisting areas, a chain gate or removable guardrail section shall be in place when not being used.

9.2 Skylights

- 9.2.1 The skylights that may be used as a walking or working surface must be protected by a *standard railing*, standard skylight screen, grill work with 4 by 4 inch *openings* or slatwork with 2-inch *openings*; and
- 9.2.2 standard skylight screens must be capable of withstanding minimum load of 200 pounds applied perpendicular to any point on the screen and will not deflect under ordinary loads and impacts and break glass.

9.3 Covers

- 9.3.1 Covers for *holes*, including grates, shall be capable of supporting, without failure, at least twice the weight of employees, equipment, and materials that may be imposed on the cover at any one time;
- 9.3.2 covers located on roadways and vehicular aisles shall be capable of supporting, without failure, at least twice the maximum axle load of the largest vehicle expected to cross over it;
- 9.3.3 all covers shall be secured when installed so as to prevent accidental displacement by the wind, equipment, or employees;
- 9.3.4 covers shall be marked with the word "*Hole*" to provide warning of the hazard when it is not readily apparent; and
- 9.3.5 while a cover is not in place, the pit or trap *opening* shall be constantly attended by someone or shall be protected on all exposed sides by removable *standard railings*.

9.4 Dockboards

- 9.4.1 *Dockboards* must be capable of supporting the maximum intended load;
- 9.4.2 *dockboards* shall be designed, constructed, or used in a way to prevent transfer vehicles from running off the *dockboard* edge;
- 9.4.3 measures, such as wheel chocks or dock clamps must be used to prevent the transport vehicle (e.g. a truck, semi-trailer, trailer) on which a *dockboard* is placed, from moving while employees are on the *dockboard*; and
- 9.4.4 portable *dockboards* must be equipped with handholds or other means to permit safe handling of *dockboards*.

10. Fall Protection - Personal Protective Equipment

Personal protective equipment shall be used to minimize fall hazards where engineering controls do not eliminate the hazard or in conjunction with engineering controls. Personal fall protection equipment components require special training for use and an understanding of which component *connectors* are compatible with one another and which are not. One manufacturer's equipment may be designed only to be compatible with its own components and subsystems. OSHA can require users to demonstrate that the components of a fall arrest system produced by different manufacturers are, in fact, compatible with each other.

Fall protection equipment is divided into five functional categories: 1) Fall Arrest, 2) Positioning, 3) Suspension, 4) Retrieval and 5) Restraint.

10.1 Fall Arrest

A *personal fall arrest system* is a combination of devices that would arrest an individual's descent prior to them reaching the next *lower level* in the event of a fall. A *personal fall arrest system* consists of a *full body harness*, lanyard, and anchor point OR a *full body harness*, lanyard, lifeline, anchor point, and deceleration/grabbing device. All fall protection equipment shall meet or exceed appropriate American National Standards Institute (ANSI) standards. Employees shall use only commercially manufactured equipment specifically designed for fall protection and certified by a nationally recognized testing laboratory. All fall protection equipment must bear the marking of the manufacturer and approvals for specified use. Requirements for a *personal fall arrest system* include but are not limited to the following:

- 10.1.1** Only *full body harnesses* shall be used. The use of a *body belt* is prohibited.
- 10.1.2** Workers exposed to potential arc flash hazards shall be provided arc rated harnesses.
- 10.1.3** Workers using personal fall protection must use head protection adequate for the job hazards and compliant with ANSI head protection standards, preferably climbing-style helmets that utilize under-chin straps to ensure they remain in-place, protecting their heads during a fall arrest.
- 10.1.4 Connecting Devices** - Shock-absorbing lanyards, lifelines and *self-retracting lanyards*
 - a. lanyards and lifelines shall have a minimum breaking strength of 5,000 pounds;
 - b. Shock absorbing lanyards shall not exceed six feet in length;

- c. ropes and straps (webbing) used in lanyards, lifelines, and strength components of *full body harnesses* shall be made from synthetic fibers;
- d. connecting assemblies shall have a minimum tensile strength of 5,000 pounds;
- e. *self-retracting lifelines* and lanyards shall have a tensile strength of at least 3000 pounds and limit free fall to two feet or less (5,000 pounds for ripstitch lanyards, and tearing and deforming lanyards);
- f. *personal fall arrest systems* shall limit the maximum arresting forces to 1800 pounds with a *full body harness*;
- g. the maximum free fall distance is six feet for all systems;
- h. the maximum *deceleration distance* is 3.5 feet;
- i. *Personal fall arrest systems* shall have sufficient strength to withstand twice the potential impact energy of the falling employee;
- j. lifelines shall be protected against cutting and abrasions;
- k. *horizontal lifelines* shall be designed and installed under the supervision of a *Qualified Person*, as part of a complete *personal fall arrest system*, which maintains a minimum safety factor of two. On suspended *scaffolds* or similar work platforms with *horizontal lifelines* which may become *vertical lifelines*, the devices used to connect to a *horizontal lifeline* shall be capable of locking in both directions on the lifeline; and
- l. each employee shall be attached to a separate lifeline when portable *vertical lifelines* are used.

