

<b>Calvin College Fall Protection Program</b>		<b>Revision 0</b>	
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**1.0 PURPOSE**

The purpose of this fall protection program is to establish guidelines to protect all employees engaged in work activities that expose them to potential falls from elevations.

**2.0 POLICY**

The College is dedicated to providing safe work facilities for students, employees, and visitors, and complying with federal and state occupational health and safety standards.

**3.0 SCOPE**

Fall hazards must first be controlled through engineering controls if feasible. When engineering controls are not feasible, then personal fall arrest systems, administrative controls and training must be instituted.

The Calvin College Fall Protection Program shall apply to all employees who are exposed to a falling hazard of six feet or more to a lower level. Employees will not be required, nor allowed to perform any duties which require the employee to get closer than six feet to an unprotected edge, platform, walkway of any building or utilize elevated equipment unless the employee is properly secured from falling.

Additionally, the Fall Protection Program shall apply to all employees in order to minimize slips, trips and falls on the same elevation. All employees shall control fall hazards in their work area by maintaining good housekeeping and shall report conditions that may lead to slips, trips and falls to Environmental, Health and Occupational Safety (EHS).

Exceptions to this requirement include the working sides of loading docks and exposed perimeters of entertainment stages. Employees may use portable ladders without fall protection equipment up to six feet. Employees may work on scaffolds and aerial scissor lifts up to 6 feet in height and on the edge of an excavation up to 6 feet in depth without fall protection.

Contractors for Calvin College are required to comply with all applicable regulations and shall have their own fall protection program.

## 4.0 DEFINITIONS

**Aerial lift device:** means equipment such as powered platforms, vehicle-mounted elevated and rotating work platforms, extensible boom platforms, aerial ladders, articulating boom platforms, vertical towers and powered industrial truck platforms.

**Anchor point:** A secure point of attachment for lifelines, lanyards or deceleration (grabbing) devices. Must be capable of supporting 5000 pounds per person.

**Body harness (also referred as Full-body harness):** An interconnected set of straps that may be secured about a person in a manner that distributes the fall arrest forces over at least the thighs, pelvis, waist, chest, and shoulders with a means for attaching the harness to other components of a personal fall arrest system.

**Connector:** A device that is used to connect parts of a personal fall arrest system together (i.e. D-rings, and snaphooks).

**Competent person:** A person who is capable of recognizing existing and predictable hazards and has the authority to take corrective action. Additionally, 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. To be considered a competent person, an 8-hour training class must be completed for general fall protection and an additional 4-hour training class must be completed for scaffolds. To be considered a competent person for equipment inspections, the manufacturer's training guidelines shall be followed.

**Fixed ladder:** a ladder, including individual rung ladders, that is permanently attached to a structure, building, or equipment. It does not include ship's stairs or manhole steps.

**Guardrail System:** A barrier erected to prevent employees from falling to lower levels. This system includes a toeboard, midrail, and toprail able to withstand 200 pounds of force applied in any direction.

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

**Leading edge:** The edge of a floor, roof, or other walking/working surface, that changes location as additional floor, roof, etc is placed or constructed. A leading edge is considered an unprotected side or edge when not under active construction.

**Low slope roof:** A roof having a slope of less than or equal to 4 in 12 (vertical to horizontal). A roof with approximately a 19.5 degree slope or less.

**Personal fall arrest system:** means a system used to arrest an employee in a fall from a working level. It consists of an anchorage,

connectors, body harness and may include a lanyard, deceleration device, lifeline, or suitable combinations of these.

**Qualified person:** one with a recognized degree or professional certificate and extensive knowledge and experience in the subject field who is capable of design, analysis, evaluation and specifications in the subject work, project or product.

**Restraint line :** a device which is attached between the employee and an anchorage to prevent the employee from walking or falling off an elevated surface.

**Steep slope roof:** A roof having a slope greater than 4 in 12 (vertical to horizontal). A roof with a slope greater than 19.5 degrees.

**Toeboard:** A low protective barrier that will prevent the fall of materials and equipment to lower levels, usually 4 inches or greater in height.

**Warning line system:** A barrier erected on a roof to warn employees that they are approaching an unprotected roof side or edge, which designates an area in which work can be conducted without the use of guardrails, personal fall arrest systems, or safety nets to protect employees in the area.

