

# **Practical Guide to Working at Height: Ensuring Safe Work Practices**

**Safety Seminar for  
Works Contract & Property Services Contracts**

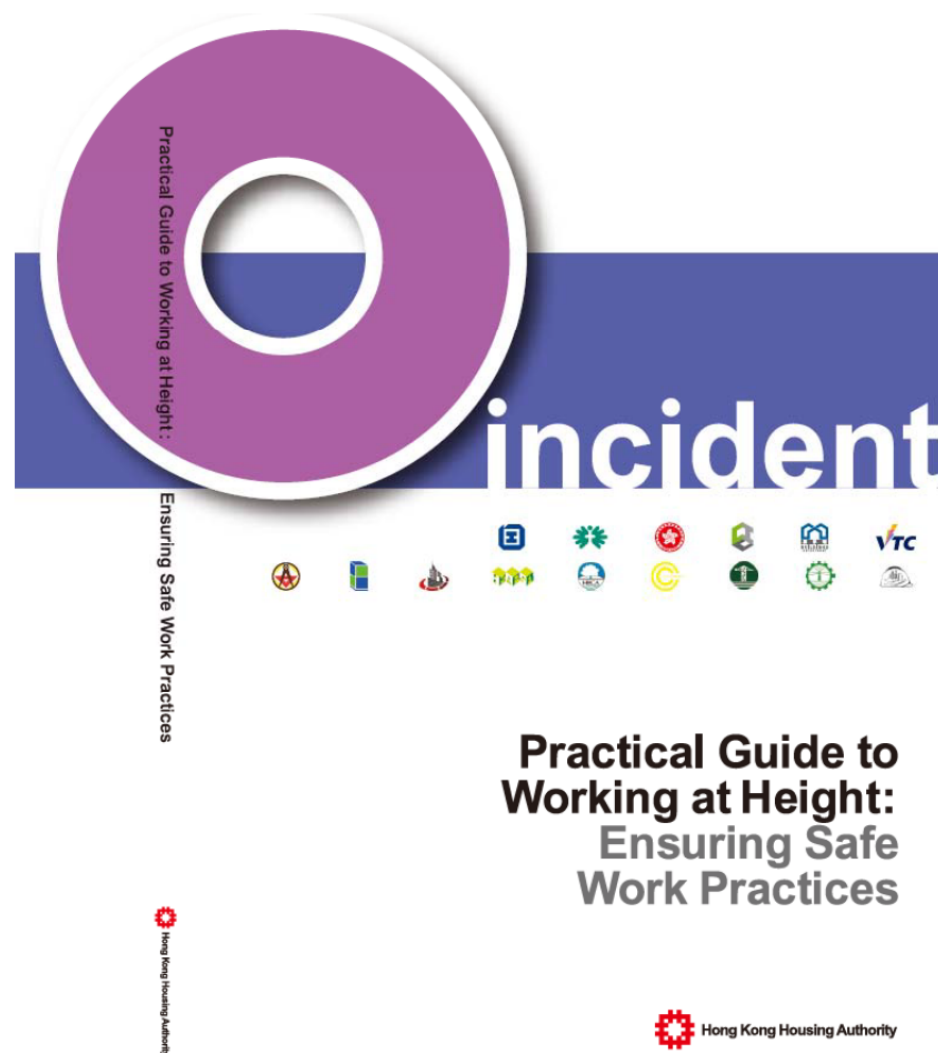
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**15-12-2011**



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1. Introduction
2. Guiding Principles
3. Risk Assessments
4. Safe Working Methods
5. Good Working Practices
6. Bad Working Practices
7. Case Studies
8. Aspirations



# Introduction

## Housing Department Site Safety Sub-Committee

### Bureaus / departments / statutory bodies

- Occupational Safety and Health Council
- Labour Department
- Development Bureau
- Buildings Department
- Construction Industry Council
- Vocational Training Council

### Contractors / service provider associations

- Hong Kong Construction Association
- The Hong Kong Federation of Electrical and Mechanical Contractors Limited
- Hong Kong Construction Sub-contractors Association
- The Association of Hong Kong Property Services Agents
- Hong Kong Cleaning Association
- The Hong Kong Chamber of Cleansing Contractors Ltd

### Trade unions

- Hong Kong Construction Industry Employees General Union
- Hong Kong and Kowloon Electrical Engineering and Appliances Trade Workers Union
- Construction Site Workers General Union







## Aim

**This Guide has used the existing legislative framework as a basis a safe system of work for providing practical advice on**

- how to plan for safe work at height
- how to establish control measures to prevent injury to persons working at heights



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# Guiding Principles

## Common causes of falls from height

- unsafe workplaces
- unsafe means of access to workplaces
- and/or a lack of planning, coordination, monitoring and control



Ensure all 'work at height' and 'prevention of objects falling from height' is planned, organised and carried out by competent persons and trained workers

## Safe system of work

1. Examine work tasks
  2. Identify hazards & assess the risks
  3. Delineate safe working methods that ensure hazards are eliminated and risks minimised. eg. permit to work
  4. Implement the system
  5. Monitor and review the system
- A safe system of work is needed when hazards cannot be physically eliminated and certain elements of risk remain



# Guiding Principles

## Hierarchy of Controls

- Avoid working at height
- Providing suitable railings, scaffolding and working platforms
- Use fall arrest systems (if appropriate) to reduce risks of falling as the last resort



Working platforms



Fall arrest system

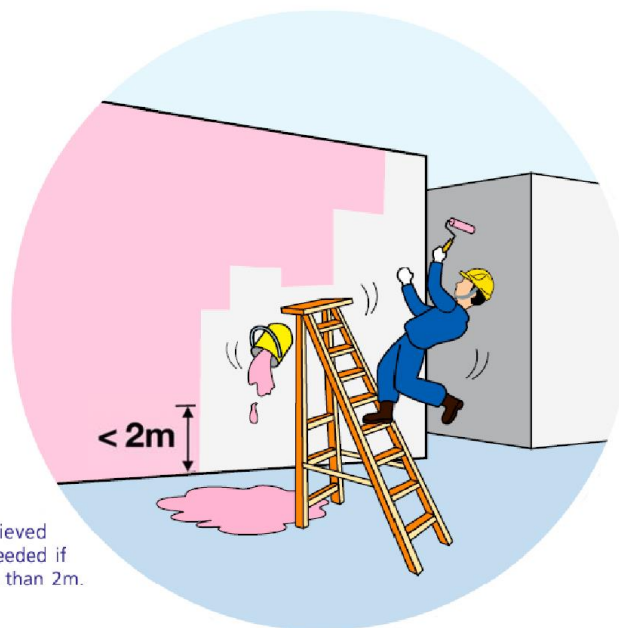


Lift shaft gate

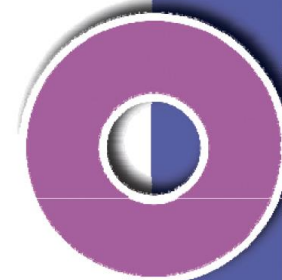
# Guiding Principles

## Two-metre Rule

- Construction Sites (Safety) Regulation 38B
  - Prevention of falls from a height of 2m or more.
- It is often mistakenly believed that no further action is needed if a person faces a fall of less than 2m. This belief is wrong !



