Work@Height Safety

By Durganand Thakur

Why Work at Height?

Working at higher heights on complex structures like towers, roof tope edges, hill tops , high rise buildings, bridges, inclined roofs, ladders, transportation machinery etc up to 20-100M is unavoidable

Working in remotest places and unmanned environment is the need of the hour

Millions of climbs every year across industries

Work at height remains one of the biggest causes of fatalities and major injuries

Know your height

Any work having fall potential of ≥1.8 m – flat roof without edge protection, inclined roof, fragile roof

Scenarios of Working at Height

Working over roof tops sites

Working on Pitched and inclined roofs

Scenarios of Working at Height

Working on telecom towers

Accessing high heap of soil

Accessing heights on ladders

Working on bridges

Working on silos

Who is at Risk

Anyone who is working at any place where the person could fall in absence of appropriate precaution.

E.g. – Person working at unprotected edges without anchoring himself.

Anyone not anchored to a secured or suitable anchor point is always at Risk of fall

Case study of a unfortunate fall lead to loss of life

Location &Date : Pune India on 31st July 2019

On 31st July afternoon, three members team were busy in finishing off the equipment installation optical fibre cable laying job. The victim Satish was at roof near a low height parapet wall. While other members were busy in other works. Satish role was to help in various activities like packing unpacking of boxes, cable dressing, tagging etc.

- The equipment room was located on the roof top of a 4 storied building
- Suddenly the team members other than victim heard a thud sound and noise of some people. They came out of the work and found that the third member the Victim have fallen down and lying on the road in front of the building. Both of them informed the supervisor/project coordinator about the incident followed by emergency response. However the doctors declared him dead
- There is no clue how the victim has fallen, however some of the observation are mentioned below

➢ Parapet wall height was less than 2 ft hence edge protection was not enough

➢ The victim was not anchored to any secured anchor point

➢ Risks like slippery floor was not captured at the time of raising the permits

➢ Supervisor was not present at site during work

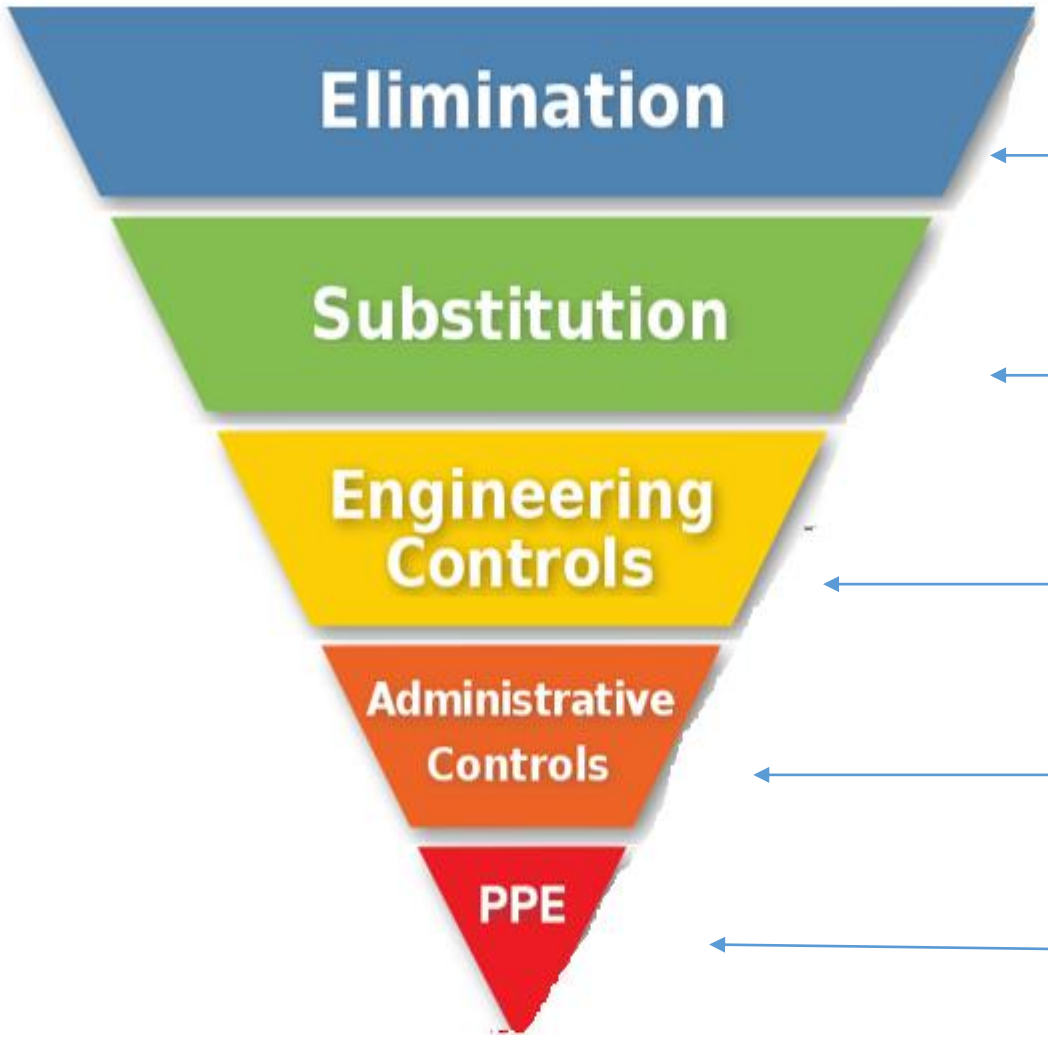
A precious life could have been saved by just anchoring the body with suitable support

Work at Heights Hazards

- Failure of a fragile surface.
- Unguarded holes in floors
- Failure of the elevated work platform
- Poor edge protection
- Falling object

Hierarchy of controls

Most Effective



Least Effective

Removing risk altogether or replacing with a lower level risk

Requires a physical change to the workplace

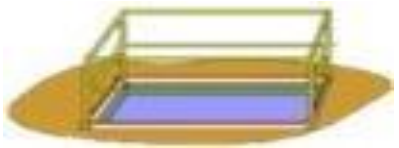
Requires worker or employer actions

Requires worker to wear

Think before working at heights

Can the task be performed at ground level.