## 5.0 DUTIES AND RESPONSIBILITIES

### Directors and Department Heads

- Designate and empower individuals who will act as competent and/or qualified persons who will be responsible for the preparation and implementation of the Fall Protection Program
- Ensure that employees who will act as competent and/or qualified persons are adequately trained and/or qualified;
- Provide administrative and financial support for this program within individual departments; and
- Ensure the Fall Protection Program is implemented and maintained within the department.

### Designated Competent Persons

- Implement all aspects of the program for work areas under their control;
- Receive training for "competent person" as defined by OSHA for fall protection;
- Act as the "competent person" for job sites under their control that contain fall hazards;
- Evaluate fall hazards in work areas under their control; and
- Ensure that employees are informed, trained, and provided with the appropriate fall protection systems and equipment to be protected from potential fall hazards associated with job tasks.

## **Supervisors**

- Ensure that employees are informed, trained, and provided with the appropriate fall protection systems and equipment to be protected from potential fall hazards associated with job tasks; and
- Coordinate the correction of fall hazards brought to their attention by employees; and
- Complete an incident report and produce any additional documentation needed to investigate and work related injuries and illnesses.

## **Employees**

- Comply with the Fall Protection Program and any further safety recommendation provided by the supervisor and/or EHS regarding fall protection;
- Complete fall protection training requirements and request further instruction if unclear;
- Conduct assigned tasks in a safe manner and wear all assigned personal protection equipment; and
- Report any unsafe or unhealthy work conditions and job related injuries or illnesses to the supervisor immediately.

## **Environmental, Health and Safety**

- Provide technical information and assist departments in implementing an effective fall protection program;
- Provide technical information and assist with designing controls for fall protection into projects;
- Provide and/or coordinate fall protection instruction as needed;
- Investigate and document all reported accidents that are related to fall hazards, recommending corrective actions; and
- Review and revise the Fall Protection Program, as needed for compliance with applicable regulations.

## **Physical Plant**

- Ensure that projects be designed according to current OSHA standards and that engineering controls for fall protection such as guardrails and anchorage points for occupant use and maintenance work be designed into projects wherever feasible; and
- Manage the work order system. Accept reports of hazards and either process work orders to correct the hazard or direct the request to another appropriate unit.

## **6.0 INFORMATION AND TRAINING**

**Employees who work on Ladders:** All employees who use ladders with a working height of six feet or more shall be knowledgeable of the following:

- How to inspect ladders for visible defects; and
- How to use ladders properly.

**Employees who use Fall Protection Personal Protective Equipment to control fall hazards in their work area:**

- The application limits of the equipment;
- The proper hook-up, anchoring and tie-off techniques including determination of elongation and deceleration distance;
- Methods of use; and
- Inspection and storage of equipment.

**Employees who use Aerial Lifts:** Employees should be knowledgeable of the following:

- The manufacturer's operating instructions;
- Pre-start inspection of the lift;
- Inspection of the work area for dangerous conditions such as uneven surfaces, overhead obstructions such as power lines, and severe weather;
- Load capacities of the equipment;
- How to safely move the equipment;
- How to prevent falls and use appropriate fall protection personal protective equipment; and
- Minimum safe approach distances to energized power lines.

**Employees who work on Scaffolds:** Specific training is required in the following:

- The nature of any electrical hazards, fall hazards and falling object hazards in the work area;
- The correct procedures for dealing with electrical hazards and for erecting, maintaining, and disassembling the fall protection systems and falling object protection systems being used;
- The proper use of the scaffold, and the proper handling of materials on the scaffold; and
- The maximum intended load and the load carrying capacities of the scaffolds.

**Employees Assigned as Fall Protection Competent Persons:**

Supervisors who act as the competent person for a work area or job site

shall be trained and certified through a qualified fall protection training program (8 hours) to be qualified and knowledgeable of the following:

- The nature of falls in the work area;
- The correct procedures for erecting, maintaining, disassembling, and inspecting the fall protection systems used;
- The use and operation of guardrail systems, personal fall arrest systems, safety net systems, warning line systems, safety monitoring systems, controlled access zones, and other protection to be used;
- The role of each employee in the safety monitoring system when this system is used;
- The limitations on the use of mechanical equipment during the performance of roofing work on low sloped roofs;
- The correct procedures for the handling and storage of equipment and material, and the erection of overhead protection;
- The role of employees in fall protection plans; and
- The appropriate OSHA standards.

