香港房屋委員會
Hong Kong Housing Authority

職業安全健康局
Occupational Safety & Health Council

"From Cradle to Cradle" Workshop on Planning & Design for Safety in Project Life Cycle for Public Housing Developments

Safety in Planning and Design for Safety in BS Installations

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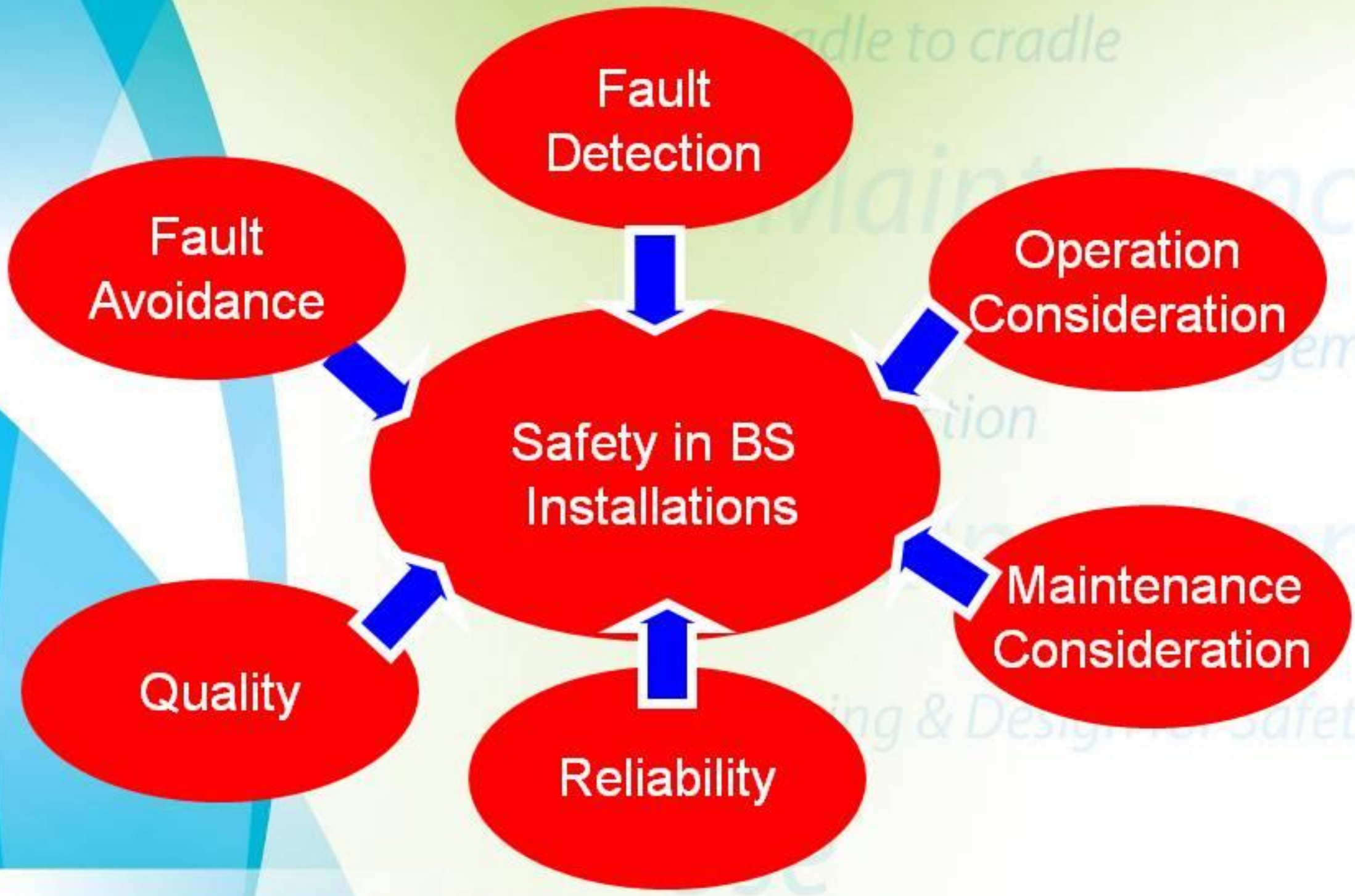
PREFACE

- Safe and effective BS systems are the essential element to any successful building project from conception to day-to-day operation.

