

# **GUIDE TO DEVELOPING A FALL PROTECTION PROGRAM**

**Developed By:**

**State of Wisconsin  
Department of Administration  
Bureau of State Risk Management**

# Guide to Developing a Fall Protection Program

## Table of Contents

	<u>Page</u>
<b>Table of Contents.....</b>	<b>1</b>
<b>Part I: Introduction.....</b>	<b>3</b>
<b>Part II: Explanation of the OSHA Fall Protection Standard.....</b>	<b>7</b>
<b>Part III: How to Develop a Fall Protection Program.....</b>	<b>25</b>
Step 1: Determine if walking/working surfaces are structurally safe.	27
Step 2: Conduct a fall protection hazard assessment.....	28
Step 3: Eliminate the need for fall protection, if possible.....	30
Step 4: Select the appropriate type of fall protection .....	31
Step 5: Develop rescue and retrieval procedures.....	42
Step 6: Develop a written fall protection plan, if appropriate.....	43
Step 7: Solicit assistance from DFD.....	45
Step 8: Purchase fall protection equipment .....	46
Step 9: Develop a fall protection equipment inspection, maintenance and storage program.....	46
Step 10: Provide fall protection training.....	47
Step 11: Promote the fall protection program.....	49
Step 12: Monitor the fall protection program .....	50
<b>Appendix A: Glossary of Fall Protection Terms.....</b>	<b>43</b>
<b>Appendix B: Fall Protection Hazard Assessment Form.....</b>	<b>46</b>
<b>Appendix C: Fall Protection Training Certification Record.....</b>	<b>47</b>

**Issued: 11/25/96**  
**Revised: 11/24/98**

# Part 1

## Introduction

### **Background:**

Falls are the second leading cause of occupational fatalities and disabling injuries in the United States. Each year, over 500 workers die in fall-related accidents and over 300,000 workers suffer a disabling injury. Most of these fatalities and disabling injuries according to the National Institute of Occupational Safety and Health (NIOSH) are the result of falls from elevations of ten (10) feet or less.

Falls can take place at any time and during a variety of elevated work tasks. According to a recent Bureau of Labor Statistics (BLS) study:

- Seventeen percent of the workers who fell were loading and unloading material when the fall occurred.
- Thirteen percent of the workers who fell were involved in operating, repairing, cleaning or installing equipment.
- Ten percent of the workers were performing carpentry tasks.
- The remaining activities that resulted in falls included painting, welding, roof work, sheet metal work and bricklaying.

The BLS survey also asked participants to describe their specific movements at the time of the fall.

- Twenty eight percent of the workers who fell said they were climbing up or down from an elevated position or location.
- Thirteen percent of the workers were walking at the time they fell.
- Eleven percent of the workers were stepping from one surface to another.
- Ten percent of the workers were moving backwards.

Most of the fatalities and injuries reported in the BLS study could have been avoided by the effective use of fall protection measures and equipment. Fall protection is defined as any means or system used to protect employees from falling from an elevated walking/working surface. Fall protection involves the elimination, prevention and/or control of fall hazards.

The elimination of fall hazards involves the use engineering controls and alternative work methods that do not expose employees to fall hazards such as the use of vehicle mounted work platforms.

The prevention of fall hazards involves the installation of guardrails, covers and other barriers around stairs, floors, wall openings, equipment and the edges of roofs.

The control of fall hazards involves the use of safety nets, warning lines, safety monitoring systems and personal fall arrest equipment such as body harnesses, lanyards and lifelines.

### **Goals:**

The goals of this manual are to:

1. To eliminate, prevent and/or control fall hazards in order to protect the life and safety of employees who perform work on elevated walking/working surfaces.
2. To improve/facilitate statewide compliance with the new OSHA Fall Protection Standard for the construction industry known as Subpart M.

### **Purpose:**

The purpose of this manual is to:

1. Provide state agencies and institutions with guidelines and a process for developing and implementing an effective fall protection program.
2. Serve as a compliance guide for the new OSHA Fall Protection Standard known as Subpart M.
3. Institute a process for agencies and institutions to solicit assistance from the Division of Facilities Development (DFD) to eliminate, prevent or control fall hazards on existing buildings and/or to incorporate fall protection systems into renovation projects or the construction of new state-owned buildings.

## **Part II**

# **Explanation of the OSHA Fall Protection Standard (Subpart M)**

## **Background:**

The new OSHA Fall Protection Standard for the construction industry, known as Subpart M, became effective on February 6, 1995. The standard identifies 15 areas or activities where some type of fall protection is needed if the potential fall distance is six feet or greater. Some examples of work activities that could expose state employees to fall hazards include roof repair or replacement, and painting and general maintenance work performed on elevated walking/working surfaces. Employers are able to select fall protection measures that are appropriate for the type of work performed. Fall protection can normally be provided by the use of guardrail systems, safety nets and/or personal fall arrest systems.

## **Sections:**

Subpart M has the following sections:

29 CFR 1926.500 - Scope, application and definitions applicable to this section.

29 CFR 1926.501 - Duty to have fall protection.

29 CFR 1926.502 - Fall protection systems criteria and practices.

29 CFR 1926.503 - Training requirements.

## **1926.500 - Scope and Application:**

This section sets forth the requirements and criteria for fall protection in construction workplaces covered under 29 CFR Part 1926. **Exception:** The provisions of this section do not apply when employees are making an inspection, investigation, or assessment of workplace conditions prior to the actual start of work or after all work has been completed.

**NOTE:** OSHA allowed this exception because:

- Employees engaged in inspecting, investigating and assessing workplace conditions before the actual work begins or after work is completed are

exposed to fall hazards for only very short duration, if at all. They also can usually accomplish their work without going near the danger zone.

- Employees who are not continually or routinely exposed to fall hazards tend to be very focused on their footing and are usually more aware of the hazards associated with falling.
- Employees who inspect, investigate or assess workplace conditions are more aware of their proximity to an unprotected edge than a roofer for example who is moving backwards while operating a felt laying machine or a plumber whose attention is on overhead pipes and not on the floor edge.

Fall protection requirements for employees working on:

- Scaffolds are provided in Subpart L.
- Cranes and Derricks are provided in Subpart N.
- Steel Erection are provided in Subpart R.
- Tunneling operations are provided in Subpart S.
- Construction of Electrical Transmission and Distribution Lines and Equipment are provided in Subpart V.
- Stairways and Ladders are provided in Subpart X.

### **1926.501 Duty to have Fall Protection:**

#### **General Requirement:**

- Employers must determine if the walking/working surfaces on which employees are to work have the strength and structural integrity to support them and their equipment safely. Employees are not permitted to work on building roofs and other walking/working surfaces until the employer has been determined that these surfaces have the requisite strength and structural integrity.

#### **Areas or activities that require fall protection:**

The standard identifies fifteen areas or activities that require fall protection.

#### **Unprotected sides or edges:**

- Employees performing work on walking/working surfaces (horizontal and vertical surfaces) with an unprotected side or edge six feet or more

above a lower level must be protected from falls by guardrail systems, safety nets, or personal fall arrest systems.

**Note:** OSHA has determined that there is no “safe” distance from an unprotected side or edge that would render fall protection unnecessary.

### **Leading edges:**

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

### **Hoist areas:**

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

### **Holes:**

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

### **Formwork or reinforcing steel:**

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

### **Ramp, runways and other walkways:**

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

### **Excavations:**

- Employees working on the edge of an excavation six feet or more in depth that is not readily visible because of plant growth or other visual barriers must be protected from falling into or onto the excavation by guardrails or equipment guards.

### **Dangerous equipment:**

- Employees positioned more six feet or more above dangerous equipment must be protected from falling into or onto the equipment by guardrails or equipment guards.

