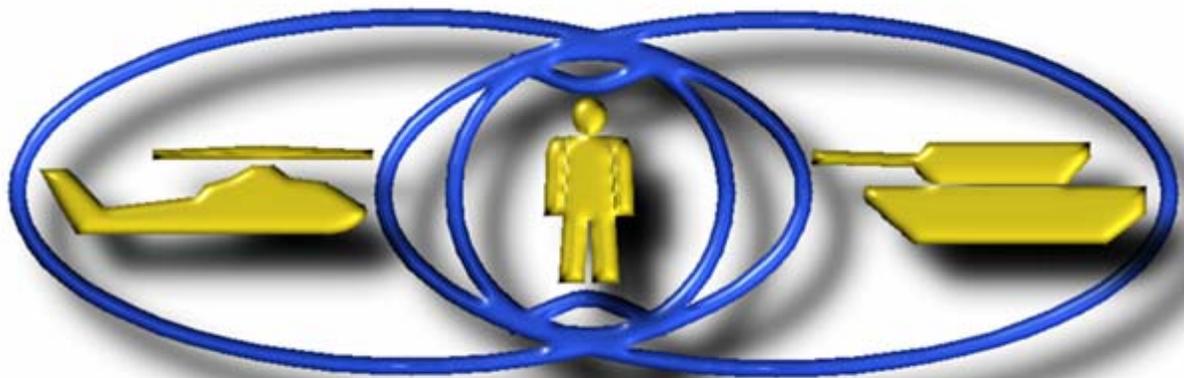


LEADER'S GUIDE: FALL PROTECTION PROGRAM



U.S. ARMY SAFETY CENTER

Leader's Guide: Fall Protection Program Preface

Falls are the leading cause of work-related injuries and fatalities in construction accidents nationwide, and are ranked as second in general industry. According to the Bureau of Labor Statistics (BLS), most work-related injuries and fatalities are on the decline. However, the number of fall-related injuries and fatalities is increasing, accounting for more than 13% of the total number of fatal work injuries. In the United States, approximately 3 fall-related fatalities occur each working day.

From an Army perspective, injuries to soldiers and civilians sustained from falls can significantly impact resources and hinder mission capability. Protecting the workforce is a responsibility shared by everyone, at all levels of the organization. However, it is you, the leader, who makes a unique contribution to job safety in that you are aware of the skills, physical condition, capabilities, and limitations of your people. You know the job, and have the authority to inspect, correct, and direct. No one is in a better position to prevent accidental falls in the workplace than you. This Leader's Fall Protection Safety Guide is designed to establish criteria for fall protection programs in order to heighten awareness and protect Army personnel exposed to fall hazards in the workplace.

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Section I Introduction

This guide provides leaders with the basic tools necessary to establish, implement and sustain a Fall Protection Program in accordance with Chapter 3 of AR 385-10, The Army Safety Program, which adopts OSHA safety standards and directs Army compliance. The goals of the program are:

- a. To prevent the occurrence of falls by Army personnel (soldiers, DA civilians, and contractors) from elevations. The threshold limit for providing fall protection is mandated by the US Code of Federal Regulations (CFR). Depending on the standard applied, this height can be from 4 to 6 feet. The standard fall protection height for personnel is 4 feet in accordance with (IAW) 29 CFR 1910; construction site workers will adhere to the threshold height of 6 feet IAW 29 CFR 1926.500, Subpart M, and US Army Corps of Engineers Safety and Health Requirements Manual 385-1-1. Protecting personnel from falls can be achieved through effective education, engineering and administrative controls, use of fall protection systems, and aggressive enforcement of standards.
- b. To apply a hierarchy of control measures to every job site where fall hazards have been identified through a comprehensive job hazard analysis.
- c. To reduce fall-related accident costs associated with lost time and worker's compensation claims.
- d. To improve mission capability and increase overall well-being and productivity of the work force.

In the program goals which were discussed above, a reference was made to a **hierarchy of control measures** which are targeted toward eliminating, or significantly reducing the risks associated with fall related hazards in the workplace. This hierarchy of control measures consists of the following:

- **Elimination**- Removing identified hazards or hazardous work practices (e.g., lowering devices or instruments such as meters or valves to the worker's level) whenever possible. This is the most effective control measure.
- **Substitution**- Substituting or replacing the hazards or hazardous work practices with those that are less hazardous (e.g., prefabricating of structures on the ground in lieu of erecting the components at heights in excess of the applicable standard).
- **Isolation**- Isolating or separating the hazards or hazardous work practices from personnel (e.g., installation of a guardrail at an opening or leading edge).
- **Engineering controls**- When hazards cannot be eliminated, substituted or isolated, engineering controls are preferred method to control the risk (e.g., pre-drilled holes for attachment of fall arrest systems to attach anchorage connections).

- **Administrative controls-** This includes measures or practices designed to reduce the risk of personnel falling (e.g., posting warning signs or restricting certain areas).
- **Personnel protective equipment (PPE)-** This should be considered only when other control measures are not practical, or to increase the level of fall protection as a secondary system. While PPE typically refers to eye, face, hand, and foot protection, fall arrest systems also constitute personal protection.

Section II Definitions

Activation Distance: Distance required to lock-off or to activate a self-retracting lifeline/fall arrestor.

Anchorage: A secured structure that can safely withstand forces exerted by fall arrest and rescue equipment. The structure can be in the form of a beam, girder, column or floor. Anchorage is either engineered or improvised. The anchorage must be capable of withstanding a minimum force of 5,000 pounds per person or engineered by a qualified person for twice the maximum arresting force.

Anchorage Connector: The means by which a fall arrest system is secured to the anchorage. This can include a steel cable sling, anchor strap, load-rated eye bolt, tripod, davit arm or any other device designed to suspend human loads and capable of withstanding forces generated by a fall. **(See Illustrations, page 72, figures 1 and 2)**

Arresting Distance: Total vertical distance required to arrest a fall. This includes activation and deceleration distance. It does not include free-fall distance.

Arresting Force: Force exerted on a worker or test weight when a fall protection system stops a fall. The amount usually expresses the peak force experienced during a fall.

Authorized Person (End User): A person approved by the employer to perform a specific type of work at heights and at a specific location; a person who is trained on the use of fall arrest systems.

Body Belt: A strap with means both for securing it about the waist and attaching it to a lanyard, lifeline or deceleration device. **(Use in a fall arrest system prohibited after January 1998)**

Body Harness: Means of configuration of connected straps secured about the employee in a manner that will distribute the fall arresting forces over at least the upper thighs, waist, shoulders, chest and pelvis, with means for attaching a lanyard to other components of the personal fall arrest system. Full-body harness is the only body support device allowed by OSHA when a free-fall distance exceeds 2 feet. **(See Illustrations, page 72, figure 3)**

Body Restraint System: An application of the fall protection equipment, in which horizontal travel is restricted, preventing exposure to fall hazards. The system consists of a strap device, such as chest harness or full body harness that can be secured around a worker and attached to a load-bearing anchorage in order to restrict travel and

limit fall hazards. The strap can be single or multiple. **(See Illustrations, page 72, figure 4)**

Buckle: A connector used for attaching the strap or webbing segments together or to themselves. **(See Illustrations, page 73, figures 5 and 6)**

Cable Grab: A fall arrest device that locks by either a cam lock (Locking arm) or inertia when a free fall is sensed. It is attached to a worker directly or by a lanyard that slides up or down a fixed or vertical cable or rope lifeline. **(See Illustrations, page 73, figure 7)**

Carabiner: A connector component generally consisting of an oval or trapezoidal shaped body with a closed gate or similar arrangement. **Only self-locking carabiners are accepted or used.** **(See Illustrations, page 73, figure 8)**

Competent Person (CP) for Fall Protection: A person who is capable of identifying hazardous or dangerous conditions in the personal fall arrest system or any component thereof, as well as in their application and use with related equipment (29 CFR 1910.66 Appendix C). Note: The OSHA CP definition {29 CFR 1926.450 and 1926.32(f)} also requires that a CP have the authority to take prompt corrective measures to eliminate the hazards of falling. **(See “Qualified Person” for design knowledge)**

Connector: A device that is used to couple (connect) parts of the personal fall arrest system 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 D-ring sewn into a body harness, or a snap hook spliced or sewn to a lanyard or self-retracting lanyard).

Connecting Means: The method to connect a body support to an anchorage, such as a lanyard or a carabiner for the purpose of providing a protected mobility for an elevated work task.

Controlled Access Zone (CAZ): A zone to restrict access to leading edge work. The CAZ is bound by a control line and should run the full length of the leading edge and connect on each side to a guardrail or wall. The control line can be made of rope, wire, tape or equivalent material and shall be supported by posts and marked with a highly visible material. **CAZ is used when a guardrail system, fall arrest systems or safety nets cannot be used or installed.**

Conventional Fall Protection Systems: Guardrail systems, personal fall arrest devices, or safety nets.

Critical Sag: Is the deflection of the Horizontal Life Line (HLL) where the arresting force exactly equals the weight of the worker. The worker's speed of fall does not decrease

until the sag of the line is greater than the critical sag. Critical Sag is a very important consideration for long span HLL with in-line energy absorber.

Deceleration Device: Any mechanism, such as a rope grab, rip-stitch lanyard, specially-woven lanyard, tearing or deforming lanyards, automatic self-retracting lifelines/lanyards, etc., that 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: 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 locations of an employee's 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.

D-ring: A connector used in a harness or a positioning belt as an attachment element or fall arrest attachment. It is also used in lanyards, energy absorbers, lifelines, and anchorage connectors as an integral connector. D-rings can be used for work positioning and restraint.

Energy (Shock) Absorber: A component whose primary function is to dissipate energy and limit deceleration forces that the system imposes on the body and the anchorage system during fall arrest, **(See Illustrations, page 74, figure 9).**

Engineered Anchor: An anchorage designed and approved by a qualified person.

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

Fall Arrest System: A combination of equipment and components connected together, designed to stop a person from striking a lower level or an obstruction during a fall.

Fall Prevention: The elimination and minimization of potential fall hazards, lessening the chance of employee exposure to falls. Any same-level means used to reasonably prevent exposure to a fall hazard; examples of fall prevention are guardrails, walls, floors and area isolation.

Fall Protection: Action and procedures to effectively protect a worker from fall hazards.

Fall-Restraint System: A system designed to restrain a worker from reaching an exposed fall hazard. The system includes personal fall protection equipment, acceptable anchorage systems, and trained worker and administrative procedures. **(See Illustrations, page 72, figure 4)**

Force Factor: The ratio of peak arresting force using rigid weight compared to a human body having the same weight, both falling under identical conditions. For comparison

between rigid weight and human body weight, multiply the rigid weight by 1.4 to allow for body comparison.

Free Fall: The act of falling before a personal-fall-arrest system begins to apply force to arrest a fall.

Free-Fall Distance: The vertical distance from the onset of a fall to a point where a fall-arrest system is activated or engaged. (This is the vertical displacement of the fall arrest attachment point on the employee's 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).

Full Body Harness: See “**Body Harness**”.

Horizontal Lifeline (HLL): A fall arrest system that uses a line made from rope, wire rope or metal railing that spans horizontally between 2 end anchorages. The assembly includes the necessary connectors, turnbuckles, in-line energy absorbers, shackles, etc., and may include intermediate anchorages. This is a component of a fall protection system, which consists of a trained worker wearing appropriate fall protection equipment that enables them to safely traverse/work in the horizontal plane. The HLL shall be designed, installed, and used under the supervision of a qualified person. **(See Illustrations, page 74, figures 10 and 11)**

Ladder Climbing (Safety) Device: A device or climbing sleeve connected to the front D-ring on the climber's full body harness that slides up or down a rigid rail or cable. Should a fall occur, the device is designed to lock by inertia or cam action to arrest the fall. **(See Illustrations, page 75, figure 12)**

Lanyard: A flexible line of rope, wire rope, or strap that generally has a connector at each end for connecting the body harness to a deceleration device, lifeline, or anchorage. **(See Illustrations, page 74, figure 9)**

Leading Edge: The unprotected side and edge that exposes a worker to a fall hazard. It means the edge of a floor, roof, or formwork for a floor or other walking/working surfaces.

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

Maximum Arresting Force: The peak force exerted on the body or test weight when a fall protection system stops a fall.

Personal Fall Arrest System: A system used to arrest an employee in a fall from a working level. It consists of an anchorage system, connecting means, body harness, and may include a lanyard, deceleration device, lifeline, or suitable combination of these.

Platforms: Any elevated surface designed or used primarily as a walking or working surface. Other elevated surfaces upon which employees are required or allowed to walk or work while performing assigned tasks on a predictable and regular basis

Positioning Belt: A single or multiple straps that can be secured around a worker's body to hold the user in a work position.

Positioning Device System: A combination of equipment that permits the user to have both hands free while being supported on an elevated vertical surface **(See Illustrations, page 75, figure 13).**

Predictable and Regular Basis: Means employee functions such as, but not limited to, inspections, service, repair, and maintenance which are performed: (a) At least once every 2 weeks, or (b) For a total of 4 man-hours or more during any sequential 4-week period (e.g., 2 employees once every 4 weeks for 2 hours=4 man-hours per 4-week period).

Qualified Person (QP) for Fall Protection: A person with a recognized degree or professional certificate, and with extensive knowledge and experience in the subject field of fall protection, who is capable of performing design, analysis, evaluation and specifications in fall protection systems and equipment. **(Note: for additional qualifications see Responsibilities, Section III)**

Restraint (Tether) System: See "Fall Restraint System".

Retracting Lifeline: Same as "Self-Retracting Lanyard".

Rollout: An action by which a snap-hook or carabiner unintentionally disengages from the component to which it is attached.

Rope Access: A rope access suspended system consisting of 2 lifelines independently anchored at the top to protect the authorized person from falling. The ropes directly suspend the person. The technique is used on buildings, bridges, and other structures for conducting inspection, cleaning, and painting.

Rope Grab: A deceleration device that travels on a lifeline and automatically, by friction, engages the lifeline and locks to arrest the fall of a worker. A rope grab usually employs the principle of inertial locking, cam/level locking, or both. **(See Illustrations, page 73, figure 7)**

Sag: The distance the wire rope deviates from the horizontal plane established by the end anchor points. This is defined by the line between 2 anchor points and measuring downward at the mid-point of the wire rope.

Self-Retracting Lanyard (SRL): A deceleration device containing a drum-wound line that 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. **(See Illustrations, page 75, figure 14)**

Shock Absorber: A component of a fall protection system that dissipates energy by deformation, or extending the deceleration distance. **(See Illustrations, page 74, figure 9)**

Snap Hook: A connector comprised of a hook-shaped body with a normally closed gate or similar arrangement, which may be opened to permit the hook to receive an object and when it is automatically released, closes to retain the object. **Only self-locking (single or double locking) snap hooks are acceptable for use (See Illustrations, page 75, figure 15).**

Swing fall: A pendulum-like motion that can result from moving horizontally away from, or toward, a fixed anchorage when falling. Swing falls generate the same amount of force when falling the same distance vertically. Swing fall has the hazards in both the horizontal (swinging into an obstruction) and vertical (falling onto obstructions or the ground) directions.

Toe-board: A deck level protective barrier that will prevent the fall of materials and equipment to lower levels.

Total Fall Distance: The vertical distance between the anchorage location and connecting point on the body (generally, the harness D-ring) after the fall is arrested, which includes the free fall and deceleration distances.

Vertical Life Line (VLL): A vertically suspended flexible line connected at the upper end to an overhead anchorage and along which a fall arrester travels.

