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UNC CHARLOTTE

Environmental Health and Safety

FALL PROTECTION AND ELEVATED WORK

UNC CHARLOTTE
9201 UNIVERSITY CITY BLVD., CHARLOTTE, NC 28223

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I. Purpose

UNC Charlotte is committed to providing a safe and healthy work environment and to protecting employees by reducing the risk of injury or fatality when working at heights four feet or more above a lower level in general industry, and six feet or more while working in certain conditions within the construction industry. UNC Charlotte believes that falls can be prevented by proper planning, providing the right fall protection equipment and training all workers to use the equipment safely.

II. Scope

This Fall Protection and Elevated Work Program applies to all UNC Charlotte employees. All employees are required to follow the minimum procedures outlined in this program. Any deviations from this program must be immediately brought to the attention of the Environmental Health and Safety Office.

III. Program Responsibilities

A. Executive Leadership

The University of North Carolina at Charlotte has legal responsibility for compliance with the occupational safety and health standards.

B. Program Administrator

The Environmental Health and Safety Office is responsible for:

1. Planning and recommending programs that adhere to all applicable federal, state, and local laws and regulations pertaining to environmental health and safety.
2. Assisting supervisors with implementing environmental health and safety programs in their areas.
3. Curtailing or stopping work that pose a clear and imminent danger to the health or safety of the University community.
4. Periodically reviewing the program and updating it as needed to ensure compliance with all applicable federal state regulations.

C. Departmental Management

Management is responsible for:

1. Planning and developing budget requests for departmental safety programs.

2. Developing safety procedures, work practices, and safe working areas for all those under their supervision.
3. Supporting safety and health as a model to those they supervise.
4. Supplying appropriate equipment and training.
5. Enforcing environmental health and safety regulation by invoking disciplinary action or administrative sanction.

D. Employees

Every UNC Charlotte employee is responsible for conducting himself/herself in accordance with this program. All employees shall:

1. Adhere to all safety policies, programs, procedures, and practices while performing his/her duties in a safe manner.
2. Notifying your immediate supervisor of unsafe working conditions, potential hazards, and accidents as soon as possible.

IV. Procedures

A. General

All employees will be protected from falling when working on a surface that has an unprotected side, edge, etc., elevated work platforms four feet or more above an adjacent lower levels, and when working above dangerous equipment while working in general industry. While performing construction type activities, all employees will be protected from falling from a surface six feet or more above a lower level. Scaffolds used during construction type activity require fall protection to be used at 10 feet or more above a lower level. In construction activities involving steel erection, employees who are on a walking working surface with an unprotected edge more than 15 feet above a lower level must be protected by conventional fall protection. When working from aerial lifts, review the UNC Charlotte Aerial Lift program for additional guidance.

Fall hazards will be evaluated by the Environmental Health and Safety Office and management to determine the best method to protect the employee. When selecting what type of fall protection to use, the Environmental Health and Safety Office will consider the hierarchy of hazard control, which organizes risk control techniques from most- to least-effective (examples are shown below in order of decreasing effectiveness and preference).

1. Elimination of the fall hazard by bringing the work down to safe ground level.
2. Passive fall protection systems, such as guard rails, that do not require active participation by the worker.
3. Fall restraint that prevents a person from reaching a fall hazard.
4. Fall arrest that utilizes equipment to stop a fall after it occurs.
5. Administrative controls such as work practices or procedures to signal or warn a worker to avoid approaching a potential fall hazard.

B. Fall Hazard Evaluation

The Environmental Health and Safety Office program administrator and departmental management will assess assigned job task and area for potential fall hazards. This evaluation will document the required steps for protecting employees from the identified fall hazards.

C. General Industry Fall Hazards

1. Loading Docks

Loading docks will be protected by a guardrail system. The guardrail will have removable sections to provide access for loading vehicles but rails must remain in place when loading is not in progress.

2. Wall Openings

All wall openings 4 feet or more above an adjacent surface will be guarded by one of the following: a rail, picket fence, half door or equivalent barrier will be placed across the wall opening. If the wall opening extends to the floor, a toe board at least four inches high shall be installed to prevent materials accidental falling from the edge.

Every window wall opening at a stairway landing, floor, platform, or balcony, from which there is a drop of more than 4 feet, and where the bottom of the opening is less than 3 feet above the platform or landing, shall be guarded by standard slats, standard grill work, or standard railing.