10.1.5 Anchorage – (Anchorage point and anchorage *connectors*)

- a. Anchorages, (either improvised or permanent dedicated anchors), if used for *personal fall arrest systems*, shall be independent of any anchorage being used to support or suspend platforms and be capable of supporting at least 5,000 pounds per employee attached, or shall be designed, installed and used as part of a complete fall arrest system which maintains a factor of two and under the supervision of a *Qualified Person*;

- b. a *Qualified Person* shall determine all permanent dedicated *anchor points*;
- c. permanent dedicated *anchor points* shall be properly marked;
- d. permanent dedicated *anchor points* shall be inspected annually and certified every 10 years. (3rd party contracted fall protection services companies normally perform these inspections).
- e. *personal fall arrest systems* shall not be attached to guardrail systems, nor shall be attached to hoists except as specified in 29 CFR 1926.

10.1.6 Positioning

- a. A *positioning device* system is not a substitute for a personal arrest system and is limited to allowing an employee to be supported on an elevated vertical surface, such as a wall or *ladder* and work with both hands free while leaning.
- b. Where *positioning device* is used, it shall comply with the following:
 - Only a *full body harness* shall be worn as part of a personal fall; arrest/positioning system, *body belts* are not acceptable;
 - *positioning devices* shall be used together with personal fall arrest and shall be rigged such that a free fall cannot exceed more than 2 feet.

NOTE: when fixed ladders are utilized as an improvised anchor for positioning or fall arrest devices, it shall be done only under the supervision of a *Qualified Person*.

10.1.7 Suspension

Personal suspension systems are used for window washing and painting and are designed to lower and support a worker to perform tasks. The components of a suspension system are:

- a. *full body harness*;
- b. work line;
- c. anchor point; and
- d. *positioning device* such as a boatswain's chair. A boatswain's chair system is considered a single-point adjustable suspended *scaffold*. Since suspension system components are not designed to arrest a free fall, a back-up fall arrest system with an anchor point separate from the boatswain's chair should be used with the personal suspension system that would activate only if the worker were to experience a free fall.

10.1.8 Retrieval

Personal retrieval systems are used for confined space entry and non-entry rescue. Refer to the University of Connecticut [Confined Space Program](#) for information on confined space entry.

Personal retrieval systems consist of the following:

- a. *full body harness*;
- b. separate retrieval lines utilizing *rope grab* connections to winch lines, or
- c. retractable lifeline/rescue unit; and
- d. quad-pod or tripod or davit arm.

10.1.9 Restraint

A *restraint line* is a device which is attached between the employee and an anchor point to prevent the employee from walking or falling off an elevated surface. It does not support an employee at an elevated surface, but rather, prevents the employee from leaving the elevated surface or work position.

11. Equipment Inspections and Maintenance

11.1 Impact Loading

Any fall arrest system or component that has been used to arrest a fall (impact loading) shall be immediately removed from service until it is inspected and determined by a *Qualified Person* to be undamaged. Notify EHS within 8 hours to report the fall (see section 5.2.3) and for guidance if this issue occurs.

11.2 Inspection

Visual equipment inspections shall be conducted by the user prior to each use in accordance with the manufacturer's user manual and their EHS Fall Protection Safety Awareness Training II. If, upon inspection, a piece of equipment shows any signs of damage, excessive wear or malfunctions in any way, it must immediately be removed from service and the supervisor notified.

11.3 Maintenance

When needed, fall protection devices can be washed in warm water using a mild detergent, rinsed thoroughly in clean warm water and allowed to dry at room temperature. Stow equipment in clean area away from sunlight and extreme temperatures which could degrade materials. Check the manufacturer's recommendations in the user's manual first for cleaning, maintenance and storage information.

12. Roofing Work

The hazards associated with *roofing work* includes falling through *openings* and falling off edges. The protection of *openings* is discussed in the engineering controls section of this program. Effective *roofing work* fall protection techniques are intended to protect workers while providing the mobility and comfort necessary to perform work tasks.

12.1 Low-slope or Flat Roofs - A *low-slope roof* has a slope less than or equal to 4 in 12 (vertical to horizontal). When engaged in *roofing work* on a *low-slope roof* that has one or more unprotected sides or edge 6 feet or more above *lower levels*, workers must be protected from falling by one of the following:

- a. Guardrail systems,
- b. Safety net systems,
- c. *Personal fall arrest systems*,
- d. A combination of conventional fall protection systems and warning line systems, or
- e. A warning line system and a safety monitoring system. Note: when engaged in *roofing work* on *low-slope roofs* 50 feet or less in width, the use of a safety monitoring system without a warning line system is permitted.

12.2 Steep roofs – (slope greater than 4 in 12)

Each employee on a *steep roof* with *unprotected sides and edges* 6 feet or more above *lower levels* shall be protected from falling by guardrail systems with toeboards, safety net systems, or *personal fall arrest systems*.

12.3 Minimum Safe Approach Distances (electrical conductors)

Persons performing *roofing work* near where energized power lines come into buildings shall maintain a minimum safe approach distance of 10 feet to all energized power lines and parts at all times. Power may be turned off by qualified (electrical) persons to enable approach within the 10 feet limit.

12.4 Inspections Prior to or After Construction

OSHA allows that employees making an inspection, investigation or assessment of rooftops prior to the actual start of roof construction work or after all roof construction work has been completed and no fall protection is feasible, can do so without the use of fall protection. **However, the supervisor must evaluate the circumstances prior to attempting to perform such work to ensure all reasonable fall protection methods have been exhausted before proceeding.** EHS can assist the supervisor in the evaluation. (Example: an employee must inspect the *roof* for

potential repair work. This assessment is for *roof* work and since *roof* work falls under Part 1926 Construction Standard, if no fall protection is feasible, it would not be mandated for this situation).