### **Overhand bricklaying and related work:**

- Employees who are performing overhand bricklaying six feet or more above lower levels must work in a controlled access zone or be protected from falls by guardrails, safety nets, or personal fall arrest systems.
- All employees reaching more than ten (10) inches below the level of the working/working surface on which they are working must be protected from falling by the use of guardrails, personal fall arrest systems, or safety nets.

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

### **Roofing work on low-slope roofs:**

- Employees who are performing roofing activities on low-slope roofs (having a slope less than or equal to 4 in 12) must be protected from falling when the roof has unprotected sides or edges more the six feet above lower levels by the use of:
  - Guardrails, safety nets, or personal fall arrest systems.
  - A combination of a warning line system and a guardrail system, or a warning line system and a personal fall arrest system, or a warning line system and a safety monitoring system.

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

### **Roofing work on steep roofs:**

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

**Precast concrete erection:**

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

**Residential construction activities:**

- Employees involved in residential construction activities six feet or more above lower levels must be protected by guardrail systems, safety nets, or personal fall arrest systems.

**Wall openings:**

- Employees who are positioned on, at, above, or near wall openings where the outside bottom edge of the wall opening is six feet or more above lower levels (and the inside bottom edge of the wall opening is less than 39 inches above the walking/working surface) must be protected from falls by guardrails, safety nets, or personal fall arrest systems.

**Walking /Working surfaces not otherwise addressed:**

- Employees working on walking/working surfaces six feet above lower levels that are not otherwise addressed above must be protected by the use guardrails, safety nets, or fall arrest systems.

**Protection from falling objects:**

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

- Erect toeboards, screens or guardrail systems to prevent objects from falling from higher levels.
- Erect a canopy structure strong enough to prevent penetration by any object that might fall into the canopy and keep objects that may fall away from the edge of the higher level.
- Barricade the area where objects could fall, prohibit employees from entering the barricaded the area and keep objects that may fall away from the edge of the higher level.

**1926.502 - Fall Protection Systems Criteria and Practices:**

### **General Requirement:**

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

### **Guardrail Systems:**

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

- The height of the top rail must be 42 inches +/- three inches above the walking/working level. When conditions warrant, the height of the top edge may exceed 45 inches provided the guardrail system meets all other design and construction criteria.
- Midrails, screen, mesh or intermediate vertical members must be installed between the top edges of guardrails and walking/working surfaces when there are no walls or parapet walls at least 21 inches high.
- Guardrails must be capable of withstanding a force of at least 200 pounds applied within 2 inches of the top edge in any outward or downward direction at any point along the top edge.
- When 200 pounds of downward force is applied, the top edges of guardrails must not deflect to less than 39 inches above the walking/working level.
- Midrails, screen, mesh or intermediate vertical members must be capable of withstanding a force of at least 150 pounds applied in any downward or outward direction at any point along the midrail or other member.
- Guardrails must have smooth surfaces that will prevent punctures, lacerations and snagging of clothing.
- The ends of top rails and midrails must not overhang terminal posts, unless an overhang would not create a projection hazard.
- Steel and plastic banding cannot be used on top rails or midrails.
- Top and midrails must be at least 1/4 inch nominal diameter or thickness to prevent cuts and lacerations.

- When guardrails are used in hoisting areas, a chain, gate or removable guardrail section must be placed across the access opening when hoisting operations are not taking place.
- When guardrails are used at holes, they must be erected on all unprotected sides or edges.
- When guardrails are used to protect holds that are used to pass materials, not more than two sides can be protected by removable guardrails.
- If wire rope is used for top rails, the rope must be flagged a not more than 6-foot intervals with high-visibility material.

### **Safety Nets Systems:**

Safety net systems and their use must comply with the following provisions:

- Safety nets must be installed as close as practicable but not more than 30 feet below walking/working surfaces. When nets are used on bridges, the potential fall area from the walking/working surface to the net must be unobstructed.
- Safety nets must extend away from outermost projection of the work surface as specified in 1926.502(c)(2).
- Drop tests must be performed on safety nets by dropping a 400 pound, 30 to 32 inch diameter bag of sand into the net from the highest walking/working surface (but not less than 42 inches).
- When it is unreasonable to perform a drop test on a net, the employer or designated competent person must certify that the net and net installation is in compliance with Subpart M.
- Nets must be inspected at least once a week. Defective nets and parts must be removed from service.
- Materials, scrap pieces, equipment and tools that fall into nets must be removed as soon as possible and at least before the next shift.
- Net openings must not exceed 36 square inches or be longer than 6 inches on any side.
- Each safety net must have a border rope with a minimum breaking strength of 5000 pounds.

- The connections between nets must be as strong as net components and not more than 6 inches apart.

### **Personal Fall Arrest Systems:**

Personal fall arrest systems and their use must comply with the following provisions:

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

- Personal fall arrest equipment anchorage points must be separate from any platform anchorage points, and be capable of supporting at least 5,000 pounds.

### **Positioning Device Systems:**

Positioning device systems and their use must comply to the following provisions:

- Positioning devices must be rigged such that an employee cannot free fall more than two feet.
- Positioning devices must be secured to an anchorage capable of supporting at least twice the potential impact load of an employee's fall or 3,000 pounds, whichever is greater.
- Connectors must be drop forged, pressed or formed steel, or made of equivalent materials.
- Connectors must have a corrosion-resistant finish, and all surfaces and edges shall be smooth to prevent damage to interfacing parts of this system.
- Connecting assemblies must have a minimum tensile strength of 5,000 pounds.
- D-rings and snaphooks must be proof-tested to a minimum tensile load of 3,600 pounds without cracking, breaking or taking permanent deformation.
- Snaphooks must be sized to be compatible with the member to which they are connected to prevent unintentional disengagement of the snaphook by the connected member, or shall be a locking type snaphook designed and used to prevent disengagement of the snaphook by the contact of the snaphook by the connected member.

### **Warning Line Systems:**

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

- The warning line must be erected around all sides of a roof work area. When mechanical equipment is not being used, the warning line must be erected not less than 6 feet from the roof edge.
- When mechanical equipment is being used, the warning line must be erected not less than 6 feet from the roof edge that is parallel to the direction of mechanical equipment operation and not less than 10 feet

from the roof edge that is perpendicular to the direction of mechanical equipment operation.

- Points of access, material handling areas, storage areas and hoisting areas must be connected to the work area by an access path formed by two warning lines. When the path to a point of access is not in use, a rope, wire, chain or other barricade equal in strength to the warning line must be placed across the path at the point where it intersects the warning line around the work area or the path must be offset in such a way that employees cannot walk directly into the work area.
- Warning lines must consist of ropes, wires or chains and supporting stanchions. The rope, wire or chain must be flagged at not more than 6 foot intervals with high-visibility material, such as ribbon or plastic barrier tape.
- The rope, wire or chain must be rigged and supported in such a way that its lowest point (including sag) is no less than 34 inches from the walking/working surface and its highest point is no more than 39 inches from the walking/working surface.
- After being erected and having the rope, wire or chain attached, a stanchion must be capable of resisting (without tipping over) a force of at least 16 pounds applied horizontally against it at a position 30 inches above the walking/working surface, perpendicular to the warning line and in the direction of the floor, roof or platform edge.
- The rope, wire or chain must have a minimum tensile strength of 500 pounds. After being attached to the stanchions, the rope, wire or chain must be capable of supporting (without breaking) a load of at least 16 pounds applied horizontally against the stanchions.
- The line must be attached at each stanchion in such a way that pulling on one section of the line will not result in slack being taken up in adjacent sections before the stanchion tips over.
- Employees must not be allowed in the area between a roof edge and a warning line, unless they are performing roofing work there.
- Mechanical equipment on roofs must be used or stored only in areas where employees are protected by a warning line system, guardrail system or personal fall arrest system.

### **Controlled Access Zones:**

Controlled access zones (CAZ) and their use must comply with the following provisions:

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

surface and its highest point is not more than 45 inches from the walking/working surface. The highest point must be 50 inches when overhand bricklaying operations are being performed.

