MINISTRY OF URBAN DEVELOPMENT AND CONSTRUCTION

Ethiopian Building Code Standards (EBCS 14)

HEALTH AND SAFETY IN BUILDING CONSTRUCTION

FINAL DRAFT

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SECTION ONE

Definitions and Scope of Application

1. Definitions

The following definitions of words and phrases apply in this Code unless the context requires otherwise.

"Adjustable suspension scaffold" means a suspension scaffold equipped with a hoist(s) that can be operated by an employee(s) on the scaffold.

"Barricade" means an obstruction to deter the passage of persons or vehicles.

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

"Brace" means a rigid connection that holds one scaffold member in a fixed position with respect to another member, or to a building or structure.

"Construction Site" means any site at which any of the construction process or operations are carried out.

"Contractor" means a person or entity responsible for construction work.

"Crane" is a machine for lifting and lowering a load and moving it horizontally, with the hoisting mechanism which is an integral part of the machine.

"Cab-operated crane" means a crane controlled by an operator in a cab located on the bridge or trolley.

"Cab" means the operator's compartment on a crane.

"Competent person" means a person possessing adequate qualifications such as suitable training and sufficient knowledge, experience and skill for the safe performance of the specific work.

“Employer” means any physical or legal person who employs one or more workers on a construction site.

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

“Excavation” means any man-made cut, cavity, trench, or depression in the earth's surface formed by earth removal. A trench is defined as a narrow underground excavation that is deeper than it is wide, and no wider than 15 feet (4.5 meters).

“Form scaffold” means a supported scaffold consisting of a platform supported by brackets attached to formwork.

“Guardrail system” means a vertical barrier, consisting of, but not limited to, top rails, mid rails, and posts, erected to prevent employees from falling off a scaffold platform or walkway to lower levels.

“Hoist” means a manual or power-operated mechanical device to raise or lower a suspended scaffold.

“Hazard” means inherent potential of any machine, material, or ambient factors to cause illness or injury from contact with or exposure to construction works.

"Lifeline" means a rope, suitable for supporting one person, to which a lanyard or safety belt (or harness) is attached.

“Ladder stand” means a mobile, fixed-size, self-supporting ladder consisting of a wide flat tread ladder in the form of stairs.

“Lifting appliance” means any stationary or mobile appliance used for raising or lowering persons or loads.

“Scaffold” means any temporary structure, fixed, suspended or mobile, and its supporting components which are used for supporting workers and materials or gain access to any such structure, and which is not a lifting appliance.

"Safety belt" means a device, usually worn around the waist which, by reason of its attachment to a lanyard and lifeline or a structure, will prevent a worker from falling.

“Signs” are the warnings of hazard, temporarily or permanently affixed or placed, at locations where hazards exist.

"Signals" are moving signs, provided by workers, such as flaggers, or by devices, such as flashing lights, to warn of possible or existing hazards.

"Tags" are temporary signs, usually attached to a piece of equipment or part of a structure, to warn of existing or immediate hazards.

"Worker" means any person engaged in construction.

"Workplace" means all places where workers need to be or to go by reasons of their work and which are under the control of an employer.

2. Scope of Application

This Code applies, to Building Construction, Maintenance, Renovation, Demolishing and other associated activities to all Classes of Buildings stated in Ethiopian Building Proclamation. This Code covers the Health and Safety precautions for the most common construction activities. If a building construction involves special method/s of construction, the builder needs to come up with the associated Health and Safety precautionary measures for such method/s. The occupational health and safety requirements specified in this document are only the minimum requirements. Other equivalent or better approaches are also acceptable if proven.

SECTION TWO

Planning

3. Safety Plan, Site Planning and Layout

3.1 Safety Plan of A Work Place

A contractor prepares Safety Plan of Work places which shall incorporate the following.

3.1.1 Assignment of a safety officer and/or the establishment of Safety and Health Committee whose members include representatives of employers and workers. The Officer/Committee will be in charge of following up the safety preparations and implementations.

3.1.2 On the job training of safety officer and/or safety committee members and the workers. The training includes providing information to workers of any measures applied on the construction site for ensuring safety in understandable ways.

3.1.3 Displaying pieces of information of particular importance including the following.

a) list of construction work to be performed on a construction site involving particular risks, the approximate time of performance of the work, the contact details of a person responsible for the work and measures for ensuring the safety of workers;

b) instructions for action in the event of a risk, the names and contact details of persons responsible;

c) the names and contact details of persons giving first aid, the contact address of nearest place of providing emergency medical assistance and the means of access.

3.2 Site Layout of a Work Place

Before work begins, site layout plan that contains the following items shall be prepared and approved.

3.2.1 Safe means of access to and egress from all workplaces.

3.2.2 The sequence or order in which work will be done.

3.2.3 Access for workers on and around the site.

3.2.4 The locations of danger zones.

3.2.5 Storage for flammable materials, if there are any.

3.2.6 Routes for vehicular traffic. These should be “one way” as far as practicable.

3.2.7 Storage areas for materials, construction waste and equipment. Materials need to be stored as close as possible to the appropriate workstation.

3.2.8 The location of construction machinery. This is usually dependent on operational requirements. The objective should be to avoid the need to slew the load over workers and traffic of the surrounding area.

3.2.9 The location of office rooms and trade workshops.

3.2.10 The location of medical and welfare facilities.

3.2.11 Delineation and fencing external border of the site and clearly marking it in order to keep away unauthorized persons and to protect the public from site hazards. The type of fencing will depend on the location of the site, but in populated areas it should be at least two meters high and without gaps or holes. Overhead protection will be necessary if tower crane loads pass over public thoroughfares or objects fall outside the fence area.

3.2.12 Appropriate lighting posts, if night work or work when there is no adequate light is expected. The illumination intensity of lighting for night work will be as per Table 3.2.12.

3.2.13 Signs and signals that convey required cautionary messages.

Table 3.2.12: Minimum Illumination Intensities (in foot candles)

Area of Operation	Illumination (foot candle)
General construction area	5
General construction areas, concrete placement, excavation and waste areas, access ways, active storage areas, loading platforms, refueling, and field maintenance areas.	3
Indoors: warehouses, corridors, hallways,	5

and exit ways.	
General construction plant and shops (e.g., batch plants, screening plants, mechanical and electrical equipment rooms, carpenter shops, rigging lofts and active store rooms, mess halls, and indoor toilets and workrooms.)	10
First aid stations, infirmaries, and offices	30

3.3 Signs and Signals

3.3.1 Warning, Cautionary, and Informative signs and signals shall be placed where required.

3.3.2 Signs shall be visible at all times when work is being performed, and shall be removed or covered when the hazards no longer exist.

3.3.3 Danger Signs: Danger signs shall be used only where an immediate hazard exists. Danger signs shall have red as the predominating color for the upper panel; black outline on the borders; and a white lower panel for additional sign wording (see Figure 3.3.3).



Figure 3.3.3: Danger Signs

3.3.4 Caution signs: Caution signs (see Figure 3.3.4) shall be used only to warn against potential hazards or to caution against unsafe practices.

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Figure 3.3.4: Caution Signs

3.3.5 Caution signs shall have yellow as the predominating color; black upper panel and borders. Yellow lettering of "caution" on the black panel; and the lower yellow panel for additional sign wording. Black lettering shall be used for additional wording.

3.3.6 Standard color of the background shall be yellow; and the panel, black with yellow letters. Any letters used against the yellow background shall be black.

3.3.7 Exit signs: Exit signs, when required, shall be lettered in legible red letters, not less than 6 inches (15 cm) high, on a white field and the principal stroke of the letters shall be at least three-fourths inch (2 cm) in width.



Figure 3.3.7: Exit Signs

3.3.8 Safety Instruction signs: Safety instruction signs, when used, shall be white with green upper panel with white letters to convey the principal message. Any additional wording on the sign shall be black letters on the white background.

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Figure 3.3.8: Safety Instruction Signs

3.3.9 Directional signs: Directional signs shall be white with a black panel and a white directional symbol. Any additional wording on the sign shall be black letters on the white background.

3.3.10 Accident prevention tags: Accident prevention tags shall be used as a temporary means of warning employees of an existing hazard, such as defective tools, equipment, etc. They shall not be used in place of, or as a substitute for, accident prevention signs.