13. Roof Top Maintenance Work

Maintenance activities (not construction) such as the preventative maintenance/repairing an HVAC unit or *roof* drain inspections fall under OSHA General Industry Standards. The following can be used for *roof* maintenance activities. (Also see Appendix II - Rooftop Maintenance Decision Tree eTool).

13.1 When work is performed on a *roof* with an unprotected edge workers shall be protected from falling by a guardrail system, safety net system, travel restraint system, or *personal fall arrest system*. Exceptions to this fall protection requirement are as follows:

- 13.1.1** When work is performed at least 6 feet but less than 15 feet from the *roof* edge a *designated area* may be used without additional fall protection if the work is both *infrequent* and *temporary*.
- 13.1.2** When work is performed 15 feet or more from the *roof* edge, fall protection is not required if the work is both *infrequent* and *temporary* and either a *designated area* is established or a work rule is implemented and enforced that prohibits workers from going within 15 feet of the *roof* edge without using fall protection in accordance with 13.1.

13.2 Designated Areas

As an alternative to installing guardrails a *designated area* may be established within which employees are not exposed to fall hazards. The following condition and requirements must be met in order to use *designated areas* in lieu of other fall protection measures:

- 13.2.1** the work must be *infrequent* and *temporary* in nature;
- 13.2.2** *designated areas* shall be established only on surfaces that have a slope from horizontal to 10 degrees (4 in 12 pitch); or less and
- 13.2.3** the *designated area* shall consist of an area surrounded by a rope, wire, or plastic chain and supporting stanchions. Additionally:
 - a.** after being erected with the line attached, stanchions shall be capable or resisting, without tipping over, a force of at least 16 pounds applied horizontally against the stanchion;
 - b.** the line shall have a minimum breaking or tensile strength of 200 pounds;

- c. the line shall be attached at each stanchion in such a way that pulling on one section of the line between stanchions will not result in slack being taken up in adjacent sections before the stanchion tips over;
- d. the line shall be installed in such a manner that its lowest point is no less than 34 inches nor more than 39 inches from the work surface;
- e. the line forming the *designated area* shall be clearly visible from any unobstructed location within the *designated area* up to 25 feet away;
- f. the stanchions shall be erected as close to the *work area* as is permitted by the task;
- g. the perimeter of the *designated area* shall be erected no less than 6 feet from the unprotected side or edge for work that is both *temporary* and *infrequent*, or not less than 15 feet for other work; and
- h. access to the *designated area* shall be by a clear path formed by two lines attached to stanchions.
- i. If fall protection (e.g., suitable *anchors*) are not feasible for the worker(s) that are solely erecting the *designated area* or fall protection system, they are not required to be tied off, (“first-man(or men)-up-rule”).
However, precautions and fall protection must be used whenever possible during this setup and distance from the edge kept to a maximum.

14. Scaffolds

14.1 Use of Scaffolds

- 14.1.1 **Selection** - the proper *scaffold* selected for the task by the *competent person* is based upon the type of work to be conducted and the working load to be supported. (Each department utilizing *scaffolding* is required to have a trained *competent person*).
- a. Light duty *scaffolds* are intended for workers and tools only. The design load should be that it will support a working load of 25 pounds per square foot;
- b. medium duty *scaffolds* are intended for workers, tools and construction materials. The design load should be that it will support a working load of 50 pounds per square foot; and

- c. heavy duty *scaffolds* are intended for workers, tools, stored materials, and construction materials. The design load of the *scaffold* should be that it will support a working load of 75 pounds per square foot.
- d. All *scaffolds* must be capable of supporting at least four times the design load.

14.1.2 General Requirements

- a. Fall protection (e.g., railings) is required for all *scaffold* use 6 feet or greater above a *lower level*.
- b. All *scaffolds*, where work is conducted in excess of 6 feet in height, shall have 4 inch toeboards;
- c. a *scaffold* shall not be moved while personnel are on it unless it is a mobile *scaffold*, (e.g., a scissor's lift), designed to move while elevated;
- d. follow all manufacturer's guidelines and special warnings if the *scaffold* is commercially produced;
- e. the maximum work level height shall not exceed 4 times the least base dimension of the *scaffold*. (e.g., a four foot by six foot *scaffold* cannot exceed sixteen feet in height at the work platform level);
- f. the minimum working platform width is two feet;
- g. the supporting structure for the *scaffold* must be rigidly braced, using adequate cross bracing or diagonal bracing with rigid platforms at each work level;
- h. working platforms should have a nonslip surface;
- i. *scaffolds* should be used only on an even surface;
- j. the platform surface should be kept clear of extraneous tools and materials;
- k. the work level platform shall be wood, aluminum, plywood planking, steel or expanded metal for the full width of the *scaffold*, except for necessary protected *openings*;
- l. work platforms shall be secured in position;
- m. all work platform planking shall be in compliance with OSHA 1926.453(a)(3)(v). Wood shall be compliance grade lumber. Planks shall be overlapped a minimum of 12 inches and extended over supports 6 - 12 inches;

- n. follow all manufacturer guidelines in the assembly of the *scaffold*. Do not use or assemble the *scaffold*, if unsure of the correct assembly procedure;
- o. hard hats or helmets must be worn within an area beneath elevated work where objects could fall from a height and strike a worker; and
- p. mobile *scaffolds* shall not be moved unless the surface of travel is within 3 degrees of level and free of pits, *holes* and obstructions, and the employee on the *scaffold* has advanced knowledge of the movement.
- q. If the work will involve entering or exiting a mobile scaffold at height ensure that:
 - i. the mobile scaffold is spotted on firm level surface;
 - ii. the platform is within 1 foot of a safe secure structure before exit/entry;
 - iii. workers are aware of and plan for vertical and horizontal platform movement when exiting /entering an elevated platform; and
 - iv. worker(s) moving to the adjacent surface immediately use a suitable means of fall protection on that surface.

