FALL PROTECTION PROGRAM
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PURPOSE

This is a statement of University policy to establish a means to analyze elevated work tasks and determine appropriate personal protection against falls in accordance with Occupational Safety and Health Administration (OSHA) regulations:

“Fall Protection,” 29 CFR 1926 Subpart M

“Walking and Working Surfaces,” 29 CFR 1910 Subpart D


“Scaffolds,” 29 CFR 1926 Subpart L

SCOPE

The University of Houston (UH) Fall Protection Program shall apply to all employees who are exposed to unprotected sides or edges of surfaces that present a falling hazard of six feet or more to a lower level. Employees shall not be required, nor allowed to perform any duties which require the employee to get closer than six feet to an unprotected edge, platform, walkway of any building or utilize elevated equipment unless the employee is properly secured from falling.

Exceptions to this requirement include the working sides of loading docks and exposed perimeters of entertainment stages. Employees may use portable ladders without fall protection equipment up to sixty feet. Employees may work on scaffolds and aerial lifts up to 6 feet in height and on the edge of an excavation up to 6 feet in depth without fall protection.

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 working for the University of Houston are required to comply with all applicable OSHA regulations and shall have their own fall protection program. Contractors are responsible for supplying and maintaining their equipment as required by OSHA and ANSI regulations and University standards.

POLICY

The University is dedicated to providing safe work facilities for students, employees, and visitors, and complying with federal and state occupational health and safety standards. Administrators, faculty, staff and students all share a responsibility to reduce the hazards associated with falls.

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.
1.0 DUTIES AND RESPONSIBILITIES

1.1 Environmental Health & Safety
- Provide technical information and assist departments in implementing an effective fall protection program;
- Provide recommendations for fall protection during the building design process;
- Provide and/or coordinate fall protection instruction as needed;
- Provide guidance or training to satisfy implementation of this policy;
- Review and revise the Fall Protection Program, as needed, for compliance with applicable regulations.

1.2 Deans, Directors, and Department Heads
- Ensure that employees who will act as competent and/or qualified persons are adequately trained and/or qualified;
- Provide administrative and financial support for this program within individual departments; and
- Ensure the Fall Protection Program is implemented and maintained within the department.

1.3 Designated Competent Persons
- Implement all aspects of the program for work areas under their control;
- Receive training for “competent person” as defined by OSHA for fall protection;
- Act as the “competent person” for job sites under their control that contain fall hazards;
- Evaluate fall hazards in work areas under their control; and
- 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.

1.4 Designated Qualified Persons
- Maintain professional certification or other requirements in their subject field;
- Provide design, analysis, evaluation and specification in their subject field;
- Maintain records of their designs, analyses, evaluations, and specifications according to the requirements of the Fall Protection Program.

1.5 Supervisors
- 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;
- Coordinate the correction of fall hazards brought to their attention by employees; and
- Complete an “Employee’s Report of Injury” report and any additional documentation needed to investigate and work related injuries and illnesses. All forms and requirements can be accessed at http://www.uh.edu/af/riskmanagement/workerscomp.htm.

1.6 Employees
- Comply with the Fall Protection Program and any further safety recommendation provided by the supervisor and/or EHLS regarding fall protection;
- Complete fall protection training requirements and request further instruction if unclear;
- Conduct assigned tasks in a safe manner and wear all assigned personal protection equipment; and
• Report any unsafe or unhealthy work conditions and job related injuries or illnesses to the supervisor immediately.

1.7 Department of Facilities Management and/or Facilities Planning & Construction
• 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 wherever feasible; and
• Operate Fix-It Service Request Center. Accept reports of hazards and either process work orders to correct the hazard or direct the request to another appropriate unit.

INFORMATION AND TRAINING
Call EHLS at (713)743-5858 or send electronic mail to ehs@uh.edu or view the EHLS home page at http://www.uh.edu/ehls/.
2.0 FALL HAZARDS
Each department shall be responsible to inspect for potential fall hazards and to have each potential fall hazard evaluated by a competent person.
Falls may be classified into three general categories:

- Slips, trips and falls on the same level
- Falls on stairs
- Falls from elevations

Slips and trips are generally caused by a lack of good housekeeping and inadequate maintenance of walking and working surfaces. Employees should keep their area clean and orderly. If they are not equipped to eliminate a hazard, they should contact the appropriate maintenance personnel to correct the problem. These hazards may include icy sidewalks, wet floors, torn floor coverings and stair treads, and missing or broken handrails and guardrails.

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. Personnel should alert their supervisors to potential fall hazards not already identified and controlled.

3.0 WALKING AND WORKING SURFACES
In general, all areas of the workplace should be kept clean, orderly, sanitary, and as dry as possible. These guidelines apply to work areas, passageways, store rooms, and service rooms:

- All spills should be cleaned promptly. Floors in work areas must be kept free of scraps, chips, oil spills, and other debris
- Boxes, chairs, buckets, desks or any other device not specifically intended for use in extending reach shall not be used
- 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
- Every floor, work area, and passageway must be maintained free from protruding nails, splinters, holes, and loose boards
- Where mechanical handling equipment is used, such as lift trucks, sufficient safe clearance must be provided for foot and vehicular traffic
- No obstructions that could create a hazard are permitted in aisles. All permanent aisles must be easily recognizable
- As a general condition, a standard toe board and guardrail are required wherever people walk near or beneath the open sides of a platform or similar structures; where objects could fall from a structure; or where objects could fall from a structure into machinery below

INCLEMENT WEATHER
During inclement weather conditions, (i.e., snow, ice, thunderstorms, lightning, wind) elevated work that requires the use of a fall protection system shall be evaluated by a Competent Person or stopped due to increased overall hazard potential. Work cannot be restarted without the approval of the Competent Person and the Dean, Director, or Department Head.
4.0 AREAS OR ACTIVITIES THAT REQUIRE FALL PROTECTION

4.1 Aerial Lift Devices
Employees utilizing aerial lifts shall be protected from fall hazards according to the manufacturer’s recommendations including guardrail systems, fall restraint systems, and fall arrest systems.

4.2 Unprotected sides or edges
Employees performing work on walking/working surfaces (horizontal and vertical surfaces) with an unprotected side or edge six feet or more above a lower level must be protected from falls by guardrail systems, safety nets, or personal fall arrest systems.
Note: OSHA has determined that there is no “safe” distance from an unprotected side or edge that would render fall protection unnecessary.

4.3 Leading edges
Employees constructing or having exposure to a leading edge six feet or more above a lower level must be protected from falls by guardrail systems, safety nets, or personal fall arrest systems. A leading edge is the edge of a floor or roof of a walking/working surface (such as a deck) which changes location as additional floor, roof, decking or formwork sections are put in place. A leading edge is considered to be an “unprotected side and edge” during periods when it is not actively and continuously under construction.

4.4 Hoist areas
Employees in hoist areas must be protected from falls of six feet or more to lower levels by guardrails or personal fall arrest systems.

