CIS 15 : 2019
GUIDELINES ON PREVENTION OF FALL AT CONSTRUCTION SITE

Descriptors: Duties, responsibilities, risk management, working at height, fall prevention and protection

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CONSTRUCTION INDUSTRY DEVELOPMENT BOARD MALAYSIA
GUIDELINES ON PREVENTION OF FALL AT CONSTRUCTION SITE

CIDB MALAYSIA
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COMMITTEE REPRESENTATION

This Construction Industry Standard (CIS) was managed and developed by the Construction Industry Development Board Malaysia with the assistance of the Technical Committee of Safety and Health in Construction which comprises representatives from the following organizations:

Association of Consulting Engineers Malaysia (ACEM)
Department of Occupational Safety and Health (DOSH)
Ekovest Construction Sdn Bhd
IJM Corporation Berhad
Malaysian Society for Occupational Safety and Health (MSOSH)
Master Builders Association Malaysia (MBAM)
National Institute of Occupational Safety and Health (NIOSH)
Naza TTDI Sdn Bhd
Perbadanan Kemajuan Negeri Selangor (PKNS)
Real Estate and Housing Developers’ Association Malaysia (REHDA)
S P Setia Bhd
Universiti Malaya (UM)
Universiti Teknologi Mara (UiTM)
WCT Holdings Berhad
PREFACE

Guidelines on Prevention of Fall at Construction Site was develop in 2009 as Construction Industry Standard (CIS 15:2009). This standard was revised 10 years later and now known as CIS 15:2019. The revision was carried out by a Technical Committee formed by CIDB, represented by the construction industry stakeholders.

References were made to several documents generally used by industry players in managing construction safety and health. This revised version of Guidelines on Prevention of Fall at Construction Site is expected to provide clearer guidance to clients, designer, contractor and workers in assessing their safety and health performance at construction sites.

It should be noted that compliance with this Construction Industry Standard does not in itself confer immunity from legal obligations.
GUIDELINES ON PREVENTION OF FALL AT CONSTRUCTION SITE

SECTION 1: GENERAL

1.1 Scope

The guideline provides guidance on adopting a risk management approach to fall prevention at construction site. It is applicable to everyone who has the duty to prevent person falling from heights.

The Guideline is not intended to apply to work on mobile plant, with the exception of mobile plant specifically mentioned in this Guideline, or that, which is commonly used to perform work at height in the general construction industry except telecommunication towers, platform and machineries.

1.2 Normative References

The following normative reference is indispensable for the application of this construction industry standard. For dated reference, only the edition cited applies. For undated references, the latest editions of the normative references (including any Amendments) Apply.

i. Best Practice Guidelines for Working at Height in New Zealand (2012)
ii. CIDB Act 1994 (Act 520) (Revised 2011)
iii. CIS 15:2009 (Guidelines on Prevention of Fall at Construction Site)
v. Factories and Machinery (Building Operations and Works of Engineering Construction [BOWEC]) (Safety) Regulations 1986
vi. Factories and Machinery Act (FMA) 1967
vii. Guidelines for The Prevention of Falls at Workplaces (2007), Department of Occupational Safety and Health, Malaysia
viii. Guidelines on Occupational Safety and Health in Construction Industry (Management) 2017
ix. ISO 45001:2018 Occupational Health and Safety Management System
x. National Code of Practice For The Prevention of Falls In General Construction Work-Related Injuries And Fatalities Involving A Fall From Height, Australia (2010)
xii. Preventing Falls in Housing Construction - Code of Practice - Safe Work Australia (2010)

1.3 Terms and Definitions

For the purpose of this Guideline:

i. Anchorage
   A component plugged or fixed into a building or structure for the purpose of attaching a scaffold or safety lines. It can also mean the holding-down system cantilevered, hanging or suspended scaffolding and platforms arrest system.

ii. CARA- HIRARC

iii. Clients
    For the purpose of this standard, clients shall have the same meaning as per the Guidelines on Occupational Safety and Health in Construction Industry (Management) 2017 by DOSH
iv. Competent person
A person who has acquired through training, qualification or experience (or a combination of these) the knowledge and skills enabling that person to safely perform a specified task.

v. Contractor
A person who undertakes to carry out or complete any construction works.

vi. Construction project
For the purpose of this standard, it means a project involving construction works.

vii. Construction site
A place at which construction work is undertaken, and any other area in the vicinity where plant or other material used or to be used in connection with the construction work is located or kept during the construction work. It does not include a place where elements are manufactured 'off site' or where construction material is stored as stock for sale or for hire.

viii. Construction works
The construction, extension, installation, repair, maintenance, renewal, removal, renovation, alteration, dismantling, or demolition of:
   a) any building, erection, edifice, structure, wall, fence or chimney, whether constructed wholly or partly above or below ground level;
   b) any road, harbor works, railway, cableway, canal or aerodrome;
   c) any drainage, irrigation or river control works;
   d) any electrical, mechanical, water, gas, petrochemical or telecommunication works; or
   e) any bridge, viaduct, dam, reservoir, earthworks, pipeline, sewer, aqueduct, culvert, drive, shaft, tunnel or reclamation works.

and includes any works which form an integral part of, or are preparatory to or temporary for the works described in paragraphs a) to e), including site clearance, soil investigation and improvement, earth moving, excavation, laying of foundation, site restoration and landscaping.

ix. Designer
An organization or individual, who in the course/ furtherance of a business:
Prepares or modifies a design for a construction project (including the design of temporary works) or
Arranges for, or instructs someone else under their control to do so
   a) relating to a structure/ to a product/ mechanical/ electrical system intended for a particular structure, and a person is deemed to prepare a design where a design is prepared by a person under their control.

Notes: "Design" includes drawings, design details, conditions of contract, specifications, bills of quantities and calculations prepared for the purpose of a design.

x. DOSH
Department of Occupational Safety and Health Malaysia.

xi. Mobile elevating work platform (MEWP)
A telescoping, scissor or articulating device, or any combination of these, that is used to position personnel, material or equipment at an elevated work area.

xii. Fall-arrest harness (Safety Harness)
An assembly of interconnected shoulder and leg straps with or without a body belt, and used where there is likelihood of free or restrained fall.
xiii. **Fall-arrest static line**
A horizontal, near-horizontal or vertical line (for a ladder fall-arrest device) to which a lanyard may be attached and which is designed to arrest a free fall. Each end of the line is connected to a fixed anchorage point. The line may be made of metal tubes, metal rods, steel wire rope, synthetic webbing or synthetic rope.

xiv. **Falling**
A reference to a person falling, and includes a person falling from, through or into a place or thing.

xv. **Fall injury minimisation system**
Equipment, material or a combination of equipment and material that is designed to prevent, or reduce the severity of injury to a person if a fall from one level to another does occur.

xvi. **Formwork**
The surface, supports and framing used to define the shape of concrete until the concrete is self-supporting. It includes the forms on which the concrete is poured, the supports used to withstand the loads imposed by the forms and the concrete, the bracing that may be added to ensure stability, and the footings. The formwork structure is called the formwork assembly. Parts of the formwork assembly are also known as falsework. Examples of formwork include prefabricated systems such as slip forms, table forms and jump forms.

xvii. **Free Fall**
Any fall or part of a fall where the person suffering the fall is under the unrestrained influence of gravity over any fall distance, either vertical or on a slope on which it is not possible to walk without the assistance of a handrail or line.

xviii. **Guardrailing**
A railing of metal, supported by stanchions of sufficient strength and good construction.

xix. **Hazard**
A source or situation with a potential for harm in terms of human injury or ill health, damage to the environment or a combination of these.