Warning Line System: A barrier erected on a roof to warn workers that they are approaching an unprotected roof, side, or edge and which designates an area where roofing work may take place without the use of guardrail, body harness or safety net system to protect workers in the area. Work performed outside barriers will require fall protection systems. **The difference between CAZ and Warning Line system is that in the CAZ, approved anchorages cannot be provided to tie off the worker (See Illustrations, page 76, figure 16).**

Walking/Working Surface: Any surface, whether horizontal or vertical, on which an employee walks or works, including, but not limited to, floors, roofs, ramps, bridges,

runways, form work, and concrete reinforcing steel (but not including ladders, vehicles, or trailers), on which employees must be located in order to perform their job duties.

Section III Responsibilities

Successful implementation of a Fall Protection Program requires a coordinated effort. As you design the program for your installation or facility, give careful thought to who the participants should be, and make sure they are involved in the process from the beginning. Below is a list of individuals and a brief description of their respective roles in the developmental process:

- **Commanders of Major Army commands (MACOMs), and Regional Installation Management Agency (IMA) Directors.** Commanders/directors will ensure their subordinate commanders/directors implement a Fall Protection Program and strictly enforce compliance.

- **Installation Commanders.** Installation commanders will implement a Fall Protection Program in accordance with AR 385-10, The Army Safety Program, OSHA Standards 1910, General Industry, and 1926, Construction, and US Army Corps of Engineers Safety and Health Requirements contained in EM 385-1-1. They will provide the necessary resources, and delegate sufficient authority to subordinate commanders/directors and division chiefs to implement the program.

- **Installation Safety Manager.** The installation Safety Manager will develop and implement the installation Fall Protection Program for the installation commander. The program should consist of a comprehensive written program document for facilities management. The Safety Manager and his/her staff may be called upon to provide guidance and technical assistance to commanders/directors regarding implementation of and compliance with elements of the Fall Protection Program, and should integrate the program elements into existing Standard Army Safety and Occupational Health Inspection (SASOHI) criteria in order to ensure compliance during evaluations. In addition, the Safety Staff may be called upon to provide, or assist with training.

- **Supervisors.** Supervisors of activities where fall hazards have been identified through comprehensive job hazard analyses will ensure that all personnel who have a potential exposure to fall hazards adhere to established fall protection requirements. They will also ensure that affected personnel have the training necessary to identify specific fall hazards and to understand the control measures and how to apply them. In addition, supervisors will also provide training that enables personnel to know when personal fall arrest equipment is necessary, what type of equipment is necessary, and how to properly don, remove, adjust and wear it. Individuals must also know and understand the limitations of the equipment, and the proper care, maintenance, useful life and disposal requirements. Personnel should be able to demonstrate their understanding of the training through practical application. Supervisors are also responsible for the following:

- a. Ensuring that training classes for personnel are properly documented. Documentation should consist of a training log or dated employee signature sheet.
- b. Ensuring that all required fall protection equipment is provided for personnel, that it is being used safely and is inspected stored and maintained properly.
- c. Ensuring that the individual components of the issued equipment are properly compatible and in good working order.
- d. Conducting frequent evaluations of the workplace to identify any fall hazards associated with new job requirements or work practices.

- **Employees.** Employees exposed to fall hazards as part of their duties will participate, as directed, in all fall protection and personal protective equipment training. In addition, they will also comply, to the fullest extent possible, with all safety and health standards outlined in their installation or facility Fall Protection Program, maintain their fall protection equipment in a safe and sanitary condition, and report directly to the first-line supervisor any problems observed which could compromise worker safety or health.

- **Civilian personnel officer.** The civilian personnel officer will provide support to supervisors and other individuals responsible for enforcing the Fall Protection Program requirements. An example of support would be to develop job descriptions, which address requirements for personnel assigned to work in fall hazard areas, and the necessity to utilize fall protection equipment as a condition of employment. In addition, the civilian personnel officer will advise supervisors with respect to appropriate disciplinary measures when personnel fail to comply with established fall protection requirements.

- **Qualified Person (QP):**

The Qualified Person duties and responsibilities consist of the following:

- a. Prepare, review, approve, and modify Fall Protection and Prevention (FP&P) Plans, and Rescue and Evacuation Plans (REP).
- b. Design, select, certify, evaluate and analyze fall protection systems and equipment.
- c. Review, prepare and approve Fall Protection (FP) specifications.
- d. Advise/assist the contracting officer in the preparation of contract documents for FP systems.

- **Competent Person (CP):**

The Competent Person duties and responsibilities consist of the following:

- a. Implementation of FP&P Plans and REP.
- b. Identification of hazardous and dangerous conditions in the work place.
- c. Inspection and installation of approved fall protection systems.

- d. Compliance with FP&P Plans and REP.
- e. Training of all workers exposed to fall hazards.
- f. Understanding and knowledge of fall protection systems and equipment.
- g. Conducting inspections and accident Investigations.
- h. Having full responsibility and authority to implement the FP&P Plans and REP in the work place.
- i. Monitoring worker compliance with FP&P Plans and REP requirements.

- **FP Program Manager/Administrator:**

The FP Program Manager/Administrator's duties and responsibilities consist of the following:

- a. Managing the fall protection program at the activity.
- b. Writing FP procedures.
- c. Developing FP training programs.
- d. Developing and approving equipment purchase lists.

- **Contracting Officer (CO).** The contracting officer, typically through the Contracting Officer's Representative, will ensure that the requirements of the installation Fall Protection Program are integrated into all applicable contracts, and that contractors understand when either they or their sub-contractors perform work on the installation or facility, they must adhere to the established guidelines set forth in the program document. Contractors will be informed of this requirement as well as the on-site construction rules that apply during the pre-construction conference.

- **Contracting Officer's Representative (COR):**

The COR shall ensure all construction contracts, prior to start of construction, include specific sections which address fall protection, and that contractors comply with the USACE manual 385-1-1 IAW FAR 52.236-14. It is the contractor's responsibility to provide fall protection to all workers exposed to fall hazards, and to ensure that they have been properly trained. Contractors shall submit a written FP&P Plan as part of the contract, which includes training requirements for their workers as well as subcontractor workers, to the COR for review and approval. The COR shall ensure that the contractor does not begin any construction-related activities until the submitted FP&P Plan has been approved. **Fall protection will be one of the main topics discussed during the Pre-Construction Conference.**

- **In-house Design:**

Responsible individuals should strive to eliminate fall hazards in the design of new buildings and facilities through engineering-in various systems and modifications designed to eliminate the need to use fall protection. Individuals shall ensure all designs requiring fall protection, whether during the construction phase, or future

maintenance and repair work, integrate the requirements into the design effort. If feasible, fall protection systems shall be permanently installed for future maintenance and repair work. The designer shall identify the required location of the safe points of connection (anchor points) for future work.

▪ **Army Design Managers:**

The Army Design Managers shall ensure that architects and engineers incorporate the following requirements in the design effort:

- a. The “Occupational Safety and Health Planning and Design Guide”.
- b. That Fall Protection requirements are integrated into the design work and added to the specification sections of the contract.
- c. Utilization of the Activity Hazard Analysis system.

▪ **Maintenance Work:**

The COs/CORs and Army Safety personnel shall ensure that all maintenance contract work performed by contractors, to include work encompassing fall protection requirements, is performed in accordance with USACE manual EM 385-1, 29 CFRs 1910 and 1926, and applicable ANSI standards. Army maintenance workers shall be trained to recognize the hazards of falling in the work place and the use of fall protection equipment.

Section IV Training Requirements

- Personnel who are exposed to fall hazards in their work environment shall be trained to recognize the hazards of falling and how to minimize such hazards. Exposed personnel shall be trained by a competent person in the following areas:
 - a. Nature of fall hazards.
 - b. Fall protection systems.
 - c. Use and operation of fall protection/prevention systems.
 - d. Inspection of fall protection equipment.
 - e. Role of each employee in the safety monitoring systems.
 - f. Handling, storage, care and maintenance of fall protection systems.

- Prior to the use of any fall protection equipment, personnel must be trained in its safe use. It is recommended that all personnel exposed to fall hazards receive a minimum of 16 hours training, or be trained to a level deemed appropriate to safely execute their duties. Training should consist of the following elements:
 - a. Application limits.
 - b. Proper anchoring and tie-off techniques.
 - c. Estimation of free fall distance, including determination of deceleration distance, and total fall distance.
 - d. Methods of use, inspection, and storage of the system.
 - e. Supervisors and workers should become familiar with applicable guides and total fall distance.
 - f. Limitations of equipment.
 - g. Specific lifelines which may be used IAW USACE Manual 385-1-1. Each worker who might be exposed to fall hazards shall be trained by a competent person qualified in the safe use of fall protection systems and the recognition of hazards related to their use, including the nature of fall hazards in the work area, and correct procedures for constructing, erecting, maintaining, using and dismantling fall protection systems.
 - h. The maximum intended load-carrying capacities of fall protection systems, applicable requirements contained in the USACE Manual 385-1-1, and limitations on the use of mechanical equipment during the performance of roofing work on low-sloped roofs. Retraining shall be provided as necessary for personnel to maintain an understanding of these subjects.

- Retraining of workers shall be provided as necessary in order to maintain an understanding of requirements and procedures.

- A written certification of training is required and shall be maintained at job sites for the duration of the work. The certificate shall identify the individuals trained, the date of the

training, and the signature of the trainer. Additionally, a determination shall be made as to whether the training provided has resulted in personnel acquiring the skills and knowledge necessary to safely perform the work. (See Appendix B, page 66, Form 1-2)

- A daily “tool box” meeting should be conducted prior to the start of work in order to discuss fall hazards for that day, and to remind workers to comply with the established fall protection procedures. Workers who receive adequate training in fall protection will be tracked in the tool box meetings.

- For workers who may be in a situation that requires climbing involving the use of fall arrest systems, the Authorized Person Training shall also include practical climbing in a controlled situation in the presence of a Competent Person. Additionally, authorized workers shall be trained in rescue and self rescue procedures. Hands-on training is also required for both investigation and inspection work.

- Architects, engineers, and in-house designers involved in planning and designing buildings, facilities, structures and equipment should be trained to incorporate fall protection and prevention control measures into their design work in order to help contractors during the construction phase, and to provide protection to workers who will be required to perform maintenance.

- Fall protection training should emphasize that fall hazards should be eliminated whenever possible, and when they cannot, there should be a mechanism in place to protect workers from fall hazards.

Prior to the start of a job, workers exposed to fall hazards shall read, understand and sign the FP&P Plan, acknowledging that they have been trained on job hazard recognition (all contractors and subcontractor workers exposed to fall hazards shall be trained accordingly). In addition, workers shall be trained in the proper use of fall protection equipment. All workers newly assigned to a job must review the FP&P Plan and sign the roster. If the fall hazards, fall protection equipment, or methods change during the course of the job, the FP&P Plan must be reviewed and signed again by personnel working at the job site. The written FP&P Plan and REP shall be part of the written Accident Prevention Plan which is maintained at the job site. If additional requirements arise or change at the job site as work progresses, the FP&P Plan and REP shall be reviewed and updated by a Qualified Person and signed by all workers exposed to fall hazards.

- “Train the Trainer”:

Administering the Fall Protection Training Program in a “pyramid” fashion.

- a. Initial training is provided by fall protection experts in order to develop trained fall protection personnel.

- b. The trained fall protection personnel in-turn:

- (1) Train others at the installation/facility level, including supervisors and workers.
- (2) May also train special assistants, who can help with recognizing fall-related hazards. The special assistants may be representatives from each department or division who assist other department members in recognizing and reporting fall hazards.

▪ Education requirements:

- a. The Installation Safety Manager, or his/her designated representative should have:
 - (1) A minimum of 40 hours of formal fall protection training. Formal training consists of classroom instruction, exercises, supervised work-site assessment, and individual learning assignments.
 - (2) Training and experience sufficient to identify Fall Protection Hazards and risk factors.
- b. Trained fall protection personnel should have:
 - (1) A minimum of 40 hours of formal Fall Protection training.
 - (2) Training and experience sufficient to identify fall protection hazards and risk
- c. Core fall protection subcommittee members, support and advisory fall protection subcommittee members, and installation level personnel providing assistance in recognizing fall protection hazards should have basic fall protection training provided by trained fall protection personnel.

▪ Training requirements:

Personnel responsible for administering the installation Fall Protection Program should receive appropriate special training. Training is necessary for Active Army, Army Reserve, and Army National Guard personnel as well as all levels of civilian personnel to enable them to understand and recognize potential fall hazards, and actively participate in their installation/facility fall protection efforts.

- a. Personnel requiring training:
 - (1) All DA personnel who are potentially exposed to fall hazards.
 - (2) Supervisors.
 - (3) Managers.
 - (4) Engineers and maintenance personnel.
 - (5) Installation safety and occupational health personnel.
- b. Personnel who may conduct training:
 - (1) Trained fall protection personnel.
 - (2) Suitable health care personnel to conduct specific portions of training, such as those related to health risks.

c. Types of training:

(1) General training. Workers who are potentially exposed to fall hazards should receive formal instruction on hazards associated with their jobs and equipment. They should receive training at an initial orientation and annually thereafter.

(2) Specific training. New and reassigned military and civilian personnel who are potentially exposed to fall hazards should receive an initial orientation and hands-on training from trained fall protection personnel and their immediate supervisor prior to being placed in a full-production position. The initial orientation should include: a demonstration of the proper use and care of, and proper operating procedures for, all tools and safety equipment, and work procedures, such as proper lifting techniques.

Section V

Fall Protection Program

Each Army activity that has workers exposed to falls from heights is required to establish a fall protection program. The program includes identification and elimination of fall hazards, whenever practical, through engineering controls, training of personnel, proper installation and use of fall protection systems, and required rescue equipment and procedures.

- A managed Fall Protection Program should include the following elements:
 - a. Command policy
 - b. Duties and responsibilities
 - c. Workplace assessment and surveys of fall hazards
 - d. Fall hazard prevention and control, including the preparation of a Fall Protection and Prevention Plan
 - e. Education and training requirements
 - f. Inspection, storage, care, and maintenance of the equipment
 - g. Rescue and evacuation procedures
 - h. Audits and evaluations

- Fall hazard assessments and surveys. Workplace assessment and survey will help identify potential fall hazards at the workplace. The gathered information will provide documentation to assist in the development of viable solutions to protect workers exposed to fall hazards. Understanding work procedures and how a person conducts the required task is very important in the selection and development of the most appropriate fall protection method. Fall hazard assessment and surveys will help identify options for fall hazard elimination and/or selecting other control measures. The survey information required to identify fall hazards at a building or facility may include:
 - a. Interview of Authorized Person(s) and their supervisors
 - b. Work paths and movement of the Authorized Person
 - c. Range and mobility in each Fall-Hazard Zone
 - d. Location and distances to obstructions
 - e. Potential anchorage location if a fall hazard cannot be eliminated
 - f. Total fall clearance
 - g. Number of personnel exposed to fall hazards
 - h. Frequency and duration of exposure
 - i. Lockout/tagout hazards
 - j. Potential severity of the fall
 - k. Access to Fall-Hazard Area
 - l. Floor and other surfaces
 - m. Review of any mishap reports at the facility

n. Identify the presence of any:

- (1) Hot objects, sparks, flames and heat-producing objects
- (2) Electrical and chemical hazards
- (3) Sharp objects
- (4) Abrasive surfaces
- (5) Moving equipment and materials
- (6) Impact of weather factors
- (7) Any other maintenance, work environment issues or conditions

- Fall-Hazard Analysis. After conducting the survey, a fall hazard analysis can be performed to determine risk based on hazard severity and fall mishap probability. This will be beneficial in prioritizing of hazard ranking and the selection of the most viable fall protection solutions.
- The primary goal is to eliminate/remove potential fall hazards.