4.5 Holes
Employees must be protected from falling through holes if the holes (including skylights) are six feet or more above lower levels by the use of personal fall arrest systems, covers, or guardrails.

4.6 Formwork or reinforcing steel
Employees who are working on the face of formwork or reinforcing steel must be protected from falls six feet or more to lower levels by personal fall arrest systems, safety nets, or positioning device systems.

4.7 Ramp, runways and other walkways
Employees working on ramps, runways and other walkways must be protected from falls six feet or more to lower levels by guardrail systems.

Open sided floors, ramps, walkways etc. that are adjacent to or above dangerous operations must be guarded regardless of height.

4.8 Excavations
Employees working on the edge of an excavation six feet or more in depth that is not readily visible because of plant growth or other visual barriers must be protected from falling into or onto the excavation by guardrail systems, fences, or barricades.
Each employee at the edge of a well, pit, shaft, and similar excavation 6 feet (1.8 m) or more in depth shall be protected from falling by guardrail systems, fences, barricades, or covers.
4.9 Dangerous equipment
Employees positioned six feet or more above dangerous equipment must be protected from falling into or onto the equipment by guardrails or equipment guards.

4.10 Overhand bricklaying and related work
Employees who are performing overhand bricklaying six feet or more above lower levels must work in a controlled access zone or be protected from falls by guardrails, safety nets, or personal fall arrest systems.

All employees reaching more than ten (10) inches below the level of the working/working surface on which they are working must be protected from falling by the use of guardrails, personal fall arrest systems, or safety nets.

Note: Related work means mason tending as well as electrical work that must be incorporated into the brick wall during the bricklaying process.

4.11 Roofing work on low-slope roofs
Employees who are performing roofing activities on low-slope roofs (having a slope less than or equal to 4 in 12, vertical to horizontal) must be protected from falling when the roof has unprotected sides or edges more the six feet above lower levels by the use of:

- Guardrails, safety nets, or personal fall arrest systems.
- A combination of a warning line system and a guardrail system, or a warning line system and a personal fall arrest system, or a warning line system and a safety monitoring system.

Note: A safety monitoring system alone is sufficient on roofs 50 feet or less in width.

4.12 Roofing work on steep roofs
Employees performing roofing activities on steep roofs (having a slope greater than 4 in 12, vertical to horizontal) must be protected from falling when the roof has unprotected sides or edges more than six feet above lower levels by the use of guardrail systems with toeboards, personal fall arrest systems, or safety net systems.

4.13 Precast concrete erection
Employees who are erecting precast concrete members six feet or more above lower levels must be protected from falls by guardrail systems, safety nets, or personal fall arrest systems.

4.14 Scaffolds
Scaffolds over 6 feet

4.15 Skylights
Skylights that are even with the roof surface, or that may otherwise serve as a walking/working surface

4.16 Wall openings (including open windows)
Employees who are positioned on, at, above, or near wall openings where the outside bottom edge of the wall opening is six feet or more above lower levels (and the inside bottom edge of the wall opening is less than 39 inches above the walking/working surface) must be protected from falls by guardrails, safety nets, or personal fall arrest systems.
4.17 Walking /Working surfaces not otherwise addressed
Employees working on walking/working surfaces six feet above lower levels that are not otherwise addressed above must be protected by the use guardrails, safety nets, or fall arrest systems.

4.18 Protection from falling objects
The employer must have employees that are exposed to falling objects wear a hard hat and must also implement one of the following measures:

- Erect toeboards, screens or guardrail systems to prevent objects from falling from higher levels.
- Erect a canopy structure strong enough to prevent penetration by any object that might fall into the canopy and keep objects that may fall away from the edge of the higher level.
- Equipment shall not be stored within four feet of an unprotected edge.
- Barricade the area where objects could fall, prohibit employees from entering the barricaded area and keep objects that may fall away from the edge of the higher level.

5.0 FALL PROTECTION SYSTEMS CRITERIA AND PRACTICES

5.1 General Requirements
Fall protection must be provided and installed before the employee begins the work that requires fall protection.

5.2 Guardrail Systems
Guardrail systems and their use must comply with the following provisions:

- The height of the top rail must be 42 inches +/- three inches above the walking/working level. When conditions warrant, the height of the top edge may exceed 45 inches provided the guardrail system meets all other design and construction criteria.
- Midrails, screen, mesh or intermediate vertical members must be installed between the top edges of guardrails and walking/working surfaces when there are no walls or parapet walls at least 21 inches high.
- Guardrails must be capable of withstanding a force of at least 200 pounds applied within 2 inches of the top edge in any outward or downward direction at any point along the top edge.
- When 200 pounds of downward force is applied, the top edges of guardrails must not deflect to less than 39 inches above the walking/working level.
- Midrails, screen, mesh or intermediate vertical members must be capable of withstanding a force of at least 150 pounds applied in any downward or outward direction at any point along the midrail or other member.
- Guardrails must have smooth surfaces that will prevent punctures, lacerations and snagging of clothing.
- The ends of top rails and midrails must not overhang terminal posts, unless an overhang would not create a projection hazard.
- Steel and plastic banding cannot be used on top rails or midrails.
- Top and midrails must be at least 1/4 inch nominal diameter or thickness to prevent cuts and lacerations.
- When guardrails are used in hoisting areas, a chain, gate or removable guardrail section must be placed across the access opening when hoisting operations are not taking place.
• When guardrails are used at holes, they must be erected on all unprotected sides or edges.
• When guardrails are used to protect holds that are used to pass materials, not more than two sides can be protected by removable guardrails.
• If wire rope is used for top rails, the rope must be flagged at not more than 6-foot intervals with high-visibility material.

Table 1: Guardrail System Specifications

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<th>Material of Construction</th>
<th>Post Requirements</th>
<th>Top rail Requirements</th>
<th>Intermediate rail Requirements</th>
<th>Additional Requirements</th>
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<tr>
<td>Wood</td>
<td>2-inch by 4-inch stock spaced 6 feet apart</td>
<td>2-inch by 4-inch stock</td>
<td>2-inch by 4-inch stock</td>
<td>If top rail is two right angle pieces of 1” x 4”, posts may be spaced 8 feet on center</td>
</tr>
<tr>
<td>Pipe</td>
<td>1 ½ inches nominal diameter spaced not more than 8 feet on center</td>
<td>1 ½ inches nominal</td>
<td>1 ½ inches nominal</td>
<td></td>
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<tr>
<td>Structural Steel</td>
<td>2&quot; x 2&quot; x 3/8” angles spaced not more than 8 feet on center</td>
<td>2” x 2” x 3/8” angles</td>
<td>2” x 2” x 3/8” angles</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>Provide strength to top rail to support 200 pounds applied in any direction</td>
<td>Smooth surface at a height 42 inches above the work surface, capable of withstanding 200 pounds top rail pressure</td>
<td>Protection between top rail and floor equivalent to that afforded by standard intermediate rails</td>
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5.3 Safety Net Systems
Safety net systems and their use must comply with the following provisions:
• Safety nets must be installed as close as practicable but not more than 30 feet below walking/working surfaces. When nets are used on bridges, the potential fall area from the walking/working surface to the net must be unobstructed.
• Safety nets must extend away from outermost projection of the work surface as specified in CFR 1926.502(c)(2).
• Drop tests must be performed on safety nets by dropping a 400 pound, 30 to 32 inch diameter bag of sand into the net from the highest walking/working surface (but not less than 42 inches).
• When it is unreasonable to perform a drop test on a net, the employer or designated competent person must certify that the net and net installation is in compliance with CFR 1926 Subpart M.
• Nets must be inspected at least once a week. Defective nets and parts must be removed from service.
• Materials, scrap pieces, equipment and tools that fall into nets must be removed as soon as possible and at least before the next shift.
• Net openings must not exceed 36 square inches or be longer than 6 inches on any side.
• Each safety net must have a border rope with a minimum breaking strength of 5000 pounds.
• The connections between nets must be as strong as net components and not more than 6 inches apart.