xx. **Professional Engineer with Practising Certificate (PEPC)**
Under Section 7(1A), Registration of Engineers Act 1967 (Revised 2015), a registered Professional Engineer with Practising Certificate is allowed to practise, carry on business or take up employment which requires him to carry out or perform professional engineering services for designated engineering works subject to section 8 of the Act.

xxi. **Solid construction**
An area that has:
a) a surface capable of supporting people and material and any other loads applied to it;
b) protection at its perimeter and around all open penetrations from, or through which, workers could fall;
c) an even and readily negotiable surface and gradient, and
d) a safe means of access and egress.
SECTION 2: DUTY HOLDER RESPONSIBILITIES

2.1 Who has the duty to prevent fall?

i. Clients

Clients have a duty to consult with designers and builders to ensure, so far as is practicable, that the structure to be built is designed and constructed so that workers, and any other persons on the construction site, are protected from hazards such as a fall from height. Clients also have a duty to consult with the person with control of a construction project to ensure that other people who may be affected by the construction work undertaken on the site are not put at risk by those work activities.

ii. Designers

Designers have a duty to ensure, to the extent that they have control over the design, that fall hazards arising from the design are identified and, where possible, eliminated by design modification. Hazards that remain should be identified in a written report to the clients.

iii. Contractors

Planning, construct, managing and monitoring the work.

a) Fall Protection

- Contractor shall ensure that working at height shall not be conducted without an approved method statement
- Contractor shall ensure that fall prevention, fall arrest and falling object protection measures shall be installed prior to commencement of working at height
- Contractor shall ensure that working at height training is provided for all persons involved in the activity
- Contractor shall ensure that a pre-task briefing, based on the job safety analysis, is provided for all persons assigned to work at height
- Contractor shall ensure that only full body safety harness manufactured in accordance with a national or internationally recognized standard shall be used for working at height
- Contractor shall ensure that safety belts is prohibited
- Contractor shall ensure that safe access is provided for working at height

b) Mobile elevating work platforms (MEWP) and Aerial Lifts

- Contractor shall ensure that MEWP are only operated on firm level ground
- Contractor shall ensure that only operators that are trained by the manufacturers/ suppliers and approved by the Safety Department, shall be permitted to operate MEWP or Aerial Lifts
- Contractor shall ensure that training in the use of MEWP or aerial lifts
- Contractor shall ensure that lift controls are tested each day prior to use to verify they are in a safe working condition
- Contractor shall ensure that personal fall protection (e.g. harness and lanyard) is worn and attached to an appropriate anchorage while in the MEWP or aerial lift basket
- Contractor shall ensure that workers shall always stand firmly on the floor of the basket and not climb out when at height
- Contractor shall ensure that boom and load limits specified by the manufacturer are displayed on the equipment and not exceeded
- Contractor shall ensure that vehicles brakes, outriggers and wheel chocks are used according to the manufacturers specification
- Contractor shall ensure that the aerial lift truck or MEWP shall not be moved when the boom is elevated with people in the basket unless specifically designed to do so, e.g. controls to
move the truck/ under carriage is located in and may be operated while in the basket. In these cases, the movement of the equipment shall be for work positioning only and not for movement from one location to another.

- Contractor shall ensure that, if the aerial lift or MEWP incorporate self-propelling or travelling function, there shall be means to isolate/ transfer level control to the basket to prevent accidental or malicious operation from ground level. However, there must be an override in the event of an emergency to be able to lower the basket to ground level.

iv. Workers
Workers must ensure, so far as is practicable, that their work does not put themselves or others at risk and that they undertake work at height in accordance with the information, instruction and training with which they have been provided.

SECTION 3: MANAGING RISKS TO PREVENT FALLS

3.1 Requirements to preventions of falls

The persons with control of a construction project and construction work to ensure workers are not exposed to fall hazards by following a risk management process. This involves the following steps:

a) identifying fall hazards;
b) assessing the risk of harm to a person associated with each hazard; and
c) controlling the risks.

Once control measures have been implemented, they should be subsequently monitored and reviewed for their effectiveness.

This risk management process should be undertaken in consultation with workers and where appropriate their health and safety representatives. Their experience and knowledge will help to identify fall hazards and control measures.

3.2 Identifying fall hazards

Before work commences, all physical locations and tasks that may present the risk of a fall need to be identified. In carrying out hazard identification process, it is helpful to break down each activity or process into a series of parts or smaller tasks and assess each one separately. This includes access to the areas where tasks are to be performed. Each task needs to be examined to determine whether there is a risk of falling and how that risk can be eliminated or minimised. In particular, tasks that need particular attention are those carried out:

a) on any structure or plant being constructed or installed, demolished or dismantled, inspected, tested, maintained, repaired or cleaned;
b) on a fragile surface (for example cement sheeting roofs, rusty metal roofs, fibreglass sheeting roofs and skylights);
c) on a potentially unstable surface (for example areas where there is potential for ground collapse, including poorly backfilled or compacted ground, or unstable areas such as on top of stacks of building materials, timber pallets or bricks);
d) using equipment to work at the elevated level (for example when using scaffolds, mobile elevating work platforms (MEWPs) or portable ladders);
e) on a sloping or slippery surface where it is difficult for people to maintain their balance (for example on glazed tiles);
f) near an unprotected open edge (for example near perimeters without guardrails, or incomplete stairwells), and;
g) near a hole, shaft or pit into which a worker could fall (for example trenches, pileholes or service pits).
3.3 Assessing the risk of a fall

If a task involving a fall hazard has been identified, the risk of a fall should be assessed by determining:

a) the likelihood of a fall and risk of harm to a person occurring; and

b) the extent of harm or injury that a person could receive in the event of a fall.

This assessment is a useful way of determining where the greatest risk is, and therefore which hazards need to be eliminated or controlled first.

The ultimate effectiveness of any risk assessment is dependant on the quality of the information available. Therefore, it is important that persons carrying out risk assessments have the necessary information, knowledge and experience of that work environment and work process.

If the risk assessment is for construction work being undertaken at a height of 2 m or more and there is a risk of falling, physical fall prevention measures should be provided so far as is practicable. CARA-HIRARC shall be used to document why a particular control has been used and a more detailed CARA-HIRARC would be required if it is not reasonably practicable to use physical fall prevention measures.

In addition to work being undertaken at a height of 2 m or more where there is a risk of falling. This Standard sets out that CARA-HIRARC must also be prepared for any other construction work that meets the definition of ‘high-risk construction work’ (e.g. construction work involving excavation to a depth greater than 1.5 m).

CARA-HIRARC shall also be referred when work is being undertaken at a height of less than 2 m if the risk assessment identifies a need for control measures to be used.

3.3.1 Tips for doing CARA-HIRARC

Ways to assess the risk arising from each identified hazard includes:

a) looking at similar workplaces or processes;
b) looking at the workplace’s previous incident and injury reports and data for falls;
c) consulting with health and safety representatives and other employees;
d) looking at the way tasks/jobs are performed;
e) looking at the way work is organized;
f) determining the size and layout of the workplace;
g) assessing the number and movement of all people at the workplace;
h) determining the type of operation to be performed;
i) identifying the type of machinery/plant to be used;
j) assessing the adequacy of inspection and maintenance processes;
k) examining the way all material and substances are stored and handled;
l) assessing what knowledge and training is needed to perform tasks safely and the adequacy of current knowledge and training, and
m) examining the adequacy of procedures for all potential emergency situations (e.g.: accidents and rescues).
3.3.2 Can the same CARA-HIRARC be used for more than one task?