Section VI

Fall Protection Systems and Guidelines

It is very important for a fall protection Qualified Person to plan, evaluate, design and select the most appropriate, safe and efficient fall protection systems. As there are many fall protection systems available, it is of the utmost importance to select the right system for the specific work application. Complete understanding of work procedures will enable the Qualified Person to select the most appropriate fall protection system.

In every fall hazard situation, it is always advisable to have two protective systems: a primary and secondary system. If the primary system fails, the secondary system will be activated to protect the worker from falling. As an example, when approaching the leading edge of a work area, a worker's primary protective system would be their feet. Therefore, a secondary protective system is required as a backup, such as a fall arrest/restraining system or guardrails. When climbing a ladder or a pole, the worker's primary fall protective system would be their hands and feet. In this case, a ladder-climbing device would be required as a secondary backup system.

▪ **Fall Protection Systems.**

a. Every worker exposed to a fall hazard shall be protected from falling to a lower level by the use of fall protection systems. The main fall protection systems are:

- **Guardrail System:** A guardrail system is a conventional method for the prevention of falls from heights. A guardrail is composed of a top rail, mid rail, posts and toe boards.
- **Safety Net:** A safety net is installed below the leading edge for worker protection, or when working over water.
- **Fall arrest System:** A fall arrest system is composed of the following subsystems and components:

- (1) Anchorage System - includes anchorage point and anchorage connection.
- (2) Connecting Means - includes lanyard (may include shock absorber, snap hooks and carabiners, self retracting lanyards, or fall arrestors).
- (3) Body Support.
- (4) Rescue and escape - self-rescue or assisted rescue.

b. Other fall protection systems include:

- Horizontal Lifelines (HLL)
- Vertical Lifelines (VLL)
- Ladder Climbing (Safety) Devices
- Positioning Device Systems

- Restraint (Tether) Systems
- Controlled Access Zone (CAZ)
- Warning Line System
- Aerial Lifting Equipment, Working Platforms, and Catwalks
- Falling Object Protection
- Covers

Note: Fall arrest systems are “passive” systems that become active when a fall is arrested. Fall arrest systems are considered secondary systems when a primary system is present.

- **Fall Protection Guidelines:**

- a. **Communication Towers:**

- Maintenance Work:

- The preferred method for accessing existing towers to perform maintenance work is by the use of fixed ladders with attached climbing devices because it provides conventional fall protection during ascent and descent of the structure.
 - To secure permanent anchorage on the tower, the first worker up requires a portable anchor, full body harness, use of self retracting lanyard (SRL), ladder climbing device or rope grab.
 - After permanent anchorage is secured in place, workers that follow the first person up will require full body harness, SRL, vertical lifeline, ladder climbing device and/or rope grab.
 - When working on towers, workers are required to wear fall protection equipment at all times.

- Erection of Towers (OSHA CPL 2-1.36 Interim inspection procedures during communication tower construction activities):

- For accessing the tower during construction activities, workers must be protected from falls using a fall arrest system or ladder climbing devices.
 - For tower access, workers can be hoisted using a gin pole or other hoisting mechanism.
 - A hoist line may be used to hoist workers for access to tower work. The rigging line or hoist shall have a safety factor of 10 against failure during personnel lift.
 - A trial lift and proof testing shall be conducted on the hoisting equipment prior to lifting of employees.
 - When working on towers, 100% fall protection is required at all times.

- b. **Roof Work:**

- On sloped roofs: use full body harness, SRL, and roof brackets/anchors for anchorage points (single or multiple connections designed for 5000 pounds per person). Also use slide guards.
- On flat roofs with no parapet or guardrails: When working 6 feet from the edge, use full body harness, restraining system and or lanyard/SRL. Establish a warning line system 6 to 10 feet away from the leading edge or temporary guardrails for workers without a fall arrest system. Personnel working within the warning line system do not require fall protection.
- NOTE: Whenever danger of roof collapse is imminent (e.g., performing emergency roof repair) as determined by a Qualified Person, appropriate fall protection will be required.

c. Leading Edge Work:

- Use horizontal lifeline, full body harness, lanyard/SRL, roof anchors, guardrail system, and a restraining system.

d. Scaffold Work:

- Use guardrails, cross bracing or full body harness and lifelines. During erection and dismantling operations it is highly recommended to have a fall protection system.
- On supported scaffolds over 20 feet high, use staircases instead of ladders to access the scaffold.

e. Suspended Scaffolds (single and two point suspended scaffolds), Work Platforms:

- The scaffold shall have guardrails and the use of an independent vertical lifeline for every worker connected to a full-body harness. **(See figure 17).**

f. Aerial Lifting Equipment:

- Use full body harness and lanyard connected to approved anchorage.
- Workers will require fall arrest system if the lifting equipment is positioned outside the wheel-base, even if the equipment has a guardrail system.
- When using scissors lift, it is highly recommended to tie off to an approved anchorage connection using a full body harness at all times.
- Aerial Lifting equipment can be modified by the manufacturer to install approved anchorage connections for a fall arrest system. Usually, guardrails in the aerial lifting equipment are not designed to arrest a fall.

g. Confined Space Entry:

- When entering a confined space, if there is a hazard of exposure to vertical fall, the person entering such space shall be tied to a lifeline or SRL, and rescue/retrieval equipment. A co-worker should be able to retrieve the victim utilizing the retrieval mechanism from outside the confined space without any difficulty (**See figure 18**). (Note: Refer to your installation/facility safety office for the required list of confined spaces – address those that require fall protection!)

h. Excavated Trenches or Holes More Than 6 Feet Deep:

- Provide temporary guardrail systems on both sides of the trench or around holes, or establish a warning line system. Any person crossing this line or guardrails is required to have fall protection.

i. Covers:

- Covers shall be capable of supporting without failure, at least twice the weight of a worker, their equipment, and their material combined.
- When installed, covers shall be secured, color-coded and clearly marked with the word 'HOLE, or COVER'.

j. Scissors Lift/Mobile Scaffold:

- Use guardrails.
- When using scissors lift, it is highly recommended to tie off to a manufacturer approved anchorage connection using full body harness at all times in addition to the guardrail.
- Workers will require fall arrest system if the lifting equipment is positioned outside the wheel base, even if the equipment has a guardrail system.

▪ Safe Work Practices on Ladders and Stairs:

a. Fixed Ladders:

- Workers shall not perform work from a fixed ladder unless they are wearing fall protection, such as a full body harness attached to a ladder climbing device or self-retracting lanyard, which in turn is attached to a properly designed and installed anchorage.
- If the total length of the climb on a fixed ladder equals or exceeds 20 feet, the following requirements must be met: fixed ladders must be equipped with either (a) ladder safety devices; (b) self-retracting lifelines, or (c) a cage or well.
- All ladder climbing safety devices must permit the worker to ascend or descend without continually having to hold, push, or pull any part of the device, leaving both hands free for climbing. These safety devices must be activated within 2 feet after a fall occurs. Ladder climbing safety devices shall be attached to a

frontal centered D-ring or other specifically designed centered frontal attachment point on a full body harness.

- The side rails of through or side-step ladder extensions must extend 42 inches above the top level or landing platform served by the ladder.

NOTE: Although allowed by OSHA, ladder cages are not a safe fall protection method. They cannot stop a fall.

b. Portable and Extension Ladders (Non-Self Supporting):

- The ladder shall be so placed as to prevent slipping, or it shall be lashed, or held in position.
- An worker may perform work from a non-self supporting portable ladder placed at the correct angle and properly secured (e.g., lashing top and bottom), if they are facing the ladder and their body is between the side rails, and they use one hand to grasp the ladder while both feet are on the ladder rungs.
- Non-self supporting ladders must be used at an angle where the horizontal distance from the top support to the foot of the ladder is approximately one-quarter of the working length of the ladder.
- A worker must use at least one hand to grasp the ladder when climbing, and when ascending or descending must face the ladder.
- A worker shall not stand or work from the top three rungs of a non-self supporting portable ladder.
- The spacing of rungs or steps of a portable ladder shall be on 12-inch centers, and the minimum width between side rails of a straight ladder or any section of an extension ladder shall be 11.5 inches.
- The length of single ladders or individual sections of ladders shall not exceed 30 feet. Two section ladders shall not exceed 48 feet in length, and over two-section ladders shall not exceed 60 feet in length.
- When portable ladders are used for access to an upper landing surface, the side rails must extend at least 3 feet above the upper landing surface. When such an extension is not possible, the ladders must be secured, and a grasping device such as a grab rail must be provided to assist workers in mounting and dismounting the ladder. In no case shall the extension be such that ladder deflection under load would, by itself, cause the ladder to slip off its support.
- The top of a non-self supporting ladder must be placed with two rails supported equally unless it is equipped with a single support attachment.
- Do not paint wooden ladders – paint hides defects and can create a slippery climbing surface.
- Single-rail ladders shall not be used.
- Workers shall not carry any object or load that could cause them to lose their balance and fall.

c. Portable Ladders – Self Supporting (Stepladders):

- Neither the top of a stepladder nor the step below the top of the ladder (top step) shall be used as a step, nor used to stand on while performing work.
- Do not use a closed stepladder as a straight ladder – it may slip out.
- Stepladders shall not exceed 20 feet in length.
- The steps of a stepladder must be corrugated, knurled, dimpled, coated with skid-resistant material, or treated to minimize slipping.

d. Stairways:

- Stairways having four or more risers, or rising more than 30 inches in height must have at least one handrail. A stairrail also must be installed along each unprotected side or edge. When the top edge of a stairrail system also serves as a handrail, the height of the top edge must be no more than 37 inches nor less than 36 inches from the upper surface of the stairrail to the surface of the tread.
- Midrails, screens, mesh, or intermediate vertical members must be provided between the top rail and stairway steps to the stair rail system. Intermediate vertical members, when used, must not be more than 19 inches apart.
- Unprotected sides and edges of stairway landings must be provided with standard 42 inch (+ or – 3 inches) guardrail systems.
- If the unprotected side or edge is protected by a 42 inch (+ or – 3 inches) standard railing, or protected by a wall, there must also be a handrail installed not more than 37 inches nor less than 36 inches from the upper surface of the stairrail system to the surface of the tread on at least one side of the stairway.

Section VII

Inspection, Maintenance, Storage and Care Procedures for Fall Protection Equipment

As stated in 29 CFR 1910.66 Appendix C, Section I, Paragraph (f), personal arrest systems must be regularly inspected. Any component of the system with significant defects such as cuts, tears, abrasions, mold, undue stretching, alterations or additions that will affect its efficiency, and damage due to deterioration, contact with fire, acids or corrosives, distorted hooks or faulty springs, tongues unfitted to the shoulder buckles, loose or damaged mountings, non functional parts and any wearing or internal deterioration of the ropes, must be taken out of service immediately and should be tagged or marked as unusable or destroyed. All FP equipment shall be inspected prior to each use by the user and by a competent person at intervals of no more than one year. Inspection of the equipment by the Competent Person should be documented. All components and sub-components of the selected fall arrest, positioning, and restraint systems shall be compatible. **As a general rule, always consult equipment manufacturer's recommendations for Use, Inspection, Care and Maintenance.**

- **Anchorage Systems:**

- a. Inspect all components of the anchorage systems.
- b. Observe any abrasion wear points, damaged threads or swags in the sling material before use.
- c. For synthetic slings and anchor straps, inspect all sewing and loops for wear, chemical damage, burn damage, and/or ultraviolet deterioration.
- d. Refer to the anchorage-attached tags to determine when the sling should be retired.
- e. Inspect cable slings for excessive damage to the steel fibers.
- f. Certify the anchorage system exposed to weather or corrosive conditions.

- **Snap-hooks and Carabiners:**

- a. Inspect on a regular basis and before each use.
- b. Retire snap-hooks and carabiners and all integral components, if any discoloration, deformation, cracks or abrasions are detected.
- c. Retire immediately if it has sustained any fall, or if the spring brake and gate are bent, or if the gatekeeper no longer engages the slot cleanly.
- d. Damaged snap-hooks and carabiners shall be tagged and removed from service and inventory list.
- e. Dirty snap-hooks and carabiners shall be cleaned with WD-40 or a similar solvent, immersed in boiling water for 30 seconds to remove the cleaning agent, and dried with a soft cloth. Ensure the gate and gatekeeper operate properly.
- f. Carabiners shall not be loaded along the gate side.
- g. Snap-hooks shall not be side-loaded.

h. Ensure that only double-locking type gates are used.

▪ **Lanyards and Energy Absorbers:**

- a. Inspect lanyards regularly under slight tension.
 - b. Check all components for abrasions, discoloration, cracks, and torn stitching.
 - c. Wash on regular basis to remove dirt and grit that can abrade the fibers.
 - d. Lanyards and energy absorbers shall have a permanently attached label indicating the manufacturer's name, serial number/lot number, manufacture date, maximum elongation, maximum arresting force, maximum free fall and capacity. The lanyards and energy absorbers must also have permanently attached labels that indicate that they meet OSHA & ANSI requirements. Lanyards bearing the markings of ANSI A10.14 only are not acceptable and they should be taken out of service.
 - e. Use and review the manufacturer's log book provided with the equipment to determine the age of the lanyard and energy absorber.
 - f. Lanyards and energy absorbers shall be inspected by the user prior to each use, and by a competent person other than the user at least once a year.
 - g. Maximum usage of a lanyard shall not be more than 5 years once put into service (assuming the new unused lanyard is stored in a climate-controlled location [i.e., in a plastic bag not exposed to fumes, and in a cool location out of direct sunlight]).
- Retire the lanyard from service:
- (1) After a hard fall.
 - (2) When the shock absorber has been even slightly impacted.
 - (3) If the lanyard has been used for any other purpose other than fall protection.
 - (4) If the equipment shows excessive wear, chemical damage, burn damage, and/or ultraviolet deterioration.

▪ **Fall Arrester (Rope Grab):**

- a. Inspect regularly.
- b. Check for signs of wear, corrosion, rust and other anomalies.
- c. If any sign of wear or malfunction, remove the device from service immediately.

▪ **Self Retracting Lifelines (SRL):**

- a. Inspect prior to each use.
- b. Ensure Inspections are conducted by a Competent Person regularly.
- c. SRL shall be returned to the manufacturer for servicing and re-certification once a year.
- d. If SRL housing becomes yellow, gathers condensation, or the indicator has been engaged, remove it from service immediately and return it to the manufacturer for repair and re-certification.

▪ **Body Support (Harness):**

- a. Inspect on a daily basis or prior to each use for frayed threads, cuts, tears or loose connections.
- b. Inspect the stitched areas thoroughly.
- c. Look for burn holes from welding or other heat sources.
- d. Ensure harnesses are not painted or marked.
- e. Store harnesses in a cool, dry, safe environment; ideally in a locked storage area.
- f. A Competent Person other than the user shall inspect the harness periodically, or at least once a year.
- g. Wash the harness in a mild soap and rinse multiple times to remove any soap residue and hang to dry out of direct sunlight in a cool dry environment.
- h. Maintain a logbook indicating the date of entry into service, the nature of the work performed, washing of the harness, and other relevant details.
- i. Retire harnesses from service after 5 years from the date put in service (assuming the new unused harness is stored in a climate-controlled environment [i.e., in a plastic bag not exposed to fumes, and in a cool location out of direct sunlight]). The body support harness shall have a permanently attached label indicating the manufacture's name, serial number/ lot number, manufacture date, capacity, and that it meets OSHA & ANSI requirements.