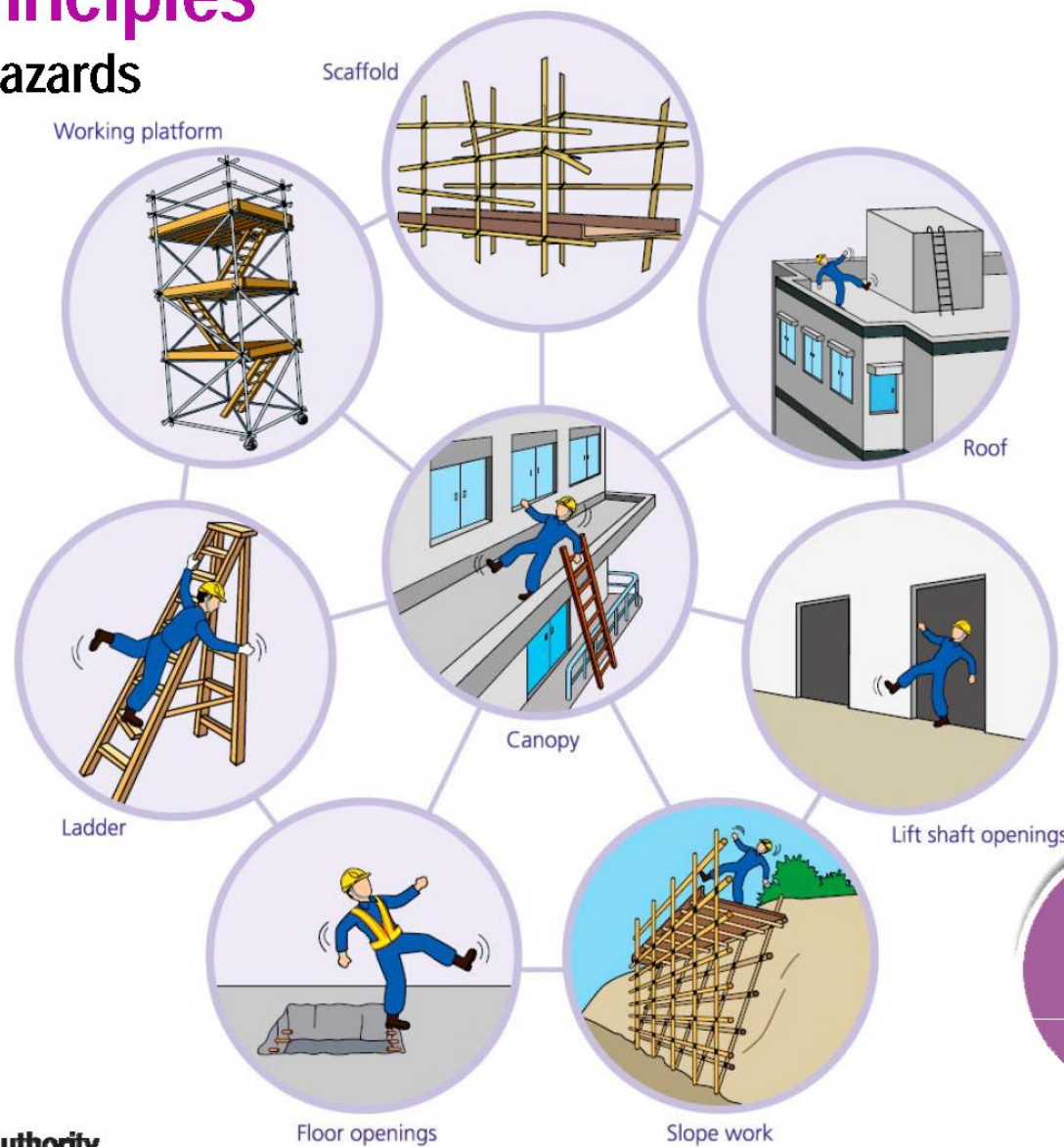
It is often mistakenly believed that no further action is needed if a person faces a fall of less than 2m. This belief is wrong.





# Guiding Principles

## Typical height hazards



# Guiding Principles

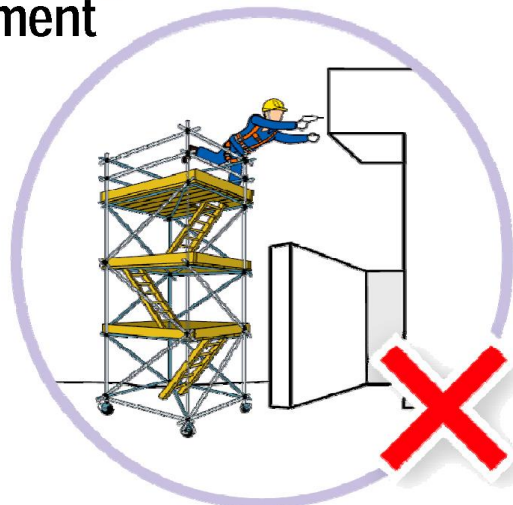
## Equipment for work at height

- It is tempting to use a ladder for a wide variety of jobs
- workers should primarily use working platforms for most jobs
- reserve ladders purely as means of access and egress to such platforms.

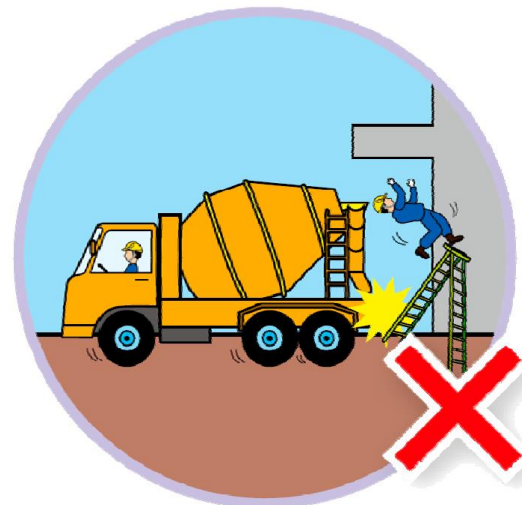


# Guiding Principles

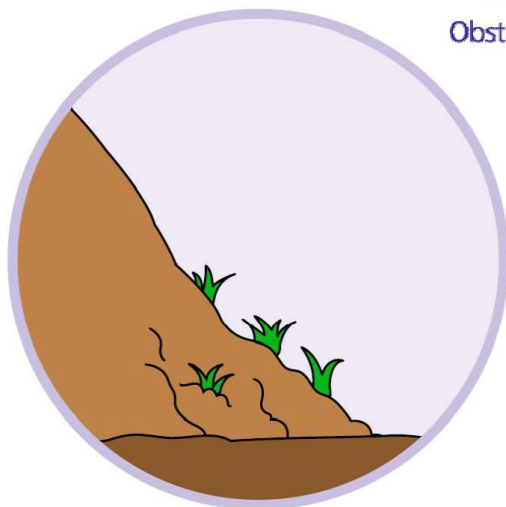
## Working environment



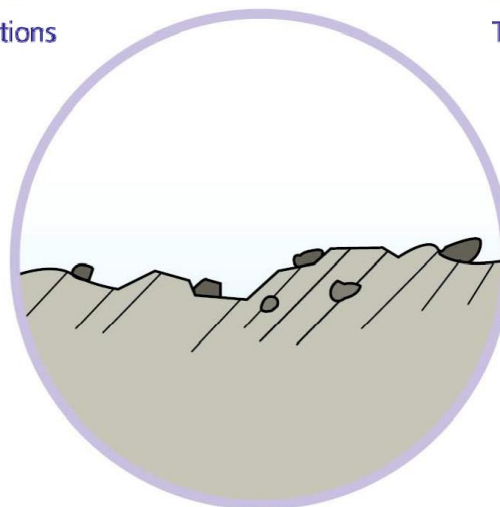
Obstructions



Traffic



Slope



Poor ground

# Guiding Principles

Distance to be negotiated for access and egress

Image 38: incorrect use of a straight ladder.