- Each line must have a minimum breaking strength of 200 pounds.
- On floors and roofs where guardrail systems are not in place prior to the beginning of overhand bricklaying operations, CAZ must be enlarged, as necessary, to enclose all access points, material handling areas and storage areas.
- On floors and roofs where guardrail systems are in place, only that portion of the guardrail necessary to accomplish that day's work must be removed to allow overhand bricklaying work or leading edge work to take place.

### **Safety Monitoring Systems:**

Safety monitoring systems and their use must comply with the following provisions:

- The employer must designate a competent person to monitor the safety of other employees in accordance with the following requirements:
  - The safety monitor must be able to recognize fall hazards.
  - The safety monitor must warn employees when it appears that they are unaware of fall hazards or are acting in an unsafe manner.
  - The safety monitor must be on the same walking/working surface and within sight of the employees he or she is monitoring.
  - The safety monitor must be close enough to communicate orally with employees.
  - The safety monitor must not have other responsibilities that could take his or her attention away from the monitoring function.
- Mechanical equipment must not be used or stored in areas where safety monitoring systems are being used to monitor employees engaged in roofing operations on low-slope roofs.

- No employees other than the employees engaged in roofing work on low-sloped roofs or covered by fall protection plans are allowed in areas where other workers are being protected by safety monitoring systems.
- Each employee working must be directed to comply with fall hazard warnings from safety monitors.

### **1926.503 - Training Requirements:**

All affected employees must be trained and/or retrained in fall protection:

- Before they are assigned to work where fall hazards exist and/or where fall protection methods will be used.
- Whenever their responsibilities change.
- Whenever there is a new fall hazard at the jobsite.
- Whenever new fall protection methods are introduced to the jobsite.
- Whenever the employer determines that the program is inadequate or that additional fall protection is necessary.
- Whenever the employer has reason to believe that employees have not acquired or retained an understanding of fall protection.

Employees must be trained in the following areas:

- How to recognize the hazards of falling in their work area.
- What procedures should be followed to minimize fall hazards.

The training must be conducted by a competent person qualified in the following areas:

- The nature of fall hazards.
- The correct procedures for erecting, maintaining, disassembling and inspecting the fall protection systems used by the employer.
- How to use and operate guardrail systems, safety net systems, personal fall arrest systems, warning line systems, safety monitoring systems, controlled access zones and any other fall protection systems used by the employer.
- What role each employee plays in the safety monitoring system, if used.

- What limitations are involved in the use of mechanical equipment while performing roofing work on low-sloped roofs.
- What procedures should be followed for handling and storing equipment and materials as well as erecting overhead protection.
- What role each employee has in a fall protection plan.
- What procedures should be followed for rescues and retrieval.
- The role of each employee when a safety monitoring system is used.

The employer must prepare a written certification that identifies the employee trained and the date of the training. The employer or the trainer must sign the certification record. A record must also be maintained by the employer when retraining is required.

### **Appendices A to E:**

Subpart M has five appendices (A to E). These appendices, which are non-mandatory, are intended to provide useful information and guidelines to assist in employers to comply with the standard. The following is a short synopsis of each appendix.

#### **Appendix A - Roof Widths:**

This appendix is a guide for compliance with the requirements of 1926.501(b)(10) - Roofing work on low-slope roofs. The appendix explains that in all cases, buildings should be viewed looking down from above. The width of the roof is then the narrower of the two primary dimensions which define the roof area. This appendix was provided to eliminate the confusion as to which dimension of a building should be considered to be the width of a roof when planning fall protection from low pitched roofs during roofing work.

#### **Appendix B - Guardrail Systems:**

This appendix provides guidelines for the design of guardrail systems in accordance with the requirements of 1926.502(b)(3)(4) and (5) - Guardrails Systems. However, these guidelines do not provide all the information necessary to build a complete guardrail system. The employer is still responsible for designing and assembling the components in such a way that the completed system will meet the requirements of the standard.

#### **Appendix C - Personal Fall Arrest Systems:**

Appendix C is provided to serve as a guide in complying with the testing requirements of 1926.502(d) - Personal fall arrest systems and 1926.502(e) -

Positioning device systems. Personal fall arrest systems and positioning device systems which have been tested in accordance with the criteria of this appendix will meet the performance criteria established in these two sections. Appendix C also provides additional non-mandatory guidelines for personal fall arrest systems.

#### **Appendix D - Positioning Device Arrest Systems:**

Appendix D complements Appendix C and provides additional information on testing methods for positioning device systems. Appendix D also contains guidelines for inspecting positioning device systems to assist in complying with the requirements of 1926.502(e)(5) - Positioning device systems.

#### **Appendix E - Sample Fall Protection Plan:**

Appendix E assists employers who are able to demonstrate that the use of conventional fall protection measures are not feasible or create a greater hazard when constructing leading edges, or erecting precast concrete structures, or when engaged in residential construction work. The plans in Appendix E were developed specifically for a precast concrete worksite and a residential construction site. These plans and guidelines can be modified and tailored for use in the other areas where the standard permits employers to develop Fall Protection Plans.

### **Part III**

## **How to Develop a Fall Protection Program\***

There are twelve components or steps involved in the development, implementation and maintenance of an effective fall protection program.

- Step 1. Determine if walking/working surfaces are structurally safe.
- Step 2. Conduct a fall protection hazard assessment.
- Step 3. Eliminate the need for fall protection if possible.
- Step 4. Select the appropriate type of fall protection system.
- Step 5. Develop rescue and retrieval procedures.
- Step 6. Develop a written fall protection plan, if applicable.
- Step 7. Solicit assistance from the Division of Facilities Development to eliminate, prevent and/or control fall hazards.

- Step 8. Purchase fall protection systems and equipment, if applicable.
- Step 9. Develop a fall protection equipment inspection, maintenance and storage program.
- Step 10. Provide fall protection training.
- Step 11. Promote the fall protection program.
- Step 12. Monitor the fall protection program.

**Step 1 - Determine if walking/working surfaces are structurally safe.**

The first step in developing an effective fall protection program is to conduct an assessment of the workplace to determine if the walking/working surfaces on which employees are to work have the strength and structural integrity to safely support them and their equipment. This assessment is especially important for older buildings and/or buildings with wooden roofs. Employees should not be permitted to work on building roofs and other walking/working surfaces until the employer has been determined that these surfaces are structurally safe.

**Note:** According to the Division of Facilities and Development (DFD), all state-owned buildings meet or exceed the strength and structural requirements of the Wisconsin Building Code (Chapter ILHR 53). Therefore, unless you are or become aware of any condition(s) that might compromise the strength and structural integrity of a building, you can rely on this statement from DFD when conducting these strength and structural integrity assessments. If you have a question about the load capacity of a specific state-owned building, call DFD at (608) 266-2884.

**Step 2 - Conduct a fall protection hazard assessment.**

The second step in developing a fall protection program is to conduct a fall protection hazard assessment to determine which specific jobs, activities or areas expose employees to fall hazards.

The following steps are involved in conducting a fall protection hazard assessment.