If similar tasks or processes are undertaken in a number of different work areas or workplaces, only a single CARA-HIRARC may be required. A single, or generic, CARA-HIRARC will only be appropriate if the hazards and risks for the work areas being covered by the assessment are the same or similar.

3.4 Controlling the risks

If the risk assessment has identified that there is a risk that a fall may occur, measures need to be put in place to control the risk. The primary duty is to eliminate the risk. If this is not practicable, the risk must then be reduced to the minimum level possible, so far as is practicable. To do this, there is a preferred order (or hierarchy) of risk control measures ranging from the most effective to the least effective, that must be applied.

3.4.1 Hierarchy of control measures

The first priority is always to eliminate the risk of a fall. In other words, ensure a fall from height cannot occur. Ways to do this include designing out the risk or working on the ground or from a solid construction. These are Level 1 controls.

If (and only if) elimination of the fall risk is not practicable through the application of a Level 1 control, the risk should be minimized through the application of control measures lower down in the hierarchy; that is, Level 2 to Level 5 controls (refer to below: Hierarchy of control).

Only where it is not practicable to use a higher order control measure may a control at the next lower level be used. Where it is reasonably practicable to undertake part of a task using a higher order control, that control must be used to the extent possible. Where a risk of a fall remains, then the next level of controls must be applied wherever reasonably practicable.

In cases where work is performed at 2 m or above and physical fall prevention measures are not able to be used because it is not practicable, it should be documented why physical fall prevention measures were not able to be used.

3.4.2 Which control to choose?

The hierarchy of control is a tool to help people working in the construction industry to choose a control that provides the highest level of safety possible in the circumstances.

3.4.3 Hierarchy of control

The hierarchy of control measures are:

a) Level 1: Undertake the work on the ground or from a solid construction (refer to clause 5.1).
b) Level 2: Undertake the work using a passive fall prevention device (refer to clause 5.2).

These include:
- Scaffolds
- Step platforms
- MEWP
- Mast climbing work platform
- Work boxes
- Purlin trolleys
- Perimeter screens
- Perimeter guarding
- Guarding edges on roofs
- Protection for trenching works
• Safety mesh

c) Level 3: Undertake the work using a work positioning system (refer to clause 5.3).
   These include:
   i. travel restraint systems; and
   ii. industrial rope access systems.

d) Level 4: Undertake the work using a fall injury minimisation system (refer to clause 5.4).
   These include:
   i. catch platforms; and
   ii. fall-arrest system

After considering all of the above, if no reasonably practicable control measure has been identified, a Level 5 control may be used.

e) Level 5: Undertake the work from ladders, or implement an administrative control (refer to clause 5.5).

3.5 Other (risk control) considerations

When selecting the most practical control measure, any non-fall risks associated with those measures must also be considered. Non-fall hazards could include electrical hazards, such as contact with overhead and temporary electrical cabling, and crushing and entanglement from plant such as MEWPs.

Make sure that the control method that is selected does not expose those installing, erecting or removing it (such as scaffolders) to a greater risk than the one it is designed to control.

If plant or equipment is used to control the risk, it must be “fit for purpose”, that is, it must be designed and constructed for the task and the working environment.

3.5.1 Personal protective equipment

Personal protective equipment (PPE), such as safety boots, gloves and hard-hats provide additional protection when used in conjunction with fall prevention. However, they should not be used as the only control measure.

3.5.2 Operator’s skill

The hierarchy generally gives preference to control measures which require the lowest level of skill to operate and maintain. For example, a perimeter guardrail, which is a passive fall prevention device that requires no operator skill (a Level 2 control), should be used in preference to another Level 2 control such as an MEWP, which requires a higher level of operator skill.

In other words, where two controls provide an equal measure of protection against falls, the one that requires the least skill to use should be chosen.

3.5.3 Monitoring and review of control measures

Implementing a fall control measure is not the end of the risk management process. Control measures must be monitored and reviewed to ensure that they continue to control the risks they were established for.

Physical fall prevention measures should be monitored regularly to make sure that workers are using them properly. Where an alteration of specific plant or fall prevention measure is to be undertaken, the person with control of the work should make sure that the integrity of the system is maintained and that
clear arrangements to this effect are in place with subcontractors. Each person with control of a construction project or work should ensure that:

a) a planned program of inspections and maintenance is in place;
b) a review is undertaken each time the work environment changes, and
c) the process for hazard identification, risk assessment and control is regularly reviewed to ensure it is effective.

In determining the frequency of the monitoring and review process, consideration should be given to:

a) the level of risk (high-risk construction work requires more frequent assessment), and
b) the type of work practice or plant involved.

3.5.4 Information, instruction and training

Information, instruction and training concerning the fall hazards, risks and control measures identified during the risk management process should be provided to those undertaking the construction work.

It should help them to understand:

a) the fall hazards to which they are exposed;
b) the risk of injury associated with the task;
c) why control measures are needed and how to use them properly, and
d) what action to take if there is an incident.

The amount and type of information, instruction and training required will depend on the severity of the hazard and the risk involved. It will also depend on the level of skill required to operate or use the control measure. Tasks involving complex work procedures or control measures will require more comprehensive training and the requirements of the respective state or territory should be referred to for certification of scaffolders, riggers, doggers and operators of MEWPs.

All information, instruction and training should be provided in a form that can be understood by all workers. This may include providing information in languages other than Bahasa Malaysia or English.

While training is important, it is not a substitute for effective control of a risk of a fall from height.

3.5.5 Fall Prevention

A fall from almost any height can result in serious injury or death. It is possible that a number of factors can combine to create a dangerous situation. This possibly makes doing a hazard identification and risk assessment processes very important for work at any height.

SECTION 4: WORKING AT HEIGHTS OF LESS THAN 2 METER (FALL PREVENTION COMPONENTS)


CARA-HIRARC is used to document the results of a risk assessment process carried out for a particular task or work activity and identifies the controls to be implemented.

CARA-HIRARC is a Standard that:

a) identifies a work activity assessed as having a safety risk or risks;
b) states the safety risk or risks;
c) describes the control measures that will be applied to the work activity;
d) describes how safety measures will be implemented; and
e) includes a description of the equipment used in the work, the qualifications of the personnel doing the work and the training required to do the work safely.

CARA-HIRARC shall be completed before all reasonable risk control measures are put into place and prior to work commencement.

4.2 Risk management

In situations where persons are working at heights, the standard risk management or CARA HIRARC shall be used to identify.

Assessing the risks of these potential falls does not need to be complicated. In most cases one can simply:
   a) look for the hazards;
   b) decide who might be harmed and how;
   c) if a risk exists, consider ways of doing the task more safely; and
   d) take action to eliminate the risk; if it is not reasonably practicable to do so, then reduce the risk.

4.3 Methods of controlling risks

A number of the more common tasks associated with falls from less than 2 m are illustrated, together with methods used to control the risks associated with these hazards.

Figure 1 shows the use of barrel raises a worker's centre of gravity, making the worker much more unstable and prone to tripping, overbalancing or falling through openings in floors or walls. Guardrails are usually not designed for people on barrel, and will not protect the user from falling. Workers sometimes use an unstable support, such as a stepladder to put on barrel, exposing themselves to the hazard of falling.

**Figure 1: Hazard – plasterer using barrel**
Source: Double Storey Housing Development, Negeri Sembilan Area 2018.

Figure 2 shows the provision of a splithead trestle scaffold.

Splithead trestle scaffolds are quick and easy to erect and can be configured in a variety of ways to suit the particular job. They are particularly useful for light and medium duty activities such as plastering, painting and general fitout and finishing.

