



NORTHEAST STATE

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FALL PROTECTION PLAN

Office of Environmental Health and Safety
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Introduction

One of the leading causes of death and injuries is falls followed by being struck by an object. The Occupational Health and Safety Administration (OSHA) and the Tennessee Occupational and Health Safety Administration (TOSHA) recognize that accidents involving falls are generally complex events frequently involving a variety of factors. Consequently, the standard for fall protection deals with both human and equipment-related issues in protecting workers from fall hazards. Northeast State Community College employees and contractors need to do the following:

- Where protection is required, select fall protection systems appropriate for given situations.
- Use proper construction and installation of safety systems.
- Supervise employees properly.
- Use safe work procedures.
- Train workers in the proper selection, use, and maintenance of all protection systems.

Scope

This plan applies to all Northeast State Community College employees and contractors on property owned, controlled, or leased by the college. This plan is in accordance with 29 CFR 1910 and 1926.500 through 1926.760 as well as the American National Standards Institute (ANSI) Z359 fall protection standards. Northeast State Community College employees must be able to select and properly implement fall protection measures compatible with the type of work being performed. Fall protection generally can be provided by guardrail systems, safety net systems, personal fall arrest systems, positioning device systems, and warning line systems, among others.

Areas that require fall protection include, but are not limited to, ramps, runways, and other walkways; excavations; hoist areas; holes; formwork and reinforcing steel; leading-edge work; unprotected sides and edges; overhand bricklaying and related work; roofing work; precast concrete erection; wall openings; residential construction; and other walking/working surfaces. The rule sets a uniform threshold height of 6 feet (4 feet for general industry), thereby providing consistent protection. This means that supervisors/managers must protect their employees from fall hazards and falling objects whenever an affected employee is 6 feet (4 feet for general industry) or more above a lower level. Protection must also be provided for employees who are exposed to the hazard of falling into dangerous equipment. The Fall Protection Plan is available on the Environmental Health and Safety webpage of the NeSCC website.

Purpose

The purpose of this plan is to ensure the safety and well-being of all employees and contractors on any Northeast State Community College property. This plan covers the maintenance, repair, replacement, alteration, demolition, and new construction for all campus properties.

Definitions

Anchorage means a secure point of attachment for lifelines, lanyards or deceleration devices.

Body belt (safety 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 straps which may be secured about the employee in a manner that will 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.

Connector means a device which is used to couple (connect) parts of the personal fall arrest system and positioning device systems together. It may be an independent component of the system, such as a carabiner, or it may be 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).

Controlled access zone (CAZ) means an area in which certain work (e.g., overhand bricklaying) may take place without the use of guardrail systems, personal fall arrest systems, or safety net systems and access to the zone is controlled.

Dangerous equipment means equipment (such as pickling or galvanizing tanks, degreasing units, machinery, electrical equipment, and other units) which, as a result of form or function, may be hazardous to employees who fall onto or into such equipment.

Deceleration device means any mechanism, such as a rope grab, rip-stitch lanyard, specially-woven lanyard, tearing or deforming lanyards, automatic self-retracting lifelines/lanyards, etc., which serves to dissipate a substantial amount of energy during a fall arrest, or otherwise limit 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 location 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 to protect against a hazard 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.

Failure means load refusal, breakage, or separation of component parts. Load refusal is the point where the ultimate strength is exceeded.

Free fall means the act of falling before a 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, and lifeline/lanyard elongation, but includes any deceleration device slide distance or self-retracting lifeline/lanyard extension before they operate and fall arrest forces occur.

Guardrail system means a barrier erected to prevent employees from falling to lower levels.

Hole means a gap or void 2 inches (5.1 cm) or more in its least dimension, in a floor, roof, or other walking/working surface.

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.

Lanyard means a flexible line of rope, wire rope, or strap which generally has a connector at each end for connecting the body belt or body harness to a deceleration device, lifeline, or anchorage.