▪ **Ropes (Natural or Synthetic Fibers):**

- a. Inspect ropes periodically for broken fibers, severely worn areas, or changes in the consistency of the core; inspect under slight tension and check for soft areas, bulges, or excessive stiffness.
- b. Avoid exposing ropes to hazardous chemicals, moisture, acids or oils.
- c. Do not use ropes after they are impacted or damaged.
- d. Wash the ropes with lukewarm water and mild detergent on regular basis to remove dirt or grit, and rinse them several times to remove soap residue. Hang them in a dry, cool, dark area.
- e. Store ropes in a strong weatherproof bag. Ropes should always be dry prior to placing them in storage.
- f. Ropes shall have a permanently attached label indicating the manufacture's name, serial number/ lot number, manufacture date, capacity, and that they meet OSHA & ANSI requirements.
- g. Retire ropes after 5 years of service. If they are damaged, impacted or exposed to chemicals, remove them from service immediately.

▪ **Vertical Lifelines:**

Refer to "**Ropes**" section above, and manufacturer's recommendations regarding inspection, care and maintenance.

▪ **Horizontal Lifelines:** Refer to Section X.

- **Ladder Climbing Systems:**

- a. Inspect on a regular basis and as per equipment manufacturer's requirements.
- b. The sleeve should run freely without hand operations or guidance.
- c. Check cable and rails for abrasions, wear, looseness and cracks.
- d. Before climbing, check integrity of cable, systems, and ground level.

Note: when climbing fixed ladders under 20 feet in length, ladder climbing devices are not required. Furthermore, portable ladders are not designed and constructed for the installation of ladder climbing devices. Therefore, using ladder-climbing devices on portable ladders is not required.

- **Raising/Lowering Devices (Rescue):**

- a. Inspect visually before each use.
- b. Check for wear and corrosion.
- c. Refer to the "**Rope**" section for additional information.

Section VIII Tie-Off Considerations

One of the most important aspects of personal fall arrest is fully planning the system before it is put in use. Probably the most overlooked component of the fall arrest system is planning for suitable anchorage points. Such planning should ideally be done during the design stage and before a structure or a building is constructed, in order for the anchor points to be incorporated into the design, used during construction, and identified for maximum use in later maintenance work.

- The strength of a personal fall arrest system depends on its subsystems and components, as well as the anchorage point and how strongly such a system is attached to the anchor point. Such attachment shall not significantly reduce the strength of the system, including the structural members (e.g., the beams or columns to which it is attached). If a means of attachment is used that will reduce the strength of the system, such component (i.e., beam, column) should be replaced with a stronger one in order to maintain the appropriate maximum characteristics.
- All components and sub-components of the selected fall arrest system shall be compatible.
- No knots shall be tied in lanyards, lifelines or anchorage connectors (i.e. anchor strap). Tie-off using a knot in a lanyard, lifeline or anchorage connector can reduce the strength by 50% or more.
- Tie-off of a rope lanyard or lifeline around an “H” or “I” beam or similar support can reduce the strength drastically due to the cutting action of sharp edges of the beam. Therefore, use should be made of webbing lanyard or wire core lifeline around the beam, or the lanyard or lifeline should be protected from the edge.
- Tie-off around rough or sharp surfaces reduces the strength of the line drastically. Such tie-off should be avoided or an alternate tie-off rigging should be used such as snap hook/D-ring connection, wire rope tie-off, an effective padding of the surfaces, or an abrasion-resistance strap around or over the sharp or rough surfaces.
- The anchor point should be located as high as possible to minimize the free fall distance and prevent any contact with an obstruction or the ground below if a worker falls.
- Tie-off point (s) shall be located in such a way as to minimize swinging of the worker (pendulum-like motion) that can occur during a fall. The farther away in a horizontal direction a worker moves from a fixed tie-off point, the greater the swinging angle if a fall occurs. If any obstruction exists in the path of the swing fall, the force generated by

such a fall is the same as the force in a vertical fall. The maximum angle of swing away from the tie-off point should not be more than 30 degrees.

- Sliding hitch knots shall not be used in lieu of fall arresters. The hitch knot reduces the strength of lifelines/lanyards in some cases by as much as 50%.
- The strength of an eyebolt 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. Also, the diameter of the eyebolt should be compatible to snap-hook or carabiner attachment. Non-rotating rings should be avoided, since falls rarely occur directly along the axis of the eyebolt. Where possible, rotating rings with full motion in the three axes should be used. The ring will then be able to automatically align along the direction of force. The eyebolt used in the fall protection system shall be forged. An effort shall be made to minimize the angle between the axis of the eyebolt and the direction of the pull.
- HLLs, depending on their geometry and angle of sag, may be subjected to greater loads than the impact load imposed by an attached component. When the angle of sag for the HLL is less than 30 degrees, the impact force generated 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 HLL 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 HLLs for multiple tie-off. The reason for this is that in multiple tie-off to a HLL, if one worker falls, the movement of the falling worker may also cause other workers to fall. HLL and anchorage strength should be calculated for each additional worker to be tied-off. For these and other reasons, HLLs shall only be designed, selected, and certified by Qualified Persons. Testing of installed HLLs and anchors prior to use is recommended. **(See figures 10 and 11 for HLL and 19 thru 22 for anchorage connection).**

Section IX

Fall Protection and Prevention (FP&P) Plans & Rescue and Evacuation Plans (REP)

The FP&P Plans and REPs are documents prepared by contractors, subcontractors or other Army entities for the purpose of planning, designing, installing, monitoring and rescuing workers exposed to fall hazards, and preventing the occurrence of fall-related accidents in the work place. These are dynamic documents that will require modification due to changes of different phases of work, procedures or methods of construction. A Qualified Person shall be responsible for preparing the documents, as well as making any required changes, and designing, updating or approving various methods and requirements of fall protection systems. It is of utmost importance that FP&P Plans and REPs be prepared and approved prior to the start of work. The plans shall be kept at the work site at all times with any changes noted.

a. FALL PROTECTION AND PREVENTION PLAN REQUIREMENTS:

The FP&P Plan is different from the Fall Protection Plan as stated in 29 CFR 1926.503(k). A Fall Protection Plan is available only to workers who can demonstrate that it is infeasible or it creates greater hazard to use conventional fall protection systems (i.e. guardrail, safety nets, or personal fall arrest system). The FP&P Plan is a document that includes written procedures for performing specific work, tasks, or projects, and indicates the proper way of using safe fall protection systems and equipment and any other relevant information. The FP&P Plan shall include the following:

- A description of the fall hazards that will be encountered at the work place by the users during performance of their work.
- The type of fall protection/fall prevention methods or systems used for every phase of work.
- The training requirements for every worker exposed to fall hazards.
- The type of fall protection equipment and systems provided to the workers that may be exposed to fall hazards.
- The names of Qualified and Competent Persons shall be included in the plan.
- The fall protection equipment and instructions for assembly/disassembly, storage maintenance and care.
- A description of training requirements.
- The FP&P Plan must be prepared and signed by a Qualified Person. A Competent Person will implement the plan.
- All workers working at heights at a job site shall understand and agree to comply with the FP&P Plan and REP.

b. RESCUE AND EVACUATION PLAN REQUIREMENTS (REP) (See Form 1-1, Appendix B)

As required by 29 CFR 1910.66 Appendix C, Section I, Paragraph (e)(8), when personal fall arrest systems are used, employers must assure workers that they can be promptly rescued, or can rescue themselves should a fall occur. The REP shall include emergency procedures, methods of rescue, equipment used, and training requirements. The REP should include the following information as part of the FP&P Plan:

- A detailed description of the work site with any information that will help find the location, building number, floor number; etc. Post written directions that can be read over the phone to first responders (ambulance/police/fire) or their dispatchers on how to get to the site from the main gate of a facility. Give complete, accurate information to the rescue responder. Post a map at the job site and highlight with yellow marker the route one should take from the site to the nearest hospital that someone can use to drive an employee with minor injuries.
- The location of the lift or other equipment that will be used in case of emergency, and the location of the activation key.
- A detailed location of the closest first aid kit. To assure that during an emergency there is no time lost looking for first aid kits, post a site map marking their location.
- A listing of emergency phone numbers. In the event an emergency rescue is required, call the phone numbers in the order that they are listed, 1st, 2nd, 3rd, etc.
- A requirement to send an escort to help the first responders and/or rescuers find the location of the accident.
- The name of the person (the escort designated to meet the first responders upon arrival at the scene) and their back-up (in the event the primary designated person is injured), who is responsible to make the phone call in case of emergency.
- The names of the workers that will require rescue during the course of performing their jobs.
- If self-rescue is used, indicate the type of self-rescue equipment that is available at the job site or will be utilized during rescue operations.
- The training requirements that the designated rescuers should receive in order to become qualified rescuers.

Section X

Fall Protection System Design Requirements

In order to plan and design a safe fall protection program, Army personnel, to include contractors and subcontractors as appropriate, shall be trained and have the knowledge, understanding and commitment to implement a comprehensive fall protection strategy for the safety of all employees exposed to fall hazards.

Leaders should be striving to achieve 100% fall protection for all workers exposed to fall hazards during maintenance, construction work, repair work, and follow-up work after construction is complete. A Fall Arrest System checklist is included at the end of this section to aid leaders in ensuring compliance.

a. Design Requirements for Fall Protection Systems:

The following design information can be inserted into contracts or used by the in-house design group:

- **General Fall Protection System Requirements:** In accordance with 29 CFR 1910, Subpart D, each employee on a walking/working surface with an unprotected side or edge that is 4 feet or more above a lower level shall be protected from falling by use of guard rail systems, safety nets, or personal fall arrest systems. Construction site workers shall adhere to the threshold height of 6 feet, per the USACE Manual EM 385-1-1, and 29 CFR 1926.500, Subpart M, The Construction Industry Standards. If working/walking near or above chemicals, liquids or obstructions, fall protection systems are required, even on the same level of the exposure.

b. Specific Fall Protection Requirements:

- **Guard Rails (See figure 23):**
 - a. 42 inches high plus or minus 3 inches above walking/working level.
 - b. Shall be made of posts (stanchions), top rail, mid-rails and toe boards.
 - c. Posts shall be made of a minimum 2X4 inch lumber with a maximum spacing of 8 feet.
 - d. The top rail shall withstand a force not less than 200 pounds if applied to the top rail in an outward or downward direction; mid-rails shall withstand a force of 150 pounds; toe boards shall withstand a force of 50 pounds.
 - e. Top rails shall be made of 2X4 inch lumber, ¼ inch diameter steel cable, 1.5 inch nominal diameter schedule 40 pipe, or 2X2X 3/8 inch structural steel.
 - f. The top rail shall not deflect lower than 39 inches.
 - g. Mid-rail shall be at least 1X6 inch lumber.
 - h. Toe-board shall be a minimum of 3½ inch high lumber.

- **Stairs Rails and Handrails:**

- a. 36-37 inches high for construction work.
- b. 30-34 inches high for general industry.

- **Safety Nets (See figure 25):**

- a. Minimum breaking strength of 5,000 pounds.
- b. Safety net mesh opening should not be larger than 36 square inches or longer than 6 inches on any side opening.
- c. In any case, the net shall not be installed lower than 30 feet from the working surface.
- d. Safety Nets must extend out from the working surface as follows:

Distance from working level to the net:	Distance the net should extend from working surface:
Up to 5 feet	8 feet
Over 5 feet up to 10 feet	10 feet
Over 10 feet	13 feet

- e. Safety nets shall be tested and certified by a qualified person once every six months using a drop test of 400 pounds, dropped from the same elevation a worker might fall.

- **Ropes:**

- a. Synthetic rope lifelines – minimum strength of 5,600 pounds.
- b. Wire rope lifelines – minimum strength of 6,000 pounds.
- c. Vertical lifelines – minimum

- **Warning Line:**

- a. Installed 6 to 10 feet away from a leading edge, and flagged every 6 feet; provide signage indicating “warning line”.
- b. The height of the warning line should be between 34-39 inches.
- c. Shall consist of a rope, wire or chain and supporting stanchions.
- d. A safety monitor is required for on-site observation in order to ensure a safe working environment at all times.

c. Personal Fall Arrest System Requirements:

The system must withstand a minimum force of 5,000 pounds with a free fall distance generally ranging between 4-6 feet.

- **Anchor System for fall Arrest:**

- a. Shall withstand a minimum force (breaking strength) of 5,000 pounds or be engineered for twice the arresting force.
- b. Many manufacturers require 5,400 pounds minimum anchorage strength for their equipment.
- c. No knots shall be tied in anchorage connectors.

- **Snap-hooks and Carabiners:**

- a. Minimum Strength 5,000 pounds; must be self locking type.
- b. Must withstand a side loading force of 350 pounds, and the gate should withstand a force of 220 pounds.

- **Lanyards:**

- a. Strength of 5,000 pounds.
- b. Length: varies from 2 to 6 feet.
- c. Synthetic rope lanyard minimum diameter is 1/2 inch.
- d. Provide energy absorber with lanyards.
- e. Dynamic performance test, where the maximum arresting force on the body is 1,800 pounds.
- f. No knots shall be tied off in lanyards.
- g. Depending on special or specific applications, dual shock absorbing lanyards may be required.
- h. A lanyard strap shall not be wrapped around a tie-off point and then attached back to itself, unless it is a tie-back lanyard where the lanyard straps have been designed accordingly.
- i. The snap hook shall only be secured to an attached D-ring (incorporated into the body harness by the manufacturer).
- j. Shall have a permanently attached label indicating manufacturer's name, serial number/lot number, manufacturer date, capacity, and that it meets the applicable OSHA and ANSI requirements.

- **Energy Absorbers:**

- a. Shall not elongate more than 42 inches.
- b. Maximum arresting force of 1800 pounds, minimum operating or activation force of 450 pounds.
- c. Shall have a permanently attached label indicating the manufacturer's name, serial number/lot number, manufacture date, maximum elongation force, maximum free fall distance, capacity, and that it meets OSHA, ANSI Z359.1 standards.

- **Self Retracting Lanyards:**

- a. Shall withstand a minimum tensile load of 5,000 pounds if free fall distance is more than 2 feet.
- b. Shall withstand a minimum tensile load of 3,000 pounds if the free fall distance is 2 feet or less.
- c. Maximum arresting force shall not exceed 1,800 pounds.

- **Full Body Harness:**

- a. Maximum arresting force of 1,800 pounds.
- b. Dorsal D-ring should be incorporated into the full body harness.
- c. Shall have a permanently attached label indicating manufacture's name, serial number/lot number, manufacture date, capacity, and it meets OSHA & ANSI Z359.1 standards.
- d. Manufacturers test the harness with a rigid weight of 220 pounds. The conversion factor of rigid weight to the human body is 1.4. A 220 pounds rigid weight is equivalent to 310 pounds of human body weight.

- **Rope Access:**

- a. Requires two independent anchorages.
- b. Two lifelines or ropes attached to the anchorages, a working line, and a back-up safety line. Each one is to be independently anchored.
- c. Ropes should be of low-stretch kern mantel and arranged so that any abrasions will be avoided.
- d. Use full-body harness.

- **Design Considerations for Horizontal Lifelines (HLL):**

HLLs shall be designed, installed, certified and used under the supervision of a Qualified Person, as part of a complete fall arrest system, which maintains a safety factor of 2. HLLs can be either permanent or temporary systems, and be either flexible or rigid (such as the trolley system). Certain parameters should be taken into consideration when designing HLLs, such as:

- a. Initial and maximum deflection or sag of the line.
- b. Clear span between supports or anchorages.
- c. Design of anchor points and anchorage connectors.
- d. Number of workers attached to the system.
- e. Free fall distance and total fall distance.
- f. Minimum clearance below the HLL system.
- g. Unit weight of the cable and line.
- h. Total weight of all workers attached to the HLL.

- **The components of typical HLL sub-system may include the following:**

- a. Anchorage, Anchorage Connectors.
- b. Lifeline Tensioner.
- c. Cable or rope.
- d. Shock or energy absorber.

▪ **Presently there are no U.S. standards that identify HLL verification and testing requirements. However, verification testing requirements may include the following tests:**

- a. Line fittings static test.
- b. Corrosion inspection.