14.1.3 Inspection of Scaffolds

Prior to the use of any *scaffold*, an inspection shall be conducted by a *competent person*, and then daily during usage of the *scaffold*. If the *scaffolding* is erected by an outside company, the daily inspections can be done by a UConn *competent person* or it can be performed by a *competent person* from the company that erected it if it is part of the contract. All *scaffold* inspections shall be documented, and records maintained by the *competent person* performing the inspections. Inspections shall be performed in accordance with any manufacturer's requirements including:

- a. carefully examining the *scaffold* for broken or missing cross bracing, broken supporting structure, working platform, and other damaged parts. In addition, all *walking/working surfaces* must be free of grease, oil, paint, or other slippery substances;
- b. mobile *scaffolds* must be equipped with positive wheel lock casters that are secured in place when in use;

- c. the joint between working platform and supporting structure must be tight, and all hardware and fittings must be attached firmly. Movable parts shall operate freely without binding or undue play;
- d. all wood parts must be free of sharp edges and splinters. Visually inspect the *scaffold* to be free of shakes, warping, decay or other irregularities. Metal parts must be free of sharp edges, burrs and corrosion. Inspect for dents or bends in supporting structure, cross braces and *walking/working surfaces*;
- e. check all working platform to support structure connections, hardware connections and rivets. If a *scaffold* tips over, inspect the *scaffold* for damage before continuing work; and
- f. damaged *scaffolds* must be withdrawn from service and either repaired or destroyed. When a defect or unsafe condition is found, personnel shall tag or mark the *scaffold* so that it will not be used until corrective action is taken. Defective or unsafe situations shall be reported to the supervisor. Field repairs and the fabrication of improvised *scaffolds* is prohibited;
- g. *scaffolds* that are erected or used by persons who are not qualified (electrical) persons, shall maintain a minimum safe approach distance of 10 feet to energized power lines and parts at all times.
- h. *Scissors lifts*, considered mobile *scaffolds*, shall be inspected prior to each day's use in accordance with the manufacturer's operator manual and the operator's training and the inspection documented (see Appendix I). Daily inspections shall be performed by individuals who have as a minimum, been trained in accordance with section 7.4.
- i. *Scissors lifts* shall be inspected by a qualified lift mechanic at least every 150 hours of use or annually, whichever occurs first.

14.1.4 Maintenance of Scaffolds

All *scaffold* repairs must be done by a *Competent Person*.

14.1.5 Storage of Scaffolds

Scaffolds should be disassembled prior to storage. *Scaffolds* should be stored where they can be inspected easily and can be reached without causing accidents. The storage area should be well ventilated and away from sources of heat and moisture.

15. *Aerial Lifts*

Aerial lifts include the following types of vehicle mounted aerial devices used to elevate personnel to job sites above ground:

- 15.1 **articulating boom platforms** are designed to reach up and over obstacles;
- 15.2 **extensible or telescoping boom platforms** may extend over one hundred feet;
- 15.3 **vehicle mounted bucket lifts** are used to repair utility lines;
- 15.4 **aerial work platforms and mast lifts** are lightweight and designed for one person to use indoors.

15.5 General requirements

- 15.5.1 *Aerial lifts* shall be inspected prior to each day's use and documented on the *Aerial Lift Pre-use Inspection Checklist* (Appendix I) in accordance with the operator's training . Daily inspections shall be performed by individuals who have as a minimum, been trained in accordance with section 7.4.
- 15.5.2 *Aerial lifts* shall be inspected by a qualified lift mechanic at least every 150 hours of use or annually, whichever occurs first.
- 15.5.3 *Aerial ladders* shall be secured in the lower traveling position before the truck is moved for highway travel;
- 15.5.4 only trained personnel shall operate an *aerial lift* (see section 7.4);
- 15.5.5 employees shall always stand firmly on the flooring of the basket and shall not sit or climb on the edge of the basket or use planks, *ladders*, or other devices for a work position;
- 15.5.6 a *full body harness* shall be worn with a retractable lanyard attached to the anchor point in boom or basket when working from articulated boom lifts and as required by manufacturer for mast lifts. The use of 2, 4 or 6 foot lanyards are prohibited;
- 15.5.7 attaching off to an adjacent pole structure, or equipment while working from an *aerial lift* shall not be permitted;
- 15.5.8 boom and basket load limits specified by the manufacturer shall not be exceeded;
- 15.5.9 the brakes shall be set and when outriggers are used, they shall be positioned on pads or other solid surface. Wheel chocks shall be installed when using an *aerial lift* on an incline;