**Employees Assigned as Scaffold Competent Persons:** Supervisors who act as the competent person in the use of scaffolding shall be additionally trained and certified through a scaffold competent person training program (4 hours) to be qualified and knowledgeable of the following:

- The proper selection of scaffold for the task based upon the type of work to be conducted and the working load to be supported;
- The correct procedures for the erection of scaffolds;
- The correct procedures for the dismantling of scaffolds;
- The correct procedures for the moving of scaffolds;
- The correct procedures for the altering of scaffolds; and
- The OSHA standards.

Employees will require retraining under any of the following conditions:

1. Changes in the workplace render previous training obsolete;
2. Changes in the types of fall protection systems or equipment to be used render previous training obsolete; or
3. Inadequacies in an employee's knowledge of use of fall protection systems or equipment or observed behavior indicate that the employee has not retained the required training.

EHS shall maintain a written training certification record containing the name of the employee trained, the name of the person who conducted the training,

and the date of the training. Departments can call EHS at x68591 or 66342 for more information on training requirements and scheduling.

## **7.0 ENGINEERING CONTROLS**

The Physical Plant shall have a competent person determine if engineering controls can eliminate or lessen the hazard of the work area or job site. Engineering controls shall be provided where possible to minimize fall hazards and may include the following:

- I. **Guardrails and Toeboards:** These requirements apply to temporary controls on job sites as well as permanent fixtures in general work areas.
  - A standard railing consists of a top rail, mid rail, and posts and is 42 inches high from the top of the rail to the floor, platform, runway or ramp. Nominal height of the mid rail is 21 inches;
  - Standard toe boards must be a minimum of 4 inches high, no more than 1/4 inch clearance to the floor. If a mesh material is used, the opening must be less than 1 inch;
  - The anchoring of posts and framing of members for railings of all types must be of such construction that the completed structure is capable of withstanding a load of 200 pounds applied in any direction at any point on the top rail;
  - Guardrail systems have a surface that prevents injuries such as punctures and lacerations and prevents snagging of clothing; and
  - When guardrail systems are in hoisting areas, a chain gate or removable guardrail section shall be in place when not being used.
  
- II. **Skylights**
  - Skylights that may be used as a walking or working surface must be protected by a standard railing, standard skylight screen, grill work with 4 by 4 inch openings or slatwork with 2-inch openings; and
  - Standard skylight screens must be capable of withstanding minimum load of 200 pounds applied perpendicular to any point on the screen and will not deflect under ordinary loads and impacts and break glass.
  
- III. **Covers**
  - Covers for holes, including grates, shall be capable of supporting, without failure, at least twice the weight of employees, equipment, and materials that may be imposed on the cover at any one time;
  - Covers located on roadways and vehicular aisles shall be capable of supporting, without failure, at least twice the maximum axle load of the largest vehicle expected to cross over it;

- All covers shall be secured when installed so as to prevent accidental displacement by the wind, equipment, or employees;
- Covers shall be marked with the word "Hole" or "Cover" to provide warning of the hazard when it is not readily apparent; and
- While a cover is not in place, the pit or trap opening shall be constantly attended by someone or shall be protected on all exposed sides by removable standard railings.

## 8.0 FALL PROTECTION PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment (PPE) shall be used to minimize fall hazards where engineering controls do not eliminate the hazard or in conjunction with engineering controls.

Fall protection equipment is divided into five functional categories: 1. Fall Arrest, 2. Positioning, 3. Retrieval and 4. Restraint.

