Chapter 10

LADDERS, SCAFFOLD, STAGING & FALL PROTECTION

'Falls are the second-leading cause (behind motor vehicles) of non-natural fatalities in the US and the LEADING cause of death in construction.'

The purpose of this chapter is to ensure that all Hight Construction employees are protected from fall hazards in accordance with Federal safety regulations. Supervisors are required to monitor and enforce the use of this procedure. Workers will be responsible to know and follow safe operating procedure for all staging methods and fall protection techniques. The goal of these policies is to limit and even eliminate fall exposure possibilities at our worksites. Methods range from simple common sense techniques (such as simply being aware and in tune to your surroundings) to the utilization of fully engineered and implemented fall protection systems. This includes safety nets, guardrail systems (including handrail, mid-rail & toe-board), personal fall arrest & restraint systems, warning lines and safety monitoring systems.

Falls - General

With a little awareness and knowledge, falls from ladders and scaffolds can be greatly reduced and even eliminated. Preventing slips, trips, and falls is a task that depends on many factors--most importantly--you. You may not be able to change your workplace, but you can recognize dangers, work to eliminate hazards, and use safety devices and equipment. Here are some other tips to help you eliminate falls from your work site:

- ☐ Falls occur whenever you move too far off your center of balance. Slips and trips often push you off your center of balance far enough to cause a fall. Many other things can cause a fall as well such as makeshift ladders, misuse of ladders, accidents while climbing, and improper scaffolding use. Most falls are slips or trips at ground level, but falls from greater heights pose a much higher risk of serious injury. Avoid falls of any kind with these safety measures:
- ☐ Do not jump. Lower yourself carefully from docks, trucks, or work stages.
- ☐ Check lighting. Make sure hallways, stairs, and work areas are properly lit.
- ☐ Repair or replace stairs or handrails that are loose or broken. Report these types of hazards to the proper personnel in your company.
- ☐ Do not store items on stairs or in aisles.
- ☐ Wear good shoes. Non-skid soles are a good choice. Remember that high heels or platforms are less stable than flat shoes.
- ☐ Always use proper equipment when you have to work at a higher level. Never use chairs or any other unstable equipment to reach higher.
- ☐ On August 9, 1994, OSHA published a final rule requiring construction employees to be protected with fall protection at heights of six feet or higher. Fall protection must be utilized at the following heights:

- **Roofs**:
  - Commercial - six feet or higher
  - Residential - 25 feet or higher
  - General Industry - four feet or higher
  - Grain Handling Facilities - six feet or higher where feasible
  - Steel Erection - 15 feet or higher
- **Scaffolds** - 10 feet or higher.
  - When width of scaffold is less than 45" - six feet or higher.
- **Ladders**:
  - Fixed ladders - 25 feet or higher
  - Portable ladders - no fall protection required
  - These heights are presently the Federal guidelines issued. However, these can be subject to change at the Federal Government's discretion. There may be exceptions to these guidelines. Refer to Federal Regulations 1926.502 and 1910.23 for further information.

Ladders – Use & Worksite Protocols:

The following are rules and policies governing the use of ladders on the jobsite:

- ☐ Place ladders with care. The bottom of the ladder should be away from the wall but never more than 1/4 of the perpendicular height of the ladder (4:1 Rule).
- ☐ Do not place a ladder in a blind corner or a doorway where it could be dislodged. If it is necessary to use a ladder in such places, the walkway must be barricaded or the doorway locked to prevent collisions.
- ☐ Do not place ladders unstable objects such as boxes, loose lumber, etc. to obtain extra height. A longer ladder should be obtained.
- ☐ When portable ladders are used, securely fasten, anchor or make secure using ropes. Tie down your ladder as close to the support point as possible. A straight ladder should extend at least 3.3 feet (1 m) past its support point.
- ☐ Do not use a step ladder as a straight ladder. Step ladders must be fully extended and in a locked position. Never stand on the top of a step ladder. Step ladders must never be used on top of scaffolds.
- ☐ Metal ladders or ladders with metal reinforcing are not to be used around electrical wiring or while working on or near electrical equipment.
- ☐ Always face the ladder when ascending or descending and use both hands. Always maintain a three-point contact.
- ☐ Do not use a solid color paint on wood ladders. Use linseed oil, varnish or clear shellac to avoid the possibility of obscuring a defect.
- ☐ Tag out of service (DO NOT USE) damaged or broken ladders until the ladder has been repaired or disposed of.
- ☐ Ladders between levels must be secured, extend 3.3 feet (1 m) above the upper landing and afford clear access at top and bottom.
- ☐ When working from an extension ladder, stand no higher than the 4th rung from the top; on a step ladder, no higher than the second step from the top.
- ☐ Make sure step ladder spreaders are functional and locked in place before climbing the ladder.
- ☐ Do not set ladders on the platforms of scaffolds, boom devices or scissor lifts.