3.3.11 Specifications for accident prevention tags similar to those shown in Figure 3.3.11 shall apply.



Figure 3.3.11: Specifications for Accident Prevention Tags

3.3.12 Flagmen: When operations are such that signs, do not provide the necessary protection adjacent to a highway or street, flagmen or other appropriate traffic controls shall be provided.

3.3.13 Hand signaling by flagmen shall be by use of red flags at least 18 inches square (77 cm2) or sign paddles, and in periods of darkness, red lights.

3.3.14 Flagmen shall be provided with and shall wear a red or orange warning garment while flagging. Warning garments worn at night shall be of reflective material.

SECTION THREE

Preventative and Protective Measures

4. Ladders and Scaffolding

4.1 Ladders

The following general requirements apply to all portable ladders including job-made ladders.

4.1.1 Ladder rungs, cleats and steps must be parallel, level and uniformly spaced when the ladder is in position for use.

4.1.2 Provide a metal spreader or locking device on each stepladder to hold the front and back sections in an open position when the ladder is being used.

4.1.3 Ladder components must be surfaced to prevent injury from punctures or lacerations, and prevent snagging of clothing.

4.1.4 The type of ladder to be used around electric lines should not be made of a conductor.

4.1.5 The bottom of a ladder should be of such material that develops friction with the floor.

4.1.6 Do not tie or fasten ladders together to create longer sections unless they are specifically designed for such use.

4.1.7 The minimum clear distance between the sides of individual-rung/step ladders and the minimum clear distance between the side rails of other fixed ladders shall be 16 inches (41 cm).

The following are recommended safe work practices when using portable ladders.

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4.1.8 When using portable ladders to access an upper landing surface, the side rails must extend at least three feet (90 cm) above the upper landing surface. If this is not possible, you must place a guard rail to assist mounting and dismounting the ladder.

4.1.9 Do not move, shift or extend ladders while occupied.

4.1.10 Do not use the top or top step of a stepladder as a step.

4.1.11 When ascending or descending a ladder, face the ladder.

4.1.12 Use at least one hand to grasp the ladder when moving up or down it.

4.1.13 A worker on the ladder must not carry any object or load that could cause him or her to lose balance and fall.

4.1.14 Ladders must have nonconductive side rails if they are used where they could contact exposed energized electrical conductors or equipment.

4.2 Step Ladder

Stepladder is a self-supporting portable ladder that is non-adjustable in length, with flat steps and a hinged design for ease of storage. It is intended for use by one person.



Figure 4.2 Step Ladder

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4.2.1 Proper Use

a) A Stepladder requires level ground support for all four of its side rails. If this worksite condition does not exist, a stepladder should not be selected for the job.
b) A Stepladder must not be used unless its base is spread fully open and the Spreaders locked. Stepladders are not to be used as Single Ladders or in the partially open position.
c) In order to prevent tipping the ladder over sideways due to over-reaching, the user must climb or work with the body near the middle of the steps. The ladder should be set-up close to the work. Never attempt to move the ladder without first descending, relocating the ladder, and then re-climbing.
d) When ascending or descending the ladder, always face the ladder and maintain a firm hand hold.
e) A stepladder must never be placed upon other objects such as boxes, barrels, scaffolds, or other unstable bases in an effort to obtain additional height.

4.3 Single Ladder

The Single Ladder is a non-self-supporting portable ladder that is non-adjustable in length, consisting of one section. It is intended for use by one person.

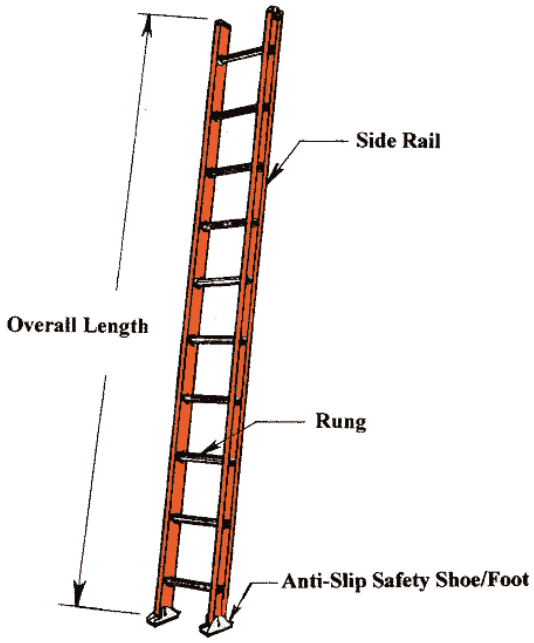


Figure 4.3 Single Ladder

4.3.1 Proper Use

a) In order to prevent tipping the ladder over sideways due to over-reaching, the user must climb or work with the body near the middle of the rungs.
b) Never attempt to move the ladder without first descending, relocating the ladder, and then re-climbing.
c) Do not attempt to mount the ladder from the side or step from one ladder to another unless the ladder is secured against sideways motion.
d) Single Ladders should be erected as close to a pitch as possible for optimum resistance against the bottom of the ladder sliding out, strength of the ladder, and balance of the climber. A simple rule for setting-up the ladder at the proper angle is to place the base a distance from the wall or upper support equal to one-quarter of the length of the ladder side rails.
e) When ascending or descending the ladder, always face the ladder and maintain a firm hand hold. Do not attempt to carry other objects in your hand(s) while climbing.
f) A Single Ladder must never be placed upon other objects such as boxes, barrels, scaffolds, or other unstable bases in an effort to obtain additional height.
g) The top of a Single Ladder must be placed with the two side rails equally supported unless the ladder is equipped with a single-support attachment for situations such a building corner.
h) Single Ladders must not be tied or fastened together to provide a longer length.

4.4 Extension Ladders

The Extension Ladder is a non-self-supporting portable ladder that is adjustable in length. It consists of two or more sections that travel in guides or brackets so arranged so as to permit length adjustment. It is intended for use by one person.

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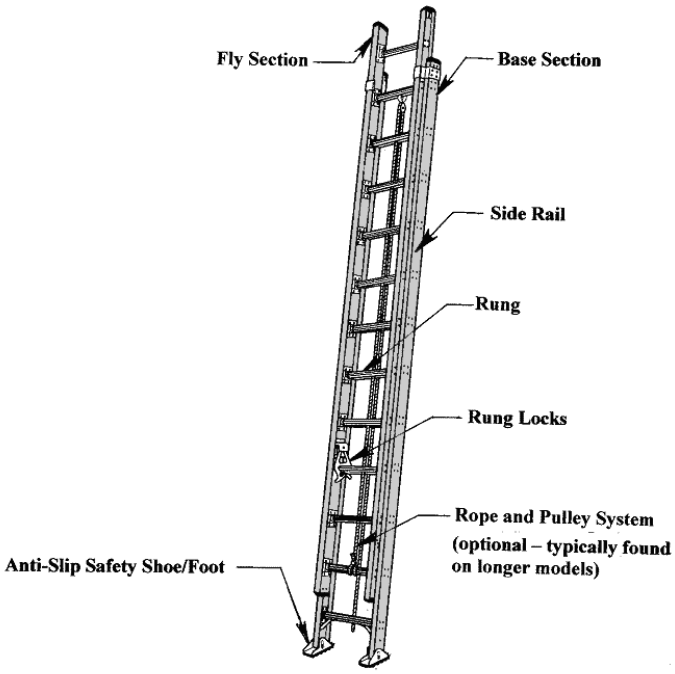


Figure 4.4 Extension Ladder

4.4.1 Proper Use

a) When ascending or descending the ladder, always face the ladder and maintain a firm hand hold. Do not attempt to carry other objects in your hand(s) while climbing.
b) An Extension Ladder must never be placed upon other objects such as boxes, barrels, scaffolds, or other unstable bases in an effort to obtain additional height.
c) The user must avoid setting-up an Extension Ladder upside-down. That is, with the Fly Section at the bottom and the Base Section at the top with the Rung Locks engaged.
d) The top of an Extension Ladder must be placed with the two side rails equally supported unless the ladder is equipped with a single-support attachment for situations such as a building corner.
e) Extension Ladders or the ladder sections must not be tied or fastened together to provide a longer length unless specifically designed with such facilities.