Distance and consequences of falls



Alternative Safety measures should be selected in such circumstances.  
i.e. fall prevention measures.



# Guiding Principles



## Duration and frequency of use

The use of ladders may be justified for low-risk, short-duration, repetitive and light work duties at heights of two metres or less.

## Evacuation and rescue

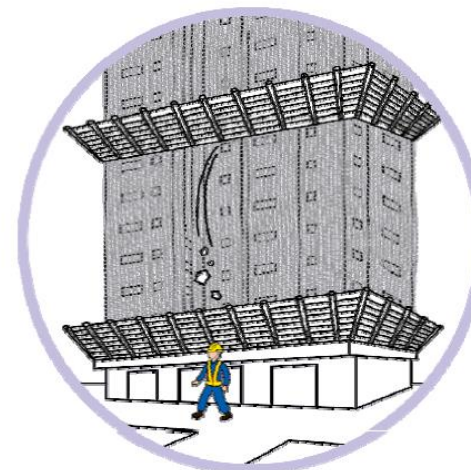
Evacuation from a deployed fall arrest system



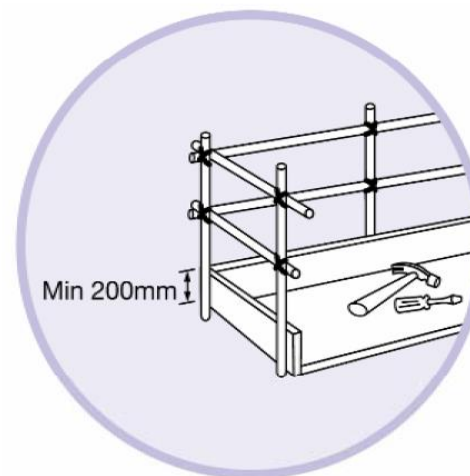
# Guiding Principles

## Hazard of objects falling from heights

- to prevent workers from being struck by falling materials or objects
- to prevent scaffolding materials, tools or other objects and materials from being thrown, tipped or shot down



Personal control measures



Prevent falling object

# Guiding Principles

## Guidance materials

- Code of Practice for Bamboo Scaffolding Safety



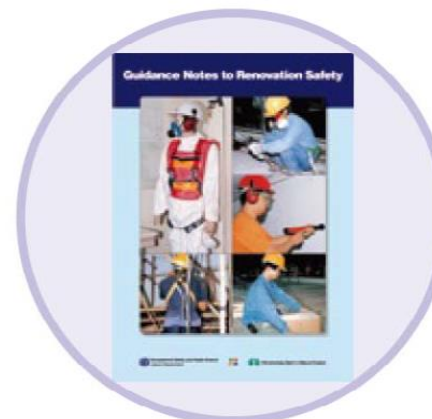
- Beware of Fall at Work



- Code of Practice for Metal Scaffolding Safety



- Guidance Notes to Renovation Safety



- Construction Sites (Safety) Regulations
- Statutory General Duties Requirements under Factories and Industrial Undertakings Ordinance - Section 6 (e.g. Safe Systems of Work)

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# Guiding Principles

- Guidance Notes on Safe Use of Power-operated Elevating Work Platforms



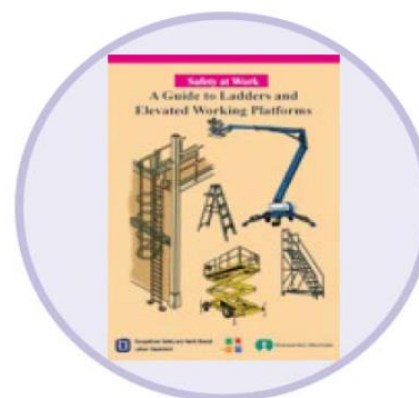
- Guidance Notes on Classification and use of Safety Belts and their Anchorage System



- Occupational Safety and Health Management in Renovation and Maintenance Works for the Property Management Industry



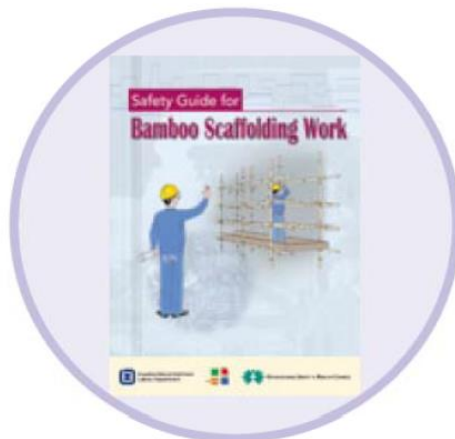
- Safety at Work – A Guide to Ladders and Elevated Working Platforms



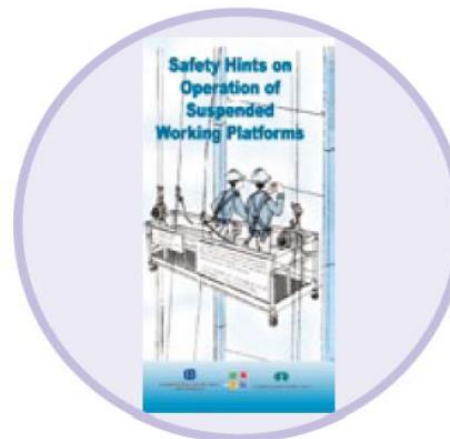


# Guiding Principles

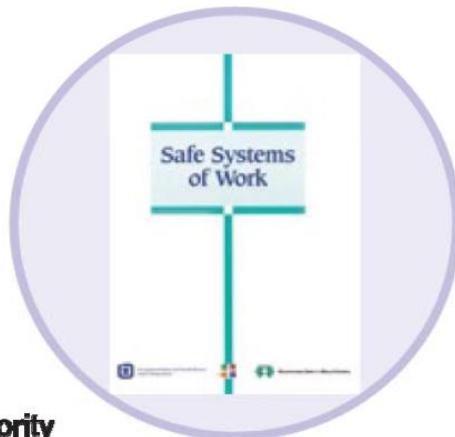
- Safety Guide for Bamboo Scaffolding Work



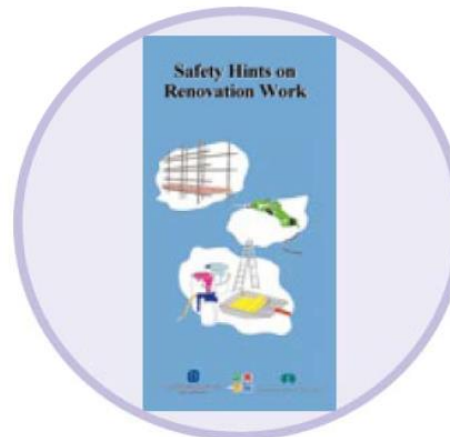
- Safety Hints on Operation of Suspended Working Platforms