5.4 Personal Fall Arrest Systems
Personal fall arrest systems and their use must comply with the following provisions:
• All connectors must be made from drop forged, pressed or formed steel or made of equivalent materials.
• All connectors must have a corrosion resistant finish.
• All surfaces and edges must be smooth to prevent damage to interfacing parts of the system with a smooth finish.
• D-rings and snap hooks must have a minimum tensile strength of 5,000 pounds.
• D-rings and snap hooks must be proof tested to a minimum tensile load of 3,600 pounds without cracking, breaking or taking permanent deformation. Effective January 1, 1998, only locking snap hooks can be used.
• Effective January 1, 1998, body belts **will not** be acceptable as part of a personal fall arrest system.
• Lanyards and vertical lifelines must have a minimum breaking point of 5,000 pounds.
• Except during construction of elevator shafts, each employee must be attached to a separate lifeline.
• Lifelines must be protected from abrasions or cuts.
• All self-retracting lifelines and lanyards which limit the free fall distance to 2 feet or less must sustain a minimum tensile load of 3,000 pounds with the unit in the fully extended position. Any self-retracting lifeline or lanyard which does not limit free-fall distance to 2 feet or less must be capable of sustaining a minimum tensile load of 5000 pounds.
• All ropes and straps used in lanyards, lifelines or belts must be made from synthetic fibers.
• Personal fall arrest equipment anchorage points must be separate from any platform anchorage points, and be capable of supporting at least 5,000 pounds.

5.5 Fall Restraint Systems/Positioning Device Systems
Fall restraint systems and their use must comply with the following provisions:
• The restraint lanyard must be short enough to prevent a fall from occurring; be protected against cutting and abrasion; and attach the body harness directly to the anchor point independently of any other lines.
• When used as a positioning device system, the lanyard length shall be rigged such that an employee cannot free fall more than 2 feet.
• Full body harness or belt use is required when utilizing fall restraint systems.
• Positioning devices must be secured to an anchorage capable of supporting at least twice the potential impact load of an employee’s fall or 3,000 pounds, whichever is greater.
• Connectors must be drop forged, pressed or formed steel, or made of equivalent materials.
Connectors must have a corrosion-resistant finish, and all surfaces and edges shall be smooth to prevent damage to interfacing parts of this system.

All components of the fall restraint system including connectors, D-rings, snaphooks, lanyards and body harnesses/belts shall meet all applicable ANSI and OSHA requirements.

Connecting assemblies must have a minimum tensile strength of 5,000 pounds.

D-rings and snaphooks must be proof-tested to a minimum tensile load of 3,600 pounds without cracking, breaking or taking permanent deformation.

Snaphooks must be sized to be compatible with the member to which they are connected to prevent unintentional disengagement of the snaphook by the connected member, or shall be a locking type snaphook designed and used to prevent disengagement of the snaphook by the contact of the snaphook by the connected member.

5.6 Warning Line Systems

Warning line systems and their use must comply with following provisions:

The warning line must be erected around all sides of a roof work area.

When mechanical equipment is not being used, the warning line must be erected not less than 6 feet from the roof edge.

When mechanical equipment is being used, the warning line must be erected not less than 6 feet from the roof edge that is parallel to the direction of mechanical equipment operation and not less than 10 feet from the roof edge that is perpendicular to the direction of mechanical equipment operation.

Points of access, material handling areas, storage areas and hoisting areas must be connected to the work area by an access path formed by two warning lines. When the path to a point of access is not in use, a rope, wire, chain or other barricade equal in strength to the warning line must be placed across the path at the point where it intersects the warning line around the work area or the path must be offset in such a way that employees cannot walk directly into the work area.

Warning lines must consist of ropes, wires or chains and supporting stanchions. The rope, wire or chain must be flagged at not more than 6 foot intervals with high-visibility material, such as ribbon or plastic barrier tape.

The rope, wire or chain must be rigged and supported in such a way that its lowest point (including sag) is no less than 34 inches from the walking/working surface and its highest point is no more than 39 inches from the walking/working surface.

After being erected and having the rope, wire or chain attached, a stanchion must be capable of resisting (without tipping over) a force of at least 16 pounds applied horizontally against it at a position 30 inches above the walking/working surface, perpendicular to the warning line and in the direction of the floor, roof or platform edge.

The rope, wire or chain must have a minimum tensile strength of 500 pounds. After being attached to the stanchions, the rope, wire or chain must be capable of supporting (without breaking) a load of at least 16 pounds applied horizontally against the stanchions.

The line must be attached at each stanchion in such a way that pulling on one section of the line will not result in slack being taken up in adjacent sections before the stanchion tips over.

Employees must not be allowed in the area between a roof edge and a warning line, unless they are performing roofing work there.

Mechanical equipment on roofs must be used or stored only in areas where employees are protected by a warning line system, guardrail system or personal fall arrest system.
5.7 Controlled Access Zones
Controlled access zones (CAZ) and their use must comply with the following provisions:

- When used to control access to areas where leading-edge and other operations are taking place, CAZ must be defined by control lines or another means that restricts access.
- When control lines are used, they must be erected not less than 6 feet and not more than 25 feet from the unprotected or leading edge, except when erecting precast concrete members.
- When erecting precast concrete members, control lines must be erected not less than 6 feet and not more than 60 feet or half the length of the member being erected (whichever is less) from the leading edge.
- The control line must extend along the entire length of the unprotected or leading edge and must be approximately parallel to the edge.
- The control line must be connected on each side to a guardrail system or wall.
- When used to control access to areas where overhand bricklaying and related work are taking place, the CAZ must be defined by a control line erected not less than 10 feet and not more than 15 feet from the working edge.
- When used to control access to areas where overhand bricklaying and related work are taking place, the control line must extend for a distance sufficient for the CAZ to enclose all employees performing this work at the working edge and must be approximately parallel to the edge.
- When used to control access to areas where overhand bricklaying and related work are taking place, additional control lines must be erected at both ends to enclose the zone.
- When used to control access to areas where overhand bricklaying and related work are taking place, only employees engaged in this work are permitted in the CAZ. The control line must consist of ropes, wires, tapes or equivalent materials and supporting stanchions.
- Each line must be flagged or otherwise clearly marked at not more than 6 foot intervals with high-visibility material, such as ribbon or plastic barrier tape.
- Each line must be rigged and supported in such a way that its lowest point (including sag) is no less than 39 inches from the walking/working surface and its highest point is not more than 45 inches from the walking/working surface. The highest point must be 50 inches when overhand bricklaying operations are being performed.
- Each line must have a minimum breaking strength of 200 pounds.
- On floors and roofs where guardrail systems are not in place prior to the beginning of overhand bricklaying operations, CAZ must be enlarged, as necessary, to enclose all access points, material handling areas and storage areas.
- On floors and roofs where guardrail systems are in place, only that portion of the guardrail necessary to accomplish that day's work must be removed to allow overhand bricklaying work or leading edge work to take place.