If you can’t



Can a physical barrier be provided

If you can’t

Can the engineered work platform provided

If you can’t

Can you prevent reaching to an edge

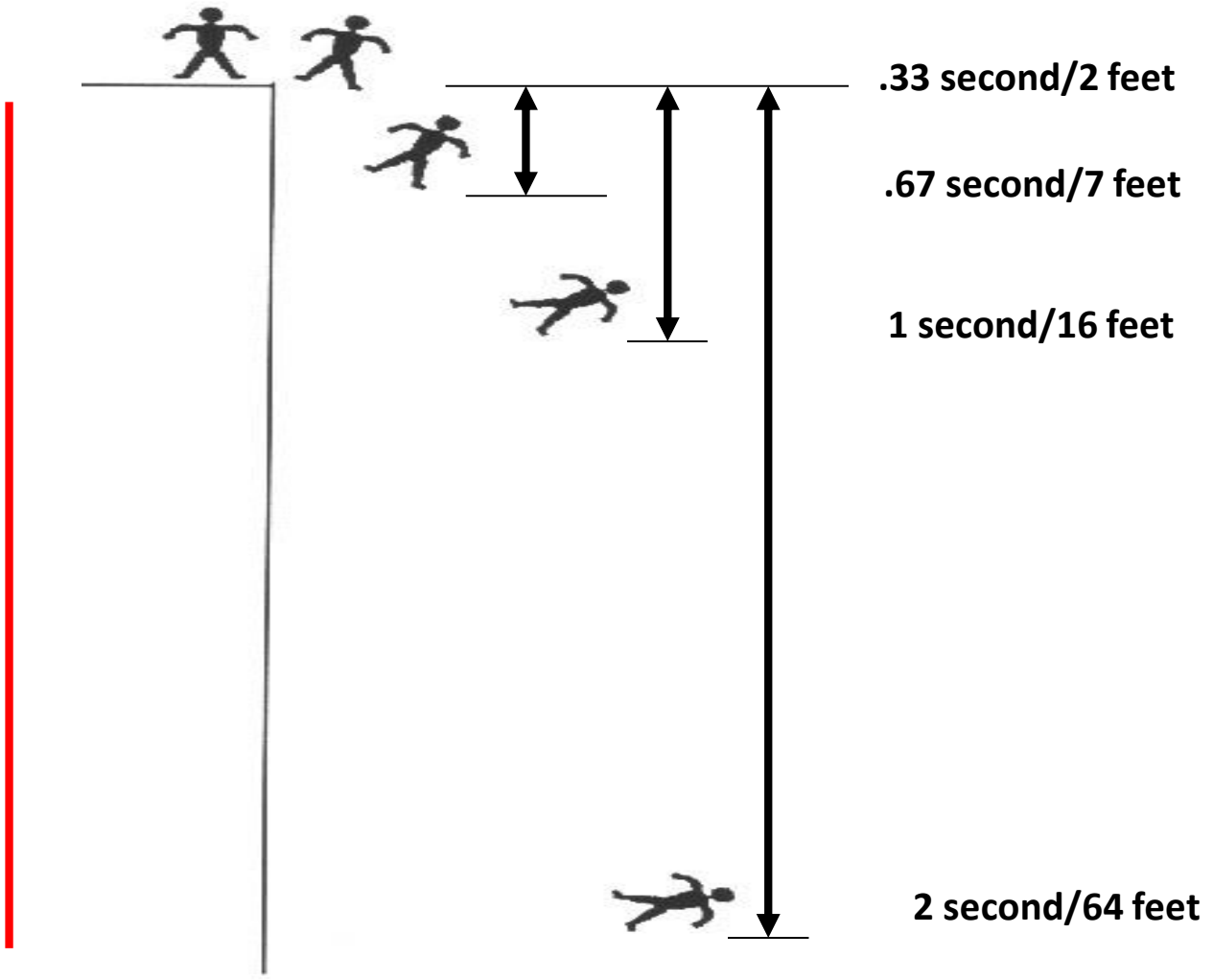
If you can’t

Can you use fall arrest system (PPE)

Understand the fall potential

Anatomy of Fall

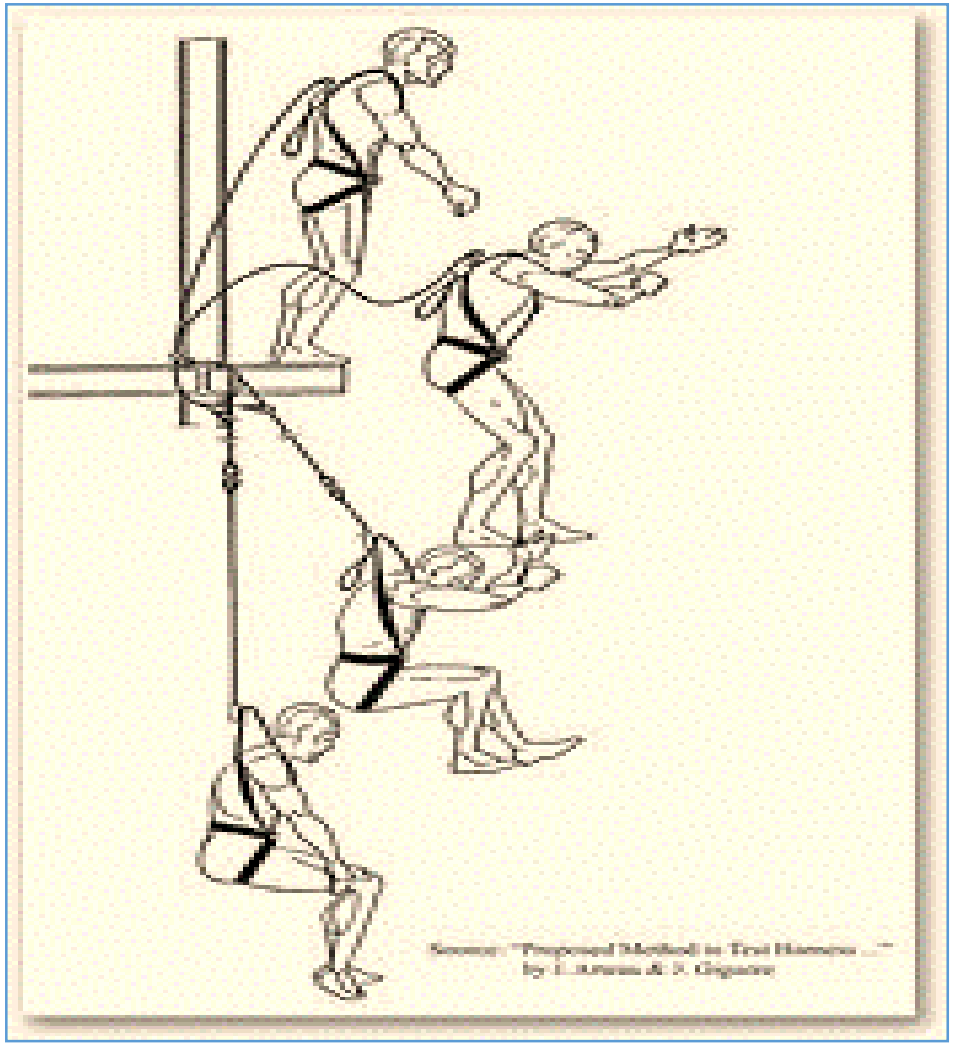
- It takes most people about 1/3 of a second to become aware.
- It takes another 1/3 of a second for the body to react.
- A body can fall up to 7 feet in 2/3 of a second.



