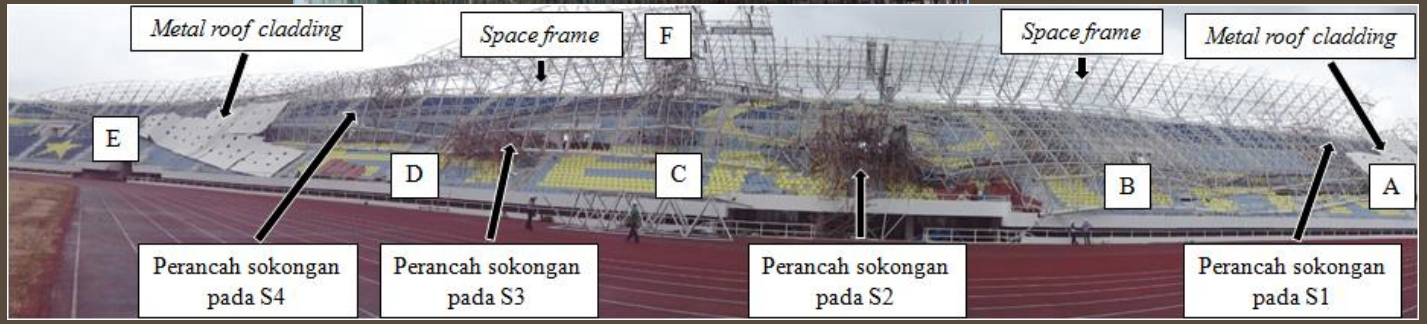
DEPARTMENT OF SAFETY AND HEALTH

GUIDELINES ON OCCUPATIONAL SAFETY AND HEALTH IN CONSTRUCTION INDUSTRY (MANAGEMENT) (OSHCIM)


PINNACLE

WHAT IS THE CONTRIBUTING FACTORS TO ACCIDENT/INCIDENT?



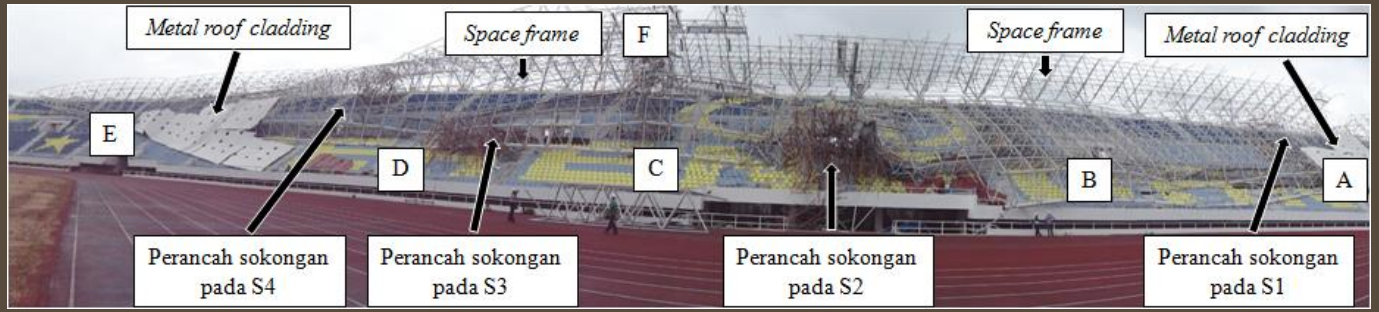
FALSEWORK FAILURE, PENANG, 2013

- Kelemahan pada pemasangan komponen falsework
- Sistem falsework tidak stabil (curved, skewed
- Unclear method statement
- Lack of information on falsework design
- Failed to recognize complexity of the work

FALSEWORK FAILURE, JB, 2013

- Installation of falsework is not according to design
- Lack of competency people during installation, inspection
- Insufficient SOP during concreting – no person to inspect while concreting, inspection must be done before concreting

BUMBUNG STADIUM RUNTUH, TERENGGANU 2013



- Incomplete method statement – MS2318:2012
- Incompetent contractor
- Failure to identify risk due to change of process
- Failure to recognize the significance of previous report
- Failure to recognize the complexity of work