### I. Fall Arrest

The use of a personal fall arrest system is the required personal protective equipment for fall hazards at Calvin College. A personal fall arrest system consists of a full-body harness, lanyard, and anchor point OR a full-body harness, lanyard, lifeline, anchor point, and deceleration/grabbing device. All fall protection equipment shall meet or exceed appropriate American National Standards Institute (ANSI) standards. College employees shall use only commercially manufactured equipment specifically designed for fall protection and certified by a nationally recognized testing laboratory. All fall protection equipment must bear the marking of the manufacturer and approvals for specified use. Requirements for a personal fall arrest system include but are not limited to the following:

- A. **Body Harness** - Only full-body harnesses shall be used. The use of a body belt is prohibited.
- B. **Connecting Device** - Shock-absorbing lanyards and lifelines
  - Lanyards and lifelines shall have a minimum breaking strength of 5000 pounds;
  - Lanyards shall not exceed six feet in length. Lanyards used on aerial lift devices should not exceed 4 feet in length to reduce slack;
  - Ropes and straps (webbing) used in lanyards, lifelines, and strength components of body harnesses shall be made from synthetic fibers;
  - Connecting assemblies shall have a minimum tensile strength of 5,000 pounds;

- Self-retracting lifelines and lanyards shall have a tensile strength of at least 3000 pounds and limit free fall to two feet or less (5,000 pounds for ripstich lanyards, and tearing and deforming lanyards);
- Personal fall arrest systems shall limit the maximum arresting forces to 1800 pounds with a full body harness;
- The maximum free fall distance is six feet for all systems;
- Personal fall arrest systems shall have sufficient strength to withstand twice the potential impact energy of the falling employee;
- Lifelines shall be protected against cutting and abrasions;
- Horizontal lifelines shall be designed, installed and used under the supervision of a qualified person, as part of a complete personal fall arrest system, which maintains a safety factor of two. On suspended scaffolds or similar work platforms with horizontal lifelines which may become vertical lifelines, the devices used to connect to a horizontal lifeline shall be capable of locking in both directions on the lifeline; and
- Each employee shall be attached to a separate lifeline when vertical lifelines are used. On suspended scaffolds or similar work platforms with horizontal lifelines which may become vertical lifelines, the devices used to connect to a horizontal lifeline shall be capable of locking in both directions on the lifeline.

**C. Anchorage** - Anchorage point and anchorage connector

Anchorage used for personal fall arrest systems shall be independent of any anchorage being used to support or suspend platforms and be capable of supporting at least 5000 pounds per employee attached, or shall be designed, installed (temporarily or permanently), and used as part of a complete fall arrest system which maintains a factor of two and under the supervision of a qualified person;

- A qualified person shall determine all anchor points, both temporary and permanent. Permanent anchor points shall be properly marked;
- Personal fall arrest systems shall not be attached to guardrail systems, nor shall they be attached to hoists except as specified in other regulations

## II. Positioning

A positioning device is not a substitute for a personal arrest system and is limited to use as a system rigged to allow an employee to be supported on an elevated vertical surface, such as a wall, and work with both hands free while leaning.

Where positioning device is used, it shall comply with the following:

- Only a full-body harness shall be worn as part of a positioning device system. Bodybelts are not acceptable;
- Positioning devices shall be rigged such that a free fall cannot be more than 2 feet; and
- Positioning devices shall be secured to an anchorage point capable of supporting at least twice the potential impact load of an employee's fall or 3,000 lbs, whichever is greater.

## III. Retrieval

Personal retrieval systems are used for confined space entry and on-entry rescue. Refer to the *Confined Spaces Plan* for information on confined spaces entry. Personal retrieval systems consist of the following:

- Full body harness;
- Retractable lifeline/rescue unit; and
- Tripod.

## IV. Restraint

A restraint line is a device which is attached between the employee and an anchorage point to prevent the employee from walking or falling off an elevated surface. It does not support an employee at an elevated surface, but rather, prevents the employee from leaving the elevated surface or work position.

**Prompt rescue shall be provided for personnel who have fallen by contacting Campus Safety at 3-3333 or radioing for help. No work shall be performed where an emergency cannot be immediately observed and prompt rescue assistance summoned.**

Any other personal protective equipment deemed necessary for the task under the Personal Protective Equipment Standard must be worn. This includes but is not limited to hard hats, gloves, safety glasses, and steel toed boots. Hard hats shall be worn within an area beneath elevated work where objects could fall from a height and strike a worker. Refer to the *Calvin College Personal Protective Equipment Program* for more information.

## **9.0 EQUIPMENT INSPECTIONS AND MAINTENANCE**

### **I. Impact Loading**

Any fall arrest system or component that has been used to arrest a fall (impact loading) shall be immediately removed from service and discarded. This must be reported to EHS immediately.

