



COURSE 12909

Fall Protection

Review Material

Uscontractorlicense LLC

PO Box 268 / Platteville, Wisconsin 53818 / 608.348.6688 / www.uscontractorlicense.com

Summary Of This Course

Fall Protection

Approved by the
Wisconsin Department of Safety and Professional Services Safety and Buildings Division

Course Identification Number 12909

Educational Credit Hours: 6

Course Provider:
USCONTRACTORLICENSE LLC

P.O. Box 268
Platteville, WI 53818
(608) 348-6688

www.uscontractorlicense.com

This course is intended to assist employers and employees in their efforts to comply with the current OSHA Fall Protection Requirements for residential construction work, as falls are the leading cause of death for workers engaged in residential construction.

This Course is approved for the following Registrations/Certifications or Licenses:

Registered Electrician	6 Hours of Continuing Education	
Commerical Plumbing Inspector	6 Hours of Continuing Education	
Cross Connection Control Tester	6 Hours of Continuing Education	
Dwelling Contractor Qualifier	6 Hours of Continuing Education	
Industrial Journeyman Electrician	6 Hours of Continuing Education	
Journeyman Electrician	6 Hours of Continuing Education	
Journeyman Plumber	6 Hours of Continuing Education	
Journeyman Plumber Restricted Appliance	6 Hours of Continuing Education	
Manufactured Home Installer	6 Hours of Continuing Education	
Master Electrician	6 Hours of Continuing Education	
Master Plumber	6 Hours of Continuing Education	
Master Plumber Restricted Appliance	6 Hours of Continuing Education	
Residential Journeyman Electrician	6 Hours of Continuing Education	
Master Electrician, Residential	6 Hours of Continuing Education	
UDC Plumbing Inspector	6 Hours of Continuing Education	
Utility Contractor	6 Hours of Continuing Education	

Course Outline

This course is a distance learning or e-learning course, which allows the attendee to complete the course on their time schedule.

MAIN TOPICS COVERED

An Illustrated Commentary (CFR 1926) OSHA Subpart M-Fall Protection

OSHA Introduction

WisCon: Informational Sheet on the Onsite Safety and Health Consultation Service offered by the Wisconsin State Laboratory of Hygiene. (Included in the Introduction section)

OSHA Guidance Document Fall Protection in Residential Construction

OSHA Fact Sheets

OSHA Residential Fall Protection Program Update

Outline of the Main Topics:

CFR 1926 Subpart M

Scope, application, and definitions

Duty to have fall protection

Fall protection systems criteria and practices

Training requirements

Determining Roof Widths

Personal Fall Arrest Systems

Positioning Device Systems

Sample Fall Protection Plan

OSHA INTRODUCTION

Fact Sheet

Compliance Assistance Quickstart

WisCon--Onsite Safety and Health Consultation in Wisconsin

Residential Construction Q and A's

OSHA FACT SHEET

Inspections

Preventing Falls

Aerial Lifts

Fall Protection in General Industry

Portable Ladder Safety Tips

Supported Scaffold Safety

Supported Scaffold Inspections

OSHA GUIDANCE DOCUMENT–FALL PROTECTION IN RESIDENTIAL CONSTRUCTION

Introduction

Installing Roof Trusses

Installing Ridge Poles and Rafters

Installing Roof Sheeting

Anchors

Roofing-Weatherproofing

Foundation Walls and Framework

Installing Floor Joists and Floor Trusses

Installing Subfloors

Installing Walls

Sheathing Walls

Exterior Finishing

Interior Finishing

RESIDENTIAL FALL PROTECTION PROGRAM UPDATE

Recession of 1999 Interim Fall Protection Guidelines for Residential Construction

Significant Changes in Policy

Alternative Methods Allowed

Definition of Residential Construction

Non-Residential Construction

Training Requirements

Conventional Fall Protection Systems

Guardrail Systems

Safety Net Systems

Anchor Point

Full Body Harness

Connector/Lanyard

Personal Fall Restraint System

Other Work Methods

FALL PROTECTION PLAN

Safety Monitor Duties

Exam

60 questions related to the reference materials are used to test the attendee on their comprehension of the materials. A 70% score will need to be attained in order to pass this course.

Answer Sheet(s)

1 bubble style answer sheet(s) are included. When you are finished with the exam, you may return the answer sheets for grading to:

By Mail: Uscontractorlicense LLC
PO Box 268
Platteville, Wisconsin 53818

By Email: michael@uscontractorlicense.com

By Fax: 608-571-0096

Once we get the answer sheets back, we will grade them, enter your hours into the attendance portal and email or mail you back your certificate of completion(s). You will be responsible for renewing your license with the DSPS at www.license.wi.gov website.

Any questions, please contact us at 608.348.6688

Uscontractorlicense LLC

PO Box 268 / Platteville, Wisconsin 53818 / 608.348.6688 / www.uscontractorlicense.com

OSHA[®] FactSheet

Fall Protection in Residential Construction

The United States Department of Labor's Occupational Safety and Health Administration (OSHA) has issued a directive rescinding the Interim Fall Protection Compliance Guidelines for Residential Construction (STD 03-00-001).

Before issuance of this new directive, STD 03-00-001 allowed employers engaged in certain residential construction activities to use specified alternative methods of fall protection (e.g., slide guards or safety monitor systems) rather than the conventional fall protection (guardrails, safety nets, or personal fall arrest systems) required by the residential construction fall protection standard (29 CFR 1926.501(b)(13)). Employers could use the alternative measures described in STD 03-00-001 without first proving that the use of conventional fall protection was infeasible or created a greater hazard and without a written fall protection plan.

With the issuance of the new directive, all residential construction employers must comply with 29 CFR 1926.501(b)(13).

- Residential construction employers generally must ensure that employees working six feet or more above lower levels use guardrails, safety nets, or personal fall arrest systems. A personal fall arrest system may consist of a full body harness, a deceleration device, a lanyard, and an anchor point. (See the definition of "personal fall arrest system" in 29 CFR 1926.500.)
- Other fall protection measures may be used to the extent allowed under other provisions of 29 CFR 1926.501(b) addressing specific types of work. For example, 1926.501(b)(10) permits the use of warning lines and safety monitoring systems during the performance of roofing work on low-sloped roofs.
- OSHA allows the use of an effective fall restraint system in lieu of a personal fall arrest system. To be effective, a fall restraint system must be rigged to prevent a worker from reaching a fall hazard and falling over

the edge. A fall restraint system may consist of a full body harness or body belt that is connected to an anchor point at the center of a roof by a lanyard of a length that will not allow a worker to physically reach the edge of the roof.

- If the employer can demonstrate that use of conventional fall protection methods is infeasible or creates a greater hazard, it must ensure that a qualified person:
 - Creates a written, site-specific fall protection plan in compliance with 29 CFR 1926.502(k); *and*
 - Documents, in that plan, the reasons why conventional fall protection systems are infeasible or why their use would create a greater hazard.

The new directive interprets "residential construction" as construction work that satisfies both of the following elements:

- The end-use of the structure being built must be as a home, i.e., a dwelling.
- The structure being built must be constructed using traditional wood frame construction materials and methods. The limited use of structural steel in a predominantly wood-framed home, such as a steel I-beam to help support wood framing, does not disqualify a structure from being considered residential construction.
 - Traditional wood frame construction materials and methods will be characterized by:
 - *Framing materials:* Wood (or equivalent cold-formed sheet metal stud) framing, not steel or concrete; wooden floor joists and roof structures.
 - *Exterior wall structure:* Wood (or equivalent cold-formed sheet metal stud) framing or masonry brick or block.
 - *Methods:* Traditional wood frame construction techniques.

This is one in a series of informational fact sheets highlighting OSHA programs, policies or standards. It does not impose any new compliance requirements. For a comprehensive list of compliance requirements of OSHA standards or regulations, refer to Title 29 of the Code of Federal Regulations. This information will be made available to sensory impaired individuals upon request. The voice phone is (202) 693-1999; teletypewriter (TTY) number: (877) 889-5627.

For more complete information:



U.S. Department of Labor

www.osha.gov

(800) 321-OSHA

12/2010



Occupational Safety & Health Administration www.osha.com

Compliance Assistance Quick Start

Link to Compliance Assistance Quick start page:

http://www.osha.gov/dcsp/compliance_assistance/quickstarts/index.html

Are you ready to learn more about how to prevent workplace injuries and illnesses and comply with the Occupational Safety and Health Act, but aren't sure where to start? By following this step-by-step guide, you can identify many of the major OSHA requirements and guidance materials that may apply to your workplace. Small and new businesses may find Quick Start helpful as an introduction to the compliance assistance resources on OSHA's website.

This Quick Start feature is not comprehensive – there may be additional OSHA standards and guidance materials that also apply to your business. If you are in a state with an [OSHA-approved state program](#), you are subject to state occupational safety and health regulations that may have more stringent or supplemental requirements. These state programs also provide compliance assistance services. Please contact your state program for additional information. In addition, you can request a free, confidential on-site consultation from the [OSHA On-site Consultation Program](#).

Please read this [DISCLAIMER](#) before proceeding.



[General Industry](#). This module applies to workplaces that are subject to OSHA's general industry standards, including manufacturing, wholesale, and retail establishments. OSHA's general industry standards also may apply to any industry to the extent that they supplement specific standards for an industry.



[Construction Industry](#). This module applies to employers and workers engaged in construction work, which OSHA defines as construction, alteration, and/or repair, including painting and decorating ([29 CFR 1910.12\(b\)](#)).



[Health Care](#). This module applies to employers and workers in the health care field.



[Hispanic Outreach](#). This module helps employers with a Spanish-speaking workforce identify the Spanish-language outreach resources on OSHA's Web site. While this module includes links to Spanish-language resources, it is intended primarily for English-speaking and bilingual users.



Compliance Assistance Quick Start: Construction Industry

Link to Compliance Assistance Quick Start: Construction Industry page:

http://www.osha.gov/dcsp/compliance_assistance/quickstarts/construction/index_construction.html

Follow the steps below to identify the major OSHA construction requirements and guidance materials that may apply to your jobsite. These steps will lead you to resources on OSHA's website that will help you comply with OSHA requirements and prevent workplace injuries and illnesses.

- **Step 1:** [OSHA Requirements Related to Leading Hazards at Construction Sites](#)
- **Step 2:** [Other OSHA Requirements That May Apply to Your Jobsite](#)
- **Step 3:** [Survey Your Workplace for Additional Hazards](#)
- **Step 4:** [Develop a Jobsite Safety and Health Program](#)
- **Step 5:** [Train Your Employees](#)
- **Step 6:** [Recordkeeping, Reporting and Posting](#)
- **Step 7:** [Find Additional Compliance Assistance Information](#)

For more information, see the [Construction Quick Start Library](#). This includes a collection of forms, resources, publications, and sample programs that are incorporated into the Quick Start steps, plus additional compliance assistance resources. You can use this collection as a reference after completing the steps.

NOTE: If you have Spanish-speaking employees, visit [OSHA's Spanish-Language Compliance Assistance Resources page](#) and [OSHA en Español](#). If you employ teen or young workers, visit [OSHA's Young Workers page](#).

Go to Step 1 »



UNITED STATES DEPARTMENT OF LABOR

Link to Region 5 page:

<http://www.osha.gov/oshdir/r05.html>

Region 5

Regional Office

230 South Dearborn Street, Room 3244
Chicago, Illinois 60604
(312) 353-2220
(312) 353-7774 FAX

Area Offices

[Illinois](#) | [Indiana](#) | [Michigan](#) | [Minnesota](#) | [Ohio](#) | [Wisconsin](#)

In case of emergency call 1-800-321-OSHA



UNITED STATES DEPARTMENT OF LABOR

Link to Wisconsin Area offices page:
<http://www.osha.gov/oshdir/wi.html>

WISCONSIN ([MAP](#))

You have selected a state that has 2 types of offices:

- Area Offices
- [Consultation Project Offices](#)

Appleton Area Office

1648 Tri Park Way
Appleton, Wisconsin 54914
(920) 734-4521
(920) 734-2661 FAX

Eau Claire Area Office

1310 W. Clairemont Avenue
Eau Claire, Wisconsin 54701
(715) 832-9019
(715) 832-1147 FAX

Madison Area Office

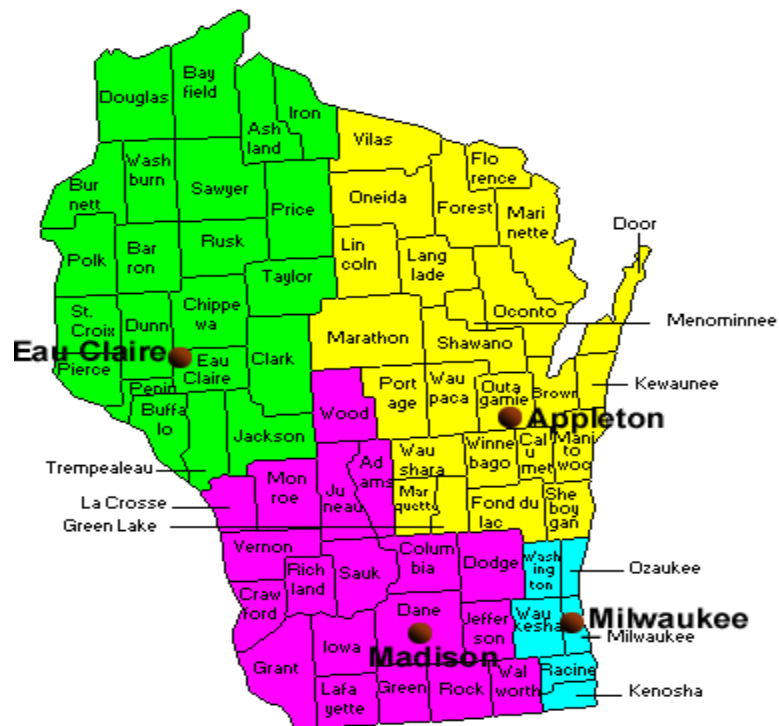
4802 E. Broadway
Madison, Wisconsin 53716
(608) 441-5388
(608) 441-5400 FAX

Milwaukee Area Office

310 West Wisconsin Avenue, Room 1180
Milwaukee, Wisconsin 53203
(414) 297-3315
(414) 297-4299 FAX

Link to Wisconsin Map page:
<http://www.osha.gov/oshdir/wi-state-map.html>

Wisconsin



The SHARP Program

The Safety and Health Achievement Recognition Program (SHARP) is an honors program for companies who have excellent health and safety program management systems in place. To achieve SHARP status, a company must:

- Have a history of maintaining an injury and illness rate below the national average for your industry
- Participate in a comprehensive consultation visit identifying all safety and health hazards
- Participate in a full evaluation of the health and safety management program in place for the company
- Involve employees in the consultation process
- Correct all serious, other-than-serious, and regulatory hazards found
- Have all basic elements for managing health and safety in place

After a thorough review, and recommendation from the consultation program manager, the company will be recommended to OSHA for recognition in the SHARP program. The company receives recognition during an awards ceremony where they receive their SHARP certificate. Companies in the SHARP program are exempt from programmed OSHA inspections during the period that the SHARP certification is valid.

Resources

For more information on workplace health and safety, please visit one of these websites:

www.osha.gov

www.cdc.gov/niosh

www.slh.wisc.edu/wiscon

WisCon Requests

WisCon offers on-site consultation services to Wisconsin employers through the Wisconsin State Laboratory of Hygiene, part of the University of Wisconsin - Madison.

Safety-Focused Requests

141 NW Barstow Street, Fourth Floor
Waukesha, WI 53188-3789
1-800-947-0553

Industrial Hygiene-Focused Requests

2601 Agriculture Drive
Madison, WI 53718
608-226-5240

Federal Enforcement (U.S. Department of Labor)

Appleton, Wis., Area Office

1648 Tri-Park Way
Appleton, WI 54914
920-734-4521 (Phone) / 920-734-2661 (Fax)

Milwaukee, Wis., Area Office

Henry S. Reuss Federal Plaza
310 West Wisconsin Avenue, Suite 1180
Milwaukee, WI 53203
414-297-3315 (Phone) / 414-297-4229 (Fax)

Madison, Wis., Area Office

4802 East Broadway
Madison, WI 53716
608-441-5388 (Phone) / 608-441-5400 (Fax)

Eau Claire, Wis., Area Office

1310 A. Clairemont Ave.
Eau Claire, WI 54701
715-832-9019 (Phone) / 715-832-1147 (Fax)

WisCon

Onsite Safety & Health Consultation in Wisconsin



WSLH Wisconsin State
Laboratory of Hygiene

Part of the University of Wisconsin - Madison

WisCon Program

The Wisconsin State Laboratory of Hygiene, part of the University of Wisconsin – Madison, and in conjunction with the U.S. Department of Labor, currently offers on-site consultation services to assist Wisconsin employers in meeting the obligations and responsibilities covered under the federal Occupational Safety and Health Act.

- **There is No Charge** for consultation services to private sector employers. The program is funded by the U.S. Department of Labor's Occupational Safety and Health Administration (OSHA) and the Wisconsin State Laboratory of Hygiene.
- **The program is voluntary:** We respond to requests from the management of small businesses to assist them in providing their workers with a safe and healthy place of employment.
- **No penalties or enforcement action:** Your only obligation as a requesting employer is a commitment to correct all serious hazards that are identified within a reasonable time schedule. Of course, imminent dangers must be corrected immediately.
- **Skilled and Knowledgeable Staff:** The program employs a wide range of safety and health professionals with considerable experience working with Wisconsin's employers. Safety specialists, industrial hygienists, ergonomists, engineers and occupational health nurses work in unison to cover all aspects of workplace health and safety.



An on-site consultation visit can provide assistance to:

- **Identify Workplace Hazards**
- **Conduct Industrial Hygiene Monitoring**
- **Conduct limited Ergonomic Assessments**
- **Recommend and assist in developing Controls**
- **Evaluate and assist in developing and implementing necessary programs**
- **Evaluate and assist in developing and implementing a Comprehensive Safety and Health Management Program**
- **Conduct limited Training and Education**

The Consultation Process

STEP 1 - CALL: As an owner or manager of a small business, call 1-800-947-0553 (or 608-226-5240 for an industrial hygiene-focused request), e-mail, or send a letter to the consultation program.

STEP 2 - SCHEDULE: A consultant will call you to schedule a consultation visit at your convenience. First priority is given to workplaces where employees are currently experiencing illnesses. Priority is also given to small employers in high hazard industries.

STEP 3 - ON-SITE VISIT: The consultant will arrive at your workplace for the on-site visit consisting of:

1. An opening conference where you can explain your workplace and health and safety concerns to the consultant. The consultant will explain the program and answer any questions that you may have.
2. A records review, where the consultant will review your OSHA-300 injury and illness logs, as well as any other health and safety programs that you have.

3. A walk-through inspection to view the worksite and identify potential hazards.
4. Industrial hygiene monitoring may be conducted on that day, or may be conducted later.
5. Conduct either a complete or a partial assessment of the safety and health management program.
6. A closing conference to discuss observations and recommendations.

STEP 4 - MONITORING RESULTS: If industrial hygiene monitoring was conducted, the consultant will provide you with the monitoring results by fax, e-mail or letter.

STEP 5 - REPORT: The consultant will evaluate all of the information and provide you with a written report detailing the findings and recommendations, including the action plan that you discussed during the closing conference. Our report to the employer and other acquired information is confidential.

STEP 6 - CORRECTION OF HAZARDS: You correct all of the serious hazards found within the agreed upon abatement schedule. If appropriate, extensions in time may be granted upon written request. Hazard abatement is required so that each consultation visit achieves its objective: effective employee protection.

ADDITIONAL VISITS: A follow-up visit may be scheduled to provide abatement assistance or to conduct additional monitoring to verify abatement if needed.

An internal referral may be made, and another consultant may schedule a visit to your site. For example, a safety consultant might find potential health hazards and request an industrial hygiene visit to assist you. Or, an industrial hygiene consultant may identify ventilation needs and request one of our engineers to assist you.



**WISCONSIN STATE
LABORATORY OF HYGIENE**

Using the Consultation Program

How To Get Started

Because consultation is a voluntary activity, you must request it. Your telephone call or letter sets the consulting machinery in motion. The consultant will discuss your specific needs with you and set up a visit date based on your work schedule and the time needed for the consultant to adequately prepare to serve you. We encourage a complete review of your firm's safety and health program; however, if you wish you may limit the visit to one or more specific issues, or even training needs.

Opening Conference

When the consultant arrives at your worksite for the scheduled visit, he or she will first meet with you to briefly clarify and review their role and the obligation you incur as an employer. In most cases, this will also be the time the consultant reviews any accident records, written programs and may also ask questions on how the employer manages safety.

Walk Through

Together, you and the consultant will examine conditions in your workplace. Recent changes in consultation procedures at the federal level now require employee participation in the consultation process. We strongly encourage employers allow employee participation in the walk-through. Better informed employees can more easily work with you to identify and correct potential injury and illness hazards in your workplace. Talking with employees during the walk-through helps the consultant identify and judge the nature and extent of specific hazards.

The consultant will study your entire workplace or the specific operations you designate and discuss the applicable OSHA standards. Consultants also will point out other safety or health risks that might not be cited under OSHA standards, but nevertheless may pose safety or health risks to your employees. They may suggest and even provide other services such as self-inspection or safety and health training that you and your employees can use to further your knowledge and prevent future situations which may expose employees to hazards.

A comprehensive consultation will include (1) a review of written programs, (2) an appraisal of all mechanical and environmental hazards and physical work practices, (3) an appraisal of the present job safety and health management program or assistance in the establishment of one, (4) a conference with you or your managers on their findings, (5) a written report of the consultants findings and recommendations, and (6) training and assistance with implementing recommendations (optional).

Closing Conference

On the day of their visit, the consultant will review their findings with you in a closing conference. You will learn not only what you need to improve, but also what you are doing right. At that time you can discuss problems, possible solutions and any abatement period to eliminate serious hazards identified during the walk-through.

In rare instances, the consultant may find an "imminent danger" situation during the walk-through. If so, you must take immediate action to protect employees exposed to such a hazard. In situations that would be judged a "serious violation" under OSHA criteria, you are required to eliminate or control that hazard within an agreed upon time period. The consultants will offer general approaches and options to you. They may also suggest additional sources for technical help.

Hazard Abatement and Follow Through

Following the closing conference, and usually within two weeks, the consultant will send you a detailed written report reviewing their findings and any hazard abatement periods. If any "serious" hazards were identified, a posting of the hazards is required. The posting would be included with the consultant's report.

Consultants may contact you from time to time to check your progress. You, of course, may always contact them for further assistance.

As stated, abatement is required for serious hazards so that each consultation visit achieves its objective -- effective employee protection which leads to safer and ultimately more efficient operations. If you fail to eliminate or control identified serious hazards (or an imminent danger hazard) within the limits agreed upon or an agreed-upon extension, the situation may be referred from Consultation to an OSHA enforcement office for appropriate action. This is required through the Cooperative Agreement the Department of Commerce maintains with the U. S. Department of Labor. Such situations very rarely occur.

Benefits

Knowledge of your workplace hazards and ways to eliminate them can only improve your own operations and the management of your firm. You will get professional advice and assistance on the correction of workplace hazards and benefit from on-site training and assistance provided by the consultant to you and your employees. The consultant can help you establish or strengthen an employee safety and health management program, making safety and health activities routine considerations. An effective management program can lead to greater efficiency, improved worker attitudes and to the overall profitability of your company.

SHARP- Program

The Consultation Program also has a recognition program for employers who are willing to make a commitment to a safe workplace. The name of the program is SHARP (Safety and Health Achievement Recognition Program). This program provides incentives and support to smaller, high-hazard employers to develop, implement and continuously improve effective safety and health programs at their worksite(s). The program recognizes employers who have demonstrated exemplary achievements in workplace safety and health by receiving a comprehensive safety and health consultation visit, correcting all workplace safety and health hazards, adopting and implementing effective safety and health management systems, and agreeing to request further consultative visits if major changes in working conditions or processes occur that may introduce new hazards. Employers meeting these specific program requirements may be exempt from general scheduled OSHA inspections for a year or more.

The Consultants Will:

- Assist you to develop or maintain an effective safety and health management program
- < Help you recognize and control hazards in your workplace
- < Suggest general approaches or options for solving a safety or health problem
- < Identify kinds of help available if you need further assistance
- < Provide you a written report summarizing findings
- < Provide certain types of training and education for you and your employees

The Consultants Will Not:

- < Issue citations or propose penalties for violations of OSHA standards.
- < Report possible violations to OSHA enforcement staff.
- < Guarantee that your workplace will "pass" an OSHA inspection.

Wisconsin Safety and Health Consultation Program - WisCon

Health Issues

State Laboratory of Hygiene
University of Wisconsin – Madison
2601 Agriculture Drive
Madison, WI 53718
(608) 226-5240
(608) 266-1550 FAX

Safety Issues

141 NW Barstow Street
Waukesha, Wisconsin 53188-3789
(262) 512-5198
(262) 521-5369 FAX
Toll Free: 1-800-947-0553

RESIDENTIAL CONSTRUCTION Q & A's

These Q & A's are designed to provide information about standards relating to fall protection in residential construction. The Occupational Safety and Health Act requires employers to comply with safety and health standards promulgated by OSHA or by a state with an OSHA-approved state plan. However, this document is not itself a standard or regulation, and it creates no new legal obligations.

Which OSHA standards address fall hazards in construction work?

29 CFR Part 1926, Subpart M, which became effective on February 6, 1995, contains general fall protection requirements for construction work. Additional fall protection requirements can be found throughout Part 1926.

What are the Subpart M requirements for residential construction?

Under 29 CFR 1926.501(b)(13), workers engaged in residential construction six (6) feet or more above lower levels must be protected by conventional fall protection (i.e., guardrail systems, safety net systems, or personal fall arrest systems) or alternative fall protection measures allowed under 1926.501(b) for particular types of work. A personal fall arrest system may consist of a full body harness, a deceleration device, a lanyard, and an anchor point. (See the definition of "personal fall arrest system" in 29 CFR 1926.500). If an employer can demonstrate that fall protection required under 1926.501(b)(13) is infeasible or presents a greater hazard it must implement a written, site-specific fall protection plan meeting the requirements of 29 CFR 1926.502(k). The fall protection plan must specify alternative measures that will be used to eliminate or reduce the possibility of employee falls.

There is a "Sample Fall Protection Plan" in Appendix E of Subpart M. Why did OSHA prepare this appendix?

OSHA included Appendix E in Subpart M to show employers and employees what a compliant fall protection plan might look like.

Why did OSHA issue Instruction STD 3.1 "Interim Fall Protection Compliance Guidelines for Residential Construction" in 1995?

Once the final rule for Subpart M was published, representatives from the residential construction industry, including the National Association of Home Builders (NAHB) and the National Roofing Contractors Association (NRCA), expressed ongoing concerns about complying with 1926.501(b)(13). For example, industry representatives were concerned about the feasibility of establishing proper anchor points on wood-framed

structures. In response to their concerns and to give OSHA time to revisit some feasibility issues, the Agency issued Directive STD 3.1. The directive allowed employers doing specified residential construction activities to comply with the requirements of Subpart M by implementing the alternative fall protection and work procedures prescribed in the directive. The alternative procedures could be used without a prior showing of infeasibility or greater hazard and without a written fall protection plan. The Agency did not intend STD 3.1 to be a permanent policy.

Why did OSHA reissue STD 3.1 as STD 3-0.1A in 1998?

OSHA issued STD 3-0.1A (later redesignated as STD 03-00-001) as a plain language replacement for STD 3.1. In STD 03-00-001, the Agency made some changes to the original interim guidance to clarify the scope of the directive and the Agency's enforcement policy with respect to fall protection requirements for the specific construction activities covered by the directive. In STD 03-00-001, OSHA indicated that it intended to reevaluate the interim policy after soliciting additional public comment.

Why did OSHA issue an Advanced Notice of Proposed Rulemaking (ANPR) for Subpart M in 1999?

OSHA issued an ANPR for Subpart M in 1999 in part to obtain information from the public that it could use to evaluate the effectiveness of and need for STD 03-00-001. In the ANPR, the Agency noted that there had been progress in the types and capability of commercially available fall protection equipment since 1926.501(b)(13) was promulgated in 1994. OSHA also stated in the ANPR that it intended to rescind STD 03-00-001 unless persuasive evidence was submitted showing that it is infeasible or presents significant safety hazards for most residential construction employers to comply with 1926.501(b)(13).