**Figure 2: A splithead trestle scaffold**
Source: Double Storey Housing Development, Negeri Sembilan Area 2018.
Figure 3 shows the worker working on the stepladder.

Most ladder-related injuries occur as a result of falls from low heights. Sideways tipping is the cause of most stepladder injuries, and this risk increases as the worker ascends the ladder. The worker is working at the top of the ladder and the chances of risk is extremely high. The worker is often working alone and does not have anyone to hold the stepladder to stabilise it.

Figure 3: Hazard – working on the stepladder  

Figure 4 shows the provision of a step platform for a stable work surface.

A commercially available step platform provides a safer alternative to a stepladder - especially where the task involves extended periods working at height or restricted vision (such as welding or welding or other hot work). The step platform is extremely stable and provides a much larger work surface than the stepladder. Some models are collapsible.

Figure 4: A step platform provides a stable work surface  

4.4 Information, instruction and training

A person in control of a construction project must ensure that any information, instruction and training relating to the hazards, risks and control measures identified in the risk management process for working at heights (of less than 2 m) are provided to those engaged to do the construction work.

The amount and type of information, instruction and training that needs to be provided will depend on the risk involved. The complexity of the work procedures and the type of physical fall prevention measures adopted should also be taken into account.

4.5 Portable ladders

For general advice on the selection and maintenance of ladders refer to clause 5.5.1 of this Standard. People using ladders should not:

a) handle or use ladders where it is possible for the worker or the ladder to make contact with power lines;

b) use metal or metal reinforced ladders when working on live electrical installations;

c) set up the ladder in places, such as driveways and doorways, where a person or vehicle could hit it. If necessary, erect a barrier or lock the door shut;

d) use a stepladder near the edge of an open floor, penetration, or on scaffolding to gain extra height;

e) over-reach (the worker’s belt buckle should remain within the ladder stiles throughout the work);
f) use any power (air, hydraulic, electric or battery) equipment or tool specifically designed to be operated with two hands and which may require the operator to brace themselves against the high level of torque exerted by the tool;

g) carry out work such as arc welding or oxy cutting unless step platforms or other temporary work platforms are not feasible and the task is of short duration and a safe work procedure is followed;

h) use tools requiring the use of both hands and dynamic movement such as axes and crowbars;

i) use tools which require a high degree of leverage type force which, if released, may cause the user to over balance or fall from the ladder, such as stillson or pinch bars;

j) work over other people, and

k) allow anyone else to be on the ladder at the same time.

Except where additional and appropriate fall protection equipment is used in conjunction with the ladder, any person using a ladder should not:

a) face away from the ladder when going up or down, or when working from it;

b) stand on a rung closer than 900 mm to the top of a single or extension ladder, and

c) stand higher than the second tread below the top plate of any stepladder

A ladder must be set up on a surface that is solid, stable and secure. It must also be set up to prevent it from slipping.

4.6 Trestle scaffolds

When adjusting the height of a trestle scaffold, make sure that only the purpose-designed pins are used. Do not use nails or pieces of reinforcing bar.

4.7 Ladder-bracket scaffolds

Ladder-bracket scaffolds are constructed from single or extension ladders with brackets to support scaffold planks (refer to figure 5). Use only for very minor tasks where the worker cannot fall more than 2m. If the platform is at a height of 2 m, the scaffolds should be used in conjunction with physical fall prevention measures so far as is practicable.

When using ladder-bracket scaffolds, the following procedure shall be adopted:

a) only use industrial grade single or extension ladders;

b) pitch the ladders at a horizontal to vertical slope ratio of 1:4;

c) make sure the ladders are firmly footed on a hard level surface;

d) secure the ladders against movement;

e) keep the horizontal distance between brackets to 2.4 m or less;

f) make sure the planks are genuine scaffold planks in good condition;

g) provide barricades or other suitable controls to prevent traffic damage;

h) no more than one person should be supported in any bay of the scaffold, and

i) do not stack materials on the working platform.

Figure 5: A ladder-bracket scaffold

Source: Retrieved on 30 August 2019 via https://www.ladders-999.co.uk/ladder-staging-scaffold.html
SECTION 5: APPLICATION OF PHYSICAL FALL PREVENTION MEASURES

When work cannot be undertaken on the ground or from a solid construction, this Guideline requires that physical fall prevention measures are used, so far as is practicable, for the protection of persons undertaking any construction work where there is a risk that they may fall 2 m or more.

Physical fall prevention includes those measures listed as Level 2, 3, and 4 controls (refer to clauses 5.2, 5.3 and 5.4). Preference should always be given to those controls higher in the hierarchy.

5.1 Level 1 Control

5.1.1 Work on the ground

Eliminating the need to work at height is the most effective way of protecting the safety of workers. Designers and persons with control of construction work should consider how work can be done at ground level and eliminate the need to work at height.

Examples of elimination include:
- prefabrication of roofs at ground level;
- prefabrication of wall frames horizontally, then standing them up;
- using precast or tilt-up concrete construction instead of concrete walls constructed in situ;
- using paint rollers with extendable handles, and
- using remote release clutches for crane lifted loads positioned at height.

5.1.2 Work from a solid construction

Many areas of a construction site can be turned into solid construction. Careful and ongoing assessment of the physical location is needed to eliminate areas in which workers could fall.

Solid construction must satisfy all of the following requirements:

a) Structural strength

Different types of work involve different loads on the supporting surface. Make sure that the surface and its supports can safely carry the expected loads – including workers, material, tools and equipment. When in doubt, make sure a structural engineer determines the safe load capacity before use.

b) Surface and gradient

Surfaces should be non-slip and free from trip hazards and penetrations. Smooth surface working areas should not be steeper than 7° (1 in 8 gradients). Cleated or grated surfaces, which provide greater slip resistance, should not be steeper than 23° (approximately 1 in 2.4 gradients).

c) Edge protection

Perimeter protection must be provided on the exposed edges of all work areas. These include:
- the perimeters of buildings or other structures;
- the perimeters of skylights or other fragile roof material; and
- openings in floor or roof structures.
  i.
  iv.
d) Additional void/ floor opening protection

Where there is a risk that workers performing tasks from work platforms or ladders may fall over the guardrailing, precautions should be taken to ensure that stairwells and other openings are covered. Coverings should be secured in place to prevent dislodgment and be designed to withstand any loads that may be imposed during construction works or in the event of a fall. Any void or floor opening in a work area can cause serious injury from falls, regardless of its depth. All voids or penetrations in floors or work areas shall be covered with a secured cover, built to the standard of a light-duty platform or such greater load that could be imposed on it. Where such covers are not practical, guardrails with toe board or barriers shall be erected around all sides. Where persons are working in such pits, fall protection should still be in place (refer to figure 6).

Figure 6: Guardrails protecting an open penetration through the slab
Source: Retrieved on 30 August 2019 via http://www.ironore.ca/CLIENTS/1-
locv4/docs/upload/sys_docs/CRSEWP_Barricading.pdf

e) Access and egress

Every solid construction must have safe and suitable access and egress. Common means of access and egress include:

i. existing floor levels;
ii. permanently installed platforms, ramps, stairways and fixed ladders complying with internationally accepted standard;
iii. temporary access ways and temporary stair systems, and
iv. secured single portable ladders set up at a slope of between 4: 1 and extending at least 1m above the stepping-off point.

Ladder and stairway landings require the same level of edge protection adjacent to their open sides and ends as solid construction.

Where possible, stepladders and trestle ladders should not be used for access to or egress from solid construction.