Leading edge means the edge of a floor, roof, or formwork for a floor or other walking/working surface (such as the deck) which changes location as additional floor, roof, decking, or formwork sections are placed, formed, or constructed. A leading edge is considered to be an "unprotected side and edge" during periods when it is not actively and continuously under construction.

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.

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

Lower levels means those areas or surfaces to which an employee can fall. Such areas or surfaces include, but are not limited to, ground levels, floors, platforms, ramps, runways, excavations, pits, tanks, material, water, equipment, structures, or portions thereof.

Mechanical equipment means all motor or human propelled wheeled equipment used for roofing work, except wheelbarrows and mopcars.

Opening 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.

Overhand bricklaying and related work means the process of laying bricks and masonry units such that the surface of the wall to be jointed is on the opposite side of the wall from the mason, requiring the mason to lean over the wall to complete the work. Related work includes mason tending and electrical installation incorporated into the brick wall during the overhand bricklaying process.

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. As of January 1, 1998, the use of a body belt for fall arrest is prohibited.

Positioning device system means a body belt or 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.

Rope grab means a deceleration device which travels on a lifeline and automatically, by friction, 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/level locking, or both.

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 become the top surface of a building.

Roofing work means the hoisting, storage, application, and removal of roofing materials and equipment, including related insulation, sheet metal, and vapor barrier work, but not including the construction of the roof deck.

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

Self-retracting lifeline/lanyard means a deceleration device containing a drum-wound line which can 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.

Snaphook 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. Snaphooks are generally one of two types:

Application

The *Fall Protection Plan* shall be incorporated into all work activity when working at a level of 4 feet in general industry workplaces, and 6 feet in the construction industry. Fall protection safeguards shall be incorporated into any work situation where the height of a lower level is 4 feet or more. Fall protection shall be required on or around dangerous equipment, elevated platforms, excavations, formwork, hoist areas, open holes or access, leading-edge work, pits, ramps and runways, roof scaffolding, skylights, stacks, staging tanks, unprotected sides and edges, wells, and other applicable locations. One of the following systems should be in place whenever an employee is exposed to a fall of greater than four feet without the use of a ladder or scaffolding. Fall protection is not required for employees climbing or working on portable ladders. Please see OSHA Regulation 1910.25 for the use of portable ladders.

Guardrail Systems

Guardrails are needed at the edge of work areas 4 feet or more in height when employees are not working from portable ladders, or scaffolding or are not secured with personal fall arrest systems. Guardrails are required when working around excavations greater than four feet when the excavation is not readily seen because of plant growth or other visual barriers. Guardrail systems must meet the requirements of OSHA Regulation 1926.502.

Personal Fall Arrest Systems

Personal fall arrest systems consist of an anchorage, body harness, and components (connectors like snap hooks or De-rings, connection points, lanyards, deceleration devices, lifelines, etc. If a personal fall arrest system is used for fall protection, it must do the following:

- Limit maximum arresting force on an employee to 900 pounds (4 kilonewtons) when used with a body belt.
- Limit maximum arresting force on an employee to 1,800 pounds (8 kilonewtons) when used with a body harness.
- Be rigged so that an employee can neither free fall more than 6 feet (1.8 meters) nor contact any lower level.
- Bring an employee to a complete stop and limit the maximum deceleration distance an employee travels to 3.5 feet (1.07 meters); and
- Have sufficient strength to withstand twice the potential impact energy of an employee falling 6 feet (1.8 meters) or the free fall distance permitted by the system, whichever is less.

As of January 1, 1998, the use of a body belt for fall arrest is prohibited.

Personal fall arrest systems must be inspected prior to each use for wear damage, and other deterioration. Defective components must be removed from service. D-rings and snap hooks must have a minimum tensile strength of 5,000 pounds (22.2 kilonewtons). D-rings and snap hooks shall be proof-tested to a minimum tensile load of 3,600 pounds (16 kilonewtons) without cracking, breaking, or suffering permanent deformation.

Snap hooks shall be sized to be compatible with the member to which they will be connected or shall be of a locking configuration.