Unfortunately, with a safety factor of 2, many tests have the potential to activate the lifeline system. Careful consideration is required in determining testing requirements.

FALL-ARREST SYSTEM CHECKLIST

(Must answer yes to all applicable questions)

ANCHORAGES

1. Do workers know appropriate anchorage points for each task that requires a fall-arrest/positioning or restraint system? _____
2. Are all anchorage points stable, substantial, and have sufficient strength to withstand twice the potential impact energy of the free-fall? _____
3. Is the “D” ring of the full body harness located at shoulder height? _____
4. Are anchorage points for self-retracting lifeline systems located overhead? _____
5. Can the worker move from one station to another or climb up and down without exposure to a fall? _____
6. If the lifeline, lanyard, or self-retracting lifeline is not permanently attached to an anchorage point at the elevated work area, is the first worker up or the last worker down protected while climbing and traversing? _____

VERTICAL LIFELINES

1. Does the lifeline have a minimum breaking strength of 5,000 pounds? (2,268 kilograms) _____
2. Is the lifeline protected from abrasive or cutting edges? _____
3. Does the system provide fall protection as the worker connects to and releases from the lifeline? _____
4. Is the lifeline arranged so workers never have to hold it for balance? (a lifeline should never be used for balance) _____
5. Is the vertical segment integrated with the horizontal segment to provide continuous fall protection? _____

HORIZONTAL LIFELINES

1. Has the entire horizontal lifeline system been designed and approved by a Qualified Person? _____

2. Have the anchorages to which the lifeline is attached been designed and evaluated specifically for a horizontal lifeline? _____
3. Has the designer of the system approved the number of workers that will be using it? _____
4. Is the rope or cable free from signs of wear or abrasion? _____
5. Does the rope or cable have the required initial sag? _____
6. Have the workers been warned about potential falls? _____
7. Have the clearances been checked? _____
8. Is the hardware riding on the horizontal lifeline made of steel? (Aluminum is not permitted because it wears excessively) _____

FALL ARRESTERS

1. Is the fall arrester compatible with the lifeline on which it is to be installed or operated? _____
2. Is the fall arrester in operational condition? _____
3. Is the fall arrester equipped with a changeover lever that allows it to become a stationary anchor on the lifeline? _____
4. Is the fall arrester equipped with a locking mechanism that prevents unintentional opening of the device and subsequent disengagement from the lifeline? _____
5. Is the fall arrester's "up" direction marked properly so that the equipment can be attached to the line correctly? _____
6. Is the fall arrester included in a regular maintenance and inspection program? _____

LANYARDS

1. Is the lanyard length as short as necessary and greater than 6 feet? (1.8 meters) _____
2. Are manually adjustable lanyards used when it is desirable to be able to take slack out of the lanyard? _____

3. Does the lanyard have a shock-absorbing feature to limit the arresting forces?

4. If the lanyard has a shock absorber, is it obvious to the user that the shock absorber has been deployed? (is there a warning label, broken pouch, etc.) _____
5. Is the tying of knots from the lanyard to the lifeline prohibited? (mechanical rope grabs or fall arresters must be used) _____

SELF-RETRACTING LIFELINE (SRL)

1. Are workers properly trained to use a SRL? _____
2. Is the SRL under a regular maintenance and inspection program? _____
3. Is the end of the cable properly spliced (Thimble eye, Flemish eye-spliced, and swaged fitting/ferrule)? _____

SNAP HOOKS

1. Have double-locking snap hooks been used? _____
2. Is the snap hook attached to the D-ring, eyebolt, or other hardware in a manner approved by the manufacturer of the snap hook? _____
3. Are snap hooks inspected regularly for stress, wear, distortion, and spring failure?

4. Are snap hooks arranged so they are never connected to each other (They should NOT be connected to each other)? _____

FULL BODY HARNESSSES

1. Are full-body harnesses selected for a particular job equipped with all necessary attachment points (i.e. fall arresting, work positioning, descent control, rescue, or ladder fall-protection systems)? _____
2. Are body harnesses inspected regularly for wear, abrasion, broken stitching, and missing hardware? _____
3. Is the Velcro type of closure prohibited from all load-bearing connections?

4. Have workers been instructed in the use and care of body harnesses? _____

OTHER CONSIDERATIONS

1. Has the free-fall distance been considered, so that a worker will not strike a lower surface or object before the fall is arrested? _____
2. Have pendulum-swing fall hazards been eliminated? _____
3. Have safe methods to retrieve fallen workers been planned? _____
4. Is all fall-arrest equipment free of potential damage from welding, chemical corrosion, or sandblasts? _____
5. Are all components of the system compatible according to the manufacture's instructions? _____
6. Have employees been properly trained in the following issues?
 - a. Manufacturer's recommendations, restrictions, instructions, and warnings

 - b. Location of appropriate anchorage points and attachment techniques

 - c. Problems associated with elongation, deceleration distance, method of use, inspection, and storage _____
7. Do trained inspectors perform all regular inspections? _____
8. Are written reports maintained? _____
9. Has the total fall distance been considered?

Section XI

Identification, Use, Certification and Re-Certification of Anchor Points

Anchorage can either be engineered or improvised. An anchorage system is a combination of an anchorage point and anchorage connector (s). Both anchorage points and anchorage connectors shall withstand a force of 5,000 pounds for every worker attached to the system. Positioning and restraint anchorage shall withstand a force of 3,000 pounds. Anchorage connectors are usually designed and prefabricated by a manufacturer under the supervision of a Qualified Person, and meet OSHA and ANSI requirements. The certification and re-certification of anchorage connectors can be done by the manufacturer or Qualified Person.

▪ **Responsibility of Anchor Point Identification, Design and Certification:**

a. If anchorages are installed, prior to use, a registered professional engineer with experience in designing fall protection systems, or another Qualified Person with appropriate education and experience should design the anchor point to be installed. If there is a need to devise an anchor point from existing structures such as beams, or eye-bolts, a Qualified Person should conduct an evaluation of the anchorages.

b. Anchorages shall be capable of supporting 5,000 pounds per each worker attached, or shall be designed, installed and used under the supervision of a Qualified Person as part of a complete fall arrest system.

c. A Qualified Person should be able to calculate the forces generated by arresting a fall; total loading; deflection of HLL; impact on the structural members the line is attached to; and determine the optimal and safe location where and how to tie-off. The Qualified Person should be knowledgeable and capable of designing, certifying, supervising, approving and rating both the anchor points and tie-off points.

▪ **Inspection, Certification and Re-certification of Anchor Points:**

a. **Inspection:** According to ANSI Z359.1, Section 6.1, fall arrest equipment shall be inspected by the user prior to each use and by a Competent Person annually and in accordance with the manufacturer's instructions. End users are not qualified to inspect anchor points; however, they could be trained to pay special attention to any cracks around the anchor points or if the anchor points are unstable or loose. End users should refrain from tying-off to unsafe anchor points, and they should bring it to the attention of the Competent Person if such a situation exists.

b. **Certification and Re-certification of Anchor Points:** Anchor points should be field-verified by a Qualified Person. ANSI Z359.1 addresses certification of anchorage connections. It does not address certification of anchor points. A registered professional engineer or a Qualified Person can certify the structural integrity of the

anchor points. Factors such as the design, type, location, size of structural member the anchorage is connected to, environment and weather conditions, determine how often such points should be inspected and re-certified by a Qualified Person.

▪ **Guide for Selecting Safe Anchorages:**

a. The strength of a personal fall-arrest system depends on its subsystems and components, as well as the points of anchorage and how strongly such a system is attached to the anchorage point. Such attachment shall not significantly reduce the strength of the system, including the structural members such as beams, columns, or any rigid structure.

b. All components and sub-components of the selected fall-arrest system shall be compatible with each other.

c. When tying off to a beam or column, do not attach the anchorage connection to a hole in the beam unless evaluated by a Qualified Person, because the forces generated by a fall will weaken the beam structure. Do not drill a hole for tying off, as this attachment will weaken the beam. The preferred method is to tie off using an anchorage connection to wrap around the beam or column, such as an anchor strap, or use a designed beam clamp.

d. Do not tie a knot in the anchorage connection.

e. The preferred location to tie off to a beam is in the center of the span. This action will distribute the forces evenly at the supports. The force of a fall will increase according to the proximity of the tie off point to the beam support.

f. Select the point of anchor as high as possible. This will minimize the free-fall distance and total fall distance, and will prevent any contact with an obstruction or the ground below.

g. When selecting the point of anchor in a column, take into consideration the impact of fall forces due to axial loading and bending stresses.

h. The point of anchorage shall be located in such a way as to minimize swinging the worker (pendulum-like motion) that can occur during a fall. The farther away in a horizontal direction a worker moves from a fixed tie off point, the greater is the swinging angle if a fall should occur. If any obstruction exists in the path of the swing fall, the force generated by such a fall is the same as the force in a vertical fall. The maximum angle of swing away from the point of anchor should not be more than 30 degrees.

i. Refrain from using welding to secure the anchorage connection to the anchorage point. However, when welding is used, bear in mind that welding certification is required annually.

j. When using nails to install roof anchors, the number of nails used to attach the component to a wood roof shall be in accordance with the building code requirements.

k. Always specify the number of authorized users that are allowed to attach to a specific point of anchor, and take into consideration the accessibility and ease of securing to it.

l. If an eyebolt is selected as a point of anchor, it should be rated along its axis. Eyebolt strength is greatly reduced if the force is applied at an angle to the eyebolt axis. In addition, the diameter of the eyebolt shall be compatible to the snap hook or carabiner attachment. Non-rotating rings should be avoided, since falls rarely occur directly along the axis of the eyebolt. Where possible, rotating rings with full motion in all three axes should be used. The ring will then be able to automatically align along the direction of force.

Section XII

Fall Prevention Considerations During Planning and Design Phase

▪ INTRODUCTION:

When planning and designing new buildings or facilities, Army planners and designers, to include the owners/managers of the buildings and facilities, are responsible for providing safe design for the protection of all workers and users exposed to the hazards of falls from heights during the performance of their work.

a. Army architects and engineers must be aware that any part of a building, facility, structure, equipment, or integral assembly such as weight-handling equipment (cranes, hoists, etc.) may require maintenance work. If such work will be required, prevention and control measures must be incorporated into the design to eliminate, if possible, the need to work at heights, and the subsequent risk of exposure to fall hazards.

b. Architects, engineers, designers, construction managers, superintendents, contractors/subcontractors, and owners of buildings and facilities have a major role, and are responsible for creating a safe work environment to include an awareness of fall hazards. They shall have the appropriate knowledge and awareness of any and all fall hazards that will be encountered at the workplaces they are designing, constructing, occupying and operating.

▪ PLANNING AND DESIGN CONSIDERATIONS:

It is very important during the design and planning phase, to give consideration to the prevention of falls, not only during construction, but during the subsequent use or maintenance of the building, structure, or facility. Areas of focus during the various phases include the following:

a. Construction Phase:

- (1) Reducing the risk when working at heights (e.g. Installation of guardrails to the perimeter structural members prior to erection).
- (2) Reducing the need to work at heights as much as possible by prefabricating modules on the ground before lifting them into position.
- (3) The site and condition of access roads leading to the building or facility during construction, for example, to enable a crane to place building material in the most appropriate and accessible location.
- (4) Preparation and or clearing of debris off of the ground or floor below the work area. The ground should be compacted and leveled in order to prevent equipment from tilting or being unstable (e.g. cranes or scissors lifts).

(5) Provision of temporary safety mesh as much as possible to prevent objects from falling down to a lower level.

b. Maintenance and Occupancy phase:

- (1) Safe access to or egress from any work area.
- (2) Provision of permanent guardrails or edge protection such as parapets.
- (3) Selection of material that can withstand harsh environment (e.g. special wood planks such as particle board can weaken because they absorb moisture and thus will not be able to support the weight of the worker during future roofing inspection or maintenance work).
- (4) Use of temporary work platforms whenever possible such as scaffolds, and elevating work platforms.
- (5) Identification and location of services (e.g. location of power lines, water).
- (6) Location and operation of types of equipment selected, and devices used (e.g. using adjustable light fixtures that can be lowered to the ground for replacement).
- (7) Use of fall arrest systems and devices, including the provision of suitably located temporary or permanent anchor points and field identification of all required anchorage points.
- (8) Provisions of safety nets, when required.
- (9) Location of and access to equipment.
- (10) First aid facilities and trained personnel.

▪ **FALL HAZARD IDENTIFICATION:**

Army planners and designers, as well as system safety engineers, should identify any hazards that involve a worker falling while at the workplace or using means of access to or egress from a building or facility. In order to assist in identifying fall hazards, special considerations should be given to:

- a. Consultation, communication and coordination with safety and health professionals.
- b. Knowledge of injuries arising from falls which have occurred at a workplace or at similar work places.
- c. Communication with various architects, engineers, and contractors to find out if “at risk” workers are having or likely to have problems while performing their jobs.
- d. Accidents or near-miss incidents related to falls at the workplace or similar workplaces.
- e. Review of relevant fall protection standards, regulations, and guidance documents.

f. Communications with personnel of similar facilities to determine the risks workers face during the performance of their duties.

g. Conduct a walk through inspection of the facility or similar facilities to become familiar with various risk situations.

h. Compile statistical records indicating potentially unsafe work practices.

▪ **RISK ASSESSMENT:**

Risk in relation to any injury or harm means that the probability of that injury or harm occurring is increased. If a hazard has been identified, then the risks associated with that hazard can be assessed. Assessment of risks will help planners, designers, and system safety engineers determine the potential for injury, and thus help to identify countermeasures to reduce or eliminate the risks. The risk assessment process consists of the following five steps:

1. IDENTIFY THE HAZARDS - Identify hazards that will negatively affect workers, equipment, or mission accomplishment. Hazards that cannot be eliminated must be risk-managed.
2. ASSESS THE HAZARDS – Determine the risk of potential loss based on probability and severity of the hazard. In other words, what are the chances something bad is going to occur; and, if it does, what are the consequences, using a worst-case scenario.
3. DEVELOP CONTROLS AND MAKE RISK DECISIONS - For each hazard, develop one or more controls that will eliminate or reduce the risk of the hazard. Specify the who, what, where, when, and how for each control. The decision whether or not to accept the risk is then made at the appropriate decision making level of command.
4. IMPLEMENT CONTROLS - State how each control will be put into effect and communicate execution in clear, simple orders that can be understood at all levels.
5. SUPERVISE - Monitor your control measures - are they effective?

▪ **RISK CONTROL:**

Leaders should consider the means by which risk may be eliminated or reduced. Once risks have been assessed, measures should be taken to control the fall hazards. There is a hierarchy of control measures ranging from eliminating the hazards as being the most effective to the other methods that reduce risks. Specific control measures may include the following:

- a. Planning and designing of new or modification of existing buildings, structures or facilities should take into consideration the prevention of falls.
- b. Evaluating methods or the way jobs or work tasks can be performed safely to eliminate or reduce the likelihood of a fall.

- c. Organizing and scheduling of work so that workers do not increase the risk of a fall for themselves or others.
- d. Identifying the information and knowledge required by contractors to enable them to work safely.
- e. Collection, assembly and presentation of the information required to eliminate or reduce hazards.
- f. Identifying the training or knowledge requirement to work safely if there is the risk of a fall.

Section XIII References

- **29 CFR 1926.500, Subpart M, Fall Protection in the Construction Industry.**
- **29 CFR 1910 - Occupational Safety and Health Standards.**
- **US Department of Labor, OSHA 3124 1993 (Revised), Stairways and Ladders.**
- **US Department of Labor, OSHA Instruction Standards, 3.1, December 1995, Interim Fall Protection Compliance Guidelines for Residential Construction.**
- **American National Standard, ANSI Z359.1-1992 (R1999), Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components.**
- **Introduction to Fall Protection; J. Nigel Ellis, PHD., CSP, PE, (Third Edition: American Society of Safety Engineers).**
- **US Army Corps of Engineers (USACE), Safety and health Requirements Manual, EM 385-1-1.**

APPENDIX A

PART I.