VIADUCT TOPPLED DURING INSTALLATION, SELANGOR, 2014

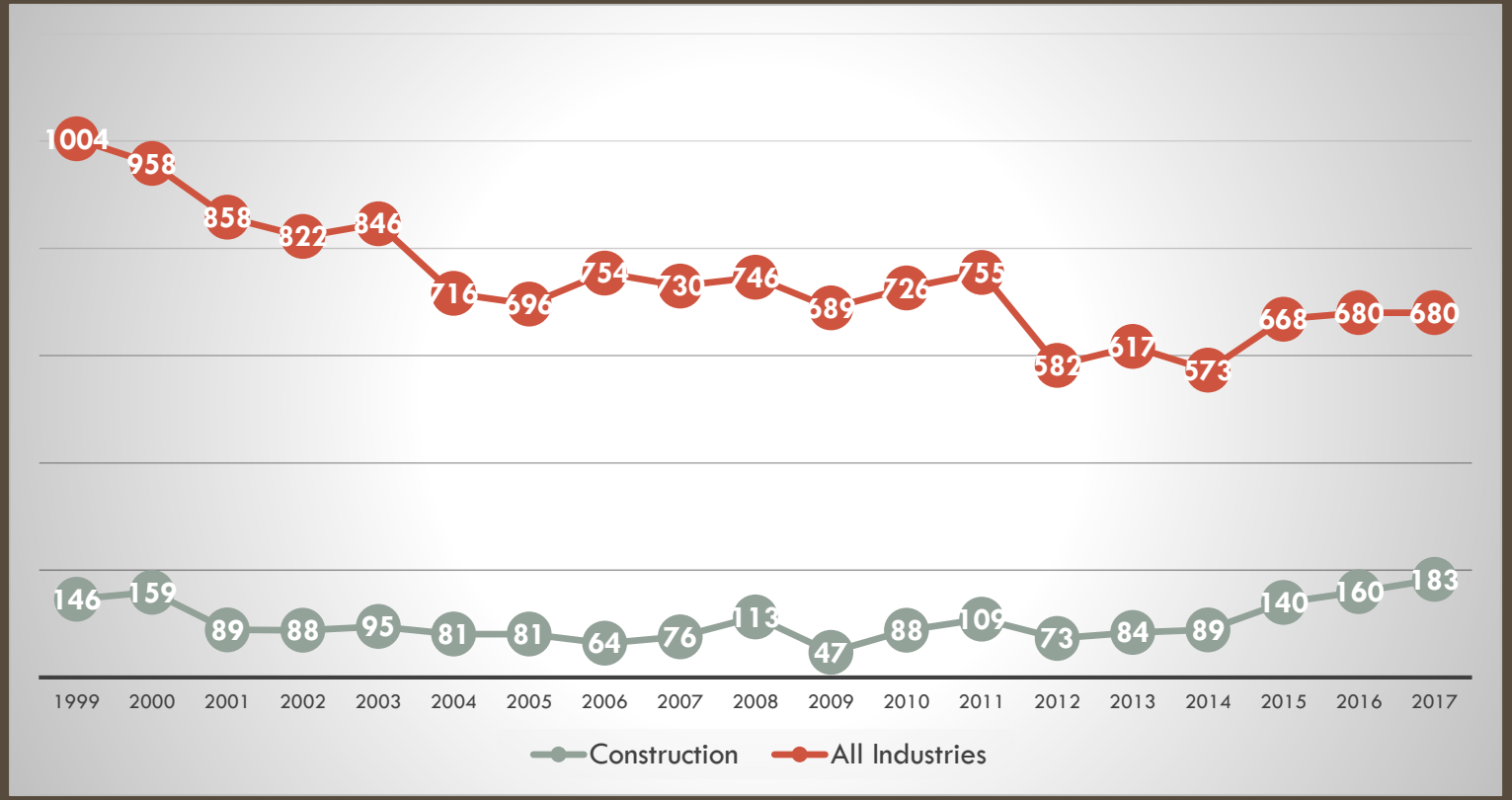
- Lack of supervision
- Failure to identify risk due to change of process
- Lack of inspection and testing
- Effective communication failure
- Lack of sub-contractor management
- Unsafe SOP

PENDEKATAN JABATAN

JKKP menggunakan pelbagai cara perundangan (*regulatory interventions*) untuk mempengaruhi (influence), menggalakkan (encourage) dan menasihati (consult) perniagaan dan, jika perlu, mendakwa mereka yang gagal melaksanakan tanggungjawab

HOW IS OUR SAFETY AND HEALTH PERFORMANCE?