Unless the snap hook is a locking type and designed for the following connections, they shall not be engaged (a) directly to webbing, rope or wire rope; (b) to each other; (c) to a D-ring to which another snap hook or other connector is attached; (d) to a horizontal lifeline; or (e) to any object incompatible in shape or dimension relative to the snap hook, thereby causing the connected object to depress the snap hook keeper and release unintentionally.

OSHA/TOSHA considers a hook to be compatible when the diameter of the D-ring to which the snap hook is attached is greater than the inside length of the snap hook when measured from the bottom (hinged end) of the snap hook keeper to the inside curve of the top of the snap hook. Thus, no matter how the D-ring is positioned or moved (rolls) with the snap hook attached, the D-ring cannot touch the outside of the keeper, thus depressing it open. As of January 1, 1998, the use of non-locking snap hooks is prohibited.

On suspended scaffolds or similar work platforms with horizontal lifelines that may become vertical lifelines, the devices used to connect to a horizontal lifeline shall be capable of locking in both directions on the lifeline.

Horizontal lifelines shall be designed, installed, and used under the supervision of a qualified person, as part of a complete personal fall arrest system that maintains a safety factor of at least two. Lifelines shall be protected against being cut or abraded.

Self-retracting lifelines and lanyards that automatically limit free fall distance to 2 feet (0.61 meters) or less shall be capable of sustaining a minimum tensile load of 3,000 pounds (13.3 kilonewtons) applied to the device with the lifeline or lanyard in the fully extended position.

Self-retracting lifelines and lanyards that do not limit free fall distance to 2 feet (0.61 meters) or less, rip stitch lanyards, and tearing and deforming lanyards shall be capable of sustaining a minimum tensile load of 5,000 pounds (22.2 kilonewtons) applied to the device with the lifeline or lanyard in the fully extended position.

Ropes and straps (webbing) used in lanyards, lifelines, and strength components of body belts and body harnesses shall be made of synthetic fibers.

Anchorage shall be designed, installed, and used under the supervision of a qualified person, as part of a complete personal fall arrest system that maintains a safety factor of at least two, i.e., capable of supporting at least twice the weight expected to be imposed upon it. Anchorages used to attach personal fall arrest systems shall be independent of any anchorage being used to support or suspend platforms and must be capable of supporting at least 5,000 pounds (22.2 kilonewtons) per person attached.

Lanyards and vertical lifelines must have a minimum breaking strength of 5,000 pounds (22.2 kilonewtons).

Ladder Safety

Fall protection must be provided for employees climbing or working on fixed ladders above 24 feet. When the length of climb is more than 24 feet under OSHA Regulation 1926.1053(a) (18) cages, wells, ladder safety devices, or self-retracting lifelines must be provided where the top of the fixed ladder is greater than 24 feet above lower levels.

Ladders shall be inspected before each use. Ladders that are defective should be discarded and replaced with class II or III fiberglass ladders. It is Northeast State Community College's intent that wooden and aluminum ladders will be phased out, wooden ladders because of their weight, and aluminum ladders because of their electrical conductivity and will be replaced with class II or III fiberglass ladders.

Lifts and Self Powered Work Platforms

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 (scissor lifts and telescoping lifts that can move only vertically do not require the use of a harness and lanyard if the work platform is protected by a guardrail system in accordance with OSHA Regulation 1926.502). The point of attachment must be the lift's boom or work platform. 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.

Work from scaffolding shall comply with OSHA Regulation 1910.28. Scaffolding must be installed on all open sides on scaffolding more than 10 feet in height OSHA Regulation 1910.28(d) (7).

Employees and contractors will inspect the entire personal fall arrest system prior to every use.

Controlled Access Zones

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

Controlled access zones are used to keep out workers other than those authorized to enter work areas from which guardrails have been removed. Where there are no guardrails, masons are the only workers allowed in controlled access zones.