- Step 1. Determine the type of work performed on elevated walking/working surfaces.
- Step 2. Determine if employees will be exposed to any of the following areas or activities:

- Unprotected sides and edges

- Leading edges
- Holes
- Formwork or reinforcing steel
- Ramps, runways and other walkways
- Excavations that may be obscured by structures or plant growth
- Formwork or reinforcing steel
- Above dangerous equipment
- Overhand bricklaying and related work
- Roofing work on low-slope roofs and steep roofs
- Precast concrete erection
- Wall openings and hoist areas
- Other elevated walking/working surfaces
- 

- Step 3. Determine the frequency the work is being performed.
- Step 4. Determine if workers require horizontal and/or vertical movement in order to perform the assigned work.
- Step 5. Determine the number of workers exposed to a fall hazard.
- Step 6. Determine the type of walking/working surface.
- Step 7. Determine the approximate distance of the surface to lower levels.
- Step 8. Determine if the edge of the building or the walking/working surface is currently protected by a guardrail system or parapet wall. If yes, determine if the guardrail system or wall is adequate.
- Step 9. Determine if the potential fall hazard(s) can be eliminated by alternative work methods or engineering controls.
- Step 10. If the fall hazard(s) can not be eliminated, determine what type of fall protection system is required/recommended.
- Step 11. Determine if there is a need for anchorage points.
- Step 12. Determine if employees could be exposed to other types of health and/or safety hazards in addition to fall hazards.
- Step 13. Determine if these additional hazards will affect the selection and/or use of fall protection systems.
- Step 14. Determine what safety precautions are needed to protect workers from these additional hazards.

The person conducting the hazard assessment should have a thorough

knowledge and understanding of the requirements of Subpart M and other related fall protection standards. In addition, the person should also have some formal education and/or experience in safety, engineering or a related field.

Various sources of information should be consulted when conducting this hazard assessment. These sources include, but are not limited to:

- The employees who are exposed to fall hazards.
- The affected supervisors and managers.
- Previous loss control surveys/inspections that may have identified areas or work activities that need fall protection.
- The Occupational Injury and Illness Log (OSHA 200 form).
- Previous injury and incident/near miss reports.

Involving employees and supervisors in the hazard assessment process is especially important. These individuals can provide valuable information not only about where and when they think fall protection is required, but also about how to possibly eliminate fall hazards. Obtaining their input will also encourage employees and supervisors to take ownership of the fall protection program and will help them recognize and understand fall hazards.

The date and results of the hazard assessment should be documented using the sample hazard assessment form provided in [Appendix B](#).

### **Step 3 - Eliminate the need for fall protection.**

If the hazard assessment indicates the need for fall protection, the next step is determine if the fall hazard(s) can be eliminated by the use of engineering controls or other alternative work methods.

The following are several examples of engineering controls or alternative work methods that could possibility eliminate the need for fall protection.

- Redesign or automate the process or job task.
- Perform work activities at lower heights.
- Use equipment that eliminates fall hazards, such as permanent access platforms that provide built-in fall protection.
- Use tool extensions to perform work from ground level.

- Lower equipment and tools to ground level for maintenance or repairs.
- Use vehicle mounted work platforms.
- Design buildings and other walking/working surfaces to eliminate/reduce exposure to fall hazards.
- Use outside contractors that have the proper fall protection systems and training to safely perform the work.

#### **Step 4 - Select the appropriate fall protection system.**

If the fall hazard(s) can not be eliminated, the next step is to select the appropriate fall protection system(s). No single fall protection system provides adequate fall protection for all jobs activities. The type of system that is the most effective will vary from job to job and from activity to activity. Therefore, always assess each job and activity to determine the proper type of fall protection.

The following factors must be considered when selecting fall protection systems:

- The distance of the elevated walking/working surface above lower levels.
- The type of job activities that will require fall protection and the specific requirements of each activity.
- What specific types of equipment and components will be needed with each fall protection system.
- How much vertical and horizontal movement employees will need to perform each job/activity.
- The environmental conditions (i.e. wind, rain, snow, extreme heat or cold) in which fall protection equipment will be used.
- The potential difficulty of using fall protection systems to perform normal and/or non-routine job activities.
- The need for anchorage points of suitable design and strength.
- The presence of chemical, electrical and welding hazards.
- How employees will recover or be rescued from fallen positions.
- The presence of sharp or rough surfaces or edges.

## **Types of fall protection:**

There are two major categories or systems of fall protection:

- Passive fall protection systems
- Active fall protection systems

## **Passive fall protection systems:**

Passive fall protection systems are designed to provide fall protection without any action by employees.

Some common passive fall protection systems include:

- Guardrails
- Toeboards
- Fences and barricades
- Safety nets
- Covers

## **Guardrails:**

The most common form of passive fall protection is guardrails. Guardrails are used to protect employees from stepping off higher walking/working surfaces. In addition to providing barriers, guardrails also help alert employees to the presence of a fall hazard.

A guardrail is made up of the following elements:

- Top rail
- Midrail
- Posts
- Toeboard

The top rail must be 39 to 45 inches above the walking/working surface. The midrail must be located halfway between the top edge of the top rail and the walking/working surface. The only exception to having midrails is when there is a 21 inch wall next to the guardrail. In that situation, the wall provides the necessary protection. Posts must be placed no more than 8 feet apart. End joints must have no overhang that could snag clothing or cause employees to trip.

Guardrails must be strong enough to withstand a force of up to 200 pounds applied within 2 inches of the top edge in any outward or downward direction at any point along the edge. Midrails, screens, intermediate vertical members and solid panels must be capable of withstanding, without failure, a force of at least 150 pounds.

Guardrails can be made from the following materials (See Appendix B to Subpart M):

- **Wood:** Posts and top rails must be made from at least 2-inch by x 4-inch construction grade lumber spaced not more than 8 feet apart. Midrails must be made of at least 1-inch by 6-inch lumber.
- **Pipe:** Posts, top rails and midrails must be at least 1.5 inch nominal diameter schedule-40 pipe spaced not more than 8 feet apart.
- **Structural Steel:** Posts, top rails and midrails must be at least 2-inch by 2-inch by 3/8 inch angles with posts not more than 8 feet apart on centers.
- **Cable:** The cable for the top rail must be 1/4 inches in diameter or thickness and marked at 6 foot intervals with high-visibility material such as ribbon or plastic barrier tape.

### **Toeboards:**

Toeboards are attached at the walking level to help keep employees from slipping over the edge. Toeboards also help prevent tools and materials from falling on employees working at lower levels.

Toeboards must be at least 3.5 inches in vertical height from their top edge to the level of the walking/working surface and be constructed of wood or another solid material. Openings in toeboards must be no larger than 1 inch at their greatest dimension. Toeboards must also have no more than 1/4 inch clearance above the surface.

In situations where tools, equipment or materials are piled higher than the top edge of toeboards, paneling or screening must be erected from the surface or toeboard to the top of a guardrail system's top rail for a distance sufficient to protect employees working below.

### **Fences and Barricades:**

Fences and barricades constructed of wood or metal can be used to protect employees from falling into excavations, wells, pits and shafts and also from being hit by falling objects.

### **Safety Nets:**

Safety nets are placed underneath walking/working surfaces to catch employees, tools and/or materials that could fall to lower levels. Safety nets are made from strong synthetic materials and have openings no larger than 6 inches at their greatest dimension.

Safety nets must be installed as close as possible to the areas where employees might fall, but never more than 30 feet below the level they are designed to protect. In some situations, more than one safety net may be required to provide adequate protection. When this is the case, the connections between the nets must be no more than 6 inches apart and the connection material must be as strong as the rest of the net.

Safety nets must be tested before use to insure they will provide adequate protection in accordance with 1926.502(c)(2). Safety nets must also be closely monitored during their use. Any objects that falls into a safety net, such as tools or materials, must be removed immediately to avoid injury to an employee who might fall into the net later.

Safety nets must be inspected at least once a week for mildew, stress and other signs of wear. Damaged nets must be removed and replaced immediately.

### **Covers:**

Covers are used to protect employees from falling through or into holes, excavations and other openings in floors, roofs and other walking/working surfaces. The standard requires that any gap or void 2 inches or more in dimension be covered.

Covers must be made of strong materials that will support twice the total weight of employees, equipment and materials imposed on the cover at one time. In addition, covers must be able to support twice the maximum weight of the axle load of any vehicle expected to cross them.

Each cover except manholes or steel grates used in streets must be firmly secured and the word **HOLE or COVER** must be written on the cover in large letters.