3. Dangerous Equipment or Materials

When working at any height above dangerous equipment or materials, each worker will be protected from falling into or onto the dangerous equipment or materials by a guardrail system, equipment guards, safety net system or personal fall arrest system.

4. Skylights

Skylights are considered an opening when present on a roof. 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 slatwork with openings not more than 2 inches wide with length unrestricted.

5. Floor Openings

An opening measuring 12 inches or more in its least dimension, in any floor, platform, pavement, or yard through which persons may fall; such as a hatchway, stair or ladder opening, pit, or large manhole.

6. Floor Hole

An opening measuring less than 12 inches but more than 1 inch in its least dimension, in any floor, platform, pavement, or yard, through which materials but not persons may fall; such as a belt hole, pipe opening or slot opening.

All floor holes will be guarded by one of the following:

- a) A standard railing with toeboard on all exposed sides.
- b) A covering of sufficient strength and construction to handle the heaviest load that could be placed on it (Note: While the cover is not in place, the floor hole must be constantly attended by someone or protected by a standard railing).

D. Construction Industry Fall Hazards

1. Leading Edges

Each worker working on or near a leading edge six feet or more above a lower level will be protected by guardrail systems, safety net systems or personal fall arrest systems.

2. Low-Slope Roofs

Workers on a low-slope (less than or equal to 4/12 pitch) roof that has one or more unprotected side or edge shall be protected from falling by one of the following:

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

3. Steep Roofs

Workers on a steep roof (greater than 4/12 pitch) that has one or more unprotected side or edge shall be protected from fall by one of the following:

- a) Guardrail systems with toeboards
- b) Safety net systems
- c) Personal fall arrest systems

4. Wall Openings

All workers working on, at, above or near wall openings (including those with chutes attached), where the bottom edge of the wall opening is less than 39 inches above the walking /working surface, must be protected by a guardrail system, safety net system or personal fall arrest system.

5. Openings

Means a gap or void 30 inches (76 cm) or more high and 18 inches (48 cm) or more wide, in a wall or partition, through which employees can fall

to a lower level.

6. Excavations

Excavations 6 feet or more deep shall be protected by a guardrail system, fence or barricade when the excavation cannot be readily seen because of plant growth or other visual barrier. Workers at the edge of a well, pit, shaft or similar excavation 6 feet or more deep will be protected from falling by a guardrail system, fence, barricade or cover.

7. Dangerous Equipment or Materials

When working at any height above dangerous equipment or materials, each worker will be protected from falling into or onto the dangerous equipment or materials by a guardrail system, equipment guards, safety net system or personal fall arrest system.

8. Holes

Each employee on walking/working surfaces shall be protected from falling through holes (including skylights) more than 6 feet (1.8 m) above lower levels, by personal fall arrest systems, covers, or guardrail systems erected around such holes. Each employee on a walking/working surface shall be protected from tripping in or stepping into or through holes (including skylights) by covers. Each employee on a walking/working surface shall be protected from objects falling through holes (including skylights) by covers.

9. Covers

Covers for holes in floors, roofs, and other walking/working surfaces shall meet the following requirements: Covers located in 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 the cover. All other covers 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. All covers shall be secured when installed so as to prevent accidental displacement by the wind, equipment, or employees. All covers shall be color coded or they shall be marked with the word "HOLE" or "COVER" to provide warning of the hazard.

10. Aerial Lifts and Self-Powered Work Platforms

Body harnesses must be worn with a lanyard, not to exceed 3 feet in length, or a self-retracting lifeline when working from all elevated mobile work platforms. The point of attachment must be the anchor point installed and designated by the equipment manufacturer. Personnel will not attach lanyards to adjacent poles, structures or equipment while they are working from the aerial lift. Personnel will not move an aerial lift while the boom is in an elevated working position and the operator is inside the lift platform. Scissor lifts and telescoping lifts that can only move vertically do not require the use of a harness and lanyard as long as the work platform is protected by a proper guardrail system and occupants do not stand on above guardrail system.

V. Fall Protection Systems

A. Guardrail Systems

After eliminating the elevated work, guardrails are the preferred method for the protection of fall hazards. Typical locations that require guardrails include floor openings, wall openings, open-sided floors, platforms and runways.