- Safe System of Work



- Safety Hints on Renovation Work



# Risk Assessment

- Conducted by person-in-charge of place of work, safety officer, supervisory personnel and frontline workers
- Cover all work details and potential hazards
- A careful examination of what could cause harm to people as a result of a work activity
- Conducted by a competent person and endorsed by a management staff with sufficient safety knowledge
- **Control measures** for work at height
  - **Collective measures** protect more than one person at any one time, such as scaffolds
  - Passive nature
  - This measure should aim at requiring no action by users in order to work effectively



Collective control measures always take priority over personal control measures

# Risk Assessment

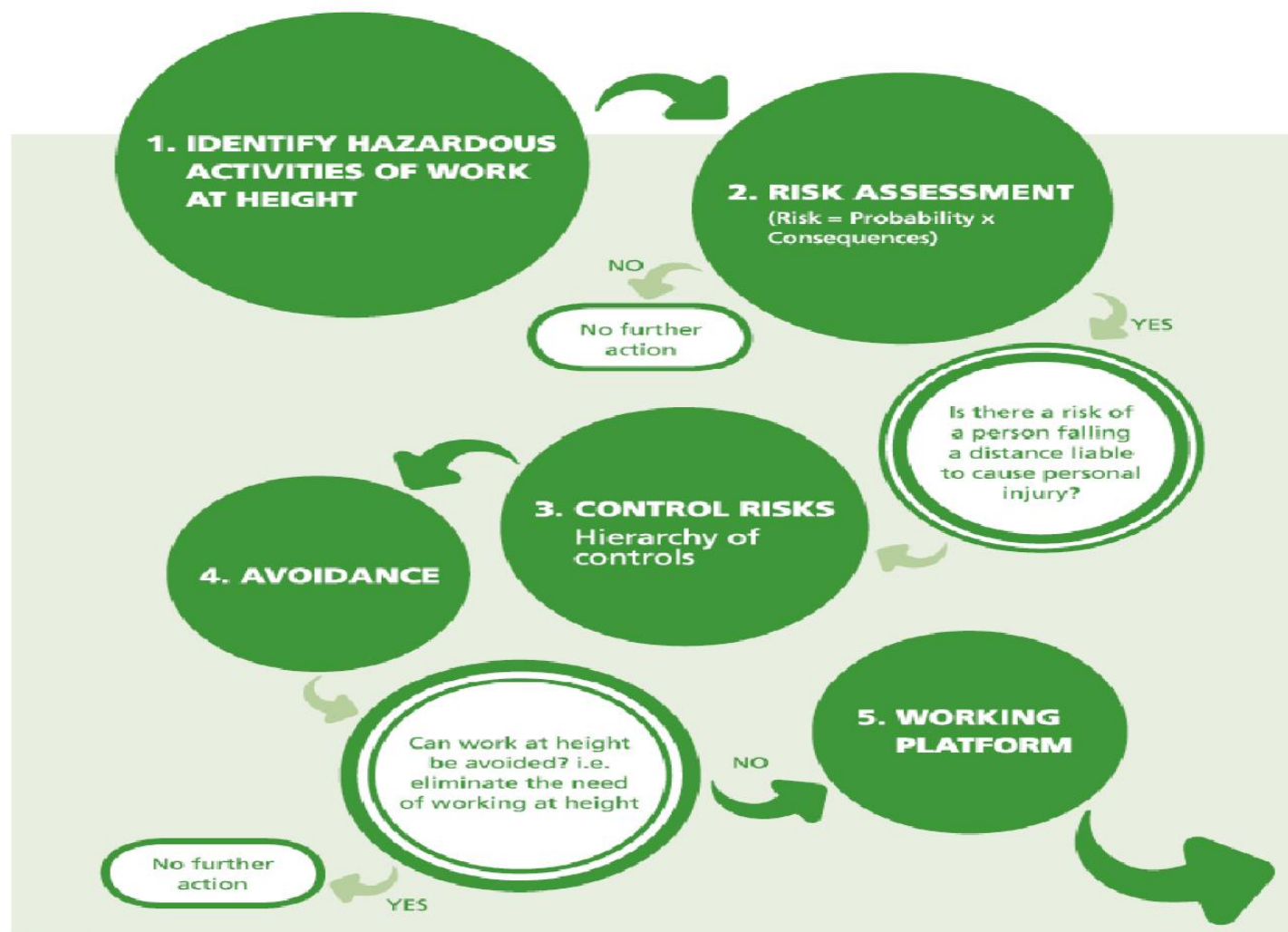
- **Personal control measures** rely upon personal protective equipment and only protect individual users, such as fall-arrest harnesses
- Require the user to take specific actions in order for them to work effectively e.g. clipping PPE lanyards onto an anchorage point



Personal protective equipment  
- Safety Belt

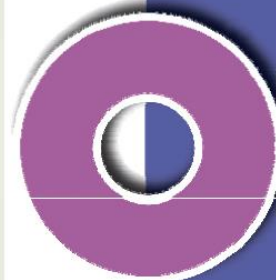
# Risk Assessment

Working at height—risk assessment flowchart





# Risk Assessment



# Risk Assessment

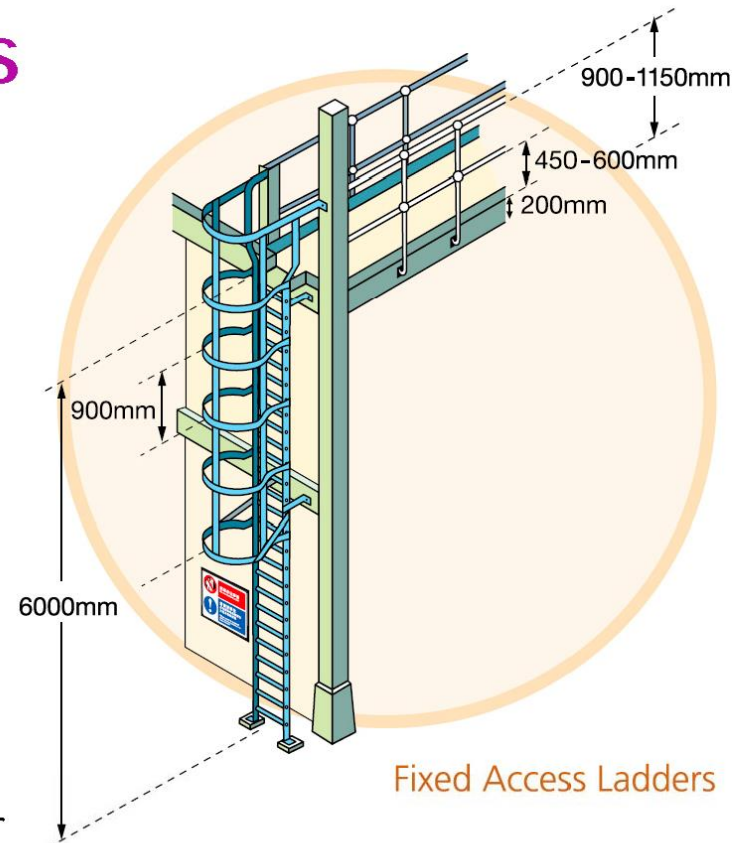


# Safe Working Methods

## Workplace access

### Fixed access ladders

- Inherent risks
- Should be avoided
- Suitable safety hoops
- Landing place or rest platform
- Additional administrative controls - Signage
- A retractable bottom section
- Using lockable plates to cover the lower rungs or having removable / retractable lower rung sections.