- This section is to highlight some of the measures to prevent the possible risk areas from planning, design, specification provisions to the operation and maintenance.

SAFETY IN BUILDING SERVICES INSTALLATIONS



SAFETY IN BUILDING SERVICES INSTALLATIONS

- By preventive design
  - Fault avoidance
  - Fault detection
  - Safe operation and maintenance
  - Reliability and quality (Specification)

SAFETY IN BUILDING SERVICES INSTALLATIONS

- By installation control
  - Encourage and enforce good site practice
  - Perform good site management through contract control
  - Ensure safety

1. PREVENTIVE DESIGN

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Fault Avoidance – Materials and Equipment

Prefabricated branch cable riser

Modular design switchboards

Prefabricated generator set

- Wider user of prefabricated materials & equipment
- Prefabrication in controlled factory environment is safer than site fabrication

1. PREVENTIVE DESIGN

Fault Avoidance – Materials and Equipment

Weatherproof type break glass unit at outdoor locations

- Frequent occurrence of false fire alarm will deteriorate tenants' alertness to real fire alarm
- Measures to avoid false alarm:-
  - Use of standalone smoke detectors and alarms
  - Use weather-proof type equipment at locations susceptible to weather conditions

1. PREVENTIVE DESIGN

Fault Avoidance – Materials and Equipment

Double doors/Enclosure for Control Panels inside Pump Rooms.

Weatherproof switch panels used in wet environments

- Double doors / Enclosure for panels to prevent water ingress in case of bursting of water pipes
- Reduce risk to operators/maintenance personels

1. PREVENTIVE DESIGN

Fault Avoidance – Maintenance Consideration

Previous Design

Big mild steel pressure vessels with conventional control

New Design

Small stainless steel pressure vessels with VSD control

- Use of Variable Speed Drive (VSD) and stainless steel pressure vessels for fresh water booster pump system enable size reduction.
- Minimize risk in handling equipment during maintenance / repair

1. PREVENTIVE DESIGN

Fault Avoidance – Maintenance Consideration

Automatic Self-cleaning Strainer to be provided at the discharge pipe of the Flush Water pumps.

Provision of Bucket Type Strainer in Flushing Water Incoming Pipe

- Prevent dirt or grits clogged in the flushing water pipes and thus prevent bursting.
- Minimize risks from flooding and manual repair works

1. PREVENTIVE DESIGN

Fault Avoidance – Maintenance Consideration

- LV switchboards are constructed in two isolated supply sections
- Maintain partial supply during maintenance such that workers not necessary to compact work and improve awareness on safety