All guardrail systems used by UNC Charlotte will meet the following criteria:

1. Toprail is 42 inches, +/- 3 inches above the walking/working level.
2. Midrail is located midway between the top rail and the walking/working level.
3. Toprails and midrails will be constructed of materials at least one-quarter inch in thickness or diameter. If wire rope is used for toprails, it must be flagged with a high-visibility material at least every 6 feet and can have no more than 3" of deflection.
4. The toprail must be capable of withstanding a force of 200 pounds when applied in any downward or outward direction.
5. The midrail must withstand a force of 150 pounds applied in any downward or outward direction.
6. Toeboards are required for all guardrails on elevated walking or working platforms where employees working below are exposed to falling objects.
7. Toeboards must be 4 inches in height and must be securely fastened.
8. The system will be smooth to prevent punctures, lacerations or snagging of clothing.

9. The ends of the top rail should not overhang the terminal posts, except when such overhang does not present a projection hazard.
10. 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.

B. Safety Nets

When safety nets are the appropriate option for fall protection, they will be installed as close as practicable under the walking/working surface on which employees are working, but in no case more than 30 feet below such level.

Safety nets must meet the following criteria:

1. Pass a 400-pound drop test or certified by employer or competent person before being used as a fall protection system, whenever relocated, after major repairs or at 6-month intervals if left in place.
2. Extend sufficiently from outer edge of the walking/working surface to catch a falling employee.
3. Have a maximum mesh size not exceed 6 inches by 6 inches.
4. Be inspected at least weekly for wear, deterioration and damage.
5. All objects must be removed from net by the end of the shift.
6. Have a 5,000-pound minimum breaking strength of border rope.
7. Have an unobstructed fall area.

C. Personal Fall Arrest Systems

If a fall occurs, the employee must not be able to freefall more than 6 feet, nor contact a lower level. To ensure this, the Environmental Health and Safety Office Program Administrator will add the height of the worker, the lanyard length and an elongation length of 5.5 feet to determine the anchorage point. All personal fall arrest system components that are subjected to an impact load must be removed from service immediately. Personal fall arrest systems will be inspected prior to each use, and damaged or deteriorated components removed from service and destroyed.

There are three main components to a personal fall arrest system; anchorage point, body harness, and connecting devices.

All personal fall arrest system components must meet the requirements of the ANSI Z359 Standards.

1. Anchorages

Secure anchor points are the most critical component when employees must use fall arrest equipment. Some UNC Charlotte buildings have existing identified anchor structures. Other work locations may require the installation of a temporary or permanent anchor.

All anchor points will be:

- a) Sound and capable of withstanding a 5,000 lb. static load per employee attached and independent of any anchorage used to support or suspend platforms.
- b) Easily accessible by employees to avoid fall hazards during hook-up.
- c) Free of sharp edges that could reduce breaking strength when tying off. Chafing pads or abrasion-resistant straps must be used on any sharp edged structures to prevent cutting of safety lanyards or lifelines.
- d) At the worker's shoulder level or higher to limit freefall to 6 feet or less and prevent contact with any lower level (except when using a self-retracting lifeline or 3-foot lanyard).
- e) Able to prevent or limit swing fall hazards. Horizontal lifelines will be used to keep the attachment point overhead and limit the fall vertically.
- f) Guardrails and hoists cannot be used as anchorage points.

In addition to all the criteria listed above, permanent anchor points will be periodically inspected and re-certified to meet static load requirements. They will be visibly labeled as permanent anchors and all anchors must be immediately removed from service and re-certified if subjected to fall arrest forces.

2. Body Harness

- a) A full body harness is required. The use of body belts is prohibited.
- b) The only attachment point allowed on the body harness is the center D-ring on the harness back.
- c) Employees must always tie off at or above the D ring of the harness except when using lanyards 3 feet or less in length.
- d) Fall protection equipment will never be load tested.

3. Connecting Devices

- a) Allowable devices include rope or web lanyards, rope grabs or retractable lifelines.
- b) All snap hooks must be self-locking.
- c) Horizontal lifelines will be designed by a qualified person and installed in accordance with the design requirements.
- d) Lanyards and vertical lifelines must have a minimum breaking strength of 5,000 pounds.
- e) The length of a single lanyard will not exceed six feet.
- f) The use of steel lanyards is prohibited.
- g) A lanyard may not be clipped back to itself (e.g. around an anchor point) unless specifically designed to do so.
- h) If vertical lifelines are used, each employee must be attached to a separate lifeline.
- i) Lifelines must be protected against cuts and abrasion.