Did OSHA rely on sources of information in addition to the comments received in response to the ANPR in evaluating whether to continue the interim enforcement policy contained in STD 03-00-001?

Yes. A Residential Fall Protection Work Group within OSHA's Advisory Committee on Construction Safety and Health (ACCSH) has reported to ACCSH on a number of presentations they have seen from home builders and fall protection equipment manufacturers describing new ways of providing safe and effective fall protection in residential construction. ACCSH has recommended rescission of STD 03-00-001 on two separate occasions – first in 2000 and again in 2008. Also in 2008, both the Occupational Safety and Health State Plan Association (OSHSPA) and the NAHB submitted letters to OSHA advocating for withdrawal of STD 03-00-001. The NRCA has continued to oppose rescission of STD 03-00-001 with respect to roofing work, but a representative of that organization conceded at an ACCSH meeting in December 2009 that nowadays it is “very tough” to establish that conventional fall protection is infeasible or creates a greater hazard.

Now that OSHA has rescinded STD 03-00-001, what do residential construction employers have to do to protect employees from fall hazards?

- Employees working six (6) feet or more above lower levels must be protected by conventional fall protection methods listed in 1926.501(b)(13) (i.e., guardrail systems, safety net systems, or personal fall arrest systems) or alternative fall protection measures allowed by other provisions of 29 CFR 1926.501(b) for particular types of work.
- An example of an alternative fall protection measure allowed under 1926.501(b) is the use of warning lines and safety monitoring systems during the performance of roofing work on low-sloped roofs. (4 in 12 pitch or less). (See 1926.501(b)(10)).
- OSHA allows the use of an effective fall restraint system in lieu of a personal fall arrest system. To be effective, a fall restraint system must be rigged to prevent a worker from reaching a fall hazard and falling over the edge. A fall restraint system may consist of a full body harness or body belt that is connected to an anchor point at the center of a roof by a lanyard of a length that will not allow a worker to physically reach the edge of the roof.
- When the employer can demonstrate that it is infeasible or creates a greater hazard to use required fall protection systems, a qualified person must develop a written site-specific fall protection plan in accordance with 1926.502(k) that, among other things, specifies the alternative fall protection methods that will be used to protect workers from falls.

When will residential construction employers that were covered by STD 03-00-001 have to start complying with 1926.501(b)(13)?

The effective date of STD 03-11-002 is June 16, 2011.

Why was compliance directive STD 03-00-001 rescinded?

Falls continue to be the leading cause of death among construction workers. Statistics show that fatalities from falls are consistently high for residential construction activities. OSHA considered the comments received in response to the 1999 ANPR and was not persuaded that compliance with 1926.501(b)(13) is infeasible or presents significant safety hazards for most residential construction employers. The recommendations from ACCSH, OSHSPA, and the NAHB, as well as the mounting evidence that has been presented to the ACCSH Residential Fall Protection Work Group showing that conventional fall protection is available and can be used safely for almost all residential construction operations, provide a separate and independent grounds for OSHA's decision to withdraw STD 03-00-001.

What are the training requirements for the use of fall protection systems?

In accordance with 29 CFR 1926.503, the employer must ensure that each employee who might be exposed to fall hazards has been trained by a competent person to recognize the hazards of falling and in the procedures to be followed in order to minimize those hazards. In addition, the employer must verify the training of each employee by preparing a written certification record that contains the name/identity of the employee trained, the date(s) of training, and the signature of the employer or the person who conducted the training.

Is OSHA prohibiting the use of slideguards as employee protection during the performance of roofing activities in residential construction?

Slideguards cannot simply be used in lieu of conventional fall protection methods under 1926.501(b)(13). However, slideguards may be used as part of a written, site-specific fall protection plan that meets the requirements of 1926.502(k) if the employer can demonstrate that the use of conventional fall protection (i.e., guardrail, safety net, or personal fall arrest systems) would be infeasible or create greater hazards.

Can monitors still be used?

Under 1926.501(b)(10), safety monitoring systems can be used in conjunction with a warning line system to protect employees during the performance of roofing work on roofs of 4 in 12 pitch or less. When such a roof is 50 feet (15.25 m) or less in width, a safety monitoring system can be used alone, i.e., without a warning line system. Under 1926.501(b)(13), if the employer can demonstrate that the use of conventional fall protection would be infeasible or create a greater hazard, monitors may be used as part of an employer's written fall protection plan under 1926.502(k).

Are there requirements for safety monitoring systems?

Yes. Safety monitoring systems must meet the requirements of 29 CFR 1926.502(h) including, but not limited to, requirements that the monitor:

- be competent to recognize fall hazards;
- be on the same walking working surface and within visual sighting distance of the employee being monitored;
- be close enough to communicate orally with the employee; and
- not have other responsibilities which could take the monitor's attention from the monitoring function.

Can a standardized fall protection plan be developed and implemented for the construction of dwellings that are of the same basic structural design?

Before using a fall protection plan at a particular worksite, the employer must first be able to demonstrate that it is infeasible or presents a greater hazard to use conventional fall protection methods at that site. Fall protection plans must be site-specific to comply with §1926.502(k). A written fall protection plan developed for repetitive use, e.g., for a particular style or model of home, will be considered site-specific with respect to a

particular site only if it fully addresses all issues related to fall protection at that site. Therefore, a standardized plan will have to be reviewed, and revised as necessary, on a site by site basis.

What are some of the benefits of rescinding STD 03-00-001?

- Falls continue to be the leading cause of fatalities in residential construction. OSHA has concluded that fall hazards pose a significant risk of death or serious injury for construction workers and that compliance with the requirements of Subpart M is reasonably necessary to protect workers from those hazards.
- STD 03-00-001 addressed only certain, specified types of residential construction work. Withdrawing that directive will result in consistent enforcement policy with respect to all residential construction activities.
- Several state plan OSHA programs did not adopt, or have already rescinded, the enforcement policy described in STD 03-00-001. Therefore, rescinding the compliance directive will promote consistency among all states regarding the enforcement of fall protection requirements for residential construction.
- OSHA expects that further advances in the design technologies of fall protection equipment will be triggered by the demands of employers who may encounter compliance difficulties on particular work sites.

What is “residential construction”?

The Agency’s interpretation of “residential construction” for purposes of 1926.501(b)(13) combines two elements – both of which must be satisfied for a project to fall under that provision:

- The end-use of the structure being built must be as a home, i.e., a dwelling; and
- The structure being built must be constructed using traditional wood frame construction materials and methods.

The limited use of structural steel in a predominantly wood-framed home, such as a steel I-beam to help support wood framing, does not disqualify a structure from being considered residential construction.

Traditional wood frame construction materials and methods will be characterized by:

- Framing materials: Wood (or equivalent cold-formed sheet metal stud) framing, not steel or concrete; wooden floor joists and roof structures.
- Exterior wall structure: Wood (or equivalent cold-formed sheet metal stud) framing or masonry brick or block.
- Methods: Traditional wood frame construction techniques.

Why are only “dwellings” considered “residential construction”?

Limiting the scope of 1926.501(b)(13) to the construction of homes/dwellings comports with the plain meaning of the term “residential” in the text of that paragraph and is consistent with OSHA’s intent in promulgating that provision.

OSHA GUIDANCE DOCUMENT



FALL PROTECTION IN RESIDENTIAL CONSTRUCTION

**OSHA GUIDANCE DOCUMENT
FALL PROTECTION IN RESIDENTIAL CONSTRUCTION**

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Executive Summary

This OSHA guidance document is designed to help employers prevent fall-related injuries and fatalities among workers engaged in residential construction activities, such as roofing. Falls are the leading cause of work-related deaths among residential construction workers.

On December 16, 2010, OSHA issued STD 03-11-002, *Compliance Guidance for Residential Construction*, which rescinds STD 03-00-001, *Interim Fall Protection Compliance Guidelines for Residential Construction*, and provides that OSHA will be enforcing 29 CFR 1926.501(b)(13) for all residential construction work.

This guidance document is intended to assist employers with their compliance efforts. It provides information on various work methods that may be used at different stages of the residential construction process.

David Michaels, PhD, MPH
Assistant Secretary of Labor for
Occupational Safety and Health

This document is intended to assist employers in their efforts to comply with fall protection requirements for residential construction work. The Occupational Safety and Health Act requires employers to comply with safety and health standards promulgated by OSHA or by a state with an OSHA-approved state plan. However, this document is not itself a standard or regulation and it creates no new legal obligations.

Introduction

Falls are the leading cause of death for workers engaged in residential construction. This “Fall Protection in Residential Construction” guidance document describes various methods that residential construction employers may be able to use to prevent fall-related injuries and fatalities at various points in the residential construction process.

The focus of this document is mostly on new construction. The examples provided in this guidance document do not represent all possible work methods that can be used in residential construction. Moreover, employers should be aware that the examples described in this document may not be suitable in all situations. Employers are responsible for ensuring compliance with applicable OSHA requirements.

Under 29 CFR 1926.501(b)(13), workers engaged in residential construction six (6) feet or more above lower levels must be protected by conventional fall protection (in other words, guardrail systems, safety net systems, or personal fall arrest systems) or other fall

protection measures allowed elsewhere in 1926.501(b). (Although the standard does not mention personal fall restraint systems, OSHA will accept a properly utilized fall restraint system in lieu of a personal fall arrest system when the restraint system is rigged in such a way that the worker cannot get to the fall hazard.) If an employer can demonstrate that the fall protection required under 1926.501(b)(13) is infeasible or presents a greater hazard, it must instead implement a written fall protection plan meeting the requirements of 1926.502(k).

Fall protection used to comply with 1926.501(b)(13), including guardrail systems, safety net systems, and personal fall arrest systems, must meet and be used in accordance with applicable requirements in 1926.502. Requirements for work performed on scaffolds, ladders, and aerial lifts are in Part 1926 – Subpart L, Subpart X, and 1926.453, respectively.

State plans may also have additional requirements. For further information on state plan standards, please visit: <http://www.osha.gov/dcsp/osp/statestandards.html>.

Installing Roof Trusses

Numerous methods can be used to prevent fall-related injuries and fatalities among workers installing roof trusses.

Bracket Scaffold

A bracket scaffold can be placed on the interior or exterior of a structure. The scaffold can provide a stable working platform. When bracket scaffolds are used on the interior of the structure, the exterior wall can limit employee exposures to fall hazards.



Figure 1 - A worker installing roof trusses from an interior bracket scaffold.

Exterior bracket scaffolds can also be used for installing roof trusses and other rooftop construction activities. The guardrail system on the scaffold can provide fall protection. With the addition of toeboards, falling object protection can be provided to the areas below.



Figure 2 - Workers using an exterior bracket scaffold to install roof trusses.

Ladders

Platform ladders and step ladders can provide a stable, elevated platform from which to work.



Figure 3 - Platform ladders can be set up inside a structure and used to install roof trusses.

Anchors

A spreader braces the trusses and distributes arrest forces across several trusses. Spreaders can act as anchors for personal fall arrest systems and fall restraint. They can be reused according to the manufacturer's instructions. It is important to refer to the truss manufacturer's instructions and have a qualified person determine if trusses will meet strength requirements for a personal fall arrest system or fall restraint system.



Figure 4 – An example of a spreader attached to roof trusses.

Installing Ridge Poles and Rafters

Although the use of roof trusses is nearly universal, some builders still frame roof systems with ridge poles and rafters. While performing this task, workers need to be protected from falls.

Anchors

Employees installing ridge poles and rafters can use strap anchors and bolt-on anchors. These anchors can be used with personal fall arrest systems and fall restraint to provide fall protection for workers engaged in this activity. Both anchors can be removed and reused according to the manufacturer's instructions.



Figure 5 - Strap anchors providing anchorage for three personal fall arrest systems.



Figure 6 - A bolt-on anchor attached to a rafter.

Installing Roof Sheathing

Once a roof has been framed, roof sheathing operations can begin. There are serious fall hazards associated with this activity, but there are a number of ways to protect workers.

Safety Net System

Safety net systems can be used as fall protection for workers installing roof sheathing.



Figure 7 - An example of a safety net system.

Bracket Scaffold

A bracket scaffold can be attached to the top plate of a structure. The scaffold can provide a secure work platform from which to install roof sheathing.



Figure 8 – A worker sheathing a roof from a bracket scaffold.

Anchors

Anchors and retractable lifeline stands can be used by workers installing roof sheathing.



Figure 9 - Anchors that can be used while performing roof sheathing operations.

Roofing – Weatherproofing

As with other roofing activities, fall protection is critical for this type of work.

Bracket Scaffolds

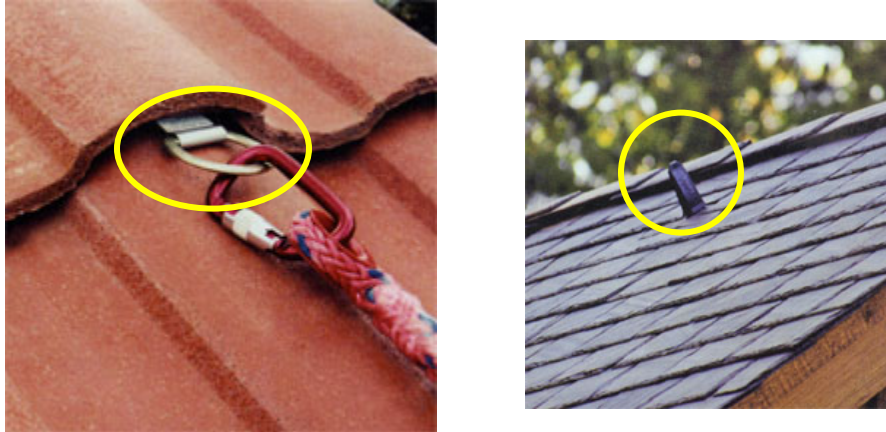
An exterior bracket scaffold can be used for workers weatherproofing a roof. Bracket scaffolds can be especially useful for installing materials along the edge of the roof. Some exterior bracket scaffolds can be used as catch platforms to prevent workers from falling six feet to the lower level.



Figure 10 - An exterior bracket scaffold with guardrails being used to protect workers while weatherproofing.

Anchors

Permanent anchors can be installed during roofing operations and left in place after construction is complete. They can provide an anchorage point during the life of the roof. Reusable anchors can also be used while weatherproofing a roof. It is important to inspect these anchors prior to use.



Figures 11 & 12 - Permanent anchors on completed roofs.



Figure 13 - A worker using a reusable anchor with a retractable lifeline.

Foundation Walls and Formwork

In most residential construction, concrete or masonry block is used to create the foundation and the foundation walls of a structure. The concrete is usually poured into an excavation to create the foundation and the foundation walls.

Anchors

Anchors can be added to cured concrete. Anchors with expandable bolts can be placed in holes that have been drilled into the concrete.



Figure 14 – A cutaway picture of an anchor with an expandable bolt for use in concrete.

Strap anchors can provide versatility and options for anchorage points while performing this type of work. Strap anchors can be looped over rebar and removed when no longer necessary.



Figure 15 - A worker placing a strap on anchor over rebar.

These strap anchors can also be poured over with concrete and left in during construction. Antichafe sleeves (the green part of the anchor) can be used to maintain the integrity of the strap. Once no longer needed, the strap can be cut out of the concrete and removed.

Anchor straps are typically reusable if they have not been poured into concrete or have not been shock loaded. Please refer to the manufacturer's instructions when using this equipment.

Scaffolds

Scaffolds can provide elevated work surfaces for workers performing foundation work.



Figure 16 - A bracket-form scaffold attached to formwork.

Installing Floor Joists and Floor Trusses

Floor joists and floor trusses are usually constructed directly over the foundation walls. Fall hazards may be present, for example, if the structure being built has a basement.

Anchors

A reusable floor truss anchor can act as a temporary truss brace and spacer as well as an anchor point for a self-retracting lifeline. The device can spread shock loads over multiple trusses. These kinds of anchors can be uninstalled, moved, reinstalled and reused as per the manufacturer's instructions.



Figure 17 - A retractable lifeline attached to a floor truss anchor.

Scaffolds

Scaffolds can be used for residential construction workers installing floor joists and floor trusses.

Mobile scaffolds can be used effectively for residential construction workers. These scaffolds can be placed on the cured concrete basement floor of a structure. From the elevated platforms of the mobile scaffold, workers can install carrier beams, floor joists, and floor trusses.



Figure 18 - Workers installing a steel beam from a mobile scaffold.

Wall bracket scaffolds can be used on a residential structure once a wall has been completed. These scaffolds can provide access around the perimeter of the structure and can be used by workers while they install carrier beams, floor joists, and floor trusses. This type of scaffold can also be used in other phases of residential construction.



Figure 19 – A scaffold rigged for installing floor joists and floor trusses.

Installing Subfloors

Subfloors are usually installed by fastening a wood deck to floor joists and floor trusses. Because of the openings between floor joists and floor trusses, fall hazards may exist while performing this task.

Anchors

A truss bracket anchorage system can distribute the arresting forces across multiple trusses in the event of a fall. When appropriately installed in accordance with the manufacturer's instructions, these anchors can be used with personal fall arrest systems and fall restraints. Because these anchors are reusable, they can be uninstalled and reinstalled in accordance with the manufacturer's instructions.



Figure 20 - Workers using a truss bracket anchor while installing a subfloor.

Guardrails

Guardrail systems can be used to protect workers from falls during the performance of flooring and subflooring activities. If installed with a toeboard, guardrail systems can also protect workers on lower levels from falling objects.



Figures 21 & 22 - Examples of guardrails installed around floor openings.

Installing Walls

Framed wall sections usually are constructed on the ground and typically include sheathing and openings for windows and doors. Guardrails across these openings can help prevent falls while work is being performed in the house after the walls have been erected. These walls can be erected by using a lifting device such as a crane, boom truck, or forklift. Jacks can also be used to raise these walls. These practices greatly reduce the likelihood that a worker will be exposed to a fall during this stage of construction.



Figure 23 - Framed walls being erected using a jack.

For workers exposed to falls while framing walls, there remain various ways of protecting against falls to lower levels.

Anchors

Some models of strap anchors are looped through soft eyes or larger D rings and can be uninstalled, moved, reinstalled and reused following the manufacturer's instructions.



Figure 24 - A reusable strap anchoring a retractable lifeline.

Strap anchors can also be preinstalled to provide an anchorage point once the walls have been erected and braced. They can be removed by cutting the strap off or pulling out the nails. Once cut or nailed, these must not be reused without being refurbished by the manufacturer.



Figures 25 & 26 - Reusable anchors

Guardrails

Guardrail systems can provide fall protection while workers are framing walls.



Figure 27 - Worker installing guardrails.

Sheathing Walls

Although it is common for sheathing to be included on panelized walls used in residential construction, sheathing still takes place on residential construction sites. Erecting the walls by lifting devices or jacks can lessen a worker's exposure to fall hazards.

Scaffolds

Welded End Frame (X brace) scaffolds (like tube/coupler, and systems scaffolds) stand on their own. With proper bracing, the frames can be stacked from cellar hole to chimney top. Like other scaffolds, these can make stable work platforms for many residential construction operations. These stand-alone scaffolds can be used for sheathing and various other vertical wall operations such as masonry wall construction, siding, and stucco application.



Figure 28 - Welded end frame scaffold.

Exterior bracket scaffolds can provide a work surface from which to attach sheathing to the frame.



Figure 29 – A worker sheathing walls from an exterior bracket scaffold.

A ladder jack scaffold consists of a platform resting on brackets attached to a ladder. Ladder jacks provide limited elevation and are primarily used in light applications because of their portability and cost-effectiveness.

Aerial Lifts

Aerial lifts may be used for wall sheathing work. In particular, boom type elevating and rotating aerial work platforms can offer positioning flexibility and provide stable elevated platforms.



Figure 30 - Worker performing residential construction activities from an aerial lift.

Exterior Finishing

The exterior finishing phase of residential construction includes a number of activities, such as installing windows, doors, siding, and gutters. Many of these tasks pose fall hazards.

Aerial Lifts

Aerial lifts can be ideal equipment for exterior finishing. By providing a stable, level work surface and positioning flexibility, an aerial lift can be used for numerous activities associated with finishing the exterior of a residential construction structure.



Figure 31 - Worker positioning an aerial lift.

Ladders

Ladders can provide access to areas of a structure where exterior finishing work will occur. They can provide a stable work surface for various exterior finishing tasks.

Scaffolds

Pump jack scaffolds consist of a platform supported by moveable brackets on vertical poles. Pump jacks are appealing for certain applications because they are easily adjusted to variable heights, and are relatively inexpensive. They can include a material shelf for carrying supplies and tools.



Figure 32 - A worker performing siding activities from a pump jack scaffold.

Interior Finishing

Although much of this work may take place while exterior finishing is happening, interior finishing is one of the last phases of residential construction. This does not mean that fall hazards are no longer present.

Guardrails

Guardrails can be an excellent option for providing fall protection for work on or near stairways and landings. The addition of a toeboard can also prevent objects from falling to lower levels.



Figure 33 - Wooden guardrail system for a stairway.



Figure 34 - A landing protected by a wooden guardrail system with a toeboard.



Figure 35 - Guardrails protecting window openings.

More Resources

STD 03-11-002, *Compliance Guidance for Residential Construction* -
http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=DIRECTIVES&p_id=4755

Fact Sheet on Fall Protection in Residential Construction -
http://www.osha.gov/doc/fall_protection_factsheet.html

Residential Construction Q & A's - <http://www.osha.gov/doc/residential-construction/residential-construction-qa.html>

OSHA FactSheet

Preventing Falls

Falls and falling objects can result from unstable working surfaces, ladders that are not safely positioned, and misuse of fall protection. Workers are also subject to falls or to the dangers of falling objects if sides and edges, floor holes, and wall openings are not protected. Any time a worker is at a height of six feet or more (construction industry) or four feet or more (general industry), the worker must be protected.

Fall Protection

Fall protection must be provided for each employee on a walking/working surface with an unprotected side or edge at the height required by the OSHA standard applicable to their work environment. Management is required to:

- Develop, implement and commit to a fall protection program
- Provide training on the fall protection program
- Evaluate the program on a regular basis to insure the program's effectiveness and determine whether it needs to be changed or updated

Employers are required to assess the workplace to determine if the walking/working surfaces on which employees are to work have the strength and structural integrity to safely support workers. Once employers have determined that the surface is safe for employees to work on, the employer must select one of the options listed for the work operation if a fall hazard is present.

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

Unprotected Sides, Wall Openings, and Floor Holes

Almost all sites have unprotected sides and edges, wall openings, or floor holes at some point during construction. If these sides and openings are not protected at your site, injuries from falls or falling objects may result, ranging from sprains and concussions to death.

- Use at least one of the following whenever

employees are exposed to a fall of 6 feet or more [see comment above] above a lower level:

- Guardrail Systems
- Safety Net Systems
- Fall Arrest Systems
- Cover or guard floor holes as soon as they are created.
- Guard or cover any openings or holes immediately.
- Construct all floor hole covers so they will effectively support two times the weight of employees, equipment, and materials that may be imposed on the cover at any one time.
- In general, it is better to use fall prevention systems, such as guardrails, than fall protection systems, such as safety nets or fall arrest devices.

Ladders

You risk falling if portable ladders are not safely positioned each time they are used. While you are on a ladder, it may move and slip from its supports. You can also lose your balance while getting on or off an unsteady ladder. Falls from ladders can cause injuries ranging from sprains to death.

- Position portable ladders so the side rails extend at least 3 feet above the landing
- Secure side rails at the top to a rigid support and use a grab device when 3 foot extension is not possible.
- Make sure that the weight on the ladder will not cause it to slip off its support.
- Before each use, inspect ladders for cracked, broken, or defective parts.
- Do not apply more weight on the ladder than it is designed to support.
- Use only ladders that comply with OSHA standards.

This is one in a series of informational fact sheets highlighting OSHA programs, policies or standards. It does not impose any new compliance requirements. For a comprehensive list of compliance requirements of OSHA standards or regulations, refer to Title 29 of the Code of Federal Regulations. This information will be made available to sensory impaired individuals upon request. The voice phone is (202) 693-1999; teletypewriter (TTY) number: (877) 889-5627.



Aerial Lifts

Protect Yourself

Aerial lifts include boom-supported aerial platforms, such as cherry pickers or bucket trucks. The major causes of fatalities are falls, electrocutions and collapses or tip overs.

Safe Work Practices

- Make sure that workers who operate aerial lifts are properly trained in the safe use of the equipment.
- Maintain and operate elevating work platforms according to the manufacturer's instructions.
- Never override hydraulic, mechanical, or electrical safety devices.
- Never move the equipment with workers in an elevated platform unless this is permitted by the manufacturer.
- Do not allow workers to position themselves between overhead hazards, such as joists and beams, and the rails of the basket. Movement of the lift could crush the worker(s).
- Maintain a minimum clearance of at least 10 feet, or 3 meters, away from the nearest overhead lines.
- Always treat power lines, wires and other conductors as energized, even if they are down or appear to be insulated.
- Use a body harness or restraining belt with a lanyard attached to the boom or basket to prevent the worker(s) from being ejected or pulled from the basket.
- Set the brakes and use wheel chocks when on an incline.
- Use outriggers, if provided.
- Do not exceed the load limits of the equipment. Allow for the combined weight of the worker, tools and materials.

For more complete information:

Jirafas Protéjase

Las jirafas incluyen a las plataformas elevadas de aguilón sostenido, como lo son las de puntal extensible con canasta (mejor conocidas como “cherry pickers”) o los camiones canasta. Las principales causas de muertes son por caídas, electrocuciones y colapsos o volteos.

Prácticas de Trabajo Seguras

- Asegúrese que los trabajadores que operan jirafas están adecuadamente adiestrados en el uso seguro del equipo.
- Mantenga y opere las plataformas de trabajo elevadas de acuerdo con las instrucciones del fabricante.
- Nunca invalide los dispositivos de seguridad hidráulicos, mecánicos o eléctricos.
- Nunca mueva el equipo con trabajadores en una plataforma elevada, a menos que sea permitido por el fabricante.
- No permita a los trabajadores ponerse entre riesgos que estén por encima de la cabeza, como viguetas y vigas, y las barandas del canasto. El movimiento de la jirafa puede aplastar al trabajador.
- Mantenga una distancia mínima segura de las líneas eléctricas aéreas más cercanas de al menos 10 pies, ó 3 metros.
- Siempre trate a las líneas de energía eléctrica, alambres y otros conductores como si estuvieran energizados (vivos), aún si están fuera de servicio o parece que están aislados.
- Use un arnés de cuerpo o correa que restringe el movimiento con una cuerda de seguridad atada al aguilón o canasto para prevenir que el trabajador salga disparado o sea tirado del canasto.
- Ponga los frenos y use calzos cuando esté en un área inclinada.
- Use estabilizadores, si son provistos.
- No exceda la carga límite del equipo. Tome en cuenta el peso combinado del trabajador, herramientas y materiales.

Para información más completa:



Administración de
Seguridad y Salud
Ocupacional

Departamento del Trabajo de EE.UU.

www.osha.gov (800) 321-OSHA



Fall Protection in General Industry

Falls are among the most common causes of serious work-related injuries and deaths. Employers must take measures in their workplaces to prevent employees from falling off overhead platforms, elevated work stations or into holes in the floor and walls.

To prevent employees from being injured from falls, employers must:

- Guard every floor hole into which a worker can accidentally walk by use of a railing and toeboard or a floor hole cover.
- Provide a guardrail and toeboard around every open-sided platform, floor or runway that is 4 feet or higher off the ground or next level.
- Regardless of height, if a worker can fall into or onto dangerous machines or equipment (such as a vat of acid or a conveyor belt), employers must provide guardrails and toeboards to prevent workers from falling and getting injured.
- Other means of fall protection that may be required on certain jobs include safety harness and line, safety nets, stair railings and handrails.



Raised platform with protected guardrail.

OSHA requires employers to:

- Provide working conditions that are free of known dangers.
- Keep floors in work areas in a clean and sanitary condition.
- Select and provide required personal protective equipment at no cost to workers.
- Train workers about job hazards in a language that they can understand.

You have a right to a safe workplace.

If you have questions about workplace safety and health, call OSHA at 1-800-321-6742.

It's confidential.

We can help!

For more complete information:



U.S. Department of Labor
www.osha.gov (800) 321-OSHA (6742)

OSHA 3257-12-10R

OSHA® DATOS RÁPIDOS

Protección contra caídas en la industria general

Las caídas son las causas más comunes de lesiones graves y muertes relacionadas con el trabajo. Los empleadores deben tomar medidas en sus plantas de trabajo para impedir que los empleados se caigan de plataformas o puestos de trabajo elevados, o en agujeros en pisos y paredes.

