DEPAUL UNIVERSITY

Fall Protection Program

Environmental Health & Safety

April 2016

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APPENDICES

1.0 PURPOSE

The Fall Protection Program was designed to specify when DePaul University employees must use fall protection systems, provide guidance on selecting the most appropriate fall protection method for the work involved and to establish procedures for the safe use of such methods, as they may present their own safety hazards to employees.

2.0 SCOPE

This program applies to all work that may pose fall hazards. This includes but is not limited to work on elevated surfaces such as roofs, building ledges, mobile lifts, scaffolding and other such work platforms.

3.0 RESPONSIBILITIES

Environmental Health & Safety (EHS) is responsible for program development and review annually in compliance with all applicable regulations and industry consensus standards. EHS will also provide guidance and assistance in training.

Department managers are responsible for identifying any existing or potential fall hazards and for identifying which employees require training prior to working at elevated heights.

Supervisors must identify and provide the necessary personal fall protection equipment required for working in fall hazard situations.

Employees are responsible for wearing the appropriate fall protection equipment when directed and for following the procedure specified in this policy. Employees are responsible for the proper care, use and inspection of their assigned fall protection equipment. Employees are expected to report any unsafe conditions to a supervisor.

4.0 WORK REQUIRING FALL PROTECTION

4.1 General

Fall protection is required whenever work is done on a surface that has an unprotected side or edge, which is 6 feet or more above an adjacent lower level and for all work using aerial lifts or other elevated work platforms and lifts. Before work begins, a qualified person shall determine if the walking/working surfaces on which its employees are to work have the strength and structural integrity to support employees safely, and to select an appropriate fall protection method if required.

Fall hazards must be evaluated to determine the preferable method to protect the employee/s. When considering which type of fall protection to use, the following hierarchy of remedies, in order of preference, should be considered:

- Elimination of the fall hazard by bringing the work down to safe ground level.
- Use of passive fall protection systems such as guard rails.
- Fall restraint, which prevents a person from reaching a fall hazard.

- Fall arrest, which utilizes equipment to stop a fall after it, occurs.
- Administrative controls, which use work practices or procedures to signal or warn a worker to avoid approaching a fall hazard.

4.2 Training

A qualified person in the following shall train all employees who may be exposed to fall hazards:

- How to recognize fall hazards in the work area.
- Procedures for erecting, maintaining, disassembling and inspecting the fall protection systems used.
- Selection, proper use and care of equipment comprising a personal fall arrest system.
- Their role in fall protection plans and rescue procedures.
- Occupational Safety and Health Administration (OSHA) fall protection standards.

A training record shall be maintained for each employee. The record will contain the name and signature of the employee trained, date of training and the signature of the person who conducted the training. Retraining shall be required if there is a change in the fall protection method being used or if an employee's actions demonstrate that the employee has not retained the understanding or skills important to fall protection.

5.0 FALL PROTECTION SYSTEMS

One of the following systems shall be in place whenever an employee is exposed to a fall hazard of six feet or higher. The use of guardrail systems is considered a passive method of fall protection and is actually the preferred method for eliminating fall hazards.

5.1 Guardrail Systems

Guardrails are needed at the edge of work areas 6 feet or more in height to protect employees from falling. This includes the edge of excavations greater than six feet in depth.

Guardrail systems need to meet the following criteria:

- Toprail is 42 inches, +/- 3 inches above the walking/working level
- Midrail is located midway between the top rail and the walking/working level
- It is important to remember that the working level is that level where the work is being done. Someone working on a stepladder next to an edge may raise his/her working surface well above the walking surface.
- Both top and midrails should be constructed of materials at least one-quarter inch in thickness or diameter. If wire rope is used for toprails, it needs to be flagged with a high-visibility material at least every 6 feet and can have no more than 3" of deflection

- The toprail needs to withstand a force of 200 pounds when applied in any downward or outward direction.
- The midrail needs to withstand a force of 150 pounds applied in any downward or outward direction
- Toeboards are required for all guardrails on elevated walking or working platforms where employees working below are exposed to falling objects. Toeboards must be four inches in height and must be securely fastened.
- The system should be smooth to prevent punctures, lacerations or snagging of clothing
- The ends of the top rail shouldn't overhang the terminal posts, except when such overhang does not present a projection hazard
- When a hoisting area is needed, a chain, gate or removable guardrail section must be placed across the access opening when hoisting operations are not taking place.

