FALL PROTECTION AND PREVENTION

TITAN UNIVERSITY
The Leader in Government Construction Training

Government Safety Course Series

EM 385-1-1
ANSI/ASSE Z359.2
ANSI Z359.2
ANSI Z359
ASTM F887
ANSI Z359.12
ANSI A92.2
ANSI A92.5
ANSI/SIA A92.3
ANSI Z359.4
ANSI Z359.14

CONSTRUCTION MANAGEMENT BEGINS WITH TITAN

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Module One: Fall Protection and Exclusions

Each year approximately 100,000 disabling injuries and deaths are attributable to work-related falls. According to the National Safety Council, falls are one of the leading causes of death in the workplace. In addition to the lost lives and injuries caused by falls, U.S. businesses lose millions of dollars each year from significant increases in insurance premiums, workman compensation claims, product liability costs, and other related expenses. In short, a comprehensive fall protection program not only saves lives and reduces injuries, but also saves money and makes good business sense.

With that being said, planning the work to include fall protection and prevention can nearly eliminate all falls. And if we really want to break it down. Fall prevention can be addressed in just 5 easy to follow steps.

1. If working 6 feet or more from a surface, use fall protection. This isn't a suggestion, it's mandatory.
2. Prior to starting a feature of work requiring fall protection, review the Fall Protection Plan and Definable Feature of Work AHA in a safety meeting.
3. Workers must be provided with the correct fall protection for the task.
4. Inspect every component of the fall protection system prior to each use.
5. Ensure all workers are trained on how to use the equipment safely

Worker injuries is the reason most government projects require programs written into the Accident Prevention Plan to mitigate risk. It is the employer's responsibility to develop a fall protection program. The most effective programs are those where employers work closely with their workers to identify fall hazards and to jointly develop a comprehensive fall protection program that either eliminates fall hazards or provides appropriate protection against them.

Fall protection takes planning ahead to ensure the job is completed safely.

- How will the job be done?
- What tasks will be involved?
- Can some of the tasks, through engineering controls, be made safer?
- What safety equipment is needed to complete each task safely?

When working on Government Construction Projects, those working 6 feet or more above lower levels must use fall protection provided by the contractor. It should be noted that citations and fines have steadily increased due to noncompliance and negligence. However, citations can be avoided by those employers. Contractors who take an active interest in their employees' well-being and develop an appropriate fall protection program. A Fall Protection Program will be required on all Government Construction Projects prior to the work. This Program is usually included in the Accident Prevention Plan and AHA's will be required for each feature of work requiring fall protect.

Before workers are expected to work above 6 feet, they must be trained on the proper set-up, and safe use of equipment. This training is provided by the Contractor. The Fall Protection Competent Person is typically responsible for training all personnel on Fall Protection and Prevention.

FALL PROTECTION LIMIT

The fall protection height requirement is 6 feet for ALL work covered under the US Army Corps of Engineers Safety Manual unless specified otherwise. This holds true whether performed by the Government or contractor work by this manual, unless specified differently below, whether performed by Government or Contractor personnel which includes steel erection activities, systems-engineered activities prefabricated metal buildings, residential (wood) construction and scaffolding work.

Sometimes construction accidents from falls, aren't as obviously identified prior to the work. For this reason, wearing fall protection when you're 6 feet up, no matter what the job, not only makes sense, but it's also a requirement. Consider this: In 2011 A worker was on the roof of a new four-story residential building and stepped into a shaft and fell to his death.

Yes, he was working on the roof, but he wasn't working near the roof edge, which is a top concern. Instead he stepped into a hole and fell 60 feet down a shaft that was never taken into consideration when and if a Fall Protection Plan was created. The 6-foot rule would have protected him from falling 60 feet, and this wouldn't even be a story.

For all USACE-owned and operated permanent facilities with open-sided floors, platforms, or unprotected edges, 4 feet or more above adjacent floor or ground level must be guarded by a guardrail system along all open sides, except where there is an entrance to a ramp, stairway, or fixed ladder. The guardrail system must be provided with a toe board when necessary.

EXCLUSIONS FROM THRESHOLD (LIMIT)

Floating Plant and Vessels are excluded from these requirements except where specifically cited. For instance, for Floating Plant and Marine Activities, the following fall protection requirements apply:

Main deck perimeter protection systems are intended to provide protection against falling overboard and are required on all manned vessels where the vessel configuration and operation exposes personnel to falls onto a hard surface from vertical distances greater than 6 feet.

EXCAVATIONS

An excavation is considered any man-made cut, cavity, hole, trench, or depression that's created in the earth's surface by removing soil. Workers in excavations can be exposed not only to cave-ins, engulfment, and hazardous atmospheres, but falls as well.

The primary hazard of trenching and excavation work is employee injury from a cave-in. Before workers enter a trench, a soil analysis should generally be conducted to determine the appropriate employee protection methods such as sloping, benching, shoring or shielding. Employers should also consider potential struck-by hazards associated with heavy equipment, falling loads, and public vehicular traffic in close proximity to the excavation operations. Also consider potential hazards from undermining sidewalks and buildings. Other unsafe conditions that may be encountered include hazardous atmospheres and electrical hazards from overhead and underground power lines. These five key trench safety tips will help keep workers safe:

- Ensure that there's a safe way to enter and exit
- Ensure trenches have cave-in protection
- Look for standing water and test for atmospheric hazards
- Keep materials away from the edge of the trench
- Never enter a trench unless it has been properly inspected by a competent person

Excavation inspections are required before work starts, during work shifts, and after rainstorms. A competent person familiar with excavation regulations and safety systems, how to type soils, and how to recognize excavation hazards must do these inspections. Inspectors

should look for signs of cave-ins, failing protective systems, and potentially hazardous atmospheres. If hazards are found, workers should exit the excavation until the work area is made safe.

To protect workers from falling soil and rocks during excavation operations, perform maintenance scaling of the open excavation face to remove loose rocks from the excavation face. Use protective shields and retaining fences to hold back loose material. Keep spoils, supplies, equipment, vehicles, and workers at least two feet from the working edge. When people inspecting or testing are in or around an excavation deeper than 6 feet, but less than 20 feet or near an excavation that contains hazards such as impalement or hazardous substances, they must be provided with Fall Protection.

However, if the person testing or inspecting is the Competent Person for Excavation, they may be relieved from using fall protection for provided they are not exposed to hazards within 24 inches of the edges, the excavation does not contain additional hazards, and the individuals stay a minimum of 34 inches from the excavation's edge.

If there is evidence a situation could result in possible cave-ins, slides, failure of protective systems, hazardous atmospheres, or other hazardous conditions are identified, exposed workers must be removed from the hazard and all work in the excavation stopped until all necessary safety precautions have been implemented.

The sides of all excavations in which employees are exposed to danger from moving ground shall be guarded by a support system, sloping, or benching of the ground, or other equivalent means.

Excavations less than 5 feet in depth and which a Competent Person examines, determines, and documents that there is no potential for cave-in do not require protective systems, however, a fixed means of egress shall be provided.