D. Warning Line Systems and Controlled Access Zones

Warning line systems and work in controlled access zones will be developed, based on the task, in accordance with OSHA regulation 1926.502 before employees are exposed to fall hazards.

Control zone systems must comply with the following:

- 1. Controlled access zones will be defined by a control line or other means that restricts access.
- 2. Control lines will extend the entire length of the unprotected or leading edge and be approximately parallel to the unprotected or leading edge.
- 3. Control lines must be connected on each side to a guardrail system or wall.
- 4. Control lines may consist of ropes, wires, tapes or equivalent materials, and supporting stanchions.
- 5. Control lines must be flagged or otherwise clearly marked at 6-foot intervals (maximum) with high-visibility material.
- 6. Control lines must be rigged and supported in such a way that the lowest point (including sag) is not less than 39 inches from the walking/working surface and the highest point is not more than 45 inches above the walking/working surface.
- 7. Control lines must have a minimum breaking strength of 200 pounds.

VI. Ladders

All ladders used by UNC Charlotte employees will meet the following requirements:

- A. Rated greater than the weight of the worker and any tools or equipment carried by the worker.
- B. Appropriate ladder style for the job (i.e. step ladders will not be used in a folded position, step ladders will be tall enough to perform work without standing on the top step, extension ladders will extend a minimum of three feet above the discharge point, etc.).
- C. Visually inspected prior to each use.
- D. Metal ladders will not be used near electrical lines or sources.
- E. All safety feet must be in place, secure and in sound condition.

Ladders must be set up on a surface that is firm, flat and is not slippery. The top of extension ladders must be against a solid, fixed surface and extend at least three feet above the landing surface. Extension ladders will be set up using the 4-to-1 rule (base of the ladder placed at a distance from the wall that is equal to one fourth of the height that the ladder is extended). When employees are on extension ladders at heights of 20 feet or higher, either a second person must steady the ladder base or the top of the ladder must be effectively tied off to a sound anchor point.

VII. Scaffolds

Scaffolds are complex systems with multiple connection points, subject to a number of factors that could affect their stability and reliability. UNC Charlotte will use only a competent person/company who has received specific training to erect scaffolds.

Basic requirements:

- A. The working edge of the scaffold will be places no more than 14 inches from the front of the building or structure.
- B. Platforms will extend over the end supports by at least 6 inches, and not more than 12 inches, unless cleated or restrained.
- C. All components that are supplied by the manufacturer will be used unless they are parts specifically designed for optional uses and are not being used at the time.
- D. All parts, including casters, pipes/poles, rails, toe boards, platforms, cams, locking pins and all connection devices must be inspected and found to be in good condition prior to each use.
- E. A workplace inspection will be conducted and documented prior and during the erection of the scaffolding, as well as prior to each use.
- F. Guardrails are to be placed between 36 and 45 inches high and placed at the open ends and sides of the platform, and must be able to withstand a

force of 200 pounds. Midrails will be placed halfway between the toprail and the toeboard. Toeboards must be in place where employees working below are exposed to falling objects.

- G. Cross bracing and railings should not be used as a means of climbing to or accessing the platform. Workers will only use the installed ladders.
- H. For mobile scaffolds, the caster wheels must be locked and all locking pins in place prior to use.
- I. Fall protection systems are required when employees erect and disassemble scaffolding.
- J. Hard hats are to be worn at all times while working on or around scaffolding.

VIII. Personal Fall Arrest System Inspection

Employees must visually inspect their entire personal fall arrest system prior to every use. The inspection will follow the manufacturer's recommendations. Any damaged components must be removed from service immediately.

A. Webbing

The entire surface of webbing must be inspected for damage. Beginning at one end, bend the webbing in an inverted "U." Holding the body side of the belt toward you, grasp the belt with your hands six to eight inches apart. This surface tension makes the damaged fibers or cuts easier to see. Watch for frayed edges, broken fibers, pulled stitches, cuts, burns and chemical damage. Check the tongue for loose, distorted or broken grommets. The webbing cannot have any additional punched holes.

B. D-Rings/Back Pads

D-rings will be checked for distortion, cracks, breaks, and rough or sharp edges. The D-ring should pivot freely. D-ring back pads should also be inspected for damage.

C. Buckles

Buckles will be inspected to identify any unusual wear, frayed or cut fibers or distortion. Buckle tongues must be free of distortion in shape and motion. They should overlap the buckle frame and move freely back and forth in their socket. The roller should turn freely on the frame. Friction and mating buckles must be inspected to ensure the outer bars and center bars are straight. Pay special attention to corners and attachment points of the center bar.