1. PREVENTIVE DESIGN

Fault Avoidance – Maintenance Consideration

Electrical meter room

Main switch room

Pump room

Lift Machine room

- Adequate space for installation, operation and maintenance

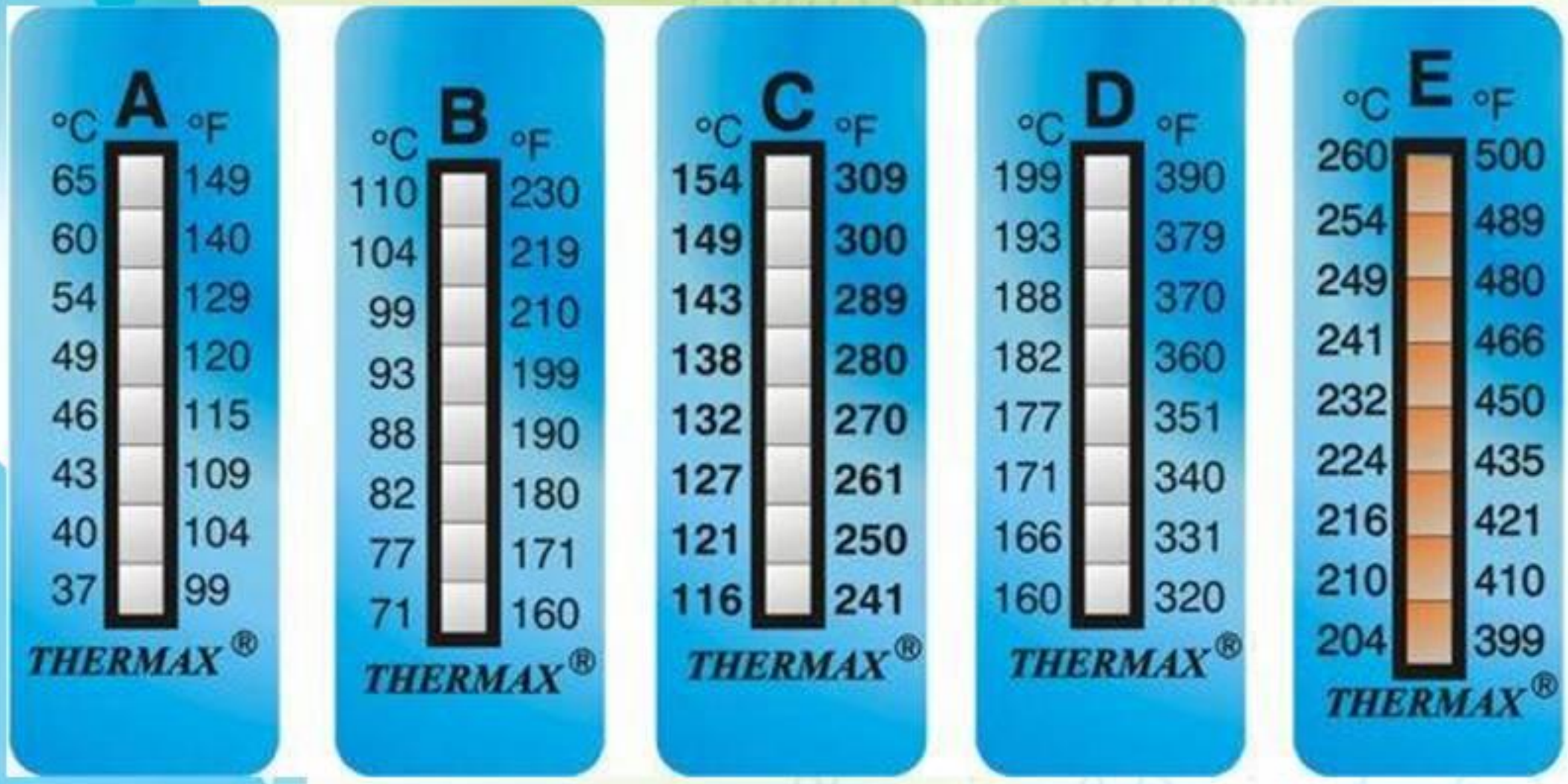
1. PREVENTIVE DESIGN

Fault Avoidance – Maintenance Consideration

- Provision of insulation rubber matt to prevent electric shock during maintenance work