### **Active fall protection systems:**

Active fall protection, also known as personal fall arrest systems (PFAS), includes components and systems that must be connected or otherwise activated by employees to provide fall protection.

Personal fall arrest systems are designed to:

- Protect workers from falling more than six feet.
- Prevent workers from contacting any lower level during arrest of a fall.
- Limit the maximum arresting force on a worker to 900 pounds when the worker uses a body belt.

- Limit the maximum arresting force on a worker to 1800 pounds when the worker uses a body harness.
- Bring a worker to a complete stop and limit the deceleration distance that a worker travels to 3.5 feet.
- Have sufficient strength to withstand twice the potential impact energy of a worker free falling a distance of 6 feet, or the free-fall distance permitted by the system, whichever is greater.

A personal fall arrest system consists of the following components:

- **Full-body harness** - A full-body harness consists of nylon and/or polyester straps that encompass the chest, chest and waist or full body. In the event of a fall, a full body harness distributes the fall arrest force over the pelvis, thighs, waist and shoulders. The attachment point must be in the center of the back or at the shoulder level of the wearer.
- **Body Belt** - A body belt is a strap or belt that is secured around the worker's waist and is attached to a lanyard, lifeline or deceleration device. The attachment point for a body belt is the center of the wearer's back. Body belts have been the traditional means of body support. Body belts are not recommended however for fall arrest systems however because they do not distribute the fall arrest force properly. When an employee's fall is stopped, a body belt can cause his or her body to jackknife which can result in serious physical and internal injuries. As of January 1, 1998, body belts are no longer permitted for use with personal fall arrest systems.
- **Lanyard** - A lanyard connects the body harness to the anchorage point. The lanyard should be attached to a D-ring on the body harness between the shoulder blades and above the employee. Lanyards may be equipped with deceleration or shock absorbing devices that limit up to 80 percent of the arresting force placed on the wearer during a fall. The lanyard must be of sufficient strength to withstand twice the impact energy of a person free falling six feet or the free-fall distance permitted by the system if the free-fall distance is less than six feet.
- **Lifeline** - A lifeline consists of a flexible line that is connected to the anchorage point at one or both ends which serves as means to connect other components of the personal fall arrest system to the anchorage. Self-retracting lifelines provide mobility as well as worker protection. The line retracts as the worker moves toward the unit and pulls out as the worker moves away from the unit. If the worker slips or falls, the sudden jerk on the cable activates the breaking mechanism and the worker is brought to stop within 2 feet.

Lifelines can be either vertical or horizontal.

- A **vertical lifeline** consists of a flexible vertical line suspended from a fixed anchorage to which a fall arrest device is secured. Vertical lifelines must have a minimum breaking strength of 5,000 pounds. When vertical lifelines are used, each worker must have a separate lifeline except during the construction of elevator shafts and provided the breaking strength of the lifeline is 10,000 pounds.
- A **horizontal lifeline** consists of a flexible line connected to two horizontal fixed anchorage points to which a fall arrest device is secured. Horizontal lifelines are used when maximum horizontal mobility is required and no overhead anchorage point is available. Horizontal lifelines are subject to greater loads than vertical lifelines and must be properly designed and installed under the supervision of a qualified person. If not properly anchored to rigid connection points, this type of lifeline system can fail at the anchorage point.

**Snaphooks:** Snaphooks are used to connect the lanyard to the D -rings on the body harness. Snaphooks must be constructed from smooth, corrosion-resistant steel and be double-locking. Snaphooks and D-rings must be compatible. This helps prevent roll-out, which occurs when the D-ring twists out of the throat of the hook and rolls out, causing the catch to open and the D-ring to come loose. Locking snaphooks should always be used instead of nonlocking snaphooks because of the potential for unintentional release (rollout).

**Note:** If a PFAS is used by an employee that has a combined tool and body weight of 310 pounds or more, the employer must appropriately modify the system to provide adequate fall protection or the system will be not in compliance with the protocols contained in Appendix C to Subpart M and 1910.502(d)(16).

### **Rope Grabs:**

A rope grab is a deceleration device that travels on a lifeline and automatically engages the lifeline and locks to arrest the fall of the employee. The lanyard must be less than 6 feet long to restrict the overall fall to 6 feet or less. The type

and size of the lifeline that must be used with each rope system is stamped on the rope grab. Knots on the end of the lifeline may not be used unless designed into an approved system by the manufacturer to prevent the rope grab from coming off the end of the line.

### **Anchorage Points:**

An anchorage point is a secure point of attachment for lifelines, lanyards and/or fall deceleration devices.

The following factors must/should be considered when designing, selecting and installing an anchorage point:

- The anchorage point must not support any other structure such as platform or guardrail.
- The anchorage point must prevent the employee from falling more than 6 feet to a lower level.
- The anchorage point must be independent of the work surface wherever possible.
- The anchorage point, when used as part of a complete Personal Fall Arrest System (PFAS), must be capable of supporting at least twice the weight expected to be imposed upon it in the event of a fall.
- The anchorage point must be clearly marked.
- The anchorage point must accommodate the employee's need for mobility.
- The anchorage point, when used with a body belt/lanyard combination, should be at waist height.
- The anchorage point, when used with a body harness/lanyard combination, should be at shoulder level.
- The anchorage point, when used with a self-retracting lanyard, should be overhead.
- The anchorage point, when used to attach a PFAS, must be independent of an anchorage being used to support or suspend platforms.
- Each anchorage point must be able to support at least 5,000 pounds per employee attached for falls up to six feet or 3600 pounds if the anchorage point is certified by a "qualified" person.

**Note:** Anchorage points should be designed by a "qualified" person such as a registered professional engineer with experience in designing fall protection systems or another person with appropriate education and experience in fall protection.

### **Anchoring System Tie-Off Considerations:**

To tie-off is the act of connecting an employee wearing personal fall arrest protection equipment to an anchorage system. The strength of the fall arrest equipment is directly based on the way the equipment is attached to the anchoring system. The anchoring system must not significantly reduce the strength of the fall arrest system. If the means of attachment used reduces the strength of the fall arrest equipment, replace that component with a stronger one that will also maintain the appropriate maximum arrest force deceleration characteristics.

The following are some known strength-reducing tie-off situations.

- **Tie-offs that have knots in the lanyard or lifeline.**

Tie-offs that have knots in the lanyard or lifeline can reduce the strength of the lanyard or lifeline by 50% or more. Replace the lanyard or lifeline with one that has a connector that eliminates the need for a knot. If knots can not be avoided, a stronger lanyard or lifeline should be used to compensate for the weakening effect of the knot. The other option is to reduce the length of the lanyard to minimize the free-fall distance.

- **Tie-offs around an I-beam.**

Tie-offs around an I-beam can reduce the strength of a lifeline by as much as 70 % due to the cutting action of the beam edges. Lanyards or lifelines can be protected from beam edges by the use of a webbing lanyard or a wire core lifeline that is wrapped around the beam.

- **Tie-offs around rough or sharp surfaces.**

Tie-offs around rough or sharp edges drastically reduces the strength and safety of a lifeline. If this type of tie-off can not be avoided, the sharp surfaces should be padded. Another option is to install an abrasion-resistant strap around the lifeline or around or over the rough or sharp edge.

## **Positioning Systems:**

A positioning system uses a body harness system that is rigged to allow an employee to be supported on an elevated vertical surface, such as a wall, and to work with both hands free.

Positioning systems must be rigged so that employees cannot free-fall more than 2 feet. In addition, positioning systems must be secured to an anchorage capable

of supporting at least twice the potential impact load of an employee's fall or 3,000 pounds, whichever is greater.

### **Free-Fall Distance:**

Free-fall distance is the vertical displacement of the fall arrest attachment point on the body harness or belt between the onset of the fall and just before the fall arrest system begins to arrest the fall. This distance includes any deceleration device slide distance or self-retracting life/lanyard extension before they operate and fall arrest forces occur. Free-fall distance excludes deceleration distance and lifeline/lanyard elongation.