INSTRUCTIONS FOR USING FALL PROTECTION WORK PLAN MATRIX

The following instructions/guide are included to help Army personnel identify fall hazards at work place using work plan matrix and to identify the recommended fall protection systems to minimize the dangers of falls:

A.1 Identification of Fall Hazards in the Work Place:

- Fall hazards more than four-foot
- Fall Hazards - Above a hazard at any height (e.g. above debris, machinery, structures, reinforcing bars, liquids)
- Open Sided - Floors Platforms Stairs Catwalks
- Scaffolds Machinery Other

A.2 How to Identify Fall Hazards in the work place:

Read the first two items, (1 & 2) and check the boxes that apply. If either statement is applicable, you should fill out the Fall Protection Work Plan Matrix.

A.2.1 Continue to read the information describing fall hazards and indicate the items that apply by placing a check mark in the appropriate box to the left of the reference number.

A.2.2 Use the reference number to find additional information in Part II.

A.2.3 If a hazard exists that is not listed, write it in the "Other" box.

A.3 Description of Fall Arrest/Restraint Methods:

A.3.1 Select the method (s) to be used from those indicated by any open circle in the intersection between section (1) and (2) (Marked "A" at the corner). Fill in the circle to indicate the method (s) that will be used and place a check mark in the appropriate box to the left of the reference number.

A.3.2 An existing **X**, in the boxes indicates a required item to be used.

A.3.3 Use the reference number to find additional information in Part II.

A.3.4 If the method chosen is not listed; write it in the "Other" box.

A.4 Inspection and Instructions for Assembly/Disassembly and Storage:

A.4.1 Fill in the open circle to indicate the item to be used from those recommended in the intersection between section (2) and (3), (Marked “**B**” at the corner). Place a check mark in the appropriate box to the left of the reference number.

A.4.2 An existing “**X**” in the boxes indicates a required item to be used.

A.4.3 Use the reference number to find additional information.

A.4.4 If the method chosen is not listed write it in the “Other” box.

A.5 Warning Systems/Falling Objects Protection:

A.5.1 Fill in the open circle to indicate the items to be used from those recommended in the intersection between section (4) and (1) (marked “**C**” at the corner) then place a check mark in the appropriate box to the left of the reference number.

A.5.2 Hard hats/Hard caps **and** one other method to protect workers from falling objects should be selected from items: 35, 36, 39, 41, 42, 47 or an appropriate “Other” method.

A.5.3 An existing “**X**” indicates a required item to be used.

A.5.4 Use the reference numbers in Part II to find additional information.

A.5.5 If the method chosen is not listed; write it in the “Other” box.

PART II.

HOW TO IDENTIFY FALL HAZARDS IN THE WORK PLACE UTILIZING WORK PLAN MATRIX

(Step by step procedure)

SECTION 1

Fall Protection Planning:

To determine the requirement for fall protection, address the following questions:

1. Do Fall Hazard of more than 6 exist? (For general industry the height is 4 feet and shipyard is 5 feet)
2. Will work be performed above hazardous locations?
 - a. If fall protection is required, the fall protection work plan matrix should be completed.
 - b. After identifying fall hazards in the work place, check all boxes that apply.
3. Open sided, Floors, Platforms, Stairs, Roof, Catwalks, Scaffolds, Machinery, Other.

Open sides and edges means any side or edge (except at entrances to points of access of floors, roofs, working platforms, stairs, cat-walks, scaffolds, ramps or runways where there is no wall or guardrail system 42 inches high.

4. "Holes" indicates a gap or void 2 inches or more, in its least dimension, in a floor, roof, or walking/working surface:

Opening 2 inches or more in its least dimension.

- Manholes, Pits, Tanks, Skylights, Open shafts,
 Chutes, Other

Examples: a gap or opening in flooring, stairways, ramps, or roofing, 2 inches or larger through which material can fall through, or in the case of larger holes, a person can step or fall through. In either case, FP in the form of a secured and marked covering, FP, or barricading is required. Consideration should also be given to guarding holes, which may be a trip hazard or entrapment hazard.

If there is a danger of falling through a skylight opening, and the skylight itself is not capable of sustaining the weight of two hundred pounds per person with a safety factor of four, a standard guardrail system should be provided on all sides of the skylight.

5. Wall Opening- at least 30 inches high by 18 inches wide through which a person may fall to a lower level. This should be considered at any time work is being performed near a wall or window opening with a fall hazard to a lower level.

6. Working in a boom supported articulating lift:

Before each elevation of the work platform, the operator will check to see that each occupant's full body harness is on, and properly attached.

7. Leaving the Floor Surface of a:

Lift, Catwalk, Platform, Scaffold, Elevating work platform,
 Stairway, Other

Whenever an employee leaves the floor of any of the above, thereby reducing the height of the top rail to less than 42 inches (plus or minus 3 inches) in relation to the employee, FP should be utilized.

8. Working above suspended ceilings: Fall arrest, restraint systems or working stands/platforms should be used.

9. Leading edge work above 6 feet on a less than 4/12 Pitch (Low Pitched Roof):

Leading edge means the advancing edge of a floor, roof, or form-work which changes location as additional floor, roof, or form-work sections are placed, formed, or constructed. Leading edges not actively under construction are considered to be "unprotected sides and edges." Positive methods of fall arrest or fall restraint shall be required to protect exposed workers to hazards of falls. Positive methods of fall arrest or fall restraint should be required for persons conducting inspections or surveying existing or old roofs.

10. Working within 6 feet of unguarded roof edges less than 4/12 Pitch:

During the performance of work on low-pitched roofs with a potential fall hazard greater than 6 feet, ensure that workers engaged in such work are protected from falling from all unprotected sides and edges of the roof as follows:

- a. By using fall restraint or fall arrest systems.
- b. By the use of a warning line system.
- c. Mechanical equipment shall be used or stored only in areas where workers are protected by a warning line system, fall restraint, or fall arrest systems.

11. Steep Roof (Greater than a 4/12 Pitch):

Fall protection or restraint systems shall be used when working on a steep roof. Warning line and safety monitor systems are prohibited on surfaces exceeding a 4/12 pitch, and on any surface with dimensions less than 45 inches in all directions.

12. Elevating work platforms (e.g. scissors lifts):

When working from elevated work-platforms 6 feet or higher, the platforms must be equipped with standard guard rails and toe boards. If the worker's feet leave the floor of the elevating work platform, or the worker will be required to exit the lift at height, the FP&P Plan must be completed and continuous fall protection must be provided. Workers shall be provided with fall arrest systems if the lifting equipment is positioned outside the wheel-base even if the equipment has guardrails. It is highly recommended to tie off in a scissors lift even if the platform does not move away from the base.

13. Boatswain Chair:

The term "boatswain chair" shall mean a seat to support a worker in a sitting position, supported by rope slings attached to a suspension rope.

14. Working on roofs when the possibility of adverse weather conditions may be present, such as wind, ice, or rain:

When the possibility of adverse weather conditions exist, extra caution must be exercised. The Safety Manager or Competent Person must be consulted with respect to where the work is occurring, the duration of the work, the number of workers required, and the responsible point of contact in case of adverse weather.

15. Other:

Write in any fall hazard identified during the site inspection that is not listed above. Be as specific as possible. Describe the fall arrest/restraint method. Fill in the open circles that apply and check the appropriate boxes to the left of the reference box under section 2.

SECTION 2

Description of Fall Arrest/Restraint Methods:

16. Guard Rails (Temporary):

Standard guard railing, temporary or permanent, shall consist of a top rail, intermediate or mid-rail, toe-board, and posts, and shall have a vertical height of 42 inches, plus or minus 3 inches, from the upper surface of the top rail to the floor, platform runway, or ramp level. The posts and framing members for railings of all types shall be capable of withstanding a load of 200 pounds applied in any outward or downward direction at any point along the top edge and with minimum deflection. In any case, the top edge of the guardrail shall not deflect to a height less than 39 inches above the walking/working surface and with minimum of deflection.

17. Warning Line System:

Warning line system means a barrier erected on a walking and working surface or a low pitch roof (4/12 or less), to warn workers that they are approaching an unprotected fall hazard.

A warning line system must be erected around all sides of the work area. Where mechanical equipment is not being used, the warning line shall be erected not less than 6 feet from the edge of the roof. When mechanical equipment is not being used, the warning line shall be erected no less than 6 feet from the roof edge, which is parallel to the direction of mechanical equipment operation. It shall not be less than 10 feet from the roof edge, which is perpendicular to the direction of mechanical equipment operation.

18. Catch Platform/Safety Nets:

A substantial catch platform shall be installed below the working area of roofs more than 20 feet from the ground to eaves, with a slope greater than 3 inches in 12 inches without a parapet. In width, the platform shall extend 2 feet beyond the projection of the eaves and shall be provided with a safety rail, mid rail and toe-board. This provision shall not apply to workers engaged in work upon such roofs protected by a harness attached to a lifeline.

Where work is in progress above workers, a catch platform or other means shall be provided to protect those working below. All workers shall be notified. One completed floor shall be maintained between workers and steel or concrete work above.

19. Vertical Lifeline/Rope Grab:

Vertical lifeline means a vertical line from a fixed anchorage independent of the walking/working surface to which a lanyard or device is attached.

Rope grab means a fall arrester designed to move up or down a lifeline, to which the harness is attached. For additional requirements refer to the definition in Section II.

Only one person shall be attached to a vertical lifeline. Two workers will require two independent vertical lifelines.

20. Horizontal Lifeline (Catenary line, static line):

A rail, rope, wire, or synthetic cable installed in a horizontal plane between two anchorages and used for attachment of a worker's lanyard or lifeline device while moving horizontally, and to control dangerous pendulum-like swing falls. A Qualified Person must design the system. The competent person will review and approve the installation only.

21. Fall Arrest System:

Fall Arrest equipment consists of:

(a) Full body harness, approved lanyard, and an approved anchor point:

- **Full Body Harness** shall meet ANSI Z359.1 requirements.
- **Lanyard** shall be a shock absorbing type lanyard (2, 4 or 6 feet long depending on the application).
- **Anchor Point** shall be capable of supporting 5,000 pounds per employee or 3000 pounds per employee if a self-retracting lifeline is used. Anchor point shall be designed and approved by a Qualified Person.

Note: Use only full body harness. Body belts are not allowed in a fall arrest system.

(b) Safety Nets:

Safety nets shall be installed as close as practical under the walking/working surface on which workers are performing their duties, but in no case more than 30 feet. Safety nets shall extend outward from the outermost projection of the work surface as follows:

Distance from working level to the net:	Distance the net should extend from working surface:
Up to 5 feet	8 feet

Over 5 feet up to 10 feet	10 feet
Over 10 feet	13 feet

(c) Catch Platforms

- (1) A catch platform shall be installed within 6 vertical feet of the work area.
- (2) The catch platform width shall equal the distance of the fall but shall be a minimum of 45 inches wide and shall be equipped with standard guard rails on all open sides.

22. Positioning and Fall Restraint System:

Positioning device system consists of:

- (a) A safety harness (full body harness) incorporated in a full body harness with two side “D” rings.
- (b) The system shall be rigged to allow a maximum fall/free fall of two feet.
- (c) Anchorages used for positioning systems shall withstand a minimum force of 3,000 pounds.

Note: Body belts should not be used in a positioning device system.

Restraint protection consists of:

- (a) Harness attached to securely rigged restraint lines.
- (b) Safety harness (full-body harness).
- (c) Rope-grab devices are prohibited for fall restraint applications, unless they are part of a fall-restraint system designed specifically for that purpose by the manufacturer’s recommendations and instructions.
- (d) Anchorages used for fall restraint shall withstand a minimum force of 3,000 pounds.
- (e) Restraint protection shall be rigged to allow the movement of workers only as far as the sides and edges of the walking/working surfaces.

23. Egress Fall Protection:

Whenever workers are required to move from one elevated area to another that presents a fall hazard of 6 feet or greater, positive fall protection shall be provided. An example of this is utilizing a scissors lift to gain access to a roof or intermediate platform. The worker must be protected when exiting the scissors lift. This can be accomplished by using a double lanyard or a “Y” lanyard. If workers are exposed to fall hazards, 100% fall protection will be required at all times.

24. Safety Monitor System (Competent Person):

A safety monitor system (SMS) may be used in conjunction with other fall arrest systems. The safety monitor system may be used only after an evaluation clearly shows that the use of other systems is not feasible or creates greater hazards. The SMS shall not be used when weather conditions create additional hazards.

A person acting in the capacity of SMS shall be trained in the function of both the safety monitor and warning line systems, and shall:

- (a) Have control authority over the work as it relates to fall protection.
- (b) Be instantly distinguishable from members of the work crew. (Distinguishable markings or a different colored high visibility vest).
- (c) Engage in no other duties while acting as safety monitor.
- (d) Be positioned in relation to the workers under their protection, so as to have a clear, unobstructed view and be able to maintain normal voice communication.
- (e) Not supervise more than eight exposed workers at one time. Control zone workers shall be distinguished from other members of the crew by wearing a high visibility vest only while in the control zone.

25. Floor/Hole Covers (Temporary):

Trenches, manhole covers, and other appurtenances, when located in a roadway or vehicular aisle, shall be designed to carry twice the maximum axle load of the largest vehicle expected to cross over.

All floor-opening covers shall be capable of supporting twice the maximum potential load including worker and equipment, but never less than two hundred pounds (with a safety factor of 2). The cover shall be the same level of the rest of the floor, and shall be securely fastened to the floor to prevent accidental removal. All covers shall be color-coded or they shall be marked with the word "Hole" or "Cover" to provide warning of the hazard. If it becomes necessary to remove a cover, provide a conventional fall protection system around the opening until the cover is replaced.

26. Other:

List any other specific fall protection system that will be used on a project.

SECTION 3

Inspection of, and Instructions for Assembly/Disassembly and Storage:

27. Inspect all fall protection/restraint equipment prior to every use:

All equipment must be inspected per manufacturer's instructions. Operator's Manual shall be included with the equipment for worker's reference. Also follow all instructions of the "Qualified Person" prior to using the equipment.

28. Contact Qualified Person for anchor points loading, selection and approval:

Due to the variability in the structural strength of different materials prior to using an anchorage point, a Qualified Person must be contacted to ensure that the anchorage point meets/exceeds regulatory requirements.

29. Protect Against Cuts and Abrasions:

All safety lines and lanyards shall be protected against being cut or abraded. Padding must be used wherever sharp edges exist.

30. Stored in an Approved Location:

All fall protection/restraint equipment shall be stored in a weatherproof container or locker when not in use. Equipment should not be allowed to lay in water or direct sunlight, since this will affect the strength of the equipment.

31. Shall be Engineered/Compatible System:

Contact Qualified Person or manufacturer's representative for assistance. When using fall arrest systems, all components shall be designed for use with each other, or approval must be obtained from the manufacturer or Qualified Person to use the configuration. All system components shall be compatible.

32. Follow Manufacturer's and the Qualified Person's Instructions for installation, assembly/disassembly and use:

All systems must be installed, assembled, and disassembled per the manufacturer's direction. Failure to follow these instructions could lead to possible system failure.

33. In the event of a fall, the first response is to ensure the safety of the workers. After rescue and, if required, provision of medical aid, all equipment involved must be removed from service. The Safety Office will be contacted for further guidance.

34. Other:

Use this space to list other special identified instructions.