5.8 Safety Monitoring Systems
This system may only be utilized on a low-slope roof. Safety monitoring systems and their use must comply with the following provisions:

- The employer must designate a competent person to monitor the safety of other employees in accordance with the following requirements:
- The safety monitor must be able to recognize fall hazards.
- The safety monitor must warn employees when it appears that they are unaware of fall hazards or are acting in an unsafe manner.
• The safety monitor must be on the same walking/working surface and within sight of the employees he or she is monitoring.
• The safety monitor must be close enough to communicate orally with employees.
• The safety monitor must ensure no unauthorized personnel access the work area.
• The safety monitor must not have other responsibilities that could take his or her attention away from the monitoring function.
• Mechanical equipment must not be used or stored in areas where safety monitoring systems are being used to monitor employees engaged in roofing operations on low-slope roofs.
• Each employee working must be directed to comply with fall hazard warnings from safety monitors.
• The safety monitor shall have the responsibility to order work stoppage and personnel removal from the elevated work areas in the event of dangerous, hazardous, or life threatening circumstances.

5.9 Toeboards
These requirements apply to temporary controls on job sites as well as permanent fixtures in general work areas.
• Standard toe boards must be a minimum of 4 inches high (3 ½ inches for construction), no more than 1/4 inch clearance to the floor. If a mesh material is used, the opening must be less than 1 inch;
• 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;
• Guardrail systems have a surface that prevents injuries such as punctures and lacerations and prevents snagging of clothing; and
• When guardrail systems are in hoisting areas, a chain gate or removable guardrail section shall be in place when not being used.

5.10 Skylights
• 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
• 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.

5.11 Covers
• Any gap or void 2 inches or more in dimension shall be covered;
• 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;
• 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;
• All covers shall be secured when installed so as to prevent accidental displacement by the wind, equipment, or employees;
• Covers shall be marked with the word “HOLE” or “COVER” to provide warning of the hazard when it is not readily apparent; and
• 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.
6.0 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. Fall protection equipment is divided into five functional categories: 1. Fall Arrest, 2. Positioning, 3. Suspension, 4. Retrieval and 5. Restraint.

6.1 Fall Arrest
The use of a personal fall arrest system is the required personal protective equipment for fall hazards at the University of Houston. 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.

University of Houston 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:

- **Body Harness**: Only full-body harnesses shall be used. The use of a body belt is prohibited.

- **Connecting Device**: Shock-absorbing lanyards and lifelines
  - Lanyards and lifelines shall have a minimum breaking strength of 5000 pounds;
  - Lanyards shall not exceed six feet in length. Lanyards used on aerial lift devices should not exceed 4 feet in length to reduce slack;
  - Ropes and straps (webbing) used in lanyards, lifelines, and strength components of body harnesses shall be made from synthetic fibers;
  - Connecting assemblies shall have a minimum tensile strength of 5,000 pounds;
  - 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);
  - Personal fall arrest systems shall limit the maximum arresting forces to 1800 pounds with a full body harness;
  - The maximum free fall distance is six feet for all systems;
  - The maximum deceleration distance is 3.5 feet;
  - Personal fall arrest systems shall have sufficient strength to withstand twice the potential impact energy of the falling employee;
  - Lifelines shall be protected against cutting and abrasions;
  - 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 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
  - Each employee shall be attached to a separate lifeline when vertical lifelines are used. 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.

- **Anchorage**: Anchorage point and anchorage connector
  - Anchorages 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 5000 pounds per employee attached, or shall be designed, installed
(temporarily or permanently), and used as part of a complete fall arrest system which maintains a factor of two and under the supervision of a qualified person;
- The anchorage point shall prevent the employee from falling more than 6 feet to a lower level.
- A qualified person shall determine all anchor points, both temporary and permanent. Permanent anchor points shall be properly marked;
- Personal fall arrest systems shall not be attached to guardrail systems, nor shall the be attached to hoists except as specified in other regulations

6.2 Positioning
A positioning device is not a substitute for a personal arrest system and is limited to use as 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.

Where positioning device is used, it shall comply with the following:
- Only a full-body harness shall be worn as part of a positioning device system.
- Body belts are not acceptable;
- Positioning devices shall be rigged such that a free fall cannot be more than 2 feet; and
- Positioning devices shall be secured to an anchorage point capable of supporting at least twice the potential impact load of an employees fall or 3,000 lbs, whichever is greater.

6.3 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:
- Full-Body Harness;
- Workline;
- Anchorage; and
- Positioning device such as a boatswain’s chair.

A boatswain’s chair system is considered a single-point adjustable suspended scaffold. Since the suspension system components are not designed to arrest a free fall, a backup fall arrest system should be used in conjunction with the personal suspension system that would activate only if the worker were to experience a free fall.

6.4 Retrieval
Personal retrieval systems are used for confined space entry and on-entry rescue. Refer to the UH Confined Spaces Plan for information on confined spaces entry. Personal retrieval systems consist of the following:
- Full body hardness;
- Retractable lifeline/rescue unit; and
- Tripod.

6.5 Restraint
A restraint line is a device which is attached between the employee and an anchorage 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.
Prompt rescue shall be provided for personnel who have fallen by contacting 9-1-1 or radioing for help. No work shall be performed where an emergency cannot be immediately observed and prompt rescue assistance summoned. Any other personal protective equipment deemed necessary for the task under the Personal Protective Equipment Standard must be worn. This includes but is not limited to hard hats, gloves, safety glasses, and steel toed boots. Hard hats shall be worn within an area beneath elevated work where objects could fall from a height and strike a worker.

6.6 Equipment Inspections and Maintenance

6.7 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 is inspected and determined by a competent person to be undamaged.

6.8 Inspection
Visual equipment inspections shall be conducted by personnel prior to each use. If, upon inspection, a piece of equipment shows any signs of wear it must immediately be removed from service and the supervisor notified.

6.9 Maintenance
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. Stow equipment in clean area away from strong sunlight and extreme temperatures which could degrade materials. Check the manufacturer’s recommendations for cleaning, maintenance and storage information.
7.0 MAINTENANCE, INSPECTION, AND STORAGE OF FALL EQUIPMENT

It is the responsibility of each UH department to maintain all fall protection systems in place on UH buildings. This can be accomplished through assigning a competent person who has completed all relevant training or utilizing contractors known to perform these operations.

