

# **Palm Beach State College**

*Florida's First Public Community College*



## **FALL PROTECTION PROGRAM**

# Palm Beach State College

## Fall Protection Program

### IDENTIFICATION OF FALL HAZARDS

Fall hazards include the following:

- Any floor opening, floor hole, window or wall opening, or other walking-working surfaces with a vertical drop of four feet or more to the next lower level.
- Any elevated work surface, including a roof, a scaffold with unguarded sides, or an aerial lift, more than four feet above the next lower level.

**Elimination of fall hazards will be the first consideration for Palm Beach State College (the College). If a fall hazard cannot be eliminated, effective fall protection will be planned, implemented, and monitored to control the risks of injury due to falling.**

### SCOPE

This Fall Protection Program shall apply to all employees working at height, i.e., an elevated work surface, which includes a roof, a scaffold with unguarded sides, or an aerial lift. **Employees are not allowed to perform any duties which require the employee to 1) get closer than six feet to an unprotected edge of a roof more than four feet above the next lower level or 2) work on a scaffold with unguarded sides or in an aerial lift unless the employee is properly secured from falling or appropriate fall protection measures are employed, and the employee has been trained in their use.**

This Fall Protection Program does not apply to the requirements contained in OSHA's Walking-Working Surfaces regulations, including 29 CFR 1910.23 (Guarding floor and wall openings and holes), 29 CFR 1910.24 (Fixed industrial stairs), 29 CFR 1910.25 (Portable wood ladders), 29 CFR 1910.26 (Portable metal ladders) and 29 CFR 1910.27 (Fixed ladders). The requirements of these regulations, including the use of standard railings, floor-hole covers, standard toe boards, standard skylight screens, or equivalent barriers that prevent employees or materials from falling, shall be followed in lieu of those prescribed in this Fall Protection Program.

### DEFINITIONS

**Aerial lift:** This is 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. See Attachment 1 for examples of an aerial lift and for guidance on their use.

**Anchorage:** A secure point of attachment for lifelines, lanyards, or deceleration devices.

**Body belt:** A strap with means for both (a) securing it about the waist and (b) attaching it to a lanyard, lifeline, or deceleration (grabbing) device. **The use of body belts at the College is prohibited.**

**Competent person:** A person who can identify 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.

**Deceleration device:** Any mechanism, such as a rip stitch lanyard, tearing or deforming 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.

**Elevated work surface:** A roof surface within six feet of an edge, a work platform (e.g., a scaffold with unguarded sides) more than four feet above a lower level, and an aerial lift.

**Fall restraint:** Equipment that keeps a person from reaching a fall point, such as a roof's edge or the railing of an aerial lift device. Examples include a parapet of at least 42 inches in height, standard railing (see definition below), and a full-body harness attached to a securely rigged restraint line, which is a device that is attached between the employee and an anchorage to prevent the employee from walking or falling off an elevated work surface.

**Full-body harness:** An interconnected set of straps that may be 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 harness to other components of a personal fall arrest system.

**Horizontal lifeline:** A component consisting of a flexible line for connection to an anchorage at both ends to stretch horizontally and which services as a means for connecting other components of a personal fall arrest system to the anchorage. These allow workers to move along the whole length of the anchor, usually without needing to disconnect.

**Lanyard:** A flexible line of rope, wire rope, or strap that generally has a connector at each end for securing the full-body harness to a deceleration device, lifeline, or anchorage.

**Low-slope roof:** A roof having a slope less than or equal to 4 in 12 (vertical to horizontal).

**Personal fall arrest system:** A system used to arrest a person in a fall from a working level. It consists of an anchorage, connectors, and a full-body harness and may include a lanyard, deceleration device, lifeline, or suitable combinations of these.

**Positioning device system:** 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. A

positioning device is not recognized as fall arrest equipment. **Positioning device systems are generally not utilized at the College.**

**Qualified person:** A person with a recognized degree or professional certificate and extensive knowledge and experience in the subject field who is capable of design, analysis, evaluation, and development of specifications in the subject work, project, or product.

**Rope grab:** A deceleration device that moves along a vertical lifeline. The device automatically engages and locks on the lifeline when a worker falls.

**Scaffold:** Any temporary elevated or suspended platform and its supporting structures, used for supporting workers or materials. See Attachment 2.

**Self-retracting lifeline:** A deceleration device containing a drum-wound line that can be slowly extracted from, or retracted onto, the drum under slight tension during normal movement, and which, after the onset of a fall, automatically locks the drum and arrests the fall (usually within two feet or less).

**Standard railing:** A barrier erected along exposed edges of a roof, floor opening, wall opening, ramp, platform, or runway to prevent falls of personnel. The term “guardrail” is included in this definition. A Standard railing consists of a top rail, intermediate rail, and posts and has a vertical height of 42 inches nominal from the upper surface of the top rail to the roof, floor, platform, runway, or ramp level. The intermediate rail is approximately halfway between the top rail and the roof, floor, platform, runway, or ramp.

**Standard toe board:** A vertical barrier at floor level erected along the exposed edges of a floor opening, wall opening, platform, runway, or a ramp to prevent the fall of materials. A standard toe board is four inches nominal in vertical height from its top edge to the level of the floor, platform, runway, or ramp, with not more than ¼-inch clearance above floor level.

**Steep roof:** A roof having a slope greater than 4 in 12 (vertical to horizontal).

**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 locking snap hooks with a self-closing, self-locking keeper which remains closed and locked until unlocked and pressed open for connection and disconnection are permitted in fall protection systems at the College.**

**Tie-off:** The act of an employee, wearing personal fall protection equipment, connecting directly or indirectly to an anchorage. It also means the condition of an employee being connected to an anchorage.

**Unprotected edge:** Any side or edge (except at entrances to points of access) of a walking/working surface, e.g., roof, floor, ramp, or runway where there is no wall or standard railing system.

## **RESPONSIBILITIES**

### **A. Safety & Risk Department**

- Provide technical information and assistance to the College's departments in implementing an effective fall protection program.
- Provide and/or coordinate fall protection training as needed.
- Aid departments with the purchase of fall protection equipment.
- Review and revise this Fall Protection Program as needed for compliance with applicable regulations.

### **B. Facilities Planning and Construction**

- Design projects to be consistent with OSHA requirements for Walking-Working Surfaces and design engineering controls for fall protection, such as standard railing and anchorage points, for occupant use and maintenance work into projects wherever feasible.
- Monitor Facilities contractor compliance with OSHA-required fall protection regulations.

### **C. Contractors**

- Comply with all applicable OSHA regulations.
- Maintain and enforce their own fall protection program.

### **D. Supervisors**

- Ensure that their personnel are trained in the recognition of fall hazards.
- Ensure that their personnel are informed, trained, and provided with the appropriate fall protection systems and equipment to be protected while working at height.
- Ensure that their personnel properly wear and use the appropriate fall protection equipment.
- Coordinate the correction of unaddressed fall hazards brought to their attention by their employees.