Module 2: Work Platforms

A walking-working surface is any horizontal or vertical surface on or through which an employee walks, works, or gains access to a work area.

Scaffolding and (mobile) elevated work platforms are versatile and are often used when erecting or maintaining structures. Both have their own risks. Scaffolding, if not erected properly, poses the risk of collapsing or a worker falling. Working from a mobile elevated work platform, such as a cherry picker, could have a worker ejected from the basket when the system moves around while a person is at height. But a worker can also fall if they overreach.

While most scaffolding and elevated work platforms are equipped with guardrails it may be necessary for workers to wear fall protection Personal Protective Equipment (PPE).

Workers exposed to fall hazards must be protected from falling to a lower level by the use of standard guardrails, work platforms, temporary floors, safety nets, engineered fall protection systems, personal fall arrest systems, or the equivalent, in the following situations when workers are exposed to falls from:

- Unprotected sides or edges
- Access ways
- Fixed ladders over 20 feet high
- Unprotected roof edge or floor openings
- Holes and skylights
- Unstable surfaces
- Leading edge work
- Scaffolds
- Formwork
- Work platforms
- Re-bar assembly
- Steel erection, and
- Engineered metal buildings
- If the project requires access ways or work platforms over water, machinery, or dangerous operations, and

- When installing or removing sheet piles, h-piles, cofferdams, or other interlocking materials from which workers may fall 6 ft (1.8 m) or more. And while we're on the subject of sheet pile, stirrups as a fall protection method is strictly prohibited on Government owned construction projects.

Order of Control

The order of control measures to decrease fall hazards or to select and use a fall protection method to protect workers performing work at heights shall be:

Elimination

Remove the hazard from work areas or change task, process, controls, or other means to eliminate the need to work at heights with its subsequent exposure to fall hazards. An example of this would be to build roof trusses on the ground and lift into place.

Prevention

Isolate and separate fall hazards from work areas by erecting same level barriers such as guardrails, walls, covers or parapets

Use scaffolds, scissor lifts, work stands or aerial lift equipment to facilitate access to work location and to protect workers from falling when performing work at high locations.

Personal Protective Systems and Equipment. The use of fall protection systems, including, and in order of preference is restraint, positioning, or personal fall arrest.

All systems require the use of full body harness, connecting means and safe anchorage system.

Administrative Controls

Introduce new work practices that reduce the risk of falling from heights, or to warn a person to avoid approaching a fall hazard (such as warning lines, audible alarms, and signs)

Module 3: Roles and Responsibilities

There are several important roles and hierarchy in the responsibilities and planning for tasks involving the necessity of fall protection. Although not all roles will be used on every project they will not doubt all be used at some point throughout a Site Safety and Health Officer's career.

Fall Protection Program Manager

Responsibilities:

The Program Manager is responsible for the overall development, implementation, monitoring, and evaluation of the Fall Protection Program. This person can also function as a Qualified Person (QP), Competent Person (CP), Competent Person Trainer, Qualified Person trainer and/or Competent Rescue trainer, if they have the appropriate training.

Program Manager Training

Training for Program Managers shall be conducted by a CP Trainer or QP Trainer. Program Managers must have a working knowledge of current fall protection regulations, requirements, standards, equipment, and systems. Training must cover the items prescribed in ANSI/ASSE Z359.2 standard.

For USACE-owned and/operated permanent facilities, Program Managers shall complete refresher training annually, by participating in at least one (1) hour of fall protection and rescue-related informational meetings and/or training.

The Fall Protection Program Manager Must:

- Be trained appropriately
- Advise and provide guidance for managers, employees and others on all matters pertaining to their Fall Protection Program;
- Establish all duties and responsibilities required by the Fall Protection Program and assign them to individuals who are trained and qualified to perform them;
- Verify personnel are provided with resources to accomplish their responsibilities;
- Establish and implement a procedure to identify and eliminate or control new and existing fall hazards;
- Ensure the proper development and implementation of the fall protection and prevention plan (written Fall Protection Procedures, per ANSI Z359.2) and rescue plan (written Rescue Procedures, per ANSI Z359.2).
- Provide/ensure appropriate level of training is received by End Users (Authorized Persons per ANSI Z359.2), CP, QP, and others as required;
- Participate in investigation of all mishaps (near misses, incidents, or accidents) related to falls from heights (personally or by designation of persons qualified to perform the investigation);
- Measure and evaluate the effectiveness of the Fall Protection Program by conducting periodic program evaluations and making improvements as necessary.

Competent Person for Fall Protection

Responsibilities

The Competent Person for Fall Protection is responsible for the immediate supervision, implementation and monitoring of the Fall Protection Program. The Competent Person for Fall Protection is defined as: Someone capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has the authorization to take prompt corrective measures to eliminate them. This is usually the Site Safety and Health Officer (SSHO) on USACE and NAVFAC projects, while other Government Agencies such as Department of Veterans Affairs or the Parks and Recreation Services call them Safety Officer or Safety Manager.

Competent Person for Fall Protection Training

The Competent Person for Fall Protection must be trained to the applicable level. Acceptable Competent Person for Fall Protection training must be a MINIMUM of 24 hours, with a combination of formal classroom training and practical applications. All training must be documented.

For USACE-owned/operated permanent facilities, the refresher training requirement for the CPs is to stay current in fall protection and rescue knowledge by participating in at least two (2) hours annually of fall protection and rescue-related training and/or informational meetings.

The Competent Person for Fall Protection Must:

- Conduct a fall hazard survey to identify all fall hazards before End Users are exposed to those hazards
- Identify, evaluate, and impose limits on the workplace activities to control fall hazard exposures and swing falls and communicate all limitations to all employees authorized to utilize the fall protection system
- Have the authority to stop the work immediately if it is determined to be unsafe and take prompt corrective measures to mitigate fall hazards
- Prepare, update, review and approve fall protection and prevention plans as directed by the Program Manager
- Review procedures as workplace activities change to determine if additional practices, procedures, or training need to be implemented
- Ensure a rescue plan has been developed for all activities
- Specify in the fall protection and prevention plan, the fall protection systems, anchorage locations, connecting means, body supports and other equipment that End Users are required to use when exposed to a fall hazard
- Supervise the selection, installation, use and inspection of non-certified anchorages
- Verify End Users who work at heights are trained and authorized to do so
- Review, periodically and as needed, fall protection and prevention plan/rescue plan and procedures, to insure the End User is adequately informed about the fall protection and prevention plan/rescue plan and procedures for workplace activities
- Ensure prompt rescue of End Users can be accomplished via the rescue plan and procedures to be used
- Participate in investigation of all mishaps related to falls from heights
- Ensure all damaged or deployed fall protection equipment, is removed from service immediately
- Inspect all fall protection equipment at the frequency required by the manufacturer.

Qualified Person for Fall Protection

QPs are responsible for performing various duties that may be critical to the life and health of other workers.