A few additional feet of free-fall distance can significantly increase the arresting force on a fallen worker. The additional arresting force could also possibly exceed the strength of the system. In order to reduce the risk of an injury, the free-fall distance should be limited to 2 feet or less and must never exceed 6 feet. To help assure this, the tie-off attachment point to a lifeline or to the anchorage point should be located at or above the connection point on the worker's body harness or belt. The ideal height for the anchorage point is 7 feet above the work surface. A shorter lanyard may also help reduce the free-fall distance.

Free-fall distance can be calculated as follows:

- If the anchorage point is below the attachment point on the worker, the distance between the anchorage point and the attachment point must be added to the length of the lanyard to obtain the free-fall distance.
- If the anchorage point is above the attachment point on the worker, the distance between the anchorage point and the attachment point must be subtracted from the length of the lanyard to obtain the free-fall distance.

**Note:** The anticipated stretch of the lanyard must be added to the free-fall distance to obtain the minimum clearance necessary to safely arrest a fall.

### **Other Fall Protection Methods:**

In some situations, the installation and use of guardrails, safety nets or personal arrest systems may not be feasible or creates a greater hazard. In these cases, additional and/or other methods and systems can be used to provide fall protection (See 1926.501).

- **Warning line system:** A warning line system uses ropes, wires or chains to keep employees out of areas where there are fall hazards. Warning line systems are often used on low-sloping roofs and around dangerous mechanical equipment.

- **Controlled access zones (CAZ):** Controlled access zones allow only employees working directly in an area to enter the zone. The CAZ must be clearly indicated by a line made of rope, wire or some other means that restricts access to the work area. When control lines are used to restrict access to an unprotected or leading edge, the line must extend along the entire length of the unprotected or leading edge. The control line must be connected on each side to a guardrail or wall.
- **Safety monitoring system:** A safety monitoring system uses competent employees to actively observe work areas and warn other workers of any possible fall and other safety hazards. Safety monitors must not be assigned other job duties which could distract their attention away from observing the work of other employees.

**Fall Protection Selection Criteria:**

The following chart shows common types of fall protection and where each type of protection can be used in various applications in accordance with Subpart M.

<u>Type of Fall Protection</u>	<u>Applications</u>
Guardrail System	Leading edges Unprotected sides Hoist areas Ramps, runways and other walkways Excavations not readily seen due to plant growth or other visual barriers Wells, pits or shafts Dangerous equipment Overhand bricklaying Roofing work on low-sloped roofs Roofing work on steep roofs Precast concrete erection Wall openings Walking/working surfaces not otherwise addressed Protection from falling objects
Fences and Barricades	Excavations not readily seen due to plant growth or other barriers Wells, pits or shafts Protection from falling objects
Safety Net System	Leading edges

	<ul style="list-style-type: none"> <li>Leading edges (for workers not involved in the leading-edge work)</li> <li>Unprotected sides</li> <li>Formwork and reinforcing steel</li> <li>Dangerous equipment</li> <li>Overhand bricklaying and related work</li> <li>Roofing work on low-sloped roofs</li> <li>Roofing work on steep roofs</li> <li>Precast concrete erection</li> <li>Wall openings</li> <li>Walking/working surfaces not otherwise addressed</li> </ul>
Covers	<ul style="list-style-type: none"> <li>Holes</li> <li>Wells, pits or shafts</li> <li>Protection from falling objects</li> </ul>
Personal Fall Arrest System	<ul style="list-style-type: none"> <li>Leading edges</li> <li>Leading edges (for workers not involved in the leading edge work)</li> <li>Unprotected sides</li> <li>Hoist areas</li> <li>Holes</li> <li>Formwork and reinforcing steel</li> <li>Dangerous equipment</li> <li>Overhead bricklaying and related work</li> <li>Roofing work on low-sloped roofs</li> <li>Roofing work on steep roofs</li> <li>Precast concrete erection</li> <li>Residential construction</li> <li>Wall openings</li> <li>Walking/working surfaces not otherwise addressed</li> </ul>
Positioning Device System	<ul style="list-style-type: none"> <li>Formwork and reinforcing steel</li> </ul>
Safety Monitoring System	<ul style="list-style-type: none"> <li>Roofing work on low-sloped roofs of 50 feet or less in width</li> </ul>
Controlled Access Zones	<ul style="list-style-type: none"> <li>Overhand bricklaying and related work</li> </ul>
Toeboards or Screens	<ul style="list-style-type: none"> <li>Protection from falling objects</li> </ul>
Canopy Structures	<ul style="list-style-type: none"> <li>Protection from falling objects</li> </ul>

Warning Line System

Roofing work on low-slopped roofs 50 feet or more in width plus one of the following systems:

- Guardrail system
- Safety net system
- Personal fall arrest system
- Safety monitoring system

Hard Hats

Protection from falling objects

### **Step 5 - Develop rescue and retrieval procedures:**

Among the most important factors in preventing fall-related injuries are the rescue and retrieval procedures taken immediately after a fall has occurred. When employees are using a personal fall arrest system, the standard requires the employer to provide for the prompt rescue of employees in the event of a fall or must assure that employees are able to rescue themselves. This requirement was included in the standard because in many fall-related accidents, the fallen employee will sustain more serious injuries the longer he/she remains suspended especially if the worker is wearing only a body belt. In order to prevent further harm to employees, all affected employees and supervisors must know how to respond quickly and properly in the event of a fall.

Rescue and retrieval planning and preparation should always take place before the work activity starts to ensure that the proper equipment and procedures will be in place to rescue employees if needed.

The equipment that can be used to rescue fallen employees includes:

- Ladders
- Scaffolds
- Mobile lifts

Some types of fall protection incorporate an automatic-descending device which is activated by the fall and provides a safe, automatically controlled descent to a lower level. The use of automatic-descending devices however still requires planning and employee training to ensure that these devices will be available and used properly during emergency situations.

The local fire department may also be able to perform rescues and retrievals of fallen employees. If the fire department agrees to provide this service (and has the necessary equipment and training), provide them with a map of your facility indicating the locations where fall protection will be used by your employees. In

addition, invite representatives of the fire department to tour your facilities to familiarize them with your fall protection program and the specific locations and situations where falls could possibly occur.

### **Step 6 - Develop a written fall protection plan, if applicable:**

In some situations, the use of conventional fall protection systems may not be feasible or may create a greater hazard. The three activities in which this may occur include:

1. Leading-edge work
2. Precast concrete erection work
3. Residential construction work

In these situations, Subpart M provides the employer the option of creating a written fall protection plan. The plan must conform to the following provisions:

- The plan must be prepared by a qualified person and developed specifically for the site where leading-edge work, precast concrete erection work or residential construction work is being performed.
- The plan must be maintained and kept up to date.
- Any changes to the plan must be approved by a qualified person.
- A copy of the plan, with all the approved changes, must be maintained at the job site.
- Implementation of the plan must be under the supervision of a competent person.
- The plan must document why the use of conventional fall protection systems (guardrails, safety nets or personal fall arrest systems) is not feasible or will create a greater hazard.
- The plan must include written discussion of other measures that will be taken to reduce or eliminate fall hazards for employees who cannot be protected using conventional fall protection systems. For example, the plan must describe the extent to which scaffolds, ladders or vehicle mounted work platforms will be used to provide safer working surfaces.
- The plan must identify each location where conventional fall protection methods cannot be used and classify these locations as controlled access zones (CAZ).

- In areas where no other alternative fall protection measure is used, the employer must implement a safety monitoring system.
- The plan must include a statement that provides the name or other method of identification for each employee allowed to work in a CAZ.
- If an employee falls or another related serious incident/near miss occurs, the employer must investigate the circumstances of the fall or incident to determine if the plan needs to be changed (i.e. new practices, procedures or training). The employer must also implement those changes to prevent similar types of falls or incidents.