Para impedir que los empleados se lesionen debido a caídas, los empleadores deben:

- Proteger todos los agujeros en el piso por donde un trabajador se pueda caer en forma accidental mediante el uso de barandillas y tablas protectoras o una cobertura del agujero en el piso.
- Proporcionar un guardarriel y tabla protectora alrededor de toda plataforma abierta a los lados, piso o camino que esté más de 1,20 metros por encima del suelo o del nivel siguiente.
- Independientemente de la altura, si un trabajador puede caer dentro o encima de máquinas o equipos peligrosos (como un tanque de ácido o una correa transportadora), los empleadores deben proporcionar guardarrieles y tablas protectoras para impedir que los trabajadores se caigan o se lesionen.
- Otros medios de protección contra caídas que se puede requerir en ciertos trabajos comprenden arneses y cables de seguridad, redes de protección, pasamanos de escaleras y barandillas.



Plataforma elevada con guardarriel de protección.

La OSHA requiere que los empleadores:

- Proporcionen condiciones de trabajo que no tengan peligros conocidos.
- Mantengan en condiciones limpias y sanitarias los pisos de los lugares de trabajo.
- Seleccionen y proporcionen el equipo de protección personal sin costo alguno para los trabajadores.
- Otorguen capacitación a los trabajadores sobre los peligros del trabajo en un idioma que ellos comprendan.

Usted tiene derecho a un lugar de trabajo seguro.

Si tiene preguntas sobre la seguridad y la salud en la planta de trabajo, llame a la OSHA al 1-800-321-6742.

Es confidencial.

¡Podemos ayudarle!

Para información más completa:



**Administración de
Seguridad y Salud
Ocupacional**

Departamento del Trabajo de EE.UU.
www.osha.gov (800) 321-OSHA (6742)

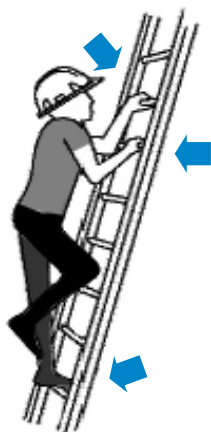
OSHA 3257-12-10R

Portable Ladder Safety Tips



Falls from portable ladders (step, straight, combination and extension) are one of the leading causes of occupational fatalities and injuries.

- Read and follow all labels/markings on the ladder.
- Avoid electrical hazards! – Look for overhead power lines before handling a ladder. Avoid using a metal ladder near power lines or exposed energized electrical equipment.
- Always inspect the ladder prior to using it. If the ladder is damaged, it must be removed from service and tagged until repaired or discarded.

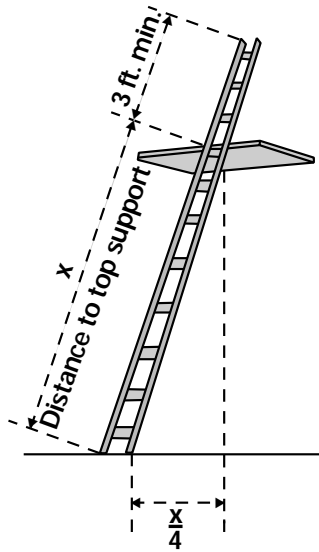


3-Point Contact

- Always maintain a 3-point (two hands and a foot, or two feet and a hand) contact on the ladder when climbing. Keep your body near the middle of the step and always face the ladder while climbing (see diagram).
- Only use ladders and appropriate accessories (ladder levelers, jacks or hooks) for their designed purposes.
- Ladders must be free of any slippery material on the rungs, steps or feet.
- Do not use a self-supporting ladder (e.g., step ladder) as a single ladder or in a partially closed position.
- Do not use the top step/rung of a ladder as a step/rung unless it was designed for that purpose.

(continued on reverse)

- Use a ladder only on a stable and level surface, unless it has been secured (top or bottom) to prevent displacement.
- Do not place a ladder on boxes, barrels or other unstable bases to obtain additional height.
- Do not move or shift a ladder while a person or equipment is on the ladder.
- An extension or straight ladder used to access an elevated surface must extend at least 3 feet above the point of support (see diagram). Do not stand on the three top rungs of a straight, single or extension ladder.
- The proper angle for setting up a ladder is to place its base a quarter of the working length of the ladder from the wall or other vertical surface (see diagram).
- A ladder placed in any location where it can be displaced by other work activities must be secured to prevent displacement or a barricade must be erected to keep traffic away from the ladder.
- Be sure that all locks on an extension ladder are properly engaged.
- Do not exceed the maximum load rating of a ladder. Be aware of the ladder's load rating and of the weight it is supporting, including the weight of any tools or equipment.



For more complete information:



Occupational
Safety and Health
Administration

U.S. Department of Labor

www.osha.gov (800) 321-OSHA

OSHA 3246-11N-05

Supported Scaffold Safety

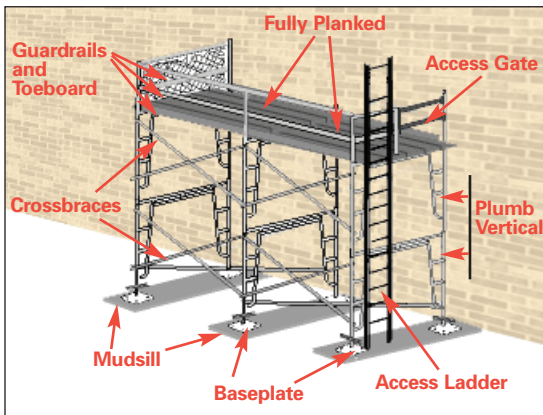
Supported scaffolds consist of one or more platforms supported by outrigger beams, brackets, poles, legs, uprights, posts, frames, or similar rigid support.

Guardrails or personal fall arrest systems for fall prevention/protection are required for workers on platforms 10 feet or higher.

Working platforms/decks must be planked close to the guardrails.

Planks are to be overlapped on a support at least 6 inches, but not more than 12 inches.

Legs, posts, frames, poles, and uprights must be on base plates and mud sills, or a firm foundation; and, be properly aligned and braced.



Scaffold user training must include:

- The hazards of type of scaffold being used;
- Maximum intended load and capacity;
- Recognizing and reporting defects;
- Fall hazards;
- Electrical hazards including overhead lines;
- Falling object hazards;
- Other hazards that may be encountered.

Andamio de Soporte Seguridad

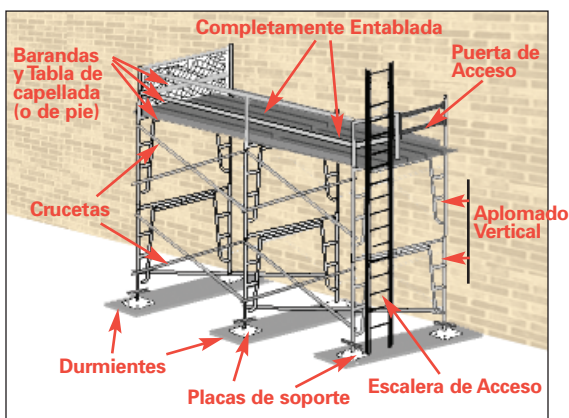
Los andamios de soporte consisten de una o más plataformas sostenidas por vigas voladizas (estabilizadoras), abrazaderas, postes, patas, montantes rectos, marcos o soportes rígidos similares.

Para la prevención/protección contra caídas, se requieren barandas o sistemas personales de prevención de caídas para los empleados sobre plataformas a 10 o más pies de alto.

Las plataformas y entarimados de trabajo tienen que estar entablados cercano a las barandas.

El entablado (Los tablones) ha (han) de estar solapado (s) sobre un soporte al menos 6 pulgadas, pero no más de 12 pulgadas.

Las patas, postes, marcos y montantes rectos tienen que estar sobre placas de soporte y durmientes, o sobre cimientos confiables, y estar apropiadamente alineada y reforzados.



La capacitación para los usuarios de andamios tiene que incluir:

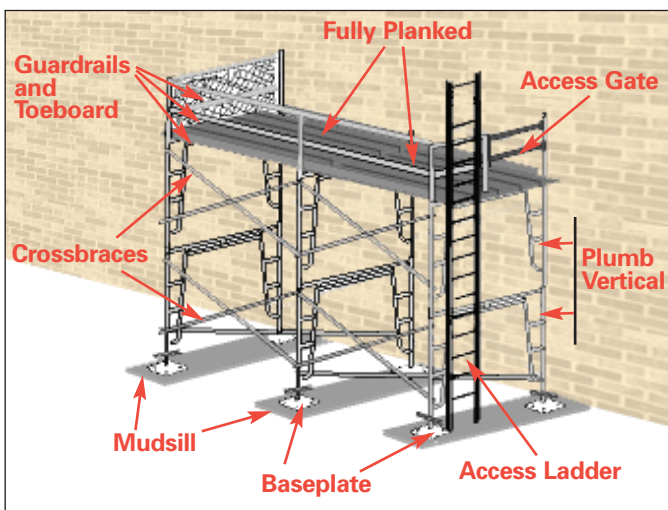
- Los riesgos específicos del tipo de andamio que se está usando,
- La carga máxima prevista y capacidad del andamio,
- El reconocimiento y reporte de defectos,
- Los riesgos de caídas,
- Los riesgos eléctricos, incluyendo las líneas aéreas,
- Riesgos causados por objetos que caen,
- Otros riesgos que se puedan encontrar.

Para información más completa:

Supported Scaffold Inspections

Inspect scaffolds and scaffold parts daily, before each work shift, and after any event that may have caused damage.

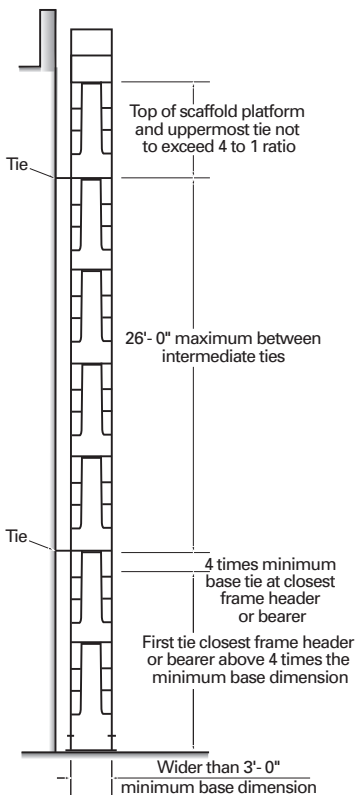
- Check to see if power lines near scaffolds are deenergized or that the scaffolds are at least 10 feet away from energized power lines.
- Make sure that tools and materials are at least 10 feet away from energized power lines.
- Verify that the scaffold is the correct type for the loads, materials, workers and weather conditions.
- Check footings to see if they are level, sound, rigid, and capable of supporting the loaded scaffold.



- Check legs, posts, frames and uprights to see if they are on baseplates and mudsills.
- Check metal components for bends, cracks, holes, rust, welding splatter, pits, broken welds, and non-compatible parts.
- Check for safe access. Do not use the crossbraces as a ladder for access or exit.

- Check wooden planks for cracks, splits greater than $\frac{1}{4}$ inch, end splits that are long, many large loose knots, warps greater than $\frac{1}{4}$ inch, boards and ends with gouges, mold, separated laminate(s), and grain sloping greater than 1 in 12 inches from the long edge and are scaffold grade lumber or equivalent.
- If the planks deflect $\frac{1}{60}$ of the span or 2 inches in a 10-foot wooden plank, the plank has been damaged and must not be used.
- Check to see if the planks are close together, with spaces no more than 1 inch around uprights.
- Check to see if 10-foot or shorter planks are 6 to 12 inches over the center line of the support, and that 10-foot or longer planks are no more than 18 inches over the end.
- Check to see if the platform is 14 inches or less from the wall or 18 inches or less away if plastering/stucco.
- Check for guardrails and midrails on platforms where work is being done.
- Check for workers under the platform and provide falling object protection or barricade the area. Make sure that hard hats are worn.
- Use braces, tie-ins and guying as described by the scaffold's manufacturer at each end, vertically and horizontally to prevent tipping.

Maximum Vertical Tie Spacing Wider Than 3'- 0" Bases



OSHA[®] FactSheet

OSHA Inspections

The Occupational Safety and Health Administration is committed to strong, fair and effective enforcement of safety and health requirements in the workplace. OSHA inspectors, called compliance safety and health officers, are experienced, well-trained industrial hygienists and safety professionals whose goal is to assure compliance with OSHA requirements and help employers and workers reduce on-the-job hazards and prevent injuries, illnesses and deaths in the workplace.

Normally, OSHA conducts inspections without advance notice. Employers have the right to require compliance officers to obtain an inspection warrant before entering the worksite.

Inspection Priorities

OSHA cannot inspect all 7 million workplaces it covers each year. The agency seeks to focus its inspection resources on the most hazardous workplaces in the following order of priority:

- 1. Imminent danger situations**—hazards that could cause death or serious physical harm—receive top priority. Compliance officers will ask employers to correct these hazards immediately—or remove endangered employees.
- 2. Fatalities and catastrophes**—incidents that involve a death or the hospitalization of three or more employees—come next. Employers must report such catastrophes to OSHA within 8 hours.
- 3. Complaints**—allegations of hazards or violations also receive a high priority. Employees may request anonymity when they file complaints.
- 4. Referrals** of hazard information from other federal, state or local agencies, individuals, organizations or the media receive consideration for inspection.
- 5. Follow-ups**—checks for abatement of violations cited during previous inspections—are also conducted by the agency in certain circumstances.
- 6. Planned or programmed investigations**—inspections aimed at specific high-hazard industries or individual workplaces that have experienced high rates of injuries and illnesses—also receive priority.

Phone/Fax Investigations

OSHA carefully prioritizes all complaints it receives based on their severity. For lower-priority hazards, with permission of a complainant, OSHA may telephone the employer to describe safety and health concerns, following up with a fax providing details on alleged safety and health hazards. The employer must respond in writing within five working days, identifying any problems found and noting corrective actions taken or planned. If the response is adequate and the complainant satisfied with the response, OSHA generally will not conduct an on-site inspection.

Onsite Inspections

Preparation—Before conducting an inspection, OSHA compliance officers research the inspection history of a worksite using various data sources, review the operations and processes in use and the standards most likely to apply. They gather appropriate personal protective equipment and testing instruments to measure potential hazards.

Presentation of credentials—The onsite inspection begins with the presentation of the compliance officer's credentials, which include both a photograph and a serial number.

Opening Conference—The compliance officer will explain why OSHA selected the workplace for inspection and describe the scope of the inspection, walkaround procedures, employee representation and employee interviews. The employer then selects a representative to accompany the compli-

ance officer during the inspection. An authorized representative of the employees, if any, also has the right to go along. In any case, the compliance officer will consult privately with a reasonable number of employees during the inspection.

Walkaround—Following the opening conference, the compliance officer and the representatives will walk through the portions of the workplace covered by the inspection, inspecting for hazards that could lead to employee injury or illness. The compliance officer will also review worksite injury and illness records and posting of the official OSHA poster.

During the walkaround, compliance officers may point out some apparent violations that can be corrected immediately. While the law requires that these hazards must still be cited, prompt correction is a sign of good faith on the part of the employer. Compliance officers try to minimize work interruptions during the inspection and will keep confidential any trade secrets they observe.

Closing Conference—After the walkaround, the compliance officer holds a closing conference with the employer and the employee representatives to discuss the findings. The compliance officer discusses possible courses of action an employer may take following an inspection, which could include an informal conference with OSHA or contesting citations and proposed penalties. The compliance officer also discusses consultation and employee rights.

Results

OSHA must issue a citation and proposed penalty within six months of the violation's occurrence.

Citations describe OSHA requirements allegedly violated, list any proposed penalties and give a deadline for correcting the alleged hazards. Violations are categorized as other-than-serious, serious, willful, repeated and failure to abate. Penalties may range up to \$7,000 for each serious violation and up to \$70,000 for each willful or repeated violation. Penalties may be reduced based on an employer's good faith, inspection history, and size of business. For serious violations, OSHA may also reduce the proposed penalty based on the gravity of the alleged violation. No good faith adjustment will be made for alleged willful violations.

Appeals

When OSHA issues a citation to an employer, it also offers the employer an opportunity for an informal conference with the OSHA Area Director to discuss citations, penalties, abatement dates or any other information pertinent to the inspection. The agency and the employer may work out a settlement agreement to resolve the matter and to eliminate the hazard. OSHA's primary goal is correcting hazards and maintaining compliance rather than issuing citations or collecting penalties.

Alternatively, employers have 15 working days after receipt of citations and proposed penalties to formally contest the alleged violations and/or penalties by sending a written notice to the Area Director. OSHA forwards the contest to the Occupational Safety and Health Review Commission for independent review. Alternatively, citations, penalties and abatement dates that are not challenged by the employer or settled become a final order of the Occupational Safety and Health Review Commission.

This is one in a series of informational fact sheets highlighting OSHA programs, policies or standards. It does not impose any new compliance requirements. For a comprehensive list of compliance requirements of OSHA standards or regulations, refer to Title 29 of the Code of Federal Regulations. This information will be made available to sensory impaired individuals upon request. The voice phone is (202) 693-1999; teletypewriter (TTY) number: (877) 889-5627.

For more complete information:



U.S. Department of Labor

www.osha.gov

(800) 321-OSHA

The background of the entire image is a close-up, slightly blurred view of the American flag, showing the stars and stripes in a diagonal orientation.

OSHA[®]

**Occupational Safety
and Health Administration**

Residential Fall Protection Program Update

Directorate of Construction - Office of
Construction Services

This presentation is intended to provide information about STD 03-11-002, Compliance Guidance for Residential Construction. The Occupational Safety and Health Act requires employers to comply with safety and health standards promulgated by OSHA or by a state with an OSHA-approved state plan. However, this presentation is not itself a standard or regulation, and it neither creates new legal obligations nor alters existing obligations created by OSHA standards or the Occupational Safety and Health Act.

The examples of fall protection shown in the photographs contained in this presentation do not represent all possible work methods that can be used in residential construction. Moreover, employers should be aware that the examples of fall protection shown in the photographs contained in this presentation may not be suitable in all situations. Employers are responsible for ensuring compliance with applicable OSHA requirements.

Residential Fall Protection Program Update

- STD 03-11-002, Compliance Guidance for Residential Construction was issued December 16, 2010.
- STD 03-11-002 rescinds STD 03-00-001, dated June 18, 1999, Interim Fall Protection Compliance Guidelines for Residential Construction.
 - All letters that reference the canceled directive will be revised or withdrawn, as appropriate.

Residential Fall Protection Program Update

Effective June 16, 2011, employers utilizing alternative fall protection found in the rescinded 1999 Interim Fall Protection Compliance Guidelines for Residential Construction will be subject to OSHA citations if they fail to comply with 29 CFR 1926.501(b)(13).

Residential Fall Protection Program Update

- Why the rescission?
 - Never intended to be a permanent resolution.
 - Fall protection is safe and feasible for the vast majority of residential construction activities.
 - OSHA received recommendations to rescind the interim directive.
 - The residential fall protection requirements have always been established in Subpart M at 29 CFR 1926.501(b)(13). The new policy directive implements the standard as originally intended.

The BLS Released Statistics Showing the Leading Causes of Construction Fatalities

FATALITIES	2005	2006	2007	2008	2009
FALLS	394	433	447	332	283
STRUCK BY	130	120	106	108	79
ELECTROCUTIONS	107	126	108	89	89
CAUGHT IN/BETWEEN	111	96	98	92	34

Source: BLS CFOI Data



Residential Fall Protection Program Update

“We cannot tolerate workers getting killed in residential construction when effective means are readily available to prevent those deaths.”

“Fatalities from falls are the number one cause of workplace deaths in construction.”

Dr. David Michaels, Assistant Secretary of Labor
for OSHA

The BLS Released Statistics Showing the Fall Fatalities in Residential Construction

FATALITIES	2005	2006	2007	2008	2009
TOTAL FALLS	134	130	110	93	78
FALLS FROM ROOFS	48	49	35	28	31

Source: BLS CFI Data

Significant Changes in the Residential Fall Protection Policy

- Under the new directive employers must follow 1926.501(b)(13).
- 1926.501(b)(13) states ... workers “engaged in residential construction activities 6 feet (1.8 m) or more above lower levels shall be protected by guardrail systems, safety net system, or personal fall arrest system.”
- ... or, by alternative fall protection measures allowed under 1926.501(b) for particular types of work.

Other Methods Allowed Under 1926.501(b)

- 1926.501(b)(2)(ii) - **Controlled access zones and control lines** can be used for some leading edge applications.
- 1926.501(b)(4)(i) and (ii) - **Covers** can be used to prevent workers from falling through holes.
- 1926.501(b)(5) - **Positioning devices** can be used while working on the face of formwork or reinforcing steel.
- 1926.501(b)(7)(i) and (ii) - **Barricades, fences and covers** can be used to prevent workers from falling into excavations.

Alternative Methods Allowed Under 1926.501(b)

- 1926.501(b)(8)(i) - **Equipment guards** can be used to prevent workers from falling into dangerous equipment.
- 1926.501(b)(10) - A combination of a **warning line system and safety monitoring system** can be used for roofing work on low-slope (4:12 or less) roofs. Or, on roofs 50-feet (15.25 m) or less in width, the use of a safety monitoring system without a warning line system is permitted.

29 CFR 1926.501(b)(13)

- If the employer can demonstrate that it is infeasible or creates a greater hazard to use the required fall protection systems, the employer must instead develop and implement a written site specific fall protection plan in accordance with 29 CFR 1926.502(k).
 - The Agency does not consider "economic infeasibility" to be a basis for failing to provide conventional fall protection.
- Note: There is a presumption that it is feasible and will not create a greater hazard to implement at least one of the fall protection systems listed in 29 CFR 1926.501(b)(13).
 - OSHA expects that the fall protection methods listed in 1926.501(b)(13) can be used without significant safety or feasibility problems for the vast majority of residential construction activities.

Significant Changes in the Residential Fall Protection Policy

OSHA did not define residential construction in 1926.501(b)(13). STD 03-11-002 includes an interpretation for the term “residential construction” for purposes of the standard.

Definition of Residential Construction

- In order to be classified as residential construction, two elements must be met:
 - The end-use of the structure being built must be as a home, i.e., a dwelling; and
 - The structure being built must be constructed using traditional wood frame construction materials and methods.
 - The limited use of steel I-beams to help support wood framing does not disqualify a structure from being considered residential construction.

Residential Construction

Cold-formed metal studs will be considered within the bounds of traditional wood frame construction materials and methods.



Residential Construction



The use of masonry **brick or block** in exterior walls will be treated as falling within the scope of traditional wood frame construction materials and methods.

Non-Residential Construction

- These methods will not be considered “Residential Construction” as the term is interpreted in this directive.
 - Precast concrete
 - Steel I beams beyond the limited use of beams to support wood framing.

Training Requirements

Under 29 CFR 1926.503, workers exposed to fall hazards must be trained to recognize potential fall hazards and in the procedures to be followed to minimize those hazards.

Training Requirements

1926.503

- Training must cover among other subjects:
 - The nature of fall hazards in the work area.
 - How to erect, maintain, disassemble, and inspect the fall protection systems to be used.
 - How to use and operate the fall protection systems to be used.
 - Subpart M requirements
- Supplements 1926.21
- Prepare training certification.
 - Documentation of the latest training certification must be maintained.
- Retraining for:
 - Changes in the fall protection systems to be used or to the workplace.
 - Inadequacies in employee's knowledge or use of fall protection indicates that retraining is necessary

Conventional Fall Protection Systems

- Guardrail Systems
- Safety Net Systems
- Personal Fall Arrest Systems

Conventional Fall Protection Systems

Guardrail Systems
1926.502(b)

Guardrail Systems

1926.502(b)

- Requirements for guardrail systems include:
 - Top rails 42" +/- 3"
 - Must withstand 200 pounds – 1926.502(b)(1) & 1926.502(b)(3)
 - Mid rails halfway
 - Must withstand 150 pounds – 1926.502(b)(2)(i) & 1926.502(b)(5)
 - Surface the guardrail to prevent punctures, lacerations and the snagging of clothing – 1926.502(b)(6)
 - No steel or plastic banding – 1926.502(b)(8)

Guardrail Systems



Here we see a 2nd floor perimeter completely protected by a guardrail system.

Guardrail Systems



- A pre-fabricated wall panel positioned for installation behind a fully protected area -- potential fall to the exterior of the structure has been eliminated.
- Stairwell is also protected by guardrails -- eliminating falls to the interior also.

Guardrail Systems



Brackets for engineered guardrail systems can either be side mounted or deck mounted. Either way, employers should look to the manufacturer instructions or the recommendations of a registered professional engineer for proper installation.

Guardrail Systems



Guardrails in place during re-roofing activities.

Note: The picture on the right lacks protection for the rake edge so some means of protecting this worker (guardrail, safety nets or PFAS) must be used.

Guardrail Systems



Here we see a fully guardrailed roof ready to go.

Conventional Fall Protection Systems

Safety Net Systems
1926.502(c)

Safety Net Systems

- Requirements for safety net systems include:
 - As close as practicable, no more than 30' below – 1926.502(c)(1)
 - Sufficient clearance to prevent contact with surface or structures below – 1926.502(c)(3)
 - Drop tested or certified – 1926.502(c)(4)

Safety Net Systems

Vertical distance from working level to horizontal plane of net	Minimum required horizontal distance of outer edge of net from the edge of the working surface
Up to 5 feet	8 feet
From 10 to 15 feet	10 feet
More than 15 feet	13 feet



From 10 to 15 feet

Safety Net Systems



These nets have been positioned to prevent falls to the interior of the building. Employers should consult the manufacturer's instructions and/or a registered professional engineer to ensure proper installation of the net and bracing of the stud walls. Give due consideration to the potential impact load on the net and lateral load on the stud walls in the event of a fall.

Conventional Fall Protection Systems

Personal Fall Arrest Systems
1926.502(d)

Personal Fall Arrest System

- A Personal Fall Arrest System (PFAS) must include the following components:
 - Anchorage
 - Body Harness
 - Connector/Lanyard
- A PFAS may also include a lanyard, deceleration device, or lifeline.

Personal Fall Arrest System Anchor Point

- 1926.502(d)(15): Anchorages used for attachment of Personal Fall Arrest equipment must be capable of supporting at least 5,000 pounds per employee attached, or must be designed and used as follows:
 - As part of a complete personal fall arrest system which maintains a safety factor of at least two.
 - Under the supervision of a qualified person.
- Employer should look to the manufacturer's instructions or the recommendations of a registered professional engineer for proper installation.



Personal Fall Arrest System Anchor Point



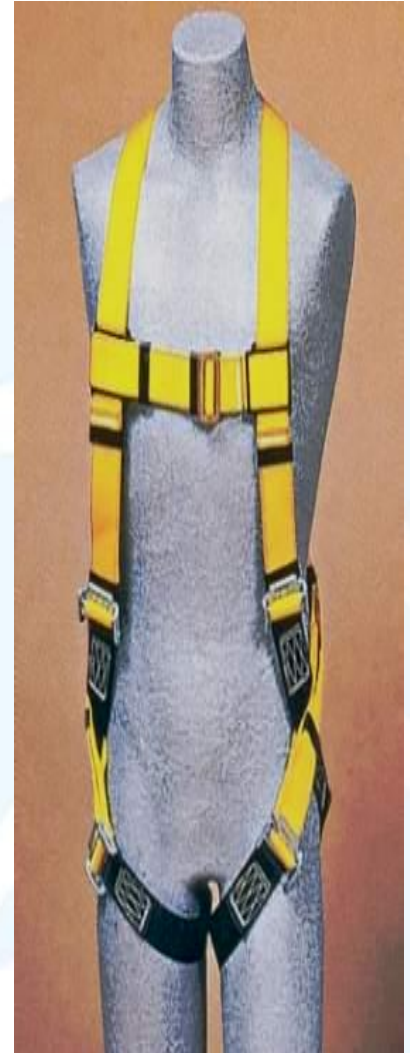
Personal Fall Arrest System Full Body Harness



PFAS in use during roofing and re-roofing activities.

Personal Fall Arrest System Full Body Harness

- A full body harness distributes the force of the fall over the thighs, pelvis, waist, chest and shoulders
- Body belts have not been allowed as part of an arrest system since January 1998.