# Safe Working Methods

## Workplace access

### Fixed access ladders

- If safety hoops is not possible and use of fixed access ladders is required with angles exceeding  $75^\circ$  to the horizontal
- Provide temporary/permanent guided-type fall arresters on rigid anchorage lines
  - Anchor cable or rail
  - Climbers need to wear a harness attached to a Type 1 fall arrest device (inertia lock) which is free to slide up and down this cable or rail

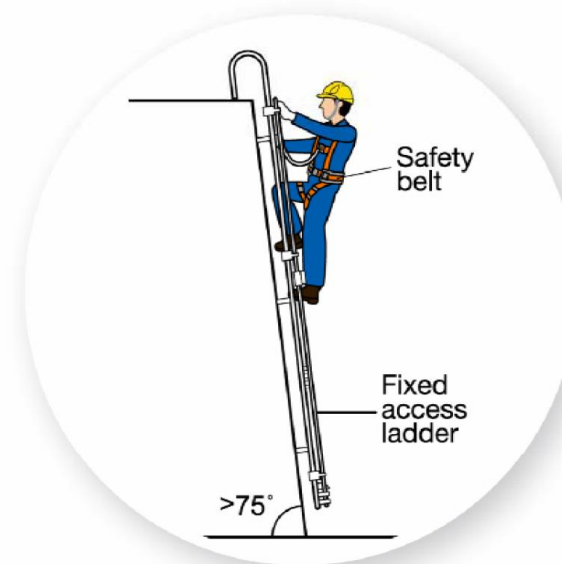


Image 16: ladder/tower-scaffold fall arrest system

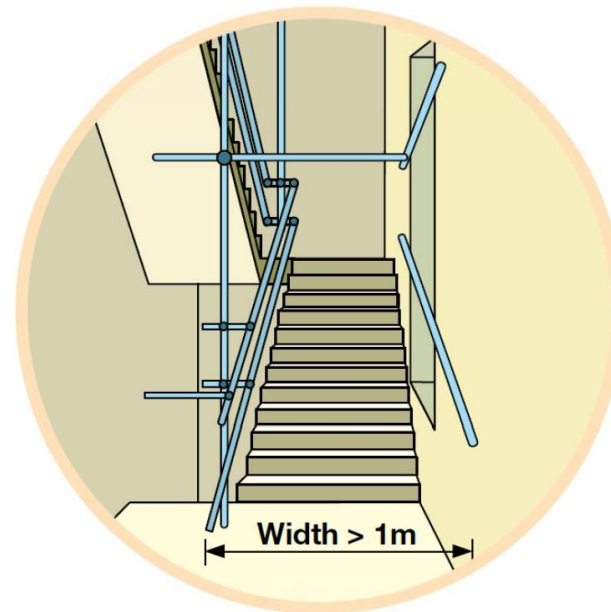
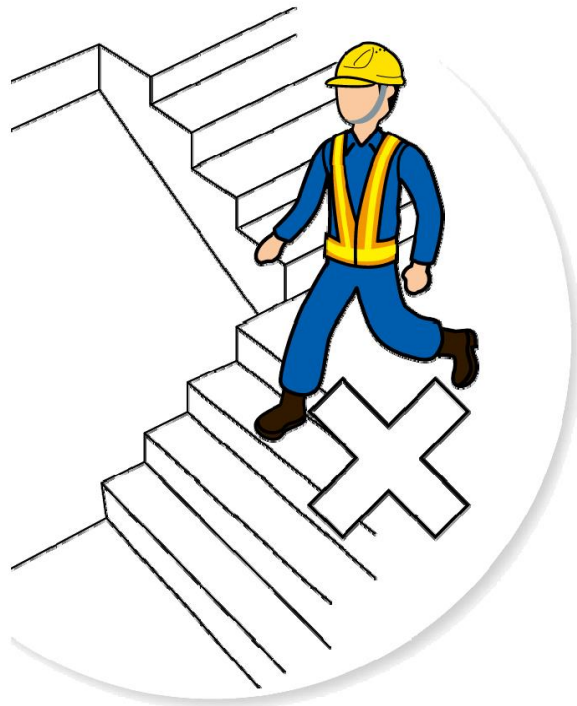


# Safe Working Methods

## Workplace access

### Stairways

- Top and mid guard rails
- Toe board required if there is a risk of falling objects



Guard rails shall be provided on both sides for stairways wider than 1m.

The open edges of stairways require guard rails with mid-rail protection.



# Safe Working Methods

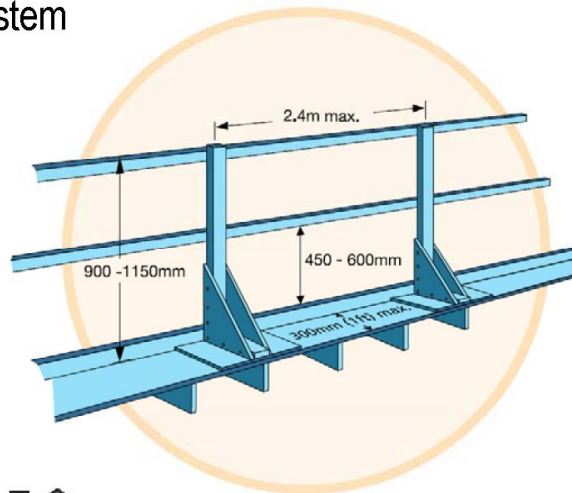
## Workplace access

### Openings, corners, breaks, edges and canopies

- Guard rails and toe board
- as a last resort — fall arrest systems be provided
- Chains are not rigid enough to provide adequate edge protection
- Where guard rails must be temporarily removed ....
- Workers in such areas must use a fall-arrest or work restraint system



Image 7: retractable fall arrester (RFA), comprising a retractable lanyard and protective housing.



All floor openings must be guarded off or securely covered.

# Safe Working Methods

## Workplace access

### Openings, corners, breaks, edges and canopies

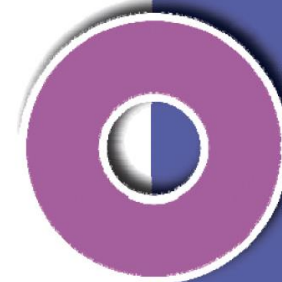
- Full-height temporary protective barriers to lift shaft openings
- Fall arrest systems must be designed to provide continuous protection
- allowing them to attach and detach safety belts/harnesses to a continuous anchorage system in a safe position before and after working at height



Image 1: full-height temporary protective steel gates covering lift shaft openings, providing protection against fall of persons/objects.



Lanyards or anchor lines must be attached to the top dorsal position





# Safe Working Methods

## Workplace access

### Openings, corners, breaks, edges and canopies

- Anchorages for lanyards should be fixed as high as practicable, but within easy reach
- There are no obstructions within this fall zone

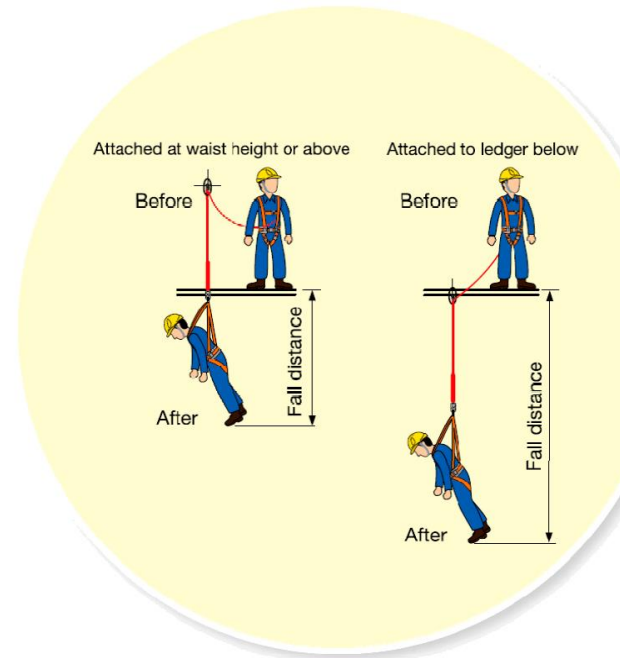


Image 37: no safety measures taken while working on sloping canopy.