- ☐ Never use a ladder horizontally as a substitute for planks, runways or ramps.
- ☐ Avoid overreaching. Do not let the trunk of your body extend past the side of the ladder. Do not straddle the space between a ladder and another surface.
- ☐ Never use the top portion of an extension ladder as a ladder. It is not equipped with skid-proof 'feet'.
- ☐ Never place and use a ladder on a slippery surface (e.g., frost covered ground or wood) without first tying off the bottom to prevent sliding. If tying off or bracing is not possible, another worker must hold the ladder in place.
- ☐ Wear slip-resistant footwear and make sure the ladder rungs are free of oil, grease or other slippery substances.
- ☐ If you must carry tools, use a tool belt or a bucket attached to a hand line to pull tools up and down.
- ☐ Before climbing any ladder, check its condition. Are the rungs secure? Everything tight and functional?
- ☐ When untying the top of a straight ladder, a fellow worker must hold the bottom of the ladder to prevent kick-out.
- ☐ Ladders must meet OSHA/ANSI specifications.

Ladder Loads:

Self-supporting (foldout) and non-self-supporting (leaning) portable ladders must be able to support at least four times the maximum intended load, except extra-heavy-duty metal or plastic ladders, which must be able to sustain 3.3 times the maximum intended load. (See Figure 1.)

Angle:

- Non-self-supporting ladders, which must lean against a wall or other support, are to be positioned at such an angle that the horizontal distance from the top support to the foot of the ladder is about 1/4 the working length of the ladder. (See Figure 2.)
- In the case of job-made wooden ladders, that angle should equal about 1/8 the working length. This minimizes the strain of the load on ladder joints that may not be as strong as on commercially manufactured ladders.

Rungs:

- Ladder rungs, cleats, or steps must be parallel, level, and uniformly spaced when the ladder is in position for use. Rungs must be spaced between 10 and 14 inches apart.
- For extension trestle ladders, the spacing must be 8-18 inches for the base, and 6-12 inches on the extension section.
- Rungs must be so shaped that an employee's foot cannot slide off, and must be skid-resistant. (See Figure 3.)

Slipping:

- Ladders are to be kept free of oil, grease, wet paint, and other slipping hazards.
- Wood ladders must not be coated with any opaque covering, except identification or warning labels on one face only of a side rail.

Other Requirements (ladders):

- Foldout or stepladders must have a metal spreader or locking device to hold the front and back sections in an open position when in use. (See Figure 4.)

- When two or more ladders are used to reach a work area, they must be offset with a landing or platform between the ladders.
- The area around the top and bottom of ladder must be kept clear.
- Ladders must not be tied or fastened together to provide longer sections, unless they are specifically designed for such use. (See Figure 5.)
- Never use a ladder for any purpose other than the one for which it was designed.

SCAFFOLDING - Scaffold Accidents

- ☐ Over a seven-year period, OSHA statistics report that about 28% of the scaffold accidents that occur are the result of construction deficiencies. These deficiencies include using substandard components, omitting essential components, or failing to complete the assembly.
- ☐ Of the fatalities that occurred, 23% occurred as a result of construction deficiencies. About 14% occurred while climbing. Another 8% occurred while assembling or disassembling the scaffolding. About 10% of the fatalities occurred was the result of the scaffolding structurally failing. Another 18% of the fatalities happened as a result of electrocutions. Approximately 10% of the fatalities were from falling objects, while 10% happened because of falls while working on the platform.

Scaffolds & Elevated Work Platforms

All metal frame scaffolds share common components. Platforms, base supports, side brackets, and support trusses. Erecting and dismantling scaffolds must be done under the supervision of a certified scaffolder or a competent, experienced worker who has demonstrated he is fully qualified. Always follow the most stringent safety rules and regulations of government (national & state of ND), owner, client or company when constructing scaffolds. Other rules that govern scaffold set-up and usage include:

- ☐ Scaffold Access - All metal frame scaffolds must have a means of access. This access can be gained from attached or portable ladders, stairways, or the adjacent structures. Ladders must extend 3 feet above the working surface. Gates or removable guardrails or safety chains must be used at the ladder landing. Employees shall not work on scaffolds during storms or high winds.
- ☐ Scaffold Erection - Scaffold shall only be erected, moved, dismantled, or altered under the supervision of competent persons. A fall protection plan must exist when erecting scaffolding.
- ☐ All staging and all working platforms must be secured to the structure where the work is to be performed, unless securing the platform creates an unsafe situation.
- ☐ Metal frame scaffolds must be designed at four times their rated carrying capacity. Trained personnel must erect all supported scaffolds. All scaffolds greater than 125 feet in height must be designed by a registered professional engineer.