1. PREVENTIVE DESIGN

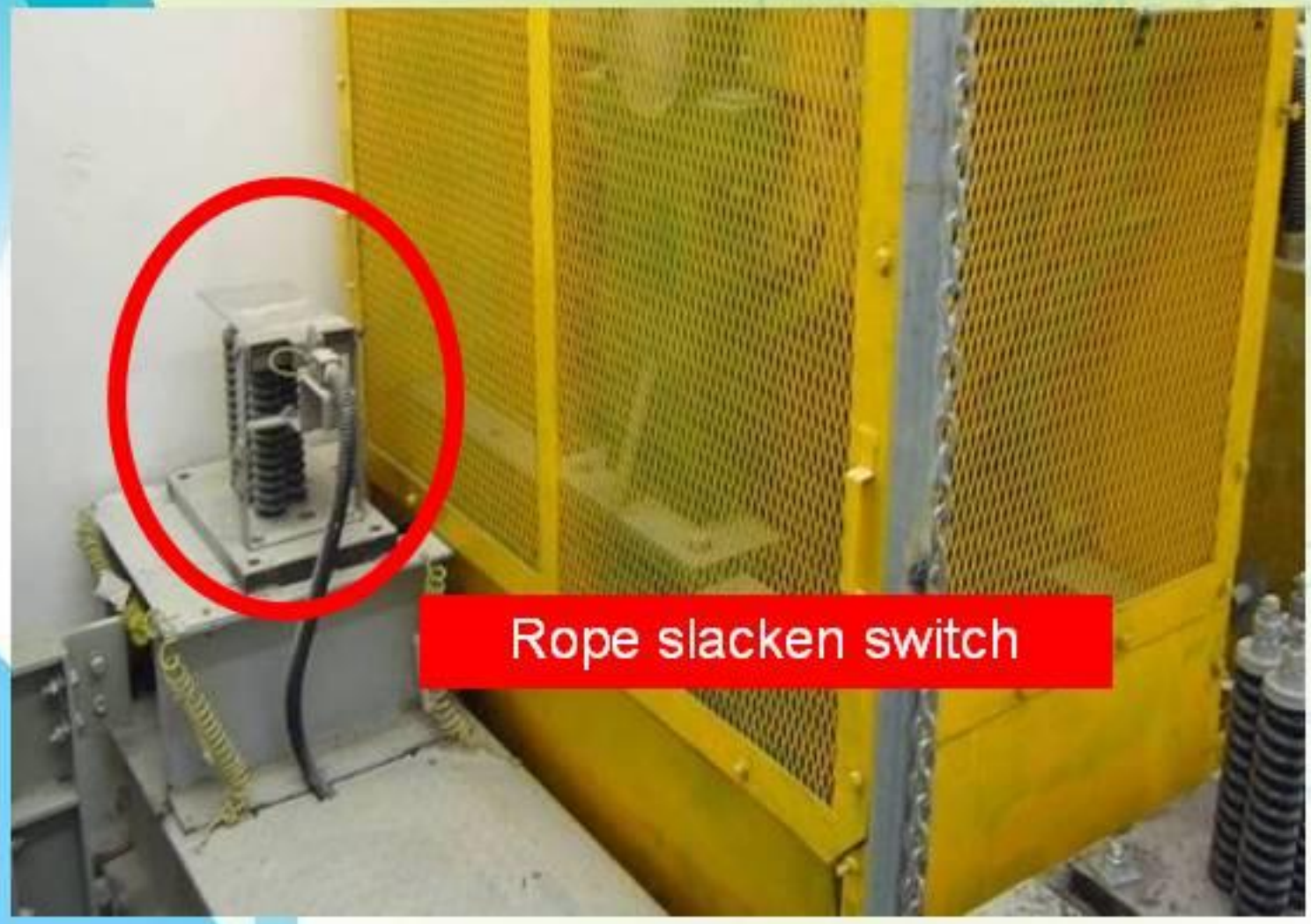
Fault Detection – Early Identification of Fault



- Temperature strips are provided at lift pulley assemblies to alert the maintenance personnel of any abnormality

1. PREVENTIVE DESIGN

Fault Detection – Early Identification of Fault



- Lift hoisting rope slacken switch are installed to stop the lift when either i) rope breakage or ii) slacken of rope