4.5 Job- made Wooden Ladders

Job-make wooden ladders are custom-made to fit specific job situations during construction operations. Their primary purpose is to provide access to or egress from a work area. They are

not intended to serve as a workstation. They are temporary in nature and serve only until a particular phase of work is completed or until permanent stairways or Fixed Ladders are ready for use (see Fig. 4.5). They are not to exceed 24-feet (8 meters) in working length. In the event the required ladder length exceeds 24-feet (8 meters), then two or more separate Job-Made Ladders are to be used in conjunction with platforms that are protected with railings.

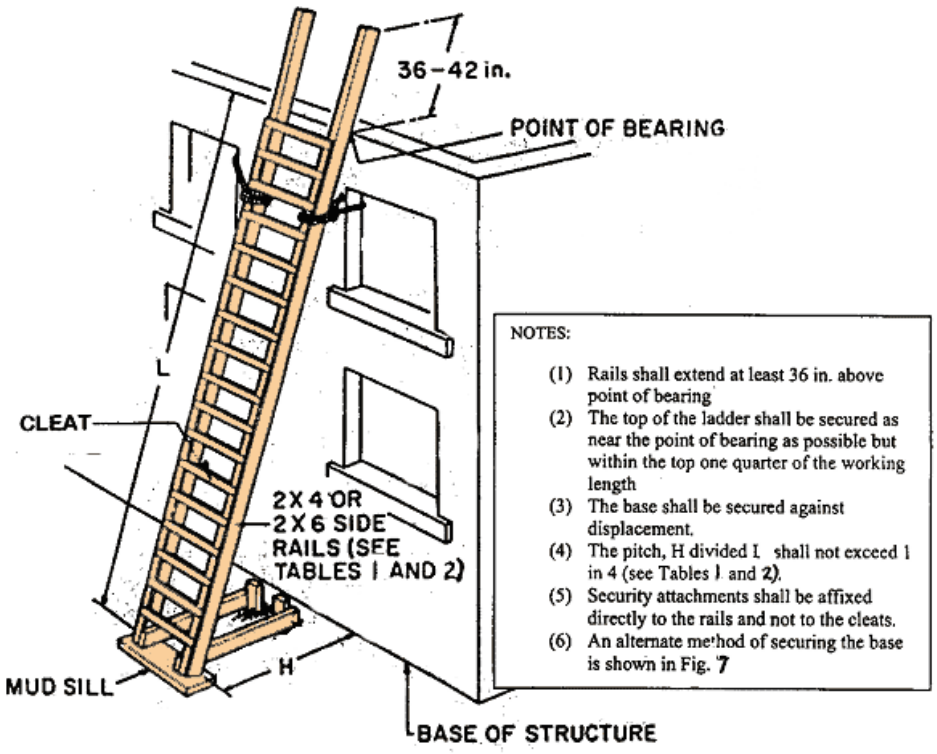


Figure 4.5 Single- Cleat Job-Made Ladder

4.5.1 Proper Use

a) Wear clean slip-resistant shoes.
b) Cleats, gripping surfaces and platforms must be kept free of oil, grease or slippery materials.
c) Only one person at a time is permitted on a Single-cleat Ladder
d) Never climb more than one cleat at a time.
e) Climbers must always step through, not around, the rail extensions at the top of the ladder.

4.6 Scaffoldings

4.6.1 General requirements for all scaffolds

a) All scaffoldings shall be designed in such a way that it is safe against falling, breaking and sway and get approval.

b) The employer shall provide safe means of access for each employee erecting or dismantling a scaffold where the provision of safe access is feasible and does not create a greater hazard. The employer shall have a competent person to determine whether it is feasible or would pose a greater hazard to provide, and have employees use a safe means of access. This determination shall be based on site conditions and the type of scaffold being erected or dismantled.

c) The vertical supports of scaffolds shall rest on a firm foundation or sills.

d) All scaffolds above 3 meters high above ground shall be equipped with a guardrail not less than 1 meter height and an intermediate rail.

e) Scaffolding shall be erected plumb line, and level, and all connections shall be securely fastened.

f) The width of work platforms on scaffolds shall be not less than 40 cm.

g) Materials only for current use shall be kept on scaffolds.

h) Safe means of access (ladder or equivalent) shall be provided to all working levels of the scaffolding.

i) Overhead protection shall be provided for workers on a scaffold exposed to overhead hazards.

j) Employees shall not work on scaffolds during storms or high winds.

k) Tools, materials, and debris shall not be allowed to accumulate on scaffolds.

l) Scaffolds shall be secured to permanent structures, through use of anchor bolts or other equivalent means. Window cleaners' anchor bolts shall not be used.

m) Buildings with curtain walls shall be provided with facilities that support suspension scaffolds.

n) Scaffolding safety report need be prepared every week containing inspection results on: connections; anchorage; and comments from users.

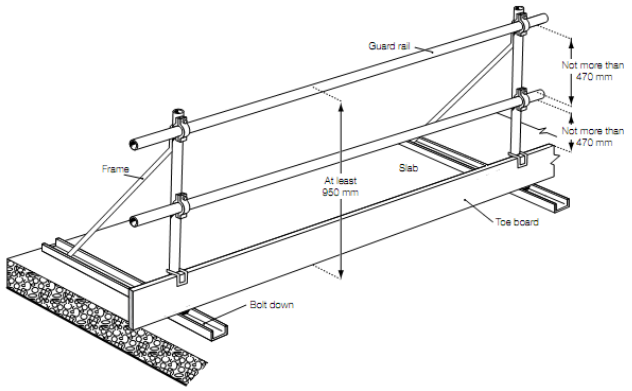


Figure 4.6: Guard rail and Toe Board

4.6.2 General Requirements for Wood Pole Scaffolds

a) Scaffold poles shall bear on a foundation of sufficient size and strength to spread the load from the poles over a sufficient area to prevent settlement.

b) All poles shall be set plumb.

c) All horizontal member shall be set level.

d) Timber used for scaffolds shall be unused and be of a grade suitable for structural purposes and shall be inspected and tested for defects before use;

e) Where wood poles are spliced, the ends shall be squared and the upper section shall rest squarely on the lower section.

f) Wood splice plates shall be provided on at least two adjacent sides and shall not be less than 4 feet 0 (1.2 meters) in length, overlapping the abutted ends equally, and have the same width and not less than the cross-sectional area of the pole.

g) All pole scaffolds shall be securely guyed or tied to the building or structure. Where the height or length exceeds 25 feet (8 meters), the scaffold shall be secured at intervals not greater than 25 feet (8 meters) vertically and horizontally.

h) Diagonal bracing shall be provided to prevent the poles from moving in a direction parallel with the wall of the building, or from buckling.

i) Cross bracing shall be provided between the inner and outer sets of poles in independent pole scaffolds. The free ends of pole scaffolds shall be cross braced.

j) Full diagonal face bracing shall be erected across the entire face of pole scaffolds in both directions. The braces shall be spliced at the poles.

k) Scaffold planks shall:

- be not less than 5 cm in thickness;
- extend not less than 15 cm not more than 30 cm beyond the supporting members;
- be supported at intervals not exceeding 2 meters;
- be of uniform thickness in adjoining planks;

l) Where planking is lapped, each plank shall lap its end supports at least 12 inches (30 cm). Where the ends of planks butt each other to form a flush floor, the butt joint shall be at the centerline of a pole. The abutted ends shall rest on separate bearers. Intermediate beams shall be provided where necessary to prevent

dislodgment of planks due to deflection, and the ends shall be nailed or cleated to prevent their dislodgment.

m) When a scaffold turns a corner, the platform planks shall be laid to prevent tipping. The planks that meet the corner putlog at an angle shall be laid first, extending over the diagonally placed putlog far enough to have a good safe bearing, but not far enough to involve any danger from tipping. The planking running in the opposite direction at right angles shall be laid so as to extend over and rest on the first layer of planking.

n) When moving platforms to the next level, the old platform shall be left undisturbed until the new putlogs or bearers have been set in place, ready to receive the platform planks.

o) Guardrails not less than 36 inches (90 cm) or more than 42 inches (105 cm) high, with a mid-rail, when required, and toe boards, shall be installed at all open sides on all scaffolds more than 10 feet (3 meters) above the ground or floor. Toe boards shall be a minimum of 4 inches (10 cm) in height.

p) All wood pole scaffolds over 60 feet (20 meters) in height shall be designed by a competent person engineer and constructed and erected in accordance with such design. A copy of the typical drawings and specifications shall be made available to the employer and for inspection purposes.

q) A damaged or weakened scaffolds shall not be used until it has been effectively repaired or strengthened.

r) Scaffolding expected to be used for one year or longer period need be constructed with steel or equivalent material.

s) Timber scaffoldings can only serve for a period of one year.