The maintenance and inspection requirements outlined in this section are general in nature. Specific requirements regarding inspections and maintenance should be addressed in the fall protection plan designed for each job requiring fall protection.

Fall protection systems permanently installed on UH buildings must be certified by a professional engineer upon completion of installation. Re-certification must be completed every 10 years or as required by the manufacturer and if the system has been placed under tension as a result of a fall incident. Re-certification must be performed by an individual/company who is certified through the manufacturer of the specific fall protection system to perform such inspections.

Fall protection systems must be inspected annually by a competent individual. Annual inspections should address all components of a fall protection system including, but not limited to, anchor points, lifelines, structural components, and personal protective equipment. Any deficiencies identified during the inspection or certification process must be addressed prior to the fall protection system being used by an employee.

Additional inspection requirements may be required by the equipment manufacturer. Adhere to all manufacturer recommendations when performing annual inspections.

Fall protection equipment including life lines, lanyards, body belts/harnesses, snaphooks and D-rings shall be inspected prior to each use by the user. Defective equipment shall be taken out of service and rendered not useable.

If an employee is involved in an accident where a fall from an elevated work surface occurs, the fall protection equipment must be removed from service immediately.

Temporary fall protection equipment such as warning lines shall be inspected upon erection by a competent individual. If the system is placed under tension as a result of an accident or near miss, the system should be re-inspected to ensure it meets all applicable requirements.

Guardrail systems or parapets should be visually inspected prior to work on an elevated surface. Any deterioration or deficiencies noted, which may cause the fall protection system to fail should be addressed prior to work commencing.

Basic care of fall 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. The following is a list of basic storage and maintenance guidelines:

- Never store the personal fall arrest equipment in the bottom of a tool box, on the ground, or outside exposed to the elements (i.e., sun, rain, snow, etc.).
- Hang equipment in a cool dry location in a manner that retains its shape.
- Always follow manufacturer recommendations for storage, maintenance, and inspection.
• Clean with a mild, nonabrasive soap, and hang to dry.
• Never force dry or use strong detergents in cleaning.
• Never store equipment near excessive heat, chemicals, moisture, or sunlight.
• Never store in an area with exposures to fumes or corrosive elements.
• Avoid dirt and build-up on equipment.
• Never use this equipment for any purpose other than personal fall arrest.
• Once exposed to a fall, remove equipment from service immediately.
8.0 FALL PROTECTION PLAN

This option of fall protection is only applicable to employees engaged in leading edge work, precast concrete erection work or residential construction work where it can be demonstrated that it is infeasible or creates a greater hazard to utilize conventional fall protection methods. The following criteria must, at a minimum, be met for the use of a fall protection plan to be valid:

- The plan must be prepared by the competent person and developed specifically for the work being done.
- A copy of the plan must be available at the work site.
- The plan must document the reasons why the use of conventional fall protection is not feasible or creates a greater hazard and must address the measures being taken to protect workers from fall hazards.
- At a minimum, the fall protection plan must include a safety monitoring system.
- In the event of an accident or near miss, the fall protection plan must be reviewed and revised to ensure similar types of incidents do not occur in the future.

9.0 RESCUE

In situations where technical rescue may be necessary, the team developing the Fall Protection Plan may decide to contact the Houston Fire Department (HFD) to develop a rescue plan.

If an employee falls and is suspended from a Personal Fall Arrest System the HFD Rescue Team shall be notified immediately by calling 911 and UH emergency system (713) 743-3333.

When possible, the employee may perform self-rescue or co-workers may attempt rescue.
- The employee may use an engineered self-rescue process that was developed for the task.
- A qualified aerial lift operator may use the lift to retrieve a suspended employee, providing the lift is rated for the intended load.
- Only personnel trained in the use of rescue equipment and methods shall perform any other type of rescue.

HFD will direct the rescue upon arrival if the employee is still suspended. The employee shall be evaluated by HFD and sent for further medical attention if necessary.
10.0 ROOFING
The hazards associated with work on roofs include falling through openings and falling off edges. The protection of openings is discussed in the “FALL PROTECTION SYSTEMS CRITERIA AND PRACTICES” section 5.0 of this program.

Effective roof work fall protection techniques are intended to protect workers while providing the mobility and comfort necessary to perform work tasks. Several techniques are available and are described below.

10.1 Low-slope or Flat Roofs
Each employee engaged in roofing activities on low-slope roofs, with unprotected sides and edges 6 feet (1.8 m) or more above lower levels shall be protected from falling by guardrail systems, safety net systems, personal fall arrest systems, or a combination of warning line system and guardrail system, warning line system and safety net system, or warning line system and personal fall arrest system, or warning line system and safety monitoring system. Or, on roofs 50-feet (15.25 m) or less in width the use of a safety monitoring system alone [i.e. without the warning line system] is permitted.

10.2 Steep roofs
Each employee on a steep roof with unprotected sides and edges 6 feet (1.8 m) or more above lower levels shall be protected from falling by guardrail systems with toeboards, safety net systems, or personal fall arrest systems.

10.3 Personal Fall Arrest System
- The system of choice for fall protection on roofs is the personal fall arrest system;
- Requirements for personal fall arrest systems are found in the Fall Protection Personal Protection Equipment section 6.0 of this program; and
- Personal fall arrest systems for roof work must be designed by a qualified person.

10.4 Designated Areas
As an alternative to installing guardrails, a designated area may be established. The following condition and requirements must be met in order to use designated areas in lieu of other fall protection measures:
- The work must be of a temporary nature, such as maintenance on roof top equipment;
- Designated areas shall be established only on surfaces that have a slope from horizontal of 10 degrees or less; and
- The designated area shall consist of an area surrounded by a rope, wire, or chain and supporting stanchions.
- 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;
- The line shall have a minimum breaking or tensile strength of 500 pounds;
- 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;
- The line shall be installed in such a manner that its lowest point is no less that 34 inches and no more than 39 inches from the work surface;
- The line forming the designated area shall be clearly visible from any unobstructed location within the designated area up to 25 feet away;
- The stanchions shall be erected as close to the work area as is permitted by the task;
• The perimeter of the designated area shall be erected no less than 6 feet from the unprotected side or edge; and
• Access to the designated area shall be by a clear path formed by two lines attached to stanchions.

10.5 Roof Access
Access to building rooftops is limited to authorized personnel only. Please see the University's "Roof Access Guidelines" at www.uh.edu/
11.0 SCAFFOLDS

11.1 Use of Scaffolds

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. The following criteria should be used when selecting a scaffold:

- 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;
- 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;
- 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.
- All scaffolds must be capable of supporting at least four times the design load.