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- 15.5.10** an *aerial lift* truck shall not be moved when the boom is elevated in a working position, except for equipment which is specifically designed for this type of operation;
 - 15.5.11** articulating and extensible boom platforms shall have both platform and ground controls; and
 - 15.5.12** before moving an *aerial lift* for travel, the boom shall be inspected to ensure that it is properly cradled and outriggers are in the stowed position.
 - 15.5.13** operators using *aerial lifts* outdoors when wind speeds are expected to exceed 15 mph shall use a calibrated multi-directional anemometer and regularly monitor wind speeds, (contact EHS for guidance regarding proper anemometer use). If wind speeds exceed 20 mph for 3 seconds, *aerial lift* operations shall cease. On days where wind speed gusts are predicted to exceed 20 mph, *aerial lift* operations are prohibited.
 - a. Arborists under the direction of a UCFD Incident Commander involved in emergency storm mitigation operations may use a bucket truck *aerial lift* in wind speeds exceeding 20 mph up to but not exceeding the lift truck manufacturer's maximum wind speed limit, determined with a multidirectional anemometer.
 - b. use of sheeting or skirting around the platform of an *aerial lift* is prohibited as it can dramatically affect the lift's stability in wind.
 - 15.5.14** When vacating (or entering) an elevated aerial platform, if permitted by the manufacturer, personnel shall only vacate or enter a raised aerial platform by following the guidelines and instructions provided by the manufacturer. These shall include but are not limited to:
 - a. Request that a *Qualified Person* (fall Protection) evaluate and make recommendations in support of worker safety;
 - b. the lift is spotted on firm level surface;
 - c. platform is within 1 foot of a safe secure structure before exit/entry;
 - d. only one worker exits the platform while attached to the platform's anchorage;
 - e. workers are aware of and plan for vertical and horizontal platform movement when exiting /entering an elevated platform;
 - f. there is *100% Tie-off* if a worker plans to move to the adjacent surface, disconnect from the lift's anchorage and work independently of the lift.

(EXCEPTION: See Section 12.4 for Inspections Prior to or After Construction where 100% tie off is not feasible).

15.6 Minimum Safe Approach Distances (electrical conductors)

Aerial lift baskets or buckets operated by persons who are not qualified (electrical) persons, shall maintain a minimum safe approach distance of 10 feet to energized power lines and parts at all times.

15.7 Touch or Step Potential during Emergency Storm Mitigation Operations

Arborists working in bucket trucks under the direction of a UCFD Incident Commander involved in storm mitigation operations must be sure no electrical lines are intertwined in or pulled down by falling trees they might work on and be aware that wet wood can conduct electricity. Additionally, fallen electrical lines on the ground can energize the ground surface with current that can have fatal consequences. Do not approach downed lines closer than 70 feet until the fallen lines are proven to be de-energized by an electric utility representative.

16. Portable Ladders

16.1 Use of Portable Ladders

The proper *ladder* must be selected for the task. General rules for selection include the following:

- 16.1.1** the *ladder* chosen must be long enough to provide access to the *work area* without necessitating standing on the top two steps of a *step ladder* or the top three rungs of a straight *ladder*;
- 16.1.2** *ladders* must have a legible manufacturer's label indicating the *ladder* type and duty rating;
- 16.1.3** the *ladder* selected must be sufficient for the weight of the employee plus the weight of any tools and materials. Only the use of Type 1, 1A, 1AA portable *ladders* are allowed;
- 16.1.4** when a straight *ladder* is used to gain access to a *roof* or platform, the side rails should extend at least 3 feet above the support point at the eave, gutter, or *roof* line;
- 16.1.5** never splice together short *ladders* to form a longer *ladder*;
- 16.1.6** never place *ladders* on boxes, barrels, or other unstable bases for additional height;
- 16.1.7** *ladders* must be placed on level surfaces. Although *ladder* feet or shoes provide an important measure of safety, they cannot compensate for uneven ground unless they are specially designed with adjustable feet;

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- 16.1.8** nonslip *ladder* feet are not a substitute for safety in placing, lashing, or holding a *ladder* on oily, metal, concrete, or other slippery surfaces;
 - 16.1.9** do not use *ladders* for unintended purposes, i.e, used horizontally as platforms, runways, or *scaffold* planking, or walking surfaces, etc.;
 - 16.1.10** never use a metal *ladder* when working on or near electrical equipment. *Ladders* used by persons who are not qualified (electrical) persons, shall maintain a minimum safe approach distance of 10 feet to energized power lines and parts at all times;
 - 16.1.11** the distance from the bottom of a straight *ladder* to its support wall shall be one-quarter the working length of the *ladder*;
 - 16.1.12** where possible, straight *ladders* should be secured with a rope or wire at the top and blocked at the bottom;
 - 16.1.13** the top two steps and platform of a *stepladder* shall not be used as a step, and the top three rungs of a straight *ladder* shall not be used as a step;
 - 16.1.14** do not over-reach, jump or slide a *ladder* while on it. *Ladders* shall not be moved, shifted, or extended while occupied;
 - 16.1.15** always face the *ladder* and use both hands while ascending or descending.
 - 16.1.16** Tools or materials should be raised by means of a rope after the climber has reached the working position. Carrying heavy loads up or down *ladders* is prohibited;
 - 16.1.17** barricades and warning signs, or safety monitors shall be posted when *ladders* are placed near doors or other locations where they could be struck;
 - 16.1.18** two workers shall handle and set up all extension *ladders*;
 - 16.1.19** *ladders* should not be used by more than one person at a time unless they are designed for such use;
 - 16.1.20** the bracing on the back-side rails of *stepladders* is designed only for increasing stability, not for climbing unless otherwise indicated on the labeling;
 - 16.1.21** extension *ladders* must have proper overlap between the two sections:
 - a. Three foot overlap for 32 foot *ladder*;
 - b. Four foot overlap for 32 to 36 foot *ladder*;
 - c. Five foot overlap for 36 to 48 foot *ladder*; and
 - d. Six foot overlap for 48 foot *ladder*.