5.2 Loading Docks

Loading docks and other open sided floors greater than 6 feet above ground level must be protected. The approved method of protection is the installation of a standard guardrail as described in this section. The guardrail may have removable sections to provide access for loading but rails must remain in place when access in not required.

5.3 Skylights

Skylight screens shall be of such construction and mounting that they are capable of withstanding a load of at least 200 pounds applied perpendicularly at any one area on the screen. They shall also be of such construction and mounting that under ordinary loads or impacts, they will not deflect downward sufficiently to break the glass below them. The construction shall be of grillwork with openings not more than 4 inches long or of slat work with openings not more than 2 inches wide with length unrestricted.

Skylights are considered an opening when present on a roof. A standard guardrail or skylight screens capable of supporting at least 200 pounds must be provided around the opening to prevent workers from falling through to the surface below.

Skylights constructed at least 42 inches above the roof deck with sides capable of supporting 200 pounds do not require additional protection.

6.0 PERSONAL FALL ARREST SYSTEMS

Personnel requiring the use of personal fall protection equipment shall employ the "Buddy System" There are three main components to the personal fall arrest system. This includes the personal protective equipment the employee wears, the connecting devices and the anchorage point. Prior to tying off to perform the work a means of rescue in the event of a fall must be immediately available. All personal fall arrest system components must meet the requirements of the ANSI Z359 Standards. The system needs to meet the following criteria for each component:

6.1 Personal Protective Equipment

- Full body harnesses are required. The use of body belts is prohibited.
- The attachment point of the body harness is the center D-ring on the back.
- Employees must always tie off at or above the D ring of the harness except when using lanyards 3 feet or less in length.
- Harnesses or lanyards that have been subjected to an impact load shall be destroyed.
- Load testing shall not be performed on fall protection equipment.

6.2 Connecting devices

This device can be a rope or web lanyard, rope grab or retractable lifeline.

- Only locking snaphooks may be used.
- Horizontal lifelines will be designed by a qualified person and installed in accordance with the design requirements.
- Lanyards and vertical lifelines need a minimum breaking strength of 5,000 pounds.
- The length of a single lanyard shall not exceed six feet.
- The use of steel lanyards is prohibited.
- Lanyards may not be clipped back to itself (e.g. around an anchor point) unless specifically designed to do so.
- If vertical lifelines are used, each employee will be attached to a separate lifeline.
- Lifelines need to be protected against being cuts or abrasions

6.3 Anchorage

Secure anchor points are the most critical component when employees must use fall arrest equipment. DPU buildings may have existing structures (e.g., steel beams that may meet the criteria for a secure anchor point). Other work locations and assignments may require the installation of a temporary or permanent anchor. At a minimum, the following criteria must be considered for each type of anchor point:

- Structure must be sound and capable of withstanding a 5000 lb. static load.
- Structure/anchor must be easily accessible to avoid fall hazards during hook up.
- Direct tying off around sharp edged structures can reduce breaking strength by 70% therefore; chafing pads or abrasion resistant straps must be used around sharp edged structures to prevent cutting action against safety lanyards or lifelines.

- Structures used as anchor points must be at the worker's shoulder level or higher to limit free fall to 6 feet or less and prevent contact with any lower level (except when using a self-retracting lifeline or 3 foot lanyard).
- Choose structures for anchor points that will prevent swing fall hazards. Potentially dangerous "pendulum" like swing falls can result when a worker moves horizontally away from a fixed anchor point and falls. The arc of the swing produces as much energy as a vertical free fall and the hazard of swinging into an obstruction becomes a major factor. Raising the height of the anchor point can reduce the angle of the arc and the force of the swing. Horizontal lifelines can help maintain the attachment point overhead and limit the fall vertically. A qualified person must design a horizontal lifeline.

6.4 Permanent Anchor Requirements

In addition to all the criteria listed above, the following points must be considered:

- Environmental factors and dissimilarity of materials can degrade exposed anchors.
- Compatibility of permanent anchors with employee's fall arrest equipment.
- Inclusion of permanent anchors into a Preventive Maintenance Program with scheduled annual re-certification.
- Visibly label permanent anchors.
- Roof anchors must be immediately removed from service and re-certified if subjected to fall arrest forces.

6.5 Reusable Temporary Anchors

- Reusable temporary roof anchors must be installed and used following the manufacturer's installation guidelines.
- Roof anchors must be compatible with employee's fall arrest equipment.
- Roof anchors must be removed from service at the completion of the job and inspected prior to reuse following the manufacturer's inspection guidelines.
- Roof anchors must be immediately removed from service and disposed of if subjected to fall arrest forces.