11.2 General Requirements

- Fall protection is required for all scaffold use 6 feet above a lower level.
- Stationary scaffolds over 125 feet in height and rolling scaffolds over 60 feet in height shall be designed by a professional engineer. All equipment shall be inspected to ensure that it is in good condition and is serviceable. Damaged or deteriorated equipment shall not be used.
- All scaffolds, where work is conducted in excess of 6 feet in height, shall have 4 inch toeboards;
- A scaffold shall not be moved while personnel are on it;
- Follow all manufacturer's guidelines and special warnings if the scaffold is commercially produced;
- The maximum work level height shall not exceed 4 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;
- The minimum working platform width is two feet;
- The supporting structure for the scaffold must be rigidly braced, using adequate cross bracing or diagonal bracing with rigid platforms at each work level;
- Working platforms should have a nonslip surface;
- Scaffolds should be used only on an even surface;
- The platform surface should be kept clear of extraneous tools and materials;
- 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
- Work platforms shall be secured in position;
- 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;
- Follow all manufacturer guidelines in the assembly of the scaffold. Do not use or assemble the scaffold, if unsure of the correct assembly procedure;
- Hard hats must be worn within an area beneath elevated work where objects could fall from a height and strike a worker; and
• 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.

11.3 Inspection of Scaffolds
Prior to the use of any scaffold, an inspection must be conducted, and then daily during usage of the scaffold. Inspection

• 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;
• The scaffold should be equipped with positive wheel lock casters that are secured in place;
• The joint between 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;
• 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 structure, cross braces and walking/working surfaces;
• 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
• 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.

11.4 Maintenance of Scaffolds
All scaffold repairs must be done by a qualified person.

11.5 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.
12.0 AERIAL LIFTS

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

- Articulating boom platforms are designed to reach up and over obstacles.
- Extensible or telescoping boom platforms may extend over one hundred feet.
- Vehicle mounted bucket lifts are used to repair utility lines.
- Scissor lifts extend into the air via a series of crisscross supports.
- Personal man lifts are lightweight and designed for one person to use indoors.

12.1 Specific requirements

- Aerial ladders shall be secured in the lower traveling position before the truck is moved for highway travel;
- Lift controls shall be tested each day prior to use;
- Only personnel authorized by a fall protection competent person shall operate an aerial lift:
- Employees shall always stand firmly on the floor 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;
- A full-body harness shall be worn and a lanyard attached to the boom or basket when working from an aerial lift (exception: a harness is not required in a scissor lift or personal man lift with surrounding guardrail system and closing gate or latch chain);
- Belting off to an adjacent pole structure, or equipment while working from an aerial lift shall not be permitted;
- Boom and basket load limits specified by the manufacturer shall not be exceeded;
- 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;
- 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;
- Articulating and extensible boom platforms shall have both platform and ground controls; and
- 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.

13.0 Minimum Safe Approach Distances (M.S.A.D)

The minimum safe approach distances to energized power lines and parts must be maintained.

<table>
<thead>
<tr>
<th>Voltage Range (phase to phase)</th>
<th>Minimum Safe Approach Distance (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 300 V</td>
<td>Avoid Contact</td>
</tr>
<tr>
<td>Over 300V to 50kV</td>
<td>10</td>
</tr>
</tbody>
</table>
14.0 PORTABLE LADDERS

14.1 Use of Portable Ladders

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

- The ladder chosen must be long enough to provide access to the work area without necessitating standing on the top two steps of a stepladder or the top three rungs of a straight ladder;
- The ladder selected must be sufficient for the weight of the employee plus the weight of any tools and materials:
  - TYPE 1A-Extra-heavy industrial ladder will support 300 lbs.
  - TYPE 1-Heavy-duty industrial ladder will support 250 lbs.
  - TYPE 2-Medium-duty commercial ladder will support 225 lbs.
  - TYPE 3-Light-duty household ladder will support 200 lbs.;
- When a straight ladder is used to gain access to a roof, the side rails should extend at least three feet above the support point at the eave, gutter, or roof line;
- Never splice together short ladders to form a longer ladder;
- Never place ladders on boxes, barrels, or other unstable bases for additional height;
- 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 designed with adjustable feet;
- Be alert to slippery surfaces. Nonslip bases are not a substitute for safety in placing, lashing, or holding a ladder on oily, metal, concrete, or other slippery surfaces;
- Do not use ladders for unintended purposes;
- Do not use a metal ladder when working on or near electrical equipment;
- The distance from the bottom of a straight ladder to its support wall shall be one-quarter the working length of the ladder;
- Where possible, straight ladders should be secured with a rope or wire at the top and blocked at the bottom;
- The top two steps and platform of a stepladder shall not be used, and the top three rungs of a straight ladder shall not be used;
- Do not over-reach, jump or slide a ladder while on it. Ladders shall not be moved, shifted, or extended while occupied;
- Always face the ladder and use both hands while ascending and descending.
- 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;
- Barricades and warning signs should be posted when ladders are placed near doors or other locations where they could be struck;
- Two workers shall handle and set up all extension ladders;
- Ladders should not be used by more than one person at a time unless they are designed for such use;
- The bracing on the back side rails of stepladders is designed only for increasing stability, not for climbing;
- Ladders shall not be used horizontally as platforms, runways, or scaffolds.
- Extension ladders must have proper overlap.
  - Three foot overlap for 32 foot ladder;
  - Four foot overlap for 32 to 36 foot ladder;
  - Five foot overlap for 36 to 48 foot ladder; and
  - Six foot overlap for 48 foot ladder.
• Make certain that both automatic locks of the extension ladder are in proper position before ascending the ladder;
• Straight ladders and stepladders that exceed 10 feet may be held by another person for steadying;
• The area around the top and bottom of the ladder shall be kept clear; and
• Hard hats must be worn within an area beneath elevated work where objects could fall from a height and strike a worker.

14.2 Inspection of Ladders
Prior to use of any ladder, an inspection must be performed:
• Carefully examine the ladder for broken or missing rungs or cleats, broken side rails, and other damaged parts;
• All cleats, rungs, and side rails must be free of grease, oil, paint, or other slippery substances;
• The ladder should be equipped with feet that are secured in place;
• The joint between steps and side rails must be tight, and all hardware and fittings should be attached firmly. Movable parts should operate freely without binding or undue play;
• All wood parts must be free of sharp edges and splinters;
• Visually inspect the ladder to be free of shakes, warpage, decay or other irregularities;
• Metal ladders must be free of sharp edges, burrs and corrosion;
• Inspect for dents or bends in side rails, rungs or cleats;
• Check step to side rail connections, hardware connections and rivets; and
• If a ladder tips over, inspect the ladder for damage before continuing work.

14.3 Maintenance of Ladders
Damaged ladders must be withdrawn from service and either repaired or destroyed. When a defect or unsafe condition is found, personnel should tag or mark the ladder so that it will not be used until the corrective action is taken. Defective or unsafe conditions must be reported to the supervisor. Field repairs and the fabrication of improvised ladders is 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.
If exposed to greases, 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.