4.6.3 General Requirements for Form Scaffolds

a) Form scaffolds shall be constructed of wood or other suitable materials, such as steel of known strength characteristics. All scaffolds shall be designed and erected with a minimum safety factor of 4, computed on the basis of the maximum rated load.
b) Scaffold planks shall be either nailed or bolted to the ledgers or of such length that they overlap the ledgers at least 6 inches (15 cm). Unsupported projecting ends of scaffolding planks shall be limited to a maximum overhang of 12 inches (30 cm).
c) Wooden bracket form scaffolds shall be an integral part of the form panel.
d) Guardrails and toe boards shall be installed on all open sides and ends of platforms and scaffolding over 10 feet (3 meters) above floor or ground. Guardrails shall be made of lumber approximately 42 inches (105 meters) high, supported at intervals not to exceed 8 feet (2.5 meters). Toe boards shall extend not less than 4 inches (10 cm) above the scaffold plank.

4.6.4 General Requirements for Metal Bracket Form Scaffolds

a) Metal brackets or scaffold jacks which are an integral part of the form shall be securely bolted or welded to the form. Folding type brackets shall be either bolted or secured with a locking-type pin when extended for use.
b) "Clip-on" or "hook-over" brackets may be used, provided the form walers are bolted to the form or secured by snap ties or shear-bolt extending through the form and securely anchored.
c) Metal brackets shall be spaced not more than 8 feet (20 cm) on centers.
d) Scaffold planks shall be either bolted to the metal brackets or of such length that they overlap the brackets at each end by at least

6 inches (15 cm). Unsupported projecting ends of scaffold planks shall be limited to a maximum overhang of 12 inches (30 cm).

e) Metal bracket form scaffolds shall be equipped with wood guardrails, intermediate rails, toe boards, and scaffold planks.

4.6.5 General Requirements for Ladder – Jack Scaffolds

Ladder – Jack scaffold:

a) shall only be used for light duty operations such as maintenance and where the work period between changes to scaffold position is of short duration;

b) shall not be used at heights in excess of 6.0 meter above ground;

c) shall not have more than two workers on the scaffold at any time;

4.6.6 General Requirements for Suspension Scaffolds

a) All suspension scaffold support devices, such as outrigger beams, cornice hooks, parapet clamps, and similar devices, shall rest on surfaces capable of supporting at least 4 times the load imposed on them by the scaffold operating at the rated load of the hoist (or at least 1.5 times the load imposed on them by the scaffold at the stall capacity of the hoist, whichever is greater).

b) Suspension Scaffold shall be designed with a support for guardrail, intermediate rail, and toe board.

c) Suspension scaffold outrigger beams, when used, shall be made of structural metal or equivalent strength material, and shall be restrained to prevent movement.

d) The inboard ends of suspension scaffold outrigger beams shall be stabilized by bolts or other direct connections to the floor or roof deck, or they shall have their inboard ends stabilized by counterweights, except masons' multi-point adjustable

suspension scaffold outrigger beams shall not be stabilized by counterweights.

e) Before the scaffold is used, direct connections shall be evaluated by a competent person who shall confirm, based on the evaluation, that the supporting surfaces are capable of supporting the loads to be imposed. In addition, masons' multi-point adjustable suspension scaffold connections shall be designed by a competent person experienced in such scaffold design.

f) Counterweights shall be made of non-flowable material. Sand, gravel and similar materials that can be easily dislocated shall not be used as counterweights.

g) Counterweights shall be secured by mechanical means to the outrigger beams to prevent accidental displacement.

h) Counterweights shall not be removed from an outrigger beam until the scaffold is disassembled.

i) Outrigger beams which are not stabilized by bolts or other direct connections to the floor or roof deck shall be secured by tiebacks.

j) Tiebacks shall be equivalent in strength to the suspension ropes.

k) Outrigger beams shall be placed perpendicular to its bearing support (usually the face of the building or structure). However, where the employer can demonstrate that it is not possible to place an outrigger beam perpendicular to the face of the building or structure because of obstructions that cannot be moved, the outrigger beam may be placed at some other angle, provided opposing angle tiebacks are used.

l) Tiebacks shall be secured to a structurally sound anchorage on the building or structure. Sound anchorages include structural members, but do not include standpipes, vents, other piping systems, or electrical conduit.

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m) Tiebacks shall be installed perpendicular to the face of the building or structure, or opposing angle tiebacks shall be installed. Single tiebacks installed at an angle are prohibited.

n) Suspension scaffold outrigger beams shall be:

- Provided with stop bolts or shackles at both ends;
- Securely fastened together with the flanges turned out when channel iron beams are used in place of I-beams;
- Installed with all bearing supports perpendicular to the beam center line;
- Set and maintained with the web in a vertical position; and

o) When an outrigger beam is used, the shackle or clevis with which the rope is attached to the outrigger beam shall be placed directly over the center line of the stirrup.

p) Suspension scaffold support devices such as cornice hooks, roof hooks, roof irons, parapet clamps, or similar devices shall be:

- Made of steel, wrought iron, or materials of equivalent strength;
- Supported by bearing blocks; and
- Secured against movement by tiebacks installed at right angles to the face of the building or structure, or opposing angle tiebacks shall be installed and secured to a structurally sound point of anchorage on the building or structure. Sound points of anchorage include structural members, but do not include standpipes, vents, other piping systems, or electrical conduit.

q) Tiebacks shall be equivalent in strength to the hoisting rope.

r) When winding drum hoists are used on a suspension scaffold, they shall contain not less than four wraps of the suspension rope at the lowest point of scaffold travel. When other types of hoists are used, the suspension ropes shall be long enough to allow the scaffold to be lowered to the level below without the rope end passing through the hoist, or the rope end shall be configured or

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provided with means to prevent the end from passing through the hoist.

s) The use of repaired wire rope as suspension rope is prohibited.

t) Wire suspension ropes shall not be joined together except through the use of eye splice thimbles connected with shackles or cover plates and bolts.

u) The load end of wire suspension ropes shall be equipped with proper size thimbles and secured by eye splicing or equivalent means.

v) Ropes shall be inspected for defects by a competent person prior to each work shift and after every occurrence which could affect a rope's integrity. Ropes shall be replaced if any of the following conditions exist:

- Any physical damage which impairs the function and strength of the rope.
- Kinks that might impair the tracking or wrapping of rope around the drum(s) or sheave(s).
- Abrasion, corrosion, scrubbing, flattening or pining causing loss of more than one-third of the original diameter of the outside wires.
- Heat damage caused by a torch or any damage caused by contact with electrical wires.
- Evidence that the secondary brake has been activated during an over speed condition and has engaged the suspension rope.

w) When wire rope clips are used on suspension scaffolds, there shall be a minimum of 3 wire rope clips installed, with the clips a minimum of 6 rope diameters apart;

x) U-bolt clips shall not be used at the point of suspension for any scaffold hoist;

y) Gasoline-powered equipment and hoists shall not be used on suspension scaffolds.

z) Gears and brakes of power-operated hoists used on suspension scaffolds shall be enclosed.