Controlled access zones, when created to limit entrance to areas where leading-edge work and other operations are taking place, must be defined by a control line or by any other means that restrict access. Control lines shall consist of ropes, wires, tapes, or equivalent materials, and supporting stanchions, and each must be:

- Flagged or otherwise clearly marked at not more than 6-foot (1.8 meters) intervals with high visibility material.
- Rigged and supported in such a way that the lowest point (including sag) is not less than 39 inches (1 meter) from the walking/working surface and the highest point is not more than 45 inches (1.3 meters) or more than 50 inches (1.3 meters) when overhand bricklaying operations are being performed from the walking/working surface.
- Strong enough to sustain the stress of not less than 200 pounds.
- Control lines shall extend along the entire length of the unprotected or leading edge and shall be approximately parallel to the unprotected or leading edge.
- Control lines also must be connected on each side to a guardrail system or wall.

When control lines are used, they shall be erected not less than 6 feet (1.8 meters) nor more than 25 feet (7.6 meters) from the unprotected or leading edge, except when precast concrete members are being erected. In the latter case, the control line is to be erected not less than 6 feet (1.8 meters) or more than 60 feet (18 meters) or half the length of the member being erected, whichever is less, from the leading edge.

Controlled access zones when used to determine access to areas where overhand bricklaying and related work are taking place are to be defined by a control line erected not less than 10 feet (3 meters) nor more than 15 feet (4.6 meters) from the working edge. Additional control lines must be erected at each end to enclose the controlled access zone. Only employees engaged in overhand bricklaying or related work are permitted in the controlled access zones.

On floors and roofs where guardrail systems are not in place prior to the beginning of overhand bricklaying operations, controlled access zones will be enlarged as necessary to enclose all points of access, material handling areas, and storage areas. On floors and roofs where guardrail systems are in place but need to be removed to allow overhand bricklaying work or leading-edge work to take place, only that portion of the guardrail necessary to accomplish that day's work shall be removed.

Safety Monitoring Systems

When no other alternative fall protection has been implemented, the employer shall implement a safety monitoring system. Employers must appoint a competent person to monitor the safety of workers and the employer shall ensure that the safety monitor:

- Is competent in the recognition of fall hazards.
- Is capable of warning workers of fall hazard dangers and detecting unsafe work practices.
- Is operating on the same walking/working surfaces as the workers and can see them.
- Is close enough to work operations to communicate orally with workers and has no other duties to distract from the monitoring function.

Mechanical equipment shall not be used or stored in areas where safety monitoring systems are being used to monitor employees engaged in roofing operations on low-sloped roofs.

No worker, other than one engaged in roofing work (on low-sloped roofs) or one covered by a fall protection plan, shall be allowed in an area where an employee is being protected by a safety monitoring system.

All workers in a controlled access zone shall be instructed to promptly comply with fall hazard warnings issued by safety monitors.

Holes

Personal fall arrest systems, covers, or guardrail systems shall be erected around holes (including skylights) that are more than 6 feet (1.8 meters) above lower levels.

Ramps, Runways, and Other Walkways

Each employee using ramps, runways, and other walkways shall be protected from falling 6 feet (1.8 meters) or more by guardrail systems.

Roofing

Low-slope Roofs

Each employee engaged in roofing activities on low-slope roofs with unprotected sides and edges 6 feet (1.8 meters) 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, warning line system and personal fall arrest system, or warning line system and safety monitoring system. On roofs 50 feet (15.24 meters) or less in width, the use of a safety monitoring system without a warning line system is permitted.

Steep Roofs

Each employee on a steep roof with unprotected sides and edges 6 feet (1.8 meters) or more above lower levels shall be protected by guardrail systems with toe boards, safety net systems, or personal fall arrest systems.

Covers

Covers located in roadways and vehicular aisles must be able to support at least twice the maximum axle load of the largest vehicle to which the cover might be subjected. All other covers must be able to support at least twice the weight of employees, equipment, and materials that may be imposed on the cover at any one time. To prevent accidental displacement resulting from wind, equipment, or workers' activities, all covers must be secured. All covers shall be color-coded or bear the markings "HOLE" or "COVER."