### **E. Competent Persons**

- Receive training for "competent person" and maintain status.
- Implement all aspects of the fall protection program and act as the "competent person" for work areas and job sites under their control that contain fall hazards.

### **F. Employees**

- Complete fall protection training requirements and request further instruction if unclear.
- Conduct assigned tasks in a safe manner and properly wear fall arrest and other assigned personal protective equipment.

- Comply with the Fall Protection Program and any additional safety recommendations provided by the supervisor and the Safety & Risk Department regarding fall protection.
- Bring any unaddressed fall hazards to the attention of their supervisor.

## GENERAL REQUIREMENTS

A. Use of the Buddy System. **No employee shall be allowed to work alone in an unprotected elevated area unless they are using a fall restraint consisting of a restraint line attached to a full-body harness or a personal fall arrest system consisting of a full-body harness and a self-retracting lifeline, connected to an appropriate anchorage. If possible, another employee should be present when someone is working at height. Personnel working at height shall be equipped with a two-way radio, either tethered to their full-body harness or in a closable holster, for communication.**

B. Preferred Controls. The following controls, including engineered controls, are preferred for protecting employees from falling when working at height, i.e., an elevated work surface, which includes a roof, a scaffold with unguarded sides, or an aerial lift, in lieu of using fall protection equipment:

1. *On Roofs*. A standard railing or a 42-inch-high parapet is preferred at roof edges when frequent access (more than four times a year) is required. For infrequent access, or if a standard railing or parapet is not present or is infeasible, one of the fall protection techniques described in Section I below may be used.
2. *On Other Elevated Work Surfaces*. The standard railing is preferred for fixed elevated platforms (except the working sides of loading docks and the exposed perimeters of entertainment stages where there is a drop of more than four feet), scaffolds, mezzanines, catwalks, and balconies when frequent access is required. For infrequent access at these locations or if the standard railing is infeasible, fall protection equipment may be used.
3. *Construction Activities*. For construction-related activities exposing employees to unprotected heights over six feet (the construction industry OSHA requirement), acceptable means to reduce fall hazards include:
  - a. Bringing the work down to ground level.
  - b. Scaffolding.
  - c. Ladders.
  - d. Elevating work platforms and aerial lifts.
  - e. Using restraint lines, work positioning, and personal fall arrest systems only if other methods are infeasible.
4. *Restraint Line*. A restraint line is a fall restraint device that is attached between the employee and an anchorage, and which is so rigged to allow the movement of an employee only as far as the sides and edges of an elevated work surface to prevent the employee from walking or falling off the surface. It does not support an employee on an elevated work surface, but rather, prevents the employee from leaving the surface or work position. **Restraint lines are preferred to the use of personal fall arrest systems at**

the College due to their ability to prevent free fall and thereby eliminate the potential need for conducting a rescue.

5. *Guardrails*. The work platform or basket of all aerial lift devices must have a guardrail. **Although this guardrail provides fall protection, the College requires that fall protection equipment, either fall restraint consisting of a restraint line attached to a full-body harness or a personal fall arrest system consisting of a full-body harness and a self-retracting lifeline, connected to an appropriate anchorage located on the lift be used on all aerial lift devices.**

C. Fall Protection Equipment. Fall protection equipment must be used to minimize fall hazards when preferred controls are infeasible or do not eliminate the hazard. Fall protection equipment is divided into the following functional categories:

1. *Fall Restraint*. A fall restraint typically consists of a restraint line attached to a full-body harness that secures the employee to an anchorage using a lanyard short enough to prevent the employee's center of mass from reaching the fall hazard. Other fall restraint measures include a parapet of at least 42 inches in height and a standard railing.
2. *Personal Fall Arrest System*. A personal fall arrest system consists of an anchorage, connectors (shock-absorbing lanyards, self-retracting lifelines) and a full-body harness. **Self-retracting lifelines are preferred over shock-absorbing lanyards, and they are required in lieu of them when using aerial lift devices at the College.** Personal fall arrest systems shall follow the system design and performance criteria and the care and use requirements contained in 29 CFR 1910.66 Appendix C, Section I. All fall protection equipment used at the College shall meet or exceed appropriate American National Standards Institute (ANSI) standards contained in ANSI Z359, Fall Protection Code, in terms of construction, materials used, breaking strengths, tensile strengths, arresting forces, potential impact energy, etc. College 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:
  - a. Full-Body Harness - **The use of a body belt at the College is prohibited.** Only full-body harnesses shall be used. Attachment 3 provides a guide to harness features. Attachment 4 provides instructions on how to put on a harness.
  - b. Connecting Devices (shock-absorbing lanyards and self-retracting lifelines)
    - The lanyard is a connecting device, a flexible line used to secure a full-body harness to an anchorage. There are two basic categories of lanyards: non-shock-absorbing and shock-absorbing. The more common and safer type is the shock-absorbing lanyard, which comprises almost all lanyards sold today.
    - Shock-absorbing lanyards extend deceleration distance during a fall, significantly reducing fall-arresting forces by 65 to 80 percent, below the threshold of injury, as specified by OSHA and recommended by ANSI. One of the most reliable constructions includes a special shock-absorbing inner core material surrounded by a heavy-duty tubular outer jacket that doubles as a backup web lanyard. In accordance with OSHA regulations, all lanyards made today are required to have

self-closing, self-locking snap hooks to reduce the possibility of unintentional disengagement, or rollout. **Although shock-absorbing lanyards may be appropriate to use in certain fall protection scenarios at Palm Beach State College, the use of self-retracting lifelines is preferred.**

- Lanyards shall not exceed six feet in length. Self-retracting lifelines should generally be no more than six feet in length, although certain tasks, e.g., painting, may require longer ones.
- A fully deployed shock-absorbing lanyard requires a fall clearance of at least 15-1/2 feet to prevent a worker from striking a surface below, based on the 6-foot lanyard length, a deceleration distance of 3-1/2 feet (due to the shock absorber) and a worker height of 6 feet. **Accordingly, rather than a shock-absorbing lanyard, either a fall restraint (i.e., a restraint line) or a self-retracting lifeline must be used on boom-supported work platforms in order to ensure that the worker remains within the confines of the work platform whenever it is at a height less than 15-1/2 feet above ground or during movement of the aerial lift when forces from the “catapult effect” could cause the occupant to be thrown from the work platform.**
- See Attachment 5 for additional information on types of lanyards.
- **Self-retracting lifelines are alternative connecting devices to shock-absorbing lanyards; they are preferred over shock-absorbing lanyards at Palm Beach State College.** While traditional six-foot shock-absorbing lanyards allow for a maximum of six feet of free-fall distance prior to activating, and another 3-1/2 feet maximum of deceleration distance prior to arresting, self-retracting lifelines can arrest free falls in only a few inches. With a shorter activation distance and shorter overall arresting distance, self-retracting lifelines reduce the risk of hitting the ground or any obstructions at a lower level. In addition, they allow for easier rescue in the event of a fall. Examples of self-retracting lifelines are shown below.