5.2 Level 2 Control

5.2.1 Passive fall prevention devices

Passive fall prevention devices include temporary work platforms, such as roof safety mesh, perimeter scaffolding, perimeter guardrailing, barriers and perimeter screens.
a) Temporary work platforms

A temporary work platform is a platform that provides a working area for the duration of work carried out at height, and which is designed to prevent a person from falling. It encompasses a wide variety of plant and equipment and includes scaffolds, mobile elevating work platforms, mast climbers, work boxes and purlin trolleys.

b) Scaffolds

Scaffolds are a common means of providing a safe working platform for working at height. There is a wide variety of scaffolding systems available.

Working platforms on scaffolds are generally rated as light, medium or heavy duty.

i. Light duty - up to 225 kg per bay. This is suitable for plastering, painting, electrical work, and other light tasks.

ii. Medium duty - up to 450 kg per bay. This is suitable for general trades work.

iii. Heavy duty - up to 675 kg per bay. This is what is needed for bricklaying, concreting, demolition work and most other work tasks involving heavy loads or heavy impact forces.

iv. Other than the above - has a designated allowable load as designed.

These safe load limits include the weight of people (which is taken to be a nominal 80 kg per person) plus the weight of any materials, tools and debris on the working platform. Therefore, a properly constructed mobile scaffold with a light duty platform can safely support one worker and 145 kg of tools and material, or two workers and 65 kg of tools and materials. All scaffolding must be erected, altered and dismantled by competent persons.

c) Information, instruction and training for workers using scaffolds

Where work is performed from a scaffold, employers must ensure that the relevant workers understand:

i. what loads the scaffold can safely take (such as how many bricks per bay);

ii. not to make any unauthorized alterations to the scaffold (such as removing guardrails, planks, ties, toeboards and braces) (refer to figure 7);

iii. that working platforms need to be kept clear of debris and access obstructions along their length, and

iv. that incomplete or defective scaffolds must never be accessed

Figure 7: Perimeter scaffold with a fully decked working platform, guardrails and toeboards

Figure 8: Mobile scaffold with an access ladder and a trapdoor to provide the largest possible hazard-free working platform
Where work is performed using mobile scaffolds (refer to figure 8), workers should understand that the scaffold:

i. should remain level and plumb at all times;
ii. be kept well clear of powerlines, open floor edges and penetrations;
iii. never be accessed until the castors are locked to prevent movement;
iv. never be moved while anyone is on it; and
v. never be accessed up the outside - use internal ladders only.

d) Trestle scaffolds

Trestle scaffolds may be used at heights greater than 2 metres only when guardrailing and toeboards are incorporated to prevent people and material falling off the open side or end of the working platform (refer to figure 9). The system (including planks) should be assembled according to the manufacturer's specifications. Trestle scaffolds without guardrailing are only suitable for tasks requiring a work platform of less than 2 metres. Some trestle ladder scaffolds include outriggers to increase stability. Trestle ladder scaffolds are only suited to light duty tasks such as painting and rendering.

When adjusting the height of a trestle scaffold, make sure that only the purpose-designed pins are used. Do not use nails or pieces of reinforcing bar.

Work should only be performed between the trestles. The working platform of a trestle scaffold should be a minimum of two planks or 450 mm wide. The maximum spacing of trestles should not exceed the maximum recommended span of the scaffold planks.

![Figure 9. A correctly set-up trestle scaffold showing guardrailing and outriggers](https://stupidinosauriles.org/scaffold-handrail/scaffold-handrail-handrails-for-stairs-handrails-at-home-depot-trestle-handrail/)

e) Mobile elevating work platforms (MEWP)

MEWPs are available in a wide variety of types and sizes. They include scissor lifts (refer to figure 11), cherry pickers, boom lifts (refer to figure 10) and travel towers. There are battery powered and internal combustion engine types. Some are designed for hard flat surfaces only, while others are designed for operation on rough terrain.

Mobile elevating work platforms:

i. should only be used on a solid, level surface; the surface area should be checked to make sure that there are no penetrations or obstructions that could cause uncontrolled movement or overturning of the platform;
ii. when designed as 'rough terrain' units, may be used on other surfaces in accordance with manufacturer's directions; the surface area should be checked for unacceptable penetrations or obstructions, and
iii. should be clearly marked with the safe working load limit.

Operators working in travel towers or boom type mobile elevating work platforms must wear an anchored safety harness. The harness system used must be able to arrest a fall before the user strikes the ground.

People operating MEWPs with boom lengths exceeding 11m should have an appropriate certificate of competency.

Figure 10. An example of a boom-type MEWP. The safety harness and lanyard assembly are not shown for purposes of clarity. The lanyard should be as short as possible and should be attached directly to the designated anchor point, not to the handrail.


Figure 11. An example of a scissor-lift MEWP. As with boom-type platforms, people should not climb onto or off the platform when it is in an elevated position.


A fall injury minimization system is not required on this item of plant, unless advised by the manufacturer, or indicated in the risk assessment, and a suitable anchor point is provided.

f) Mast climbing work platforms

Mast climbing work platforms are hoists with a working platform that is used to raise personnel and material to a temporary working position (refer to figure 12). They use a drive system mounted on an extendable mast, which may be tied to a building.
Mast climbing work platforms can be set up in either single-mast or multi-mast configurations. They are generally not suitable for use if the profile of a structure changes at different elevations (for example, if the upper floors of a building ‘step’ back or balconies protrude from the building).

The erection and dismantling of mast climbing work platforms must be carried out, or directly supervised, by a person holding an appropriate rigging or scaffolding license.

![Image of a mast climbing work platform](http://omegaeipl.com/image/cache/catalog/Umit/1-600x533.jpg)

**Figure 12. An example of a typical mast climbing work platform**


g) Work boxes

A work box is a human carrying device and designed to be suspended from a crane for the purpose of providing a working area for persons elevated by and working from the box. They consist of a platform surrounded by an edge protection system, and shall be designed by Professional Engineer with Practising Certificate (PEPC).

Other work platforms should be used instead of work boxes if at all practicable.

h) Purlin trolleys

Purlin trolleys travel on top of purlins (horizontal beams running along the length of a roof) and can be used to support material and roof workers. They may be used during installation or removal of roof coverings.

Before a purlin trolley is placed on a roof structure, advice should be obtained from an engineer on whether the roof structure is suitable for the particular purlin trolley and its operational loads.

The purlin trolley should have a holding brake and a device to prevent its inadvertent dislodgment from the supporting purlins.

Fall prevention should be provided at all times for people working from the purlin trolley, preferably through the use of guardrails. If this is not practicable, a safety harness anchored to the trolley should be provided and used. The trolley should be provided with suitable safety harness anchorage points complying with accepted international standard. Persons using individual fall-arrest systems should be adequately trained and supervised.
i) Perimeter protection

  i. Perimeter screens

  Perimeter screens that are purpose-designed for a building provide a high level of protection in preventing construction workers and any debris, tools or building material from falling from the building (refer to figure 13).

  Some screens incorporate prefabricated formwork to enable the casting of perimeter edge beams or stop ends for the edge of the floor. They may also be designed to cover two or more floors, with trailing screens to protect construction workers on lower levels while they are stripping the formwork and installing back propping.

  Perimeter screens normally extend one floor above the floor they are supported from. The top of the screen should be high enough to provide perimeter protection for the floor that is to be built before anyone has to access this floor or its formwork deck. The framework supporting the screen should be able to bear the load of the screen. The mesh should be of minimum gauge 2.5 mm, and have a maximum mesh opening size of:

  - 25 mm nominal where no lining is used, or
  - 50 mm nominal where lining is used.