Science of Fall

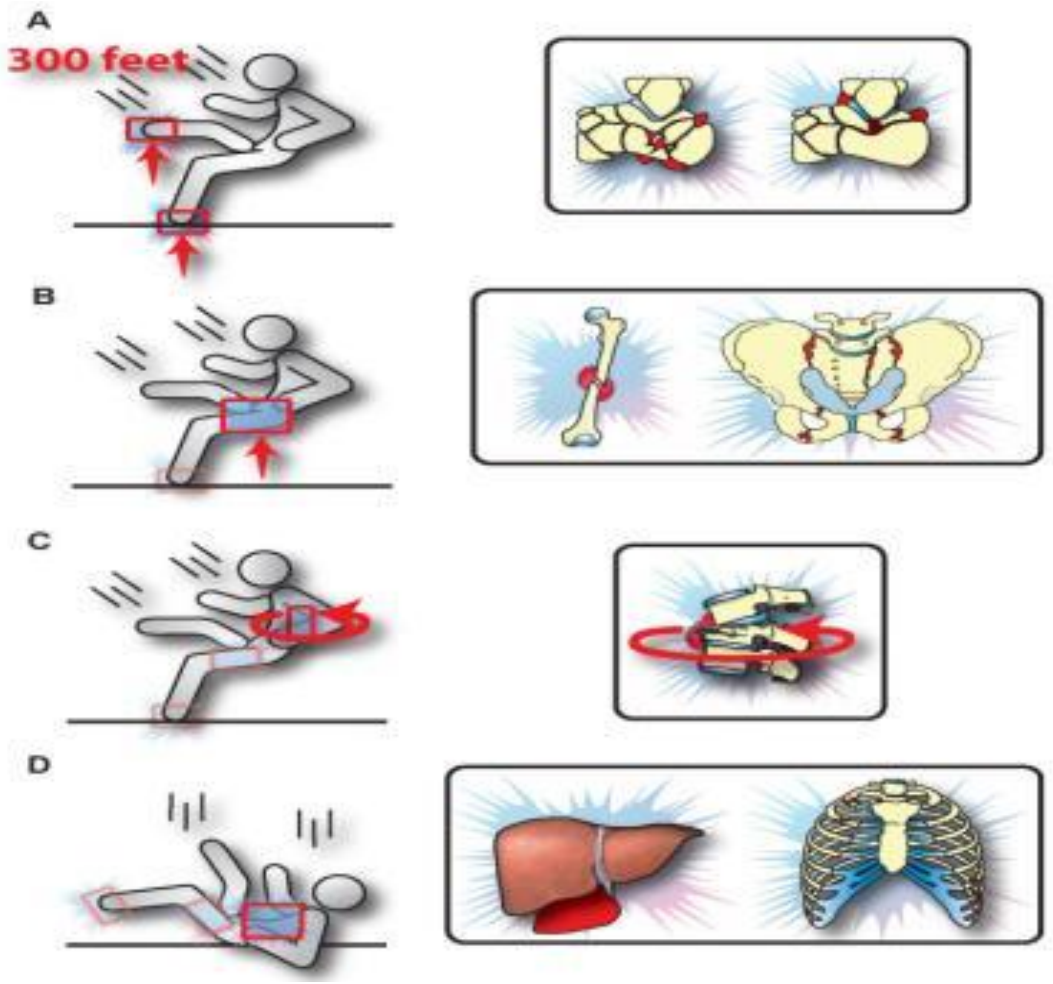
Fall in Meters	Force In kgs.
0.5	660
2.0	1568

A fall of 2 meter height converts to 1568 Kg force on a human body of 80 kg man.



After effects of fall

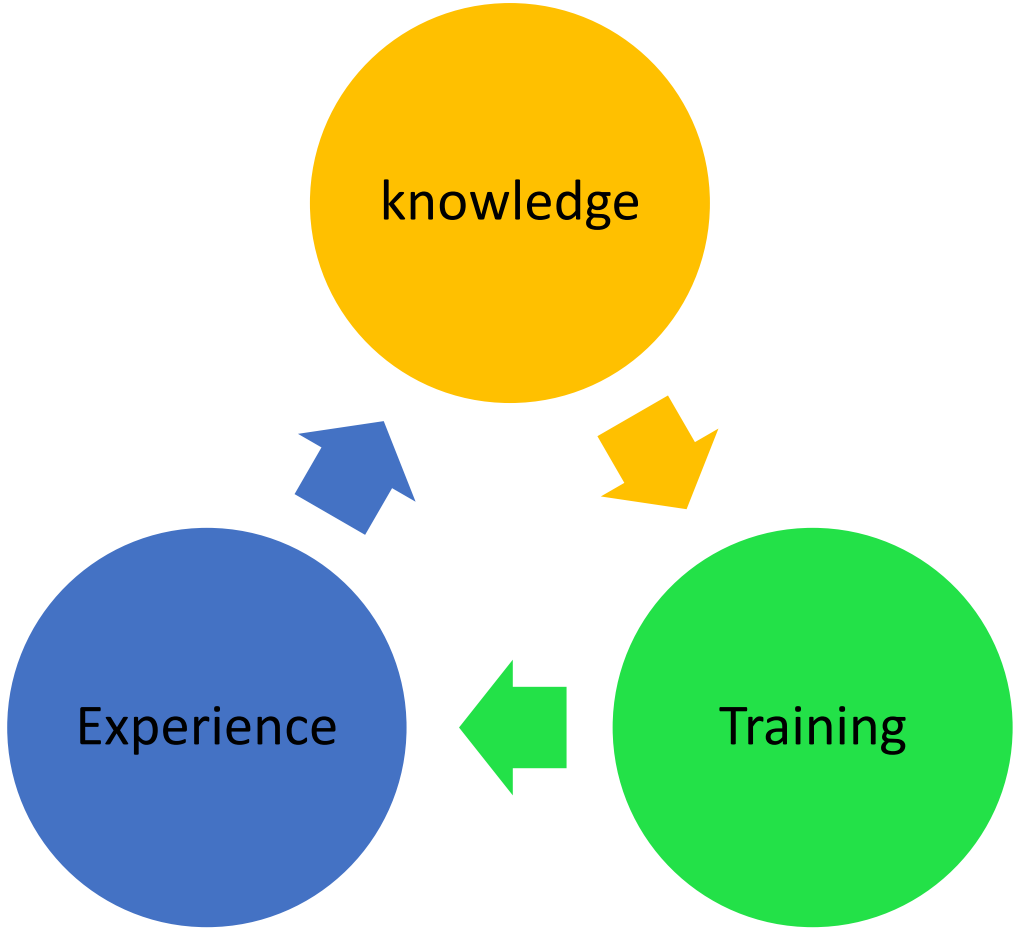
- Fracture, bone displacement
- Spinal injury
- Loss of limbs/ body parts
- Internal bleeding
- Loss of life – most common



Majority of accidents in Industrial environment are due to fall from height

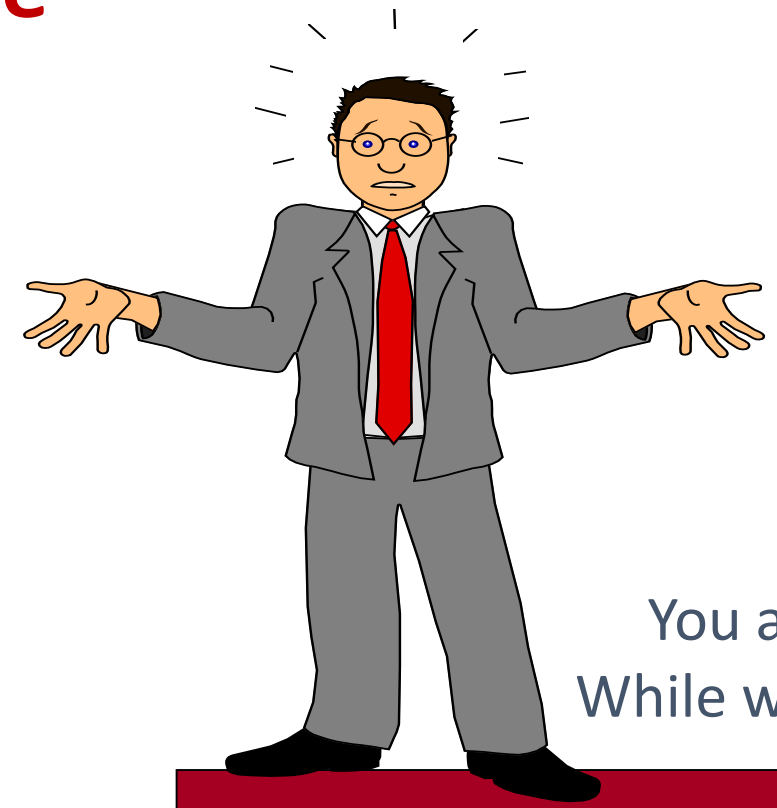
Can we prevent fall

- Anchorage point must be available
- Only trained personal must W@H.
- W@H must not be carried out during poor weather condition
- All w@H must be supervised (PTW/rescue and emergency response)