Qualified Person for Fall Protection Training

A QP shall be trained by a QP Trainer in proper inspection, assembly and use of all fall protection equipment and systems that they encounter in their work as a QP. The frequency and duration of training that a QP requires to remain proficient in that role varies with the amount and types of fall protection work for which that person is responsible.

Training shall include those items in ANSI /ASSE Z359.2 standard, and shall include hands-on use of all types of equipment and systems used in locations where End Users work, to include: inspecting the systems prior to use; installing systems; analyzing structures and verifying that fall protection systems are properly installed; determining component compatibility; estimating free fall distances; determining total required clearance; dismantling systems storing equipment and common hazards associated with each system component.

For USACE-owned/operated permanent facilities, the refresher training requirement for the QPs is to stay current with fall protection and rescue knowledge by participating in at least one (1) hour annually of fall protection and rescue-related training and/or informational meetings

End User

The End User shall understand workplace activities and follow the policy and procedures and the instructions of the CP regarding the use of fall protection and rescue systems and equipment.

End User Training

Each worker who might be exposed to fall hazards from heights, shall be trained before using fall protection equipment by a CP, who is qualified in delivering fall protection training to the workers in the safe use of fall protection systems/equipment and the recognition of fall hazards related to their use, including:

- The nature of fall hazards in the work area
- The correct procedures for erecting, using, dismantling, inspecting, maintaining, and storing fall protection equipment

- The application limits, free fall distance, total fall distance and clearance requirements of fall protection systems and equipment
- Rescue equipment and procedures
- Hands-on training and practical demonstrations
- Proper anchoring and tie off techniques

End User refresher training must be provided to end users in the following situations:

- Changes in the fall protection program render previous training obsolete
- Changes in fall protection or rescue equipment render previous training obsolete
- Inadequacies in an employee's performance indicate a lack of knowledge or skill
- A condition in the workplace changes in a manner that could affect the safe use of the fall protection equipment.
- For USACE-owned/operated permanent facilities, the refresher training for end users must be provided a minimum of one (1) hour annually to stay current with fall protection and rescue requirements.

The End User must:

- Bring all unsafe or hazardous conditions or actions that may cause injury to them or others, to the attention of the Competent Person
- Properly use, inspect, maintain, store and care for their fall protection equipment and systems;
- Inspect all fall protection equipment or damage or defects, prior to each use. End User must notify the CP of those problems and must not use that equipment.

Competent Rescuer

The Competent Rescuer is responsible for anticipating the potential for planned rescue and ensuring effective rescue plan procedures and methods are in place before the End User or Users begin working at heights. This function may be performed by local emergency services, in-house professionals, competent or qualified persons or contractor services.

Competent Rescuer Training

The Competent Rescuer shall be trained by a Competent Rescue Trainer.

The training must include: Safe use of all types of equipment and systems used for rescue including inspection of the systems prior to use, installation, component compatibility, descent control, back-up systems, dismantling, storage and the common hazards associated with each system

Practical demonstrations on how to properly select, inspect, anchor, assemble and use the fall protection and rescue equipment used.

For USACE-owned/operated permanent facilities, the refresher training for Competent Rescuers shall be provided a minimum of one (1) hour annually to stay current with fall protection and rescue requirements.

The Competent Rescuer Must:

- Be trained appropriately to have a working knowledge through experience and training of current fall protection and planned rescue regulations, standards, equipment, and systems.
- Prepare, update, review and approve the rescue plan and procedures before End Users start work at heights;
- Verify all Authorized Rescuers have been adequately trained and are proficient at performing rescue;
- Identify resources necessary to conduct safe, effective rescue from heights and verify those resources are available for a prompt rescue;
- Know the hazards associated with rescue from heights and how to mitigate these hazards within the area of rescue
- Verify the rescue equipment is protected against damage;
- Verify rescue plans, procedures, and performances are, at a minimum, evaluated annually and any deficiencies have been corrected.

Authorized Rescuer

The Authorized Rescuers is responsible for performing and/or assisting in workplace rescues for personnel suspended in or attached to fall protection systems.

Authorized Rescuer Training

The Authorized Rescuer shall be trained by a Competent Rescuer. The training must:

- Be received before exposure to a fall hazard or a potential rescue event;
- Include practical demonstrations on how to properly select, inspect, anchor, assemble, disassemble, store and use the fall protection and rescue equipment used.
- Include and demonstrate before-use inspection of rescue equipment and systems.

For USACE-owned/operated permanent facilities, the refresher training for authorized rescuers shall be provided a minimum of one (1) hour annually to stay current with fall protection and rescue requirements.

The Authorized Rescuer Must:

- Have through experience and training, plus working knowledge of and experience in the selection, use, storage, and care of all equipment necessary to perform a rescue;
- Inspect the rescue equipment according to procedures developed by the Competent Rescuer and ensure it is protected, in proper working condition, and safe for rescue use;
- Be trained to the appropriate level and shall be aware of the hazards that may endanger the rescuer during rescue operations.

Documentation

Training and evaluations for fall protection and rescue training shall be documented and retained for the current and previous training program and shall include the trainer/evaluator's name, student's name, training, or evaluation organization's name (if external), dates/times of training and evaluations, course objectives, content of training program, performance of student based on observation of physical demonstrations of skill or on exercises.

Module 4: Fall Protection Plan and Program

If personnel will be working at heights or exposed to fall hazards, a Fall Protection and Prevention Plan must be developed and submitted to the GDA for review and acceptance as part of their Accident Prevention Plan (APP).

This plan may be developed by either the Competent Person or Qualified Person. If the plan includes fall protection components or systems requiring direction, supervision, design calculations or drawings by a Qualified Person (QP), the name, qualifications, and responsibilities of the QP shall be addressed.

The Fall Protection and Prevention plan must describe, in all practices, equipment and control methods used to protect workers from falling to lower levels.

The Fall Protection and Prevention Plan will need to be changed as conditions change. The plan should be reassessed at least every six months.

We've included a Fall Protection and Prevention Plan template in these course materials. Please feel free to use them. If you need help with your Fall Protection Plan, reach out to us in the forums.

Fall Protection Systems

Controlled Access Zones: The use of Controlled Access Zone as a fall protection method is prohibited.

Standard Guardrail Systems

A standard guardrail must consist of toprails, midrails, and posts, and must have a vertical height of 42, plus or minus 3-inches from the upper surface of the top rail to the floor, platform, runway, or ramp level;

Midrails must be erected halfway between the toprails and the floor, platform, runway, or ramp;

The ends of the toprails and midrails must not overhang the terminal posts except where such overhang does not create a projection hazard

Toe-boards must be provided on all open sides and ends and at locations where persons are required or permitted to pass or work under the elevated platform or where needed to prevent persons and material from falling from the elevated platform.

Covers

If you remember back in Module 1 where the worker on the roof stepped into a shaft and fell 60-feet to his death? Personal Fall Protection would have saved his life. But, if there had been a cover over the shaft, he wouldn't have fallen at all. With, or without Personal Fall Protection

Install covers on any hole 2 inches or more in its least dimension on walking or working surfaces such as floors, roofs or other openings. Covers must be capable of supporting, without failure, at least twice the weight of the worker, equipment and material combined.