  Perimeter screens should be designed by an engineer and fitted by licensed riggers in accordance with the design engineer's requirements. Gaps between screens and between the screens and the structure should not exceed 25 mm.

  Some jurisdictions regulate the types of material used to construct perimeter screens. There are also specific requirements for mesh screens, including the maximum allowed size of mesh openings, the gauge of the mesh, and the use of linings with mesh.

![Figure 13. An example of a perimeter screen secured by props](https://www.caelli.com.au/assets/images/equ_perimeter_02.jpg)

ii) Perimeter guardrails

  Guardrails may be used to provide effective fall prevention at (refer to figure 14):

  a. the edges of roofs and roof framing;
  b. the edges of scaffolds;
  c. the edges of work platforms, suspended slabs, formwork and falsework, walkways, stairways, ramps and landings;
  d. the perimeters of buildings and other structures;
  e. the perimeters of skylights and other fragile roof material;
  f. openings in floor and roof structures, and
g. the edges of shafts, pits and other excavations

Before a guardrail system been adopted, the person with control should ensure it will be adequate for the potential loads. The required load resistance will depend on the momentum of a failing person. For example, the momentum of a person falling from a pitched roof will increase as the pitch (or angle) of the roof increases.

Proprietary systems should be configured, installed, used and dismantled by a competent person in accordance with the manufacturer’s instructions.

![Guardrail system](https://www.ulmaconstruction.com/en-us/formwork/safety-systems/safety-guardrail-system)

**Figure 14. An example of perimeter guardrail**

iii) Guardrailing the edges of roofs

Guardrailing may be used as fall prevention around the edge of a roof as a proprietary designed system or through incorporation into scaffolding. The following diagrams show common examples of acceptable roof guardrailing arrangements on scaffolding (refer to figure 15). The toeboards are not shown for clarity.

![Guardrail diagrams](https://www.ulmaconstruction.com/en-us/formwork/safety-systems/safety-guardrail-system)

**Figure 15: Common examples of acceptable guardrail arrangements for roof work (for clarify, toeboards are not shown).**
Source: CIS 15:2008 Guidelines on Prevention of Fall at Construction Site
Where the slope of the roof exceeds 35 degrees, the roof is an inappropriate surface to stand on. Perimeter guardrails and catch platforms are inappropriate measures to protect workers on a steeply sloping roof.

In these circumstances, roof workers need a system to prevent sliding and to prevent falls from the perimeter, comprising one or more of the following:

a. aerial access equipment, such as an MEWP;

b. a work positioning system, such as travel restraint or industrial rope access system;

c. a scaffold platform, located at the roof edge; and

d. a roof ladder.

Proprietary systems should be configured, installed, used and dismantled in accordance with the manufacturer's instructions.

iv) Barriers to restrict access

Barriers should be used to cordon-off elevated areas including roofs and balconies where edge protection is not provided and people are not permitted to access. The barriers should be secure and restrict access to authorized people only. Signage should be erected which warns against entry to those areas.

Where possible, barriers should be placed at least 2 metres in from any unprotected edge or opening. They can include steel mesh panels, metal post and rails and metal posts with timber rail assemblies. They should be highly visible and securely fixed to prevent displacement.

v) Safety mesh

Safety mesh is designed to prevent internal falls through a roof, which is one of the most common fall problems in the Construction industry. If securely fixed, safety mesh provides fall protection for roof installers and offers long term protection against falling for maintenance and repair workers. Safety mesh should be formally inspected and certified as being installed in accordance with the manufacturer's instructions. The inspection and certification of the safety mesh must be performed by a competent person. Where existing safety mesh is to be used to control the risk of workers falling, the integrity of the mesh and its fixings should also be verified by a competent person prior to use.

Safety mesh does not control the risk of perimeter falls or through penetration hazards. Therefore, safety mesh should always be used in conjunction with appropriate edge protection, guardrails or fall-arrest systems and devices. Used in conjunction with these control measures, safety mesh is the preferred system for protection against falling for workers laying roof sheets.

5.3 Level 3 Control

5.3.1 Work positioning systems

A work positioning system is equipment that enables a person to be positioned and safely supported at a work location for the duration of the task being undertaken at height. Work positioning systems require a higher level of operator competency and supervision than control measures which are higher on the hierarchy of control (refer to clause 5). Accordingly, they should only be used where it is not reasonably practicable to use higher order controls.

a) Industrial rope access systems

Industrial rope access systems are used for gaining access to, and working at, a workface, usually by means of vertically suspended ropes. Although fall-arrest components are used in the industrial rope access system, the main purpose of the system is to gain access to a work area rather than to provide backup fall protection. Other methods of accessing a work face should be considered (for example,
MEWP's or building maintenance units) before rope access systems, as a high level of skill is essential for their safe use.

Industrial rope access systems require a high level of competency on the part of the user and supervisors to ensure safe use. Users, including supervisors, should undertake a competency based course of training such as those approved by the DOSH.

b) Travel restraint systems

A travel restraint system prevents the user from approaching an unprotected edge on a building or structure (refer to figure 16). Generally, the system consists of a safety belt or harness that is connected by a lanyard to a suitable anchorage point or static line. The system must be set up to prevent the wearer from reaching the edge.

Where a temporary roof anchor is used as an anchorage for a travel restraint system it must be installed in accordance with the manufacturer's or designer's instructions.

The roof or other building component to which an anchor is to be attached must be checked by a competent person to verify that it is suitable for supporting the anchor.

It is preferable that travel restraint systems are used in conjunction with other fall prevention methods, such as guardrails, safety nets and catch platforms.

NOTE: Travel restraint systems are not fall-arrest devices.

Typical anchorage points for travel restraint systems are not designed for the impact loads applied in the event of a fall. Therefore, where there is any possibility that a person using a travel restraint device may approach an edge from where a fall is possible, a travel restraint system should not be used.

![Figure 16. Travel restraint system](http://www.valcourt.net/safety-systems/about/)

Source: Retrieved on 30 August 2019 via http://www.valcourt.net/safety-systems/about/

c) Use of a fall-arrest system instead of a restraint system

Although fall-arrest systems are not preferred (being low in the hierarchy of control measures), an individual fall-arrest system should be used instead of a travel restraint system if any of the following situations apply:

i) the user can reach a position where a fall is possible;

ii) the user has a restraint line that can be adjusted in length so that a free fall position can be reached;

iii) there is a danger the user may fall through the surface (e.g. fragile roofing material), and

iv) there is any other reasonably likely use or misuse of the system which could lead to a free fall.
5.4  Level 4 Control

5.4.1  Fall injury minimization systems

A fall injury minimisation system means equipment and/or materials that are intended to prevent or reduce the severity of an injury to a person if a fall does occur. It includes, where appropriate, industrial safety nets, catch platforms and safety harness systems (other than a travel restraint system).

There are two examples listed below:

a.  Catch platforms

A catch platform is a temporary platform located below a work area designed to catch a falling person and/or object. The platform should be of robust construction and designed to withstand the maximum potential impact load. Scaffolding components may be used to construct fixed and mobile catch platforms.

Catch platforms should:

i)  incorporate a fully planked-out deck;
ii) be positioned so the deck extends at least 2 m beyond all unprotected edges of the work area, except where extended guardrail is fitted to the catch platform;
iii) be positioned as close as possible to the underside of the work area; and
iv)  always be used with an adequate form of edge protection.