Yes we can prevent any potential fall with right discipline

Basic rule



You always need fall protection
While working >1.8 mtr potential fall

1.8 meters

Understand the fall protection

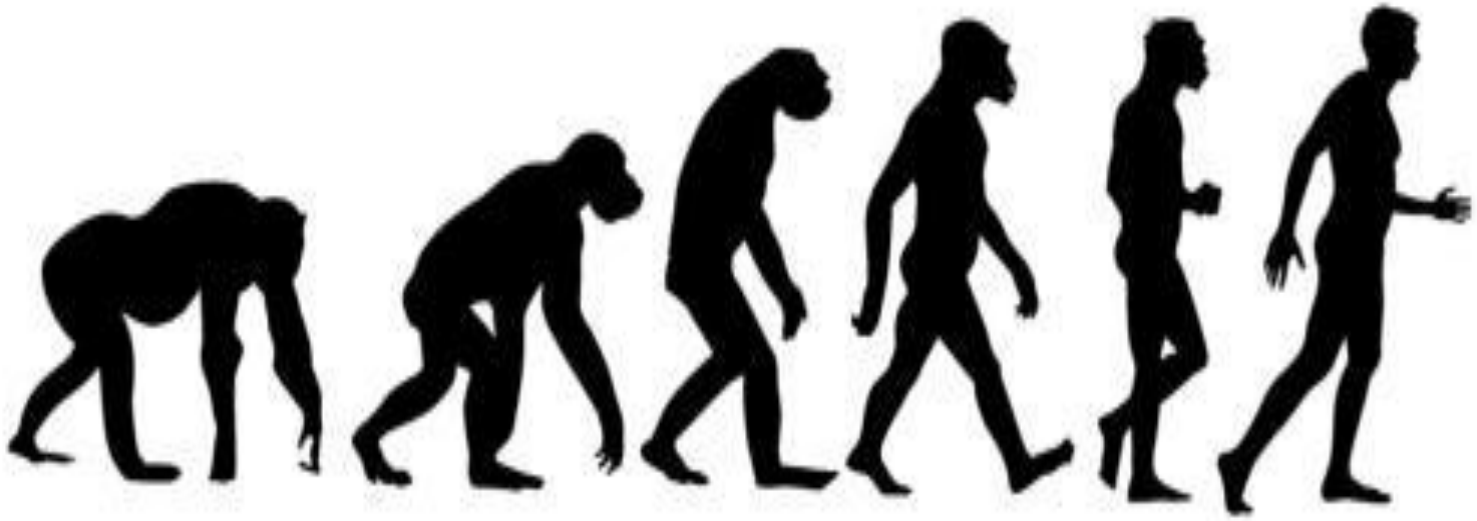
Fall protection is just ABCD

- **A**nchorage
- **B**ody Support Harness
- **C**onnecting element
- **D**escent

Evolution of Fall Protection

The developments

- Fall prevention
- Less injury
- Shock absorption
- Work positioning
- Rescue,SafeAccess,
- Industry specific Harness



NO HARNESS

Fall Protection Components

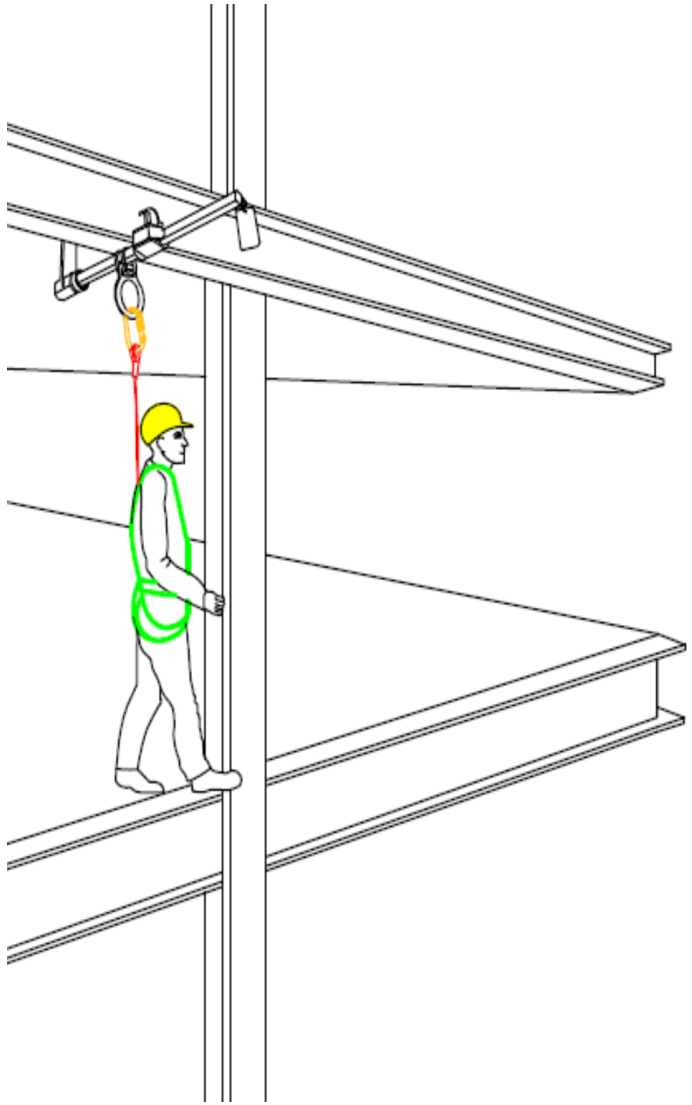
A  Anchor

C  Connecting element

B  Body support harness

D  Descent

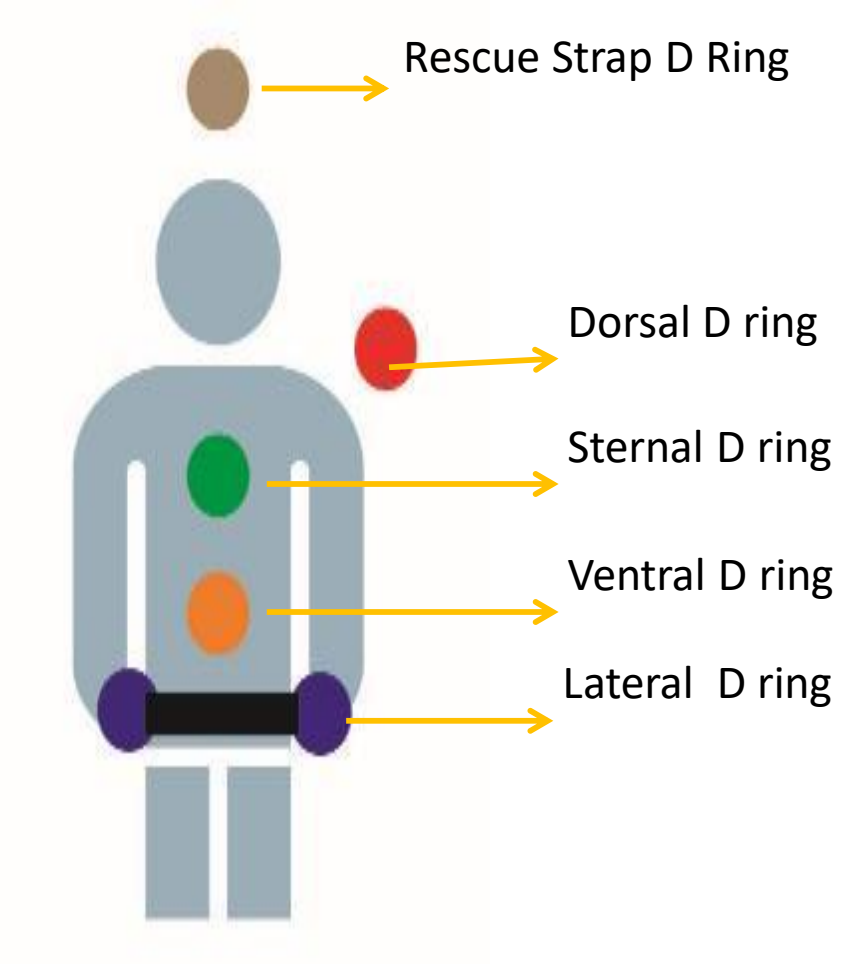
E  Entry



Body Support system of any harness

Attachment in Harness

- Dorsal d ring
- Sternal d ring
- Ventral d ring
- Lateral d ring
- Rescue Strap D Ring