Image 42: anchorage devices installed too close to roof edges and anchors not providing continuous protection.



Image 11: fall arrest PPE (horizontal lines)



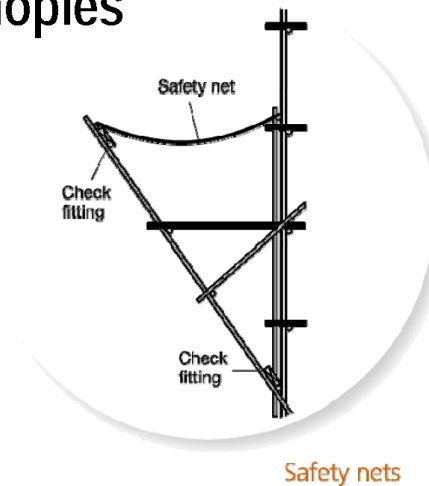
# Safe Working Methods

## Workplace access

### Openings, corners, breaks, edges and canopies

#### Safety nets

- When all other safety measures are impracticable to protect workers from injury due to fall hazards
- impracticable to provide a working platforms
- the fencing off of dangerous places
- maximum recommended distance a person should be able to fall before encountering a safety net is 6m
- Be installed by a competent person
- Be maintained, checked and tested according to manufacturer's instructions and records of such properly recorded
- Be installed with exits at their edges
- Free from with chemical and physical damage
- Not be used for storage of any items



Safety nets



Image 22: external safety nets

# Safe Working Methods

## Workplace access

### Roof work

- No risk of a fall → Deemed safe
- flat roofs with a parapet or permanent guard rail of adequate height to prevent falls over the edge
- temporary guard rails, scaffolding, tower scaffolds and elevating working platforms is required to prevent a fall
- barriers or guard rails high enough and strong enough to stop people rolling/sliding down the roof slope



Fall prevention – flat roofs with a parapet or permanent guard rail adequate height to prevent falls over the edge



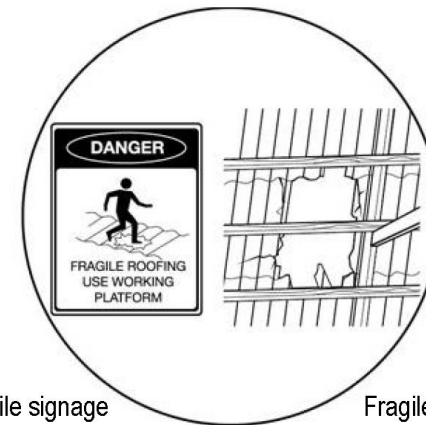
Image 14: safe access via temporary scaffolding work platform

# Safe Working Methods

## Workplace access

### Work on/near fragile roofs and surfaces

- Risk of collapse
- Planning for work on/near fragile roofs and surfaces
- using elevating working platforms, tower scaffolds or other safe means to access the work areas from underneath



Fragile signage

Fragile roof

### Tree lopping and trunk/branch removal

- Access equipment eg. Mobile elevating work platform



The safe use of access equipment such as mobile elevating work platforms



Image 21: fragile/brittle roofing material





# Safe Working Methods

## Metal and bamboo scaffoldings

- Top and mid guard rails and toe boards
- Be fully boarded
- Erection, alteration and dismantling must be conducted by trained workmen under the immediate supervision of a competent person
- Form 5 (inspection by competent person – before 1st use, every 14 days, after adverse weather.

Image 6: working gangways and runs with boards/planks.



Image 3: suitable guard rail heights (steel scaffolding).

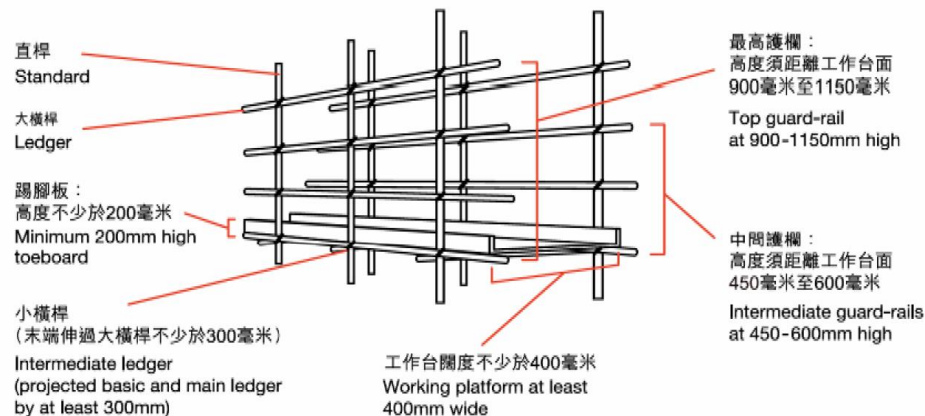


Image 34: non-closely-boarded working platform with dangerous void space.



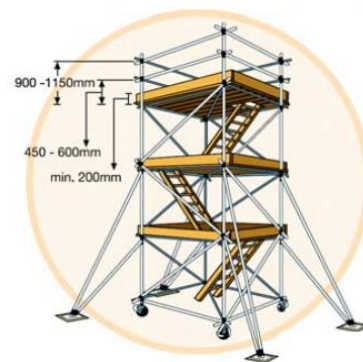
# Safe Working Methods

## Tower scaffolds

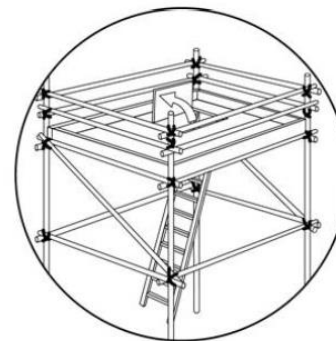
- Risk of toppling

## Tower scaffold stability

- Ratio of height to base width should not exceed 4:1 for static tower used indoors
- Ratio should be 3:5:1 for static towers used outdoors
- Ratio should not exceed 3:1 for mobile towers used outdoors
- Lock the wheel when the tower is in use
- Form 5



Fencing in mobile working platform



The working platform of tower scaffolds should be equipped with a cover

Image 17: mobile tower scaffold, access ladder with guard rails, trapdoor and toe boards provide a safe working platform.