Heavy duty trestle scaffolds and split-head trestle scaffolds can provide simple and inexpensive catch platforms. The latter are particularly effective in openings and stairwells.

b.  Fall-arrest systems

The hazards of using a fall-arrest system are considerable. Their use should only be considered where measures higher in the hierarchy of control are not reasonably practicable.

A fall-arrest system should only be used where it is not practicable to use a fall prevention measure, or where the fall prevention applied is not fully effective on its own. A fall-arrest system requires considerable skill to use safely, and in the event of an arrested fall, it is likely to cause some physical injury to the user. People using a fall-arrest system should wear adequate head protection to protect them in the event of a fall.

A fall-arrest system is intended to safely stop a worker falling an uncontrolled distance and reduce the impact of the fall. It is an assembly of inter-connected components, comprising a harness connected to an anchorage, either directly or by means of a lanyard. Fall-arrest systems can be used where workers are required to carry out their work near an unprotected edge.

Fall-arrest systems should be evaluated to ensure not only that they will be effective, but also that no new hazards will be created by their use. Examples of possible new hazards include trip hazards, and such severe restrictions on a person’s movements that they cannot safely perform their tasks.

A person must not use a fall-arrest system unless there is at least one other person on the site who can rescue them if they fall. In some situations, at least two people are required to safely rescue a person who has fallen.
5.5  Level 5 Control

5.5.1  Use of ladders

Ladders are a Level 5 control, and may be used when it is not reasonably practicable to use a higher order control measure.

Ladders should be used primarily as a means of access to or egress from a work area. They should only be used as a work platform if:

- other methods of working at the required height are not practicable, and
- a risk assessment is carried out to minimize the risks associated with the work to be done from the ladder.

a. Selection of ladders

Ladders must be correctly selected for the task to be undertaken. In doing this, the duration of the task, the physical surroundings of where the task is to be undertaken and the prevailing weather conditions must be taken into consideration. For example, metal ladders or metal reinforced ladders should not be used for live electrical work.

Typically, ladder use for construction work involves repetitive, high volume use and handling, requiring them to be of robust design and construction. Ladders used for construction work should be industrial grade, not domestic grade.

b. Safe use of ladders

Any ladder used at a workplace must be set up on a surface that is solid and stable, and set up so as to prevent the ladder from slipping. (refer to figure 17 and 19)

Slipping of ladders can be prevented by:

- placing single and extension ladders at a slope of 4 to 1, and setting up stepladders in the fully opened position, and
- securing single and extension ladders at both the top and bottom

People using ladders should not:

i) handle or use ladders where it is possible for the worker or the ladder to make contact with powerlines;

ii) use metal or metal reinforced ladders when working on live electrical installations;

iii) set up the ladder in places, such as driveways and doorways, where a person or vehicle could hit it without appropriate safeguards, such as erecting a barrier or locking the door shut;

iv) use a ladder near the edge of an open floor, penetration, or on scaffolding to gain extra height;

v) over-reach (the worker’s belt buckle should be within the ladder stiles throughout the work) (refer to figure 18);

vi) use any power (air, hydraulic, electric or battery) equipment or tool, specifically designed to be operated with two hands, such as concrete cutting saws and circular saws;

vii) use tools which require a high degree of leverage type force which, if released, may cause the user to over balance or fall from the ladder, such as stillson or pinch bars;

viii) carry out work such as arc welding or oxy cutting;

ix) work over other people, and

tax) allow anyone else to be on the ladder at the same time.
Except where a pole strap (or similar device providing the user with full body support) is used, any person using a ladder should not:

i) face away from the ladder when going up or down, or when working from it

ii) stand on a rung closer than 900 mm to the top of a single or extension ladder, and

iii) stand higher than the second tread below the top plate of any stepladder.

Where possible, ladders being used as access should be set up at right angles to the working surface to allow workers to step off the ladder rather than having to step around or over the ladder.

**Figure 17. Pole straps used with portable ladders**

**Figure 18. Unsafe ladder use**

**Figure 19. Acceptable ladder use**

c. **Ladder maintenance**

Ladders should be regularly inspected by a competent person. Ladders with any of the following faults should be replaced or repaired:

i) timber stiles warped, splintered, cracked or bruised;

ii) metal stiles twisted, bent, kinked, crushed or with cracked welds or damaged feet;

iii) rungs, steps, treads or top plates which are missing, worn, damaged or loose;

iv) tie rods missing, broken or loose;

v) ropes, braces, or brackets which are missing, broken or worn, and

vi) timber members that, apart from narrow identification bands, are covered with opaque paint or other treatment which could disguise faults in the timber.

**5.5.2 Administrative controls**

Administrative controls are systems of work or work procedures that help to reduce the exposure of employees to fall hazards where it is not reasonably practicable to use higher level controls.

They may be used to support other control measures that are put in place. For example, work procedures may be needed to ensure the safe use of temporary work platforms, fall injury minimisation systems and ladders. Administrative controls may also be needed to limit the time workers are exposed to a fall hazard and/or the number of workers involved in the task.

It is essential to involve contractors and other workers in the development of administrative controls. People who perform a task regularly often have a good understanding of the risks involved.

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Administrative controls may include 'no entry' areas, permit systems, the sequencing of work and safe work procedures.

'No entry' areas can be an effective method of making sure people are not exposed to fall hazards. They require adequate signage to warn against access to the hazardous area (refer to figure 20).

They can be used to highlight the risks of entry to an area where there is an unguarded fall hazard, or to areas where work is being undertaken overhead and there is a risk of falling material.

![No Entry Sign](image)

**Figure 20. Example of signage for a “no entry” area**

*Source: Retrieved on 30 August 2019 via https://www.jplennard.com/no-entry-sign.html*

Persons with control of the construction project or construction work should ensure that relevant information and instruction is provided to construction workers on the site about 'no entry' areas, and that there is adequate supervision to ensure that no unauthorised worker enters the 'no entry' area.

a) Permit systems

Permit systems ensure that only competent persons trained in the use of appropriate control measures work in an area where there is a fall hazard.

Examples includes:

i. tagging all access points to a scaffold to prevent unauthorized access during erection and dismantling, with 'only licensed scaffolders permitted on an incomplete scaffold', and

ii. permits for access to areas where travel restraint systems or fall-arrest systems are to be used.

b) Organizing and sequencing of work

Make sure that the work is organised so that people do not interfere with or increase the risk of a fall for themselves or others. For example, sequence jobs so that different trades are not working above or below each other at the same time. Plan the work so tasks are not performed for extended periods from a ladder, or so that work at height is minimised in extremely hot or cold weather.

c) Safe work procedures

An administrative control may be as simple as a safe work procedure that describes the steps involved in safely undertaking a task. It may also include any particular training, instruction and the level of supervision required.

A safe work procedure can be generic and applicable to a task that is routinely or repeatedly carried out.

d) Recording administrative controls

If administrative controls are used as a means of reducing the risk associated with a particular task, the person with control of the construction work should make sure details of the task and the controls are recorded.
These records should be kept until the work covered by the administrative controls has been completed.

A single administrative control, such as a safe work procedure, may apply to a task that is repeatedly carried out at single or multiple workplaces.

However, the record should make it clear which particular task the administrative control applies to and the location(s) where the task is being undertaken. If relying on administrative controls, it will be necessary to provide a high level of supervision to ensure that the safe work procedure is being adhered to. The procedures should be regularly reviewed to gauge the effectiveness of the procedures.

SECTION 6: TRENCHING AND EXCAVATION WORK

Excavation work can expose persons to the risk of injury from a wide range of hazards. However, consistent with the purpose and scope of this Guideline, this chapter focuses on trenching and excavation work that presents the risk of a fall from height and provides general guidance only.