Evolution of Connecting Elements

Single Lanyard

Twin Lanyard

Internal shock absorbing Lanyard

Connecting Elements

Rope Grab Fall arrestors

Retractable Fall arrestors

Various Fall protections systems

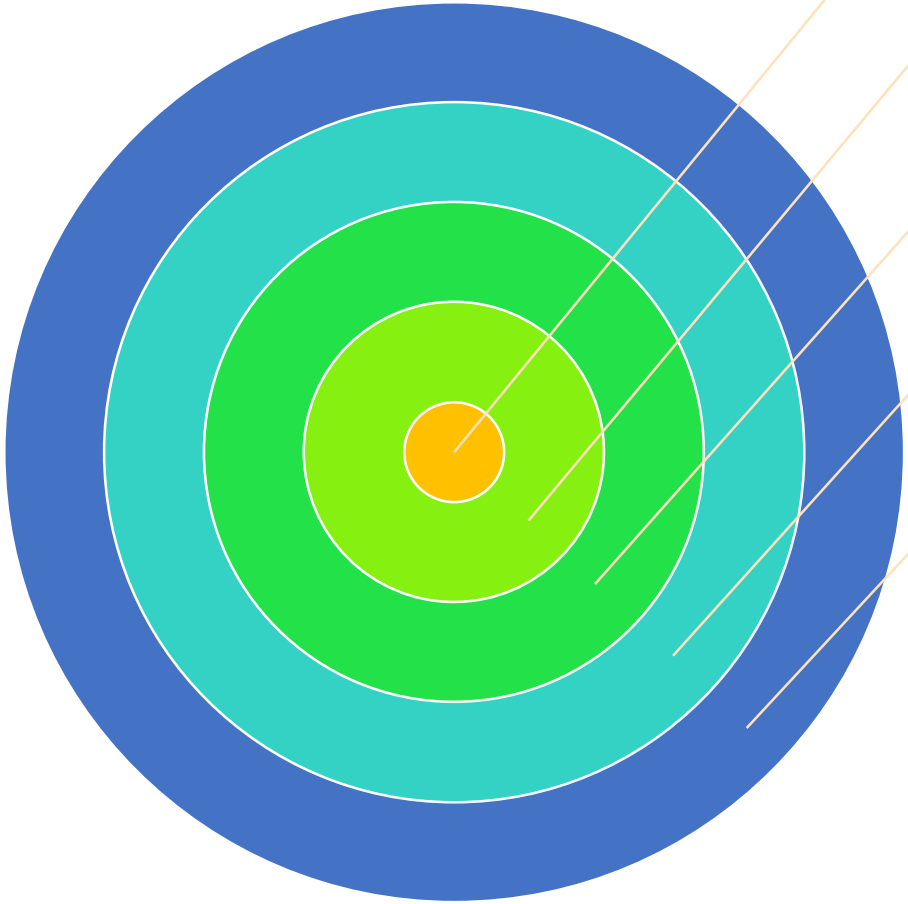
Primary fall Protection

- Scaffolding / Temporary work platform
- Guardrail Systems
- Ladders platform Covers
- Warning signs / caution tapes / lines

Secondary fall Protection

- Full Body Harness / Shock Absorbing Lanyards
- Anchorage Points
- Life Line System
- Retractable Life Line
- Safety Nets
- Connector Toggles