National Accident Figure in Malaysia



National Accident Rate and Facts

Bil. Pekerja 2017

1.25j

Kadar Kematian Pekerja

Pembinaan per 100,000 pekerja Perbandingan

14.9 (4.9)	
10.1 (3.6)	
9.3 (2.8)	
8.8 (2.3)	
3.3 (1.5)	
2.6 (1.2)	
2.2 (2.1)	
1.4 (0.4)	

( ) Kadar kematian keseluruhan industri 2016/17

CABARAN 2018

13,151 Bil. Tapak Aktif

75 ribu Kontraktor

104 Pegawai SKB

PENCAPAIAN 2017

9,984 Bil. Pemeriksaan

1,229 Operasi Tapak Bina

3,141 Notis Perbaikan

3,110 Notis Larangan

693 Kompaun & Mahkamah

RM2,329,301 Denda

Strategi 1

Mempromosikan Budaya Pencegahan

- Prinsip OSHCIM
- *Risk ownership*
- Penglibatan menyeluruh

Strategi 2

Mengurangkan Bahaya Projek

- Peranan kontraktor G7
- *Self-assessment*
- *Early regulatory intervention*

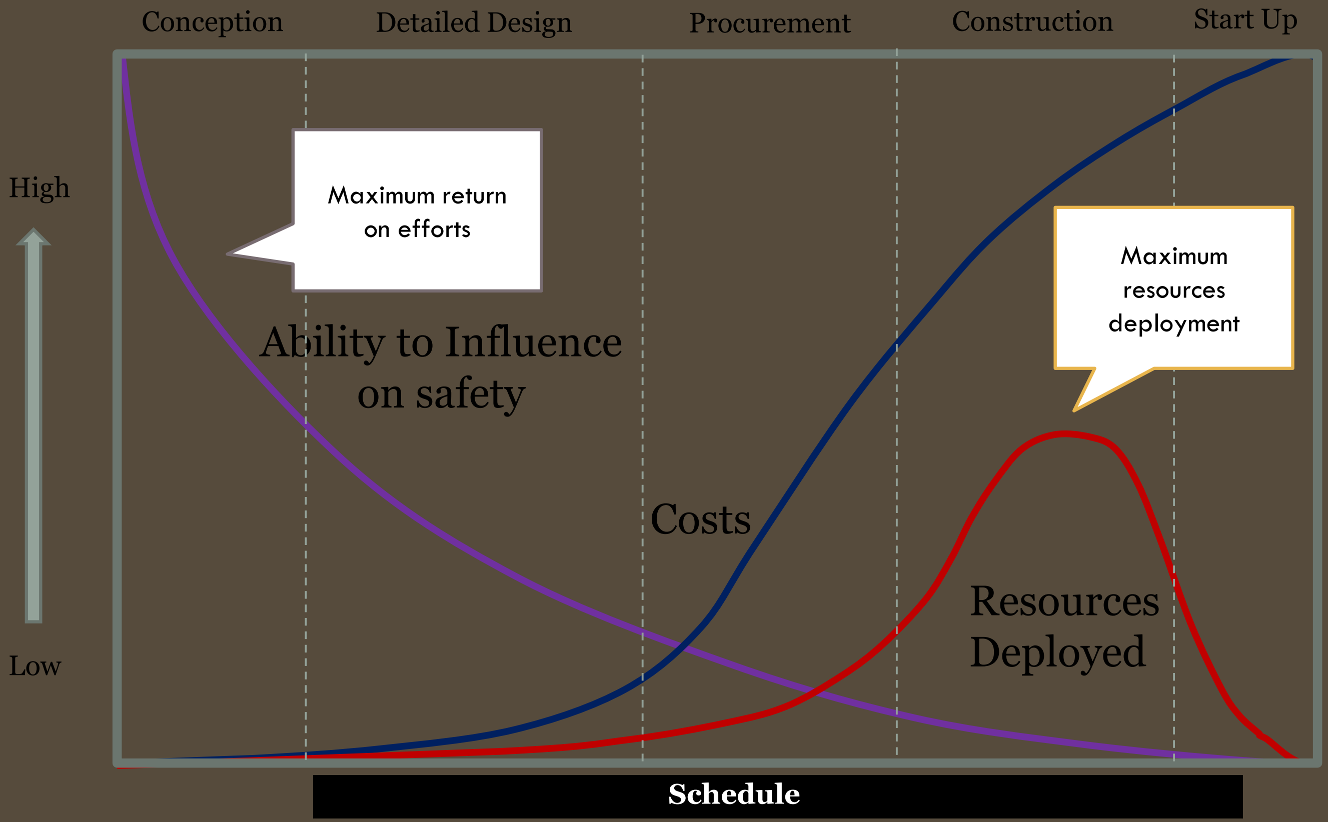
Strategi 3

Memaksimumkan Sumber

- Penggunaan teknologi
- Perundangan berkesan
- Keberkesanan *regulatory intervention*

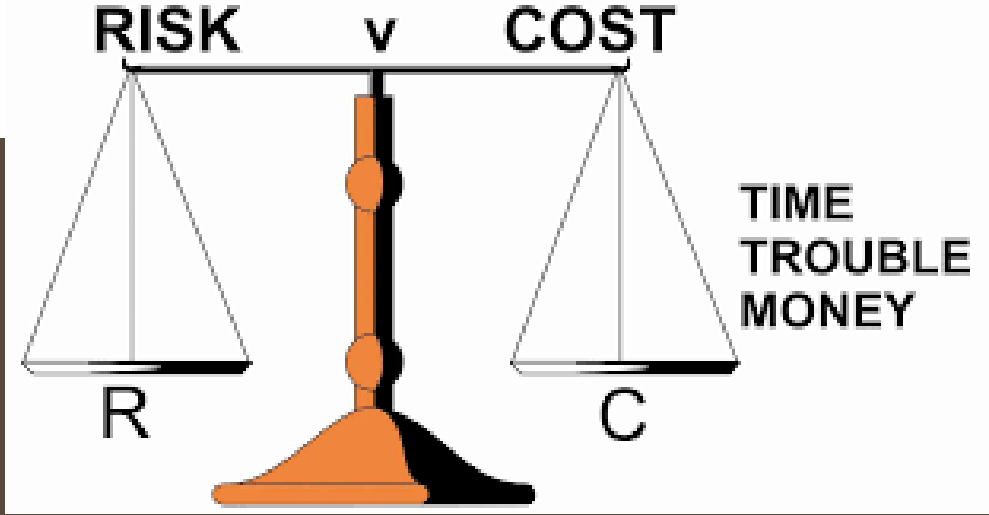
2017 : EVERY 2 DAYS - 1 FATALITI

ABILITY TO INFLUENCE SAFETY[1]