Scaffolds - Platforms:

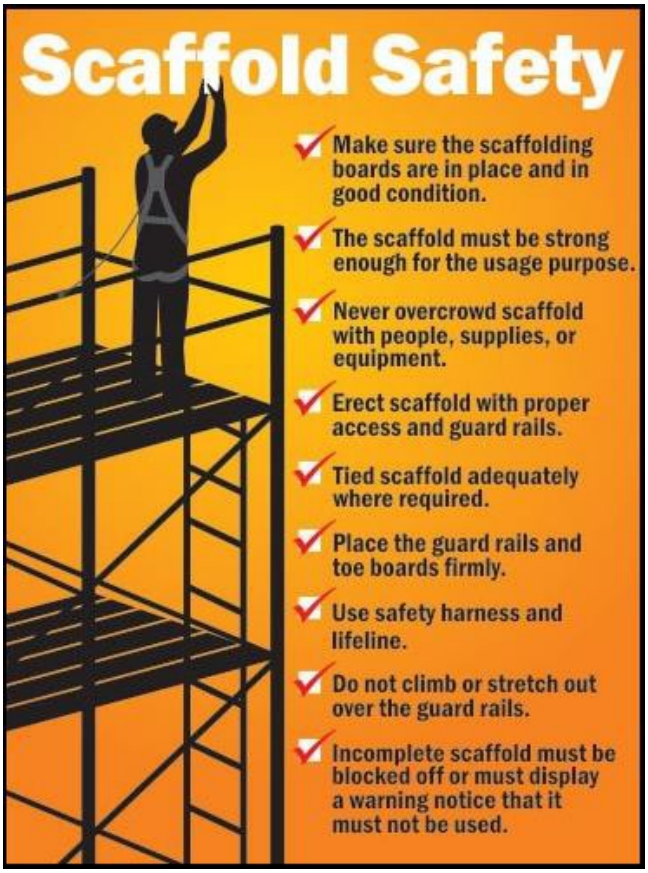
- o Each platform must be fully planked or decked. Platforms should be a minimum of 18” wide. Each platform unit (e.g., scaffold plank, fabricated plank, fabricated deck, or fabricated platform) shall be installed so that the space between adjacent units and the space between the platform and the uprights is no more than 1 inch (2.5 cm) wide, except where the employer can demonstrate that a wider space is necessary (for example, to fit around uprights when side brackets are used to extend the width of the platform).

Scaffolds - Platform Loading:

- Distribute the weight evenly. Place the heaviest load over vertical members. Scaffold platforms cannot deflect greater than 1/60 of the span distance when loaded.
- Platform Overhang:
- If a platform is less than 10 feet long, the maximum overhang is restricted to 12 inches. On platforms longer than 10 feet, the maximum overhang is 18 inches.

Scaffolds - Planks:

- Scaffold planks must be made from scaffold-grade lumber or be laminated planks. Do not use planks that are cut, split, chemically damaged, or painted. Plank overlap must be by 12" unless restrained. Ends should always be cleated or restrained. If the end overhang is less than 6", the ends must be cleated or restrained. Planks must be a minimum of 2" by 10" (nominal). A minimum of two planks no further than 1" apart must be used.



Scaffolds - Fabricated Wooden or Metal Decks:

- Load bearing limits and dimensions are determined by the scaffold deck manufacturer. The deck must be marked with its carrying capacity. Decks are not to be dropped from scaffolds. Never use bent or damaged decks. Standard lengths are 6' and 10'. No overlap is required.

Scaffolds - Base Support:

- A firm, level foundation is required for all supported scaffolds. Scaffold base plates or casters are to be used on all scaffold legs. Plates and casters must be pinned or secured to the frame at all times.

Scaffolds - Mud Sills:

- Mud sills are platforms designed to distribute scaffold weight. The size of mud sills used is based on ground support conditions and maximum anticipated loads on the scaffold legs. Scaffold planks are sometimes used as mud sills. Do not use working planks for mud sills since this practice could damage planks.

Scaffolds - Screw Jacks:

- Screw jacks are designed for leveling the scaffold. The recommended maximum extension for fixed scaffolds is 18", while 12" is the maximum for mobile scaffolds.

Scaffolds - Side Brackets:

- Side brackets can be used with all metal frame scaffolds. Manufacturers determine the requirements. They are designed only to support personnel unless engineered otherwise.

Scaffolds - Truss Bearers:

- These are used when it is necessary to span greater than standard distances such as doorways. The manufacturer sets limits to the length and capacity. Truss bearers may require additional bracing on the scaffold system. Follow the manufacturer's requirements when truss bearers are used.