**Step 7 - Solicit assistance from the Division of Facilities Development (DFD) to eliminate, prevent or control fall hazards.**

**Existing Buildings:**

Agencies and institutions should contact the Division of Facilities Development (DFD) for assistance in eliminating, preventing or controlling fall hazards on existing buildings. If needed, an architect/engineer will be assigned, a funding source identified and a project initiated. DFD will administer projects costing less than \$100,000 under the Small Projects Program. Requests must be submitted on a Request for Small Project Approval Form (Rev 8/95). All-Agency funds administered by DFD may be used for work in GPR funded facilities only and approval is on a case-by-case basis depending upon the availability of funds and the technical merits of the request. The Small Projects form and instructions for use of the form are on the Internet at <http://www.doa.state.wi.us/dfd/moredfd.htm> under Small Project Guidelines or is available by calling DFD at (608) 266-1799 or (608) 266-2731.

When submitting requests, the agency/institution must demonstrate that the walking/working surface requires fall protection to meet the requirements of Subpart M. Upon approval, DFD will provide the necessary engineering expertise internally or contract out for this service with a qualified engineering consultant.

Agencies and institutions should attempt to coordinate these requests with planned re-roof or roof repair projects. When this is not possible, the agency/institution must review the installation plans with DFD roofing specialists to avoid roof leaks or voiding existing roof warranties.

**Note:** Small projects may cost up to \$250,000 with multiple funding sources. Projects costing less than \$5000 are not be eligible for all-agency funding unless the project is approved by DFD as a Special Needs Project. The use of special needs funding should be discussed directly with the appropriate DFD staff specialist.

**New Construction and Major Renovation Projects:**

For new construction and major renovation projects on state-owned buildings and other structures, the agency/institution should identify the need for fall protection in the Program Statement submitted to DFD in the Detailed Requirements section of the statement. The agency/institution is responsible for determining what specific fall protection system is needed to meet the requirements of Subpart M. Upon approval, DFD will include the system in the design of the building or structure.

### **Step 8 - Purchase fall protection equipment:**

The eighth step in a fall protection program is to purchase the appropriate fall protection systems and equipment. Two of the largest and best known manufacturers of fall arrest and positioning systems and anchorage connectors in the U. S. are DBI/SALA and Miller Equipment. Both of these companies provide a wide selection of full body harnesses, lanyards, self-retracting lifelines and anchorage connectors. Their product lines are distributed by most of the safety equipment companies that have sales offices/representatives in Wisconsin. When purchasing fall protection and other safety equipment, agencies and institutions should consider utilizing the state contract for safety equipment with Fisher Safety Products. The contract provides agencies/institutions with a 25% discount and free shipping and handling. Fisher also provides the services of a safety specialist who can help your staff select the fall protection equipment that is best suited for your particular facility and job activities. Although the use of the state contract is optional, agencies/institutions are strongly encouraged to compare the discounts and services offered by Fisher Safety with other safety equipment companies.

**Note:** Agencies and institutions are responsible for purchasing fall protection equipment, such as body harness and lanyards, with funds from their own operating budgets. Agencies can also use their risk management premium savings (if available) to purchase fall protection equipment upon approval from the Bureau of State Risk Management.

### **Step 9 - Develop a fall protection equipment inspection, maintenance and storage program.**

The ninth step in a fall protection program is to develop an inspection, maintenance and storage program in accordance with Subpart M and the manufacturer's recommendations to ensure that fall protection systems will function properly. Additional guidelines for inspecting personal fall arrest and positioning systems are provided in Appendixes C and D to Subpart M.

Personal fall arrest and positioning systems (i.e. body harnesses, lanyards and lifelines) must be inspected before each use for the following defects or damage:

- Any component with a significant defect, such as cuts, tears, abrasions, mold or stretching.
- Alterations or additions which might affect the system's efficiency.
- Damage to any component caused by contact with fire, acids and other corrosives.
- Distorted hooks or faulty hook springs.
- Cracked, broken or deformed D-ring and snaphooks.
- Loose, damaged or non-functioning mountings and parts.
- Wearing or any internal deterioration in the ropes.

Defective equipment must be immediately taken out of service and tagged or marked as unusable or destroyed.

**Note:** Any personal fall arrest or positioning system that has been used to arrest a fall can not be used again unless the system is inspected by a "qualified" person who determines the system is undamaged and able to be reused.

Fall protection equipment must also be cleaned on a regular basis to help keep the equipment in proper working condition. Synthetic ropes, belts and harnesses can be washed in soapy water to remove loose debris and then rinsed with clean water and allowed to air dry at room temperature. Industrial solvents should not be used on synthetic materials because they can degrade the materials and reduce their strength. Moving parts should not be oiled unless permitted by the manufacturer.

Synthetic materials should always be stored in a clean dry place and away from strong sunlight and extreme temperatures which could degrade the materials. When dyed synthetic color fades, it indicates UV exposure that could lead to equipment failure. Replace any damaged equipment immediately.

**Note:** All affected employees and supervisors should be trained how to properly inspect, maintain and store fall protection systems and equipment.

## **Step 10 - Provide fall protection training.**

The tenth step in a fall protection program is to train each employee who may be exposed to fall hazards how to recognize fall hazards and the procedures they need to follow to minimize these hazards.

The training must be provided:

- Before employees are assigned to work where fall hazards exist and/or where fall protection methods will be used.
- Whenever employee responsibilities change.
- Whenever there is a new fall hazard at the jobsite.
- Whenever new fall protection methods are introduced to the jobsite.
- Whenever the employer determines that the fall protection program is inadequate or that additional fall protection is necessary.
- Whenever the employer determines that employees have not acquired or retained an understanding of fall protection.

The required components of fall protection training and the required qualifications of the trainer are listed in the training section of Subpart M (See 1926.503). The standard does not specify however the required length or format of the training program. In general, fall protection training should include 1-4 hours of classroom instruction and hands-on training on the proper use of the fall protection equipment that will be used by employees at the jobsite. The training should also address proper inspection, maintenance and storage techniques and procedures.

Safety videos and booklets on fall protection can be used to enhance (but not replace) your training program. Several companies such as J. J. Keller & Associates, Summit Training Source and Comprehensive Loss Management provide videos and other excellent training resources on fall protection. Several vendors listed in the new Safety and Risk Management Training Bulletin (No. 11-97533-601) also provide fall protection training. Many of the fall protection equipment manufacturers can also provide training on the use of their equipment upon request at little or no cost.

Upon completion of the training, the agency/institution must prepare a written training certification record containing the following information:

- Name of the employee trained
- Date(s) of training
- Signature of the person conducting the training or the signature of the employer

The standard allows the employer to prepare the certification record in any format including attendance sheets and computer generated training lists. A sample fall protection training certification record is provided in [Appendix C](#) . The agency or institution must (at a minimum) keep and maintain the latest certification record on file.

**Note:** The standard does not require the individual who conducts the training to be certified in safety or fall protection or possess a certain college or technical degree to be regarded as a “competent person.” The standard instead places emphasis on the person’s knowledge of fall protection systems and his/her ability to train employees how to recognize fall hazards and how to properly use, inspect and maintain fall protection equipment.

### **Step 11 - Promote the fall protection program.**

In order maintain the effectiveness of a fall protection program, managers, supervisors and other staff personnel need to actively promote the proper use of fall protection equipment and encourage employee involvement and support of the program.

The following are several suggested ways to promote a fall protection program.

- Provide positive feedback to employees who use fall protection equipment properly.
- Display posters and distribute information sheets to employees that reinforce the importance of fall protection.
- Conduct safety meetings with employees about fall protection.
- Respond in a timely manner to suggestions and requests for improving the program and/or equipment.
- Encourage union representatives and safety committee members to actively support the program.
- Collect and distribute "success stories" about injuries prevented by the use of fall protection.
- Include articles about the proper use fall protection in agency or institution newsletters or other publications.