Covers must be secured when installed, clearly marked with the word "HOLE", "COVER" or "Danger, Roof Opening-Do Not Remove" or color-coded or equivalent methods (e.g., red or orange "X"). Workers must be made aware of the meaning for color coding and equivalent methods.

Safety Net Systems for Fall Protection

Safety nets protect workers on site by minimizing the distance of a fall as well as absorbing the energy of falls. Safety nets prevent fatalities and serious accidents when working at heights. Not only does a safety net provide freedom of movement and protection, but they also protect workers below from being hurt from falling objects. Consider this: A 3-pound tool that falls 200 feet hits the ground with 1,062 pounds per square inch of force. While it's, of course mandatory to wear a hard hat while working on Government Construction Projects, a hard hat really couldn't stop the horrible damage of 1,062 pounds falling on someone. This is where safety nets are so important. They stop an object from making a direct impact.

In the majority of situations safety nets have advantages over other forms of fall arrest. Most Health & Safety Executives and Authorities regard nets as their "preferred method of fall arrest when working at height". Safety nets must be installed as close under the work surfaces as practical but in no case more than 30 feet below the surface. Nets will need to be hung with enough clearance that it can prevent contact with the surfaces below.

The maximum size of the mesh openings is 36 inches and can't be longer than 6-inches on any side.

The border rope or must have a minimum breaking strength of 5,000 pounds and the nets must extend outward.

Safety Net Distances

Vertical Distance from Working Level to Horizontal Plane of Net	Minimum Required Horizontal Distance of Outer Edge of Net from Edge of Working Surface
Up to 5 ft (up to 1.5 m)	8 ft (2.5 m)
5 ft up to 10 ft (1.5 m up to 3.1 m)	10 ft (3.1 m)
more than 10 ft (more than 3.1 m)	13 ft (4 m)

Safety Net Inspections

Safety nets must always be inspected by a CP in accordance with the manufacturer's instructions and recommendations. These inspections must be conducted immediately after installation, and weekly thereafter. Inspections are also required and documented if a safety net has to undergo repair, alteration, or an occurrence which may affect the integrity of the safety net system

Barriers

If any welding or cutting operations occur above the net or nets, noncombustible barriers must be provided. The frequency of inspections will also be required more frequently in correlation to the potential of damage to the nets.

As with all Government construction projects requiring defective equipment being removed from service and replaced, safety net systems are no different. Immediately remove defective components from service and replace them.

Module 5: Personal Fall Protection Systems

Fall arrest systems, in this case, Personal Fall Arrest systems are considered by some as the life saver of choice for those working at heights. But are they? While a fall protection harness may keep a person from hitting the ground, but he or she is still dangling from the harness and waiting for help. The risk to this is a serious one, and the clock is ticking.

Suspension trauma is a real problem and puts the worker at risk for loss of consciousness, and even death. Suspension trauma occurs due to an extended period of orthostatic intolerance and is characterized with symptoms such as light-headed or dizzy, palpitations, tremors, fatigue, nausea, headache, sweating, weakness and occasionally fainting during upright standing.

And, at the risk of making matters worse, being immobile for an extended period of time can cause blood to pool in the legs. This reduces the amount of blood circulating in the rest of the body and can cause damage to the brain, kidneys and other organs.

When a worker is suspended in a fall harness, the body has no way of going horizontal. The blood keeps pooling and cannot flow properly. This is suspension trauma. And unless the worker is rescued promptly, venous pooling and orthostatic intolerance occurs. This may result in serious damage to the brain, kidneys, and other organs.

Personal fall protection equipment and systems must be used when a person is working at heights with the potential of fall hazards. These systems can include fall arrest, positioning and restraint.

Inspections

Personal fall protection equipment must be inspected by the End User prior to each use to determine that it is in a safe working condition. The Competent Person for fall protection will need to inspect the equipment once semi-annually and whenever equipment is subjected to a fall or impact.

Inspection by the CP must be documented and:

Defective or damaged equipment must be removed from service immediately and replaced. The inspection criteria must include:

Harnesses, lanyards, straps and ropes: These components must be checked for cuts, wear, tears, damaged threads, broken or torn stitching, discoloration, abrasions, burn or chemical damage, ultraviolet deterioration and missing markings and/or labels.

Hardware: All hardware components must be checked for signs of wear, cracks, corrosion, and deformation.

Personal fall protection equipment must be used, inspected, maintained, and stored in a safe place in accordance with manufacturer's instructions and recommendations or as prescribed by the CP.

Fall Protection Equipment Selection

Selection for the appropriate fall protection must be based on the work being performed, the environment, and the weight, size, and shape of the worker; the type and position/location of anchorage; and the required length of the lanyard.

PFAS are known as Personal Fall Arrest Systems. These systems consist of a full body harness, connecting means, and an anchorage system.

PFAS must always meet the requirements contained in ANSI Z359, Fall Protection Code, to include fall restraint and positioning systems. It's important to note that PFAS are generally certified for users within the capacity range of 130 to 310 lbs including the weight of the worker, equipment and tools.

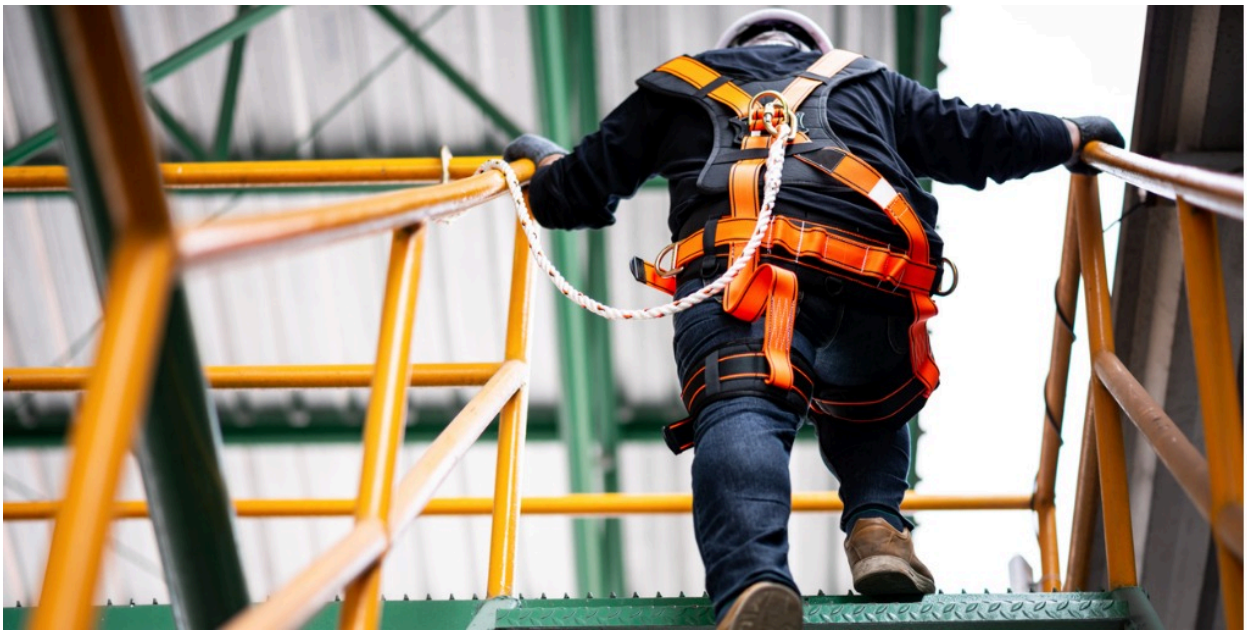
Workers are not permitted to exceed the 210-pound limit unless the manufacturer permits it, in writing.