Personal Fall Arrest System Full Body Harness

- The attachment point on a full body harness is a D-ring in the center of ~~your~~ upper back.
- Be sure to use a size that fits properly.
- Use with compatible equipment.



Personal Fall Arrest System Full Body Harness



Which worker is wearing the harness correctly?

Personal Fall Arrest System Full Body Harness



Personal Fall Arrest System Connector/Lanyard

Snaphooks must be locking type –
1926.502(d)(5).

Never hook two snaphooks together unless
designed for that purpose – 1926.502(d)(6).



Personal Fall Arrest System Connector/Lanyard



Personal Fall Restraint System

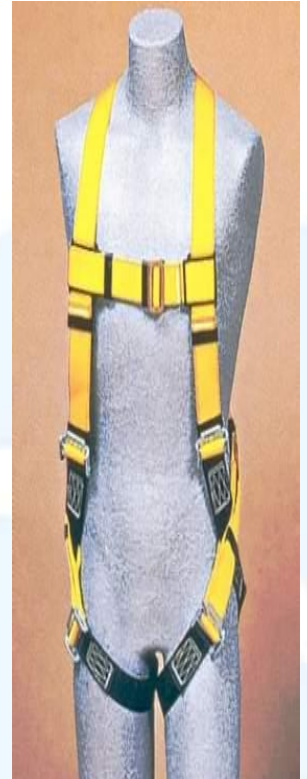
Although the standard does not mention personal fall restraint systems, OSHA has previously stated that it accepts a properly utilized fall restraint system in lieu of a personal fall arrest system when the restraint system is rigged in such a way that prevents the worker from being exposed to the fall hazard.

Personal Fall Restraint System

Fall restraint can be a body belt or full body harness.



Must be tied off so that the worker cannot go past the unprotected side or edge, no matter where the work is on the walking/working surface.



Lanyards should be adjustable to take up slack when workers move about.

Residential Fall Protection Program

Other Work Methods

Other Work Methods

Employers also have the option of having workers work from scaffolds (in compliance with Subpart L), ladders (in compliance with Subpart X) or aerial lifts (in compliance with 29 CFR 1926.453) instead of complying with 1926.501(b)(13).

Other Work Methods



Platform Ladders



Step Ladder

Other Work Methods



Bakers / Perry Scaffolds

Other Work Methods



Here is an example of a wall bracket, or top plate, scaffold system. Some contractors are using these systems for rolling trusses, cutting rafter tails and hanging fascia.

Other Work Methods



This contractor is working with trusses from this wall bracket/top plate scaffold system.

Other Work Methods



The positioning of an engineered guardrail system allows easy access for sheathing, roofing and utility installation. Multiple trades can be protected by these kinds of systems.

Other Work Methods



Scaffold System

Other Work Methods



Pump-jack Scaffold

Other Work Methods



Extensible Boom
Aerial Lift



All-terrain Forklift with basket attachment

Other Work Methods

- Extensible Boom Aerial Lift
 - Alternative for reaching heights if properly used.
 - PFAS or fall restraint must be worn and lanyard attached to boom or basket when working from an aerial lift
 - 1926.453(b)(2)(v).

Other Work Methods



Here are properly installed guard/hand rails using a “safety boot” system to position the uprights installed during framing.

Other Work Methods



Here is the same system still in place through MEP installation and dry wall. Priming and painting can be done before installing the permanent handrail and removing the guardrail.

Other Work Methods



Working at heights cannot be eliminated, but there are ways to minimize exposure to falls. Assemble as many parts of the building as possible on the ground.

Properly assembled and braced IAW the manufacturer's instruction and the BCSI gu

Other Work Methods



Flying pre-assembled structures into place will minimize worker exposure to fall hazards.

Properly assembled and braced IAW the manufacturer's instruction and the BCSI guidelines.

Other Work Methods



Do as many things on the ground as possible. Here a contractor installed the building wrap prior to flying this section into place.

Properly assembled and braced IAW the manufacturer's instruction and the BCSI gu

Other Work Methods



Some contractors are even pre-positioning portions of the guardrail system on the ground.

Other Work Methods



Pre-installed fall protection

Properly assembled and braced IAW the manufacturer's instruction and the BCSI guidelines

FALL HAZARDS



All sites have unprotected sides and edges, wall openings, or floor holes at some point during construction.

If these sides and openings are not protected, injuries from falls can happen.

There's no reason to work like this ...

PFAS



... when at minimum, you can work like this.
If this worker should slip and fall, he will not hit the ground. P

Fall Hazard



Some builders use 24" OC studs for non-load bearing walls. Prior to installation of drywall, temporary guardrail systems must be installed to prevent workers from falling through the studs.

Guardrail System



Like this!

Fall Hazard



Each employee on walking/working surfaces shall be protected from falling through holes (including skylights) more than 6 feet (1.8 m) above lower levels, by personal fall arrest systems, covers, or guardrail systems erected around such holes (1926.501(b)(4)).

This open-sided stairwell opening can be protected by a guardrail system (and handrail system – 1926.1052(c)).

Guardrail System



Like this!

Fall Protection Plan 1926.502(k)

- If an employer can demonstrate that conventional fall protection is infeasible or presents a greater hazard, the employer shall develop and implement a fall protection plan that complies with 1926.502(k).
- The employer bears the burden of establishing that it is appropriate to implement a fall protection plan for a particular workplace situation.

Significant Changes in the Residential Fall Protection Policy

- Under 1926.502(k) the fall protection plan:
 - Must be written.
 - Must be site-specific.
 - A written fall protection plan developed for repetitive use, e.g., for a particular style or model of home, will be considered site-specific with respect to a particular site only if it fully addresses all issues related to fall protection at that site. Therefore, a standardized plan will have to be reviewed, and revised as necessary, on a site by site basis.

Fall Protection Plan

1926.502(k)

- The plan must be prepared by a “qualified person” - 1926.502(k)(1).
 - “Qualified” means one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated his ability to solve or resolve problems relating to the subject matter, the work, or the project - 1926.32(m). (This could be the owner, supervisor, etc.).
- Be developed specifically for the site where the residential construction work is being performed – 1926.502(k)(1).
- Must be maintained up to date – 1926.502(k)(1).
- All changes shall be approved by a qualified person – 1926.502(k)(2).

Fall Protection Plan

1926.502(k)

- Shall be maintained on the site – 1926.502(k)(3).
- Shall be implemented under the supervision of a competent person – 1926.502(k)(4).
 - “Competent Person” means one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them – 1926.32(f). (This could be the owner, supervisor, etc.).
- Shall include documentation of reasons why conventional fall protection systems are infeasible or create a greater hazard – 1926.502(k)(5).
- Shall include a written discussion of the alternative work practices to be used that will eliminate or reduce the possibility of a fall – 1926.502(k)(6).

Fall Protection Plan

1926.502(k)

- Shall identify each location where conventional fall protection systems cannot be used and designate them Controlled Access Zones (CAZ) – 1926.502(k)(7).
- Implement a safety monitoring system in conformance with 1926.502(h) where no other alternative measure has been implemented – 1926.502(k)(8).
- Shall identify all workers designated to work in the CAZ – 1926.502(k)(9).
- Shall be reviewed and updated as appropriate if a fall, or near miss, occurs – 1926.502(k)(10).

Fall Protection Plan

Safety Monitor Duties

- For a safety monitoring system under 1926.502(h) the monitor must:
 - Be a competent person.
 - Warn workers of fall dangers.
 - Be on same working level and within visual sighting.
 - Be close enough to communicate orally.
 - Not have responsibilities which take attention away from monitoring.

Fall Protection Plan 1926.502(k)

A sample plan is in Appendix E to Subpart M and can be reviewed @

https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10927

In Closing

- All workers should return safely home to their families every day.
- Employers must provide workers a place of employment free from recognized hazards.
- Visit the OSHA Construction webpage for additional residential fall protection compliance assistance and guidance materials:

www.osha.gov/doc/residential_fall_protection.html

- For Fall Protection Standards for States with OSHA-approved State Plans, please visit:

<http://www.osha.gov/dcsp/osp/statestandards.html>

- The enforcement date for the new directive is June 16, 2011.



QUESTIONS

- On-site Consultation
 - <http://www.osha.gov/dcsp/smallbusiness/consult.html>
- To submit an information inquiry by Electronic Mail Form:
 - http://www.osha.gov/ecor_form.html
- By Phone
 - 1-800-321-OSHA (6742) Toll Free U.S.
- Write To:
 - U.S. Department of Labor
Occupational Safety & Health
Administration
Directorate of Construction – Room N-3468
200 Constitution Avenue
Washington, D.C. 20210

The background of the entire image is a close-up, slightly blurred view of the American flag, showing the stars and stripes. The stars are in the upper left, and the stripes run diagonally across the frame.

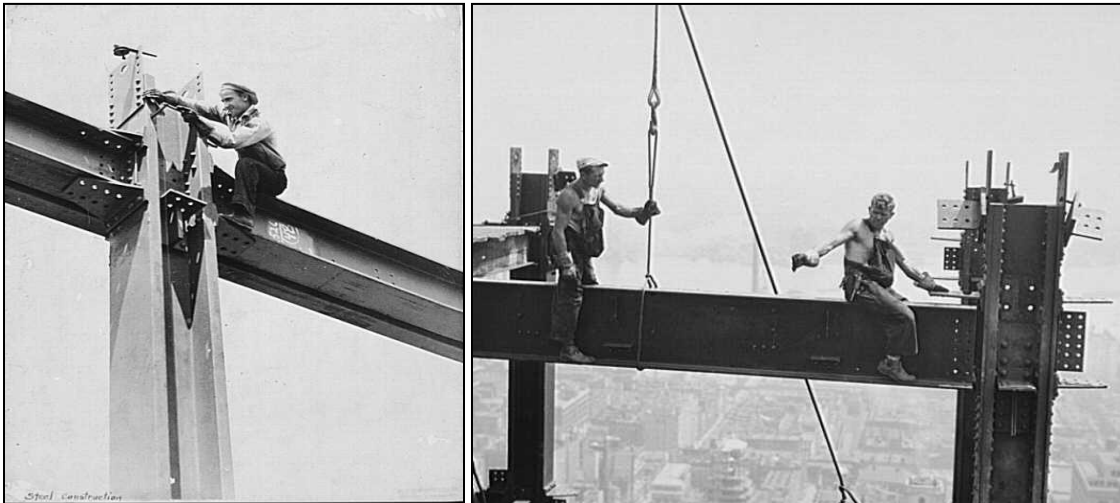
OSHA[®]

**Occupational Safety
and Health Administration**

**This Section is intended to be used as a commentary to
OSHA Subpart M – Fall Protection.**

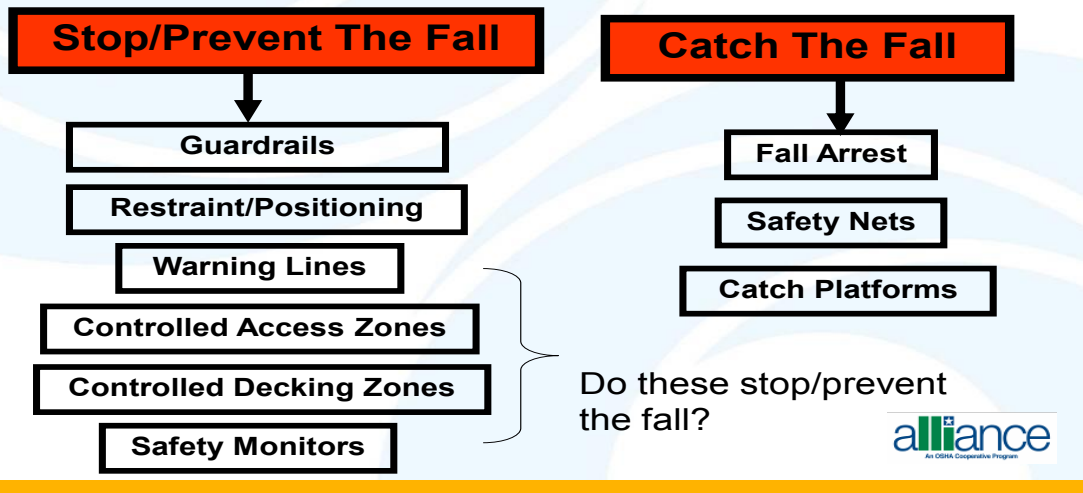


“The Empire State building was built in 1930. Safety won’t be invented until much later.”



“Fall protection? What are you, some kind of sissy?”

Philosophies of Fall Protection



Do these stop/prevent the fall?

- Controlled Access Zone (CAZ) – No, it merely attempts to limit employee access. Human error, misjudgment, and inattentiveness can be a problem
- Controlled Decking Zone (CDZ) – Similar to CAZ, a CDZ is an area defined in Subpart R where positive fall protection is not required, and a “plan” can be used to protect employees. Human error, misjudgment, and inattentiveness can be a problem
- Safety Monitors – Do not necessarily prevent falls, their function is to warn employees of potential hazards as they occur. Human error, misjudgment, and inattentiveness can be a problem

Eight Step Approach to Fall Protection

- Determine walking/working surfaces structurally sound
- Conduct fall assessment
- Eliminate need for fall protection
- Select type of fall protection system
- Develop rescue/retrieval procedures
- Develop equipment inspection, maintenance storage program
- Provide fall protection training
- Monitor fall protection program

1926.500 Scope, application, and definitions applicable to this subpart.

Scope and application.

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

Section 1926.501 sets forth those workplaces, conditions, operations, and circumstances for which fall protection shall be provided except as follows:

Requirements relating to fall protection for employees working on scaffolds are provided in subpart L of this part.

Requirements relating to fall protection for employees working on cranes and derricks are provided in subpart CC of this part.

Fall protection requirements for employees performing steel erection work (except for towers and tanks) are provided in subpart R of this part.

Requirements relating to fall protection for employees working on certain types of equipment used in tunneling operations are provided in subpart S of this part.

Requirements relating to fall protection for employees engaged in the erection of tanks and communication and broadcast towers are provided in §1926.105.

Requirements relating to fall protection for employees engaged in the construction of electric transmission and distribution lines and equipment are provided in subpart V of this part.

Requirements relating to fall protection for employees working on stairways and ladders are provided in subpart X of this part.

Section 1926.502 sets forth the requirements for the installation, construction, and proper use of fall protection required by part 1926, except as follows:

Performance requirements for guardrail systems used on scaffolds and performance requirements for falling object protection used on scaffolds are provided in subpart L of this part.

Performance requirements for stairways, stairrail systems, and handrails are provided in subpart X of this part.

Additional performance requirements for personal climbing equipment, lineman's body belts, safety straps, and lanyards are provided in subpart V of this part.

Section 1926.502 does not apply to the erection of tanks and communication and broadcast towers. (Note: Section 1926.104 sets the criteria for body belts, lanyards and lifelines used for fall protection during tank and communication and broadcast tower erection. Paragraphs (b),(c) and (f) of §1926.107 provide definitions for the pertinent terms.)

Criteria for steps, handholds, ladders, and grabrails/guardrails/railings required by subpart CC are provided in subpart CC. Sections 1926.502(a), (c) through (e), and (i) apply to activities covered under subpart CC unless otherwise stated in subpart CC. No other paragraphs of §1926.502 apply to subpart CC.

Section 1926.503 sets forth requirements for training in the installation and use of fall protection systems, except in relation to steel erection activities and the use of equipment covered by subpart CC.

Definitions:

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

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



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



Workers must be trained in the proper wear and use of the body harness. They are not a one size fits all component. Proper sizing is critical to preventing injuries. The harness must fit snugly across the chest and around the thighs and the D-ring must be positioned in the center of the back between the shoulder blades. Employers must ensure workers use a size that fits properly.

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

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

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

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

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

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

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

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

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

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

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



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

Infeasible means that it is impossible to perform the construction work using a conventional fall protection system (i.e., guardrail system, safety net system, or personal fall arrest system) or that it is technologically impossible to use any one of these systems to provide fall protection.

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

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

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

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

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

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

Opening means a gap or void 30 inches (76 cm) or more high and 18 inches (48 cm) or more wide, in a wall or partition, through which employees can fall to a lower level.

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

Personal fall arrest system means a system used to arrest an employee in a fall from a working level. It consists of an anchorage, connectors, a body belt or body harness and may include a lanyard, deceleration device, lifeline, or suitable combinations of these. As of January 1, 1998, the use of a body belt for fall arrest is prohibited.

Positioning device system means a body belt or body harness system rigged to allow an employee to be supported on an elevated vertical surface, such as a wall, and work with both hands free while leaning.

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

Roof means the exterior surface on the top of a building. This does not include floors or formwork which, because a building has not been completed, temporarily become the top surface of a building.

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

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

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

Snaphook means a connector comprised of a hook-shaped member with a normally closed keeper, or similar arrangement, which may be opened to permit the hook to receive an object and, when released, automatically closes to retain the object. Snaphooks are generally one of two types:

The locking type with a self-closing, self-locking keeper which remains closed and locked until unlocked and pressed open for connection or disconnection; or

The non-locking type with a self-closing keeper which remains closed until pressed open for connection or disconnection. As of January 1, 1998, the use of a non-locking snaphook as part of personal fall arrest systems and positioning device systems is prohibited.

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

Toeboard means a low protective barrier that will prevent the fall of materials and equipment to lower levels and provide protection from falls for personnel.

Unprotected sides and edges means 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 (1.0 m) high.

Walking/working surface means 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 but not including ladders, vehicles, or trailers, on which employees must be located in order to perform their job duties.

Warning line system means 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.



Warning-line systems consist of ropes, wires or chains, and supporting stanchions that form a barrier to warn those who approach an unprotected roof side or edge. The lines mark off an area which one can do roofing work without using guardrails or safety nets.

Work area means that portion of a walking/working surface where job duties are being performed.

1926.501 Duty to have fall protection.

FATALITIES	2005	2006	2007	2008	2009
FALLS	394	433	447	332	283
STRUCK BY	130	120	106	108	79
ELECTROCUTIONS	107	126	108	89	89
CAUGHT IN/BETWEEN	111	96	98	92	34

Falls accounted for more deaths than any of the other OSHA focus four hazards. Falls accounted for 34% of the construction fatalities in 2008 and 2009 ... and 35% of the fatalities since 2005.

General.

This section sets forth requirements for employers to provide fall protection systems. All fall protection required by this section shall conform to the criteria set forth in §1926.502 of this subpart.

The employer shall determine if the walking/working surfaces on which its employees are to work have the strength and structural integrity to support employees safely. Employees shall be allowed to work on those surfaces only when the surfaces have the requisite strength and structural integrity.

Unprotected sides and edges. Each employee on a walking/working surface (horizontal and vertical surface) with an unprotected side or edge which is 6 feet (1.8 m) or more above a lower level shall be protected from falling by the use of guardrail systems, safety net systems, or personal fall arrest systems.



The worker in this picture lacks protection for the rake edge so another means of protecting him (safety nets or Personal Fall Arrest System) must be used.

Leading edges. (i) Each employee who is constructing a leading edge 6 feet (1.8 m) or more above lower levels shall be protected from falling by guardrail systems, safety net systems, or personal fall arrest systems. Exception: When the employer can demonstrate that it is infeasible or creates a greater hazard to use these systems, the employer shall develop and

implement a fall protection plan which meets the requirements of paragraph (k) of §1926.502.

Note: There is a presumption that it is feasible and will not create a greater hazard to implement at least one of the above-listed fall protection systems. Accordingly, the employer has the burden of establishing that it is appropriate to implement a fall protection plan which complies with §1926.502(k) for a particular workplace situation, in lieu of implementing any of those systems.

Each employee on a walking/working surface 6 feet (1.8 m) or more above a lower level where leading edges are under construction, but who is not engaged in the leading edge work, shall be protected from falling by a guardrail system, safety net system, or personal fall arrest system. If a guardrail system is chosen to provide the fall protection, and a controlled access zone has already been established for leading edge work, the control line may be used in lieu of a guardrail along the edge that parallels the leading edge.

Hoist areas. Each employee in a hoist area shall be protected from falling 6 feet (1.8 m) or more to lower levels by guardrail systems or personal fall arrest systems. If guardrail systems, [or chain, gate, or guardrail] or portions thereof, are removed to facilitate the hoisting operation (e.g., during landing of materials), and an employee must lean through the access opening or out over the edge of the access opening (to receive or guide equipment and materials, for example), that employee shall be protected from fall hazards by a personal fall arrest system.

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

Each employee on a walking/working surface shall be protected from tripping in or stepping into or through holes (including skylights) by covers.

Each employee on a walking/working surface shall be protected from objects falling through holes (including skylights) by covers.

Formwork and reinforcing steel. Each employee on the face of formwork or reinforcing steel shall be protected from falling 6 feet (1.8 m) or more to lower levels by personal fall arrest systems, safety net systems, or positioning device systems.

Ramps, runways, and other walkways. Each employee on ramps, runways, and other walkways shall be protected from falling 6 feet (1.8 m) or more to lower levels by guardrail systems.

Excavations. (i) Each employee at the edge of an excavation 6 feet (1.8 m) or more in depth shall be protected from falling by guardrail systems, fences, or barricades when the excavations are not readily seen because of plant growth or other visual barrier;

Each employee at the edge of a well, pit, shaft, and similar excavation 6 feet (1.8 m) or more in depth shall be protected from falling by guardrail systems, fences, barricades, or covers.

Dangerous equipment. (i) Each employee less than 6 feet (1.8 m) above dangerous equipment shall be protected from falling into or onto the dangerous equipment by guardrail systems or by equipment guards.

Each employee 6 feet (1.8 m) or more above dangerous equipment shall be protected from fall hazards by guardrail systems, personal fall arrest systems, or safety net systems.

Overhand bricklaying and related work. (i) Except as otherwise provided in paragraph (b) of this section, each employee performing overhand bricklaying and related work 6 feet (1.8 m) or more above lower levels, shall be protected from falling by guardrail systems, safety net systems, personal fall arrest systems, or shall work in a controlled access zone.

Each employee reaching more than 10 inches (25 cm) below the level of the walking/working surface on which they are working, shall be protected from falling by a guardrail system, safety net system, or personal fall arrest system.

Note: Bricklaying operations performed on scaffolds are regulated by subpart L—Scaffolds of this part.

Roofing work on Low-slope roofs. Except as otherwise provided in paragraph (b) of this section, each employee engaged in roofing activities on low-slope roofs, with unprotected sides and edges 6 feet (1.8 m) or more above lower levels shall be protected from falling by guardrail systems, safety net systems, personal fall arrest systems, or a combination of warning line system and guardrail system, warning line system and safety net system, or warning line system and personal fall arrest system, or warning line system and safety monitoring system. Or, on roofs 50-feet (15.25 m) or less in width (see appendix A to subpart M of this part), the use of a safety monitoring system alone [i.e. without the warning line system] is permitted.

Steep roofs. Each employee on a steep roof with unprotected sides and edges 6 feet (1.8 m) or more above lower levels shall be protected from falling by guardrail systems with toeboards, safety net systems, or personal fall arrest systems.

Precast concrete erection. Each employee engaged in the erection of precast concrete members (including, but not limited to the erection of wall panels, columns, beams, and floor and roof “tees”) and related operations such as grouting of precast concrete members, who is 6 feet (1.8 m) or more above lower levels shall be protected from falling by guardrail systems, safety net systems, or personal fall arrest systems, unless another provision in paragraph (b) of this section provides for an alternative fall protection measure. Exception: When the employer can demonstrate that it is infeasible or creates a greater hazard to use these systems, the employer shall develop and implement a fall protection plan which meets the requirements of paragraph (k) of §1926.502.

Note: There is a presumption that it is feasible and will not create a greater hazard to implement at least one of the above-listed fall protection systems. Accordingly, the employer

has the burden of establishing that it is appropriate to implement a fall protection plan which complies with §1926.502(k) for a particular workplace situation, in lieu of implementing any of those systems.

Residential construction. Each employee engaged in residential construction activities 6 feet (1.8 m) or more above lower levels shall be protected by guardrail systems, safety net system, or personal fall arrest system unless another provision in paragraph (b) of this section provides for an alternative fall protection measure. Exception: When the employer can demonstrate that it is infeasible or creates a greater hazard to use these systems, the employer shall develop and implement a fall protection plan which meets the requirements of paragraph (k) of §1926.502.



Homes built with masonry **brick or block exterior walls**, will also be considered to meet the Residential Construction definition and will be treated as falling within the scope of traditional wood frame construction materials and methods.

Note: There is a presumption that it is feasible and will not create a greater hazard to implement at least one of the above-listed fall protection systems. Accordingly, the employer has the burden of establishing that it is appropriate to implement a fall protection plan which complies with §1926.502(k) for a particular workplace situation, in lieu of implementing any of those systems.

Wall openings. Each employee working on, at, above, or near wall openings (including those with chutes attached) where the outside bottom edge of the wall opening is 6 feet (1.8 m) or more above lower levels and the inside bottom edge of the wall opening is less than 39 inches (1.0 m) above the walking/working surface, shall be protected from falling by the use of a guardrail system, a safety net system, or a personal fall arrest system.

Walking/working surfaces not otherwise addressed. Except as provided in §1926.500(a)(2) or in §1926.501 (b)(1) through (b)(14), each employee on a walking/working surface 6 feet (1.8 m) or more above lower levels shall be protected from falling by a guardrail system, safety net system, or personal fall arrest system.

Protection from falling objects. When an employee is exposed to falling objects, the employer shall have each employee wear a hard hat and shall implement one of the following measures:

Erect toeboards, screens, or guardrail systems to prevent objects from falling from higher levels; or,

Erect a canopy structure and keep potential fall objects far enough from the edge of the higher level so that those objects would not go over the edge if they were accidentally displaced; or,

Barricade the area to which objects could fall, prohibit employees from entering the barricaded area, and keep objects that may fall far enough away from the edge of a higher level so that those objects would not go over the edge if they were accidentally displaced.

1926.502 Fall protection systems criteria and practices.

General.

Fall protection systems required by this part shall comply with the applicable provisions of this section.

Employers shall provide and install all fall protection systems required by this subpart for an employee, and shall comply with all other pertinent requirements of this subpart before that employee begins the work that necessitates the fall protection.

Guardrail systems.



Here is a 2nd floor perimeter completely protected by a guard rail system.



And from this angle we can see a pre-fabricated wall panel in position to be installed from within a fully protected area. The potential for a fall to the exterior in this instance has been eliminated.

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

Top edge height of top rails, or equivalent guardrail system members, shall be 42 inches (1.1 m) plus or minus 3 inches (8 cm) above the walking/working level. When conditions warrant, the height of the top edge may exceed the 45-inch height, provided the guardrail system meets all other criteria of this paragraph.

Note: When employees are using stilts, the top edge height of the top rail, or equivalent member, shall be increased an amount equal to the height of the stilts.

Midrails, screens, mesh, intermediate vertical members, or equivalent intermediate structural members shall be installed between the top edge of the guardrail system and the walking/working surface when there is no wall or parapet wall at least 21 inches (53 cm) high.

Midrails, when used, shall be installed at a height midway between the top edge of the guardrail system and the walking/working level.

Screens and mesh, when used, shall extend from the top rail to the walking/working level and along the entire opening between top rail supports.

Intermediate members (such as balusters), when used between posts, shall be not more than 19 inches (48 cm) apart.

Other structural members (such as additional midrails and architectural panels) shall be installed such that there are no openings in the guardrail system that are more than 19 inches (.5 m) wide.

Guardrail systems shall be capable of withstanding, without failure, a force of at least 200 pounds (890 N) applied within 2 inches (5.1 cm) of the top edge, in any outward or downward direction, at any point along the top edge.

When the 200 pound (890 N) test load specified in paragraph (b)(3) of this section is applied in a downward direction, the top edge of the guardrail shall not deflect to a height less than 39 inches (1.0 m) above the walking/working level. Guardrail system components selected and constructed in accordance with the appendix B to subpart M of this part will be deemed to meet this requirement.

Midrails, screens, mesh, intermediate vertical members, solid panels, and equivalent structural members shall be capable of withstanding, without failure, a force of at least 150 pounds (666 N) applied in any downward or outward direction at any point along the midrail or other member.

Guardrail systems shall be so surfaced as to prevent injury to an employee from punctures or lacerations, and to prevent snagging of clothing.

The ends of all top rails and midrails shall not overhang the terminal posts, except where such overhang does not constitute a projection hazard.

Steel banding and plastic banding shall not be used as top rails or midrails.

Top rails and midrails shall be at least one-quarter inch (0.6 cm) nominal diameter or thickness to prevent cuts and lacerations. If wire rope is used for top rails, it shall be flagged at not more than 6-foot (1.8 m) intervals with high-visibility material.