### **II. Inspection**

Visual equipment inspections shall be conducted by personnel prior to each use. If, upon inspection, a piece of equipment shows any signs of wear it must immediately be removed from service and the supervisor notified.

Fall protection equipment will be inspected annually by a qualified outside vendor.

### **Maintenance**

When needed, fall protection devices should be washed in warm water using a mild detergent, rinsed thoroughly in clean warm water and allowed to dry at room temperature. Stow equipment in clean area away from strong sunlight and extreme temperatures which could degrade materials. Check the manufacturer's recommendations for cleaning, maintenance and storage information.

## **10.0 ROOFING**

The hazards associated with work on roofs include falling through openings and falling off edges. The protection of openings is discussed in the engineering controls section of this program.

Effective roof work fall protection techniques are intended to protect workers while providing the mobility and comfort necessary to perform work tasks. Several techniques are available and are described below.

### **I. Low-slope or Flat Roofs**

Each employee engaged in roofing activities on low-slope roofs, with unprotected sides and edges 6 feet (1.8 m) or more above lower levels shall be protected from falling by guardrail systems, safety net systems, personal fall arrest systems, or a combination of warning line system and guardrail system, warning line system and safety net system, or warning line system and personal fall arrest system, or warning line system and safety monitoring system. Or, on roofs 50-feet (15.25 m) or less in width

the use of a safety monitoring system alone [i.e. without the warning line system] is permitted.

## II. **Steep roofs**

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

## III. **Personal Fall Arrest System**

- The system of choice for fall protection on roofs is the personal fall arrest system;
- Requirements for personal fall arrest systems are found in the Fall Protection Personal Protection Equipment section of this program; and
- Personal fall arrest systems for roof work must be designed by a qualified person.

## IV. **Designated Areas**

As an alternative to installing guardrails, a designated area may be established. The following condition and requirements must be met in order to use designated areas in lieu of other fall protection measures:

- A. The work must be of a temporary nature, such as maintenance on roof top equipment;
- B. Designated areas shall be established only on surfaces that have a slope from horizontal of 10 degrees or less; and
- C. The designated area shall consist of an area surrounded by a rope, wire, or chain and supporting stanchions.
  1. After being erected with the line attached, stanchions shall be capable of resisting, without tipping over, a force of at least 16 pounds applied horizontally against the stanchion;
  2. The line shall have a minimum breaking or tensile strength of 500 pounds;
  3. The line shall be attached at each stanchion in such a way that pulling on one section of the line between stanchions will not result in slack being taken up in adjacent sections before the stanchion tips over;
  4. The line shall be installed in such a manner that its lowest point is no less than 34 inches nor more than 39 inches from the work surface;
  5. The line forming the designated area shall be clearly visible from any unobstructed location within the designated area up to 25 feet away;

6. The stanchions shall be erected as close to the work area as is permitted by the task;
7. The perimeter of the designated area shall be erected no less than 6 feet from the unprotected side or edge; and
8. Access to the designated area shall be by a clear path formed by two lines attached to stanchions.

## **11.0 SCAFFOLDS**

### **I. Use of Scaffolds**

#### **A. Selection**

The proper scaffold selected for the task by the competent person is based upon the type of work to be conducted and the working load to be supported.

- Light duty scaffolds are intended for workers and tools only. The design load should be that it will support a working load of 25 pounds per square foot;
- Medium duty scaffolds are intended for workers, tools and construction materials. The design load should be that it will support a working load of 50 pounds per square foot; and
- Heavy duty scaffolds are intended for workers, tools, stored materials, and construction materials. The design load of the scaffold should be that it will support a working load of 75 pounds per square foot.

All scaffolds must be capable of supporting at least four times the design load.

#### **B. General Requirements**

1. Fall protection is required for all scaffold use 6 feet above a lower level.
2. All scaffolds, where work is conducted in excess of 6 feet in height, shall have 4 inch toeboards;
3. A scaffold shall not be moved while personnel are on it;
4. Follow all manufacturer's guidelines and special warnings if the scaffold is commercially produced;
5. The maximum work level height shall not exceed 4 times the least base dimension of the scaffold. Example: a four foot by six foot scaffold cannot exceed sixteen feet in height at the work platform level;
6. The minimum working platform width is two feet;
7. The supporting structure for the scaffold must be rigidly braced, using adequate cross bracing or diagonal bracing with rigid platforms at each work level;