For workers who weigh less than 130 lbs., a special designed harness and special designed energy absorbing lanyard must be used. This system will properly deploy if this person was to fall.

PFAS Used to Stop Falls

When designing new PFAS, the QP must always try to minimize fall distances including free fall distances and arrest forces. If necessary, increase free fall distances and arrest forces in order to accommodate existing and new structures or provide mobility to end users. Only the QP can make this determination and the maximum arrest force must always be kept below 1,800 lbs.

PFAS – Body Support Requirements



Full Body Harness: PFAS require the use of a full-body harness. (The use of body belts is prohibited)

The concept of fall protection is to stop workers from falling with the use of a tethering system. The longer the attachment lanyard, the greater the acceleration time during the fall and the greater the stress on the body. An attachment near the shoulders means that any drag from the lanyard will serve to position the worker's body in an upright position so the forces are distributed from head to foot. The head is somewhat protected if the legs and body precede it in the fall.

Only full body harnesses meeting the requirements of ANSI Z359 are acceptable. Full body harnesses labeled to meet the requirements of the ANSI A10.14 will not be used.

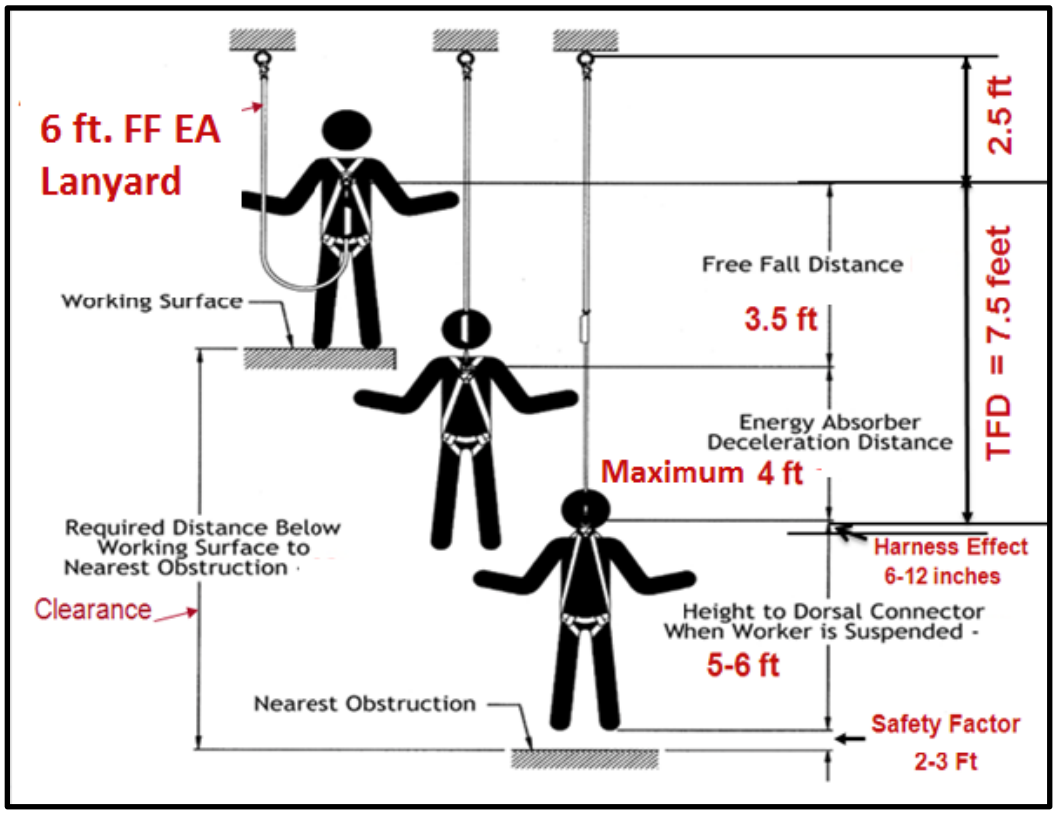
The fall arrest attachment point on the full body harness must be intrinsically attached and located at the wearer’s upper back between the shoulder blades (dorsal D-ring).

A frontal D-ring attachment point integrally attached to wearer’s full body harness and located at the sternum, can be used for fall arrest such as when using a ladder or climbing device.

However, if this frontal D ring is used, the free fall distance must not exceed 2-feet and the max arresting forces cannot exceed 900 pounds.

All full body harnesses must have Suspension Trauma Preventers such as stirrups, relief steps, or similar in order to provide short-term relief from the effects of orthostatic intolerance.

Full-Body electrically rated harnesses used by Linemen is used around high voltage equipment or structures. This equipment must be an industry designed "linemen's fall protection harness" that will resist arc flash and meet ASTM F887 and ANSI Z359. The equipment must also bear a label stating as such.



Connecting subsystems may include energy absorbing lanyards with snap hooks or carabiners at each end, self-retracting devices or fall arrestors also known as rope grabs. Rope Grabs move easily up and down vertical lifelines to provide continuous fall protection. The rope grab is the device that allows the worker to move up and down a vertical lifeline. One of the first things to

consider while using a rope grab is to find where your rope meets the roof edge and tie a knot. This is just an added safety precaution you can make in case the unforeseeable happens.