- 16.1.22** Make certain that both automatic locks of the extension *ladder* are in proper position before ascending the *ladder*.

16.2 Inspection of Portable Ladders

Prior to use of any *ladder*, the user must perform an inspection. This includes carefully examining the *ladder* to ensure:

- 16.2.1** the *ladder* has no broken or missing rungs or cleats, broken side rails, *ladder* feet and other damaged parts;
- 16.2.2** all cleats, rungs, and side rails must be free of grease, oil, paint, or other slippery substances;
- 16.2.3** the *ladder* must be equipped with feet that are secured in place;
- 16.2.4** the joints between steps and side rails must be tight, and all hardware and fittings must be attached firmly. Movable parts must operate freely without binding or undue play;
- 16.2.5** all wood parts must be free of sharp edges and splinters;
- 16.2.6** the *ladder* must be free of loose parts, warping, decay, or other irregularities;
- 16.2.7** the *ladder's* rating labels are legible and a Type 1, 1A or 1AA *ladder*.
- 16.2.8** metal *ladders* must be free of sharp edges, burrs and corrosion dents or bends in side rails, rungs or cleats;
- 16.2.9** if a *ladder* tips over, for any reason, inspect the *ladder* for damage before continuing work.

16.3 Maintenance of Portable Ladders

A damaged ladder must be removed from service and either repaired or disposed of unless it has been involved in an incident involving a worker injury or a near-miss. In which case, it must be tagged out and retained until an official incident investigation has been performed by Environmental Health and Safety.

- 16.3.1** Generally, repairs constitute replacement of removable feet or replacing rating labels of the portable ladder. Repairs beyond this are NOT endorsed by the manufacturer. Prior to disposal of an unrepairable ladder, it shall be made un-usable, (e.g., cut in half with a reciprocating saw), to prevent potential injuries by persons that might salvage the ladder from disposal and

attempt to re-utilize the damaged ladder at work or for personal use after its disposal.

- 16.3.2 When a defect or unsafe condition is found, personnel should tag or mark the ladder so that it will not be used until corrective action is taken. Defective or unsafe conditions must be reported to the supervisor.
- 16.3.3 Field repairs and the fabrication of improvised ladders are prohibited. Never try to straighten a bent or bowed ladder. Remove it from service immediately. Do not paint wooden ladders with solid color paints. This may mask cracks in the wood and make them hard to see. Clear wood preservative can be used to protect bare wood.
- 16.3.4 Fiberglass ladders stored outside will in time will exhibit “fiber bloom.” This is a mainly aesthetic condition caused by ultraviolet (UV) radiation exposure from sunlight that can cause user discomfort if exposed fibers contact the skin. Fiber blooming can influence the electrical properties of the ladder’s railings as well, as the roughened surface can pick up contamination such as dirt or grease that can form an “electrical track” along the ladder’s railings.
- 16.3.5 Ladders stored out-of-doors for extended periods of time can have the effect of weathering decreased by semi-annual waxing of the rails. A good commercial non-slip paste wax, such as Trewax Paste Wax, will reduce the possibility of glass fiber prominence.
- 16.3.6 Ladders exhibiting fiber bloom can have extended life and reduced potential for glass fiber prominence by periodic coating with certain acrylic lacquers, polyurethane coatings, or similar materials. The UV protectant additive employed in the original resin formulation for fiberglass ladders is gradually consumed during sunlight exposure. These subsequent coatings can replace the UV screen or barrier and reduce contact to exposed fibers. Any coating applied fiberglass ladders must be di-electric in nature to prevent electric conduction.
- 16.3.7 If a ladder is exposed to grease, oils or other slippery substances, the ladder must be cleaned of the substance with solvents or steam. If the slippery substance is not completely removed, the ladder must be removed from service.

16.4 Storage of *Ladders*

Ladders should be stored where they can be inspected easily and can be reached without causing accidents.

17. Fixed *Ladders* and Industrial Stairs

17.1 Fixed *Ladders*

17.1.1 Fixed *ladders* shall:

- a. support their maximum intended load;
- b. support added anticipated loads caused by ice buildup, winds, rigging and impact loads resulting from using *ladder* safety devices;
- c. have rungs of metal *ladders* must have minimal diameter of three quarters inch;
- d. have rungs must be at least 16 inches wide, and spaced 12 inches apart;
- e. *fixed ladders*, when their location so demands, must be painted or treated with a preservative to resist deterioration;
- f. have the preferred pitch for a safe descent is between 75 to 90 degrees. *Ladders* with 90-degree pitch must have 30 inches of clearance on the climbing side. There must be a three-foot clearance on *ladders* with a 75-degree pitch;
- g. *Fixed ladder* shall have at least a seven-inch clearance behind the *ladder* to provide adequate toe space;
- h. shall have a clear width of 15 inches on each side of the center line of the *ladder*, unless the *ladder* is equipped with a cage or well;
- i. have cages if they ascend to heights exceeding 20 feet, except on chimneys.
- j. Newly installed *fixed ladders* that extend more than 24 feet above a *lower level* must be equipped with a *personal fall arrest system* or a *ladder safety system (vertical lifeline)*. Any existing *fixed ladders* that extend more than 24 feet above a *lower level* must have *personal fall arrest systems* installed by November 18, 2036, unless sections/portions or entire *ladders* are replaced before.
- k. The *personal fall arrest system* or *ladder safety system* shall provide protection throughout the entire vertical distance of the *ladder*, including all *ladder* sections; and the *ladder* has rest platforms provided at maximum intervals of 150 feet.