SECTION 4

Warning Systems and Falling Object Protection:

35. Barricade Area:

All areas must be barricaded to safe guard workers. When working overhead, barricade the area below to prevent entry by unauthorized workers. A distance of 6 feet shall be barricaded around the worker.

36. Warning Tapes/Signs:

Construction warning tape and signs shall be posted so as to be clearly visible from all possible access points. When signs are used, they should clearly indicate the entry requirements, potential hazards, and personal protective equipment requirement.

37. Hard Hat/hard Cap Requirements:

Hard hats/hard caps complying with ANSI Z89.1, 1997 Type I, Class E & G will be required when exposed to falling/flying objects. In addition, select one of the additional control measures:

Barricades Canopy Structure Toe Boards

Hard hats/hard caps must be worn any time workers are working at a level below other workers and/or the potential exists for falling objects to strike them. In addition to hard hats, one additional preventive measure (above) must be implemented.

As an example, when using hard hats/hard caps, the employee must use an additional form of protection from falling objects such as: barricading the area, a protective canopy structure, or platforms with toe boards.

38. Clothing and Safety Shoes:

Suitable clothing shall be worn. Sufficient and proper clothing shall be worn to assist in preventing scratches, abrasions, slivers, sunburn, or similar hazards. Loose or ragged clothing or ties shall not be worn while working around moving machinery. At a minimum, workers must wear a short sleeve shirt, and long pants.

Substantial footwear, made of leather or other equally firm material, shall be worn by workers whenever there is a danger of injury to the feet through falling or moving objects, or from burning, cutting, penetration, or similar hazards. The soles and heels of such footwear shall be of a material that will not create a slipping hazard. Footwear that has deteriorated to the point where it does not provide the required protection shall not be used.

39. Evacuate Area Below:

All non-essential personnel below a construction area must be cleared or have protection provided for them.

40. Secure Stored Material:

All construction materials and equipment stored on a roof or other exposed areas must be secured against inclement weather conditions. Prior to the end of the workday, all loose materials must be secured to prevent injury or property damage from falling objects. Caution must also be taken so as not to overload the roof. Materials shall not be stored within 6 feet of the edge of the roof unless guardrails are erected on the roof edge.

41. Traffic Control:

When working over or adjacent to a roadway, traffic control measures must be developed. Workers performing their duties adjacent to roadways must wear vests that are highly visible and have reflective markings. When working adjacent to transportation aisles, traffic control measures should be reviewed to ensure the safety of the workers on the job site.

42. Control Falling Objects:

When workers are working at a surface level above other workers, tethers should be used to tie off tools and equipment to secure it from falling. Workers must wear hard hats whenever there is a potential for falling objects. (See reference #37). Toe-boards and solid floor surfaces without openings shall be provided to prevent objects from falling through.

43. Debris Control:

Measures shall be taken to control debris in the construction area. Debris shall not be allowed to accumulate on walking/working surfaces.

44. Safety monitoring on the floor, or radio communication is recommended:

Whenever working on a roof, lift or other area where the potential for falls exist, a safety monitor or two-way radio communication is recommended.

45. Safety Communications:

Establish/maintain contact/communication with your activity Safety Manager or competent person whenever roof top work is being performed, and the possibility of adverse weather conditions exists.

46. Perform Fall Protection Equipment Inspection:

All fall protection equipment shall be inspected each day prior to use. A Competent Person other than the user shall conduct thorough inspection of the equipment annually.

47. Canopy:

A covering that is erected to provide protection from falling or flying objects. The canopy must be designed and constructed to withstand the force of all potential falling objects and approved by a Qualified Person before it is erected or put into use.

48. Lock-Out/Tag-Out:

When working in the vicinity of energy sources, lock-out/tag-out must be used to eliminate any potential hazards.

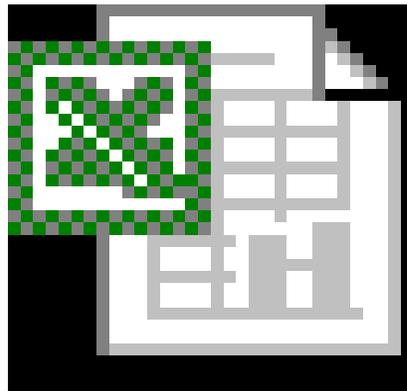
49. Crane Rail Stops:

Any time work is to be done within an overhead crane/WHE system, crane rail stops will be used to isolate the work area and prevent collisions between workers at height, and cranes and other overhead weight handling equipment.

50. Other:

Note any other falling object protection measures or other protective measures taken.

FALL PROTECTION WORK PLAN MATRIX



FP-MATRIX.xls

APPENDIX "B"
FORMS

EMERGENCY RESCUE PLAN FORM

Site & Location Identification:

Detailed Location:

Primary Emergency Phone Number:

Type of Phone/Location:

Local Phone Line/Outside Line:

Secondary Emergency Phone Number:

Backup Rescue Lift is Available/Located at:

First Aid kit Location(s):

Fire Extinguishers locations(s):

Nearest Hospital Route and Location:

Describe Rescue Operation:

Type of equipment (PPE, Ladder, Hoist, etc.)

Training on Rescue:

Name of Personnel Requiring Rescue:

Self-Rescue Equipment used:

Additional Comments: _____

FORM 1-1

FALL PROTECTION TRAINING ROSTER (FORM)

All workers signing this form shall indicate that they fully understand the fall hazards associated with the work to be conducted at their job site, and that they have been trained in fall protection methods and the use of required fall protection equipment. They further agree to comply with the standards to which they have been trained, and to wear the necessary equipment required by the job. Workers will review and sign again if hazards or methods change.

NAME: _____
ORGANIZATION/CODE/SHOP: _____
SIGNATURE: _____
TRAINING DATE(s): _____
DURATION OF TRAINING (Hrs): _____
INSTRUCTORE'S NAME: _____
COURSE TITLE: _____
DESCRIPTION OF THE COURSE: _____

NAME: _____
ORGANIZATION/CODE/SHOP: _____
SIGNATURE: _____
TRAINING DATE(s): _____
DURATION OF TRAINING (Hrs): _____
INSTRUCTORE'S NAME: _____
COURSE TITLE: _____
DESCRIPTION OF THE COURSE: _____

NAME: _____
ORGANIZATION/CODE/SHOP: _____
SIGNATURE: _____
TRAINING DATE(s): _____
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INSTRUCTORE'S NAME: _____
COURSE TITLE: _____
DESCRIPTION OF THE COURSE: _____

NAME: _____
ORGANIZATION/CODE/SHOP: _____
SIGNATURE: _____
TRAINING DATE(s): _____
DURATION OF TRAINING (Hrs): _____
INSTRUCTORE'S NAME: _____
COURSE TITLE: _____
DESCRIPTION OF THE COURSE: _____

APPENDIX "C"

SAMPLE FALL-PROTECTION PROGRAM

1. References.

- (a) DODI 6055.1, Safety and Occupational Health Program (19 Aug 98)
- (b) AR 385-10, The Army Safety Program (29 Feb 00)
- (c) 29 CFR 1910, General Industry Standard
- (d) 29 CFR 1926, Construction Standard
- (e) USACE Manual EM 385-1-1

2. Purpose. To provide policy and guidance for the implementation of **(Command name)** Fall Protection Program.

3. Background. Falls from elevation are one of the leading causes of injuries and fatalities in the workplace. Each year, thousands of workers suffer injuries due to falls, resulting in lost work time. Reference (b) above directs adoption of OSHA standards as Army safety standards, applicable in Army workplaces. These workplaces are typically comparable to the private sector. As such, activities will be required to establish fall protection programs that include identification and elimination of fall hazards, whenever practical, through engineering controls, training for personnel, proper installation and use of fall protection systems, and required rescue equipment and procedures.

4. Command Policy. A Fall Protection Program will be implemented for **(Name of Command)** in accordance with requirements of the applicable standards and regulations. This instruction will be utilized as the primary guide for the protection of workers exposed to fall hazards. Whenever performance of any task would allow a worker to fall a distance of four feet or more to a lower level, the hazard shall be identified, evaluated, and controlled. The worker shall receive adequate training as required, and shall be protected from falling. Refer to references (c) (d) and (e) above for appropriate regulatory guidance.

5. Responsibilities.

a. The Fall Protection Program Manager shall:

- (1) Ensure that the designated Competent Persons and Qualified Persons receive adequate training commensurate with their duties within the fall protection program.
- (2) Ensure that all workers, including contractors and subcontractors, are protected from falling to a lower level at all times.
- (3) Set the guidelines for the Safety Office to implement and maintain the command policies and the fall protection program.
- (4) Establish that all personnel, contractors, and subcontractors shall abide by the requirements of the fall protection program.

- (5) Ensure that all personnel exposed to fall hazards, and those who are involved in the implementation of the fall-protection program, have been adequately trained.
- (6) Ensure that the investigation and reporting of a fall mishap comply with the requirements set forth in AR 385-40, Accident Reporting and Records.
- (7) Ensure that fall hazard assessments and surveys have been completed.
- (8) Ensure that fall protection and prevention plans, rescue, and escape plans are adequately prepared and used.

b. Qualified Person (QP) Shall: ***(See the QP duties and responsibilities addressed under Section III, Responsibilities, this guide. Include additional duties and responsibilities as required).***

c. Competent Person (CP) Shall: ***(See the CP duties and responsibilities addressed under Section III, Responsibilities, this guide. Include additional duties and responsibilities as required).***

d. Authorized Person Shall:

- (1) Not work in any fall hazard area without being adequately trained, and then only after the Competent Person has authorized him/her to proceed with the type of work to be performed.
- (2) Be adequately trained in the fall protection equipment selection, use, rescue, storage and maintenance.
- (3) Not work in any fall hazard area without first reviewing and fully understanding the FP & P Plan and Rescue and Evacuation Plan.
- (4) Not proceed with work assignments without having the proper fall protection equipment and/or systems.
- (5) Include any additional duties as required.

e. Other positions as required: ***(Identify responsibilities as appropriate).***

6. Workplace Assessments/Surveys.

a. Surveys of the work areas shall identify all fall hazards that exist at a specific location within buildings and facilities. This information will be used by the Fall Protection Program Manager or the Qualified Person (QP) for fall hazard elimination and/or protection of authorized persons from falling while performing various work tasks. The survey will provide pertinent information as to the type of fall hazard that will be encountered. All hazards shall be evaluated in accordance with references (c) (d) and (e) above, as appropriate. This evaluation will enable the program manager/QP to develop solutions to those hazards that present the greatest risk of exposure and potential for injury.

b. A team consisting of Authorized Users and the CP will conduct an assessment of workplace hazards.

7. Fall Hazard Prevention and Control (Site Specific):

- a. Regarding the proper order of control measures and solutions to fall hazards and project hierarchy and desirability, the QP should consider the order of control measures specified in Section I, Introduction, this guide.
- b. For System Design Requirements, see Section X, Fall Protection System Design Requirements, this guide.
- c. For preparation of the Fall Protection and Prevention Plan (FP&PP), see Section IX, Fall Protection and Prevention (FP&P) Plans & Rescue and Evacuation Plans (REP), this guide.

8. Education and Training Requirements.

a. Fall-Protection Training Requirements for:

(1) Authorized Person: Training will include the following: hands-on training on the safe use and limitations of the equipment, nature of fall hazards, application limits, and proper anchoring and tie-off techniques. It will also include estimation of free-fall distance, deceleration distance and total fall distance; methods of inspection, storage, and care of the equipment and systems, familiarity with the applicable fall-protection regulations and standards, and rescue/self rescue techniques. The authorized person will receive a minimum of 16 hours of training, or as appropriate.

(2) Competent Person: In addition to the above-authorized person (end user), the Competent Person (CP) will require more stringent, detailed training requirements. Training will include different types of fall-protection systems, hazard ranking systems and risk assessment, and various fall arrest/restraint and positioning systems; inspection and record keeping of fall-arrest equipment, inspection and identification of fall hazards, and installation and inspection of proper anchoring and tie-off points. CP will receive 40 hours of training or as appropriate.

(3) Qualified Person: In addition to the above CP training, the qualified person (QP) will be trained on how to design, select, certify, evaluate, and analyze fall-protection systems. The duration of the training is 40 hours, or as appropriate.

(4) Contracting Officer/Contracting Officer Representative Personnel: These personnel will receive awareness training.

(5) Architects and Engineers: These personnel will receive awareness training. Note: For additional personnel training, see Section IV, Training Requirements, this guide.

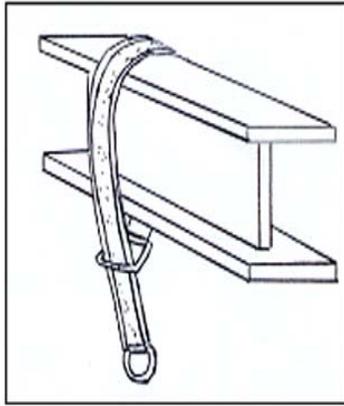
9. Audits and Program Evaluation: The FP program shall be evaluated periodically to determine the success of the program. The program manager shall collect and compare

fall mishap data and near misses in order to compare this data to establish metrics. Other metrics may be included as required.

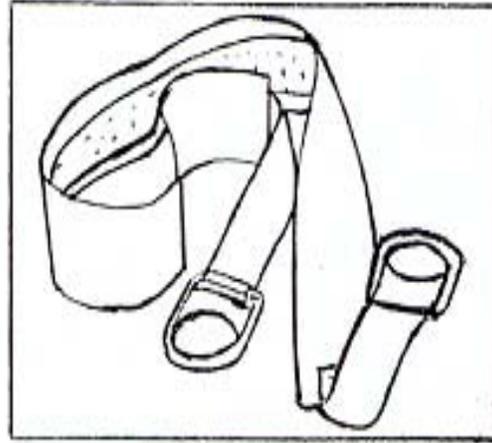
10. Inspection, Storage, Care, and Maintenance of Equipment: See Section VII, Inspection, Maintenance, Storage and Care Procedures for Fall Protection Equipment, this guide.

11. Rescue Systems/Plans: See Section IX, Fall Protection and Prevention (FP&P) Plans & Rescue and Evacuation Plans (REP), and Appendix B, Form 1-1, this guide.