6.6 Complete system

- If a fall occurs, the employee should not be able to free fall more than 6 feet nor contact a lower level.
- To ensure this, add the height of the worker, the lanyard length and an elongation length of 5.5 feet. Using this formula, a six-foot worker would require a tie-off point at least 15.5 feet above the next lower level.

- A personal fall arrest system that was subjected to an impact needs to be removed from service immediately.
- Personal fall arrest systems need to be inspected prior to each use and damaged or deteriorated components removed from service.
- Personal fall arrest systems should not be attached to guardrails or hoists.

7.0 AERIAL LIFTS AND SELF POWERED WORK PLATFORMS

Training in the proper operation and inspection of the equipment must be received prior to operating or working from an aerial lift or self-powered work platform, regardless of the type.

Body harnesses must be worn with a shock-absorbing lanyard (preferably not to exceed 3 feet in length) and must be worn when working from an elevated work platform (exception: scissor lifts and telescoping lifts that can move only vertically do not require the use of a harness and lanyard as long as the work platform is protected by a guardrail system). The point of attachment must be the anchor point installed by the equipment manufacturer. Personnel cannot attach lanyards to adjacent poles, structures or equipment while they are working from the aerial lift.

7.1 Inspection

The employee will inspect the entire system in use at the initial installation and inspect the entire personal fall arrest system prior to every use. The visual inspection of a personal fall arrest system shall follow the manufacturer's recommendations. Any components of a personal fall arrest system noted to be damaged should be removed from service immediately.

APPENDICES

APPENDIX A: DEFINITIONS

"Anchorage" means a secure point of attachment for lifelines, lanyards or deceleration devices, and which is independent of the means of supporting or suspending the employee.

"Body belt" means a strap with means both for securing it about the waist and for attaching it to a lanyard, lifeline, or deceleration device.

"Body harness" means a design of straps which may be secured about the employee in a manner to distribute the fall arrest forces over at least the thighs, pelvis. Waist, chest and shoulders with means for attaching it, to other components of a personal fall arrest system.

"Buckle," means any device for holding the body belt or body harness closed around the employee's body.

"Competent person" means 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.

"Connector" means a device, which is used to couple (connect) parts of the system together. It may be an independent component of the system (such as a carabiner), or an integral component of part of the system (such as a buckle or dee-ring sewn into a body belt or body harness, or a snap-hook spliced or sewn to a lanyard or self-retracting lanyard).

"Deceleration device" means any mechanism, such as a rope grab, rip stitch lanyard, specially woven 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.

"Deceleration distance" means the additional vertical distance a falling employee travels, excluding lifeline elongation and free fall distance, before stopping, from the point at which the deceleration device begins to operate. It is measured as the distance between the locations of an employee's body belt or body harness attachment point at the moment of activation (at the onset of fall arrest forces) of the deceleration device during a fall, and the location of that attachment point after the employee comes to a full stop.

"Equivalent" means alternative designs, materials or methods which the employer can demonstrate will provide an equal or greater degree of safety for employees than the methods, materials or designs specified in the standard.

"Free fall" means the act of falling before the personal fall arrest system begins to apply force to arrest the fall.

"Free fall distance" means the vertical displacement of the fall arrest attachment point on the employee's body belt or body harness between onset of the fall and just before the system begins to apply force to arrest the fall. This distance excludes deceleration distance, lifeline and lanyard elongation but include any deceleration device slide distance or self-retracting lifeline/lanyard extension before they operate and fall arrest forces occur.

"Lanyard" means a flexible line of rope, wire rope, or strap, which is used to secure the body belt or body harness to a deceleration device, lifeline, or anchorage.

"Lifeline" means 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.

"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, a body belt or body harness and may include a lanyard, deceleration device, lifeline, or suitable combinations of these.

"Qualified person," means 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.

"Rope grab" means a deceleration device that travels on a lifeline and automatically frictionally engages the lifeline and locks so as to arrest the fall of an employee. A rope grab usually employs the principle of inertial locking, cam/lever locking, or both.

"Self-retracting lifeline/lanyard" means a deceleration device, which contains a drum, wound line, which may be slowly extracted from, or retracted onto, the drum under slight tension during normal employee movement, and which, after onset of a fall, automatically locks the drum and arrests the fall.

"Snap-hook" means a connector comprised 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.

APPENDIX B: Program History

Date	Revision Number	Brief Description of Changes	Review Completed by

ACKNOWLEDGEMENTS

This program was developed using best practice examples from the University of Florida as well as Federal and State regulations and guidance documents.