- **Self-retracting lifelines shall always be used when fall clearance is less than 15-1/2 feet. They may be used in lieu of fall restraint on a boom-supported work platform.** See Attachment 6 for the determination of fall clearance.
- Horizontal lifelines shall be designed, installed, and used under the supervision of a qualified person, as part of a complete personal fall arrest system, which maintains a safety factor of two.
- **On suspended scaffolds with unguarded sides 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.

- Lifelines shall be protected against cuts and abrasions.
- Each employee shall be attached to a separate lifeline when vertical lifelines are used.
- Snap hooks will not be connected to webbing, rope, wire, or to a horizontal lifeline.
- Snap hooks will not be connected to each other.
- Not more than one snap hook will be connected to any single D-ring.

c. Anchorages

- Anchorages used for personal fall arrest systems must be independent of any anchorage being used to support or suspend platforms. All anchorages must be designed and installed in accordance with ANSI Z359.
- A qualified person shall determine all anchorages, both temporary and permanent. Permanent anchorages shall be properly marked and approved by a Professional Engineer.
- Permanent anchorages used for fall arrest or used for positioning devices shall be inspected annually or before use by a competent person or Professional Engineer.
- Personal fall arrest systems shall be attached to an anchorage; they shall not be attached to standard railings or hoists.
- Employees should always tie off to an anchorage above the head where possible.
- OSHA requires that anchorages be rigged such that an employee can neither free fall more than six feet, nor contact any lower level.

3. *Positioning Device System.* A positioning device is used to hold a worker in place while allowing a hands-free work environment at elevated heights on a vertical surface, such as a wall, and/or restrict the worker's movement to prevent reaching a location where a fall hazard exists. It is not a substitute for a personal fall arrest system, and therefore a backup fall arrest system must be used. A typical positioning device system consists of an anchorage, a full-body harness, and a connecting device (positioning lanyard). **Although generally not utilized at the College, where a positioning device system is used, it shall comply with the following:**

- a. Only a full-body harness shall be worn as part of a positioning device system. **Body belts are not allowed at the College.**
- b. Positioning device systems shall be rigged such that a free fall cannot be more than two feet.
- c. The anchorage must be designed and installed in accordance with ANSI Z359.

4. *Suspension System.* Personal suspension systems are used for window washing and painting and are designed to lower and support a single worker to perform tasks. (A suspension scaffold would be used for window washing and painting by multiple employees.) **Suspension systems are generally not utilized at the College.** The components of a suspension system are:

- a. Anchorage
- b. Full-body harness.

- c. Connecting device (work line).
- d. Suspension device, such as a boatswain's chair. A boatswain's chair system is considered a single-point adjustable suspended scaffold. Since the suspension system is not designed for fall arrest, a backup fall arrest system must be used.

D. Life Expectancy of Harnesses and Lanyards. In general, harnesses and lanyards that exhibit no visual damage and that have not been exposed to abnormal heat or excessive ultraviolet light can be expected to have a five-year life expectancy from the date of first use. It is possible that the equipment will last longer depending on the care and use the equipment may see. **Because of the much greater degree of wear and exposure experienced by the fall protection equipment used by the Facilities painters, it shall be replaced at least every two years.**

E. Equipment Inspection and Maintenance

1. *Impact Loading*. **Personal fall arrest systems or components (harness, lanyard, or self-retracting lifeline) that have been used to arrest a fall (impact loading) must be immediately removed from service, cut up, and disposed of properly. The anchor shall not be used again until a competent person has inspected it and determined it to be undamaged and suitable for reuse.**
2. *Inspection and Maintenance*. **Personal fall arrest systems shall be visually inspected by the user prior to each use for mildew, wear, damage, and other deterioration. Defective or questionable components shall be immediately removed from service to be cut up and disposed.** In addition, all fall protection equipment shall be similarly inspected at least once a year by a competent person. This inspection shall be documented as shown in Attachment 7.
3. *Maintenance*. In general, when needed, fall protection devices should be washed in warm water using a mild detergent, rinsed thoroughly in clean warm water, and allowed to dry at room temperature. Store equipment in a clean area away from strong sunlight and extreme temperatures. Check the manufacturer's recommendations for specific cleaning, maintenance, and storage information.
4. *Additional Information*. See Attachment 8 for recommended inspection and cleaning procedures.

F. Additional Personal Protective Equipment. Any other PPE deemed necessary for the task to be performed by the employee must be worn. This includes, but is not limited, to hard hats, gloves, and safety glasses. Hard hats shall be worn within an area beneath elevated work where objects could fall from a height and strike a worker below.

G. Training. Before using a personal fall arrest system, and after any component or system is changed, employees shall be trained in the safe use of the system consistent with the guidance in 29 CFR 1910.66(i)(1). Training shall be arranged through the Safety & Risk Department. Employees shall be trained in the following:

1. Personal fall arrest system inspection, care, use, and performance.
2. Recognition of safety hazards when working at height.

3. Safe practices when working at height.
4. Rescue procedures in the event of a fall.

H. Rescue. The Fall Rescue Plan described in Attachment 9 must be implemented immediately in the event of a fall from height while wearing a personal fall arrest system. When a fall from height while wearing a personal fall arrest system occurs, suspension trauma can be the result. Following the fall, the employee is suspended in an upright position with legs dangling and the full-body harness straps exert pressure on leg veins, compressing them and reducing blood flow back to the heart. This causes pooling of the blood in the veins, which can lead to potentially fatal reduced blood flow to the brain and other vital organs, such as the kidneys. **Suspension trauma in a fall arrest device can result in unconsciousness followed by death in less than 30 minutes.** A U.S. Air Force study showed adverse effects on a person after 15 minutes. Accordingly, it is essential that rescue be undertaken promptly. OSHA interprets that to be “in time to prevent serious injury to the worker.”

Following the rescue of the fallen employee, it is vitally important for everyone to remember that normal first aid rules do not apply in the case of rescue trauma. If the suspended employee has lost consciousness, the rescue personnel must be careful in handling such a person or death may occur. **DO NOT LAY THE RESCUED PERSON DOWN IN A HORIZONTAL POSITION.** The blood which has pooled in the legs is prevented from collecting oxygen from the lungs and becomes oxygen-deficient and “stale”. It becomes loaded with carbon dioxide and is contaminated with toxins resulting from the body’s metabolizing processes. If the casualty is laid down during the rescue, the stale blood rushes back to the heart and vital organs. This rush of deoxygenated and toxic blood can cause death by heart attack or result in organ failure days after the event. The current recommended procedure following a rescue is to keep the casualty in a knees-bent “W” sitting position for 30 to 40 minutes before moving the casualty to a lying down horizontal position. This action partially closes the femoral artery, allowing any pooling of blood to be slowly released back toward the heart. The blood is then able to be re-processed, preventing toxic shock. **Emergency and medical personnel must not be allowed to lay the casualty down or transfer the person to a stretcher before allowing any pooling of the blood to be slowly released back toward the heart.**

I. Roofs. The hazards associated with work on roofs include falling through openings and falling off edges. Effective roof work fall protection techniques are intended to protect workers while providing the mobility and comfort necessary to perform work tasks.