Scaffolds - Ties

- Ties provide protection against toppling. Ties are secured at the junction of the vertical and horizontal scaffold members. They must be of rigid construction. A positive anchor is required. Guys, ties, and braces must be installed according to the scaffold manufacturer's recommendations or at the closest horizontal member to the 4:1 height and be repeated vertically at locations of horizontal members every 20 feet or less thereafter for scaffolds 3 feet wide or less, and every 26 feet or less thereafter for scaffolds greater than 3 feet wide.
- The top guy, tie or brace of completed scaffolds shall be placed no further than the 4:1 height from the top. Such guys, ties and braces shall be installed at each end of the scaffold and at horizontal intervals not to exceed 30 feet (measured from one end [not both] towards the other).
- Additional ties may be required under special circumstances, such as loads not centered, winds, hoisting, or on covered scaffolds. Guys are required if the scaffolding is free standing and are greater than four times the minimum base width in height. Guys must be a minimum of 3/8" wire rope and should be tied at a 45º angle to the scaffold.

Scaffolds - Supported Metal Scaffolds:

- Welded Frame Scaffold - These consist of end frames and braces. All components must be inspected for damage/defects prior to being used. When erecting scaffolding, start at the highest point of the run and work downhill. Cross braces will automatically square the scaffold frames. Ensure that the scaffold is level, square, and plumb. Use pin connections on all frames to prevent separations of frames. Ladders provide access to the scaffold. Ladders are not to be used on scaffolding unless it is secured top and bottom, the scaffold is secured from any movement, and the platform is stabilized to prevent deflection.

Scaffolds - Mobile Scaffold:

- Mobile scaffolds have restricted reach unless a guy wire secures them. They are more susceptible to overturning and require a smooth, level working surface. Additionally, they are the most frequent type of scaffold involved in power line accidents. A complete guardrail system must be used at elevations above 10 feet and shall be used at all working levels. Scaffold should be moved when unoccupied and only by pushing from the base. Wheel brakes must be set when scaffold is in use. Base dimensions may be extended with outriggers.

Scaffolds - Swing Stage Scaffold:

- Platforms shall not be less than 20". The platform shall be securely fashioned to the hangers. Hangers shall be capable of sustaining four times the maximum rated load and shall be designed with support for guard railing. Roof irons or hooks shall be of mild steel or equivalent material. Tiebacks of ¾" manila rope or equivalent shall serve as a secondary means of anchorage, installed at right angles to the face of the building and secured to a structurally sound portion of the building.
- All scaffold components must be inspected before each use and periodically while in use. On suspension scaffolds designed for working load of 500 pounds, no more than two employees shall be permitted to work at one time. On suspended scaffolds with a working load of 750 pounds, no more than three employees shall be permitted to work at one time. Each employee shall be protected by an

approved safety line attached to a safety harness. The safety-line shall be securely attached to substantial members of the structure independent of the scaffold. A minimum of slack in the lifeline must be maintained.

Scaffolds - Guardrail System/Fall Protection:

- Fall protection is required on all scaffolds where the working height is above 10 feet. A guardrail is required above 10 feet on all scaffolds if fall arrest system is not used. Guardrails must be able to withstand 200 pounds of force. Top rails shall be about 42" in height. Mid rails and toe boards are required. Toe boards must be a least 3½" in height. Cross braces may be used as mid rails if the cross height is 20" to 30" above the platform. Interior guardrails are not required when the working face is less that 14" from the platform. Guardrails must be installed on all open ends and sides of platforms more than 10 feet in height. Upright supports must be no more than 8 feet apart.

Man-baskets & Suspended Cages

- ☐ The suspended cage and suspension system must be designed and certified by a professional engineer. The suspension system must be designed to minimize tipping due to movement of workers on the platform.
- ☐ The suspended cage must be erected, operated and maintained according to manufacturer's specifications.
- ☐ Each worker must be provided with a safety harness, lifeline and lanyard and be instructed in their proper use. The supervisor must ensure each worker wears the safety harness and properly attaches the lanyard to the lifeline.
- ☐ Lifelines must be attached above the suspended cage anchor point. Lifelines must not be attached to the same anchor point as a suspension line.
- ☐ Lanyards must be attached to the lifeline by an approved device. A protective thimble must be used to connect ropes or straps to eyes or rings. Workers must be certain the lanyard and lifeline cannot be caught or entangled on the suspended cage.
- ☐ The rigging load (the sum of all parts: workers, materials and equipment) must not exceed 10% of the breaking strength of the weakest part of the rigging. The maximum load which may be hoisted by any rigging must be conspicuously marked on the rigging. A safety factor of 10 must be applied to all suspension cables, slings and attachments.
- ☐ All parts of the suspended cage and rigging must be inspected daily.
- ☐ If it is impractical to provide a separate lifeline, a separate cage support must be attached between the suspended cage and the hoist line above the hook assembly. This support must be capable of withstanding the weight of the cage, materials, equipment and workers, should the hook assembly fail. In this case, workers must wear safety harnesses with lanyards securely attached to the cage.
- ☐ Suspended personnel cages, platforms or buckets must be secured by safety-wired shackles or safety hooks. Do not use open hooks.
- ☐ The hoisting unit must be equipped with a brake capable of controlling the speed during lowering and of sustaining a load at rest of 1.5 times the rated load of the hoisting unit.
- ☐ The man-basket must be completely enclosed to a height of 42 inches (107 cm) or be fitted with substantial guard rails and toe-boards extending completely around the perimeter of the man-basket.
- ☐ Hoisting of the suspended cage must be slow, careful and controlled, avoiding all sudden movements.
- ☐ Access gates, if installed, must not be capable of swinging outward during hoisting.
- ☐ The number of workers allowed in the man-basket must not exceed its rated capacity. Materials workers and tools must be evenly distributed within the confines of the basket while suspended.
- ☐ When a wire rope bridle is used to connect the man-basket to the load line, each bridle leg must be connected to a master link or shackle such that the load is evenly distributed among the bridle legs.