1. PREVENTIVE DESIGN

Operation Consideration – Meet all Users' Needs

Lighting Level Requirements for Internal Public Areas of Domestic Blocks		
Location	Normal Illumination Level	Elevated Illumination Level*
Lift lobby	50 lux	85 lux
Corridor	30 lux	85 lux
Staircase	30 lux	85 lux

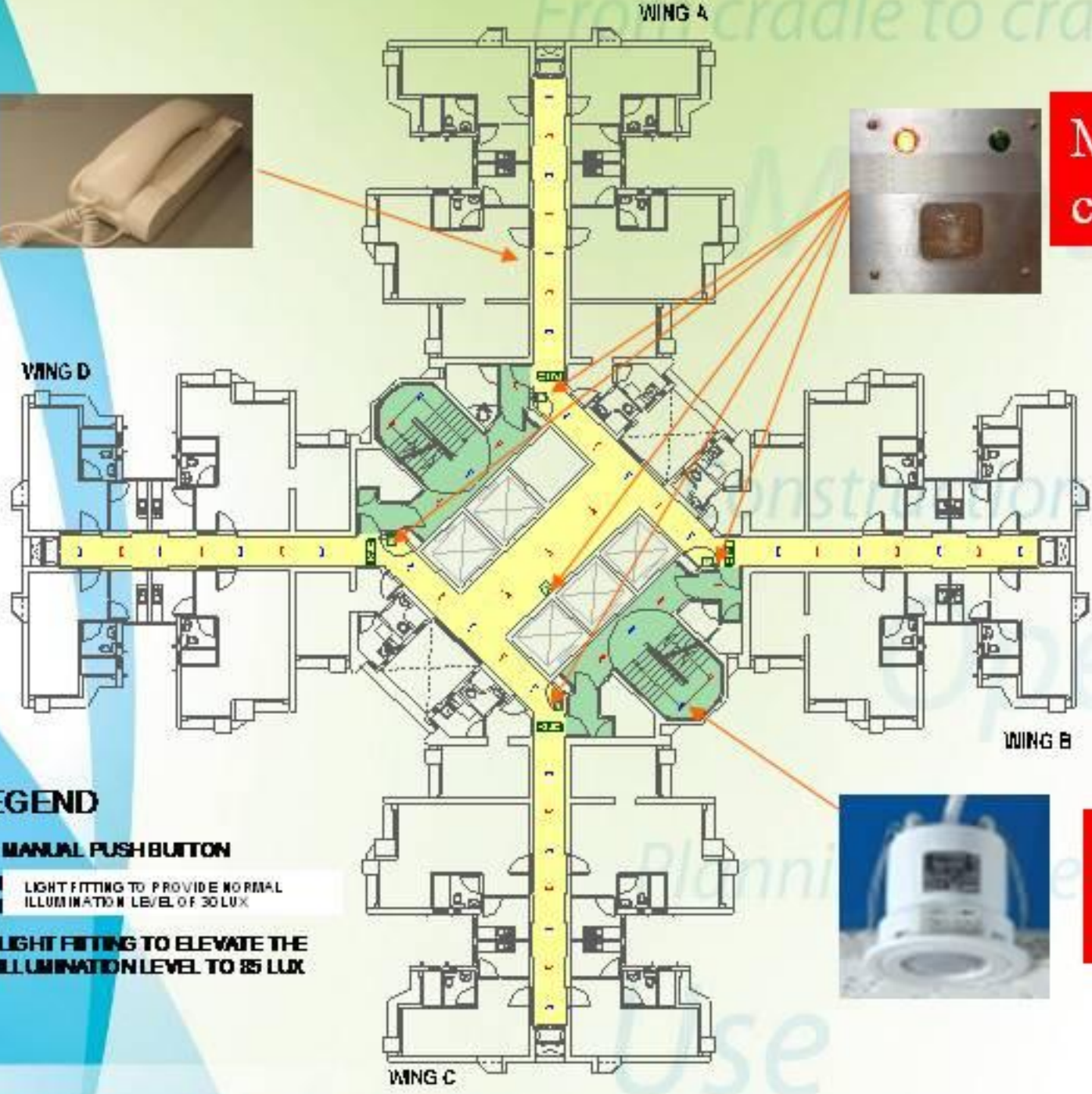
* The elevated illumination level will be automatically resumed to normal illumination level after an adjustable time delay.