When guardrail systems are used at hoisting areas, a chain, gate or removable guardrail section shall be placed across the access opening between guardrail sections when hoisting operations are not taking place.

When guardrail systems are used at holes, they shall be erected on all unprotected sides or edges of the hole.

When guardrail systems are used around holes used for the passage of materials, the hole shall have not more than two sides provided with removable guardrail sections to allow the passage of materials. When the hole is not in use, it shall be closed over with a cover, or a guardrail system shall be provided along all unprotected sides or edges.

When guardrail systems are used around holes which are used as points of access (such as ladderways), they shall be provided with a gate, or be so offset that a person cannot walk directly into the hole.

Guardrail systems used on ramps and runways shall be erected along each unprotected side or edge.

Manila, plastic or synthetic rope being used for top rails or midrails shall be inspected as frequently as necessary to ensure that it continues to meet the strength requirements of paragraph (b)(3) of this section.

Safety net systems.



These nets have been positioned to prevent falls to the interior of the building. Employers should consult the manufacturer's instructions and/or a registered professional engineer to ensure proper installation of the net and bracing of the stud walls. Give due consideration to the potential impact load on the net and lateral load on the stud walls in the event

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

Safety nets shall be installed as close as practicable under the walking/working surface on which employees are working, but in no case more than 30 feet (9.1 m) below such level. When nets are used on bridges, the potential fall area from the walking/working surface to the net shall be unobstructed.

Safety nets shall extend outward from the outermost projection of the work surface as follows:

Vertical distance from working level to horizontal plane of net	Minimum required horizontal distance of outer edge of net from the edge of the working surface
Up to 5 feet	8 feet.
More than 5 feet up to 10 feet	10 feet.
More than 10 feet	13 feet.

Safety nets shall be installed with sufficient clearance under them to prevent contact with the surface or structures below when subjected to an impact force equal to the drop test specified in paragraph (c)(4) of this section.

Safety nets and their installations shall be capable of absorbing an impact force equal to that produced by the drop test specified in paragraph (c)(4)(i) of this section.

Except as provided in paragraph (c)(4)(ii) of this section, safety nets and safety net installations shall be drop-tested at the jobsite after initial installation and before being used as a fall protection system, whenever relocated, after major repair, and at 6-month intervals if left in one place. The drop-test shall consist of a 400 pound (180 kg) bag of sand 30 ± 2 inches (76 ± 5 cm) in diameter dropped into the net from the highest walking/working surface at which employees are exposed to fall hazards, but not from less than 42 inches (1.1 m) above that level.

When the employer can demonstrate that it is unreasonable to perform the drop-test required by paragraph (c)(4)(i) of this section, the employer (or a designated competent person) shall certify that the net and net installation is in compliance with the provisions of paragraphs (c)(3) and (c)(4)(i) of this section by preparing a certification record prior to the net being used as a fall protection system. The certification record must include an identification of the net and net installation for which the certification record is being prepared; the date that it was determined that the identified net and net installation were in compliance with paragraph (c)(3) of this section and the signature of the person making the determination and certification. The most recent certification record for each net and net installation shall be available at the jobsite for inspection.

Defective nets shall not be used. Safety nets shall be inspected at least once a week for wear, damage, and other deterioration. Defective components shall be removed from service. Safety nets shall also be inspected after any occurrence which could affect the integrity of the safety net system.

Materials, scrap pieces, equipment, and tools which have fallen into the safety net shall be removed as soon as possible from the net and at least before the next work shift.

The maximum size of each safety net mesh opening shall not exceed 36 square inches (230 cm^2) nor be longer than 6 inches (15 cm) on any side, and the opening, measured center-to-center of mesh ropes or webbing, shall not be longer than 6 inches (15 cm). All mesh crossings shall be secured to prevent enlargement of the mesh opening.

Each safety net (or section of it) shall have a border rope for webbing with a minimum breaking strength of 5,000 pounds (22.2 kN).

Connections between safety net panels shall be as strong as integral net components and shall be spaced not more than 6 inches (15 cm) apart.



Personal fall arrest systems and their use shall comply with the provisions set forth below. Effective January 1, 1998, body belts are not acceptable as part of a personal fall arrest system. Note: The use of a body belt in a positioning device system is acceptable and is regulated under paragraph (e) of this section.

Connectors shall be drop forged, pressed or formed steel, or made of equivalent materials.

Connectors shall have a corrosion-resistant finish, and all surfaces and edges shall be smooth to prevent damage to interfacing parts of the system.

Dee-rings and snaphooks shall have a minimum tensile strength of 5,000 pounds (22.2 kN).

Dee-rings and snaphooks shall be proof-tested to a minimum tensile load of 3,600 pounds (16 kN) without cracking, breaking, or taking permanent deformation.

Snaphooks shall be sized to be compatible with the member to which they are connected to prevent unintentional disengagement of the snaphook by depression of the snaphook keeper 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 keeper by the connected member. Effective January 1, 1998, only locking type snaphooks shall be used.

Unless the snaphook is a locking type and designed for the following connections, snaphooks shall not be engaged:

directly to webbing, rope or wire rope;

to each other;

to a Dee-ring to which another snaphook or other connector is attached;

to a horizontal lifeline; or

to any object which is incompatibly shaped or dimensioned in relation to the snaphook such that unintentional disengagement could occur by the connected object being able to depress the snaphook keeper and release itself.

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

Horizontal lifelines shall be designed, installed, and used, under the supervision of a qualified person, as part of a complete personal fall arrest system, which maintains a safety factor of at least two.

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

Except as provided in paragraph (d)(10)(ii) of this section, when vertical lifelines are used, each employee shall be attached to a separate lifeline.

During the construction of elevator shafts, two employees may be attached to the same lifeline in the hoistway, provided both employees are working atop a false car that is equipped with guardrails; the strength of the lifeline is 10,000 pounds [5,000 pounds per employee attached] (44.4 kN); and all other criteria specified in this paragraph for lifelines have been met.

Lifelines shall be protected against being cut or abraded.

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

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

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

Anchorage used for attachment of personal fall arrest equipment shall be independent of any anchorage being used to support or suspend platforms and capable of supporting at least

5,000 pounds (22.2 kN) per employee attached, or shall be designed, installed, and used as follows:



Here are examples of various anchorage devices. All anchorage points must be capable of supporting at least 5,000 pounds per employee attached, or must be designed and used under the supervision of a qualified person and maintain a safety factor of at least two.

as part of a complete personal fall arrest system which maintains a safety factor of at least two; and

under the supervision of a qualified person.

Personal fall arrest systems, when stopping a fall, shall:



Proper installation of the Anchorage point is critical to the success of the Personal Fall Arrest System. It must be designed and installed to support the amount of force that would be applied to it if a worker fell. Consulting the manufacturer's instructions or a registered professional engineer will ensure this critical component is properly installed and maintained.

limit maximum arresting force on an employee to 900 pounds (4 kN) when used with a body belt;

limit maximum arresting force on an employee to 1,800 pounds (8 kN) when used with a body harness;

be rigged such that an employee can neither free fall more than 6 feet (1.8 m), nor contact any lower level;

bring an employee to a complete stop and limit maximum deceleration distance an employee travels to 3.5 feet (1.07 m); and,

have sufficient strength to withstand twice the potential impact energy of an employee free falling a distance of 6 feet (1.8 m), or the free fall distance permitted by the system, whichever is less.

Note: If the personal fall arrest system meets the criteria and protocols contained in appendix C to subpart M, and if the system is being used by an employee having a combined person and tool weight of less than 310 pounds (140 kg), the system will be considered to be in compliance with the provisions of paragraph (d)(16) of this section. If the system is used by an employee having a combined tool and body weight of 310 pounds (140 kg) or more, then the employer must appropriately modify the criteria and protocols of the appendix to provide proper protection for such heavier weights, or the system will not be deemed to be in compliance with the requirements of paragraph (d)(16) of this section.

The attachment point of the body belt shall be located in the center of the wearer's back. The attachment point of the body harness shall be located in the center of the wearer's back near shoulder level, or above the wearer's head.



Which one of these workers is wearing his harness correctly?

The one on left ... or the one on the right?



You guessed correct..... the one on the right.

Body belts, harnesses, and components shall be used only for employee protection (as part of a personal fall arrest system or positioning device system) and not to hoist materials.

Personal fall arrest systems and components subjected to impact loading shall be immediately removed from service and shall not be used again for employee protection until inspected and determined by a competent person to be undamaged and suitable for reuse.

The employer shall provide for prompt rescue of employees in the event of a fall or shall assure that employees are able to rescue themselves.

Personal fall arrest systems shall be inspected prior to each use for wear, damage and other deterioration, and defective components shall be removed from service.

Body belts shall be at least one and five-eighths (15/8) inches (4.1 cm) wide.



Personal fall arrest systems shall not be attached to guardrail systems, nor shall they be attached to hoists except as specified in other subparts of this part.

When a personal fall arrest system is used at hoist areas, it shall be rigged to allow the movement of the employee only as far as the edge of the walking/working surface.

Positioning device systems. Positioning device systems and their use shall conform to the following provisions:



Position-device systems enable the worker to work with both hands free on a surface such as a wall or other vertical structure. They are typically used as protection for concrete form work and placing rebar.

The difference between a positioning-device system and a personal fall-arrest system is that the positioning device system supports the worker on an elevated surface and limits a fall to two feet.

Positioning devices shall be rigged such that an employee cannot free fall more than 2 feet (.6 m).

Positioning devices shall be secured to an anchorage capable of supporting at least twice the potential impact load of an employee's fall or 3,000 pounds (13.3 kN), whichever is greater.

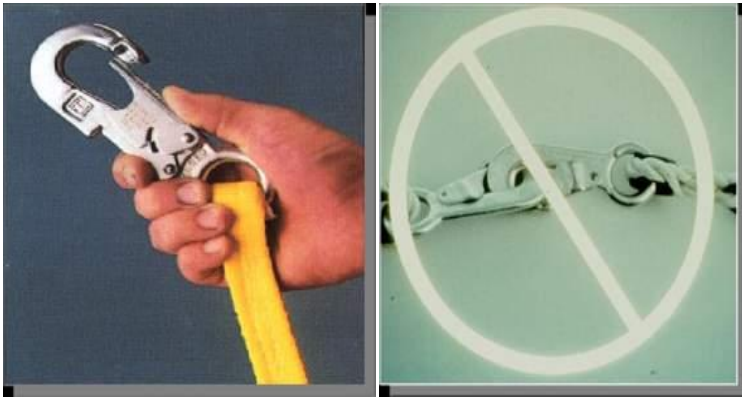
Connectors shall be drop forged, pressed or formed steel, or made of equivalent materials.

Connectors shall have a corrosion-resistant finish, and all surfaces and edges shall be smooth to prevent damage to interfacing parts of this system.

Connecting assemblies shall have a minimum tensile strength of 5,000 pounds (22.2 kN)

Dee-rings and snaphooks shall be proof-tested to a minimum tensile load of 3,600 pounds (16 kN) without cracking, breaking, or taking permanent deformation.

Snaphooks shall be sized to be compatible with the member to which they are connected to prevent unintentional disengagement of the snaphook by depression of the snaphook keeper 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 keeper by the connected member. As of January 1, 1998, only locking type snaphooks shall be used.



Snaphooks must be locking type – 1926.502(d)(5).

Never hook two snaphooks together unless designed for that purpose – 1926.502(d)(6).

Unless the snaphook is a locking type and designed for the following connections, snaphooks shall not be engaged:

directly to webbing, rope or wire rope;

to each other;

to a Dee-ring to which another snaphook or other connector is attached;

to a horizontal lifeline; or

to any object which is incompatibly shaped or dimensioned in relation to the snaphook such that unintentional disengagement could occur by the connected object being able to depress the snaphook keeper and release itself.

Positioning device systems shall be inspected prior to each use for wear, damage, and other deterioration, and defective components shall be removed from service.

Body belts, harnesses, and components shall be used only for employee protection (as part of a personal fall arrest system or positioning device system) and not to hoist materials.

Warning line systems. Warning line systems [See §1926.501(b)(10)] and their use shall comply with the following provisions:



You can use a warning line to alert workers they are approaching an unprotected edge of a roof, floor, or other work surface. The warning line must be set up so that it eliminates the risk that a worker could fall over the edge. Signs and flagging emphasize the hazard.



A warning line should have signs such as this one that alert workers they are approaching an unprotected edge.

The warning line shall be erected around all sides of the roof work area.

When mechanical equipment is not being used, the warning line shall be erected not less than 6 feet (1.8 m) from the roof edge.

When mechanical equipment is being used, the warning line shall be erected not less than 6 feet (1.8 m) from the roof edge which is parallel to the direction of mechanical equipment

operation, and not less than 10 feet (3.1 m) from the roof edge which is perpendicular to the direction of mechanical equipment operation.

Points of access, materials handling areas, storage areas, and hoisting areas shall 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, equivalent in strength and height to the warning line, shall be placed across the path at the point where the path intersects the warning line erected around the work area, or the path shall be offset such that a person cannot walk directly into the work area.

Warning lines shall consist of ropes, wires, or chains, and supporting stanchions erected as follows:

The rope, wire, or chain shall be flagged at not more than 6-foot (1.8 m) intervals with high-visibility material;

The rope, wire, or chain shall be rigged and supported in such a way that its lowest point (including sag) is no less than 34 inches (.9 m) from the walking/working surface and its highest point is no more than 39 inches (1.0 m) from the walking/working surface;

After being erected, with the rope, wire, or chain attached, stanchions shall be capable of resisting, without tipping over, a force of at least 16 pounds (71 N) applied horizontally against the stanchion, 30 inches (.8 m) 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 shall have a minimum tensile strength of 500 pounds (2.22 kN), and after being attached to the stanchions, shall be capable of supporting, without breaking, the loads applied to the stanchions as prescribed in paragraph (f)(2)(iii) of this section; and

The line shall be attached at each stanchion in such a way that pulling on one section of the line between stanchions will not result in slack being taken up in adjacent sections before the stanchion tips over.

No employee shall be allowed in the area between a roof edge and a warning line unless the employee is performing roofing work in that area.

Mechanical equipment on roofs shall 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 [See §1926.501(b)(9) and §1926.502(k)] and their use shall conform to the following provisions.



A Controlled Access Zone should have signs such as this one, to alert workers.

When used to control access to areas where leading edge and other operations are taking place the controlled access zone shall be defined by a control line or by any other means that restricts access.

When control lines are used, they shall be erected not less than 6 feet (1.8 m) nor more than 25 feet (7.7 m) from the unprotected or leading edge, except when erecting precast concrete members.

When erecting precast concrete members, the control line shall be erected not less than 6 feet (1.8 m) nor more than 60 feet (18 m) or half the length of the member being erected, whichever is less, from the leading edge.

The control line shall extend along the entire length of the unprotected or leading edge and shall be approximately parallel to the unprotected or leading edge.

The control line shall 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 controlled access zone shall be defined by a control line erected not less than 10 feet (3.1 m) nor more than 15 feet (4.5 m) from the working edge.

The control line shall extend for a distance sufficient for the controlled access zone to enclose all employees performing overhand bricklaying and related work at the working edge and shall be approximately parallel to the working edge.

Additional control lines shall be erected at each end to enclose the controlled access zone.

Only employees engaged in overhand bricklaying or related work shall be permitted in the controlled access zone.

Control lines shall consist of ropes, wires, tapes, or equivalent materials, and supporting stanchions as follows:

Each line shall be flagged or otherwise clearly marked at not more than 6-foot (1.8 m) intervals with high-visibility material.

Each line shall be rigged and supported in such a way that its lowest point (including sag) is not less than 39 inches (1 m) from the walking/working surface and its highest point is not more than 45 inches (1.3 m) [50 inches (1.3 m) when overhand bricklaying operations are being performed] from the walking/working surface.

Each line shall have a minimum breaking strength of 200 pounds (.88 kN).

On floors and roofs where guardrail systems are not in place prior to the beginning of overhand bricklaying operations, controlled access zones shall be enlarged, as necessary, to enclose all points of access, material handling areas, and storage areas.

On floors and roofs where guardrail systems are in place, but need to be removed to allow overhand bricklaying work or leading edge work to take place, only that portion of the guardrail necessary to accomplish that day's work shall be removed.

Safety monitoring systems. Safety monitoring systems [See §§1926.501(b)(10) and 1926.502(k)] and their use shall comply with the following provisions:

The employer shall designate a competent person to monitor the safety of other employees and the employer shall ensure that the safety monitor complies with the following requirements:

The safety monitor shall be competent to recognize fall hazards;

The safety monitor shall warn the employee when it appears that the employee is unaware of a fall hazard or is acting in an unsafe manner;

The safety monitor shall be on the same walking/working surface and within visual sighting distance of the employee being monitored;

The safety monitor shall be close enough to communicate orally with the employee; and

The safety monitor shall not have other responsibilities which could take the monitor's attention from the monitoring function.

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

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

Each employee working in a controlled access zone shall be directed to comply promptly with fall hazard warnings from safety monitors.

Covers. Covers for holes in floors, roofs, and other walking/working surfaces shall meet the following requirements:

Covers located in roadways and vehicular aisles shall be capable of supporting, without failure, at least twice the maximum axle load of the largest vehicle expected to cross over the cover.

All other covers shall be capable of supporting, without failure, at least twice the weight of employees, equipment, and materials that may be imposed on the cover at any one time.

All covers shall be secured when installed so as to prevent accidental displacement by the wind, equipment, or employees.

All covers shall be color coded or they shall be marked with the word “HOLE” or “COVER” to provide warning of the hazard.

Note: This provision does not apply to cast iron manhole covers or steel grates used on streets or roadways.

Protection from falling objects. Falling object protection shall comply with the following provisions:



A landing protected by a wooden guardrail system with a toeboard.

Toeboards, when used as falling object protection, shall be erected along the edge of the overhead walking/working surface for a distance sufficient to protect employees below.

Toeboards shall be capable of withstanding, without failure, a force of at least 50 pounds (222 N) applied in any downward or outward direction at any point along the toeboard.

Toeboards shall be a minimum of 3 1/2 inches (9 cm) in vertical height from their top edge to the level of the walking/working surface. They shall have not more than 1/4 inch (0.6 cm) clearance above the walking/working surface. They shall be solid or have openings not over 1 inch (2.5 cm) in greatest dimension.

Where tools, equipment, or materials are piled higher than the top edge of a toeboard, paneling or screening shall be erected from the walking/working surface or toeboard to the

top of a guardrail system's top rail or midrail, for a distance sufficient to protect employees below.

Guardrail systems, when used as falling object protection, shall have all openings small enough to prevent passage of potential falling objects.

During the performance of overhand bricklaying and related work:

No materials or equipment except masonry and mortar shall be stored within 4 feet (1.2 m) of the working edge.

Excess mortar, broken or scattered masonry units, and all other materials and debris shall be kept clear from the work area by removal at regular intervals.

During the performance of roofing work:

Materials and equipment shall not be stored within 6 feet (1.8 m) of a roof edge unless guardrails are erected at the edge.

Materials which are piled, grouped, or stacked near a roof edge shall be stable and self-supporting.

Canopies, when used as falling object protection, shall be strong enough to prevent collapse and to prevent penetration by any objects which may fall onto the canopy.

Fall protection plan. This option is available only to employees engaged in leading edge work, precast concrete erection work, or residential construction work (See §1926.501(b)(2), (b)(12), and (b)(13)) who can demonstrate that it is infeasible or it creates a greater hazard to use conventional fall protection equipment. The fall protection plan must conform to the following provisions.

The fall protection plan shall be prepared by a qualified person and developed specifically for the site where the leading edge work, precast concrete work, or residential construction work is being performed and the plan must be maintained up to date.

Any changes to the fall protection plan shall be approved by a qualified person.

A copy of the fall protection plan with all approved changes shall be maintained at the job site.

The implementation of the fall protection plan shall be under the supervision of a competent person.

The fall protection plan shall document the reasons why the use of conventional fall protection systems (guardrail systems, personal fall arrest systems, or safety nets systems) are infeasible or why their use would create a greater hazard.



Guard Rail System



Safety Net System



Positioning Device
System



Warning Line
System

If you are not using conventional fall protection systems (like in the pictures above) you will need to document why they are infeasible or why their use would create a greater hazard.

The fall protection plan shall include a written discussion of other measures that will be taken to reduce or eliminate the fall hazard for workers who cannot be provided with protection from the conventional fall protection systems. For example, the employer shall discuss the extent to which scaffolds, ladders, or vehicle mounted work platforms can be used to provide a safer working surface and thereby reduce the hazard of falling.

The fall protection plan shall identify each location where conventional fall protection methods cannot be used. These locations shall then be classified as controlled access zones and the employer must comply with the criteria in paragraph (g) of this section.

Where no other alternative measure has been implemented, the employer shall implement a safety monitoring system in conformance with §1926.502(h).

The fall protection plan must include a statement which provides the name or other method of identification for each employee who is designated to work in controlled access zones. No other employees may enter controlled access zones.

In the event an employee falls, or some other related, serious incident occurs, (e.g., a near miss) the employer shall investigate the circumstances of the fall or other incident to determine if the fall protection plan needs to be changed (e.g. new practices, procedures, or training) and shall implement those changes to prevent similar types of falls or incidents.

1926.503 Training requirements.

The following training provisions supplement and clarify the requirements of §1926.21 regarding the hazards addressed in subpart M of this part.



The employers needs to provide a training program for each employee and needs to keep training records, whether the training takes place in a classroom setting (as pictured) or on the job

Training Program. (1) The employer shall provide a training program for each employee who might be exposed to fall hazards. The program shall enable each employee to recognize the hazards of falling and shall train each employee in the procedures to be followed in order to minimize these hazards.

The employer shall assure that each employee has been trained, as necessary, by a competent person qualified in the following areas:

The nature of fall hazards in the work area;

The correct procedures for erecting, maintaining, disassembling, and inspecting the fall protection systems to be used;

The use and operation of guardrail systems, personal fall arrest systems, safety net systems, warning line systems, safety monitoring systems, controlled access zones, and other protection to be used;

The role of each employee in the safety monitoring system when this system is used;

The limitations on the use of mechanical equipment during the performance of roofing work on low-sloped roofs;

The correct procedures for the handling and storage of equipment and materials and the erection of overhead protection; and

The role of employees in fall protection plans;

The standards contained in this subpart.

Certification of training. (1) The employer shall verify compliance with paragraph (a) of this section by preparing a written certification record. The written certification record shall contain

the name or other identity of the employee trained, the date(s) of the training, and the signature of the person who conducted the training or the signature of the employer. If the employer relies on training conducted by another employer or completed prior to the effective date of this section, the certification record shall indicate the date the employer determined the prior training was adequate rather than the date of actual training.

The latest training certification shall be maintained.

Retraining. When the employer has reason to believe that any affected employee who has already been trained does not have the understanding and skill required by paragraph (a) of this section, the employer shall retrain each such employee. Circumstances where retraining is required include, but are not limited to, situations where:

Changes in the workplace render previous training obsolete; or

Changes in the types of fall protection systems or equipment to be used render previous training obsolete; or

Inadequacies in an affected employee's knowledge or use of fall protection systems or equipment indicate that the employee has not retained the requisite understanding or skill.

Note: The following appendices to subpart M of this part serve as non-mandatory guidelines to assist employers in complying with the appropriate requirements of subpart M of this part

The following Appendices are Non-mandatory Guidelines

Appendix A to Subpart M of Part 1926—Determining Roof Widths

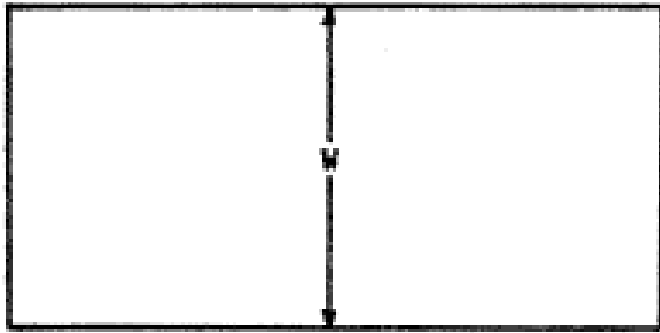
This appendix serves as a guideline to assist employers complying with the requirements of §1926.501(b)(10). Section 1910.501(b)(10) allows the use of a safety monitoring system alone as a means of providing fall protection during the performance of roofing operations on low-sloped roofs 50 feet (15.25 m) or less in width. Each example in the appendix shows a roof plan or plans and indicates where each roof or roof area is to be measured to determine its width. Section views or elevation views are shown where appropriate. Some examples show “correct” and “incorrect” subdivisions of irregularly shaped roofs divided into smaller, regularly shaped areas. In all examples, the dimension selected to be the width of an area is the lesser of the two primary dimensions of the area, as viewed from above. Example A shows that on a simple rectangular roof, width is the lesser of the two primary overall dimensions. This is also the case with roofs which are sloped toward or away from the roof center, as shown in Example B.

Many roofs are not simple rectangles. Such roofs may be broken down into subareas as shown in Example C. The process of dividing a roof area can produce many different configurations. Example C gives the general rule of using dividing lines of minimum length to minimize the size and number of the areas which are potentially less than 50 feet (15.25 m) wide. The intent is to minimize the number of roof areas where safety monitoring systems alone are sufficient protection.



Here we see Personal Fall Arrest System in use during roofing and re-roofing operations.

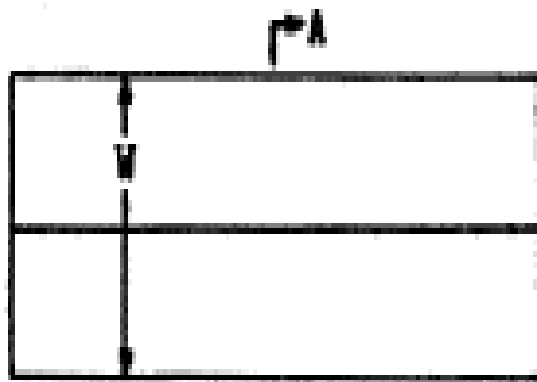
Roofs which are comprised of several separate, non-contiguous roof areas, as in Example D, may be considered as a series of individual roofs. Some roofs have penthouses, additional floors, courtyard openings, or similar architectural features; Example E shows how the rule for dividing roofs into subareas is applied to such configurations. Irregular, non-rectangular roofs must be considered on an individual basis, as shown in Example F.



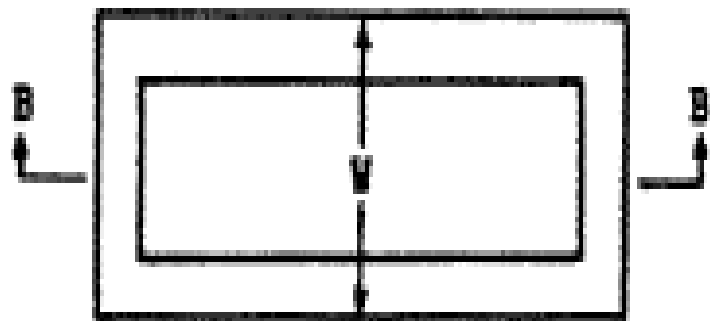
PLAN VIEW

Example A: Rectangular Shaped Roofs

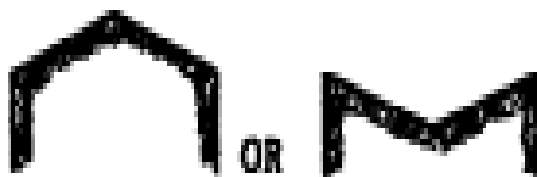
Example B: Sloped Rectangular Shaped Roofs



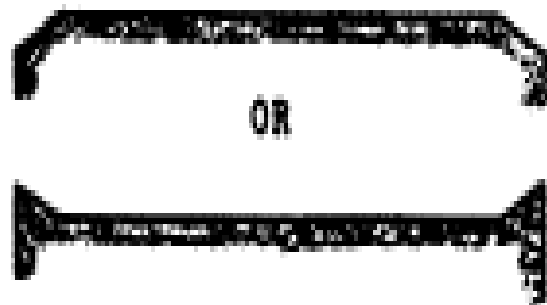
PLAN VIEW



PLAN VIEW



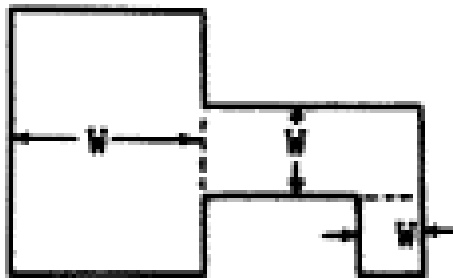
SECTION A-A



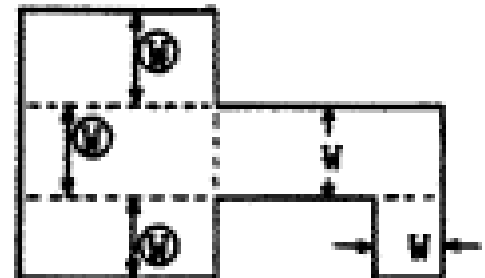
SECTION B-B

Example C: Irregularly Shaped Roofs With Rectangular Shaped Sections

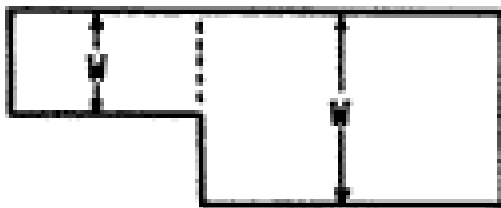
Such roofs are to be divided into sub-areas by using dividing lines of minimum length to minimize the size and number of the areas which are potentially less than or equal to 50 feet (15.25 meters) in width, in order to limit the size of roof areas where the safety monitoring system alone can be used [1926.502(b)(10)]. Dotted lines are used in the examples to show the location of dividing lines. W denotes incorrect measurements of width.