- ☐ Prior to hoisting workers and after any repair, modification or change of location, a trial lift and re-inspection must be performed.
- ☐ A trial lift, with the unoccupied man-basket loaded to at least the anticipated lift-weight, must be made from the entry level to the hoist position level immediately prior to lifting workers. The hoist operator must ensure: all systems, controls and safety devices are activated and functioning properly; no interferences exist; and all configurations necessary to reach the work locations will allow the operator to remain within the pre-determined safety limit of the hoist's rated capacity.
- ☐ The test loaded platform must be inspected to ensure it is secure and properly balanced. All lines must be free of kinks and entanglements. The primary attachment must be centered over the platform. Any slack lines must be investigated to ensure they are properly stated on drums and in sheaves.
- ☐ A visual inspection of the crane or derrick, rigging, personnel platform, crane base support or ground, must be conducted by a competent person immediately after the trial lift to determine if the testing has exposed any defect or produced any adverse effect on any hoist component or structure. Any defects must be corrected before hoisting personnel.
- ☐ Workers must keep all parts of their body inside the man-basket during raising, lowering and positioning.
- ☐ Prior to entry or exit of a suspended platform, the

Aerial Lifts:

- ☐ OSHA regulates aerial lifts as *scaffolds*
- ☐ 1926.453 Aerial Lifts only applies to bucket trucks
- ☐ Fall protection is required (full body harness with lanyard or body belt with 2-foot lanyard as restraint device) while working from an aerial lift
- ☐ OSHA does not require harnesses and lanyards on other boom lifts and scissor lifts if there are guardrails.
- ☐ Fall arrest systems (harness plus lanyard to stop a fall)
- ☐ Can tip over some boom lifts and scissor lifts due to fall stopping force
- ☐ Fall restraint systems intended to prevent falls are preferred e.g. full body harness plus lanyard designed for size of lift platform.
- ☐ Always close entrance chains or doors
- ☐ Stand on floor of bucket or lift platform
- ☐ Do not climb on or lean over guardrails
- ☐ Aerial lifts may be field modified for uses other than those intended by the manufacturer provided the modification has been certified in writing by the manufacturer or by any other equivalent entity, such as a nationally recognized testing laboratory, to be in conformity with all applicable provisions of ANSI A92.2-1969 and this section and to be at least as safe as the equipment was before modification. Lift controls must be inspected and tested before each use. Only authorized personnel can operate the lift.

Maintenance/Staging Requirements – Aerial Lift:

- Training of mechanics should be done by qualified person experienced with lift model
- Maintenance should include:
- Knowledge of manufacturer's maintenance requirements
- Frequent inspections of aerial lift by qualified mechanic
- At least annual detailed inspections by qualified mechanic
- Insulated aerial lifts have special electrical test requirements
- De-energize and lockout/tagout aerial lift before conducting maintenance and repairs
- Do not modify aerial lift without written permission
- Check safety devices, operating controls before each use

Other hazards/Staging & Safety – Aerial Lift:

- Check area in which aerial lift will be used for:
- Level surface (Do not exceed manufacturer slope recommendations)
- Holes, drop-offs, bumps, debris, etc.
- Overhead obstructions and overhead power lines
- Stable surface
- Set outriggers, brakes, wheel chocks
- Preventing Tip-Overs
- Do not exceed manufacturer rated load capacity limits
- Do not travel to job location with lift in elevated position.
- Set up proper work zone protection when working near traffic
- Positioning of lifts
- Do not drive near drop-offs or holes.
- Do not raise platform on uneven or soft surfaces.
- Do not drive onto uneven or soft surfaces when elevated.
- Do not raise platform on slope or drive onto slope when elevated.
- Do not raise platform in windy or gusty conditions.
- Avoid excessive horizontal forces when working on elevated scissor lifts

Safe Work Practices – FALL PROTECTION

- The following safe work practices are provided as part of Hight Construction's Fall Protection Program and are to be used as a guideline.