D. Snaps

Must be inspected closely for hook-and-eye distortions, cracks, corrosion, or pitted surfaces. The keeper (latch) should seat into the nose without binding and should not be distorted or obstructed. The keeper spring should exert sufficient force to firmly close the keeper. Keeper locks must prevent the keeper from opening when the keeper closes.

E. Thimbles

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

F. Web Lanyard

Inspect the lanyard by bending the webbing over a curved surface, such as a pipe, observing each side of the webbed lanyard for any cuts or breaks. Examine the webbing for swelling, discoloration, cracks or burns. Check closely for any breaks in the stitching.

G. Rope Lanyard

Rotate the rope lanyard while inspecting from end to end. This will make any fuzzy, worn, broken or cut fibers more apparent. The rope diameter should be uniform throughout, following a short break-in period. Weakened areas from extreme loads will appear as a noticeable change from the original diameter. Make sure the rope has no knots tied in it. Knots can reduce the strength of the rope by up to 60 percent.

H. Shock-Absorbing Lanyard

Shock-absorbing lanyards should be examined similarly to a web lanyard. However, also look for signs of deployment. If the lanyard shows signs of having been put under load (e.g. torn out stitching), remove it from service.

I. Self-Retracting Lanyard/Lifeline

The lanyard housing must be inspected to ensure that casing bolts are tight and that there are no loose fasteners, missing parts, cracks or excessive wear or corrosion. Webbing must be inspected for cuts, nicks or tears as well as for any broken fibers, stitching or fraying. Steel lanyards will be inspected for cuts,

fraying, broken wires, overall deterioration and excessive wear. Check fittings for wear or cracks and obvious damage. Employees will follow manufacturer's recommendations for additional inspection tasks and for any requirements that the unit be sent in to the manufacturer for periodic inspection.

IX. Rescue

Personnel requiring the use of personal fall protection equipment will use a "Buddy System" or have an observer to render assistance when and if required. Prior to tying off to perform the work, a means of rescue in the event of a fall must be immediately available if employees cannot be expected to rescue themselves. All components of fall arrest system impacted by a fall event shall be removed from service. The components will be tagged with employee's name, date and activity at time of fall and give the equipment to the Environmental Health and Safety Office Program Administrator.

A. Self-Rescue

Persons working at heights may be able to perform a self-rescue by climbing back up to the level from which they fell, typically a few inches to 3 feet. Employees who fall any distance should return to the floor or ground to be medically evaluated.

B. Assisted Rescue

Persons unable to self-rescue will be assisted, if appropriate, by their "buddy" or other observer. The "buddy" will immediately contact Police & Public Safety for rescue assistance.

X. Training

Each employee who may be exposed to fall hazards must be trained to recognize the hazards and the procedures to follow to minimize the hazards. Training will consist of the following:

- A. Fall hazards in the work area.
- B. Correct procedures for erecting, using, maintaining, disassembling and inspecting the fall prevention and protection systems.
- C. Selection, proper use and care of equipment of a personal fall arrest system.
- D. Limitations of fall protection equipment.
- E. Role of employees in fall protection plans.
- F. Rescue procedures to follow in case of a fall.
- G. Overview of the OSHA fall protection requirements.

The frequency of training will depend on the following factors:

- A. Initial assignment to fall hazard job task.
- B. Whenever the employee's responsibilities or designated actions under the plan change.
- C. Whenever changes are made to the plan.
- D. Whenever there is a change in the type of fall protection equipment used.
- E. Whenever a new employee is hired or assigned.
- F. Whenever a known hazard is added to the work environment.
- G. Whenever a fall protection procedure fails.

Specific safety training will be required for the following equipment:

- A. Aerial Lifts
- B. Scaffolds
- C. Ladders

XI. Outside Contractors

Each contractor who is retained to perform operations that require fall protection shall:

- A. Review the UNC Charlotte Contractor Safety Program.
- B. Coordinate fall protection with UNC Charlotte Project Manager.

XII. Periodic Program Review

At least annually, the Environmental Health and Safety Program Administrator will conduct a review to assess the plan's effectiveness. The annual review will be evaluated and program updated as needed.

XIII. Record Retention

UNC Charlotte will maintain Fall Protection and Elevated Work Program records.