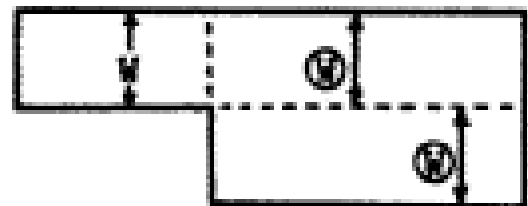
Correct



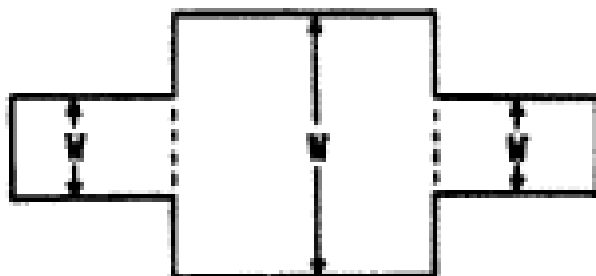
Incorrect



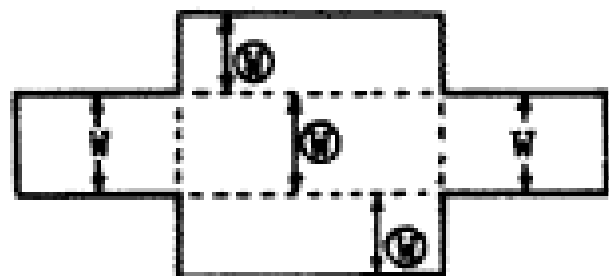
Correct



Incorrect



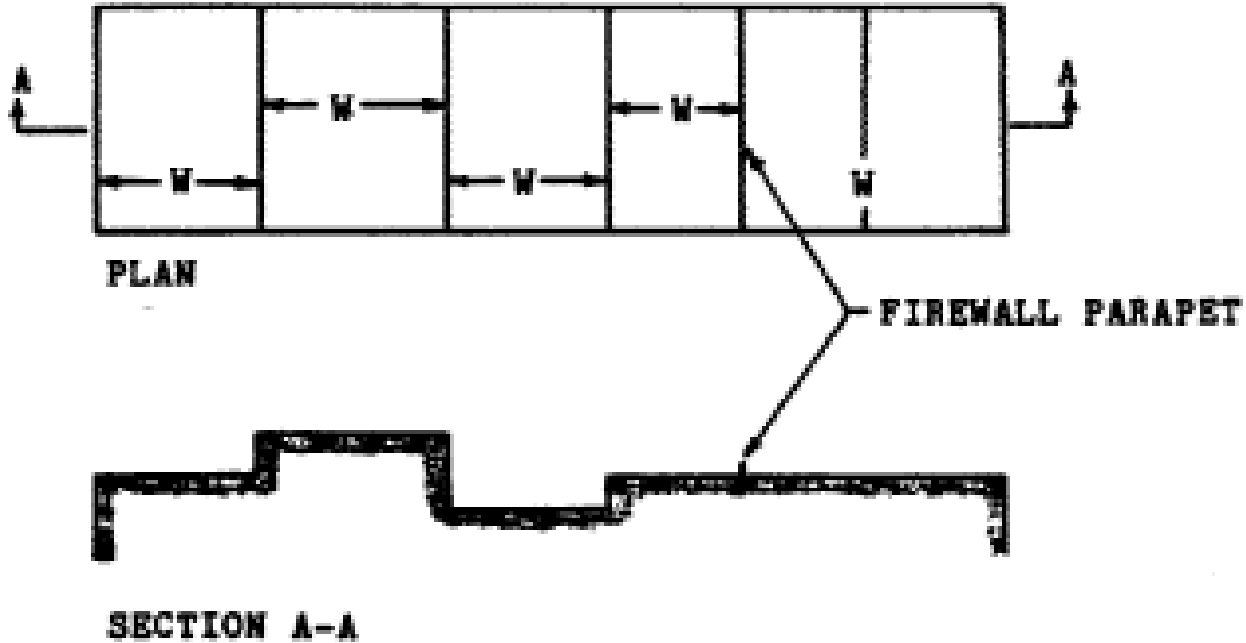
Correct



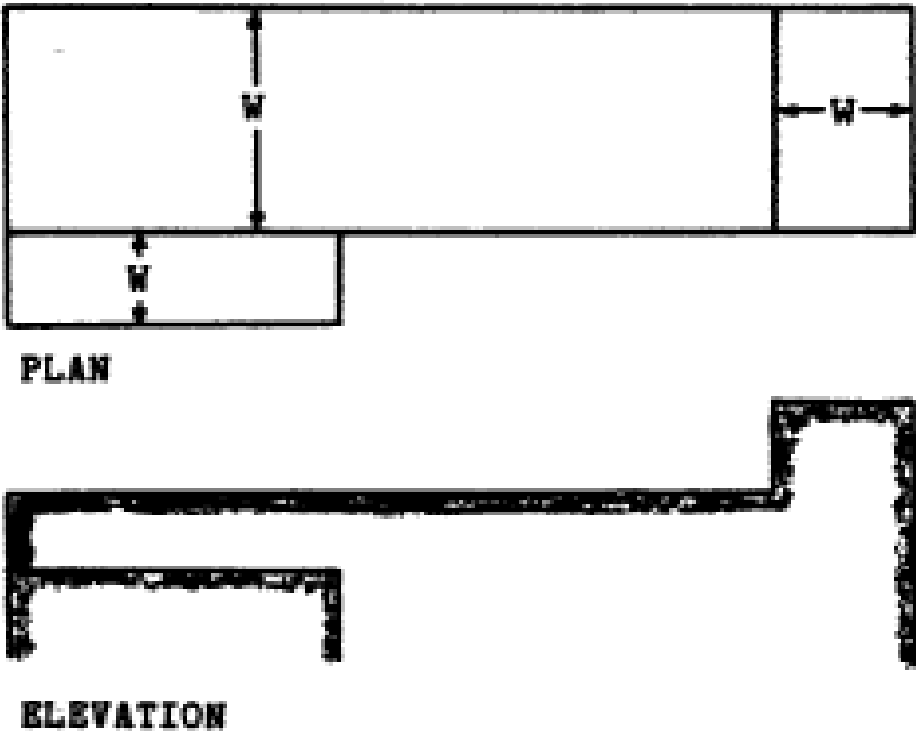
Incorrect

Example D: Separate, Non-Contiguous Roof Areas

1.

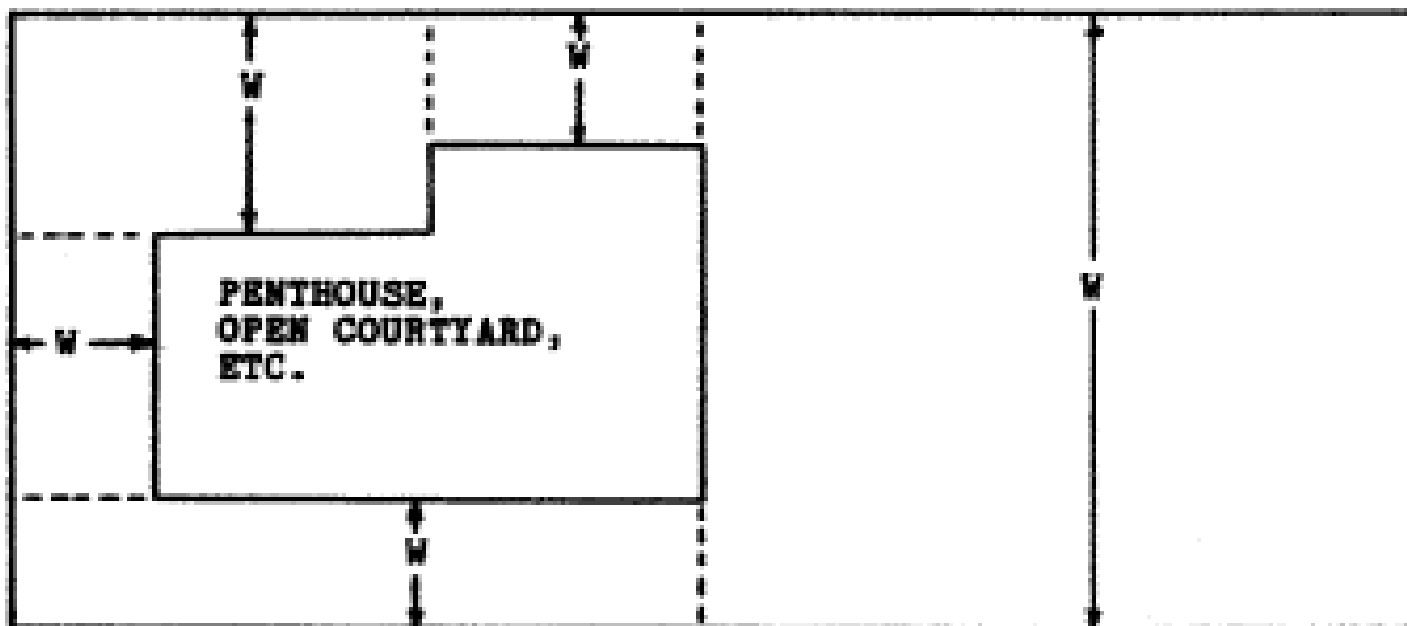


2.

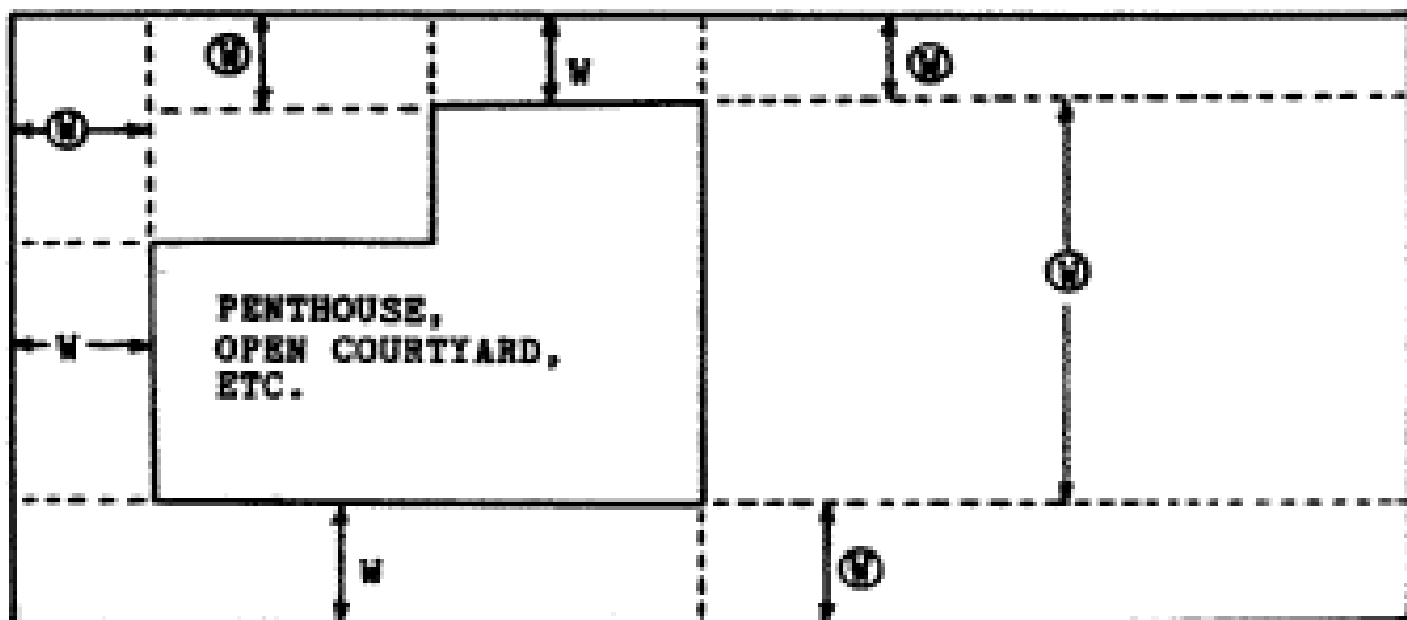


Example E: Roofs With Penthouses, Open Courtyards, Additional Floors, etc.

Such roofs are to be divided into sub-areas by using dividing lines of minimum length to minimize the size and number of the areas which are potentially less than or equal to 50 feet (15.25 meters) in width, in order to limit the size of roof areas where the safety monitoring system alone can be used [1926.502(b)(10)]. Dotted lines are used in the examples to show the location of dividing lines. W denotes incorrect measurements of width.

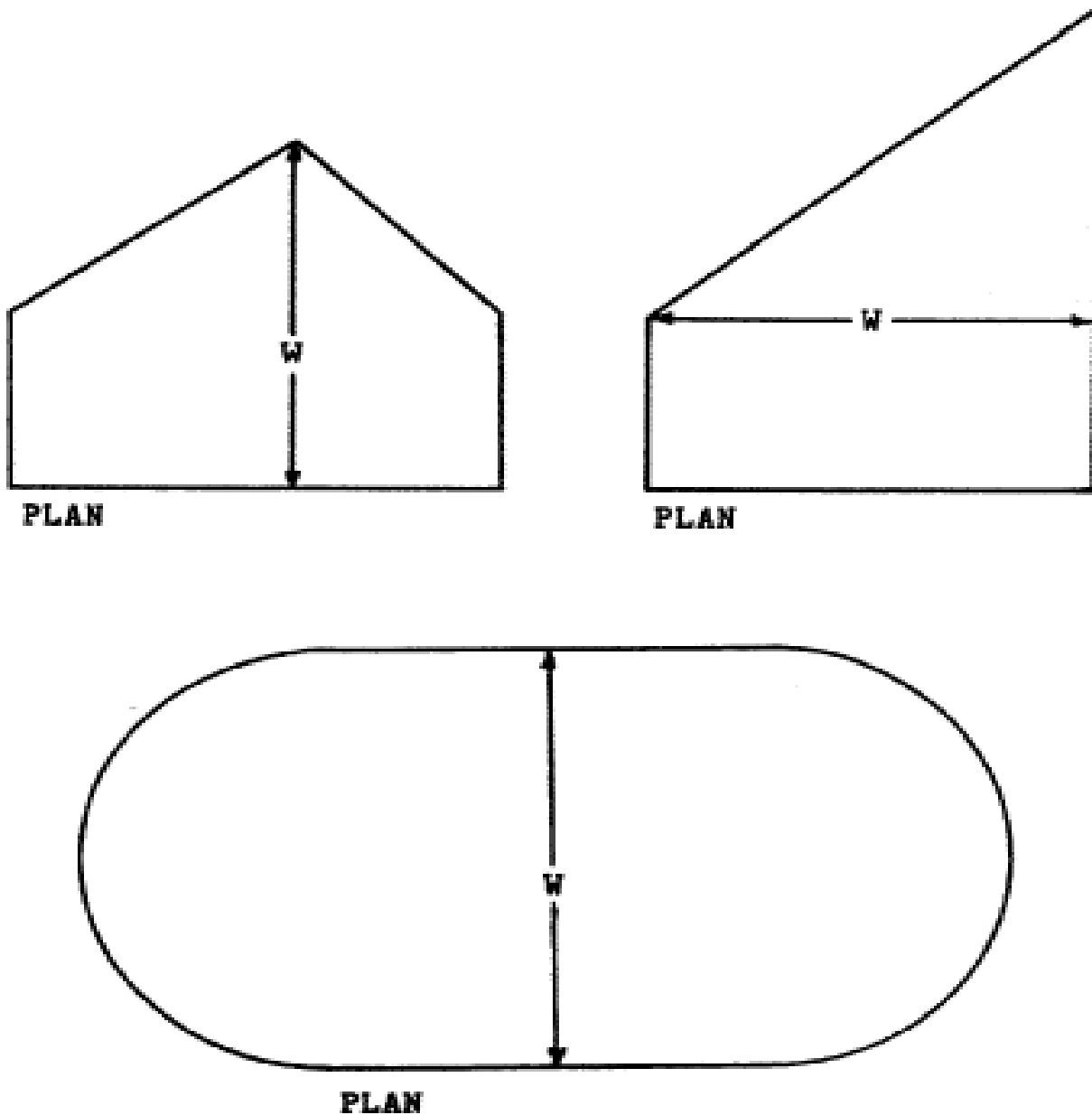


Correct



Incorrect

Example F: Irregular, Non-rectangular Shaped Roofs



Appendix B to Subpart M of Part 1926—Guardrail Systems

The standard requires guardrail systems and components to be designed and built to meet the requirements of §1926.502 (b) (3), (4), and (5). This appendix serves as a non-mandatory guideline to assist employers in complying with these requirements. An employer may use these guidelines as a starting point for designing guardrail systems. However, the guidelines do not provide all the information necessary to build a complete system, and the employer is still responsible for designing and assembling these components in such a way that the completed system will meet the requirements of §1926.502(b) (3), (4), and (5). Components for which no specific guidelines are given in this appendix (e.g., joints, base connections,

components made with other materials, and components with other dimensions) must also be designed and constructed in such a way that the completed system meets the requirements of §1926.502.

For wood railings: Wood components shall be minimum 1500 lb-ft/in² fiber (stress grade) construction grade lumber; the posts shall be at least 2-inch by 4-inch (5 cm×10 cm) lumber spaced not more than 8 feet (2.4 m) apart on centers; the top rail shall be at least 2-inch by 4-inch (5 cm×10 cm) lumber, the intermediate rail shall be at least 1-inch by 6-inch (2.5 cm×15 cm) lumber. All lumber dimensions are nominal sizes as provided by the American Softwood Lumber Standards, dated January 1970.

For pipe railings: posts, top rails, and intermediate railings shall be at least one and one-half inches nominal diameter (schedule 40 pipe) with posts spaced not more than 8 feet (2.4 m) apart on centers.

For structural steel railings: posts, top rails, and intermediate rails shall be at least 2-inch by 2-inch (5 cm×10 cm) by 3/8-inch (1.1 cm) angles, with posts spaced not more than 8 feet (2.4 m) apart on centers.



This open-sided stairwell (in the far left picture) opening can be protected by a guardrail system (and handrail system – 1926.1052(c)).

Like the pictures in the middle and right!

Appendix C to Subpart M of Part 1926—Personal Fall Arrest System

Test methods for personal fall arrest systems and positioning device systems —(a) General. This appendix serves as a non-mandatory guideline to assist employers comply with the requirements in §1926.502(d). Paragraphs (b), (c), (d) and (e) of this appendix describe test procedures which may be used to determine compliance with the requirements in §1926.502(d)(16). As noted in appendix D of this subpart, the test methods listed here in appendix C can also be used to assist employers comply with the requirements in §1926.502(e) (3) and (4) for positioning device systems.

General conditions for all tests in the appendix to §1926.502(d). (1) Lifelines, lanyards and deceleration devices should be attached to an anchorage and connected to the body-belt or body harness in the same manner as they would be when used to protect employees.



Here are examples of various anchorage devices. All anchorage points must be capable of supporting at least 5,000 pounds per employee attached, or must be designed and used under the supervision of a qualified person and maintain a safety factor of at least two.

The anchorage should be rigid, and should not have a deflection greater than 0.04 inches (1 mm) when a force of 2,250 pounds (10 kN) is applied.

The frequency response of the load measuring instrumentation should be 500 Hz.

The test weight used in the strength and force tests should be a rigid, metal, cylindrical or torso-shaped object with a girth of 38 inches plus or minus 4 inches (96 cm plus or minus 10 cm).

The lanyard or lifeline used to create the free fall distance should be supplied with the system, or in its absence, the least elastic lanyard or lifeline available to be used with the system.

The test weight for each test should be hoisted to the required level and should be quickly released without having any appreciable motion imparted to it.

The system's performance should be evaluated taking into account the range of environmental conditions for which it is designed to be used.

Following the test, the system need not be capable of further operation.

Strength test. (1) During the testing of all systems, a test weight of 300 pounds plus or minus 5 pounds (135 kg plus or minus 2.5 kg) should be used. (See paragraph (b)(4) of this section.)

The test consists of dropping the test weight once. A new unused system should be used for each test.

For lanyard systems, the lanyard length should be 6 feet plus or minus 2 inches (1.83 m plus or minus 5 cm) as measured from the fixed anchorage to the attachment on the body belt or body harness.

For rope-grab-type deceleration systems, the length of the lifeline above the centerline of the grabbing mechanism to the lifeline's anchorage point should not exceed 2 feet (0.61 m).

For lanyard systems, for systems with deceleration devices which do not automatically limit free fall distance to 2 feet (0.61 m) or less, and for systems with deceleration devices which have a connection distance in excess of 1 foot (0.3 m) (measured between the centerline of the lifeline and the attachment point to the body belt or harness), the test weight should be rigged to free fall a distance of 7.5 feet (2.3 m) from a point that is 1.5 feet (.46 m) above the anchorage point, to its hanging location (6 feet below the anchorage). The test weight should fall without interference, obstruction, or hitting the floor or ground during the test. In some cases a non-elastic wire lanyard of sufficient length may need to be added to the system (for test purposes) to create the necessary free fall distance.

For deceleration device systems with integral lifelines or lanyards which automatically limit free fall distance to 2 feet (0.61 m) or less, the test weight should be rigged to free fall a distance of 4 feet (1.22 m).

Any weight which detaches from the belt or harness has failed the strength test.

Force test —(1) *General*. The test consists of dropping the respective test weight once as specified in paragraph (d)(2)(i) or (d)(3)(i) of this section. A new, unused system should be used for each test.

For lanyard systems. (i) A test weight of 220 pounds plus or minus 3 pounds (100 kg plus or minus 1.6 kg) should be used. (See paragraph (b)(4) of this appendix).

Lanyard length should be 6 feet plus or minus two inches (1.83 m plus or minus 5 cm) as measured from the fixed anchorage to the attachment on the body belt or body harness.

The test weight should fall free from the anchorage level to its hanging location (a total of 6 feet (1.83 m) free fall distance) without interference, obstruction, or hitting the floor or ground during the test.

For all other systems. (i) A test weight of 220 pounds plus or minus 3 pounds (100 kg plus or minus 1.6 kg) should be used. (See paragraph (b)(4) of this appendix)

The free fall distance to be used in the test should be the maximum fall distance physically permitted by the system during normal use conditions, up to a maximum free fall distance for the test weight of 6 feet (1.83 m), except as follows:

For deceleration systems which have a connection link or lanyard, the test weight should free fall a distance equal to the connection distance (measured between the centerline of the lifeline and the attachment point to the body belt or harness).

For deceleration device systems with integral lifelines or lanyards which automatically limit free fall distance to 2 feet (0.61 m) or less, the test weight should free fall a distance equal to that permitted by the system in normal use. (For example, to test a system with a self-retracting lifeline or lanyard, the test weight should be supported and the system allowed to retract the lifeline or lanyard as it would in normal use. The test weight would then be released and the force and deceleration distance measured).

A system fails the force test if the recorded maximum arresting force exceeds 1,260 pounds (5.6 kN) when using a body belt, and/or exceeds 2,520 pounds (11.2 kN) when using a body harness.

The maximum elongation and deceleration distance should be recorded during the force test.

Deceleration device tests —(1) *General*. The device should be evaluated or tested under the environmental conditions, (such as rain, ice, grease, dirt, type of lifeline, etc.), for which the device is designed.

Rope-grab-type deceleration devices. (i) Devices should be moved on a lifeline 1,000 times over the same length of line a distance of not less than 1 foot (30.5 cm), and the mechanism should lock each time.

Unless the device is permanently marked to indicate the type(s) of lifeline which must be used, several types (different diameters and different materials), of lifelines should be used to test the device.

Other self-activating-type deceleration devices. The locking mechanisms of other self-activating-type deceleration devices designed for more than one arrest should lock each of 1,000 times as they would in normal service.

Additional non-mandatory guidelines for personal fall arrest systems. The following information constitutes additional guidelines for use in complying with requirements for a personal fall arrest system.

Selection and use considerations. (1) The kind of personal fall arrest system selected should match the particular work situation, and any possible free fall distance should be kept to a minimum. Consideration should be given to the particular work environment. For example, the presence of acids, dirt, moisture, oil, grease, etc., and their effect on the system, should be evaluated. Hot or cold environments may also have an adverse effect on the system. Wire rope should not be used where an electrical hazard is anticipated. As required by the standard, the employer must plan to have means available to promptly rescue an employee should a fall occur, since the suspended employee may not be able to reach a work level independently.

Where lanyards, connectors, and lifelines are subject to damage by work operations such as welding, chemical cleaning, and sandblasting, the component should be protected, or other securing systems should be used. The employer should fully evaluate the work conditions and environment (including seasonal weather changes) before selecting the appropriate personal fall protection system. Once in use, the system's effectiveness should be monitored. In some cases, a program for cleaning and maintenance of the system may be necessary.

Testing considerations. Before purchasing or putting into use a personal fall arrest system, an employer should obtain from the supplier information about the system based on its performance during testing so that the employer can know if the system meets this standard. Testing should be done using recognized test methods. This appendix contains test methods recognized for evaluating the performance of fall arrest systems. Not all systems may need to be individually tested; the performance of some systems may be based on data and calculations derived from testing of similar systems, provided that enough information is available to demonstrate similarity of function and design.

Component compatibility considerations. Ideally, a personal fall arrest system is designed, tested, and supplied as a complete system. However, it is common practice for lanyards, connectors, lifelines, deceleration devices, body belts and body harnesses to be interchanged since some components wear out before others. The employer and employee should realize that not all components are interchangeable. For instance, a lanyard should not be connected between a body belt (or harness) and a deceleration device of the self-retracting type since this can result in additional free fall for which the system was not designed. Any substitution or change to a personal fall arrest system should be fully evaluated or tested by a competent person to determine that it meets the standard, before the modified system is put in use.

Employee training considerations. Thorough employee training in the selection and use of personal fall arrest systems is imperative. Employees must be trained in the safe use of the system. This should include the following: application limits; proper anchoring and tie-off techniques; estimation of free fall distance, including determination of deceleration distance, and total fall distance to prevent striking a lower level; methods of use; and inspection and storage of the system. Careless or improper use of the equipment can result in serious injury or death. Employers and employees should become familiar with the material in this Appendix, as well as manufacturer's recommendations, before a system is used. Of uppermost importance is the reduction in strength caused by certain tie-offs (such as using knots, tying around sharp edges, etc.) and maximum permitted free fall distance. Also, to be stressed are the importance of inspections prior to use, the limitations of the equipment, and unique conditions at the worksite which may be important in determining the type of system to use.

Instruction considerations. Employers should obtain comprehensive instructions from the supplier as to the system's proper use and application, including, where applicable:

The force measured during the sample force test;

The maximum elongation measured for lanyards during the force test;

The deceleration distance measured for deceleration devices during the force test;

Caution statements on critical use limitations;

Application limits;

Proper hook-up, anchoring and tie-off techniques, including the proper dee-ring or other attachment point to use on the body belt and harness for fall arrest;

Proper climbing techniques;

Methods of inspection, use, cleaning, and storage; and

Specific lifelines which may be used. This information should be provided to employees during training.