Fall Protection Policy

☐ It is Hight policy to protect workers from the hazard of falling by using some form or combination of fall protection when:
- Working at heights > or = 10 feet (3 m) in height
- When working above operating machinery, water, hazardous substances or hazardous objects – REGARDLESS OF HEIGHT.

- When there is a requirement for fall arrest it is company policy to use full body safety harnesses and lanyards attached to individual lifelines even though client rules or government regulations may only specify the use of a safety belt and line. Safety belts are only permit• ted as part of a restrictive work positioning system.

☐ Shock absorbing lanyards or their equivalent are mandatory. All personal fall protective equipment must be certified (e.g., C.S.A. or equivalent). Horizontal lifeline systems must be manufacturer and engineered to minimum design specifications.

☐ Whenever a fall hazard exists it is Hight policy to develop, write and implement a fall protection plan. All workers are to be trained in the site-specific fall protection practices, emergency response procedures, and correct usage/maintenance of their personal protective gear. Workers are required to know, understand and comply with fall protection requirements. It is the supervisor's responsibility to ensure this policy is practiced and enforced and that all fall protection safe work practices are adhered to.

☐ Remember, regulations vary from province to province and state to state. Always refer to the relevant provincial or state regulations for specific requirements for your place and location of work and follow the most stringent of government, company or owner safety rules.

☐ Violation of this policy will result in disciplinary action which may include immediate termination.

Access Equipment

The following guidelines apply to all access equipment, including ladders, scaffolds, fork lifts, suspended access equipment and powered elevating work platforms such as scissor and boom lifts.

- ☐ Always be aware of the danger of contact with overhead hazards such as power lines.
- ☐ Inspect equipment and components before use. Never use damaged or defective equipment.
- ☐ Make sure supporting surfaces, whether indoors or outdoors, are suitable for the type, weight and operating requirements of the equipment.
- ☐ Do not exceed safe working loads/limits.
- ☐ When mounting, using or dismounting from access equipment, always maintain a three-point contact (two hands/one foot or two feet/one hand).
- ☐ Keep boots free of mud, snow, grease or other slippery materials.
- When working from access equipment, avoid over•reaching. Keep your center of gravity within the support provided by the equipment (side-rails on a ladder or guardrails on a scissor lift).
- ☐ Make sure tools I material are secure and will not fall.
- ☐ Wherever possible avoid working under or over other personnel.
- ☐ Keep fire extinguishers at the top and bottom of the equipment whenever there is a potential fire hazard.
- ☐ Avoid blocking doorways, blind entrances or traffic routes.
- ☐ Wherever possible, use signs and barriers to warn others of work overhead.
- ☐ Use fall protection as required for place of work, equipment in use and nature of work.
- ☐ Always refer to manufacturer's specifications and the relevant Occupational Health and

Barricades, Guardrails & Hole Covers:

- ☐ Anyone who makes a hole or opening is responsible for having it barricaded or securely covered. Barricades or guardrails are required around excavations, holes or openings in floors or roof areas, edges of roofs and elevated platforms, below certain types of overhead work, around hazardous work areas such as leaks, or whenever necessary to warn or protect people against falling in, through or off.
- ☐ Barricades are for your protection. Do not proceed through a barricaded area.
- ☐ Barricades or guardrails and hole or opening covers must be constructed of suitable materials and strength to Support a worker who accidentally falls or bumps against it or, in the case of covers, walks on top of it. Tag as needed.
- ☐ If manpower or equipment is required to work or be near any barricade under poor light conditions (e.g., night), such barricades must be properly marked with reflective material and/or warning lights.
- ☐ Do not lean against barricades or guardrails.
- ☐ If barricades, guardrails or cover must be removed to complete a task at height, fall protection is required.

Fall Protection – General/Tie-off

- ☐ If standard fall protection is not feasible, all workers must tie off. Tie off must be done with a full body harness and shock absorbing lanyard equipped with double-locking snaps. The 1994 OSHA rule prohibits the use of body belts as part of a personal fall arrest system as of January 1, 1998. In addition, only locking type snap-hooks will be permitted for use in personal fall arrest systems and positioning systems as of the same date. The lanyard must be attached to the D-ring in the center of the back and to a structural member capable of supporting a 5,000 pound load in the event of a fall. The tie off point shall be above the head as high as practical. The lanyard can be no longer than six feet. Other rules and practices governing work performed from staged situations includes:
- ☐ Employees working from swing scaffolds, boatswain chairs, spider baskets, etc., shall tie off to an independent lifeline which is securely attached to a structural member. Each worker will have a separate lifeline to themselves.
- ☐ Employees working near electrical equipment will use nylon or other non-conductive lanyards. Steel slings will not be used.