14.5 Storage of Ladders
Ladders should be stored where they can be inspected easily, damage to the ladder will not occur, and can be reached without causing accidents.
15.0 FIXED LADDERS AND STAIRS

15.1 Fixed Ladders
- Fixed ladders should be designed to withstand a single concentrated load of at least 200 lbs;
- Rungs of metal ladders must have minimal diameter of three quarters inch. Rungs must be at least 16 inches wide, be spaced 12 inches apart;
- Fixed Ladders, when their location so demands, must be painted or treated with a preservative to resist deterioration;
- The preferred pitch for a safe descent is 75 to 90 degrees. Ladders with 90 degree pitch must have two and one half feet of clearance on the climbing side.
- There must be a three foot clearance on ladders with a 75 degree pitch;
- There must be at least a seven inch clearance in back of the ladder to provide adequate toe space;
- There must be 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;
- Fixed ladders must have cages if they are longer than 20 feet. Landing platforms must be provided on ladders greater than 20 feet long. A platform is required every 30 feet for caged ladders and every 20 feet for unprotected ladders; and
- Side rails must extend at least 42 inches above the landing.

15.2 Fixed industrial stairs
The following applies to all stairs around equipment, machinery, tanks etc. They do not apply to stairs used for fire exits:
- Riser height and tread width of fixed industrial stairs should be uniform throughout any flight of stairs. All treads must be reasonably slip resistant;
- The minimum permissible width of a stairway is 22 inches;
- The angle to the horizontal made by the stairs must be between 30 and 50 degrees;
- All stairs should be adequately lighted; and
- If the tread is less than 9 inches wide the risers should be open.

15.3 Flights of stairs having four or more risers
- A stair railing is required on each opened side;
- 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;
- If the stairway is greater than 44 inches wide a handrail is required on each enclosed side;
- If the stairway is greater than 88 inches wide an intermediate stair railing located midway is required;
- 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
- Spiral stairways are not permitted except for special limited usage and secondary access situations where it is not practical to provide a conventional stairway.

15.4 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;
- Individual rungs or steps must be uniformly spaced from 12 to 16.5 inches; and
• The use of steps in personal access holes should be designed to prevent the foot from sliding off the end.

15.5 Alternating Tread Stairs
Alternating tread type stairs are permitted if they are installed, used, and maintained according to the manufacturer’s recommendations:
• The stair must be installed at an angle of 70 degrees or less; and
• The stairs must be equipped with a handrail at each side to assist the workers in climbing or descending.
16.0 TRAINING
Training shall be provided to all employees performing work on an elevated work surface or who may be exposed to a fall hazard. The training program should enable employees to recognize fall hazards and provide the requirements to be followed to minimize these hazards.

Employees shall be trained in the following areas by a competent person:
- The nature of fall hazards in the work area;
- Procedures for erecting, maintaining, disassembling and inspecting fall protection systems being utilized;
- The use and operation of guardrail systems, fall restraint systems, personal fall arrest systems, warning line systems, safety monitoring systems, and other protection to be used;
- The role of each employee in the safety monitoring program, if being incorporated into the fall protection program for the work to be performed;
- Limitations on the use of mechanical equipment during roof work on low-sloped roof tops;
- Procedures for handling and storage of equipment and materials and the erection of overhead protection;
- The employee’s role in the fall protection program;
- The applicable standards and regulations affecting the work to be performed;
- Limitations of fall protection equipment;
- Personal protective equipment specific to fall protection including use, inspection, care and storage requirements.

16.1 University Employees Assigned as Qualified Climbers: Employees who routinely climb fixed ladders, step bolts or similar climbing devices on towers and poles where ladder safety devices are not provided shall meet the following requirements:
- Shall be physically capable;
- Shall have successfully completed a training or apprenticeship program that covers hands-on training for the safe climbing of ladders or step bolts; and
- Shall be protected by a fall protection system when reaching their work position.
- Employees will require retraining under any of the following conditions:
  - Changes in the workplace render previous training obsolete;
  - Changes in the types of fall protection systems or equipment to be used render previous training obsolete; or
  - Inadequacies in an employee’s knowledge of use of fall protection systems or equipment or observed behavior indicate that the employee has not retained the required training.

Employees must demonstrate competency on the proper use of fall protection systems and understanding of this fall protection program.

In addition to the requirements listed in this section, competent individuals shall be trained specifically for the fall protection systems under their responsibilities. See Table II for Specific Training Guidelines.

Retraining shall be completed when the following occur:
- It is suspected that any affected employee who has already received training is no longer competent in the fall protection program;
- Changes in the workplace render the current training insufficient;
• Changes in the types of fall protection systems in place.

Installations of new fall protection systems are installed on UH buildings require retraining of the competent individuals by the installing fall protection company or their representative.

Table II. Specific Training Guidelines

| Fall Protection PPE | University Employees who use Fall Protection Personal Protective Equipment to control fall hazards in their work area shall be trained in the following:
|                    | • The application limits of the equipment
|                    | • The proper hook-up, anchoring and tie-off techniques including determination of elongation and deceleration distance
|                    | • Methods of use
|                    | • Inspection and storage of equipment
| Ladders            | All University Employees who use ladders with a working height of six feet or more shall be knowledgeable of the following:
|                    | • How to inspect ladders for visible defects
|                    | • How to use ladders properly
| Aerial Lifts       | University Employees who use Aerial Lifts should be knowledgeable of the following:
|                    | • The manufacturer’s operating instructions
|                    | • Pre-start inspection of the lift
|                    | • Inspection of the work area for dangerous conditions such as uneven surfaces, overhead obstructions such as power lines, and severe weather
|                    | • Load capacities of the equipment
|                    | • How to safely move the equipment
|                    | • How to prevent falls and use appropriate fall protection personal protective equipment
|                    | • Minimum safe approach distances to energized power lines
| Fall Protection Competent Person | Supervisors who act as the competent person shall be trained and certified through a qualified fall protection training program (8 hours) to be qualified and knowledgeable in the following:
|                                | • The nature of falls in the work area
|                                | • The correct procedures for erecting, maintaining, disassembling, and inspecting the fall protection systems used
|                                | • The use and operation of guardrail systems, personal fall arrest systems, safety net systems, warning line systems, safety monitoring systems, controlled access zones, and other protection to be used
|                                | • The role of each employee in the safety monitoring system when this system is used
|                                | • The limitations on the use of mechanical equipment during the performance of roofing work on low sloped roofs
|                                | • The correct procedures for the handling and storage of equipment and material, and the erection of overhead protection
|                                | • The role of employees in fall protection plans
|                                | • The appropriate OSHA standards
| Scaffolds              | University Employees who work on Scaffolds must be trained in the

The nature of any electrical hazards, fall hazards and falling object hazards in the work area
- The correct procedures for dealing with electrical hazards and for erecting, maintaining, and disassembling the fall protection systems and falling object protection systems being used
- The proper use of the scaffold, and the proper handling of materials on the scaffold
- The maximum intended load and the load carrying capacities of the scaffolds

<table>
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<tr>
<th>Qualified Climbers</th>
<th>Employees who routinely climb fixed ladders, step bolts or similar climbing devices on towers and poles where ladder safety devices are not provided shall meet the following requirements:</th>
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<td>- Shall be physically capable</td>
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<td>- Shall have successfully completed a training or apprenticeship program that covers hands-on training for the safe climbing of ladders or step bolts</td>
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<td>- Shall be protected by a fall protection system when reaching their work position</td>
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<tr>
<th>Scaffold Competent Person</th>
<th>Supervisors who act as the competent person in the use of scaffolding shall be additionally trained and certified through a scaffold competent person training program (4 hours) to be qualified and knowledgeable in following:</th>
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<td>- The proper selection of scaffold for the task based upon the type of work to be conducted and the working load to be supported</td>
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<td>- The correct procedures for the erection of scaffolds</td>
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<td>- The correct procedures for the dismantling of scaffolds</td>
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<td>- The correct procedures for the moving of scaffolds</td>
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<td>- The correct procedures for the altering of scaffolds</td>
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<td>- The OSHA standards</td>
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</table>

### 17.0 RECORDKEEPING
It is the responsibility of each department within the scope of this program to maintain applicable records for employees and fall protection systems.