- New Lighting Control System to elevate illumination levels for Visually Impaired Person

1. PREVENTIVE DESIGN

Operation Consideration – Meet all Users' Needs

Doorphone handset inside each domestic flat



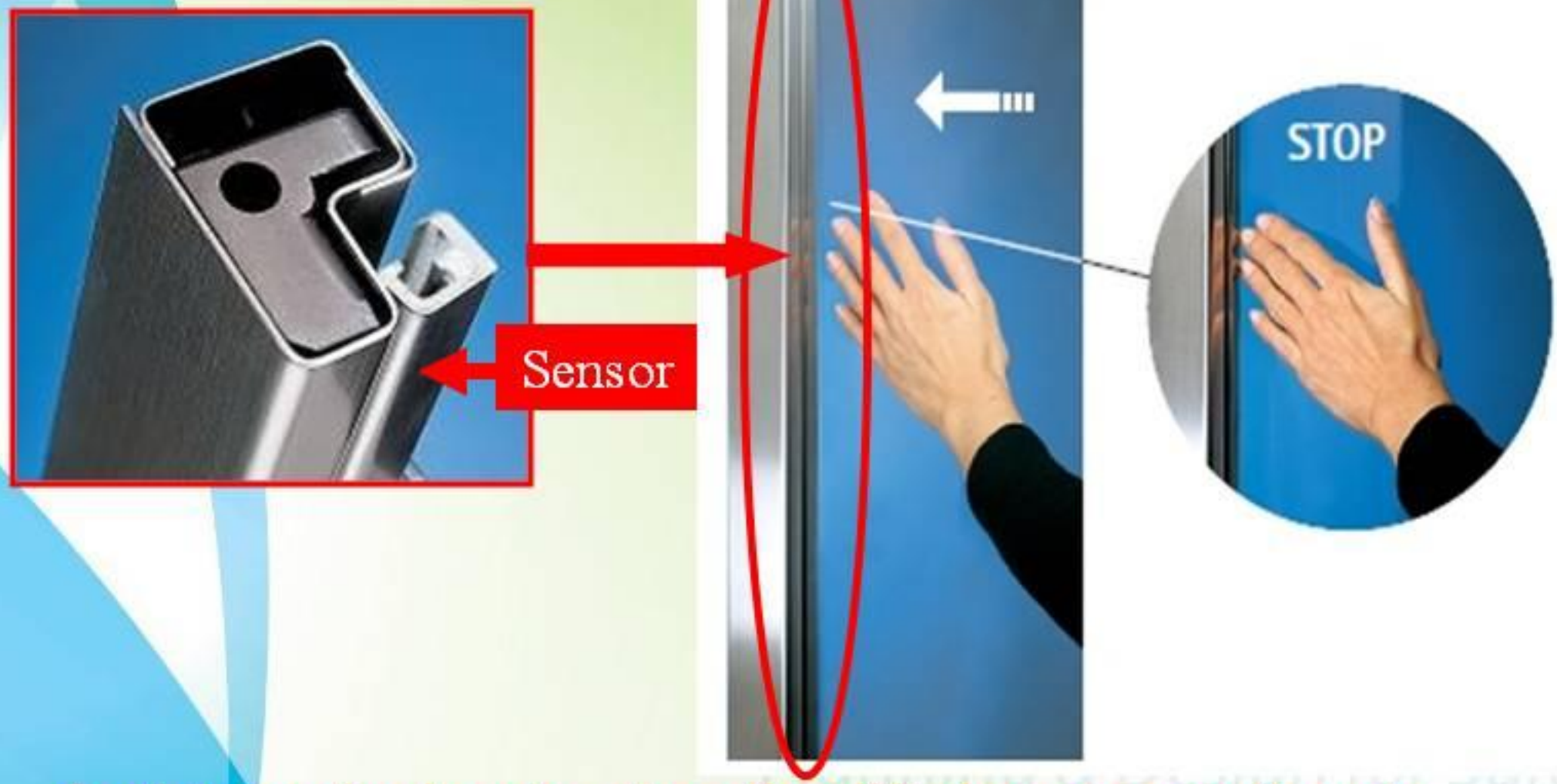
Manual switch at corridor / lobby

New Lighting Control System at Typical Domestic Floor

Motion sensor at staircase lighting

1. PREVENTIVE DESIGN

Operation Consideration – Prevent Mishap



- Anti-trap device to stop the lift door operation to prevent the trapping of passenger hand into the lift door gap

1. PREVENTIVE DESIGN

Operation Consideration – Prevent Mishap

Electrical Interlock

- Electrical Interlock to prevent operation of Refuse Storage Device if refuse bin is not in position

1. PREVENTIVE DESIGN

Operation Consideration – Enhance Awareness

Warning strips at the bottom of lift car

Warning strips at the bottom of landing opening

- Warning strips at both lift car and landing to alert passengers of any uneven level difference

1. PREVENTIVE DESIGN

Operation Consideration – Enhance Awareness

- Yellow demarcation on the three borders of each escalator step to alert passengers of the gap

2. INSTALLATION CONTROL

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Site Management

- Fix cables at high level to avoid damage that leads to electric shock:
  - Min 5.8 m across vehicular road
  - Min 5.2 m at other locations

2. INSTALLATION CONTROL

Site Management

- Full Height lift landing barriers at all landing openings to prevent falling of people and objects