☐ All fall protection equipment will be protected from damage and kept in good repair. Any equipment subject to in-service loading (a fall) will be immediately removed from service. All employees exposed to fall hazards will be trained in this procedure. Documentation of training will be kept by the safety coordinator. This procedure will be strictly enforced and any employee not in compliance will be subject to disciplinary action up to and including termination.

Horizontal lifelines and lanyards must (as applicable):

- Meet CSA or equivalent standard
- Be free of splices except for the end terminations;
- Have an unloaded sag of approximately the span length divided by 60; the span must be at least 20 feet (6 m) but not more than 60 feet (18 m)
- Limit the free fall distance to 4 feet (1.2 m)
- Be positioned so it does not impede the safe movement of workers
- Be positioned at least 39 inches (1 m) above the working surface
- Be positioned 4 feet (1.2 m) of the ground level or safe landing and secured to prevent the lanyard from running off
- Be securely anchored to a fixed, independent anchor point with a minimum capacity of 22.2 kN or approximately 5000 lbs (stopping a fall can put a load of up to 2,000 lbs (907 kg) on the lifeline and its anchorage)
- Be installed and used in a manner that minimizes the "swing-fall hazard" (i.e., the risk of swinging and colliding with an obstruction following a fall).
- The engineered design of the horizontal lifeline system will determine the number of workers permitted to be attached at any one time.
- The connecting hardware and end anchors for a horizontal lifeline system must have a load capacity of at least 71 kN or approximately 16,000 pounds.

Vertical lifelines must be:

- First grade, three-stand, hawser-laid manila rope, not less than 3/4"(19 mm) in diameter, or static kern mantel line with a breaking strength of not less than 27 kN or approximately 6000 pounds;
- Used by only one worker at a time;
- Free from chafing, cuts, abrasions, and other defects. Care must be taken to prevent damage to the life line from sharp edges, heat, abrasions, or corrosive materials (e.g., oil, concrete, grease, paint);
- Long enough to reach the ground or extend to within 4
- Ensure compliance with Regulations governing your place of work.

☐ All workers who use a fall prevention/protection system must be trained in its use, limitations, applications, maintenance, and inspection requirements.

☐ Personnel working from or riding in any mechanized lift device (JLG, etc.) must use a 'fall arresting system' with the lanyard attached to a fall arrest anchor.

☐ Workers in a man-basket will, as a minimum, secure their lanyard to the crane cable above all other attachments. See also section on Suspended Cages, etc.

☐ Erection and dismantling of scaffolds must be done by or supervised by qualified workers. During the erection or dismantling of scaffolding, workers must be tied off when the height is 10 ft (3 m) or greater.

☐ Workers engaged in work on a sloped roof must be protected by a fall restraint or fall arresting system.

☐ Workers engaged in work on a 'flat roof must be protected from falling if the work is within 6.5 feet (2 m) of the edge. Work at a distance greater than 6.5 feet (2 m) from the edge will not require fall protection but will

require a warning system indicating the 6.5 foot (2 m) edge zone, for a distance of 16.4 feet (5 m) on each side of the work area.

- ☐ In addition to supported planking, a fall arrest system must be used when on a non-load bearing roof. Non-load bearing roof panels are not considered a solid surface when determining the height restriction for the application of a fall prevention system.
- Safety harnesses, shock absorbing lanyards and lifelines exposed to a fall impact load must be removed from service immediately and all components destroyed or re• certified by the manufacturer or a professional engineer.
- ☐ Fall arrest/restraint protection equipment must be inspected by the owner when new and yearly thereafter; by the user before each use. Workers must report and replace damaged equipment immediately.
- In general, workers on elevating work platforms, needle• beam scaffolds, swing stages, suspended powered or work platforms, ladder-jack scaffolds, scaffold stages, and thrust-out crane landing platforms must wear full body harnesses, secured to independently anchored lifelines unless another acceptable fall protection system is in use.
- ☐ A triple sliding hitch may not be used as part of a personal fall protection system.
- ☐ A worker must use an appropriate fall protection system in combination with a life jacket or personal flotation device if worker may fall into water and is exposed to a drowning hazard or could drown from a fall (other than from a boat).
- ☐ To eliminate the risk of accidental disengagement, long free falls and swing hazards, use compatible hardware, anchor as high as possible over the work area, and use a retractable or the shortest practicable lanyard.