1. *Low-Sloped Roofs* - All employees working on low-slope roofs with unprotected sides and edges four feet or more above the lower levels shall be protected from falling by one of the following: standard railing; a parapet at least 42 inches in height; a warning line, which serves as a barrier that cannot be crossed; or a personal fall arrest system.
2. *Steep Roofs* - All employees on a steep roof with unprotected sides and edges four feet or more above the lower levels shall be protected by one of the following: standard railing with toe boards; a parapet at least 42 inches in height; or a personal fall arrest system.

## ATTACHMENT 1

### Aerial Lifts

An aerial lift is any vehicle-mounted device used to elevate personnel to perform above-ground work. The term “aerial lift” may also include aerial work platform (AWP), elevating work platform (EWP) and mobile elevating work platform (MEWP). Aerial lifts include:

1. Articulating (jointed) boom platforms.
2. Aerial ladders.
3. Vertical towers.
4. Scissor lifts.
5. Extendable (telescoping) boom platforms.

The most common reasons for falls from aerial lifts are hydraulic cylinder failures that cause the boom to drop, outriggers that are not used or are improperly placed causing lift vehicle overturns, workers that are not tied off while they are in the basket and workers that fall or are pulled off a platform when the vehicle is struck by another vehicle or moves unexpectedly.

Specific requirements.

1. Only personnel who are authorized and trained may operate aerial lifts.
2. **Articulating and extensible boom platforms shall have both platform and ground controls.**
3. **Boom, basket, and lift controls shall be tested each day prior to use.**
4. Before moving an aerial lift for travel, the boom shall be inspected to ensure that it is properly cradled and secured and that the outriggers are in the stowed position.
5. **An aerial lift shall not be moved when the work platform is elevated in a working position with employees in the basket.**
6. **Personnel traveling in the basket of an aerial lift shall wear a full-body harness with either a restraint line or a self-retracting lifeline attached to an appropriate anchorage in the basket.**
7. Boom and basket load limits specified by the manufacturer shall not be exceeded.
8. The aerial lift shall not be placed against another object to steady the elevated platform.
9. The aerial lift shall not be used as a crane or other lifting device.
10. Aerial lifts shall not be operated on grades, side slopes, or ramps that exceed the manufacturer’s recommendations.
11. The brakes shall be set, and when outriggers are used, they shall be positioned on pads or another solid surface. Wheel chocks shall be installed when using an aerial lift on an incline.
12. **A full-body harness shall be worn with either a restraint line or a self-retracting lifeline attached to an appropriate anchorage on the boom or basket when working from an aerial lift.**
13. **Tying off to an adjacent pole, structure or piece of equipment while working from an aerial lift shall not be permitted.**

14. Personnel may work alone in the aerial lift only if they are wearing a full-body harness and a self-retracting lifeline, connected to an appropriate anchorage in the basket, and they are equipped with a two-way radio, tethered to their full-body harness or in a closable holster, for communication. Otherwise, they must be accompanied by another employee on the ground who is responsible for observing the employee in the basket and initiating an emergency response in the event of an accident. In the event of a fall from the basket that activates the fallen employee's personal fall arrest system, the employee on the ground shall utilize the aerial lift's ground controls to safely lower the fallen employee to the ground.
15. When working in high-traffic areas for pedestrians or vehicles, in addition to the aerial lift operator working in the basket, one employee on the ground should be designated as a ground controller with the following responsibilities:
  - a. Installation of caution tape or safety cones in work locations where passersby or vehicles may pass below an elevated aerial lift platform to exclude them from the area.
  - b. Direction of pedestrian or vehicular traffic away from the work location.
16. Personnel shall always stand firmly on the floor of the basket and shall not sit or climb on the guardrail or the edge of the basket or use planks, ladders, or other devices for a work position.
17. Personnel shall not step out of aerial lifts or on the guardrail to perform work or maintenance.
18. Personnel shall not allow tools or materials to accumulate on the floor of the platform.
19. Personnel working below an elevated aerial lift platform shall wear hard hats.
- 20. Man-lifts and scissors lifts must have guardrails, and personnel working on them must wear a full-body harness to which a restraint line or self-retracting lifeline is attached connecting it to an appropriate anchorage located on the lift.**

Examples of aerial lifts are shown below:

	<p><b>Vehicle Mounted Aerial Lift / Bucket Truck</b> The lift platform is an integral part of an over the road vehicle.</p>
	<p><b>Articulating Boom Aerial Lift</b> This aerial lift has at least 2 hinged sections which are used to increase mobility.</p>
	<p><b>Man Lift / Cherry Picker</b> This piece of equipment lifts personnel vertically, but not horizontally.</p>
	<p><b>Scissor Lift</b> This piece of equipment lifts personnel vertically, but not horizontally.</p>
	<p><b>Extendable / Telescoping Aerial Lift</b> This aerial lift has a boom that extends horizontally and vertically.</p>

## ATTACHMENT 2

### Scaffolds

1. Fall protection in the form of either a standard railing or a personal fall arrest system consisting of a full-body harness and a self-retracting lifeline is required for all scaffold use with unguarded sides four feet above a lower level. However, for suspended scaffolds, both are required.
2. All scaffolds, where work is conducted more than four feet in height, shall have four-inch toe boards.
3. Each scaffold and scaffold component must be capable of supporting its own weight and at least four times the maximum intended load applied or transmitted to it.
4. If the scaffold is commercially manufactured, follow all manufacturer guidelines and special warnings in the assembly and use of the scaffold. Do not use or assemble the scaffold if unsure of the correct assembly procedure.
5. Scaffolds should be erected only on an even surface with a firm foundation such as dry compacted soil or concrete slabs.
6. The maximum work level height shall not exceed four times the least base dimension of the scaffold. Example: a four-foot by six-foot scaffold cannot exceed sixteen feet in height at the work platform level.
7. Scaffolds with a height-to-base width (including outrigger supports, if used) ratio of 4:1 shall be restrained from tipping by guying, tying, bracing, or equivalent means.
8. The supporting structure for the scaffold must be rigidly braced, using adequate cross-bracing or diagonal bracing with rigid platforms at each work level.
9. 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.
10. Work platforms shall be secured in position.
11. The minimum working platform width is two feet.
12. Working platforms should have a nonslip surface.
13. All work platform planking shall be compliance-grade lumber. Planks shall be overlapped a minimum of 12 inches and extended over supports 6 - 12 inches.
14. Planking shall be complete for the platform and not spaced more than one inch apart.
15. Wooden planking should not be painted so cracks can be observed.
16. The platform surface should be kept clear of extraneous tools and materials.
17. Hard hats must be worn within an area beneath elevated work where objects could fall from a height and strike a worker.
18. Use a ramp or ladder to access a scaffold platform. Do not climb scaffold cross-bracing to access the scaffold platform.
19. Mobile scaffolds shall not be moved unless the surface of travel is within three degrees of level and free of pits, holes, and obstructions.
20. A scaffold shall not be moved while personnel are on it.