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aa) In addition to the normal operating brake, suspension scaffold power-operated hoists and manually operated hoists shall have a braking device or locking pawl which engages automatically when a hoist makes either of the following uncontrolled movements: an instantaneous change in momentum or an accelerated over speed.

bb) Manually operated hoists shall require a positive crank force to descend.

cc) Two-point and multi-point suspension scaffolds shall be tied or otherwise secured to prevent them from swaying, as determined to be necessary based on an evaluation by a competent person. Window cleaners' anchors shall not be used for this purpose.

dd) When scaffold platforms are more than 2 feet (0.6 m) above or below a point of access, portable ladders, hook-on ladders, attachable ladders, stair towers (scaffold stairways/towers), stairway-type ladders (such as ladder stands), ramps, walkways, integral prefabricated scaffold access, or direct access from another scaffold, structure, personnel hoist, or similar surface shall be used.

ee) Hook-on and attachable ladders shall be positioned so that their bottom rung is not more than 24 inches (61 cm) above the scaffold supporting level;

ff) When hook-on and attachable ladders are used on a supported scaffold more than 35 feet (10.7 m) high, they shall have rest platforms at 35-foot (10.7 m) maximum vertical intervals.

gg) Hook-on and attachable ladders shall be specifically designed for use with the type of scaffold used;

hh) Hook-on and attachable ladders shall have a minimum rung length of 11 1/2 inches (30 cm); and

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ii) Hook-on and attachable ladders shall have uniformly spaced rungs with a maximum spacing between rungs of 16 3/4 inches (42 cm).

jj) Stair towers (scaffold stairway/towers) shall be positioned such that their bottom step is not more than 24 inches (60 cm.) above the scaffold supporting level.

kk) A stair rail consisting of a top rail and a mid rail shall be provided on each side of each scaffold stairway.

ll) The top rail of each stair rail system shall also be capable of serving as a handrail, unless a separate handrail is provided.

mm) Handrails, and top rails that serve as handrails, shall provide an adequate handhold for employees grasping them to avoid falling.

nn) Stair rail systems and handrails shall be surfaced to prevent injury to employees from punctures or lacerations, and to prevent snagging of clothing.

oo) Handrails, and top rails that are used as handrails, shall be at least 3 inches (8 cm) from other objects.

pp) Stair rails shall be not less than 28 inches (70 cm) nor more than 37 inches (94 cm) from the upper surface of the stair rail to the surface of the tread, in line with the face of the riser at the forward edge of the tread.

qq) A landing platform at least 18 inches (45 cm) wide by at least 18 inches (45 cm) long shall be provided at each level.

rr) Each scaffold stairway shall be at least 18 inches (45 cm) wide between stair rails.

ss) Treads and landings shall have slip-resistant surfaces.

tt) Stairways shall be installed between 40 degrees and 60 degrees from the horizontal.

uu) Riser height shall be uniform, within 1/4 inch, (0.6 cm) for each flight of stairs. Greater variations in riser height are allowed for the

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top and bottom steps of the entire system, not for each flight of stairs.

vv) Tread depth shall be uniform, within 1/4 inch (0.6 cm), for each flight of stairs.

4.6.7 General Requirements for Swinging Scaffolds (Two-Point Suspension)

a) Two-point suspension scaffold platforms shall be not less than 20 inches nor more than 36 inches wide overall. The platform shall be securely fastened to the hangers by U-bolts or by other equivalent means.

b) Two-point suspension scaffolds shall be suspended by wire, synthetic, or fiber ropes capable of supporting at least 6 times the rated load. All other components shall be capable of supporting at least four times the rated load.

c) All wire ropes, fiber and synthetic ropes, slings, hangers, platforms, and other supporting parts shall be inspected before every installation. Periodic inspections shall be made while the scaffold is in use.

d) The platform of every two-point suspension scaffold shall be of "Plank-type" platform composed of not less than nominal 2- x 10-inch (5- x 25 cm) un-spliced planks, properly cleated together on the underside, starting 6 inches (15 cm) from each end. Intervals in between shall not exceed 4 feet (1.2 meters). The plank-type platform shall not extend beyond the hangers more than 12 inches (30 cm). A bar or other effective means shall be securely fastened to the platform at each end to prevent its slipping off the hanger. The span between hangers for plank-type platforms shall not exceed 8 feet (2.5 meters).

e) Guardrails approximately 42 inches (105 cm) high, with a mid-rail, and toe boards, shall be installed at all open sides and ends on all scaffolds more than 10 feet above the ground or floor. Toe boards shall be a minimum of 4 inches (10 cm) in height.

4.6.8 General Requirements for Single-Point Adjustable Suspension Scaffolds

a) The power units may be either electrically or air motor driven.
b) All power-operated gears and brakes shall be enclosed.
c) In addition to the normal operating brake, all power-driven units shall have an emergency brake which engages automatically when the normal speed of descent is exceeded.
d) The supporting cable shall be vertical for its entire length, and the basket shall not be swayed nor the cable fixed to any intermediate points to change the original path of travel.
e) Guards, mid rails, and toe boards shall completely enclose the cage or basket. Guardrails shall be approximately 42 inches (105 cm) above the platform. Mid rails shall be installed equidistant between the guardrail and the platform. Toe boards shall be a minimum of 4 inches (10 cm) in height.

4.7 Use

4.7.1 Scaffolds and scaffold components shall not be loaded in excess of their maximum intended loads or rated capacities, whichever is less.

4.7.2 The use of shore or lean-to scaffolds is prohibited.

4.7.3 Scaffolds and scaffold components shall be inspected for visible defects by a competent person before each work shift, and after any occurrence which could affect a scaffold's structural integrity.

4.7.4 Ladders shall not be used on scaffolds to increase the working level height of employees, except on large area scaffolds where employers have satisfied the following criteria:

a. When the ladder is placed against a structure which is not a part of the scaffold, the scaffold shall be secured against the sideways thrust exerted by the ladder;

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b. The platform units shall be secured to the scaffold to prevent their movement;
c. The ladder legs shall be on the same platform or other means shall be provided to stabilize the ladder against unequal platform deflection, and
d. The ladder legs shall be secured to prevent them from slipping or being pushed off the platform.

4.8 Clearance

The clearance between scaffolds and power lines shall be as depicted in Table 4.6.6. Scaffolds shall not be erected, used, dismantled, altered, or moved such that they or any conductive material handled on them might come closer to exposed and energized power lines than the dimensions indicated in Table 4.6.6.

Table 4.6.6: Clearance Distances of Scaffoldings from Power Lines

Insulated Lines		
Voltage	**Minimum Distance**	**Alternatives**
Less than 300 Volts	0.9 meters	Two times the length of the line insulator, but never less than 3.1 meter
300 Volts to 50 kV	3.1 meters	
Moe than 50 kV	3.1 meters plus 1 cm for each 1 kV over 50 kV	
Un-insulated Lines		
Less than 50 kV	3.1 meters	Two times the length of the line insulator, but never less than 3.1 meter
More than 50 kV	3.1 meters plus 1 cm for each 1 kV over 50 kV	

Note: Scaffolds and materials may be closer to power lines than specified above where such clearance is necessary for performance of work, and only after the utility company, or electrical system operator, has been notified of the need to work closer and the utility company, or electrical system operator, has de-energized the lines, relocated the lines, or installed protective coverings to prevent accidental contact with the lines.

5. Lifting Appliances

5.1 General Requirements to Hoists

5.1.1 Entrance to hoist shaft ways shall be protected by a barrier placed outside the line of the shaft way.

5.1.2 When entrances to hoist shaft ways are exposed to hazards from falling materials, a substantial covering shall be provided.

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5.1.3 All hoist shaft ways shall be enclosed to a height at least 1.8 meter at each landing on all sides used for loading or unloading.

5.1.4 Hoist platforms shall be substantially constructed and be equipped with guardrails and toe-board on all sides not used for loading and unloading.

5.1.5 When hoisting equipment is of a type that control dogs are used on cable drums, the dogs shall be visible and accessible to the operator and the equipment shall be provided with an efficient brake system.

5.1.6 Runways to hoist shall have:

a) A substantial flooring matching the full width of the runways;

b) each side of runways shall be formed of solid boarding or have a curb;

c) Guard rails, if situated more than 1.2 meters above ground;

5.1.7 Daily inspection shall be made of hoists and all attached equipments;

5.2 Material hoists

5.2.1 Overhead protective covering of 2 inches (5 cm) planking, ¾ inch (2 cm) plywood, or other solid material of equivalent strength, shall be provided on the top of every material hoist cage or platform.

5.2.2 The operator's station of a hoisting machine shall be provided with overhead protection equivalent to tight planking not less than 2 inches (5 cm) thick. The support for the overhead protection shall be of equal strength.