Rescue considerations. As required by §1926.502(d)(20), when personal fall arrest systems are used, the employer must assure that employees can be promptly rescued or can rescue themselves should a fall occur. The availability of rescue personnel, ladders or other rescue equipment should be evaluated. In some situations, equipment which allows employees to rescue themselves after the fall has been arrested may be desirable, such as devices which have descent capability.



Rescue comes down to planning and preparing. Some important points to consider:

- Train your rescuers in rescue techniques and practice rescue attempts
- Ensure available equipment is readily available
- Arrange and communicate with other contractors on site
- Arrange and communicate with outside services, if available
- Designate someone to summon them upon arrival
- Plan a route and establish lines of communication

Inspection considerations. As required by §1926.502(d)(21), personal fall arrest systems must be regularly inspected. Any component with any significant defect, such as cuts, tears, abrasions, mold, or undue stretching; alterations or additions which might affect its efficiency; damage due to deterioration; contact with fire, acids, or other corrosives; distorted hooks or faulty hook springs; tongues unfitted to the shoulder of buckles; loose or damaged mountings;

non-functioning parts; or wearing or internal deterioration in the ropes must be withdrawn from service immediately, and should be tagged or marked as unusable, or destroyed.



All fall protection equipment, including harnesses, lanyards, and other connectors must be visually inspected before each use.

Inspect for:

- Cuts, tears, rips, snags, punctures, abrasions, mold, or stretching
 - Alterations or additions which might effect the system's efficiency
 - Damage caused by acids, corrosives
 - Distorted hooks or faulty hook springs
 - Cracked, broken, or deformed D-Ring, carabiners, grommets, and snaphooks
 - Loose, damaged or non-functioning mountings and parts
 - Wearing or any internal deterioration in the ropes
- Color fading possibly indicating UV exposure

Tie-off considerations. (1) One of the most important aspects of personal fall protection systems is fully planning the system *before* it is put into use. Probably the most overlooked component is planning for suitable anchorage points. Such planning should ideally be done before the structure or building is constructed so that anchorage points can be incorporated during construction for use later for window cleaning or other building maintenance. If properly planned, these anchorage points may be used *during* construction, as well as afterwards.

Properly planned anchorages should be used if they are available. In some cases, anchorages must be installed immediately prior to use. In such cases, a registered professional engineer with experience in designing fall protection systems, or another qualified person with appropriate education and experience should design an anchor point to be installed.



In other cases, the Agency recognizes that there will be a need to devise an anchor point from existing structures. Examples of what might be appropriate anchor points are steel members or I-beams if an acceptable strap is available for the connection (do not use a lanyard with a snaphook clipped onto itself); large eye-bolts made of an appropriate grade steel; guardrails or railings if they have been designed for use as an anchor point; or masonry or wood members only if the attachment point is substantial and precautions have been taken to assure that bolts or other connectors will not pull through. A qualified person should be used to evaluate the suitability of these “make shift” anchorages with a focus on proper strength.

Employers and employees should at all times be aware that the strength of a personal fall arrest system is based on its being attached to an anchoring system which does not reduce the strength of the system (such as a properly dimensioned eye-bolt/snap-hook anchorage). Therefore, if a means of attachment is used that will reduce the strength of the system, that component should be replaced by a stronger one, but one that will also maintain the appropriate maximum arrest force characteristics.

Tie-off using a knot in a rope lanyard or lifeline (at any location) can reduce the lifeline or lanyard strength by 50 percent or more. Therefore, a stronger lanyard or lifeline should be used to compensate for the weakening effect of the knot, or the lanyard length should be reduced (or the tie-off location raised) to minimize free fall distance, or the lanyard or lifeline should be replaced by one which has an appropriately incorporated connector to eliminate the need for a knot.

Tie-off of a rope lanyard or lifeline around an “H” or “I” beam or similar support can reduce its strength as much as 70 percent due to the cutting action of the beam edges. Therefore, use should be made of a webbing lanyard or wire core lifeline around the beam; or the lanyard or lifeline should be protected from the edge; or free fall distance should be greatly minimized.

Tie-off where the line passes over or around rough or sharp surfaces reduces strength drastically. Such a tie-off should be avoided or an alternative tie-off rigging should be used. Such alternatives may include use of a snap-hook/dee ring connection, wire rope tie-off, an effective padding of the surfaces, or an abrasion-resistance strap around or over the problem surface.

Horizontal lifelines may, depending on their geometry and angle of sag, be subjected to greater loads than the impact load imposed by an attached component. When the angle of horizontal lifeline sag is less than 30 degrees, the impact force imparted to the lifeline by an attached lanyard is greatly amplified. For example, with a sag angle of 15 degrees, the force amplification is about 2:1 and at 5 degrees sag, it is about 6:1. Depending on the angle of sag, and the line's elasticity, the strength of the horizontal lifeline and the anchorages to which it is attached should be increased a number of times over that of the lanyard. Extreme care should be taken in considering a horizontal lifeline for multiple tie-offs. The reason for this is that in multiple tie-offs to a horizontal lifeline, if one employee falls, the movement of the falling employee and the horizontal lifeline during arrest of the fall may cause other

employees to fall also. Horizontal lifeline and anchorage strength should be increased for each additional employee to be tied off. For these and other reasons, the design of systems using horizontal lifelines must only be done by qualified persons. Testing of installed lifelines and anchors prior to use is recommended.

The strength of an eye-bolt is rated along the axis of the bolt and its strength is greatly reduced if the force is applied at an angle to this axis (in the direction of shear). Also, care should be exercised in selecting the proper diameter of the eye to avoid accidental disengagement of snap-hooks not designed to be compatible for the connection.

Due to the significant reduction in the strength of the lifeline/lanyard (in some cases, as much as a 70 percent reduction), the sliding hitch knot (prusik) should not be used for lifeline/lanyard connections except in emergency situations where no other available system is practical. The "one-and-one" sliding hitch knot should never be used because it is unreliable in stopping a fall. The "two-and-two," or "three-and-three" knot (preferable) may be used in emergency situations; however, care should be taken to limit free fall distance to a minimum because of reduced lifeline/lanyard strength.

Vertical lifeline considerations. As required by the standard, each employee must have a separate lifeline [except employees engaged in constructing elevator shafts who are permitted to have two employees on one lifeline] when the lifeline is vertical. The reason for this is that in multiple tie-offs to a single lifeline, if one employee falls, the movement of the lifeline during the arrest of the fall may pull other employees' lanyards, causing them to fall as well.

Snap-hook considerations. (1) Although not required by this standard for all connections until January 1, 1998, locking snaphooks designed for connection to suitable objects (of sufficient strength) are highly recommended in lieu of the nonlocking type. Locking snaphooks incorporate a positive locking mechanism in addition to the spring loaded keeper, which will not allow the keeper to open under moderate pressure without someone first releasing the mechanism. Such a feature, properly designed, effectively prevents roll-out from occurring.

As required by §1926.502(d)(6), the following connections must be avoided (unless properly designed locking snaphooks are used) because they are conditions which can result in roll-out when a nonlocking snaphook is used:

Direct connection of a snaphook to a horizontal lifeline.

Two (or more) snaphooks connected to one dee-ring.

Two snaphooks connected to each other.

A snaphook connected back on its integral lanyard.

A snaphook connected to a webbing loop or webbing lanyard.

Improper dimensions of the dee-ring, rebar, or other connection point in relation to the snaphook dimensions which would allow the snaphook keeper to be depressed by a turning motion of the snaphook.

Free fall considerations. The employer and employee should at all times be aware that a system's maximum arresting force is evaluated under normal use conditions established by the manufacturer, and in no case using a free fall distance in excess of 6 feet (1.8 m). A few extra feet of free fall can significantly increase the arresting force on the employee, possibly to the point of causing injury. Because of this, the free fall distance should be kept at a minimum, and, as required by the standard, in no case greater than 6 feet (1.8 m). To help assure this, the tie-off attachment point to the lifeline or anchor should be located at or above the connection point of the fall arrest equipment to belt or harness. (Since otherwise additional free fall distance is added to the length of the connecting means (i.e. lanyard)). Attaching to the working surface will often result in a free fall greater than 6 feet (1.8 m). For instance, if a 6 foot (1.8 m) lanyard is used, the total free fall distance will be the distance from the working level to the body belt (or harness) attachment point plus the 6 feet (1.8 m) of lanyard length. Another important consideration is that the arresting force which the fall system must withstand also goes up with greater distances of free fall, possibly exceeding the strength of the system.

Elongation and deceleration distance considerations. Other factors involved in a proper tie-off are elongation and deceleration distance. During the arresting of a fall, a lanyard will experience a length of stretching or elongation, whereas activation of a deceleration device will result in a certain stopping distance. These distances should be available with the lanyard or device's instructions and must be added to the free fall distance to arrive at the total fall distance before an employee is fully stopped. The additional stopping distance may be very significant if the lanyard or deceleration device is attached near or at the end of a long lifeline, which may itself add considerable distance due to its own elongation. As required by the standard, sufficient distance to allow for all of these factors must also be maintained between the employee and obstructions below, to prevent an injury due to impact before the system fully arrests the fall. In addition, a minimum of 12 feet (3.7 m) of lifeline should be allowed below the securing point of a rope grab type deceleration device, and the end terminated to prevent the device from sliding off the lifeline. Alternatively, the lifeline should extend to the ground or the next working level below. These measures are suggested to prevent the worker from inadvertently moving past the end of the lifeline and having the rope grab become disengaged from the lifeline.

Obstruction considerations. The location of the tie-off should also consider the hazard of obstructions in the potential fall path of the employee. Tie-offs which minimize the possibilities of exaggerated swinging should be considered. In addition, when a body belt is used, the employee's body will go through a horizontal position to a jack-knifed position during the arrest of all falls. Thus, obstructions which might interfere with this motion should be avoided or a severe injury could occur.

Other considerations. Because of the design of some personal fall arrest systems, additional considerations may be required for proper tie-off. For example, heavy deceleration devices of the self-retracting type should be secured overhead in order to avoid the weight of the device having to be supported by the employee. Also, if self-retracting equipment is connected to a horizontal lifeline, the sag in the lifeline should be minimized to prevent the device from sliding down the lifeline to a position which creates a swing hazard during fall arrest. In all cases, manufacturer's instructions should be followed.

Appendix D to Subpart M of Part 1926—Positioning Device Systems

Testing Methods For Positioning Device Systems. This appendix serves as a non-mandatory guideline to assist employers comply with the requirements for positioning device systems in §1926.502(e). Paragraphs (b), (c), (d) and (e) of appendix C of subpart M relating to §1926.502(d)—Personal Fall Arrest Systems—set forth test procedures which may be used, along with the procedures listed below, to determine compliance with the requirements for positioning device systems in §1926.502(e) (3) and (4) of subpart M.

General. (1) Single strap positioning devices shall have one end attached to a fixed anchorage and the other end connected to a body belt or harness in the same manner as they would be used to protect employees. Double strap positioning devices, similar to window cleaner's belts, shall have one end of the strap attached to a fixed anchorage and the other end shall hang free. The body belt or harness shall be attached to the strap in the same manner as it would be used to protect employees. The two strap ends shall be adjusted to their maximum span.

The fixed anchorage shall be rigid, and shall not have a deflection greater than .04 inches (1 mm) when a force of 2,250 pounds (10 kN) is applied.

During the testing of all systems, a test weight of 250 pounds plus or minus 3 pounds (113 kg plus or minus 1.6 kg) shall be used. The weight shall be a rigid object with a girth of 38 inches plus or minus 4 inches (96 cm plus or minus 10 cm).

Each test shall consist of dropping the specified weight one time without failure of the system being tested. A new system shall be used for each test.

The test weight for each test shall be hoisted exactly 4 feet (1.2 m above its "at rest" position), and shall be dropped so as to permit a vertical free fall of 4 feet (1.2 m).

The test is failed whenever any breakage or slippage occurs which permits the weight to fall free of the system.

Following the test, the system need not be capable of further operation; however, all such incapacities shall be readily apparent.

Inspection Considerations. As required in §1926.502 (e)(5), positioning device systems must be regularly inspected. Any component with any significant defect, such as cuts, tears,

abrasions, mold, or undue stretching; alterations or additions which might affect its efficiency; damage due to deterioration; contact with fire, acids, or other corrosives; distorted hooks or faulty hook springs; tongues unfitted to the shoulder of buckles; loose or damaged mountings; non-functioning parts; or wearing or internal deterioration in the ropes must be withdrawn from service immediately, and should be tagged or marked as unusable, or destroyed.

Appendix E to Subpart M of Part 1926—Sample Fall Protection Plan

Employers engaged in leading edge work, precast concrete construction work and residential construction work who can demonstrate that it is infeasible or creates a greater hazard to use conventional fall protection systems must develop and follow a fall protection plan. Below are sample fall protection plans developed for precast concrete construction and residential work that could be tailored to be site specific for other precast concrete or residential jobsite. This sample plan can be modified to be used for other work involving leading edge work. The sample plan outlines the elements that must be addressed in any fall protection plan. The reasons outlined in this sample fall protection plan are for illustrative purposes only and are not necessarily a valid, acceptable rationale (unless the conditions at the job site are the same as those covered by these sample plans) for not using conventional fall protection systems for a particular precast concrete or residential construction worksite. However, the sample plans provide guidance to employers on the type of information that is required to be discussed in fall protection plans.

Sample Fall Protection Plans

Fall Protection Plan For Precast/Prestress Concrete Structures

This Fall Protection Plan is specific for the following project:

Location of Job _____
Erecting Company _____
Date Plan Prepared or Modified _____
Plan Prepared By _____
Plan Approved By _____
Plan Supervised By _____

The following Fall Protection Plan is a sample program prepared for the prevention of injuries associated with falls. A Fall Protection Plan must be developed and evaluated on a site by site basis. It is recommended that erectors discuss the written Fall Protection Plan with their OSHA Area Office prior to going on a jobsite.

I. Statement of Company Policy

(Company Name) is dedicated to the protection of its employees from on-the-job injuries. All employees of (Company Name) have the responsibility to work safely on the job. The purpose of this plan is: (a) To supplement our standard safety policy by providing safety standards specifically designed to cover fall protection on this job and; (b) to ensure that each employee

is trained and made aware of the safety provisions which are to be implemented by this plan prior to the start of erection.

This Fall Protection Plan addresses the use of other than conventional fall protection at a number of areas on the project, as well as identifying specific activities that require non-conventional means of fall protection. These areas include:

- a. Connecting activity (point of erection).
- b. Leading edge work.
- c. Unprotected sides or edge.
- d. Grouting.

This plan is designed to enable employers and employees to recognize the fall hazards on this job and to establish the procedures that are to be followed in order to prevent falls to lower levels or through holes and openings in walking/working surfaces. Each employee will be trained in these procedures and strictly adhere to them except when doing so would expose the employee to a greater hazard. If, in the employee's opinion, this is the case, the employee is to notify the foreman of the concern and the concern addressed before proceeding.

Safety policy and procedure on any one project cannot be administered, implemented, monitored and enforced by any one individual. The total objective of a safe, accident free work environment can only be accomplished by a dedicated, concerted effort by every individual involved with the project from management down to the last employee. Each employee must understand their value to the company; the costs of accidents, both monetary, physical, and emotional; the objective of the safety policy and procedures; the safety rules that apply to the safety policy and procedures; and what their individual role is in administering, implementing, monitoring, and compliance of their safety policy and procedures. This allows for a more personal approach to compliance through planning, training, understanding and cooperative effort, rather than by strict enforcement. If for any reason an unsafe act persists, strict enforcement will be implemented.

It is the responsibility of (name of competent person) to implement this Fall Protection Plan. (Name of Competent Person) is responsible for continual observational safety checks of their work operations and to enforce the safety policy and procedures. The foreman also is responsible to correct any unsafe acts or conditions immediately. It is the responsibility of the employee to understand and adhere to the procedures of this plan and to follow the instructions of the foreman. It is also the responsibility of the employee to bring to management's attention any unsafe or hazardous conditions or acts that may cause injury to either themselves or any other employees. Any changes to this Fall Protection Plan must be approved by (name of Qualified Person).

II. Fall Protection Systems To Be Used on This Project

Where conventional fall protection is infeasible or creates a greater hazard at the leading edge and during initial connecting activity, we plan to do this work using a safety monitoring system and expose only a minimum number of employees for the time necessary to actually accomplish the job. The maximum number of workers to be monitored by one safety monitor is six (6). We are designating the following trained employees as designated erectors and they are permitted to enter the controlled access zones and work without the use of conventional fall protection.

Safety monitor:

Designated erector:

Designated erector:

Designated erector:

Designated erector:

Designated erector:

Designated erector:

The safety monitor shall be identified by wearing an orange hard hat. The designated erectors will be identified by one of the following methods:

1. They will wear a blue colored arm band, or
2. They will wear a blue colored hard hat, or
3. They will wear a blue colored vest.

Only individuals with the appropriate experience, skills, and training will be authorized as designated erectors. All employees that will be working as designated erectors under the safety monitoring system shall have been trained and instructed in the following areas:

1. Recognition of the fall hazards in the work area (at the leading edge and when making initial connections—point of erection).
2. Avoidance of fall hazards using established work practices which have been made known to the employees.
3. Recognition of unsafe practices or working conditions that could lead to a fall, such as windy conditions.

4. The function, use, and operation of safety monitoring systems, guardrail systems, body belt/harness systems, control zones and other protection to be used.
5. The correct procedure for erecting, maintaining, disassembling and inspecting the system(s) to be used.
6. Knowledge of construction sequence or the erection plan.

A conference will take place prior to starting work involving all members of the erection crew, crane crew and supervisors of any other concerned contractors. This conference will be conducted by the precast concrete erection supervisor in charge of the project. During the pre-work conference, erection procedures and sequences pertinent to this job will be thoroughly discussed and safety practices to be used throughout the project will be specified. Further, all personnel will be informed that the controlled access zones are off limits to all personnel other than those designated erectors specifically trained to work in that area.

Safety Monitoring System

A safety monitoring system means a fall protection system in which a competent person is responsible for recognizing and warning employees of fall hazards. The duties of the safety monitor are to:

1. Warn by voice when approaching the open edge in an unsafe manner.
2. Warn by voice if there is a dangerous situation developing which cannot be seen by another person involved with product placement, such as a member getting out of control.
3. Make the designated erectors aware they are in a dangerous area.
4. Be competent in recognizing fall hazards.
5. Warn employees when they appear to be unaware of a fall hazard or are acting in an unsafe manner.
6. Be on the same walking/working surface as the monitored employees and within visual sighting distance of the monitored employees.
7. Be close enough to communicate orally with the employees.
8. Not allow other responsibilities to encumber monitoring. If the safety monitor becomes too encumbered with other responsibilities, the monitor shall (1) stop the erection process; and (2) turn over other responsibilities to a designated erector; or (3) turn over the safety monitoring function to another designated, competent person. The safety monitoring system shall not be used when the wind is strong enough to cause loads with large surface areas to swing out of radius, or result in loss of control of the load, or when weather conditions cause the walking-working surfaces to become icy or slippery.

Control Zone System

A controlled access zone means an area designated and clearly marked, in which leading edge work may take place without the use of guardrail, safety net or personal fall arrest systems to protect the employees in the area. Control zone systems shall comply with the following provisions:

1. When used to control access to areas where leading edge and other operations are taking place the controlled access zone shall be defined by a control line or by any other means that restricts access.

When control lines are used, they shall be erected not less than 6 feet (1.8 m) nor more than 60 feet (18 m) or half the length of the member being erected, whichever is less, from the leading edge.

2. The control line shall extend along the entire length of the unprotected or leading edge and shall be approximately parallel to the unprotected or leading edge.

3. The control line shall be connected on each side to a guardrail system or wall.

4. Control lines shall consist of ropes, wires, tapes, or equivalent materials, and supporting stanchions as follows:

5. Each line shall be flagged or otherwise clearly marked at not more than 6-foot (1.8 m) intervals with high- visibility material.

6. Each line shall be rigged and supported in such a way that its lowest point (including sag) is not less than 39 inches (1 m) from the walking/working surface and its highest point is not more than 45 inches (1.3 m) from the walking/working surface.

7. Each line shall have a minimum breaking strength of 200 pounds (.88 kN).

Holes

All openings greater than 12 in.×12 in. will have perimeter guarding or covering. All predetermined holes will have the plywood covers made in the precasters' yard and shipped with the member to the jobsite. Prior to cutting holes on the job, proper protection for the hole must be provided to protect the workers. Perimeter guarding or covers will not be removed without the approval of the erection foreman.

Precast concrete column erection through the existing deck requires that many holes be provided through this deck. These are to be covered and protected. Except for the opening being currently used to erect a column, all opening protection is to be left undisturbed. The opening being uncovered to erect a column will become part of the point of erection and will be addressed as part of this Fall Protection Plan. This uncovering is to be done at the erection foreman's direction and will only occur immediately prior to "feeding" the column through the

opening. Once the end of the column is through the slab opening, there will no longer exist a fall hazard at this location.

III. Implementation of Fall Protection Plan

The structure being erected is a multistory total precast concrete building consisting of columns, beams, wall panels and hollow core slabs and double tee floor and roof members.

The following is a list of the products and erection situations on this job:

Columns

For columns 10 ft to 36 ft long, employees disconnecting crane hooks from columns will work from a ladder and wear a body belt/harness with lanyard and be tied off when both hands are needed to disconnect. For tying off, a vertical lifeline will be connected to the lifting eye at the top of the column, prior to lifting, to be used with a manually operated or mobile rope grab. For columns too high for the use of a ladder, 36 ft and higher, an added cable will be used to reduce the height of the disconnecting point so that a ladder can be used. This cable will be left in place until a point in erection that it can be removed safely. In some cases, columns will be unhooked from the crane by using an erection tube or shackle with a pull pin which is released from the ground after the column is stabilized.

The column will be adequately connected and/or braced to safely support the weight of a ladder with an employee on it.

Inverted Tee Beams

Employees erecting inverted tee beams, at a height of 6 to 40 ft, will erect the beam, make initial connections, and final alignment from a ladder. If the employee needs to reach over the side of the beam to bar or make an adjustment to the alignment of the beam, they will mount the beam and be tied off to the lifting device in the beam after ensuring the load has been stabilized on its bearing. To disconnect the crane from the beam an employee will stand a ladder against the beam. Because the use of ladders is not practical at heights above 40 ft, beams will be initially placed with the use of tag lines and their final alignment made by a person on a manlift or similar employee positioning systems.

Spandrel Beams

Spandrel beams at the exterior of the building will be aligned as closely as possible with the use of tag lines with the final placement of the spandrel beam made from a ladder at the open end of the structure. A ladder will be used to make the initial connections and a ladder will be used to disconnect the crane. The other end of the beam will be placed by the designated erector from the double tee deck under the observation of the safety monitor.

The beams will be adequately connected and/or braced to safely support the weight of a ladder with an employee on it.

Floor and Roof Members

During installation of the precast concrete floor and/or roof members, the work deck continuously increases in area as more and more units are being erected and positioned. Thus, the unprotected floor/roof perimeter is constantly modified with the leading edge changing location as each member is installed. The fall protection for workers at the leading edge shall be assured by properly constructed and maintained control zone lines not more than 60 ft away from the leading edge supplemented by a safety monitoring system to ensure the safety of all designated erectors working within the area defined by the control zone lines.

The hollow core slabs erected on the masonry portion of the building will be erected and grouted using the safety monitoring system. Grout will be placed in the space between the end of the slab and face shell of the concrete masonry by dumping from a wheelbarrow. The grout in the keyways between the slabs will be dumped from a wheelbarrow and then spread with long handled tools, allowing the worker to stand erect facing toward the unprotected edge and back from any work deck edge.

Whenever possible, the designated erectors will approach the incoming member at the leading edge only after it is below waist height so that the member itself provides protection against falls.

Except for the situations described below, when the arriving floor or roof member is within 2 to 3 inches of its final position, the designated erectors can then proceed to their position of erection at each end of the member under the control of the safety monitor. Crane hooks will be unhooked from double tee members by designated erectors under the direction and supervision of the safety monitor.

Designated erectors, while waiting for the next floor or roof member, will be constantly under the control of the safety monitor for fall protection and are directed to stay a minimum of six (6) ft from the edge. In the event a designated erector must move from one end of a member, which has just been placed at the leading edge, they must first move away from the leading edge a minimum of six (6) ft and then progress to the other end while maintaining the minimum distance of six (6) ft at all times.

Erection of double tees, where conditions require bearing of one end into a closed pocket and the other end on a beam ledge, restricting the tee legs from going directly into the pockets, require special considerations. The tee legs that are to bear in the closed pocket must hang lower than those at the beam bearing. The double tee will be "two-lined" in order to elevate one end higher than the other to allow for the low end to be ducked into the closed pocket using the following procedure.

The double tee will be rigged with a standard four-way spreader off of the main load line. An additional choker will be attached to the married point of the two-legged spreader at the end of the tee that is to be elevated. The double tee will be hoisted with the main load line and swung into a position as close as possible to the tee's final bearing elevation. When the tee is

in this position and stabilized, the whip line load block will be lowered to just above the tee deck. At this time, two erectors will walk out on the suspended tee deck at midspan of the tee member and pull the load block to the end of the tee to be elevated and attach the additional choker to the load block. The possibility of entanglement with the crane lines and other obstacles during this two lining process while raising and lowering the crane block on that second line could be hazardous to an encumbered employee. Therefore, the designated erectors will not tie off during any part of this process. While the designated erectors are on the double tee, the safety monitoring system will be used. After attaching the choker, the two erectors then step back on the previously erected tee deck and signal the crane operator to hoist the load with the whip line to the elevation that will allow for enough clearance to let the low end tee legs slide into the pockets when the main load line is lowered. The erector, who is handling the lowered end of the tee at the closed pocket bearing, will step out on the suspended tee. An erection bar will then be placed between the end of the tee leg and the inside face of the pocketed spandrel member. The tee is barred away from the pocketed member to reduce the friction and lateral force against the pocketed member. As the tee is being lowered, the other erector remains on the tee which was previously erected to handle the other end. At this point the tee is slowly lowered by the crane to a point where the tee legs can freely slide into the pockets. The erector working the lowered end of the tee must keep pressure on the bar between the tee and the face of the pocketed spandrel member to very gradually let the tee legs slide into the pocket to its proper bearing dimension. The tee is then slowly lowered into its final erected position.

The designated erector should be allowed onto the suspended double tee, otherwise there is no control over the horizontal movement of the double tee and this movement could knock the spandrel off of its bearing or the column out of plumb. The control necessary to prevent hitting the spandrel can only be done safely from the top of the double tee being erected.

Loadbearing Wall Panels: The erection of the loadbearing wall panels on the elevated decks requires the use of a safety monitor and a controlled access zone that is a minimum of 25 ft and a maximum of 1/2 the length of the wall panels away from the unprotected edge, so that designated erectors can move freely and unencumbered when receiving the panels. Bracing, if required for stability, will be installed by ladder. After the braces are secured, the crane will be disconnected from the wall by using a ladder. The wall to wall connections will also be performed from a ladder.

Non-Loadbearing Panels (Cladding): The locating of survey lines, panel layout and other installation prerequisites (prewelding, etc.) for non-loadbearing panels (cladding) will not commence until floor perimeter and floor openings have been protected. In some areas, it is necessary because of panel configuration to remove the perimeter protection as the cladding is being installed. Removal of perimeter protection will be performed on a bay to bay basis, just ahead of cladding erection to minimize temporarily unprotected floor edges. Those workers within 6 ft of the edge, receiving and positioning the cladding when the perimeter protection is removed shall be tied off.

Detailing

Employees exposed to falls of six (6) feet or more to lower levels, who are not actively engaged in leading edge work or connecting activity, such as welding, bolting, cutting, bracing, guying, patching, painting or other operations, and who are working less than six (6) ft from an unprotected edge will be tied off at all times or guardrails will be installed.

Employees engaged in these activities but who are more than six (6) ft from an unprotected edge as defined by the control zone lines, do not require fall protection but a warning line or control lines must be erected to remind employees they are approaching an area where fall protection is required.

IV. Conventional Fall Protection Considered for the Point of Erection or Leading Edge Erection Operations

A. Personal Fall Arrest Systems

In this particular erection sequence and procedure, personal fall arrest systems requiring body belt/harness systems, lifelines and lanyards will not reduce possible hazards to workers and will create offsetting hazards during their usage at the leading edge of precast/prestressed concrete construction.