## 21. Inspection of Scaffolds

- a. Prior to the use of any scaffold, an inspection must be conducted, and then daily during usage of the scaffold.
  - b. Carefully examine the scaffold for broken or missing cross bracing, broken supporting structure, working platform, and other damaged parts. In addition, all walking and working surfaces must be free of grease, oil, paint, or other slippery substances.
  - c. The scaffold should be equipped with positive wheel lock casters secured in place.
  - d. The joint between the working platform and supporting structure must be tight, and all hardware and fittings should be attached firmly. Movable parts should operate freely without binding or undue play.
  - e. All wood parts must be free of sharp edges and splinters. Visually inspect the scaffold to be free of shakes, warpage, decay, or other irregularities. Metal parts must be free of sharp edges, burrs, and corrosion. Inspect for dents or bends in supporting structures, cross braces, and walking/working surfaces.
  - f. Check all working platforms to support structure connections, hardware connections, and rivets. If a scaffold tips over, inspect the scaffold for damage before continuing work.
22. 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 are prohibited.

## ATTACHMENT 3

### Guide to Harness Features

#### Standard Features



#### Sliding Back D-Ring

Sliding back D-ring with flexible D-ring pad.



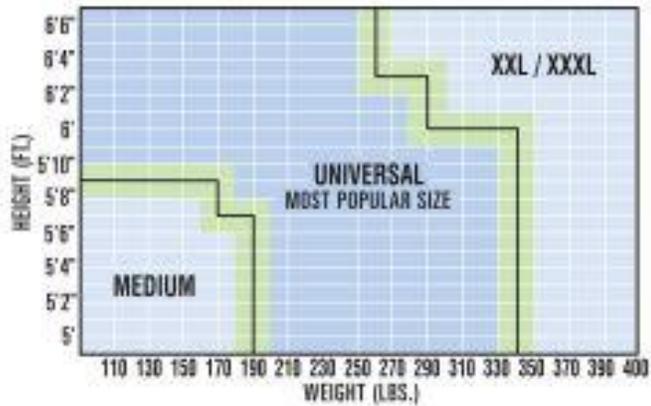
#### Pull-Free Lanyard Rings

Allow user to attach lanyard when not in use. Minimizes hazards associated with the lanyard hanging freely.



#### Self-Contained Label Pack

Integrated pack encapsulates labels minimizing damage and loss.



#### D-Ring Options



#### Front D-Ring

Used for a variety of climbing, confined space and rescue applications.



#### Side D-Rings

Most commonly used for work positioning.



### **Shoulder D-Rings**

Primarily used for lifting and lowering individuals, such as in confined space and rescue applications.

## **Adjustment Buckle Types**



### **Friction Buckle**

To adjust the friction buckle, simply pass the webbing over the knurled bar and back down between the knurled bar and frame. Pull the web end to tighten.



### **Mating Buckle**

To connect the mating buckle, push the center bar buckle completely through the square link and allow it to fall into place. Pull the web end to tighten.



### **Tongue Buckle**

The tongue buckle works similarly to a belt buckle. Insert the loose strap of webbing through the tongue buckle placing the buckle tongue through the appropriate grommet hole. Push the remaining webbing through the keeper.



### **Quick-Connect Buckle**

Quick-Connect Buckles for chest and leg straps interlock like a seat belt for easy donning and feature a dual-tab release mechanism to prevent accidental opening.



### **Cam Buckle**

The locking tabs of the cam buckle trap the webbing to prevent unintentional slippage. Lift the locking tab for easy, one-hand adjustment/release

## ATTACHMENT 4

### How to Put on a Harness



#### Step 1

Hold harness by back D-ring. Shake harness to allow all straps to fall in place.



#### Step 2

If chest, leg and/or waist straps are buckled, release straps and unbuckle at this time.



#### Step 3

Slip straps over shoulders so D-ring is located in the middle of back between shoulder blades.



#### Step 4

Pull the leg strap between the legs and connect to the opposite end. Repeat with a second leg strap. If belted harness, connect the waist strap after the leg straps.



#### Step 5

Connect the chest strap and position in the mid-chest area. Tighten to keep shoulder straps taut.



#### Step 6

After all straps have been buckled, tighten all buckles so that the harness fits snugly but allows a full range of movement. Pass the excess strap through loop keepers.

## ATTACHMENT 5

### Types of Lanyards

#### PACK TYPE



#### **SofStop® Shock Absorber Pack**

Designed with a specially woven inner core that smoothly expands up to 42 inches (1.1m) to reduce fall arrest forces and includes a heavy-duty backup safety strap.

#### TUBULAR



#### **Shock-Absorbing Lanyard**

Designed with a specially woven inner core that smoothly expands up to 42 inches (1.1m) to reduce fall arrest forces.

#### TIE-BACK



#### **BackBiter® Tie-Back Lanyard**

All-in-one lanyard with SofStop Shock Absorber and cross-arm anchorage connector. Snap hook has a 5,000 lb. (22kN) gate load capacity from any angle.

#### DOUBLE-LEGGED, SHOCK-ABSORBING LANYARD



Double-legged lanyards are used for 100% tie-off safety. It is important, however, to understand the safe and proper use of a double-legged lanyard when one leg is not being used.

If one leg of a double-legged lanyard (with a shock absorber pack OR tubular-style shock absorber) is not being used, the unused leg should not be attached to any permanent fixture on a harness, such as side D-rings. This will inhibit the proper operation of the shock absorber design.