5.2.3 No person shall be allowed to ride on material hoists except for the purposes of inspection and maintenance.

5.3 **Personnel Hoists.**

5.3.1 Cars shall be permanently enclosed on all sides and the top, except sides used for entrance and exit which have car gates or doors.

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5.3.2 Overhead protective covering of 2 inches (5 cm) planking, ¾ inch (2 cm) plywood or other solid material or equivalent strength shall be provided on the top of every personnel hoist.

5.3.3 Safeties shall be capable of stopping and holding the car and rated load when traveling at governor tripping speed.

5.3.4 Cars shall be provided with a capacity and data plate secured in a conspicuous place on the car or crosshead.

5.3.5 Normal and final terminal stopping devices shall be provided.

5.3.6 The minimum number of hoisting ropes used shall be three for traction hoists and two for drum-type hoists.

5.3.7 Following assembly and erection of hoists, and before being put in service, an inspection and test of all functions and safety devices shall be made under the supervision of a competent person. A similar inspection and test is required following major alteration of an existing installation. All hoists shall be inspected and tested at not more than 3-month intervals. The employer shall prepare a certification record which includes the date the inspection and test of all functions and safety devices was performed; the signature of the person who performed the inspection and test; and a serial number, or other identifier, for the hoist that was inspected and tested. The most recent certification record shall be maintained on file.

5.3.8 When a hoist tower is not enclosed, the hoist platform or car shall be totally enclosed (caged) on all sides for the full height between the floor and the overhead protective covering. The hoist platform enclosure shall include the required gates for loading and unloading.

5.3.9 Wire rope shall be taken out of service when any of the following conditions exist:

a. Wear of one-third the original diameter of outside individual wires. Kinking, crushing, bird caging, or any other damage resulting in distortion of the rope structure;

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b. Evidence of any heat damage from any cause;
c. Reductions from nominal diameter of more than three-sixty-fourths inch (1.2 mm) for diameters to and including three-fourths inch (1.9 cm), one-sixteenth inch (1.6 mm) for diameters seven-eights inch (2.2 cm) to 1 1/8 inches (2.85 cm) inclusive, three-thirty-seconds inch (2.4 mm) for diameters 1 1/4 to 1 1/2 inches (3.2 to 3.8 cm) inclusive;
d. In standing ropes, more than two broken wires in one lay in sections beyond end connections or more than one broken wire at an end connection.

5.4 Tower Crane

5.4.1 Footing and Anchorage design shall be submitted for approval to commencing construction.

5.4.2 Crane safety report need be prepared every day on the following items:

a) Foundation;
b) Plumb line alignment;
c) Cable;
d) Hooks;
e) Overload indicator;
f) Connections; and
g) Anchorage.

6. Work at Heights and Roof Work

6.1 Working at Height

6.1.1 When workers are engaged in working at height and if the height of the fall would exceed 2 meters above a floor, safety devices such as cradles with toe board or other equivalent protection devices shall be used.

6.1.2 Persons working at elevated workplaces and other work places more than 2 meters in height should be protected by means of safety belts or other equivalent protection devices;

6.1.3 Construction sites in built-up areas and/or alongside roads should be barricaded and notice boards informing the public about the activities

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the possible danger and expected completion time should be posted at suitable locations;

6.1.4 If the use of such equipment is impossible because of the nature of the work, workers shall be provided with a safety net or equivalent to be affixed with safety cables or ropes, or other anchoring safety methods shall be used in order to ensure safety.

6.1.5 Every floor opening into which a worker may fall or slip shall be protected by a guardrail;

6.1.6 Construction sheds and tool boxes shall be so located as not expose workers to the danger of falling walls and other falling objects.

6.1.7 A cradle which is placed in order to prevent falls from a height shall have a handrail (with a height of 1 meter), a toe board and an intermediate handrail at a height of 0.5 meters.

6.1.8 Cradles shall be placed to the free sides of work platforms or traffic routes where the height of a fall would be at least 2 meters;

6.1.9 All guardrails for the fencing of floor openings, wall openings, gangways, elevated workplaces and other similar places should:

a) Consist of two rails, supporting upright pole or post and a toe-board to prevent persons slipping or objects fallings;

b) be at least 1 meter above platform levels as regards guard-rails.

6.1.10 Elevated work places should be provided with safe means of access and egress such as stairs, ramps or ladders. The save means of access (stairs, ramps or ladders) used for elevated work places should be of adequate strength to withstand safety of the loads they will have to carry;

6.2 Roof Work

6.2.1 Roof work shall be undertaken by workers who are physically and psychologically fit and have the necessary knowledge and experience for such work;

6.2.2 Work on roofs shall not be carried out in weather condition such as strong wind and heavy rain that threaten the safety of workers;

6.2.3 Crawling boards, walkways and roof ladders shall be securely fastened to a firm structure;

6.2.4 For a person to kneel or crouch near the edge of the roof an intermediate rail shall be provided, safety belt or other equivalent protection devices shall be provided;

6.2.5 Roofing brackets shall fit the slope of the roof and be securely supported;

6.2.6 A simple barrier consisting of crossed scaffold tubes may be provided on a large roof where work does not have to be carried out at or near the edge;

6.2.7 When work is being carried out on a slopping roofs, sufficient and suitable crawling boards or roof ladders should be provided and firmly secured in position as soon as it is practicable;

6.2.8 Buildings with fragile roofs shall have a warning notice prominently displayed at the approaches to the roof;

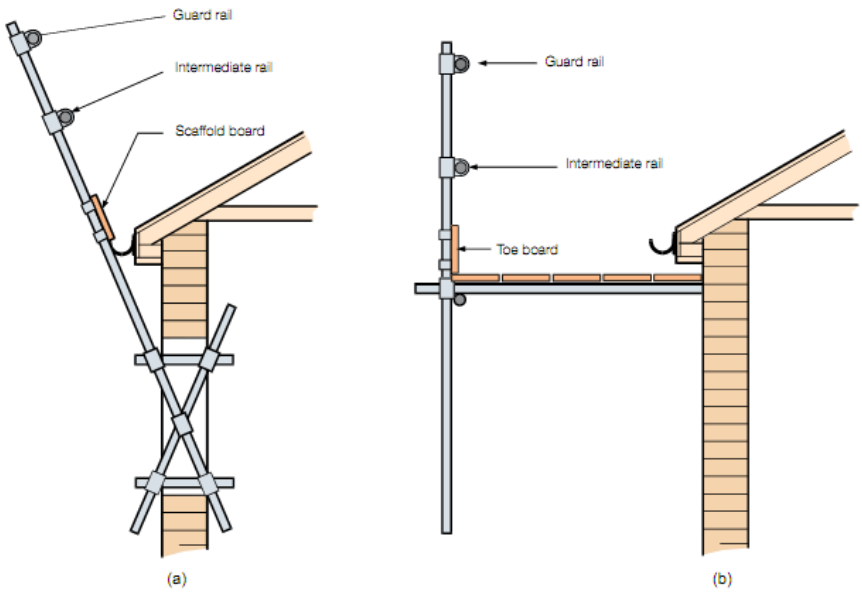


Figure 6.2 : Typical Sloping Roof Edge Protection

6.3 Fall Protection

6.3.1 Guardrail System

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

a) Top edge height of top rails, or equivalent guardrail system members, shall be 42 inches (1.05 m) plus or minus 3 inches (8 cm) above the walking/working level.

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

b) Mid rails, shall be installed between the top edge of the guardrail system and the walking/working surface when there is no wall or parapet wall at least 21 inches (50 cm) high.

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

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

e) Steel banding and plastic banding shall not be used as top rails or mid-rails.

f) If wire rope is used for top rails, it shall be flagged at not more than 6 feet (2 meters) intervals with high-visibility material.

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

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

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

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

6.3.2 Fall Arrest System

Personal fall arrest systems and their use shall comply with the standards provided by Ethiopian Standards Agency.