2. INSTALLATION CONTROL

Site Management

- Safety net with net eye < 20mm x 20mm inside lift shaft at interval less than 20m to protect workers from falling objects

2. INSTALLATION CONTROL

Site Management

Use 110-volt power supply

Circuit Protective Device (RCCB) provided for sockets for potable equipment

Effective earthing for all circuits / exposed conductive parts

- Various measures to avoid electric shock to workers

2. INSTALLATION CONTROL

Site Management

- Provisions of site supervisors
  - Supervising engineer
  - Full time site supervisor
  - Site foreman per block
- Provisions of skilled workers to carry out the work

Trades	Minimum percentage
Electrical	40%
FSWP	30%
Lift	50% (during last 35% of installation period)
HVAC	10%

2. INSTALLATION CONTROL

Site management

- Pay for Safety
  - Safety Audit
  - Safety Plan - Include trade specific training
  - Hazard identification and pre-work safety check
  - Safety Supervisor
- Work control
  - On site welded components inside lift shaft shall be approved by CM to contain the risk

3. WAY FORWARD

3. WAY FORWARD

Lift Shaft Work

- Contractors are required to implement a permit-to-work system for any lift shaft works.
- Ensure close supervision on the adoption of safety precautions.

工作許可證 (升降機槽內工作)
Permit to Work (Work inside lift shaft)

Permit No.許可證號碼: _____

Project地盤名稱 : _____
Location 工作地點 : (Lift shaft no.升降機槽) (Floor 樓層)
Description of work工作性質:

Company 公司 : _____ 日期 Date : _____
Permit valid from 許可工作由 : _____ hrs. to 至 : _____ hrs.