### **Lanyard with a Shock Absorber Pack**

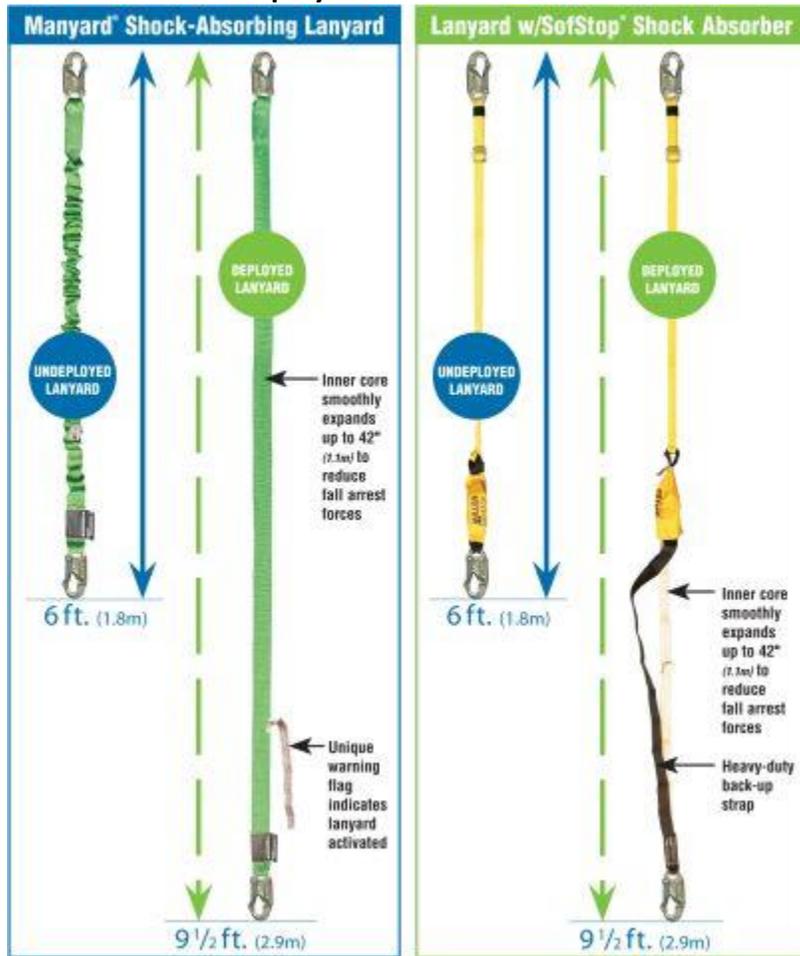
When using a double-legged lanyard with a shock absorber pack and electing not to use one leg of the lanyard, connect the unused leg to a harness with a pull-free lanyard ring. The ring will easily disengage in the event of a fall and the shock absorber pack will function properly, arresting the fall and reducing peak fall arrest forces to under 900 lbs.

### **Tubular Shock-Absorbing Lanyards**

Each leg of a double-legged tubular shock-absorbing lanyard contains a built-in shock absorber that works independently of the other. Storing the unused leg of a double-legged, tubular shock-absorbing lanyard to the pull-free lanyard ring on a harness has no effect on maximum fall arrest forces. During a fall, the lanyard leg attached to the anchorage connector will deploy as designed and fall arrest forces will be kept below 900 lbs., while the lanyard leg attached to the pull-free lanyard ring will remain secured to the ring, unaffected.

Tubular shock-absorbing lanyards take into account foreseeable misuse. If a user unintentionally attaches the unused leg of a double-legged tubular shock-absorbing lanyard to their side D-ring or another permanent fixture on the harness, the unused leg will not have an effect on peak arrest forces.

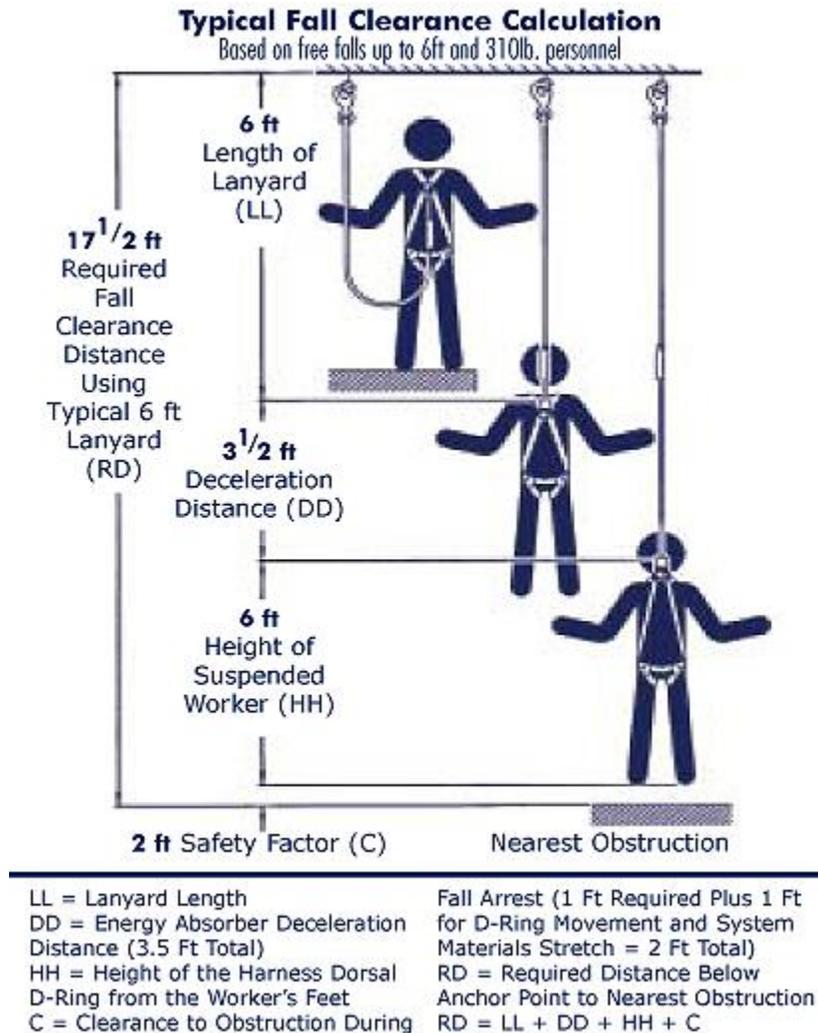
## Before and After Deployment



## ATTACHMENT 6

### Calculation of Fall Clearance

To determine the required Fall Clearance add the appropriate factors together, this will give you the safe Required Distance (RD) below the working surface for work that is to be carried out where there is any risk of falling.



For a three-foot Safety Factor (C), the calculated Fall Clearance (RD) is 18-1/2 feet.



## ATTACHMENT 8

### Inspection and Maintenance Recommendations

To maintain proper service life and high performance, fall protection equipment – anchorage connectors, full-body harnesses, and connecting devices – must be inspected regularly!

**What to look for.** There are some common causes of wear and damage. As with all equipment, read and follow the manufacturer's guidelines for inspections.

**Excessive dirt** can cause deterioration of the equipment. Contaminants can come into contact with the harness or lanyard and get into the webbing. The dirt abrades the fibers of the webbing which weakens them. Certain chemicals can also eat into the fibers or negatively react with the material. Try to keep fall protection gear as clean as possible.

**Fading** caused by exposure to ultraviolet (UV) rays can damage the fibers of the webbing. Inspect webbing for stiff, brittle, or discolored areas, and for webbing that looks faded.

**Cuts, tears, and holes** are caused by contact with or damage from tools, equipment, or materials. Check the edges of the webbing, around stitching, connectors, and buckles.

**Burns or areas that are eaten away** are areas of damage caused by heat or by chemical contact. Fall protection used in hazardous environments (mixing chemicals, pouring molten metals, welding, and other hot work) needs special attention. Webbing in these situations can be severely damaged in a very short period. When used in these severe environments, employees may need to inspect their fall protection equipment several times during a shift.

If employees are not sure of the state of their fall protection equipment, or if there are questions as to the suitability of the equipment, take it out of service until it can be inspected by a competent person familiar with fall protection equipment.

#### Harness Inspection

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To inspect your harness, perform the following procedures.