6.3.3 Protection from Falling Objects

" Falling object protection shall comply with the following provisions:

a) The building blocks should be covered so that dust and other material will not spread in to the surrounding;

b) Dumping of construction by products should be sent through shuts. No free dumping is allowed;

c) Toe boards, when used as falling object protection, shall be erected along the edge of the overhead walking/working surface for a distance sufficient to protect employees below;

d) Toe boards shall be a minimum of 3 1/2 inches (9 cm) in vertical height from their top edge to the level of the walking/working surface. They shall have not more than 1/4 inch (0.6 cm) clearance above the walking/working surface;

e) During the performance of overhand bricklaying and related work no materials or equipment except masonry and mortar shall be stored within 4 feet (1.2 m) of the working edge;

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

g) During the performance of roofing work materials and equipment shall not be stored within 6 feet (1.8 m) of a roof edge unless guardrails are erected at the edge;

h) If the maneuvering area of a crane exceeds beyond the working area and protrudes to areas of high traffic, a shed shall be provided for collective protection.

7. Excavation

7.1 Before commencing excavation work the following pre-excavation requirements should be recognized:

a) Excavation works with power tools or equipments in an area likely to have underground conduits, cables or pipelines, the location of the service facilities shall be accurately determined;

b) Trees, boulders or other matters located within 2 meters of the area to be excavated shall be removed before commencing excavation work;

7.2 The following points should be properly studied before the work of excavation begins on site:

a) The nature of the ground should be verified by a competent person or organization;

b) Proper safety plan should be submitted and approved to make sure that the excavation will not affect adjoining buildings, structures or roadways;

c) The concerned body should check and verify the position of all the public utilities such as water pipes, underground sewers and electrical conductors that may cause danger during work;

7.3 A worker shall not be permitted or required to enter an excavation over 1.5 meters in depth unless:

a) the sides of the excavation are firm or are sloped to safe angle;

b) the sides have been secured by the use of sheet piling, shoring or bracing;

c) the workers are protected by other effective means.

7.4 If equipment or other heavy objects are located or operated close to the edge of excavation or if excavations are adjacent to or abutting buildings or other structures or a hazard is created by vibration from nearby equipment or from passing vehicles traffic , the added loads shall be considered in the design of the support system;

7.5 When workers are required to enter excavations over 1.5 meters in depth, a ladder shall be provided in the immediate area where workers are employed and the ladder shall extend from the bottom of the excavation to the least 90 cm above the top of the excavation;

7.6 With the exceptions of borrow pits, excavations of depth higher than 3.0 meters shall be guarded by substantial railings. Shallower excavations shall be marked along their perimeter by reflective ropes;

7.7 Adequate measures should be taken to prevent the formation of dusts or to suppress as practicable as possible, such as by sprinkling water at regular intervals in excavation works;

7.8 A worker shall not allow excavated materials to remain within 1.2 meters of the edge of a trench typed excavation, not within 1.5 meters of a pit-typed excavation;

8. Structural Frames, Formworks and Concrete Work

8.1 Steel and Prefabricated Structures

8.1.1 The structural steel or prefabricated parts should be lifted by methods or appliances that prevent them from spinning accidentally;

8.1.2 When the method of erection does not permit the provision of other means of protection against falls of persons, the work places should be protected by guard-rails, and when appropriate by toe-boards;

8.1.3 Structural steel parts that are to be erected at a great height should as far as practicable be assembled on the ground;

8.1.4 When structural steel or prefabricated parts are being erected, a sufficiently extended area underneath the work place should be barricaded or guarded;

8.1.5 Steel trusses that are being erected should be adequately shored, braced or guyed until they are permanently secured in position;

8.2 Form Works

8.2.1 All adjustable shoring should be locked in position when adjusted,.

8.2.2 Shoring should be left in place until the concrete has acquired sufficient strength to support safely not only its own weight but also any imposed loads.

8.2.3 Shoring should not be removed until authorization has been given by a competent person.

8.2.4 when shuttering is being taken down, to prevent danger from falling parts the shuttering should as far as practicable be taken down whole, or else remaining parts should be supported.

8.2.5 To prevent danger Mechanical, hydraulic or pneumatic lifting appliances for handling forms should be provided with automatic holding devices if the power of the lifting mechanism fails.

9. Demolishing Works

9.1 General

9.1.1 Prior to permitting employees to start demolition operations, an engineering survey and plan shall be made, by a competent person, of the structure to determine the condition of the framing, floors, and walls, and possibility of unplanned collapse of any portion of the structure. Any adjacent structure where employees may be exposed shall also be similarly checked. The employer shall acquire approval of the plan as per the Ethiopian Building Proclamation.

9.1.2 It shall also be determined if any type of hazardous chemicals, gases, explosives, flammable materials, or similarly dangerous substances have been used in any pipes, tanks, or other equipment on the property.

9.1.3 When the presence of any such substances is apparent or suspected, testing and purging shall be performed and the hazard eliminated before demolition is started.

9.1.4 For demolition of buildings by explosives, the contractor submit special plan fulfilling approved international standards and inland security requirements for approval.

9.1.5 before the work of demolishing begins:

a) a building should be checked and it should be verified that it is vacant;

b) all electric, water, telephone and other service lines are shut off;

c) if it is necessary to maintain any electric power, water or other services during demolishing operations, they should be adequately protected against damage.

9.1.6 During demolition, continuing inspections shall be made as the work progresses to detect hazards resulting from weakened or deteriorated floors or walls, or loosened material.

9.1.7 Provisions for dust control shall include the use of water to keep material or debris sufficiently wet or other equivalent steps taken to prevent dust from rising.

9.1.8 Mechanical equipment shall not be used on floors or working surfaces unless a qualified person has determined that such floors or surfaces are of sufficient strength to support the imposed load.

9.1.9 When workers are to be exposed to demolishing procedures, glass and sash shall be removed before other demolishing is started, and demolition shall proceed in an orderly manner from top to bottom of the structure;

9.1.10 To protect the public, the danger zone round the building should be adequately fenced off and sign posted;

9.1.11 A fence 2 meters high should be erected enclosing the demolition operations and the access gates should be secured outside working hours;

9.1.12 Demolition activities should not be continued under climatic conditions such as high winds, which could cause the collapse of already weakened structures;

9.1.13 Foundation walls serving as retaining walls to support each or adjoining structures should not be demolished until the adjoining structure has been underpinned or braced, and the earth removed or supported by sheet piling or sheathing;

9.1.14 During demolition work, it is essential for the workers to use the necessary personal protection clothes and equipment;

9.1.15 When a building is being demolished, chutes shall be provided for the removal of brick or other loose debris and these chutes shall be enclosed;

9.1.16 Chutes shall not extend in unbroken line for more than two stories in elevation and gates or stops shall be placed at the bottom of each chute;

9.2 Demolition of Walls

9.2.1 Masonry walls or other sections of masonry shall not be permitted to fall or remain on the floors of the building in masses that exceed the safe carrying capacity of the floor.

9.2.2 Walls should be demolished story by story beginning at the roof and working downwards, unsupported walls should be left un-demolished.

9.2.3 Each story of exterior wall and floor construction shall be removed and dropped into the storage space before commencing the removal of exterior walls and floors in the story next below.

9.2.4 Sections of walls shall not be allowed to fall upon floors supported by wood joists or other floors unable to withstand such impact.

9.2.5 Before demolishing an interior or exterior wall which is within 3 meters of an opening, the opening shall be substantially planked over, unless all workers are removed from all floors below and access to the floors is prohibited and prevented;

9.2.6 Walls shall not be left standing in a dangerous or unstable conditions;

9.3 Demolition of Floors

9.3.1 Materials and rubbish shall be removed as far as practicable and not allowed to accumulate on floors or upon the ground immediately outside of the building;

9.3.2 When necessary to prevent danger, workers demolishing floors should be provided with planking or walkways on which to stand or move;

9.3.3 Opening through which material is dropped should be adequately fenced or barricaded to prevent danger

9.3.4 All works above each tier of floor beams should be completed before the safety of the tier supports is impaired;

9.4 Demolition of Steel Structure Works

9.4.1 A structural member which is being dismantled shall not be placed under stress other than its own weight, and the member shall be chained or lashed in place to prevent an uncontrolled swinging or dropping.

9.4.2 Dismantling of truss members shall be carried out in such a way that the truss does not collapse while workers are inside.

9.4.3 Steel construction should be demolished tier by tier and structural steel parts should be lowered and not dropped from a height.