Factors to choose right fall protection equipment



Height you will be working at

if you will be in a confined space

Length of time you need to perform the task

Flexibility of movement to perform the task

Proximity of the task to the anchor points

Right Anchor point a game changer

Anchors

1 

Mobile anchor

2 

Fixed anchor

3 

Continuous anchor

Variety of anchors

Fixed anchors

Mobile anchors

Door Anchor

Beam Anchor Trolley

Swivel Anchor

Beam Anchor

Toggle Anchor

Concrete Bolt Anchor

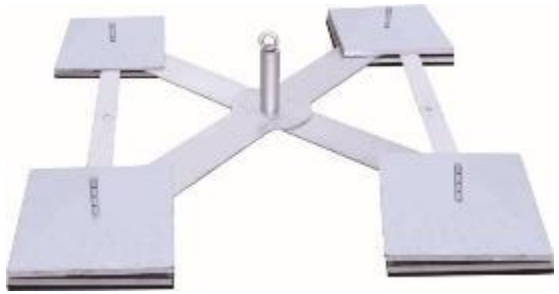
Parapet Anchor

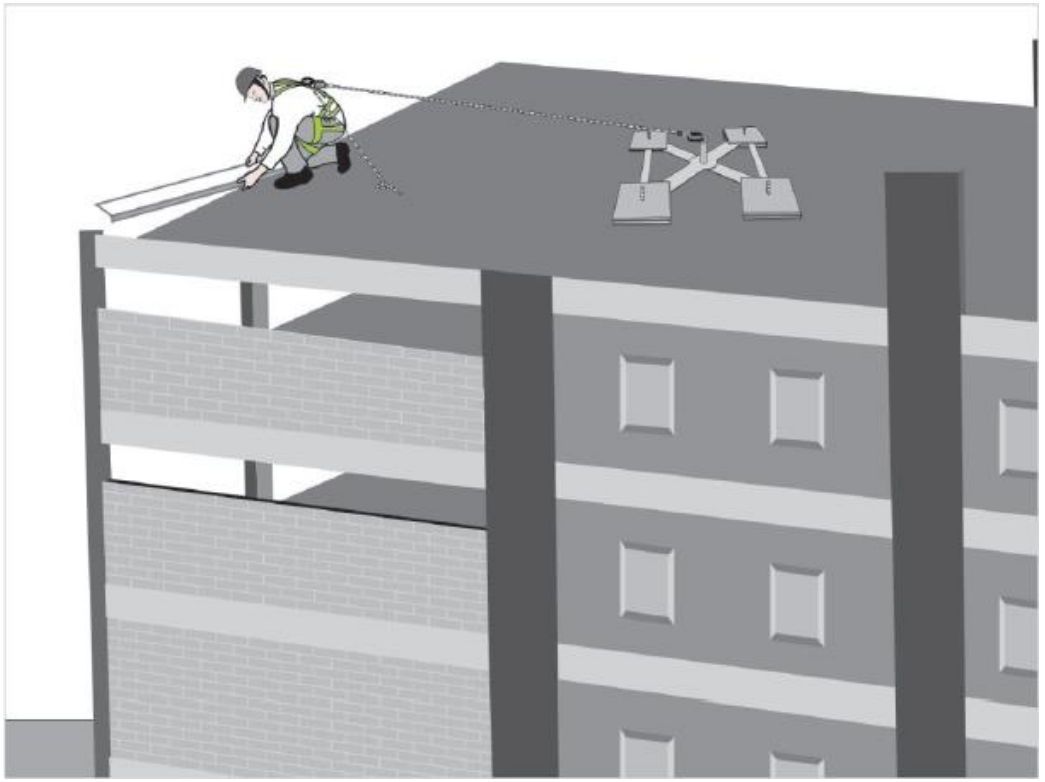
Sling type Anchors

Anchorage Slings

Temporary Horizontal Lifelines

Dead Weight Anchors



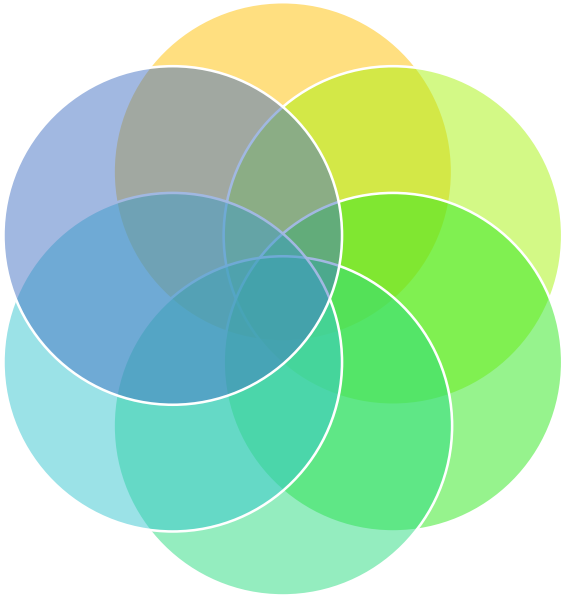


Type of protection systems

Edge protections

MEWPs

TRD



Over head life lines

Vertical Life lines

Horizontal lifelines

How to choose/calculate a correct Anchor Point

- Non-engineered 5,000lbs Approx. 22kN
- Engineered system Min. 2XMAF* (2x1800 = 3,600lbs)
  - (BS 7883: 2005 -- the anchor device shall be designed to withstand a force of at least 12kN (OSHA -- 16kN) in all directions in which a force could be applied during a fall arrest).
- Anchor Devices
  - ISO 14567:1999 PPE for protection against falls from a height – Single-point anchor devices.
  - BS EN 795:2012 Personal fall protection equipment – Anchor devices.
  - BS 7883:2005 Code of Practice for the design, selection, installation, use and maintenance of anchor devices conforming to EN 795.

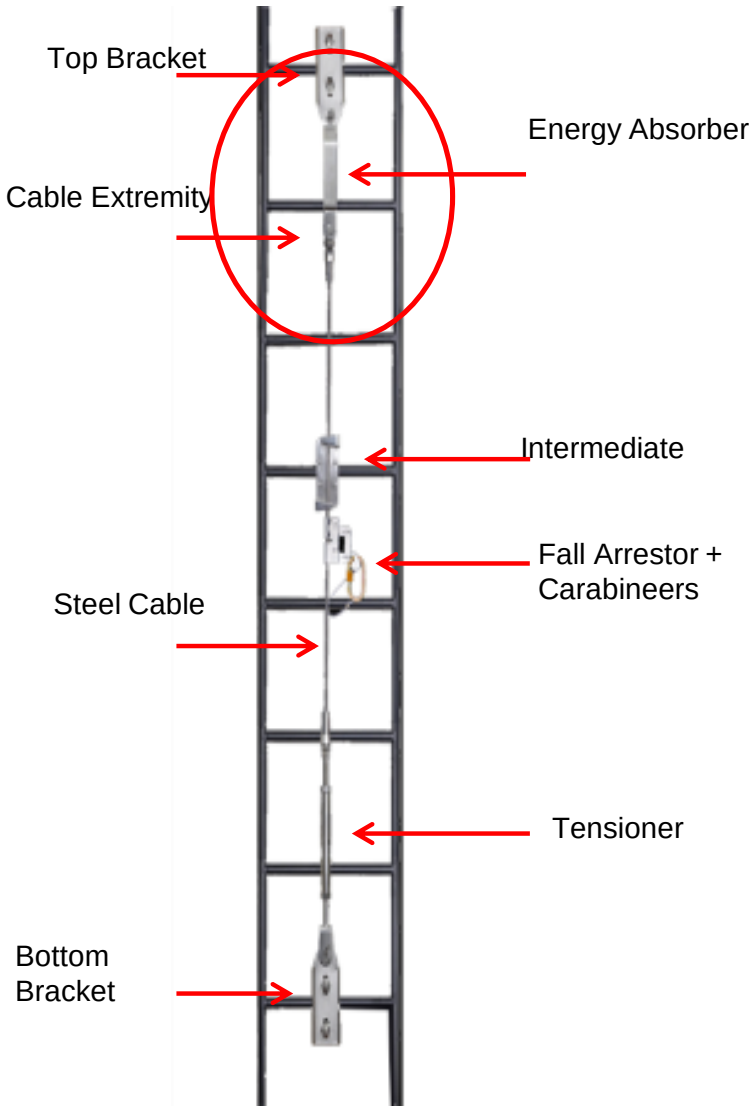
Anchorage for Rescue For 2 Person 12 kN *2 = 24 kN