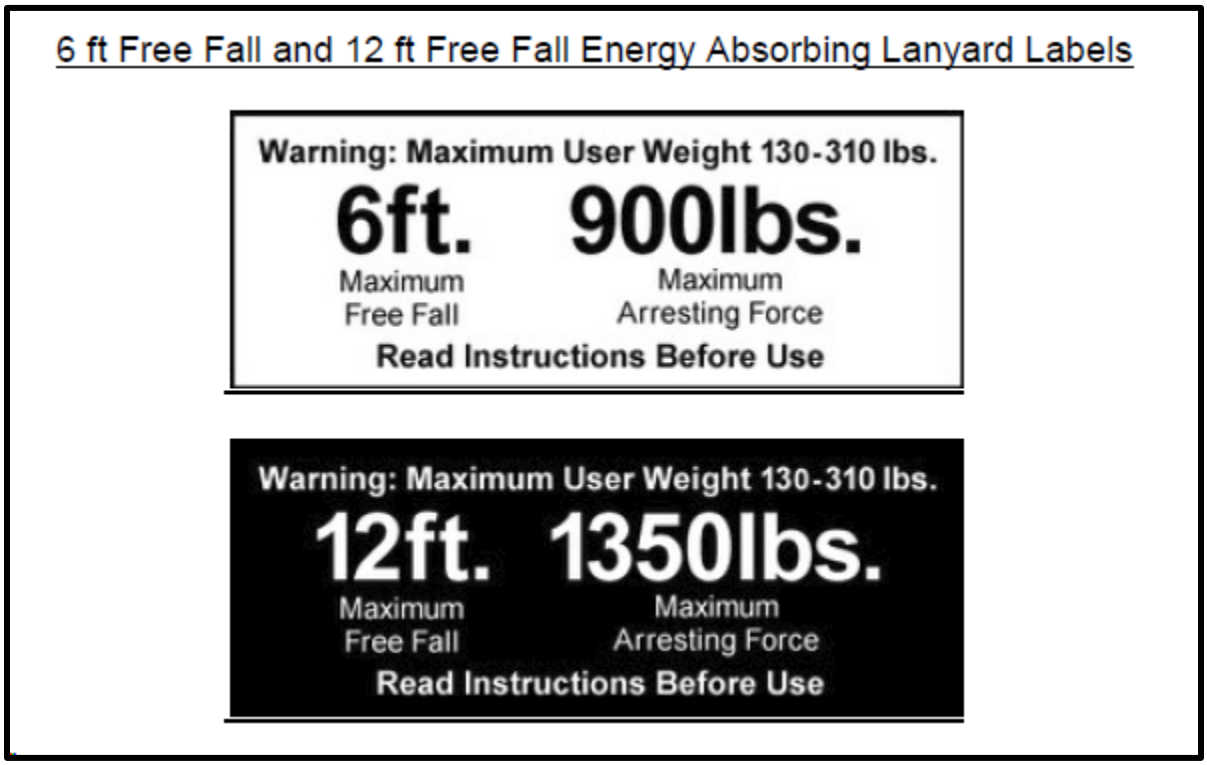
Lanyards - Lanyards must be energy absorbing and made of synthetic ropes, straps or webbing. Lanyards must be capable of sustaining a tensile load of 5,000 pounds. The maximum length of single or “Y” lanyards used in fall arrest must not exceed 6 ft.

The 6 ft Free Fall energy absorbing lanyard must only be used when the tie-off point is above the dorsal D-ring creating a free fall distance of less than 6 ft. The energy absorber must have an average arrest force of 900 pounds and a maximum deployment distance of four feet. If an anchor point is used below the dorsal D Ring, the free fall distance will be greater than 6 feet. It’s for this reason the requirement for the tie off point to be above the dorsal ring is so important.

It’s important to note that lanyards must never be looped back over or through an object and then attached back to themselves unless permitted by the manufacturer.

When using “Y” Lanyards with two integrally connected legs for 100% tie off, attach only the snap hook at the center of the lanyard to the fall arrest attachment element of the harness (D-ring).

6 ft Free Fall and 12 ft Free Fall Energy Absorbing Lanyard Labels



Components of Personal Fall Protection Devices

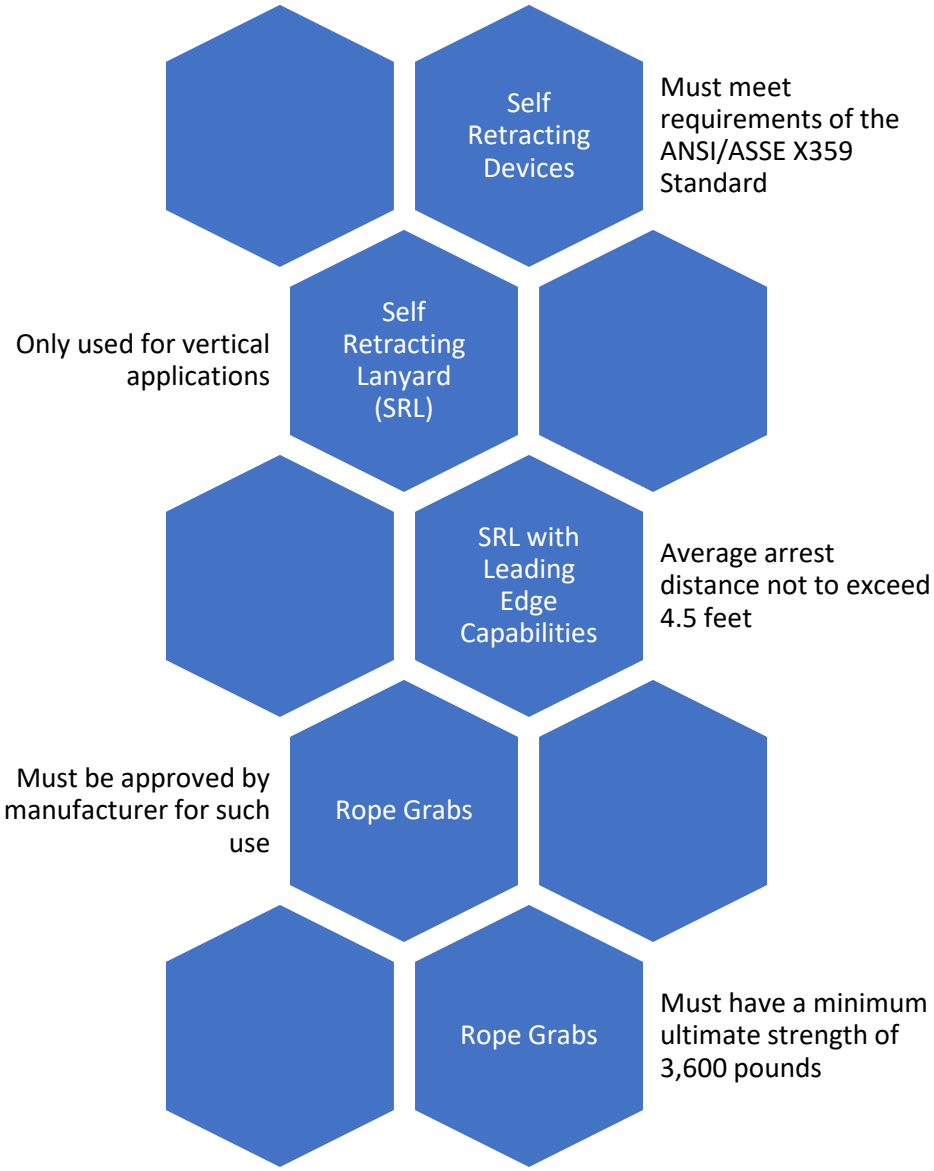
6-foot snap hooks and caribiners must be self closing, self locking, capable of being opened in at least 2 consecutive actions. Minimum gate strength of 3,600 required.