10 Tools, Equipment, Plant and Machinery

10.1 Hand Tools

10.1.1 The cutting edges of cutting tools should be kept sharp and, when not in use and/or while being carried or transported, they should be kept in suitable places.

10.1.2 In areas where there is risk of electrical shock, only insulated or non-conducting should be used.

10.1.3 Care should be taken to ensure that non-sparkling tools are used near or in the presence of flammable or explosives dusts or vapors.

10.2 Electrical Tools and Electricity

10.2.1 All electrical tools should be earthed, unless they are all insulated or double insulated tools which do not require earthing.

10.2.2 All electrical tools should receive inspection and maintenance on a regular basis by a competent electrician, and complete records should be kept.

10.2.3 The laying and maintenance of electric cables and apparatus on construction sites shall be governed by electrical rules and standards applied at the national level.

10.3 Concrete Working Equipment

10.3.1 Concrete mixers should be protected by side railings to prevent workers from passing under the skip while it is raised.

10.3.2 While the drum of the concrete mixer is being cleaned, adequate precautions should be taken to protect the workers by locking switches open, removing fuses or otherwise cutting of the power.

10.3.3 Concrete buckets for use with cranes and aerial cable ways should be free as far as practicable from projections from which accumulations of concrete could fall. loaded concrete buckets should be guided into positions by appropriate means.

10.3.4 Concrete buckets positioned by crane aerial cable ways should be suspended by safety hooks. when concrete is being tipped from

buckets, workers should keep out of range of any kick-back due to concrete sticking to the bucket.

10.3.5 The winch of hoisting the bucket should be so placed that the operator can see the feeling, hoisting, emptying and lowering of the bucket. Where this is not practicable, a banks man should direct the operator.

11 Electrical Equipment and Installations

11.1 General

11.1.1 Power cables and other electrical installations shall be protected against mechanical injuries;

11.1.2 Electrical installations should be constructed and maintained so as to prevent danger of electric shock, fire and external explosions;

11.1.3 Electrical installation workers should use appropriate protective equipment such as insulated tools, insulating boots and gloves;

11.1.4 Electrical appliances and outlets should be clearly marked to indicate their purpose and voltage. If the layout of electrical installations can not be clearly distinguished, the circuit and appliance should be identified by labels or other means;

11.1.5 Electrical appliances and circuits carrying different voltages in the some installation should be clearly distinguished by conscription means such as colored marking;

11.1.6 Protection against excessive contact voltage in case of direct or indirect contact should be provided in all kinds of electrical installation. Protection may be afforded by:

a) complete insulation;

c) earthing of the neutral;

d) earthing of the normally dead parts,

e) circuit breakers;

f) enclosures using covers, protective means and housing which is made of incombustible materials; and

g) insulation control device;

11.1.7 arrangement should be made for the control of electrical installations by appliances that automatically cut off the current such as automatic circuit breakers, fuses or by suitable other means;

11.2 Electrical Equipment

11.2.1 Installation of electrical appliances such as switches, fuses, and circuit breakers should not be at places where there are explosives and flammable liquid or gases unless they are flameproof;

11.2.2 Equipments such as motors, distribution apparatus and switch gear should be protected against dripping or splashing water;

11.2.3 Electrical apparatus and circuits should be provided with suitable switchboard and switch gear to facilitate control;

11.2.4 Cover plates on electrical equipment and junction boxes should be kept in place at all times except during testing or repair;

11.2.5 Switch board and switch gear should be installed, located and guarded in the following manner:

a) The control means will be safety and readily accessible to authorized person and live parts will be inaccessible to unauthorized person;

b) Adequate clear space is provided between the top of the equipment and any ceiling having exposed combustible material;

c) Adequate working space is provided for manual operation where required;

d) Access to unauthorized person should be prohibited and a notice to this effect posted at the entrance;

12 Emergency Routes and Exiles

12.1 Emergency routes and exits, that are free from any obstruction and which lead as directly as possible to a safe area, shall be provided.

12.2 In the event of danger, it shall be possible for workers to evacuate all workplaces quickly and as safe as possible.

12.3 The number, distribution and dimension of emergency routes and exits should depend on the dimension and location of the construction site the work equipment used and the maximum number of workers that may be present.

12.4 The floor of work places shall not be slippery and have no dangerous holes or slopes.

13 Use of Personal Protective Clothing and Protective Equipment

13.1 Protective Clothing

13.1.1 Head, hand and foot protection appropriate to the type of exposure, shall be worn by workers on demolishing projects.

13.1.2 If work is performed in places in the vicinity of traffic, the worker shall wear a bright waistcoat or clothing and in the dark also a reflector-band.

13.1.3 In the construction site the contractor shall provide the following protective clothing:

a) Safety footwear shall be generally used on construction sites;

b) Water proof shoes shall be provided for workers working in muddy areas and concrete.

13.2 Protective Equipment

13.2.1 A protective helmet is mandatory on a building construction site;

13.2.2 Safety belts equipped with safety ropes shall be used while working on scaffolding, roofs and work platforms and in other places where falling from a height cannot be prevented by other safety measures;

13.2.3 If work is performed in the dark or underground, a reflex reflector-band shall be worn on clothing;

13.2.4 In the construction site the contractor shall provide the following protective clothing and safety equipments:

a) Protective breathing equipment for workers at work where dust may be produced from the activities;

b) Goggles, for workers where rays may be produced from the activities;

c) Foot wears of an appropriate type for workers exposed to injury from falling or crushing objects, hot, corrosive or poisonous substances, sharp – edged tools such as axes nails, abnormal wet or slippery surfaces;

d) Safety belts where it is not practicable to provide safe working platform;

e) Suitable gloves for workers exposed to hot, corrosive or toxic substances or hand or arm injuries from or rough point edges or surface of objects;

g) Ear protectors where it is not practicable to reduce noise exposure to below prescribed levels;

13.2.5 All protective clothing and equipment shall fulfill the standards set by Ethiopian Standards Authority.

SECTION FOUR

Handling of Hazards

14 Health Hazards, First aid, Medical Care and Welfare

14.1 First Aid

14.1.1 Employers of a construction work should be required to provide equipment and facilities enabling first aid to be rendered to their employer when they are injured or become ill at work;

14.1.2 Every working area should be provided with appropriate set up for emergencies such as first aid, first aid personnel and equipment, means of communication and means of transportation;

14.1.3 Where the work involves risk of drowning, asphyxiation or electric shock, first aid personnel should be proficient in the use of resuscitation and other life-saving techniques and in rescue procedures;

14.1.4 Employers must inform their employees of arrangement that have been for rendering first aid, including the location of equipment, facilities and personnel;

14.1.5 All injuries should be reported, treated and recorded as soon as practicable at the nearest first aid post;

14.1.6 There must be at least one first-aid box on any construction site or work locations;

14.2 Medical Care

14.2.1 Workers of a construction site should undergo a pre-employment medical examination with special emphasis on physical and psychological conditions.

14.2.2 If the project site is susceptible to epidemics such as Malaria, the contractor should provide protective means to the workers.

14.3 Emergency Action Plan

14.3.1 An employer must have an emergency action plan. The emergency action plan must be in writing, kept in the workplace, and available to employees for review. However, an employer with 10 or fewer employees may communicate the plan orally to employees. The Plan should contain, but not limited to the following:

a) The location of the nearby health institutions where an injured employee/visitor could be taken (based on the type of injury);
b) The means of access to the institution;
c) The methods of communications with the institutions;
d) The responsible persons to be communicated.

14.4 Welfare

Welfares shall be provided as per Ethiopian Building proclamation

14.5 Training

14.5.1 Workers shall be adequately and suitably, instructed and trained in the measures available for the prevention and control of, and protection against potential hazards.

14.5.2 The employer of the construction work should have to provide appropriate instructions and training as is necessary to ensure the health and safety at work of his employees and also others who may be affected by acts of omission. Such training should include physical ergonomics.

14.5.3 The employer shall provide short courses for all new personnel which includes an outline of the organization and management of the company, personnel and welfare arrangements, health and safety, and staff facilities available.

Adopted from:

1. Occupational Safety and Health Administration (OSHA), United States Department of Labor (www.osha.gov)
2. California Code of Regulation (www.dir.ca.gov)

FINAL DRAFT