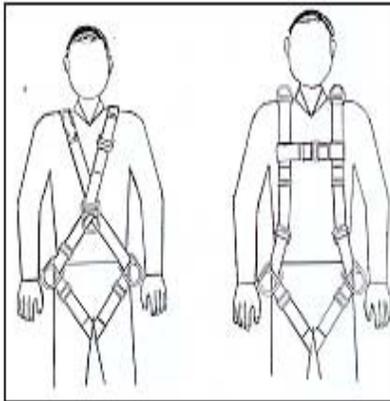
ILLUSTRATIONS



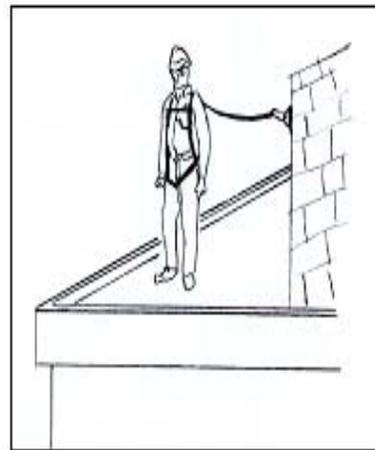
**Anchor Strap Connected to a Beam
(Figure 1)**



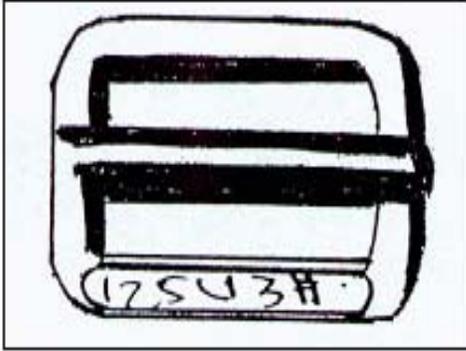
**Anchor Strap
(Figure 2)**



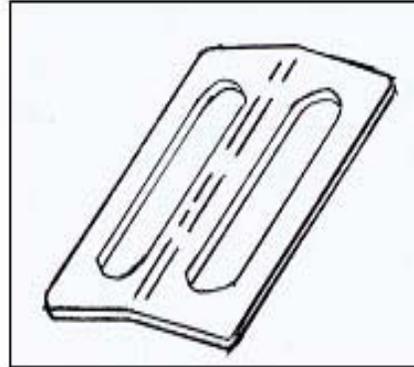
**Full Body Harness
(Figure 3)**



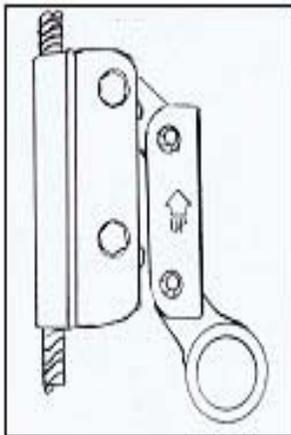
**Body Restraint System
(Figure 4)**



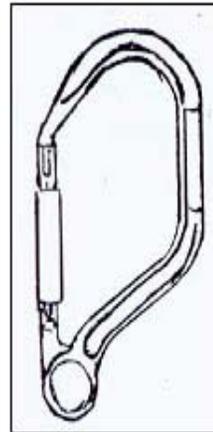
**Adjustable buckle
(Figure 5)**



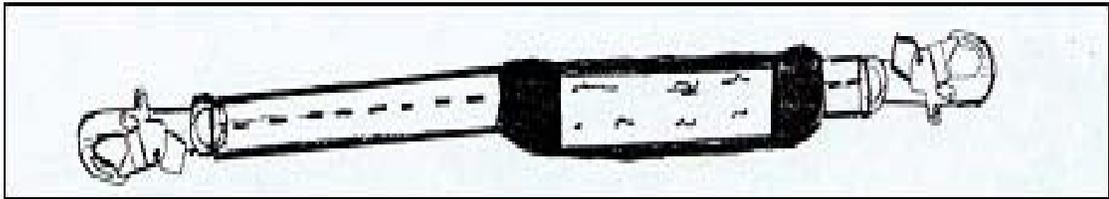
**Friction Buckle
(Figure 6)**



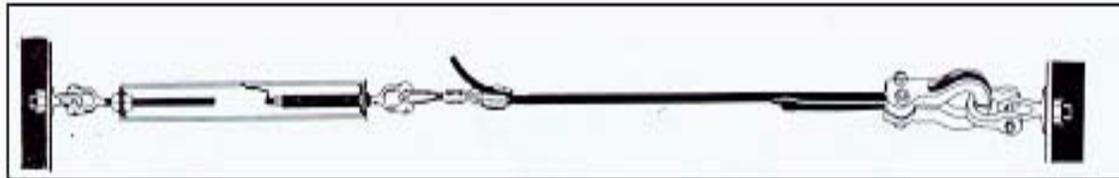
**Rope/Cable Grab
(Figure 7)**



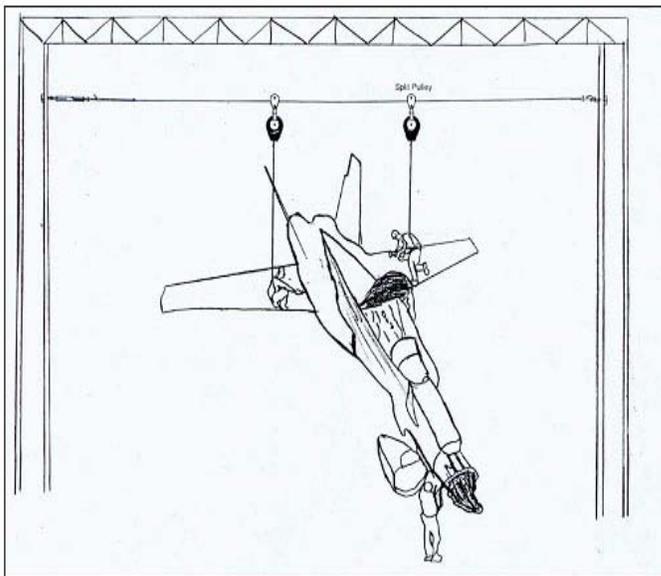
**Carabiner
(Figure 8)**



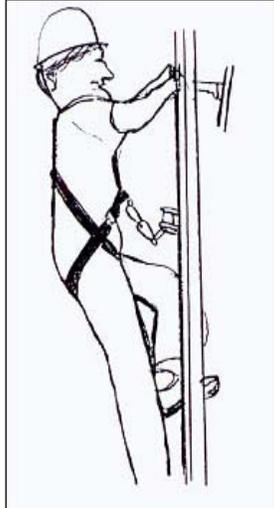
**Lanyard with energy Absorber
(Figure 9)**



**Horizontal Lifeline System
(Figure 10)**



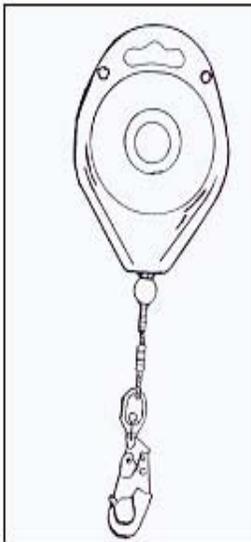
**Horizontal Lifeline system
For Aircraft Maintenance
(Figure 11)**



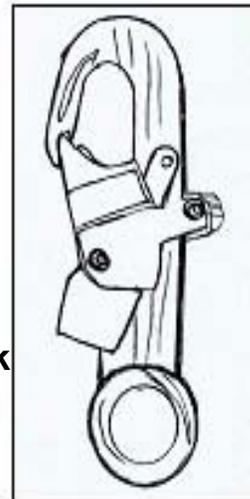
**Ladder Climbing Device
(Figure 12)**



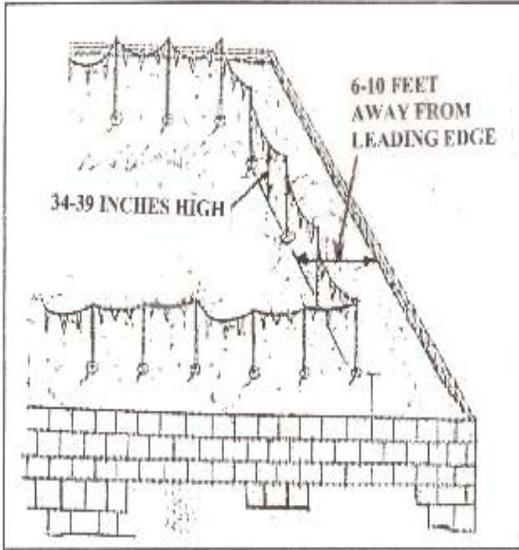
**Positioning system with
Vertical Lifeline
(Figure 13)**



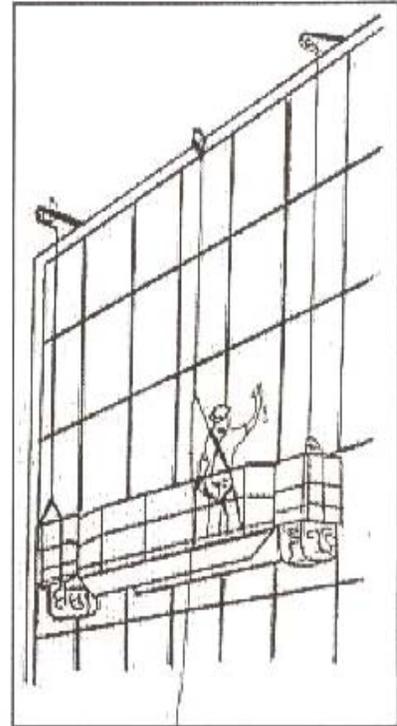
**Self Retracting Lanyard
(Figure 14)**



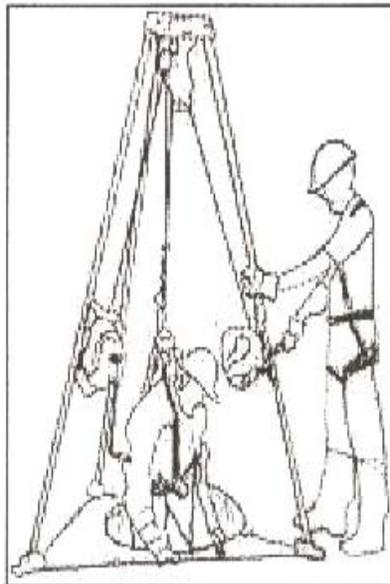
**Locking Snap Hook
(Figure 15)**



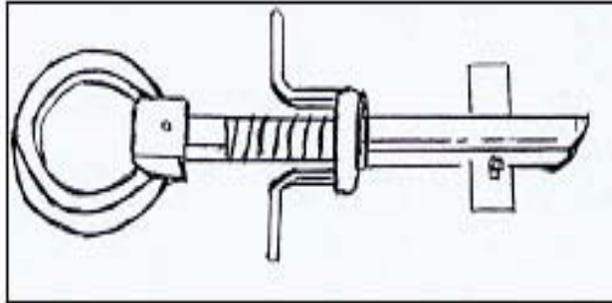
**Warning Line System
(Figure 16)**



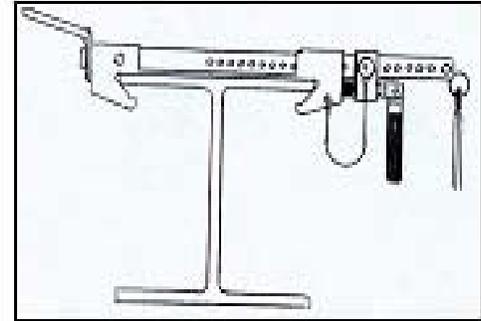
**Suspended Scaffold with
Vertical Lifeline
(Figure 17)**



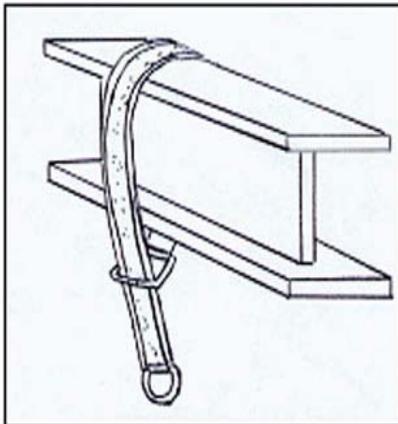
**Confined Space Entry
(Figure 18)**



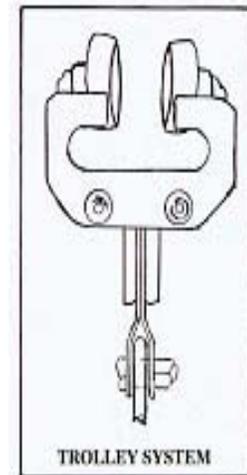
**Bolt Hole Anchor connection
(Figure 19)**



**Beam Anchor Connection
(Figure 20)**



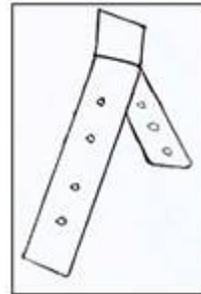
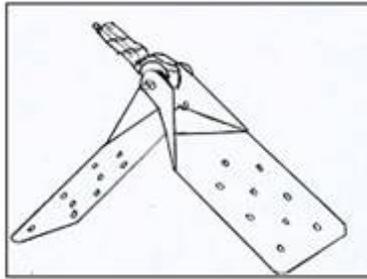
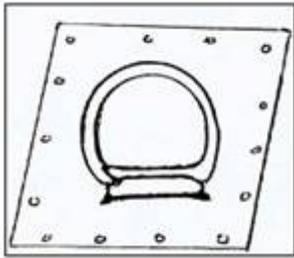
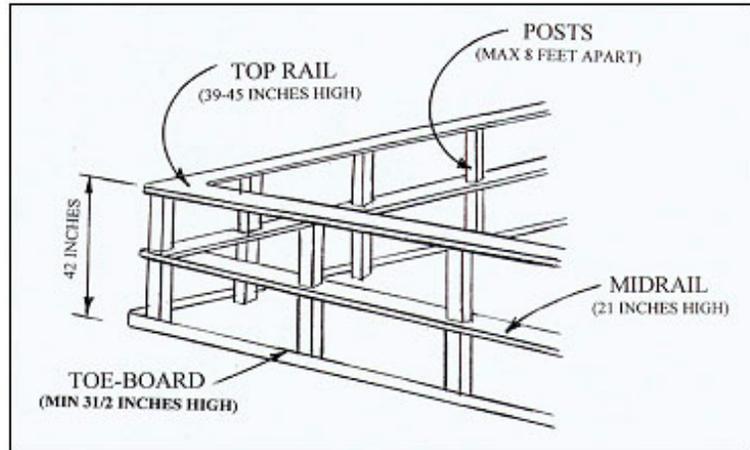
**Anchor Strap rapped around a beam
(Figure 21)**



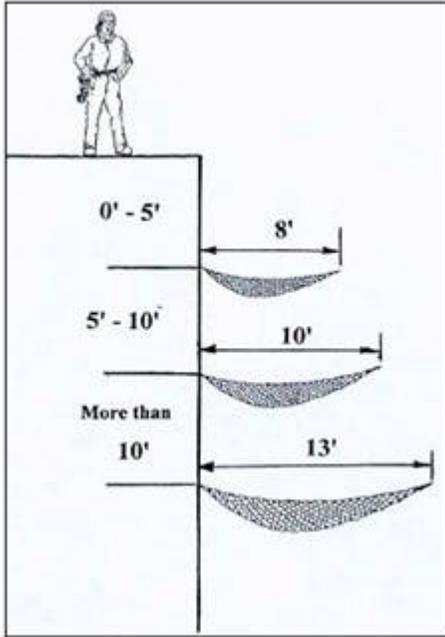
**Trolley System
(Figure 22)**

Miscellaneous Anchorage Connections

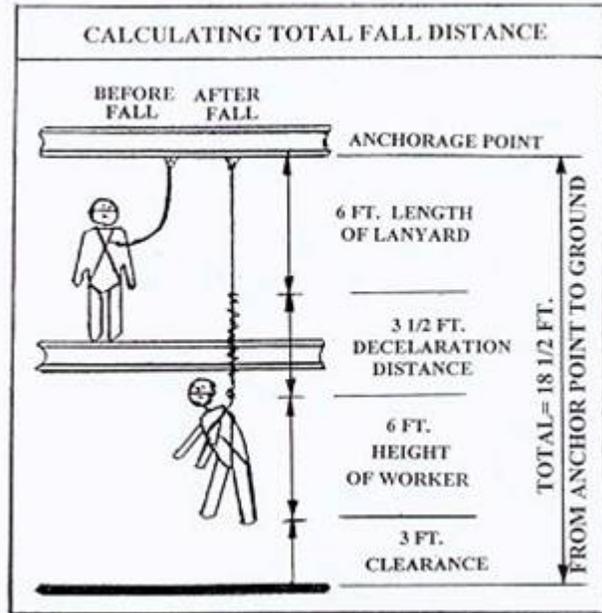
**Guard Rail system
(Figure 23)**



**Miscellaneous Roof anchors
(Figure 24)**



**Safety Net Extension
(Figure 25)**



**Total Fall Distance
(Figure 26)**



Work Stand for Aircraft

Various Work Stands and Platforms for Aircraft Maintenance

(Figure 27)