### **Step 12 - Monitor the fall protection program.**

The final step in a fall protection program is to continuously monitor the effectiveness of the program to insure that the required elements of the program are being followed by supervisors and employees at the jobsite.

The following are several suggested ways to monitor a fall protection program:

- Conduct periodic inspections of the jobsite to insure that employees are properly using fall protection systems.
- Take immediate corrective action, including the use of disciplinary action if appropriate, any time fall protection is not being used properly.
- Conduct a formal audit of the entire fall protection program at least annually. Document and communicate the results of the audit to the affected employees, supervisors and managers. Develop a method of comparing the results of the audit with previous audits such as assigning points to each required element.
- Conduct periodic inspections of equipment storage areas.
- Require employees to notify their supervisor if they have any problems with the use and/or maintenance of their fall protection equipment.
- Require employees to notify their supervisor if they are involved in any accident related to fall protection. Promptly and thoroughly investigate each accident and document the results of each investigation.
- Hold managers and supervisors accountable for the proper use and maintenance of fall protection equipment by their employees.

**Note:** Several parts of this section were adapted from a manual on fall protection developed by Comprehensive Loss Management, Inc.

## **Glossary of Fall Protection Terms**

**Anchorage** -- A secure point of attachment for lifelines, lanyards or deceleration devices.

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

**Body harness** -- Straps that may be secured about the person in a manner that distributes the fall-arrest forces over at least the thighs, pelvis, waist, chest, and shoulders with a means for attaching the harness to other components of a personal fall arrest system.

**Connector** -- A device that is used to couple (connect) parts of a personal fall arrest system or positioning device system together.

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

**Deceleration device** -- Any mechanism such as rope grab, ripstitch lanyard, specially-woven lanyard, tearing or deforming lanyards, automatic self-retracting lifelines/lanyards which serves to dissipate a substantial amount of energy during a fall arrest, or otherwise limits the energy the energy imposed on an employee during fall arrest.

**Deceleration distance** -- The additional vertical distance a falling person travels, excluding lifeline elongation and free fall distance, before stopping, from the point at which a deceleration device begins to operate.

**Guardrail system** -- A barrier erected to prevent employees from falling to lower levels.

**Hole** -- A void or gap 2 inches or more in the least dimension in a floor, or roof, or other walking/working surface.

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

**Leading edge** -- 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.

**Lifeline** -- A component consisting of a flexible line for connection to an anchorage at one end to hang vertically (vertical lifeline), or for connection to anchorage's at both ends to stretch horizontally (horizontal lifeline) and that serves as a means for connecting other components of a personal fall arrest system to the anchorage.

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

**Opening** -- A gap or void 30 inches or more high and 18 inches or more wide, in a wall or partition, through which employees can fall to a lower level.

**Personal fall arrest system** -- A system including but not limited to an anchorage, connectors, and a body belt or body harness used to arrest an

employee in a fall from a working level. As of January 1, 1998 the use of a body belt for fall arrest is prohibited.

**Positioning device system** -- 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 backwards.

**Rope grab** -- A deceleration device that travels on a lifeline and automatically, by friction, engages the lifeline and locks to arrest a fall.

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

**Self-retracting lifeline/lanyard** -- A declaration device containing a drum-wound line which can be slowly extracted from, or retracted onto, the drum under minimal tension during normal employee movement and which, after onset of a fall, automatically locks the drum and arrests the fall.

**Snaphook** -- A connector consisting of a hook-shaped member with a normally closed keeper, or similar arrangement, which may be opened to permit the hook to receive an object and, when released automatically closes to retain the object.

**Steep roof** -- A roof having a slope greater than 4 in 12 (vertical to horizontal).

**Toeboard** -- A low protective barrier that prevents material and equipment from falling to lower levels and which protects personnel from falling.

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

**Walking/working surface** -- Any surface, whether horizontal or vertical, on which an employee walks or works, including but not limited to floors, roofs, ramps, bridges, runways, formwork, and concrete reinforcing steel. Walking/working surfaces do not include ladders, vehicles or trailers on which employees must be located to perform their work duties.

**Warning line system** -- A barrier erected on a roof to warn employees that they are approaching an unprotected roof side or edge and which designates an area in which roofing work may take place without the use of guardrail, body belt or safety net systems to protect employees in the area.

# **Fall Protection Hazard Assessment Form**

Agency: \_\_\_\_\_ Location: \_\_\_\_\_

Jobsite: \_\_\_\_\_

Type of work performed: \_\_\_\_\_

---

---

---

Type of area/activity:

- Unprotected sides or edges
- Hoist areas

- Leading edge(s)
- Roofing work on low-sloped roofs

- |   |   |
|---|---|
| <input type="checkbox"/> Holes                            | <input type="checkbox"/> Roofing work on steep roofs                      |
| <input type="checkbox"/> Formwork or reinforcing steel    | <input type="checkbox"/> Precast concrete erection                        |
| <input type="checkbox"/> Ramp, runways and other walkways | <input type="checkbox"/> Residential construction activities              |
| <input type="checkbox"/> Excavations                      | <input type="checkbox"/> Wall opening(s)                                  |
| <input type="checkbox"/> Dangerous equipment              | <input type="checkbox"/> Walking/Working surfaces not otherwise addressed |
| <input type="checkbox"/> Overhead bricklaying             |   |

How frequently is the work performed (i.e. daily, weekly)? \_\_\_\_\_

Does the job/activity require vertical and/or horizontal movement? Yes \_\_\_\_\_

No \_\_\_\_ If yes, describe \_\_\_\_\_

Number of workers exposed to a fall hazard: \_\_\_\_\_

Type of surface (i.e. flat/sloping roof): \_\_\_\_\_

Approximate distance from the surface to lower levels: \_\_\_\_\_

Is the edge of the building or walking/working surface currently protected by a guardrail system or parapet wall? Yes \_\_\_\_ No \_\_\_\_ If yes, is the guardrail system/parapet wall adequate? Yes \_\_\_\_ No \_\_\_\_ If no, describe \_\_\_\_\_

Can the fall hazard(s) be eliminated by alternative work methods or engineering controls? Yes \_\_\_\_ No \_\_\_\_ If yes, explain \_\_\_\_\_

If the fall hazard(s) can not be eliminated, what type of fall protection system is required/recommended? \_\_\_\_\_

Is there a need for anchorage points? Yes \_\_\_\_ No \_\_\_\_ If yes, how many points are needed? \_\_\_\_\_

In addition to fall hazards, could workers be exposed to any of the following hazards? Yes \_\_\_\_ No \_\_\_\_ (Check all hazards that apply)

- |   |   |
|---|---|
| <input type="checkbox"/> Hot objects/sparks | <input type="checkbox"/> Moving equipment           |
| <input type="checkbox"/> Chemical hazards   | <input type="checkbox"/> Uneven surfaces            |
| <input type="checkbox"/> Electrical hazards | <input type="checkbox"/> Slippery/oily surfaces     |
| <input type="checkbox"/> Abrasive surfaces  | <input type="checkbox"/> Adverse weather conditions |

If yes, describe each hazard: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Could any of the above hazards affect the selection/use of fall protection systems? Yes \_\_\_\_\_ No \_\_\_\_\_ If yes, describe \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

What safety precautions should be taken to protect workers from these additional hazards? \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**Assessed By:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Title:** \_\_\_\_\_ **Work Phone:** \_\_\_\_\_

## **Fall Protection Training Certification Record**

**Agency:** \_\_\_\_\_ **Division:** \_\_\_\_\_

**Location:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Instructor:** \_\_\_\_\_

Employee Name	Classification	Type of Fall Protection