Foreseeable hazards associated with the work 可預見危害:
- ☐ Falling Objects 物料從高處下墮
- ☐ Fall of person 人體從高處下墮
- ☐ Insufficient Lighting 燈光不足

Permit To Work System

3. WAY FORWARD

Lift Shaft Work

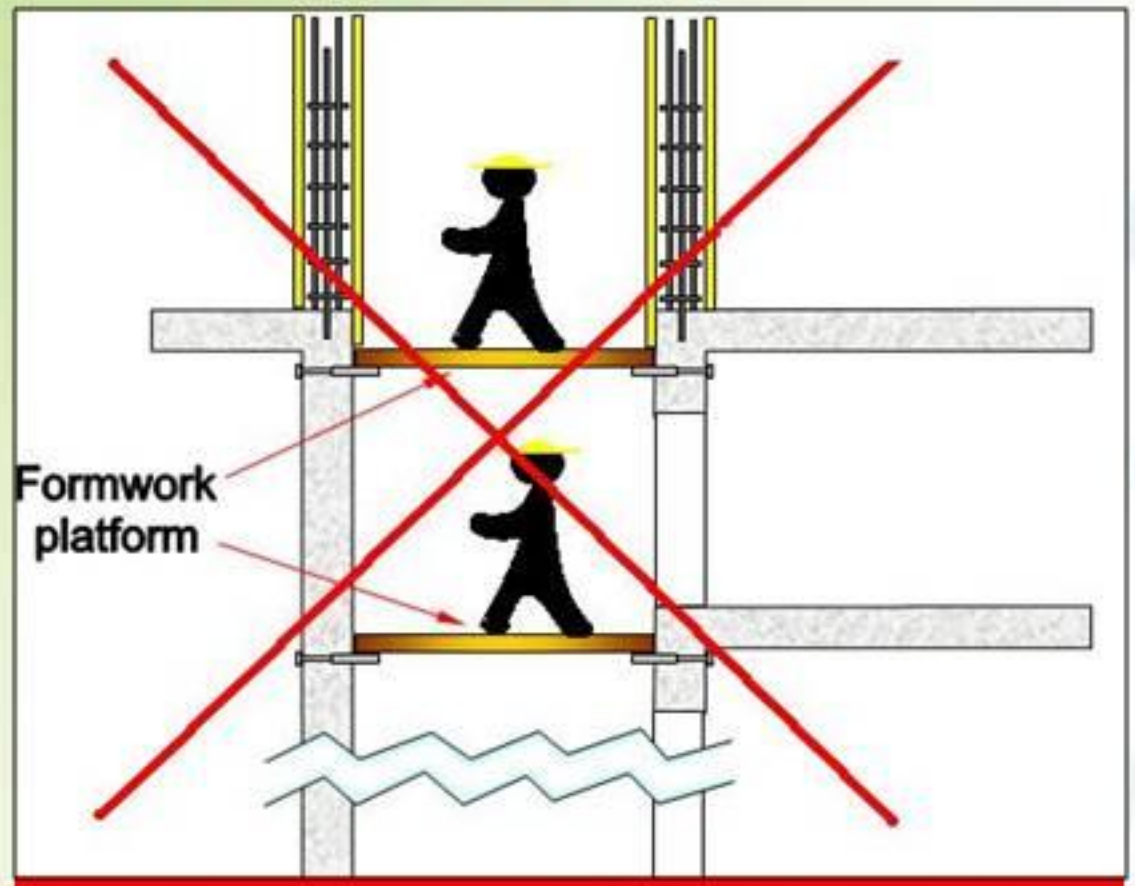
- Metal scaffolding is adopted for lift shaft works for better strength, fire resistance and reliability.

Metal Scaffolding for new Building Construction

3. WAY FORWARD

Lift Shaft Work

- It is strongly not advisable to allow simultaneous working at two different levels.
- If practicably unavoidable, a lift shaft platform might be designed and constructed in double decks.



Simultaneous Working in 2 Levels is not allowed

4. CONCLUSION

- Achieving site safety requires joint effort of designers, contractors, workers and users.
- Good preventive design to avoid fault occurrence and prompt detection of fault is useful to minimize risk and danger.
- Due consideration of operational risks will help to avoid accidents
- Good installation control will help to ensure safety and work quality

THANK YOU