Snap hooks and carabiners - Minimum tensile strength of 5,000 pounds

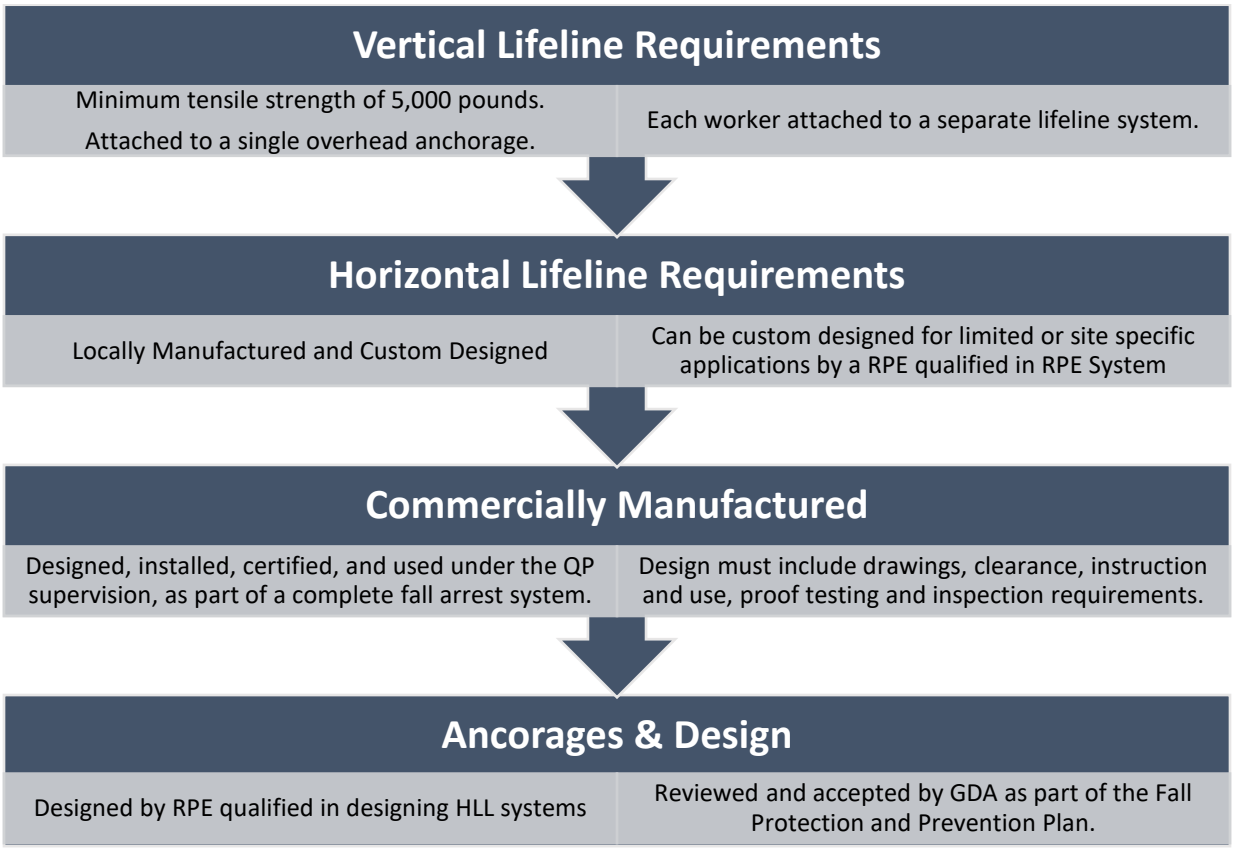
Connectors and adjusters must be capable of withstanding tensile load of 5,000 pounds & Corrosion resistant finishes

All connecting components used in PFAS must be compatable and used property

Self-Retracting Devices (SRD)



Lifelines



Positioning System

A positioning system uses some of the same equipment as a fall protection system however a positioning system used alone does not constitute fall protection. A positioning system will not be used as a primary fall arrest system. While positioning (working with both hands free), a person must use a separate system that provides back-up protection from a fall.

Positioning System Must:

- Be rigged to prevent the worker from falling more than 2 ft

- Be secured to an anchorage capable of supporting at least twice the potential impact load of a worker's fall or 3,000 pounds, whichever is greater.
- Ensure workers achieve 100% tie-off during use
- Be located on the sides or on the front of the harness.

Restraint Systems

Consideration must be made for use of fall restraint over fall arrest. Fall restraint systems prevent the user from reaching an area where a free fall could occur by restricting the length of the lanyard or by other means.

The anchorage strength requirement for restraint systems is 3,000 lbs or designed by a QP for two times the foreseeable force. Restraint systems can be used only on flat or low-sloped surfaces.

Module 6: Scaffolds, Platforms & Elevating Aerial Devices

Reasons for Most Falls from Work Platforms

All Scaffolds will be equipped with a standard guardrail or other fall protection systems. For workers erecting and dismantling scaffolds, an evaluation must be conducted by a Competent Person to determine the feasibility and safety of providing fall protection if fall protection is not feasible.

An Activity Hazard Analysis (AHA) detailing rationale for infeasibility of use of fall protection must be submitted and accepted by the GDA prior to the work.

Suspended scaffolds

Single point or two point suspended scaffold:

In addition to railings, workers must also be tied off to an independent vertical lifeline using a full body harness.

For other suspended scaffolds such as catenary, float, needle-beam, or Boatswain chairs PFAS is required, and workers must also be tied off to an independent vertical lifeline using a full body harness.

Risk Assessment

A risk assessment will be performed when persons are supported on a multi-point adjustable suspended scaffold to evaluate the effectiveness and feasibility of the use of PFAS. Results must be documented in the AHA for the activity being performed.

Self-Propelled Elevating Work Platforms (Scissor Lifts)

All Scissor lifts will be equipped with standard guardrails. In addition to the guardrail provided by the manufacturer, the scissor lift must be equipped with anchorages meeting the ANSI Z359 Fall Protection Code.

Scissor lifts not equipped with anchorages are prohibited.

A restraint system must also be used in addition to the attached guardrails. The lanyards must be designed with built built-in shock absorbers. These are used with the restraint system and

must be short enough that workers are prohibited from climbing our or being ejected from the platform.

The use of a self-retracting device (SRD) is prohibited unless permitted by the SRD manufacturer and used in accordance with manufacturer's instructions.

Workers are prohibited from climbing on or over the guardrails.

Aerial Work Platforms: Boom Supported Platforms and Vehicle Mounted Rotating and Elevating Aerial Devices

Boom lifts are known by other names including cherry picker, man lift and basket crane. Boom lifts are very similar to scissor lifts; however, they can typically reach higher heights and are equipped to maneuver around obstacles. Unlike most telehandlers, boom lifts are used to transport personnel and materials to high heights.

Boom lifts can extend anywhere from 30 to 170 feet and can either be electrically powered or powered by IC engines. They are especially useful for accessing hard to reach areas that could be potentially dangerous. Booms are often used by firefighters, construction, electricians and sometimes even window cleaners.