- Employee training must be maintained for all employees exposed to fall hazards.
- All inspection and certification records must be maintained.
- An inventory of all fall protection systems on working unit buildings should be maintained.
- A written certificate of training shall be maintained for all employees exposed to fall hazards. The certificate must include the employee name, date of training, and signature of trainer or employee.

EHLS shall maintain a written training certification record containing the name of the employee trained, the name of the person who conducted the training, and the date of the training for Competent Persons in Fall Protection and Scaffolds, and Qualified Climber. The written certification record shall contain the name of the employee trained, the date of training, and the signature of the person who conducted the training. Departments can call EHLS at (713) 743-5858 for more information on training requirements, costs, and scheduling.
APPENDIX A

Glossary of Terms

Aerial lift device: 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.

Anchor point: A secure point of attachment for lifelines, lanyards or deceleration (grabbing) devices.

Authorized Person: A person approved or assigned by the employer to perform a specific type of duty or duties or to be at a specific location or job site, i.e., building maintenance, roof repair, etc.

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. Body belts are prohibited at the University of Houston.

Body harness (also referred as 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.

Connector: A device that is used to connect parts of a personal fall arrest system together (i.e. D-rings, and snaphooks).

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. To be considered a competent person, an 8-hour training class must be completed for general fall protection and an additional 4-hour training class must be completed for scaffolds. To be considered a competent person for equipment inspections, the manufacturer’s training guidelines shall be followed.

Controlled access zone -- A work area designed and clearly marked in which certain types of work, such as overhand bricklaying, may take place without the use of conventional fall protection systems (e.g. guardrail, personal arrest or safety net) to protect the employees working in the zone.

Deceleration device: Any mechanism, such as a rope, grabbing device, ripstitch 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.

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.

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.

Free Fall: The act of falling before a personal fall arrest system begins to apply force to arrest the fall.

Free Fall Distance: The vertical displacement of the fall arrest attachment point on the employee’s body harness between the onset of the fall, and just before the system begins to apply force to arrest the fall. Free fall distance must not exceed 6 feet. This distance excludes deceleration distance and lifeline/lanyard elongation distance.
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.
Guardrail: A barrier erected to prevent personnel from falling to lower levels. This system includes a midrail and toeboard able to withstand 200 pounds applied to the top rail in any direction.
Hole: A void or gap 2 inches or more in its least dimension in a floor, roof, or other walking/working surface.
Horizontal lifeline: a flexible line between two horizontal fixed anchorages to which a fall arrest device is connected.
Infeasible: means that it is impossible to perform the construction work using a conventional fall protection system (i.e., guardrail system, safety net system, or personal fall arrest system) or that it is technologically impossible to use any one of these systems to provide fall protection.
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.
Lanyard: A flexible line of rope or strap that generally has a connector at each end for connecting the body harness to a deceleration device, lifeline or anchor point.
Leading Edge: The edge of a floor, roof, or other walking/working surface, which changes location as additional floor, roof, etc., is placed or constructed. A leading edge is considered an unprotected side or edge when not under active construction.
Lifeline: A component consisting of a flexible line for connection to an anchorage at one end to hang vertically (vertical lifeline), or for connection to anchorages at both ends to stretch horizontally (horizontal lifeline), and which serves as a means for connecting other components of a personal fall arrest system to the anchorage.
Lower levels: Those areas or surfaces to which and employee can fall. Such areas include, but are not limited to, ground levels, floors, platforms, ramps, runways, excavations, pits tanks, material, water, equipment, structures, or portions thereof.
Low-slope roof: means a roof having a slope less than or equal to 4 in 12 (vertical to horizontal).
Mechanical equipment: means all motor or human propelled wheeled equipment used for roofing work, except wheelbarrows and mopcarts.
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.
Positioning device system: means a 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.
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, body harness and may include a lanyard, deceleration device, lifeline, or suitable combinations of these.
Qualified Climber: a person who by virtue of physical capabilities, training, work experience and job assignment who is authorized by the employer to routinely climb fixed ladders and step bolts on structures such as towers and poles that do not have ladder protection devices such as cages and rest platforms.
Qualified person: one with a recognized degree or professional certificate and extensive knowledge and experience in the subject field who is capable of design, analysis, evaluation and specifications in the subject work, project or product.
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.
Roof: means the exterior surface on the top of a building. This does not include floors or formwork which, because a building has not been completed, temporarily becomes the top surface of a building.
Roof 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.

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.

Safety-monitoring system -- A safety system in which a competent person is responsible for recognizing and warning employees of fall hazards

Scaffold: means any temporary elevated or suspended platform, at its supporting structures, used for supporting employees or materials or both.

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).

Standard railing: A vertical barrier erected along exposed edges of a floor opening, wall opening, ramp, platform, or runway to prevent falls of persons.

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

Snaphook: 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 are permitted at the University of Houston.

Toe board: A low protective barrier that prevents material and equipment from falling to lower levels and which protects personnel from falling.

Tie-Off: A procedure of connecting directly or indirectly to an anchorage point.

Total Fall Distance: The maximum vertical change in distance from the bottom of an individual's feet at the onset of a fall, to the position of the feet after the fall is arrested - including free fall distance and deceleration distance.

Unprotected sides and edges: means any side or edge (except at entrances to points of access) of a walking/working surface, e.g., floor, roof, ramp, or runway where there is no wall or guardrail system at least 39 inches (1.0 m) high.

Vertical Lifeline: A component consisting of a flexible line for connection to an anchor point at one end to hang vertically and that serves as a means for connecting other components of a personal fall arrest system to the anchor point.

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, bridges, 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.

Warning line system: A barrier erected on a roof to warn employees that they are approaching an unprotected roof side or edge, and which designates an area in which work can be conducted without the use of guardrails, personal fall arrest systems, or safety nets to protect employees in the area. This will be utilized on any roof greater than 50” wide and in conjunction with a safety monitor only where the other forms of fall protection have been deemed infeasible to use.

Work area: means that portion of a walking/working surface where job duties are being performed.