Protection from Falling Objects

When guardrail systems are used to prevent materials from falling from one level to another, any openings must be small enough to prevent the passage of potential falling objects. No materials or equipment except masonry and mortar shall be stored within 4 feet (1.2 meters) of the working edges. Excess mortar, broken or scattered masonry units, and all other materials and debris shall be kept clear of the working area by removal at regular intervals.

During roofing work, materials and equipment shall not be stored within 6 feet (1.8 meters) of a roof edge unless guardrails are erected at the edge, and materials piled, grouped, or stacked near a roof edge must be stable and self-supporting.

Canopies

When used as protection from falling objects, canopies must be strong enough to prevent collapse and to prevent penetration by any objects that may fall onto them.

Toe boards

When toe boards are used as protection from falling objects, they must be erected along the edges of the overhead walking/working surface for a distance sufficient to protect persons working below. Toe boards shall be capable of withstanding a force of at least 50 pounds (222 newtons) applied in any downward or outward direction at any point along the toe board. Toe boards shall be a minimum of 3.5 inches (9 centimeters) tall from their top edge to the level of the walking/working surface, have no more than 0.25 inches (0.6 centimeters) clearance above the walking/working surface, and be solid or have openings no larger than 1 inch (2.5 centimeters) in size.

Where tools, equipment, or materials are piled higher than the top edge of a toe board, paneling or screening must be erected from the walking/working surface or toe board to the top of a guardrail system's top rail or mid-rail, for a distance sufficient to protect employees below.

Overhand Bricklaying and Related Work

Each employee performing overhand bricklaying and related work 6 feet (1.8 meters) or more above lower levels shall be protected by guardrail systems, safety net systems, or personal fall arrest systems, or shall work in a controlled access zone. All employees reaching more than 10 inches (25 cm) below the level of a walking/working surface on which they are working shall be protected by a guardrail system, safety net system, or personal fall arrest system.

Excavations

Each employee at the edge of an excavation 6 feet (1.8 meters) or deeper shall be protected from falling by guardrail systems, fences, barricades, or covers. Where walkways are provided to permit employees to cross over excavations, guardrails are required on the walkway if it is 6 feet (1.8 meters) or more above the excavation.

Training

In accordance with 29 CFR 1926.503(a) (2), Supervisors who fall under this plan must provide a training program that teaches employees who might be exposed to fall hazards how to recognize such hazards and how to minimize them. Employees must be trained in the following areas: (a) the nature of fall hazards in the work area; (b) the correct procedures for erecting, maintaining, disassembling, and inspecting fall protection systems; (c) the use and operation of controlled access zones and guardrail, personal fall arrest, safety net, warning line, and safety monitoring systems; (d) the role of each employee in the safety monitoring system when the system is in use; (e) the limitations on the use of mechanical equipment during the performance of roofing work on low-sloped roofs; (f) the correct procedures for equipment and materials handling and storage and the erection of overhead protection; and, (g) employees' role in fall protection plans.

Supervisors must prepare a written certification that identifies the employee trained and the date of the training. The employer or trainer must sign the certification record. Retraining must also be provided when necessary.

Responsibilities

Managers/Supervisors

- Provide a training program that ensures employees under their supervision comply with the safety requirements in this plan and applicable OSHA/TOSHA regulations.
- Maintain training records for review.
- Ensure that only trained individuals are assigned responsibilities that require the use of fall protection systems.
- Ensure the appropriate equipment is purchased and available for employees.
- Monitor and enforce employee compliance with this policy.
- Report any violations immediately to the Office of Safety, Security, and Plant Operations

Office of Environmental Health and Safety

- Serve as the department responsible for developing and implementing the college's *Fall Protection Plan*.
- Assist department managers/supervisors in the development, updating, and implementation of the departmental training program.
- Maintain injury reports of any accident related to a fall.
- In coordination with the college's Health and Safety Committee, recommend changes and/or updates to the overall fall protection program.
- Monitor department managers/supervisors to ensure training programs are implemented and followed.