- l. *Fixed ladders* having a cage or well must be offset from adjacent sections and provide landing platforms at least every 50 feet.
- m. Side rails must extend at least 42 inches above the landing.
- n. *Personal fall arrest system* or *ladder safety system* can be used on *fixed ladders* with cages or wells as long as the cage or well does not interfere with the operation of the system.
- o. The maximum number of persons a *ladder safety system (vertical lifeline)* can accommodate shall be posted at each level from where the *ladder* can be accessed.

17.2 Fixed *industrial stairs*

The following applies to all stairs designed on to or is an integral part of machinery, generally used to provide access to equipment, machinery, tanks etc. This does not apply to standard building stairs used for egress:

- 17.2.1** riser height and tread width of fixed *industrial stairs* should be uniform throughout any flight of stairs. All treads must be reasonably slip resistant;
- 17.2.2** the minimum permissible width of a stairway is 22 inches;
- 17.2.3** the angle to the horizontal made by the stairs must be between 30 and 50 degrees;
- 17.2.4** all stairs should be adequately lighted; and
- 17.2.5** if the *tread depth* is less than 9 inches, the risers should be open.

17.3 Flights of *industrial stairs* having four or more risers:

- 17.3.1** a stair railing is required on each opened side;
- 17.3.2** if the stairway is less than 44 inches wide and both sides are enclosed, at least one handrail is required, preferably on the right-side descending;
- 17.3.3** if the stairway is greater than 44 inches wide a handrail is required on each enclosed side;
- 17.3.4** if the stairway is greater than 88 inches wide an intermediate stair railing located midway is required;
- 17.3.5** the vertical height of a stair railing must be 30 to 34 inches, and it must be of construction similar to the standard *guard railing*; and
- 17.3.6** spiral stairways are not permitted except for special limited usage and secondary access situations where it is not practical to provide a conventional stairway.

17.4 Embedded Stairs

Individual steps used for access or egress, embedded in the walls of risers or the conical top sections of manholes must be safe, well-constructed, and installed in accordance with good engineering practices;

- 17.4.1** individual rungs or steps must be uniformly spaced from 12 to 16.5 inches; and
- 17.4.2** the use of steps in personnel access *holes* should be designed to prevent the foot from sliding off the end.

17.5 Alternating Tread Stairs

Alternating tread type stairs are permitted if they are installed, used, and maintained according to the manufacturer's recommendations:

- 17.5.1** the stair must be installed at an angle of 70 degrees or less; and
- 17.5.2** the stairs must be equipped with a handrail at each side to assist the workers in climbing or descending.

18. Walking/Working Surfaces

In general, all areas of the workplace should be kept clean, orderly, sanitary, and as dry as possible. These guidelines and engineering controls apply to *work areas*, passageways, mechanical rooms, store rooms, and service rooms and stairs:

- 18.1** all spills should be cleaned promptly. Floors in *work areas* must be kept free of scraps, chips, oil spills, and other debris or obstructions;
- 18.2** maintaining stair treads free of loose, uneven or broken surfaces;
- 18.3** boxes, chairs, buckets, desks or any other device not specifically intended for use in extending reach shall not be used for this purpose;
- 18.4** areas which are constantly wet should have non-slip surfaces or mats where workers may walk or work. Where wet processes are used, good drainage must be maintained;
- 18.5** every floor, working place, and passageway must be maintained free from protruding nails, splinters, *holes*, and loose boards;
- 18.6** where mechanical handling equipment is used, such as lift trucks, sufficient safe clearance must be provided for foot and vehicular traffic;
- 18.7** no obstructions that could create a hazard are permitted in aisles. All permanent aisles must be easily recognizable; and

18.8 as a general condition, a standard *toe board* and *guard rail* are required wherever people walk near or beneath the open sides of a platform or similar structures; where things could fall from a structure; or where things could fall from a structure into machinery below.

19. Arboricultural Operations

Employee use of *ladders* or *aerial lifts* for tree work shall be performed in accordance with The University of Connecticut [Arboricultural Operations Procedures](#).

20. Theatrical Production Rehearsals and Performances

20.1 Fall protection plans shall be developed and implemented for theatrical production rehearsals/ performances using “BSR E1.46-2018 Standard for the Prevention of Falls from Theatrical Stages and Raised Performance Platforms” as a guidance document.

20.2 Theatrical production rehearsals and performances where aerial effects (flying performers) are used shall be developed and implemented using “BSR E1.43-2016 Entertainment Technology-Live Performer Flying Systems” as a guidance document.

21. Rescue Plan and Rescue

21.1 Prompt rescue must be provided for personnel who have fallen by dialing 9-1-1 or radioing for help. Individuals suspended from personal fall protection devices can face *suspension trauma* if not rescued within 15 minutes. All elevated work requires pre-planning to be able to act quickly in the event of a fall. With simple everyday portable *ladder* use, the simple plan to call 911 may be sufficient. In complex elevated work operations, pre-job safety briefings for teams are highly recommended as a means to reinforce the rescue plan, safe work practices, etc. to all workers on the team.