8. Working platforms should have a nonslip surface;
9. Scaffolds should be used only on an even surface;
10. The platform surface should be kept clear of extraneous tools and materials;
11. The work level platform shall be wood, aluminum, plywood planking, steel or expanded metal for the full width of the scaffold, except for necessary protected openings
12. Work platforms shall be secured in position;
13. All work platform planking shall be in compliance with OSHA 1926.453(a)(3)(v). Wood shall be compliance grade lumber. Planks shall be overlapped a minimum of 12 inches and extended over supports 6 - 12 inches;
14. Follow all manufacturer guidelines in the assembly of the scaffold. Do not use or assemble the scaffold, if unsure of the correct assembly procedure;
15. Hard hats must be worn within an area beneath elevated work where objects could fall from a height and strike a worker; and
16. Mobile scaffolds shall not be moved unless the surface of travel is within 3 degrees of level and free of pits, holes and obstructions, and the employee on the scaffold has advanced knowledge of the movement.

## II. **Inspection of Scaffolds**

Prior to the use of any scaffold, an inspection must be conducted, and then daily during usage of the scaffold.

- Carefully examine the scaffold for broken or missing cross bracing, broken supporting structure, working platform, and other damaged parts. In addition, all walking and working surfaces must be free of grease, oil, paint, or other slippery substances;
- The scaffold should be equipped with positive wheel lock casters that are secured in place;
- The joint between working platform and supporting structure must be tight, and all hardware and fittings should be attached firmly. Movable parts should operate freely without binding or undue play;
- All wood parts must be free of sharp edges and splinters. Visually inspect the scaffold to be free of shakes, warpage, decay or other irregularities. Metal parts must be free of sharp edges, burrs and corrosion. Inspect for dents or bends in supporting structure, cross braces and walking/working surfaces;
- Check all working platform to support structure connections, hardware connections and rivets. If a scaffold tips over, inspect the scaffold for damage before continuing work; and
- Damaged scaffolds must be withdrawn from service and either repaired or destroyed. When a defect or unsafe condition is found,

personnel shall tag or mark the scaffold so that it will not be used until corrective action is taken. Defective or unsafe situations shall be reported to the supervisor. Field repairs and the fabrication of improvised scaffolds is prohibited.

### III. **Maintenance of Scaffolds**

All scaffold repairs must be done by a qualified person.

### IV. **Storage of Scaffolds**

Scaffolds should be disassembled prior to storage. Scaffolds should be stored where they can be inspected easily and can be reached without causing accidents. The storage area should be well ventilated and away from sources of heat and moisture.

## 12.0 **AERIAL LIFTS**

Aerial lifts include the following types of vehicle mounted aerial devices used to elevate personnel to job sites above ground:

- **Articulating boom platforms** are designed to reach up and over obstacles.
- **Extensible or telescoping boom platforms** may extend over one hundred feet.
- **Vehicle mounted bucket lifts** are primarily used for electrical work.
- **Scissor lifts** extend into the air via a series of crisscross supports.
- **Personal man lifts** are lightweight and designed for one person to use indoor.

### I. **Specific requirements**

- Aerial ladders shall be secured in the lower traveling position before the truck is moved for highway travel;
- Lift controls shall be tested each day prior to use;
- Only personnel authorized by a fall protection competent person shall operate an aerial lift:
- Employees shall always stand firmly on the floor of the basket and shall not sit or climb on the edge of the basket or use planks, ladders, or other devices for a work position;
- A full-body harness shall be worn and a lanyard attached to the boom or basket when working from an aerial lift (exception: a harness is not required in a scissor lift or personal man lift with surrounding guardrail system and closing gate or latch chain);
- Belting off to an adjacent pole structure, or equipment while working from an aerial lift shall not be permitted;

- Boom and basket load limits specified by the manufacturer shall not be exceeded;
- The brakes shall be set and when outriggers are used, they shall be positioned on pads or other solid surface. Wheel chocks shall be installed when using an aerial lift on an incline;
- An aerial lift truck shall not be moved when the boom is elevated in a working position, except for equipment which is specifically designed for this type of operation;
- Articulating and extensible boom platforms shall have both platform and ground controls; and
- Before moving an aerial lift for travel, the boom shall be inspected to ensure that it is properly cradled and outriggers are in the stowed position.