Leading edge erection and initial connections are conducted by employees who are specifically trained to do this type of work and are trained to recognize the fall hazards. The nature of such work normally exposes the employee to the fall hazard for a short period of time and installation of fall protection systems for a short duration is not feasible because it exposes the installers of the system to the same fall hazard, but for a longer period of time.

1. It is necessary that the employee be able to move freely without encumbrance in order to guide the sections of precast concrete into their final position without having lifelines attached which will restrict the employee's ability to move about at the point of erection.
2. A typical procedure requires 2 or more workers to maneuver around each other as a concrete member is positioned to fit into the structure. If they are each attached to a lifeline, part of their attention must be diverted from their main task of positioning a member weighing several tons to the task of avoiding entanglements of their lifelines or avoiding tripping over lanyards. Therefore, if these workers are attached to lanyards, more fall potential would result than from not using such a device.

In this specific erection sequence and procedure, retractable lifelines do not solve the problem of two workers becoming tangled. In fact, such a tangle could prevent the lifeline from retracting as the worker moved, thus potentially exposing the worker to a fall greater than 6 ft. Also, a worker crossing over the lifeline of another worker can create a hazard because the movement of one person can unbalance the other. In the event of a fall by one person there is a likelihood that the other person will be caused to fall as well. In addition, if contamination such as grout (during hollow core grouting) enters the retractable housing it

can cause excessive wear and damage to the device and could clog the retracting mechanism as the lanyard is dragged across the deck. Obstructing the cable orifice can defeat the device's shock absorbing function, produce cable slack and damage, and adversely affect cable extraction and retraction.

3. Employees tied to a lifeline can be trapped and crushed by moving structural members if the employee becomes restrained by the lanyard or retractable lifeline and cannot get out of the path of the moving load.

The sudden movement of a precast concrete member being raised by a crane can be caused by a number of factors. When this happens, a connector may immediately have to move a considerable distance to avoid injury. If a tied off body belt/harness is being used, the connector could be trapped. Therefore, there is a greater risk of injury if the connector is tied to the structure for this specific erection sequence and procedure.

When necessary to move away from a retractable device, the worker cannot move at a rate greater than the device locking speed typically 3.5 to 4.5 ft/sec. When moving toward the device it is necessary to move at a rate which does not permit cable slack to build up. This slack may cause cable retraction acceleration and cause a worker to lose their balance by applying a higher than normal jerking force on the body when the cable suddenly becomes taut after building up momentum. This slack can also cause damage to the internal spring-loaded drum, uneven coiling of cable on the drum, and possible cable damage.

The factors causing sudden movements for this location include:

(a) Cranes

- (1) Operator error.
- (2) Site conditions (soft or unstable ground).
- (3) Mechanical failure.
- (4) Structural failure.
- (5) Rigging failure.
- (6) Crane signal/radio communication failure.

(b) Weather Conditions

- (1) Wind (strong wind/sudden gusting)—particularly a problem with the large surface areas of precast concrete members.
- (2) Snow/rain (visibility).

(3) Fog (visibility).

(4) Cold—causing slowed reactions or mechanical problems.

(c) Structure/Product Conditions.

(1) Lifting Eye failure.

(2) Bearing failure or slippage.

(3) Structure shifting.

(4) Bracing failure.

(5) Product failure.

(d) Human Error.

(1) Incorrect tag line procedure.

(2) Tag line hang-up.

(3) Incorrect or misunderstood crane signals.

(4) Misjudged elevation of member.

(5) Misjudged speed of member.

(6) Misjudged angle of member.

4. Anchorages or special attachment points could be cast into the precast concrete members if sufficient preplanning and consideration of erectors' position is done before the members are cast. Any hole or other attachment must be approved by the engineer who designed the member. It is possible that some design restrictions will not allow a member to be weakened by an additional hole; however, it is anticipated that such situations would be the exception, not the rule. Attachment points, other than on the deck surface, will require removal and/or patching. In order to remove and/or patch these points, requires the employee to be exposed to an additional fall hazard at an unprotected perimeter. The fact that attachment points could be available anywhere on the structure does not eliminate the hazards of using these points for tying off as discussed above. A logical point for tying off on double tees would be using the lifting loops, except that they must be cut off to eliminate a tripping hazard at an appropriate time.

5. Providing attachment at a point above the walking/working surface would also create fall exposures for employees installing their devices. Final positioning of a precast concrete member requires it to be moved in such a way that it must pass through the area that would

be occupied by the lifeline and the lanyards attached to the point above. Resulting entanglements of lifelines and lanyards on a moving member could pull employees from the work surface. Also, the structure is being created and, in most cases, there is no structure above the members being placed.

(a) Temporary structural supports, installed to provide attaching points for lifelines limit the space which is essential for orderly positioning, alignment and placement of the precast concrete members. To keep the lanyards a reasonable and manageable length, lifeline supports would necessarily need to be in proximity to the positioning process. A sudden shift of the precast concrete member being positioned because of wind pressure or crane movement could make it strike the temporary supporting structure, moving it suddenly and causing tied off employees to fall.

(b) The time in manhours which would be expended in placing and maintaining temporary structural supports for lifeline attaching points could exceed the expended manhours involved in placing the precast concrete members. No protection could be provided for the employees erecting the temporary structural supports and these supports would have to be moved for each successive step in the construction process, thus greatly increasing the employee's exposure to the fall hazard.

(c) The use of a cable strung horizontally between two columns to provide tie off lines for erecting or walking a beam for connecting work is not feasible and creates a greater hazard on this multi-story building for the following reasons:

(1) If a connector is to use such a line, it must be installed between the two columns. To perform this installation requires an erector to have more fall exposure time attaching the cable to the columns than would be spent to make the beam to column connection itself.

(2) If such a line is to be installed so that an erector can walk along a beam, it must be overhead or below him. For example, if a connector must walk along a 24 in. wide beam, the presence of a line next to the connector at waist level, attached directly to the columns, would prevent the connector from centering their weight over the beam and balancing themselves. Installing the line above the connector might be possible on the first level of a two-story column; however, the column may extend only a few feet above the floor level at the second level or be flush with the floor level. Attaching the line to the side of the beam could be a solution; however, it would require the connector to attach the lanyard below foot level which would most likely extend a fall farther than 6 ft.

(3) When lines are strung over every beam, it becomes more and more difficult for the crane operator to lower a precast concrete member into position without the member becoming fouled. Should the member become entangled, it could easily dislodge the line from a column. If a worker is tied to it at the time, a fall could be caused.

6. The ANSI A10.14–1991 American National Standard for Construction and Demolition Operations—Requirements for Safety Belts, Harnesses, Lanyards and Lifelines for

Construction and Demolition Use, states that the anchor point of a lanyard or deceleration device should, if possible, be located above the wearer's belt or harness attachment. ANSI A10.14 also states that a suitable anchorage point is one which is located as high as possible to prevent contact with an obstruction below should the worker fall. Most manufacturers also warn in the user's handbook that the safety block/retractable lifeline must be positioned above the D-ring (above the work space of the intended user) and OSHA recommends that fall arrest and restraint equipment be used in accordance with the manufacturer's instructions.

Attachment of a retractable device to a horizontal cable near floor level or using the inserts in the floor or roof members may result in increased free fall due to the dorsal D-ring of the full-body harness riding higher than the attachment point of the snaphook to the cable or insert (e.g., 6 foot tall worker with a dorsal D-ring at 5 feet above the floor or surface, reduces the working length to only one foot, by placing the anchorage five feet away from the fall hazard). In addition, impact loads may exceed maximum fall arrest forces (MAF) because the fall arrest D-ring would be 4 to 5 feet higher than the safety block/retractable lifeline anchored to the walking-working surface; and the potential for swing hazards is increased.

Manufacturers also require that workers not work at a level where the point of snaphook attachment to the body harness is above the device because this will increase the free fall distance and the deceleration distance and will cause higher forces on the body in the event of an accidental fall.

Manufacturers recommend an anchorage for the retractable lifeline which is immovably fixed in space and is independent of the user's support systems. A moveable anchorage is one which can be moved around (such as equipment or wheeled vehicles) or which can deflect substantially under shock loading (such as a horizontal cable or very flexible beam). In the case of a very flexible anchorage, a shock load applied to the anchorage during fall arrest can cause oscillation of the flexible anchorage such that the retractable brake mechanism may undergo one or more cycles of locking/unlocking/locking (ratchet effect) until the anchorage deflection is dampened. Therefore, use of a moveable anchorage involves critical engineering and safety factors and should only be considered after fixed anchorage has been determined to be not feasible.

Horizontal cables used as an anchorage present an additional hazard due to amplification of the horizontal component of maximum arrest force (of a fall) transmitted to the points where the horizontal cable is attached to the structure. This amplification is due to the angle of sag of a horizontal cable and is most severe for small angles of sag. For a cable sag angle of 2 degrees the horizontal force on the points of cable attachment can be amplified by a factor of 15.

It is also necessary to install the retractable device vertically overhead to minimize swing falls. If an object is in the worker's swing path (or that of the cable) hazardous situations exist: (1) due to the swing, horizontal speed of the user may be high enough to cause injury when an obstacle in the swing fall path is struck by either the user or the cable; (2) the total vertical fall

distance of the user may be much greater than if the user had fallen only vertically without a swing fall path.

With retractable lines, overconfidence may cause the worker to engage in inappropriate behavior, such as approaching the perimeter of a floor or roof at a distance appreciably greater than the shortest distance between the anchorage point and the leading edge. Though the retractable lifeline may arrest a worker's fall before he or she has fallen a few feet, the lifeline may drag along the edge of the floor or beam and swing the worker like a pendulum until the line has moved to a position where the distance between the anchorage point and floor edge is the shortest distance between those two points. Accompanying this pendulum swing is a lowering of the worker, with the attendant danger that he or she may violently impact the floor or some obstruction below.

The risk of a cable breaking is increased if a lifeline is dragged sideways across the rough surface or edge of a concrete member at the same moment that the lifeline is being subjected to a maximum impact loading during a fall. The typical 3/16 in. cable in a retractable lifeline has a breaking strength of from 3000 to 3700 lbs.

7. The competent person, who can take into account the specialized operations being performed on this project, should determine when and where a designated erector cannot use a personal fall arrest system.

B. Safety Net Systems

The nature of this particular precast concrete erection worksite precludes the safe use of safety nets where point of erection or leading edge work must take place.

1. To install safety nets in the interior high bay of the single story portion of the building poses rigging attachment problems. Structural members do not exist to which supporting devices for nets can be attached in the area where protection is required. As the erection operation advances, the location of point of erection or leading edge work changes constantly as each member is attached to the structure. Due to this constant change it is not feasible to set net sections and build separate structures to support the nets.

2. The nature of the erection process for the precast concrete members is such that an installed net would protect workers as they position and secure only one structural member. After each member is stabilized the net would have to be moved to a new location (this could mean a move of 8 to 10 ft or the possibility of a move to a different level or area of the structure) to protect workers placing the next piece in the construction sequence. The result would be the installation and dismantling of safety nets repeatedly throughout the normal work day. As the time necessary to install a net, test, and remove it is significantly greater than the time necessary to position and secure a precast concrete member, the exposure time for the worker installing the safety net would be far longer than for the workers whom the net is intended to protect. The time exposure repeats itself each time the nets and supporting

hardware must be moved laterally or upward to provide protection at the point of erection or leading edge.

3. Strict interpretation of §1926.502(c) requires that operations shall not be undertaken until the net is in place and has been tested. With the point of erection constantly changing, the time necessary to install and test a safety net significantly exceeds the time necessary to position and secure the concrete member.

4. Use of safety nets on exposed perimeter wall openings and opensided floors, causes attachment points to be left in architectural concrete which must be patched and filled with matching material after the net supporting hardware is removed. In order to patch these openings, additional numbers of employees must be suspended by swing stages, boatswain chairs or other devices, thereby increasing the amount of fall exposure time to employees.

5. Installed safety nets pose an additional hazard at the perimeter of the erected structure where limited space is available in which members can be turned after being lifted from the ground by the crane. There would be a high probability that the member being lifted could become entangled in net hardware, cables, etc.

6. The use of safety nets where structural wall panels are being erected would prevent movement of panels to point of installation. To be effective, nets would necessarily have to provide protection across the area where structural supporting wall panels would be set and plumbed before roof units could be placed.

7. Use of a tower crane for the erection of the high rise portion of the structure poses a particular hazard in that the crane operator cannot see or judge the proximity of the load in relation to the structure or nets. If the signaler is looking through nets and supporting structural devices while giving instructions to the crane operator, it is not possible to judge precise relationships between the load and the structure itself or to nets and supporting structural devices. This could cause the load to become entangled in the net or hit the structure causing potential damage.

C. Guardrail Systems

On this particular worksite, guardrails, barricades, ropes, cables or other perimeter guarding devices or methods on the erection floor will pose problems to safe erection procedures. Typically, a floor or roof is erected by placing 4 to 10 ft wide structural members next to one another and welding or grouting them together. The perimeter of a floor and roof changes each time a new member is placed into position. It is unreasonable and virtually impossible to erect guardrails and toe boards at the ever changing leading edge of a floor or roof.

1. To position a member safely it is necessary to remove all obstructions extending above the floor level near the point of erection. Such a procedure allows workers to swing a new member across the erected surface as necessary to position it properly without worrying about knocking material off of this surface.

Hollow core slab erection on the masonry wall requires installation of the perimeter protection where the masonry wall has to be constructed. This means the guardrail is installed then subsequently removed to continue the masonry construction. The erector will be exposed to a fall hazard for a longer period of time while installing and removing perimeter protection than while erecting the slabs.

In hollow core work, as in other precast concrete erection, others are not typically on the work deck until the precast concrete erection is complete. The deck is not complete until the leveling, aligning, and grouting of the joints is done. It is normal practice to keep others off the deck until at least the next day after the installation is complete to allow the grout to harden.

2. There is no permanent boundary until all structural members have been placed in the floor or roof. At the leading edge, workers are operating at the temporary edge of the structure as they work to position the next member in the sequence. Compliance with the standard would require a guardrail and toe board be installed along this edge. However, the presence of such a device would prevent a new member from being swung over the erected surface low enough to allow workers to control it safely during the positioning process. Further, these employees would have to work through the guardrail to align the new member and connect it to the structure. The guardrail would not protect an employee who must lean through it to do the necessary work, rather it would hinder the employee to such a degree that a greater hazard is created than if the guardrail were absent.

3. Guardrail requirements pose a hazard at the leading edge of installed floor or roof sections by creating the possibility of employees being caught between guardrails and suspended loads. The lack of a clear work area in which to guide the suspended load into position for placement and welding of members into the existing structure creates still further hazards.

4. Where erection processes require precast concrete stairways or openings to be installed as an integral part of the overall erection process, it must also be recognized that guardrails or handrails must not project above the surface of the erection floor. Such guardrails should be terminated at the level of the erection floor to avoid placing hazardous obstacles in the path of a member being positioned.

V. Other Fall Protection Measures Considered for This Job

The following is a list and explanation of other fall protection measures available and an explanation of limitations for use on this particular jobsite. If during the course of erecting the building the employee sees an area that could be erected more safely by the use of these fall protection measures, the foreman should be notified.

A. Scaffolds are not used because:

1. The leading edge of the building is constantly changing and the scaffolding would have to be moved at very frequent intervals. Employees erecting and dismantling the scaffolding

would be exposed to fall hazards for a greater length of time than they would by merely erecting the precast concrete member.

2. A scaffold tower could interfere with the safe swinging of a load by the crane.

3. Power lines, terrain and site do not allow for the safe use of scaffolding.

B. Vehicle mounted platforms are not used because:

1. A vehicle mounted platform will not reach areas on the deck that are erected over other levels.

2. The leading edge of the building is usually over a lower level of the building and this lower level will not support the weight of a vehicle mounted platform.

3. A vehicle mounted platform could interfere with the safe swinging of a load by the crane, either by the crane swinging the load over or into the equipment.

4. Power lines and surrounding site work do not allow for the safe use of a vehicle mounted platform.

C. Crane suspended personnel platforms are not used because:

1. A second crane close enough to suspend any employee in the working and erecting area could interfere with the safe swinging of a load by the crane hoisting the product to be erected.

2. Power lines and surrounding site work do not allow for the safe use of a second crane on the job.

VI. Enforcement

Constant awareness of and respect for fall hazards, and compliance with all safety rules are considered conditions of employment. The jobsite Superintendent, as well as individuals in the Safety and Personnel Department, reserve the right to issue disciplinary warnings to employees, up to and including termination, for failure to follow the guidelines of this program.

VII. Accident Investigations

All accidents that result in injury to workers, regardless of their nature, shall be investigated and reported. It is an integral part of any safety program that documentation take place as soon as possible so that the cause and means of prevention can be identified to prevent a reoccurrence.

In the event that an employee falls or there is some other related, serious incident occurring, this plan shall be reviewed to determine if additional practices, procedures, or training need to be implemented to prevent similar types of falls or incidents from occurring.

VIII. Changes to Plan

Any changes to the plan will be approved by (name of the qualified person). This plan shall be reviewed by a qualified person as the job progresses to determine if additional practices, procedures or training needs to be implemented by the competent person to improve or provide additional fall protection. Workers shall be notified and trained, if necessary, in the new procedures. A copy of this plan and all approved changes shall be maintained at the jobsite.

Sample Fall Protection Plan for Residential Construction

(Insert Company Name)

This Fall Protection Plan Is Specific For The Following Project:

Location of Job _____
Date Plan Prepared or Modified _____
Plan Prepared By _____
Plan Approved By _____
Plan Supervised By _____

The following Fall Protection Plan is a sample program prepared for the prevention of injuries associated with falls. A Fall Protection Plan must be developed and evaluated on a site by site basis. It is recommended that builders discuss the written Fall Protection Plan with their OSHA Area Office prior to going on a jobsite.

I. Statement of Company Policy

(Your company name here) is dedicated to the protection of its employees from on-the-job injuries. All employees of (Your company name here) have the responsibility to work safely on the job. The purpose of the plan is to supplement our existing safety and health program and to ensure that every employee who works for (Your company name here) recognizes workplace fall hazards and takes the appropriate measures to address those hazards.

This Fall Protection Plan addresses the use of conventional fall protection at a number of areas on the project, as well as identifies specific activities that require non-conventional means of fall protection. During the construction of residential buildings under 48 feet in height, it is sometimes infeasible or it creates a greater hazard to use conventional fall protection systems at specific areas or for specific tasks. The areas or tasks may include, but are not limited to:

a. Setting and bracing of roof trusses and rafters;

- b. Installation of floor sheathing and joists;
- c. Roof sheathing operations; and
- d. Erecting exterior walls.

In these cases, conventional fall protection systems may not be the safest choice for builders. This plan is designed to enable employers and employees to recognize the fall hazards associated with this job and to establish the safest procedures that are to be followed in order to prevent falls to lower levels or through holes and openings in walking/working surfaces.

Each employee will be trained in these procedures and will strictly adhere to them except when doing so would expose the employee to a greater hazard. If, in the employee's opinion, this is the case, the employee is to notify the competent person of their concern and have the concern addressed before proceeding.

It is the responsibility of (name of competent person) to implement this Fall Protection Plan. Continual observational safety checks of work operations and the enforcement of the safety policy and procedures shall be regularly enforced. The crew supervisor or foreman (insert name) is responsible for correcting any unsafe practices or conditions immediately.

It is the responsibility of the employer to ensure that all employees understand and adhere to the procedures of this plan and to follow the instructions of the crew supervisor. It is also the responsibility of the employee to bring to management's attention any unsafe or hazardous conditions or practices that may cause injury to either themselves or any other employees. Any changes to the Fall Protection Plan must be approved by (name of qualified person).

II. Fall Protection Systems To Be Used on This Job

Installation of roof trusses/rafters, exterior wall erection, roof sheathing, floor sheathing and joist/truss activities will be conducted by employees who are specifically trained to do this type of work and are trained to recognize the fall hazards. The nature of such work normally exposes the employee to the fall hazard for a short period of time. This Plan details how (Your company name here) will minimize these hazards.

Controlled Access Zones

When using the Plan to implement the fall protection options available, workers must be protected through limited access to high hazard locations. Before any non-conventional fall protection systems are used as part of the work plan, a controlled access zone (CAZ) shall be clearly defined by the competent person as an area where a recognized hazard exists. The demarcation of the CAZ shall be communicated by the competent person in a recognized manner, either through signs, wires, tapes, ropes or chains.

(Your company name here) shall take the following steps to ensure that the CAZ is clearly marked or controlled by the competent person:

- All access to the CAZ must be restricted to authorized entrants;
- All workers who are permitted in the CAZ shall be listed in the appropriate sections of the Plan (or be visibly identifiable by the competent person) prior to implementation;
- The competent person shall ensure that all protective elements of the CAZ be implemented prior to the beginning of work.

Installation Procedures for Roof Truss and Rafter Erection

During the erection and bracing of roof trusses/rafters, conventional fall protection may present a greater hazard to workers. On this job, safety nets, guardrails and personal fall arrest systems will not provide adequate fall protection because the nets will cause the walls to collapse, while there are no suitable attachment or anchorage points for guardrails or personal fall arrest systems.

On this job, requiring workers to use a ladder for the entire installation process will cause a greater hazard because the worker must stand on the ladder with his back or side to the front of the ladder. While erecting the truss or rafter the worker will need both hands to maneuver the truss and therefore cannot hold onto the ladder. In addition, ladders cannot be adequately protected from movement while trusses are being maneuvered into place. Many workers may experience additional fatigue because of the increase in overhead work with heavy materials, which can also lead to a greater hazard.

Exterior scaffolds cannot be utilized on this job because the ground, after recent backfilling, cannot support the scaffolding. In most cases, the erection and dismantling of the scaffold would expose workers to a greater fall hazard than erection of the trusses/rafters.

On all walls eight feet or less, workers will install interior scaffolds along the interior wall below the location where the trusses/rafters will be erected. "Sawhorse" scaffolds constructed of 46 inch sawhorses and 2×10 planks will often allow workers to be elevated high enough to allow for the erection of trusses and rafters without working on the top plate of the wall.

In structures that have walls higher than eight feet and where the use of scaffolds and ladders would create a greater hazard, safe working procedures will be utilized when working on the top plate and will be monitored by the crew supervisor. During all stages of truss/rafter erection the stability of the trusses/rafters will be ensured at all times.

(Your company name here) shall take the following steps to protect workers who are exposed to fall hazards while working from the top plate installing trusses/rafters:

- Only the following trained workers will be allowed to work on the top plate during roof truss or rafter installation:

- Workers shall have no other duties to perform during truss/rafter erection procedures;
- All trusses/rafters will be adequately braced before any worker can use the truss/rafter as a support;
- Workers will remain on the top plate using the previously stabilized truss/rafter as a support while other trusses/rafters are being erected;
- Workers will leave the area of the secured trusses only when it is necessary to secure another truss/rafter;
- The first two trusses/rafters will be set from ladders leaning on side walls at points where the walls can support the weight of the ladder; and
- A worker will climb onto the interior top plate via a ladder to secure the peaks of the first two trusses/rafters being set.

The workers responsible for detaching trusses from cranes and/or securing trusses at the peaks traditionally are positioned at the peak of the trusses/rafters. There are also situations where workers securing rafters to ridge beams will be positioned on top of the ridge beam.

(Your company name here) shall take the following steps to protect workers who are exposed to fall hazards while securing trusses/rafters at the peak of the trusses/ridge beam:

- Only the following trained workers will be allowed to work at the peak during roof truss or rafter installation:

- Once truss or rafter installation begins, workers not involved in that activity shall not stand or walk below or adjacent to the roof opening or exterior walls in any area where they could be struck by falling objects;
- Workers shall have no other duties than securing/bracing the trusses/ridge beam;
- Workers positioned at the peaks or in the webs of trusses or on top of the ridge beam shall work from a stable position, either by sitting on a “ridge seat” or other equivalent surface that

provides additional stability or by positioning themselves in previously stabilized trusses/rafters and leaning into and reaching through the trusses/rafters;

- Workers shall not remain on or in the peak/ridge any longer than necessary to safely complete the task.

Roof Sheathing Operations

Workers typically install roof sheathing after all trusses/rafters and any permanent truss bracing is in place. Roof structures are unstable until some sheathing is installed, so workers installing roof sheathing cannot be protected from fall hazards by conventional fall protection systems until it is determined that the roofing system can be used as an anchorage point. At that point, employees shall be protected by a personal fall arrest system.

Trusses/rafters are subject to collapse if a worker falls while attached to a single truss with a belt/harness. Nets could also cause collapse, and there is no place to attach guardrails.

All workers will ensure that they have secure footing before they attempt to walk on the sheathing, including cleaning shoes/boots of mud or other slip hazards.

To minimize the time workers must be exposed to a fall hazard, materials will be staged to allow for the quickest installation of sheathing.

(Your company name here) shall take the following steps to protect workers who are exposed to fall hazards while installing roof sheathing:

- Once roof sheathing installation begins, workers not involved in that activity shall not stand or walk below or adjacent to the roof opening or exterior walls in any area where they could be struck by falling objects;
- The competent person shall determine the limits of this area, which shall be clearly communicated to workers prior to placement of the first piece of roof sheathing;
- The competent person may order work on the roof to be suspended for brief periods as necessary to allow other workers to pass through such areas when this would not create a greater hazard;
- Only qualified workers shall install roof sheathing;
- The bottom row of roof sheathing may be installed by workers standing in truss webs;
- After the bottom row of roof sheathing is installed, a slide guard extending the width of the roof shall be securely attached to the roof. Slide guards are to be constructed of no less than nominal 4" height capable of limiting the uncontrolled slide of workers. Workers should install the slide guard while standing in truss webs and leaning over the sheathing;

- Additional rows of roof sheathing may be installed by workers positioned on previously installed rows of sheathing. A slide guard can be used to assist workers in retaining their footing during successive sheathing operations; and
- Additional slide guards shall be securely attached to the roof at intervals not to exceed 13 feet as successive rows of sheathing are installed. For roofs with pitches in excess of 9-in-12, slide guards will be installed at four-foot intervals.
- When wet weather (rain, snow, or sleet) are present, roof sheathing operations shall be suspended unless safe footing can be assured for those workers installing sheathing.
- When strong winds (above 40 miles per hour) are present, roof sheathing operations are to be suspended unless wind breakers are erected.

Installation of Floor Joists and Sheathing

During the installation of floor sheathing/joists (leading edge construction), the following steps shall be taken to protect workers:

- Only the following trained workers will be allowed to install floor joists or sheathing:

- Materials for the operations shall be conveniently staged to allow for easy access to workers;
- The first floor joists or trusses will be rolled into position and secured either from the ground, ladders or sawhorse scaffolds;
- Each successive floor joist or truss will be rolled into place and secured from a platform created from a sheet of plywood laid over the previously secured floor joists or trusses;
- Except for the first row of sheathing which will be installed from ladders or the ground, workers shall work from the established deck; and
- Any workers not assisting in the leading edge construction while leading edges still exist (e.g. cutting the decking for the installers) shall not be permitted within six feet of the leading edge under construction.

Erection of Exterior Walls

During the construction and erection of exterior walls, employers shall take the following steps to protect workers:

- Only the following trained workers will be allowed to erect exterior walls:

- A painted line six feet from the perimeter will be clearly marked prior to any wall erection activities to warn of the approaching unprotected edge;
- Materials for operations shall be conveniently staged to minimize fall hazards; and
- Workers constructing exterior walls shall complete as much cutting of materials and other preparation as possible away from the edge of the deck.

III. Enforcement

Constant awareness of and respect for fall hazards, and compliance with all safety rules are considered conditions of employment. The crew supervisor or foreman, as well as individuals in the Safety and Personnel Department, reserve the right to issue disciplinary warnings to employees, up to and including termination, for failure to follow the guidelines of this program.

IV. Accident Investigations

All accidents that result in injury to workers, regardless of their nature, shall be investigated and reported. It is an integral part of any safety program that documentation take place as soon as possible so that the cause and means of prevention can be identified to prevent a reoccurrence.

In the event that an employee falls or there is some other related, serious incident occurring, this plan shall be reviewed to determine if additional practices, procedures, or training need to be implemented to prevent similar types of falls or incidents from occurring.

V. Changes to Plan

Any changes to the plan will be approved by (name of the qualified person). This plan shall be reviewed by a qualified person as the job progresses to determine if additional practices, procedures or training needs to be implemented by the competent person to improve or provide additional fall protection. Workers shall be notified and trained, if necessary, in the new procedures. A copy of this plan and all approved changes shall be maintained at the jobsite.