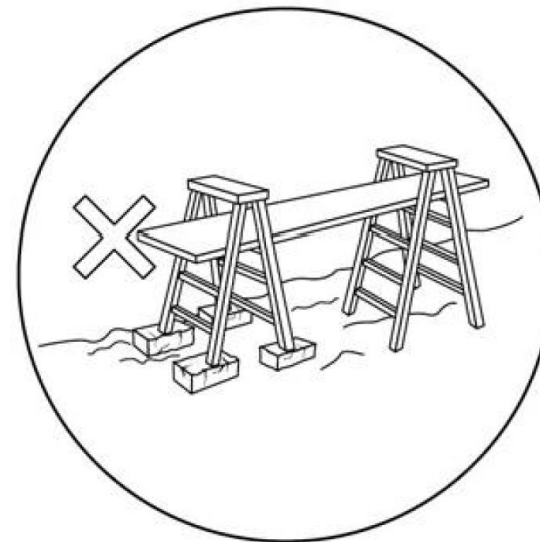
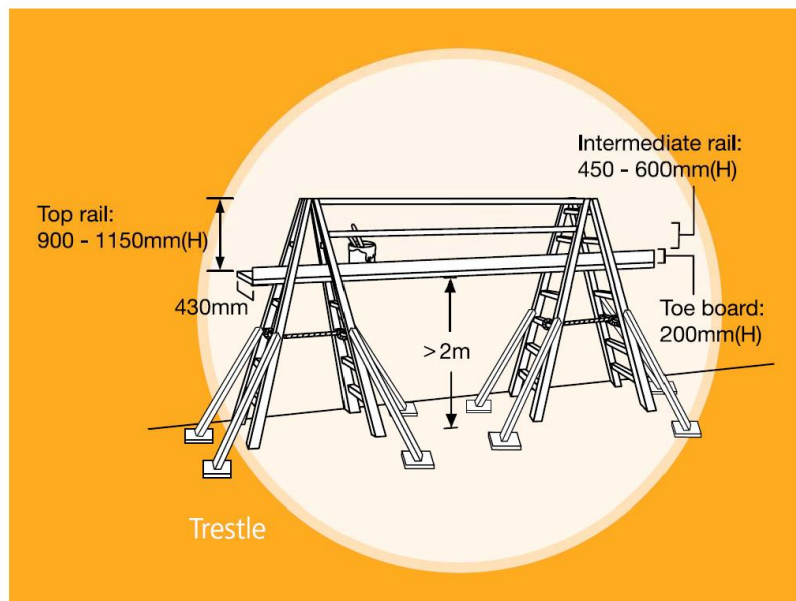


The tower is erected on sloping / uneven ground

# Safe Working Methods

## Trestles

- They have toe boards and guard rails installed where the fall distance is over 2m or the fall area contains hazards such as sharp projecting objects like steel reinforcing bars (rebar)
- Measures are in place to control instability and prevent possible toppling including tying trestles to a permanent structure or using outriggers



Do not use bricks / blocks as soleplates for trestles



# Safe Working Methods

## Ladders and stepladders

- Low risk
- Repetitive and right work
- Work of short duration ( maximum of 30 minutes )
- Where a worker can maintain three points of contact, via hands and feet, in their working position
- For any works conducted at a height of 2m or more, ladders should only be used for access and egress, and not as a long-term 'platform'
- Ladder : height / base ratio = 4:1



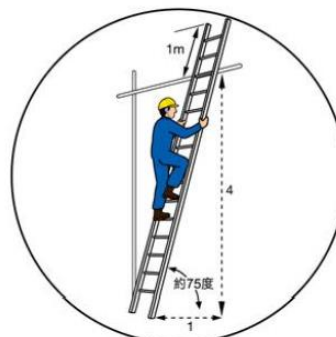
Image 18: step platform ladder



Tools requiring the use of two hands should not be used



Overstretch the body to either sides of the ladder



1m out at the base for every 4m in height



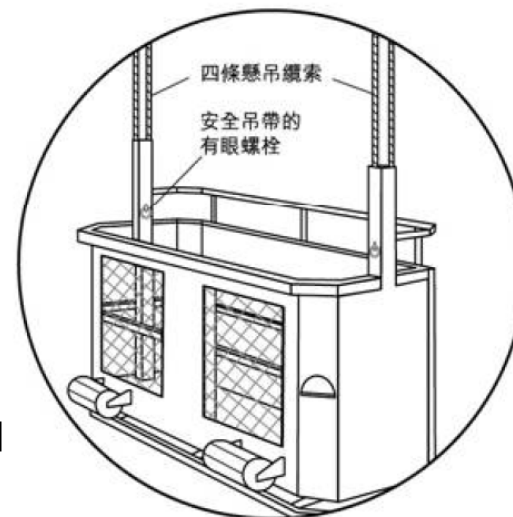
Three points of contact



# Safe Working Methods

## Suspended working platforms (SWPs)

- All installation, maintenance and dismantling of suspended working platforms should meet the Factories and Industrial Undertakings (Suspended Working Platforms) Regulation
- The top guard rail and intermediate guard rail should be fixed 900–1150mm and 450–600mm above the platform and a toe board of 200mm high
- Every person riding on a suspended working platform shall wear a safety belt properly attached to an independent lifeline or an appropriate anchorage
- The maximum number of persons that may be carried at any one time must be clearly and legibly marked on each SWP
- Form 1 ( inspection by competent persons  $\leq 7$  days )
- Form 2 ( examination by competent examiner  $\leq 6$  months )
- Form 3 ( loading less and examination by competent examiner  $\leq 12$  months )



Suspended working platforms

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# Safe Working Methods

## Mobile elevating working platforms (MEWP)

### Scissor-type platform

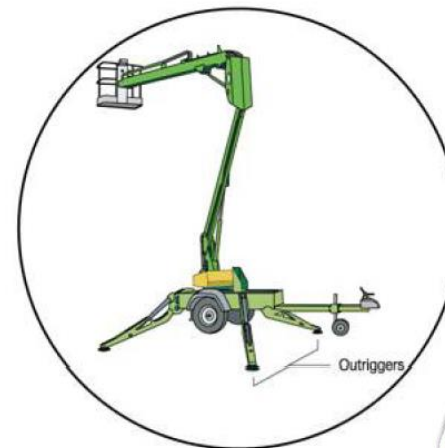
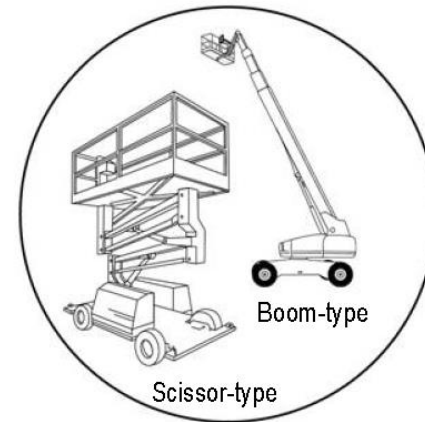
- Larger basket and lift capacity than boom type

### Boom-type platform

- Unsuitable for installing long/heavy materials, or bulky materials that may obstruct the function controls

## Avoiding operator overreaches

- All workers must wear safety harnesses when working on MEWPs
- The bucket should be used purely as a working platform and not as a means of access to, or egress, work areas.