### **13.0 PORTABLE LADDERS**

#### **I. Use of Portable Ladders**

The proper ladder must be selected for the task. General rules include the following:

- The ladder chosen must be long enough to provide access to the work area without necessitating standing on the top two steps of a stepladder or the top three rungs of a straight ladder;
- The ladder selected must be sufficient for the weight of the employee plus the weight of any tools and materials:
  - Type 1A-Extra-heavy industrial ladder will support 300 lbs.
  - Type 1-Heavy-duty industrial ladder will support 250 lbs.
  - Type 2-Medium-duty commercial ladder will support 225 lbs.
  - Type 3-Light-duty household ladder will support 200 lbs.;
- When a straight ladder is used to gain access to a roof, the side rails should extend at least three feet above the support point at the eave, gutter, or roof line;
- Never splice together short ladders to form a longer ladder;
- Never place ladders on boxes, barrels, or other unstable bases for additional height;
- Ladders must be placed on level surfaces. Although ladder feet or shoes provide an important measure of safety, they cannot compensate for uneven ground unless they are designed with adjustable feet;
- Be alert to slippery surfaces. Nonslip bases are not a substitute for safety in placing, lashing, or holding a ladder on oily, metal, concrete, or other slippery surfaces;
- Do not use ladders for unintended purposes;

- Do not use a metal ladder when working on or near electrical equipment;
- Where possible, straight ladders should be secured with a rope or wire at the top and blocked at the bottom;
- The top two steps and platform of a stepladder shall not be used, and the top three rungs of a straight ladder shall not be used;
- Do not over-reach, jump or slide a ladder while on it. Ladders shall not be moved, shifted, or extended while occupied;
- Always face the ladder and use both hands while ascending or descending.
- Tools or materials should be raised by means of a rope after the climber has reached the working position. Carrying heavy loads up or down ladders is prohibited;
- Barricades and warning signs should be posted when ladders are placed near doors or other locations where they could be struck;
- Two workers shall handle and set up all extension ladders;
- Ladders should not be used by more than one person at a time unless they are designed for such use;
- The bracing on the back side rails of stepladders is designed only for increasing stability, not for climbing;
- Ladders shall not be used horizontally as platforms, runways, or scaffolds.
- Extension ladders must have proper overlap.
  1. Three foot overlap for 32 foot ladder;
  2. Four foot overlap for 32 to 36 foot ladder;
  3. Five foot overlap for 36 to 48 foot ladder; and
  4. Six foot overlap for 48 foot ladder.;
- Make certain that both automatic locks of the extension ladder are in proper position before ascending the ladder;
- Straight ladders and stepladders that exceed 10 feet may be held by another person for steadying;
- The area around the top and bottom of the ladder shall be kept clear; and
- Hard hats must be worn within an area beneath elevated work where objects could fall from a height and strike a worker.

## II. Inspection of Ladders

Prior to use of any ladder, an inspection must be performed:

- Carefully examine the ladder for broken or missing rungs or cleats, broken side rails, and other damaged parts;
- All cleats, rungs, and side rails must be free of grease, oil, paint, or other slippery substances;
- The ladder should be equipped with feet that are secured in place;
- The joint between steps and side rails must be tight, and all hardware and fittings should be attached firmly. Movable parts should operate freely without binding or undue play;
- All wood parts must be free of sharp edges and splinters;
- Visually inspect the ladder to be free of shakes, warpage, decay or other irregularities;
- Metal ladders must be free of sharp edges, burrs and corrosion;
- Inspect for dents or bends in side rails, rungs or cleats;
- Check step to side rail connections, hardware connections and rivets; and
- If a ladder tips over, inspect the ladder for damage before continuing work.

### III. **Maintenance of Ladders**

Damaged ladders must be withdrawn from service and either repaired or destroyed. When a defect or unsafe condition is found, personnel should tag or mark the ladder so that it will not be used until the corrective action is taken. Defective or unsafe conditions must be reported to the supervisor. Field repairs and the fabrication of improvised ladders is prohibited. Never try to straighten a bent or bowed ladder. Remove it from service immediately. Do not paint wooden ladders with solid color paints. This may mask cracks in the wood and make them hard to see. Clear wood preservative can be used to protect bare wood.