Fall Protection:

- Train workers on fall emergency rescue plans, including self-rescue where possible. Ensure rescue equipment is available, accessible and inspected regularly. Rescuers must be trained and competent to perform rescue. Pre• plan, involve and utilize trained, practiced rescuers.
- ☐ Ensure fall arrest harnesses are fitted correctly and are used with compatible hardware. Safety harnesses must be snug fitting and worn with all hardware and straps intact and properly fastened. Store equipment together when not in use in a clean, dry place.
- ☐ Safety nets must be rigged under every part of an access ladder or gangway unless the ladder or gangway are positioned such that safety nets are unnecessary or the rigging of a safety net is impractical.
- ☐ Every unprotected floor and roof opening which constitutes a hazard to a worker must have personnel and material safety nets installed below the opening.
- ☐ A professional engineer must certify in writing that the supporting structure to which a personnel safety net is attached is capable of withstanding any load the net is likely to impose on the structure.
- ☐ Workers working from a portable ladder, where the person's belt buckle area remains within the confines of the ladder side-rails and top, at a maximum height not to exceed 10 feet (3 m), do not require fall protection.
- ☐ If workers are experienced at working at height and the use of safety harnesses, lifelines or safety-straps would produce an additional hazard or is clearly impractical, then the situation and proposed safe work plan must be documented and pre-approved by the appropriate bodies (refer to government regulations and Hight Corporate Safety for guidance) prior to work proceeding.
- ☐ Mandatory fall protection is required for all connectors. In some jurisdictions the worker making the initial connection may be exempt from the requirement to use fall protection. Refer to government regulations for your location of work.
- ☐ Standard guardrails, intermediate rails and toe-boards must be installed on all work platforms.
- ☐ When a guardrail must be removed to accommodate work, only that portion of the guardrail necessary to do the job may be removed. Workers exposed to this fall hazard must be protected by another form of fall protection until the guardrail is reinstalled. The guardrail must be replaced before leaving the unguarded area.

- ☐ Safety harnesses, lanyards, shock absorbers and lifelines must be appropriately (e.g., C.S.A. or equivalent) certified.
- ☐ Lanyards must meet CSA or equivalent standards. The minimum 'fall arresting lanyard' will limit the fall distance to 3.9 feet (1.2 m) or 6.5 feet (2 m) if extended due to release of a shock absorber, with a maximum arresting force of 8 kN.
- ☐ The fall arrest system must ensure worker cannot hit the ground or an object or level below the work area.
- ☐ An anchor for a vertical lifeline or a lanyard used without a lifeline must have a load capacity of 22.2 kN or approximately 5000 pounds in any direction needed to resist a fall. Permanent anchors or anchors with multiple attachment points must be certified in writing by a professional engineer as having the required load capacity.
- ☐ A snap hook on a lanyard or lifeline must be self-locking. All connecting hardware must be secured to prevent accidental opening. The load capacity of all devices must be clearly marked and compatible, with a means of identifying the manufacturer.
- ☐ If working near an energized conductor or an area where a conductive lanyard or safety strap cannot be safely used and there is risk of damaging a non-wire rope, two (2) nonconductive lanyards or safety straps must be used or another effective means of fall protection must be employed.
- ☐ Shock absorbers must be used with lanyards made of wire or other non-elastic material.
- ☐ A fall protection system is any combination of the following used to protect a worker from falling or to minimize the risk from falling.
    - Guardrails, toe boards and barricades (a fall restraint or work positioning system which prevents a worker from traveling to an edge from which he could fall).
    - Full body harness with a lanyard and/or lifeline, an anchor (a secure point of attachment) and related equipment (a fall arrest system to stop a worker's fall before hitting the surface below).
    - A safety net (a fall arrest system).
    - A "control zone" (the area between an unguarded edge of a structure and a raised, high visibility, warning line which is set back at least 6.5 feet (2 m) from the edge).
    - A "safety monitor" (a trained worker designated to monitor work activities in a control zone to ensure work is done in a manner which minimizes the risk of falling) and a control zone or other procedures applicable to the specific situation and pre-approved by W.C.B., OH&S, OSHA, WISHA, etc. as required.
- ☐ A plan is not complete without a fall emergency response plan and procedures that will ensure rescue is prompt and effective.
- ☐ Project managers are required to review fall protection safe work practices and fall emergency response plan with workers and to incorporate the applicable practices in their site-specific fall protection plan. Remember, a fall protection plan which does not conform to legislated rules because of the specific nature of the work must receive approval from the applicable regulatory body before being implemented.
- ☐ Always refer to the legislation applicable to your province, territory or state of operation when developing a fall protection plan for a specific task.

Post Fall-Arrest Rescue:

- For further information on the subject, **see chapter 'FIRST AID AND EMERGENCY PROCEDURES'**, later in this manual.