Aerial Work Platform Requirements

Workers must be anchored to the basket or bucket in accordance with the manufacturer's specifications and instructions, Anchoring to the boom may only be used when allowed by the manufacturer and permitted by the CP.

Lanyards used shall be sufficiently short to prohibit worker from climbing out of the basket. The use of Self-retracting devices are not acceptable.

Tying off to an adjacent pole or structure is not permitted unless a safe device for 100% tie-off is used for the transfer.

Manually Propelled Elevating Work Platforms

The platform must be equipped with standard guardrails.

If the platform is equipped with anchorages meeting the ANSI Z359, a restraint system must be used in addition to the guardrails.

Lanyards used with the restraint system must be sufficiently short to prohibit workers from climbing out of or being ejected from the platform.

Lanyards with built-in shock absorbers are acceptable

Self-retracting devices are not acceptable.

The platform must not be occupied when moved and at no time will workers be allowed to climb on or over the guardrails.

Module 7: Warning Line System (WLS)

Warning Lines serve as visual reminders of the defined work area, and to clearly mark areas where workers do not belong.

A Warning line system (WLS) may ONLY be used on floors, flat, or low-sloped roofs during construction work and shall be erected around all sides of the work area.

A WLS must consist of wires, rope, or chains between 34 and 39 inches high with supporting pillars (stanchions). WLS must be flagged at no more than 6-foot intervals with a high visibility material.

The wire, rope or chains must have a minimum tensile strength of 500 pounds and, after being attached to the stanchions, must be capable of supporting — without breaking — the loads applied to the stanchions.

Stanchions must be capable of resisting, without tipping, when a force of 16 pounds is applied horizontally against the stanchions and 30 inches above the walking or working surface, perpendicular to the warning line and in the direction of the roof floor or platform edge.

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

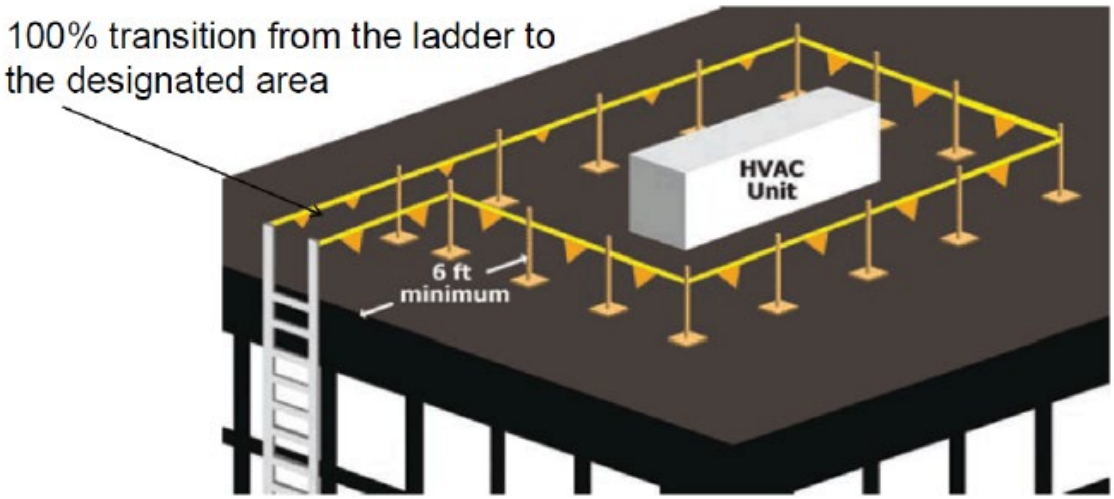
Working within the Warning Line System does not require fall protection. No workers will be allowed in the area between the roof or floor edge and the WLS without fall protection. Fall protection is required when working outside the WLS.

Roofing Work & Safety Monitoring

When a project involves roofing work for a flat roof, the Warning Line System (WLS) shall be **at minimum 6 Feet from the edge.**

When roofing work is conducted on low sloped roofs (less than 4:12), or when using mechanical equipment or when work is performed by other trades, the WLS shall be erected **at minimum 15 feet from the unprotected side or edge.**

There must be a designated area used as a fall protection method during maintenance work, such as maintenance on HVAC equipment on the roof. The requirement for a Designated Area is identical to the requirements of a Warning Line System. Also required is a 100% transition from the access point on the roof to the Designated Area.



Module 8: Rescue Plan

The employer is required to provide prompt rescue to all fallen workers. A rescue plan must be prepared and maintained when workers are using fall protection equipment.

The plan must contain provisions for self-rescue and assisted rescue of any worker who falls including rescue equipment. If other methods of rescue are planned (i.e. a jurisdictional public or Government emergency rescue agencies), it must be indicated in the rescue plan including how to contact and summon the agency to the mishap site.

Personnel conducting rescue must be trained accordingly.

If required, anchorages for self-rescue and assisted–rescue shall be identified, selected, and documented in Site-Specific Fall protection and Prevention Plan.

Anchorages selected for rescue must be capable of withstanding static loads of 3,000 pounds, or five times the applied loads as designed by a QP.

Workers using fall protection equipment must have an assigned safety person (spotter) also known as the “buddy system”, who will be within visual and/ or verbal range to initiate rescue of the fallen worker if required.

Rescue equipment used for self-rescue or assisted-rescue (i.e. SRL with rescue capability) must meet ANSI Z359.4 and Z359.14.

Module 9: Working Over or Near Water

Working Over or Near Water such as on barges, piers, crane supported work platforms and wharves, requires Personal Flotation Devices (PFDs).

PFDs are required for all work over or near water unless detailed in the graphic below.

* Note 1: All USACE and contractor workers, including divers, must comply with the requirements below as well.

*Note 2: If utilizing PFDs with full body harness, the full body harness must be worn under the PFD. The type of PFD used must not interfere with proper use of a full body harness and lanyard.

When continuous fall protection is used, without exception, to prevent workers from falling into the water, the employer has effectively removed the drowning hazard and PFDs are not required.

*Note: When using safety nets as fall protection, USCG-approved PFDs are usually required, unless rationale is provided in the DFOW AHA.

When working over or near water and the distance from walking/working surface to the water's surface is 25 feet or more, workers must be protected from falling by the use of a fall protection system and PFDs are not required.

When working over or near water where the distance from the walking/working surface to the water's surface is less than 25 feet AND the water depth is less than 10 feet, fall protection will be required and PFDs are not required.

When working over water, PFD, lifesaving equipment and safety skiffs meeting the requirements of the EM 385-1-1 must be used as required.

When working from or in machinery or movable work platforms directly over water AND the depth of the water is at least 10 feet deep, fall protection is not required however, PFDs are required.

When there are hazards from currents, intakes, dangerous machinery or equipment, or barges, etc., fall protection must be required regardless of the fall distance and PFDs are not required.

FALL PROTECTION VS PERSONAL FLOTATION DEVICE USE

WHEN WORKING OVER OR NEAR WATER