Trenching and excavation work have the potential to expose persons to the risk of injury from falls from height. Many incidents on construction sites have involved people, including young children, sustaining serious injury from falls into open trenches and excavations. Even shallow excavations can be trip and fall hazards, although the likelihood of injury when a person falls increases with the depth of the trenching or excavation work.

For more information on risk assessment processes, control measures and instruction and training, refer to clause 4 of this Guideline.

6.1 Risk assessment

For any trenching or excavation work a risk assessment should be conducted in order to identify the fall hazards and determine which control measures will be implemented to eliminate or minimize the risks arising from those hazards.

If the risk assessment is for construction work where there is a risk that someone could fall 2m or more, physical fall prevention measures must be provided so far as is practicable.

The risk assessment should also take into consideration the security of the excavation, both during work and when left unattended. Consideration should be given to factors such as:

- how long the excavation will be left open; and
- who may gain access to the excavation (including pedestrians and children).

6.2 Control measures

Control measures to prevent persons being injured from a fall from height during the excavation work must be provided and should be properly installed and maintained until the work is completed, or until a further risk assessment identifies that there is no longer any risk of persons falling into the excavation.

Some control measures that should be considered are:

a) the application of physical fall prevention measures;
b) isolating the trench or excavation by the use of perimeter fencing, barricades, barriers, screens, handrails and trench covers, which are capable of preventing access or preventing a person from falling;
c) pedestrian detours which should be clearly defined and protected;
d) the provision of a safe means of movement between different levels of the excavation;
e) the use of intermediate platforms for deep excavation, and
f) backfilling the excavation as work progresses.

When barriers are used they should be placed at least 2 m from the edge of the trench where possible. They should be highly visible and capable of remaining in place during adverse weather conditions. Safety type tape is not an adequate physical barrier as it is hard to refer to in low light conditions and can be easily broken. Unless they are specifically designed for the purpose, barriers should not be used as guardrails.

SECTION 7: PROTECTION FROM FALLING OBJECT

Workers should be protected from falling when working on an elevated surface and be aware of those working above or below them. Workers and members of the public can be protected from falling objects with one of the following methods:

a) Canopies - Make sure canopies will not collapse or tear from an object’s impact;

b) Toeboards - Toeboards must be least 200mm high and strong enough to withstand a force of at least 25 kg applied downward or outward;

c) Panels and screens - If you need to pile material higher than the top edge of a toeboard, install panels or screens to keep the material from dropping over the edge;

d) Barricades and fences – Use them to keep people away from areas where falling objects could hit them; and

e) Hard hats and safety boots - use them at all time when working at construction site.

When doing overhand bricklaying, keep materials and equipment (except masonry and mortar) at least 1.5 m from the working edge.

When doing roofing work, keep materials and equipment at least 2 m from the roof edge unless there are guardrails along the edge. All piled, grouped, or stacked material near the roof edge must be stable and self-supporting.
SECTION 8: EMERGENCY RESPONSE PLAN

8.1 Prompt rescue

The best strategy for protecting workers from falls is to eliminate the hazards that cause them. When hazards can't be eliminated, workers must be provided with an appropriate fall-protection system or method. If a worker is suspended in a personal fall-arrest system, prompt rescue must be provided.

"Prompt" means without delay. A worker suspended in a harness after a fall can lose consciousness if the harness puts too much pressure on arteries. A worker suspended in a body harness must be rescued in time to prevent serious injury. If a fall related emergency could happen at the construction site, a plan to responding to it promptly must be in place. Workers who use personal fall-arrest systems must know how to promptly rescue themselves after a fall or they must be promptly rescued.

8.2 Developing an Emergency Response Plan

The following guidelines will help employer to develop a plan for responding promptly to falls and other emergencies.

8.2.1 Effective plans don't need to be elaborate

The plan should show that employer have thought about how to eliminate and control hazards that worker know how to respond promptly if something goes wrong.

8.2.2 Get others involved in planning

When other workers participate, they'll contribute valuable information, take the plan seriously, and be more likely to respond effectively during an emergency.

Key planning objectives:

i. Identify the emergencies that could affect the site.
ii. Establish a chain of command.
iii. Establish procedures for responding to the emergencies.
iv. Identify critical resources and rescue equipment.
v. Train on-site responders.

8.2.3 Identify emergencies that could affect the workplace

Identify any event that could threaten worker safety or health. Two examples:

i. A worker suspended in a full-body harness after a fall.
ii. A worker on a scaffold who contacts an overhead power line.

8.2.4 Identify critical resources and rescue equipment

Prompt rescue won't happen without trained responders, appropriate medical supplies, and the right equipment for the emergency.

i. First-aid supplies

Every construction site needs medical supplies for common injuries. Make sure that the construction site has a first-aid kit for injuries that are likely to occur. Store the supplies in clearly marked, protective containers and make them available to all shifts.

ii. Rescue equipment

Identify on-site equipment that responders can use to rescue a suspended worker. Extension ladders and mobile lifts are useful and available at most sites. Determine where and how each type of equipment would be most effective during a rescue. Make sure the equipment will permit
rescuers to reach a fall victim, that it's available when rescuers need it, and that rescuers know how to use it.
Will the longest ladder at site reach a suspended worker? If not, what equipment will reach the worker? When equipment is needed for a rescue, will workers know where it is and how to use it? Think about seasonal and environmental conditions and how they may affect rescue equipment and those who use it. Equipment that works for dry season rescues may not work for wet/rainy season rescues.

iii. Train on-site responders

An effective emergency-response plan ensures that on-site responders know emergency procedures, know how to use available rescue equipment, and - if necessary - know how to contact off-site responders. Workers who use personal fall-arrest systems and who work alone must know how to rescue themselves. Those who work at a remote site may need a higher level of emergency training than those who work near a trauma centre or a fire department.

iv. Establish a chain of command

All workers must know their roles and responsibilities during an emergency. A chain of command links one person with overall responsibility for managing an emergency to those responsible for carrying out specific emergency response tasks. Make sure that back-up personnel can take over when primary responders are not available.

v. Establish procedures for responding to emergencies

Procedures are instructions for accomplishing specific tasks. Emergency procedures are important because they tell workers exactly what to do to ensure their safety during an emergency. The emergency-response plan should include the following procedures - preferably in writing - that describe what people must know and do to ensure that a fallen worker receives prompt attention:

- How to report an emergency?
- How to rescue a suspended worker?
- How to provide first aid?

After an emergency, review the procedures; determine if they should be changed to prevent similar events and revise them accordingly.
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**Advisor of Construction Industry Standard**  
Dato’ Ir. Ahmad ‘Asri Abdul Hamid  
Chief Executive CIDB Malaysia

**Chairman of Construction Industry Standard Main Committee**  
Datuk Ir. Elias Ismail  
Senior General Manager CIDB Malaysia

**Technical Committee**

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<td>Puan Elaini Binti Wahab</td>
<td>Department of Occupational Safety &amp; Health (DOSH)</td>
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<tr>
<td>Encik Mohamad Redzuan Shah Bin Masri</td>
<td>National Institute of Occupational Safety and Health (NIOSH)</td>
</tr>
<tr>
<td>Encik Mohammad Irwan B. Mohd Pilus</td>
<td>Malaysian Society for Occupational Safety and Health (MSOSH)</td>
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<td>Encik Nasaruddin Bin Abd Rahman</td>
<td>Universiti Teknologi Mara (UITM)</td>
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<tr>
<td>Dr. Yap Soon Poh</td>
<td>Universiti Malaya (UM)</td>
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