Further additions 24kN + 2kN per additional Person

****MAF : Maximum Arrest Force)***

Anchoring devices

Fall Arrest & Travel Restrain devices

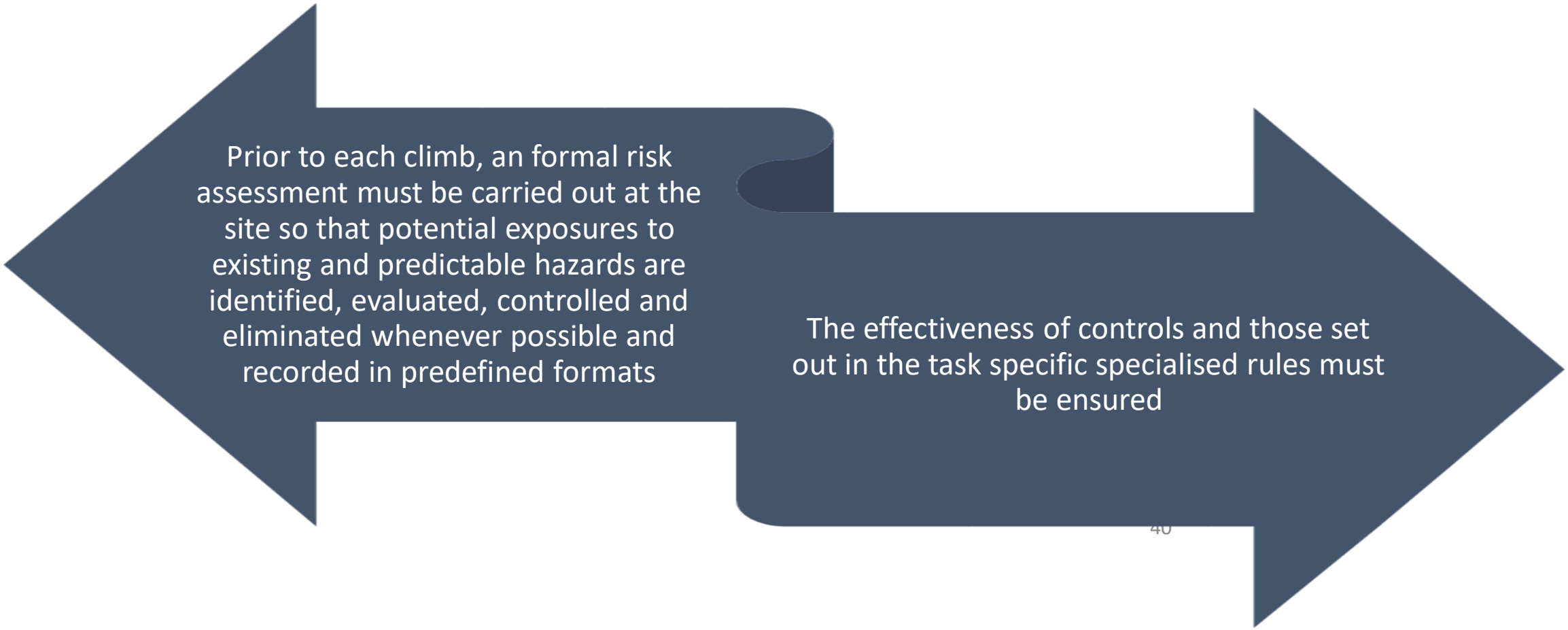


Knots

A Correct Knot is key to success of any anchor

Safe approach to work at heights

Always start with a formal risk assessment

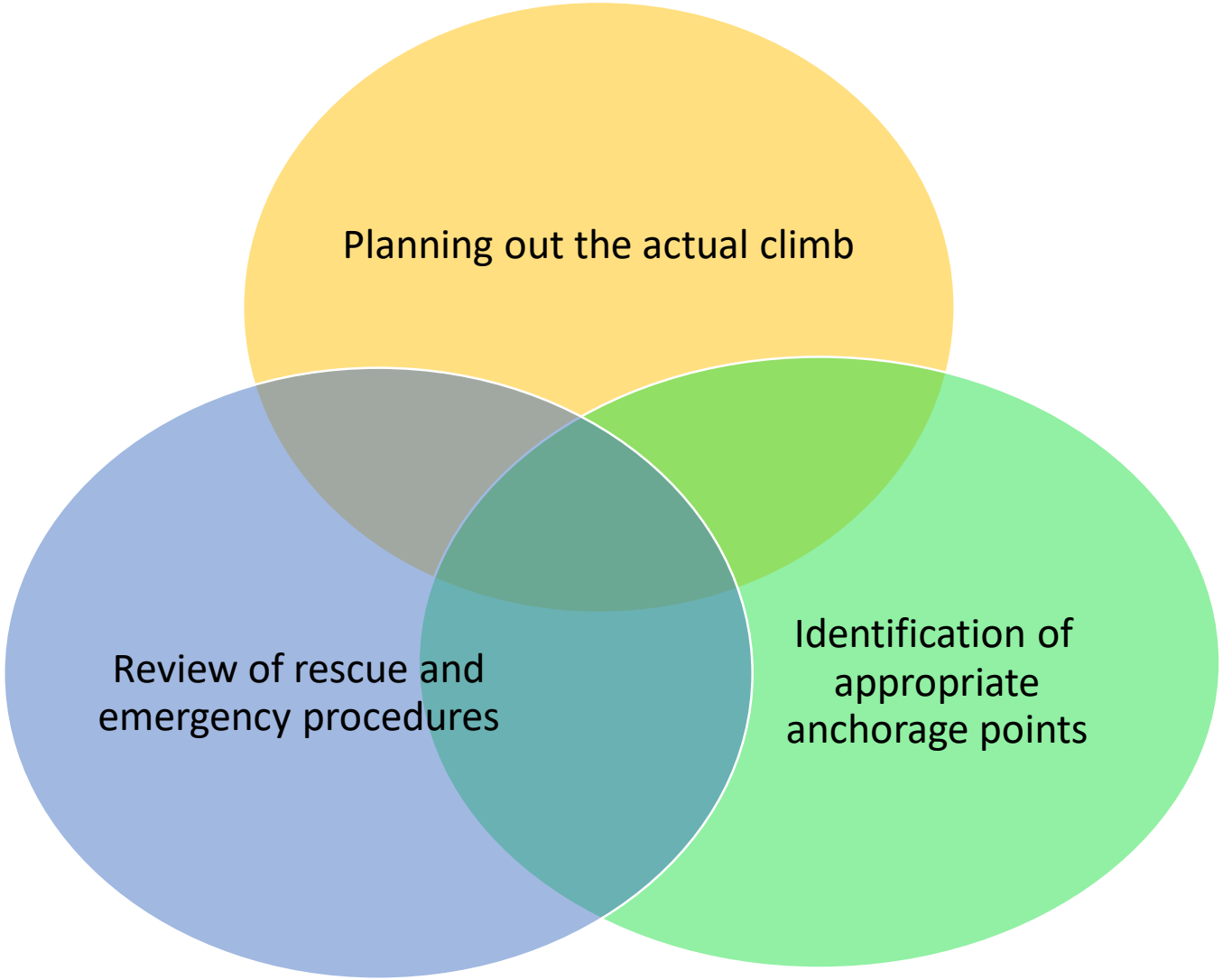


Only trained personal must perform W@H

W@H is a complex and dangerous operation that requires a high level of mental alertness, physical fitness, preparation, knowledge, experience and training

All personnel carrying out W@H must have completed company approved training courses

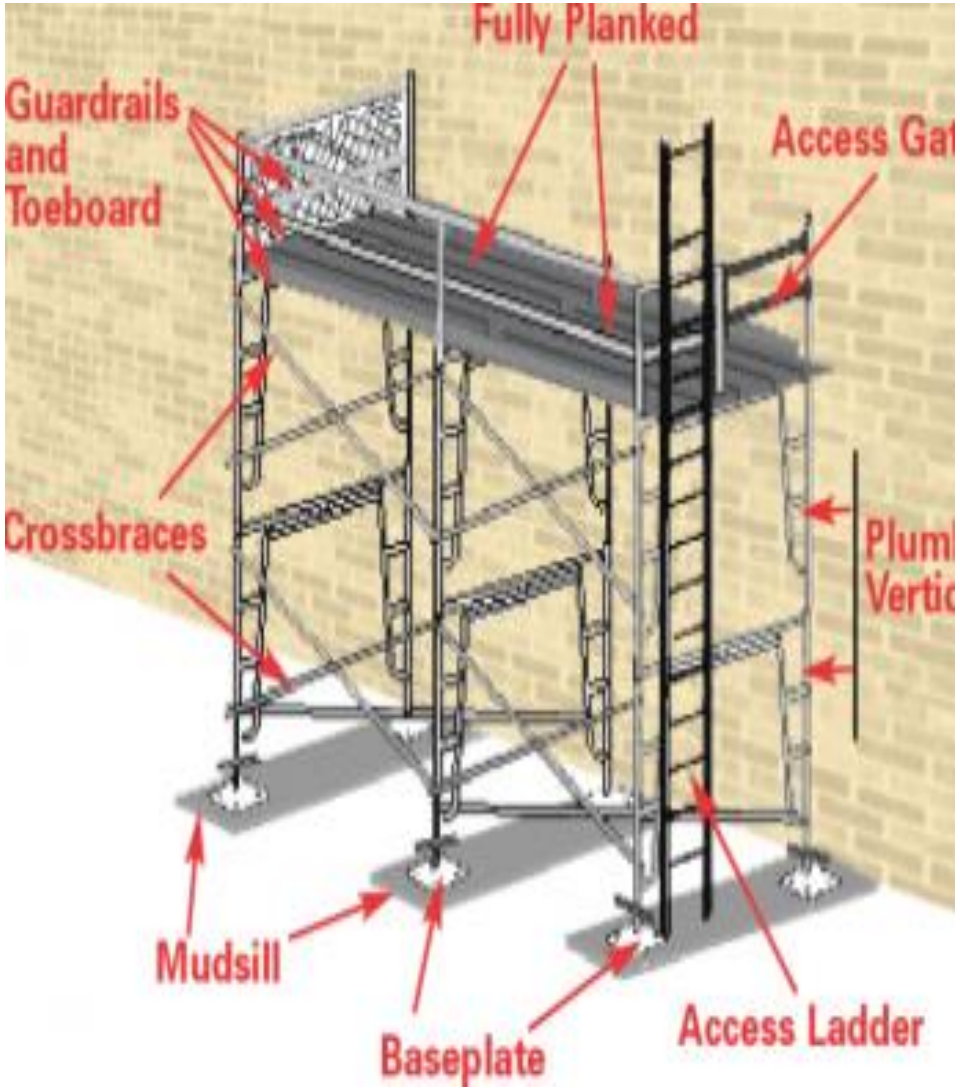
Tool box talk prior to the start of W@H



A toolbox talk must be carried out to ensure that all site specific hazards and control measures are understood by all concerned at site prior to start of job. This must also include