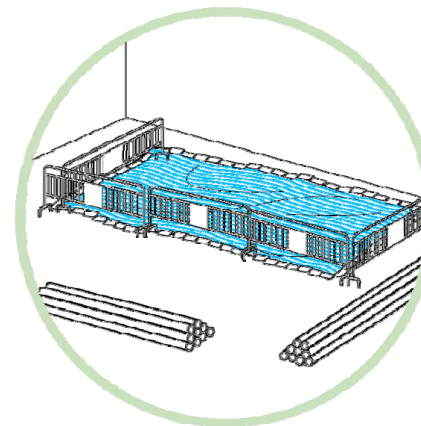


Fully extension of outrigger

# Safe Working Methods

## Objects falling from height

- Provide a safe means of raising and lowering plant, materials and debris in the place of work
- Take sufficient measures to arrest the fall of such objects including: scaffolding platforms, roof edge protection systems, toe boards and appropriate guard rail infill panels
- Secure loose and/or light materials stored on roofs, open floors and platforms
- Keep materials at a reasonably safe distance—at least 1.8m—away from floor and roof openings
- Nylon meshes and catch-fans to guard against falling objects
- Workers should be provided with tool straps to prevent materials and hand tools falling from height
- Personal protective equipment, such as safety helmets, must be worn by all workers
- Fence off areas with work at height and risk of falling objects

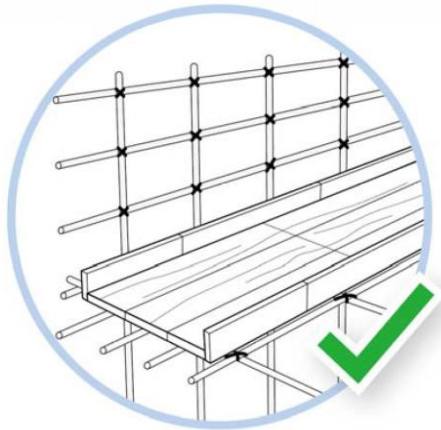


Keep materials at a reasonably safe distance—at least 1.8m—from floor, roof openings, edges, excavations and/or trenches.

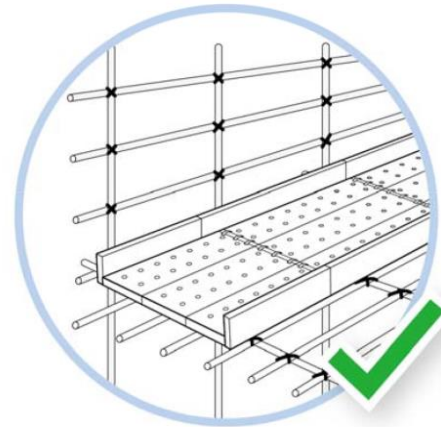


Image 28: sloping catch-fan

# Good Working Practices



suitable guard rail heights (bamboo scaffolding).



working gangways and runs with boards/planks.



working platforms with boards/planks.



boom-type mobile elevating working platforms (MEWP)



# Good Working Practices



provision of safe access to, and egress from, a work area



temporary working platform (TWP)



large steel formwork working platform with wire mesh fencing



lift-shaft temporary working platform



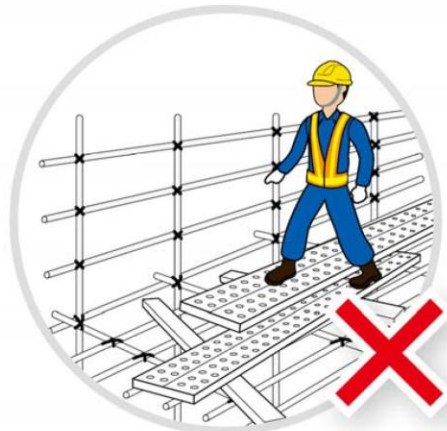
# Bad Working Practices



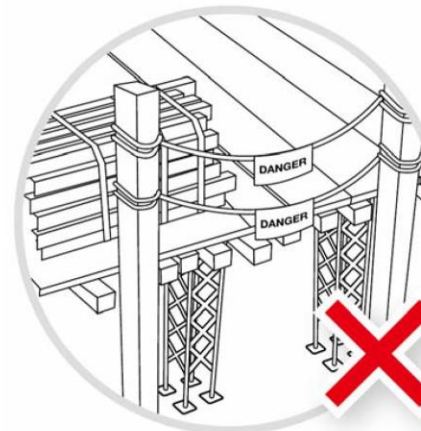
working near floor edge without adequate fall protection.



working on substandard working platform.



working platform which is not closely boarded with uneven planks and dangerous void space.



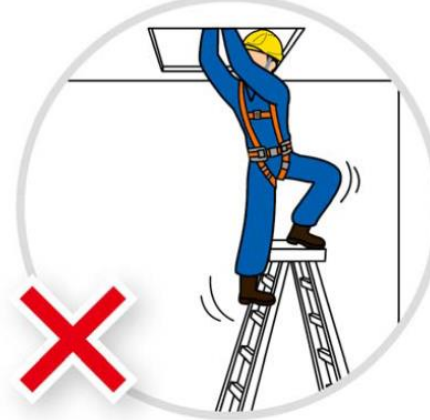
Nylon rope fencing at floor edge is unacceptable.



# Bad Working Practices



workers supporting themselves unsafely on narrow wooden planks.



'at-risk behaviour'—standing on top step of stepladder.



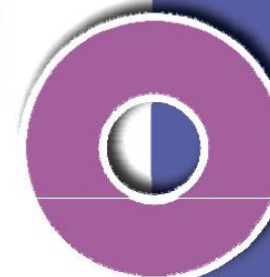
unsafe makeshift wooden ladder without guard rail.



unprotected floor opening without netting to prevent materials/persons falling.

# Case Studies

- Learning from mistakes – avoiding tragedies





# Performance checklist for working at height

- Items for checking :
  1. Scaffolding
  2. Working platforms
  3. Floor edges, staircase edges, lift shafts and floor openings
  4. Ladders
  5. Preventive measures against people falling
  6. Preventive measures against material from falling
  7. Suspended working platforms
- Check performance :
  1. Good
  2. Needs improvement
  3. Needs immediate improvement

Performance checklist for working at height

Item	Good	Needs Improvement	Needs Immediate Improvement	N/A	Remarks
<b>1. Scaffolding</b>					
Has the construction, addition and alteration works of the scaffold been conducted by trained and experienced workers under the direct supervision of a competent person?					
Is the scaffolding secure from collapse by being effectively fastened vertically, horizontally and diagonally?					
Is the scaffolding standing on suitable ground surface or foundation?					
Is there safe access available to the scaffolding users?					
Was the scaffolding inspected by a competent person before use and at least once every 14 days with the findings duly recorded in the statutory inspection form?					

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# Principal safety and health legislation

## General duties provisions under FIUO

- Sections 6A and 6B of the Ordinance impose general duties on proprietors and persons employed with regard to the health and safety at work in industrial undertakings

## Construction Sites (Safety) Regulations

- Legal requirements to ensure the safety, health and welfare of workers on construction sites

## Issuance of improvement notice and suspension notice under the Occupational Safety and Health Ordinance

- Section 9 - Commissioner to serve on an employer or an occupier of premises where a workplace is located an improvement notice requiring the rectification of contravention against safety legislation within a specified period
- Section 10 - Commissioner to serve on an employer who is responsible for, or an occupier of, premises where a workplace is located a suspension notice requiring suspension of an activity or use of premises or of any plant or substance where there is an imminent risk of death or serious bodily injury



# Aspirations

- Safety First
- ZERO incident's as a performance goal to provoke vigilance on all fronts.
- Adopt Safe System of Work
- 3 EARLYS:
  - EARLY planning
  - EARLY design
  - EARLY management
- Proper planning
- Safe methods
- Effective control, communication and supervision
- Reduce, and when possible eliminate, work hazards



# Thank You !!