##### 1) Webbing

Grasp the webbing with your hands six inches (152mm) to eight inches (203mm) apart. Bend the webbing in an inverted “U” as shown. The surface tension resulting makes damaged fibers or cuts easier to detect. Follow this procedure the entire length of the webbing, inspecting both sides of each strap. Look for frayed edges, broken fibers, pulled stitches, cuts, burns and chemical damage.



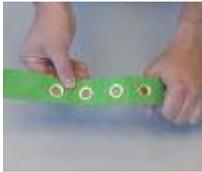
## 2) D-Rings/Back Pads

Check D-rings for distortion, cracks, breaks, and rough or sharp edges. The D-ring should pivot freely. Inspect for any unusual wear, frayed or cut fibers, or broken stitching of the D-ring attachments. Pads should also be inspected for cracks, excessive wear, or other signs of damage.



## 3) Buckles

Inspect for any unusual wear, frayed or cut fibers, or broken stitching of the buckle attachments.



## 4) Tongue Buckles/Grommets

Buckle tongues should be free of distortion in shape and motion. They should overlap the buckle frame and move freely back and forth in their socket. The roller should turn freely on the frame. Check for distortion or sharp edges. Inspect for loose, distorted, or broken grommets. Webbing should not have additional punched holes.



## 5) Friction and Mating Buckles

Inspect the buckle for distortion. The outer bars and center bars must be straight. Pay special attention to corners and attachment points at the center bar.



## 6) Quick-Connect Buckles

Inspect the buckle for distortion. The outer bars and center bars must be straight. Make sure dual-tab release mechanism is free of debris and engages properly.



## 7) Harness Fall Arrest Indicators

Inspect fall arrest indicators (located on the back D-ring pad) for signs of activation. Remove from service if broken or stretched between any of the four pairs of arrows.

## Lanyard Inspection

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When inspecting lanyards, begin at one end and work to the opposite end, slowly rotating the lanyard so that the entire circumference is checked. Additionally, follow the procedures below.



## 1) Hardware

**A) Snaps:** Inspect closely for hook and eye distortions, cracks, corrosion, or pitted surfaces. The keeper (latch) should seat into the nose without binding and should not be distorted or obstructed. The keeper spring should exert sufficient force to firmly close the keeper.

Keeper locks must prevent the keeper from opening when the keeper closes.



**B) Thimbles:** The thimble must be firmly seated in the eye of the splice, and the splice should have no loose or cut strands. The edges of the thimble must be free of sharp edges, distortion, or cracks.



### **2) Wire Rope Lanyard**

Always wear gloves when inspecting a wire rope lanyard; broken strands can cause injury. While rotating the wire rope lanyard, watch for cuts, frayed areas, or unusual wearing patterns on the wire. Broken strands will separate from the body of the lanyard.



### **3) Web Lanyard**

While bending webbing over a pipe or mandrel, observe each side of the webbed lanyard. This will reveal any cuts, snags, or breaks. Swelling, discoloration, cracks, and charring are obvious signs of chemical or heat damage. Observe closely for any breaks in stitching. Inspect the lanyard warning flag for signs of activation. Titan tubular lanyards must be measured to determine activation.



### **4) Rope Lanyard**

Rotate the rope lanyard while inspecting from end-to-end for any fuzzy, worn, broken, or cut fibers. Weakened areas from extreme loads will appear as a noticeable change in original diameter. The rope diameter should be uniform throughout, following a short break-in period.



### **5) Shock Absorber Pack**

The outer portion of the pack should be examined for burn holes and tears. Stitching on areas where the pack is sewn to D-rings, belts or lanyards should be examined for loose strands, rips, deterioration, or other signs of activation.



### **6) Shock-Absorbing Lanyard**

Shock-absorbing lanyards should be examined in the same manner as a web lanyard (described in item 3 above). However, also look for the warning flag or signs of deployment. If the flag has been activated, remove this shock-absorbing lanyard from service.

## **Self-Retracting Lifeline Inspection**

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### **1) Check Housing**

Before every use, inspect the unit's housing for loose fasteners and bent, cracked, distorted, worn, malfunctioning, or damaged parts.



## 2) Lifeline

Test the lifeline retraction and tension by pulling out several feet of the lifeline and allowing it to retract back into the unit. Always maintain a light tension on the lifeline as it retracts.

The lifeline should pull out freely and retract all the way back into the unit. Do not use the unit if the lifeline does not retract. The lifeline must be checked regularly for signs of damage. Inspect for cuts, burns, corrosion, kinks, frays, or worn areas. Inspect any sewing (web lifelines) for loose, broken, or damaged stitching.



## 3) Braking Mechanism

The braking mechanism can be tested by grasping the lifeline above the load indicator and applying a sharp steady pull downward which will engage the brakes. There should be no slippage of the lifeline while the brakes are engaged. Once tension is released, the brakes will disengage, and the unit will return to the retractable mode. Do not use the unit if the brakes do not engage.

Check the hardware as directed in 1A under Lanyard Inspection. The snap hook load indicator is located in the swivel of the snap hook. The swivel eye will elongate and expose a red area when subjected to fall arresting forces. Do not use the unit if the load impact indicator has been activated.



## 4) Snap Hook

Check the snap hook to be sure that it operates freely, locks, and the swivel operates smoothly. Inspect the snap hook for any signs of damage to the keepers and any bent, cracked, or distorted components.



## 5) Anchorage Connection

Make sure the carabiner is properly seated and in the locked position between the attachment swivel/point on the device and the anchor point.

## Cleaning

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Basic care of all safety equipment will prolong the durable life of the unit and will contribute toward the performance of its vital safety function. Proper storage and maintenance after use are as important as cleansing the equipment of dirt, corrosives, or contaminants. Storage areas should be clean, dry, and free from exposure to fumes, corrosive elements/chemicals, and ultraviolet light.

**1) Nylon or Polyester**

Remove all surface dirt with a sponge dampened in plain water. Squeeze the sponge dry. Dip the sponge in a mild solution of water and commercial soap or detergent. Work up a thick lather with a vigorous back and forth motion; then wipe with a clean cloth. Hang freely to dry, but away from excessive heat.

**2) Housing**

Periodically clean the unit using a damp cloth and mild detergent. Towel dry.

**3) Drying**

Equipment should dry thoroughly without close exposure to heat, steam, or long periods of sunlight.