21.2 For operations involving aerial/scissor lifts or *roofing work*, a minimum two-person team (with at least one on the ground for lift work) is required to ensure that prompt rescue is initiated in the event a worker falls.

21.2.1 To prevent *suspension trauma* and ensure prompt rescue can take place in the event of a fall:

- a. All team members must know how to lower the lift using ground controls; and
- b. before starting elevated work, ground personnel shall ensure they have the reliable communication means to summon rescue services. (e.g., radio checks with the Facilities Operations Center, or if using a cell phone, verify you have good cell phone signal strength).

- 21.2.2** Due to the inherent risks associated with tree cutting and trimming, employees performing arboricultural operations involving *aerial lifts*, shall notify the University of Connecticut Fire Department (UCFD) through the Facilities Operations Center prior to the start of aerial operations. Arborists will cease operations if UCFD informs the Operations Center that they are responding to a committed call and is not available to provide a prompt rescue response. (See [Arboricultural Operations Procedures](#)).

References

29 CFR 1926 Subpart M	"Fall Protection,"
29 CFR 1910 Subpart D	"Walking and Working Surfaces,"
29 CFR 1910 Subpart F	"Powered Platforms, Manlifts, and Vehicle-Mounted Platforms,"
29 CFR 1926 Subpart L	"Scaffolds,"
29 CFR 1910.268 Subpart R	"Telecommunications,"

29 CFR 1910.269 Subpart R Electric Power Generation, Transmission, and Distribution.

BSR E1.43 Entertainment Technology—Live Performer Flying Systems

BSR E1.46 Standard for the prevention of falls from theatrical stages and raised performance platforms

Appendix I

AERIAL LIFT PRE-USE INSPECTION FORM

AERIAL LIFT PRE - USE INSPECTION CHECKLIST			
Operator Print Name and Sign			Aerial or Scissor Lift ID#
Unit Type	<input type="checkbox"/> Scissor Lift	<input type="checkbox"/> Articulating Boom	<input type="checkbox"/> Mast Lift
	<input type="checkbox"/> Bucket Truck	Other _____	
	Date	Location of Use	
#	Section I: Inspection Item and Description		P/F/NA
1	Self-locking gate or toprail/midrail safety chains in good working condition		
2	Operating controls are in proper working condition, EMO button or Emergency Stop Device functional		
3	Upper drive control interlock (i.e. foot pedal, spring lock, or two hand controls) are functional		
4	Emergency lowering function operates properly and lower controls successfully override the upper controls		
5	Both upper and lower controls are adequately protected from inadvertent operation.		
6	Control panel is clean & all buttons/switches are labeled and clearly visible (no paint over spray, etc.)		
7	All switch & mechanical guards are in good condition and properly installed		
8	All safety indicator lights work		
9	Drive controls function properly & accurately labeled (up, down, right, left, forward, back)		
10	Motion alarms are functional		
11	Safety decals are in place and readable		
12	Work platform & extension slides are clean, dry, & clear of debris		
13	Work platform extension slides in and out freely with safety locking pins in place		
14	Inspect for defects such as cracked welds, fuel leaks, hydraulic leaks, damaged control cables or wire harness, etc.		
15	Tires and wheels are in good condition, with adequate air pressure if pneumatic		
16	Braking devices are operating properly		
17	Tail board meeting with lift and ground crews to discuss safety and rescue plan has occurred		
18	Oil level, hydraulic oil level, fuel level, coolant level		
19	Battery charge		
20	Outriggers in place or functioning. Associated alarms working		
21	Manufacturer's operators manual is stored on Aerial platform		
22	Anchor points and guard railings in place and in good condition		
23	Periodic Inspection sticker displayed and posted within last 12 months		
24	Operator has received EHS Fall Protection Training and has a documented Aerial Lift Operator's Training		
Section II: Safety Precautions (Have, Look For, or be Aware of)			Check to Confirm
Personal Protection req'd. (fall protection harnesses, retractable lanyards, helmet etc.), (6ft lanyards prohibited)			
If windy conditions are expected, (greater than 15mph), see Fall Protection Program guidelines for multi-directional anemometer use requirement. Lift operations will cease if wind speed is \geq 20mph for 3 seconds.			
Ground surface conditions: drop offs, holes, uneven surfaces, wet ground, curbs, and sloped floors.			
Housekeeping: Debris, floor obstructions, cords, construction material and supplies.			
Electrical power cables or devices, (minimum 10 feet away). If larger lines or wet conditions contact EH&S or the Electrical shop for guidance.			
Underground tanks or utilities e.g., chemical lines, gas lines, sewer lines, steam, water, electrical ductbanks, etc.			
Overhead obstructions, i.e., trees, power lines, light poles, building structures,			
Loads (do not exceed lift capacity - be sure to include weight of personnel, tools, and materials)			
Evaluate vehicular and pedestrian traffic. Setup work zone signs and/or traffic channeling devices as necessary.			
Comments:			
If the aerial lift fails and part of this inspection, remove the key and report the problem to your supervisor. Do not attempt to make repairs unless you are a trained and authorized service person. All service is to be documented. Report any unauthorized modifications.			

Appendix II Rooftop Maintenance Decision Tree Tool