Safe Scaffolding

- Must be anchored properly
- Must be secured to adjacent structures
- Must be inspected regularly during usage
- Must be provided with hand rails and toe boards on the working platforms
- Must be provided with safe means of access to climb the scaffolds



PPEs - only approved standards

Only approved standards PPE must be used for W@H. It must be ensured that an energy absorber is used along with full body harness while W@H

Line managers must ensure that adequate PPE is available on site for the assigned work and it is inspected prior to use. Defective or damaged PPE must not be used.

Following any fall the lanyard must be inspected thoroughly.

PPE Inspections

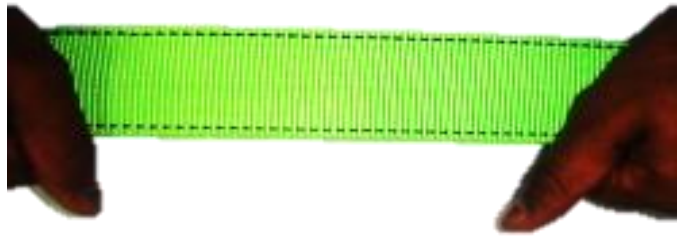
Daily Pre-Use inspection (before and after use by the USER)

Periodic Inspection (by In-house Competent Person)/ Annual Inspection (by 3rd Party Competent Person)

Inspected by manufacturer if packed & not being used for 3 years

Identifying Damaged PPE

What to inspect



Webbing Strap

Metal parts

look for any cuts

Plastic Parts

look for cracks, dents,& cuts/gauges

look for damage in threads & stitches

Inspection of Metal & Plastic Parts

Dorsal D-ring deformed/ bent/ rusted

ID plate cut

Cracks on D-ring/ buckles

Protective sleeve removed

Buckles missing/ removed

Inspection of Rope & Lanyard

Rope yarn frayed, dirty with dirt / paint

Rope / yarn cut

Signs of burning

Rope splicing open

Broken rope

Signs of UV damage or chemicals (discoloration)

Rope extension above above 10%

Visually Inspect all parts of the Rope

Check the Label for proper covering

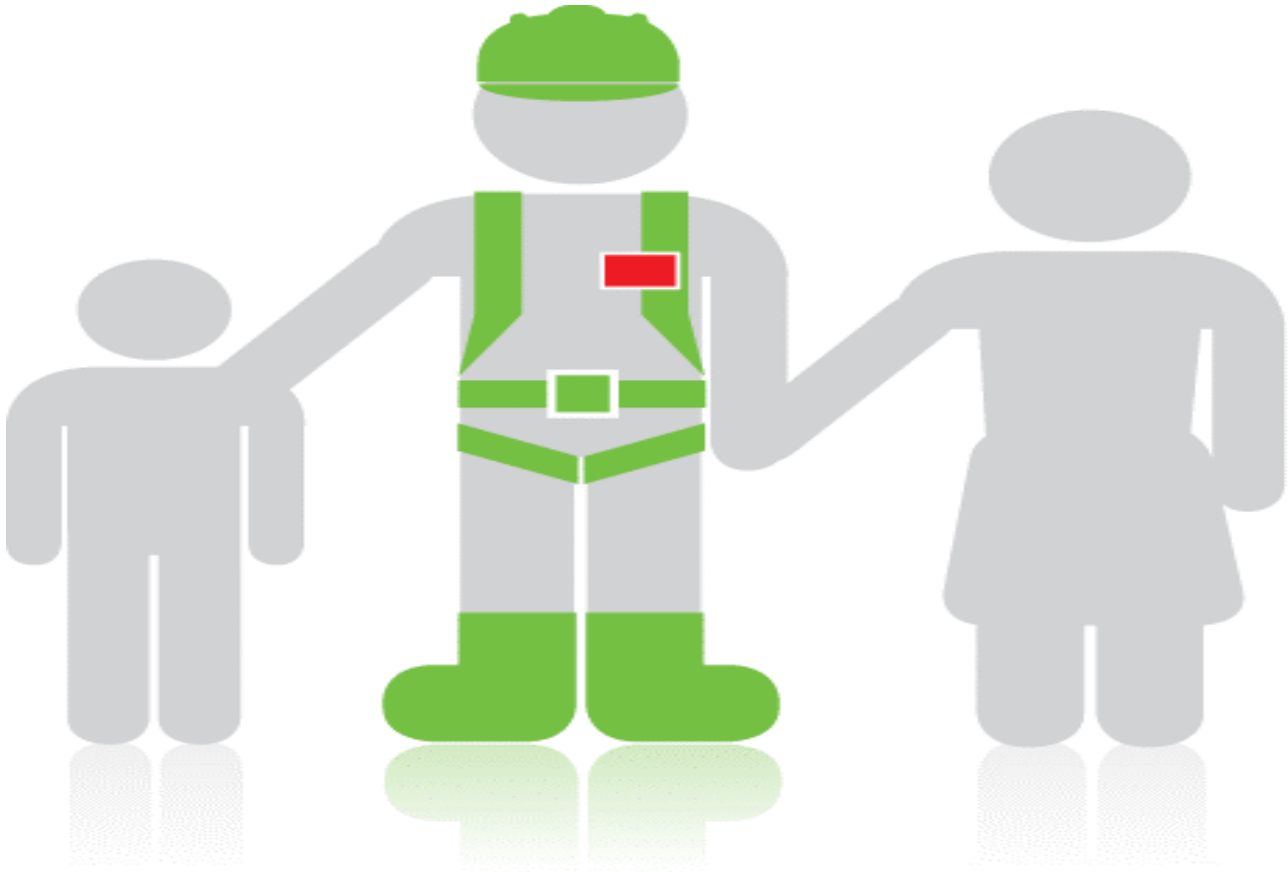
Storage & Maintenance

- Make sure equipment's are :
- Used properly
- Properly stored
    - In a dry & clean place
    - Eye protection - in a box / case
- Visually checked for any damage before using
- Maintenance of Metal parts
    - Washed with water and mild soap
    - Dry in shade
- Any detailed repair should be done only by the Manufacturer
- Check for Corrosion or Mechanical defects

Emergency response planning for Height & Lifting

- Availability of Emergency vehicle, as feasible
- Standard first aid box
- Contact number of other available utility sources like Ambulance, police station etc.
- Emergency Contact number of local health Centre

We can get every job done safely !!!



There is no work/activity worth to harm a Human life!

WE PROMISE TO OURSELVES THAT WE WILL **WORK SAFELY** AND **GO HOME SAFELY**

THANK YOU FOR YOUR ATTENTION

Any Questions?