## ATTACHMENT 9

### Fall Rescue Plan

In the event an employee working at height falls while wearing a personal fall arrest system, it is critical that rescue be undertaken as quickly as possible (target less than five minutes) to ensure that suspension trauma to the fallen employee does not occur. The following actions must occur:

1. Self-Rescue
  - a. If equipped with a Personal Rescue Device, the fallen employee, if conscious, will attempt self-rescue by pulling the device's "rip cord". This will activate the descending system (a braking mechanism and a spool containing typically 65 feet of rope) that will allow the user to be lowered to the ground in a controlled manner.
  - b. If the fallen employee is equipped with a Personal Rescue Device but is unconscious or is otherwise unable to initiate self-rescue, the ground controller or, if not present, another employee in the work area will immediately activate the device's secondary release mechanism.
  - c. If the fallen employee is not equipped with a Personal Rescue Device, but is wearing a self-retracting lifeline, the fall will be limited to only a few inches. In this instance, the employee, if conscious, must attempt to turn around to grab the guardrail of the work platform, basket, or scaffold to pull him/herself back onto the work platform or scaffold or into the basket. If present, other employees shall assist.
2. Aided Rescue
  - a. If the suspended worker is not equipped with a Personal Rescue Device or is unable to otherwise perform self-rescue (e.g., due to loss of consciousness), the ground controller or, if not present, another employee in the work area will immediately use his/her two-way radio to report the emergency to Security (561-868-3600). Security will call 911 to report the emergency. Be sure to state that there is an employee suspended in a full-body harness so that responding Fire-Rescue personnel can bring the right equipment and the EMT/medical personnel understand that they may have to deal with suspension trauma.
  - b. Both Security and Facilities utilize the same two-way radio system, however, notification to Security will not alert the Facilities offices which operate on different radio channel frequencies. Facilities should be notified to be prepared to direct appropriate rescue equipment to the scene of the incident based on an estimate of the distance above ground for the suspended employee.
  - c. **While awaiting rescue, the suspended worker, if conscious, must take immediate action to relieve the harness pressure on his/her legs and restore a measure of blood flow to the heart.** Otherwise, fainting could occur quickly, perhaps within five minutes. **One thing that he/she can do to relieve harness pressure is to bring the legs up and down alternately, vigorously, as if riding a bicycle. Another method to relieve harness pressure is the foot wrap, which is described in Figures 1 - 4 on page 32. Similarly, if the**

worker's full-body harness is equipped with trauma straps (see illustration below),



these may be taken out of their pouches and connected to establish a “platform” on which the worker’s feet can be placed for “standing” to relieve harness pressure. **NOTE: the worker must adjust the length of the trauma straps to accommodate his/her height after donning the harness and prior to beginning the work.**

- d. If the fall is from an aerial lift, the ground controller or, if not present, another employee in the area shall immediately move to the ground control panel to utilize the aerial lift’s ground controls to safely lower the fallen employee to the ground as quickly as possible.
- e. If lowering the aerial lift basket to lower the suspended employee to the ground is not possible, or if the fall is from a roof or a scaffold, rescue equipment on the campus that can reach the suspended employee must be brought to the scene. The ground controller or, if not present, another employee in the area shall immediately radio the Facilities office to request that appropriate rescue equipment be brought to the scene of the incident, with an estimate of the distance above ground for the suspended employee. **Such rescue equipment includes another aerial lift device, extension ladders of sufficient length, step ladders of sufficient height, and forklifts.**
- f. Upon arrival, the personnel transporting the rescue equipment from Facilities shall immediately position it and set it up to reach the suspended employee. If the suspended employee is conscious and can access the rescue equipment, he/she shall do so.
- g. If the suspended employee is not conscious, a rescuer in the aerial lift device (if available) will have to bring the suspended employee into the basket or onto the work platform.
- h. If the suspended employee is not conscious and an aerial lift device is not available, a rescuer on a ladder shall attempt to elevate the suspended employee’s legs to relieve harness pressure, if possible, to prolong the toleration of suspension until Fire-Rescue personnel can arrive. **NOTE: It is not advisable for the rescuer on the ladder to attempt to carry the unconscious employee down the ladder since it would be quite possible for the rescuer to lose his/her balance with the result that both persons will fall to the ground. Also, their combined weights will likely exceed the ladder’s rated capacity, possibly causing the ladder to fail.**
- i. Likewise, even if the suspended employee is conscious and can pump his/her legs or use a foot wrap, it may be necessary to have a rescuer on a ladder elevate the suspended employee’s legs to relieve harness pressure, if possible, until Fire-Rescue personnel can

arrive in case the suspended employee becomes too tired to continue while waiting for their arrival.

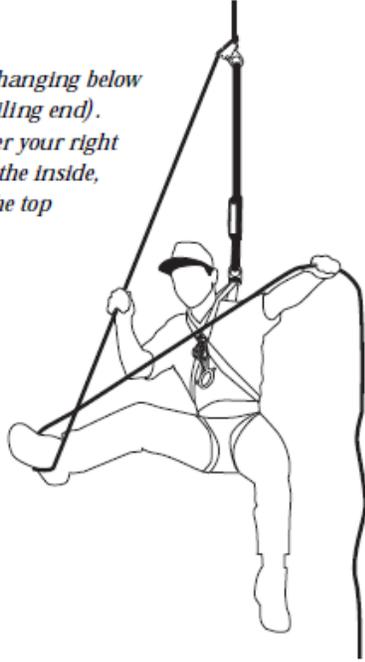
- j. Fire-Rescue personnel shall take charge of the rescue and complete it once they arrive, if necessary.
- k. **If unconscious when brought to the ground, the suspended employee must be placed in a “W” sitting position (knees bent and torso upright and supported) for 30 to 40 minutes before moving the casualty to a lying down horizontal position to control the flow of pooled blood to the major organs. See figure below.**



## How to Do a Foot Wrap

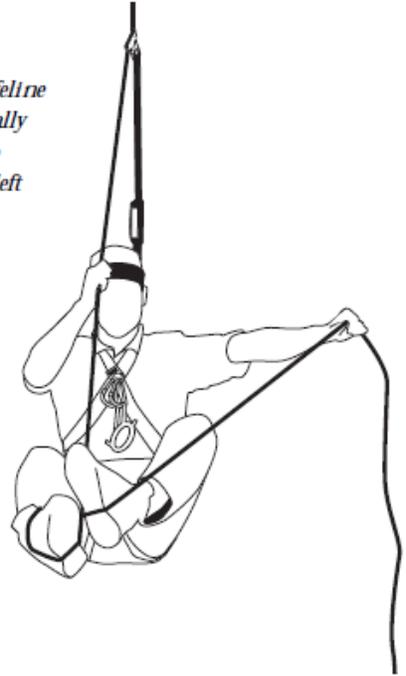
**Fig. 1**

*Grasp the lifeline hanging below you (that's the trailing end). Wrap it once under your right foot starting from the inside, then loop it over the top of the foot.*



**Fig. 2**

*Stretch the lifeline out horizontally and step into it with your left foot.*



**Fig. 3**

*Raise the trailing end of the lifeline and bring both parts together. You have now created a loop that will allow you to stand.*



**Fig. 4**

*Continue to hold on to the lifeline with both hands and stand up. This will relieve the pressure on your upper legs. When you get tired, you can shift back to a sitting position. While waiting for help, alternate between sitting in the harness and standing in the loop. You can also distribute weight between your feet and the harness. To climb up or down short distances, slide the rope grab up (to climb up) or down (to climb down); sit back down, grasp another bite of rope, then repeat the process.*