If exposed to greases, oils or other slippery substances, the ladder must be cleaned of the substance with solvents or steam. If the slippery substance is not completely removed, the ladder must be removed from service.

### IV. **Storage of Ladders**

Ladders should be stored where they can be inspected easily and can be reached without causing accidents.

## **14.0 FIXED LADDERS AND STAIRS**

### **I. Fixed Ladders**

- Fixed ladders should be designed to withstand a single concentrated load of at least 200 lbs;
- Rungs of metal ladders must have minimal diameter of three quarters inch. Rungs must be at least 16 inches wide, be spaced 12 inches apart;
- Fixed Ladders, when their location so demands, must be painted or treated with a preservative to resist deterioration;
- The preferred pitch for a safe descent is 75 to 90 degrees. Ladders with 90 degree pitch must have two and one half feet of clearance on the climbing side. There must be a three foot clearance on ladders with a 75 degree pitch;
- There must be at least a seven inch clearance in back of the ladder to provide adequate toe space;
- There must be a clear width of 15 inches on each side of the center line of the ladder, unless the ladder is equipped with a cage or well;
- Fixed ladders must have cages if they are longer than 20 feet. Landing platforms must be provided on ladders greater than 20 feet long. A platform is required every 30 feet for caged ladders and every 20 feet for unprotected ladders; and
- Side rails must extend at least 42 inches above the landing.

### **II. Fixed industrial stairs**

The following applies to all stairs around equipment, machinery, tanks etc. (they do not apply to stairs used for fire exits):

- Riser height and tread width of fixed industrial stairs should be uniform throughout any flight of stairs. All treads must be reasonably slip resistant;
- The minimum permissible width of a stairway is 22 inches;
- The angle to the horizontal made by the stairs must be between 30 and 50 degrees;
- All stairs should be adequately lighted; and
- If the tread is less than 9 inches wide the risers should be open.

### **III. Flights of stairs having four or more risers:**

- A stair railing is required on each opened side;
- If the stairway is less than 44 inches wide and both sides are enclosed, at least one handrail is required, preferably on the right side descending;

- If the stairway is greater than 44 inches wide a handrail is required on each enclosed side;
- If the stairway is greater than 88 inches wide an intermediate stair railing located midway is required;
- The vertical height of a stair railing must be 30 to 34 inches, and it must be of construction similar to the standard guard railing; and
- Spiral stairways are not permitted except for special limited usage and secondary access situations where it is not practical to provide a conventional stairway.

#### IV. **Embedded Stairs**

Individual steps used for access or egress, embedded in the walls of risers or the conical top sections of manholes must be safe, well constructed, and installed in accordance with good engineering practices;

- Individual rungs or steps must be uniformly spaced from 12 to 16.5 inches; and
- The use of steps in personal access holes should be designed to prevent the foot from sliding off the end.

#### V. **Alternating Tread Stairs**

Alternating tread type stairs are permitted if they are installed, used, and maintained according to the manufacturer's recommendations:

- The stair must be installed at an angle of 70 degrees or less; and
- The stairs must be equipped with a handrail at each side to assist the workers in climbing or descending.

### **15.0 WALKING AND WORKING SURFACES**

In general, all areas of the workplace should be kept clean, sanitary, and as dry as possible. These guidelines apply to work areas, passageways, store rooms, and service rooms:

- All spills should be cleaned promptly. Floors in work areas must be kept free of scraps, chips, oil spills, and other debris;
- Boxes, chairs, buckets, desks or any other device not specifically intended for use in extending reach shall not be used;
- Areas which are constantly wet should have non-slip surfaces or mats where workers may walk or work. Where wet processes are used good drainage must be maintained;

- Every floor, working place, and passageway must be maintained free from protruding nails, splinters, holes, and loose boards;
- Where mechanical handling equipment is used, such as lift trucks, sufficient safe clearance must be provided for foot and vehicular traffic;
- No obstructions that could create a hazard are permitted in aisles. All permanent aisles must be easily recognizable; and
- As a general condition, a standard toe board and guard rail are required where ever people walk near or beneath the open sides of a platform or similar structures; where things could fall from a structure; or where things could fall from a structure into machinery below.

#### 16.0 REVISIONS

Revision	Date	Description
0	11/2/2009	Initial release