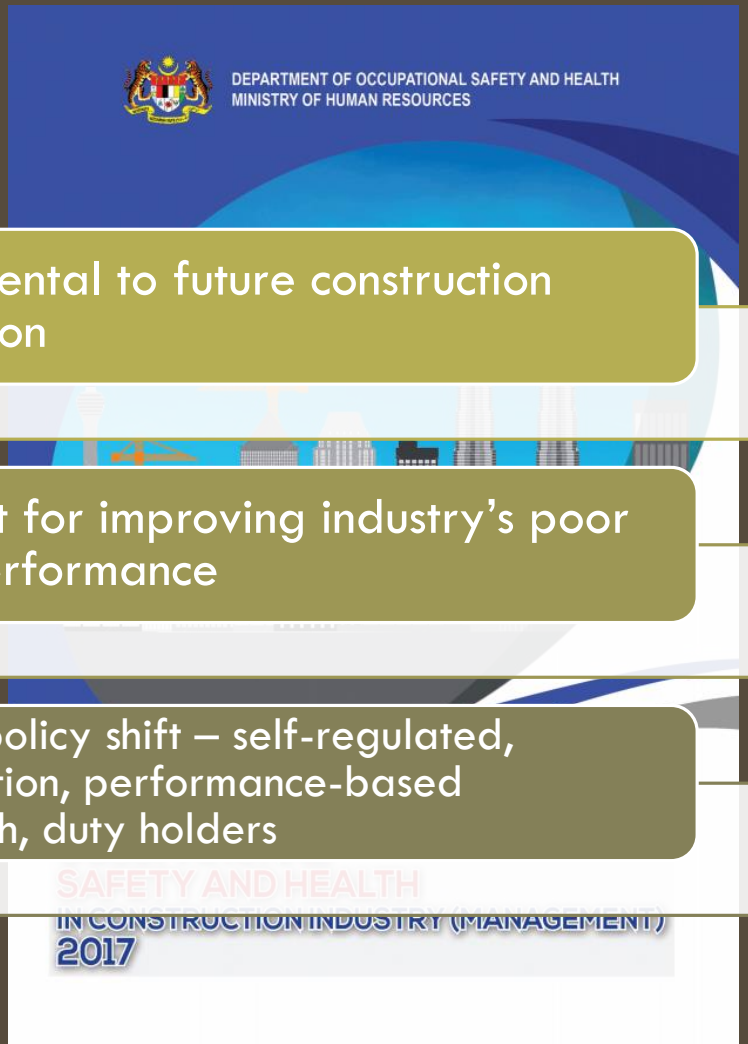
1 R. Szymberski, "Construction Project Safety Planning" TAPPI Journal, 1997.


RISK ASSESSMENT
HAZARD IDENTIFICATION
HIRARC
RISK CONTROL


RISK v COST
TIME
TROUBLE
MONEY
R
C

Construction OSH Management Guidelines - Significance

- Managing OSH at planning and design stage is more effective
- Provide practical guidance to the client, designer and contractor
- OSH is shared responsibilities & team work to design hazards out



- Fundamental to future construction legislation
- Catalyst for improving industry's poor OSH performance
- Signify policy shift – self-regulated, cooperation, performance-based approach, duty holders

OSHCIM JOURNEY

Launched by HR Minister (28 Feb 2017)

Promotional works (since Mar 2017)

Embedded into CITP (Jun 2017)

Embedded into Construction OSH Strategic Plan (Nov 2017)

Development of Training Modules for Duty Holders (2018)

Implementation of Training Modules (2019)

Enactment of OSHCIM regulations and ICOP (2020)

Enforcement of OSHCIM and ICOP (post 2020)


IKEA
KAJIMA
MALAYSIA
CONGRATULATION
ASSEMBLY AREA


P5305-mH
L
41136
22098-0
07102


TERAJU
CONSTRUCTION SDN BHD
CAUTION
FALLING OBJECT
RISK
Watch overhead at
all times.
TERAJU
CONSTRUCTION SDN BHD
SITE SAFETY
Hard Hats
Must Be Worn
High Visibility Vest
Must Be Worn
Wear
Safety Harness
Foot Protection
Must Be Worn


ERAJU
DANGER
Lifting in progress

HOW TO GET INVOLVED?

- Client
  - REHDA
- Designer
  - Architects /Board of Engineers
  - IEM
  - BQSM
- Constructor
  - MBAM
  - Associations
- Government
  - DOSH
  - KKR
  - CIDB
  - LLM
  - PBT
- Training Institution
  - Universities
  - Training Providers

GUIDELINES ON OCCUPATIONAL SAFETY AND HEALTH IN CONSTRUCTION INDUSTRY (MANAGEMENT) 2017

Construction OSH Management Guidelines - Significance

Across US, **42%** of construction fatalities were **related to design issues** between the years 1990 and 2003[1]

A 1991 study done in Europe found that **60%** of fatalities were **the result of decisions made before the site work even began**[2]

63% of all fatalities and injuries could be attributed to design decisions of lack of planning[3]

[1] Behm, M., Linking construction fatalities to the design for construction concept (2005)
[2] European Foundation for the Imrpovement of Living and Working Conditions (1991)
[3] NSW WorkCover, CHAIR Safety in Design Tool, 2001

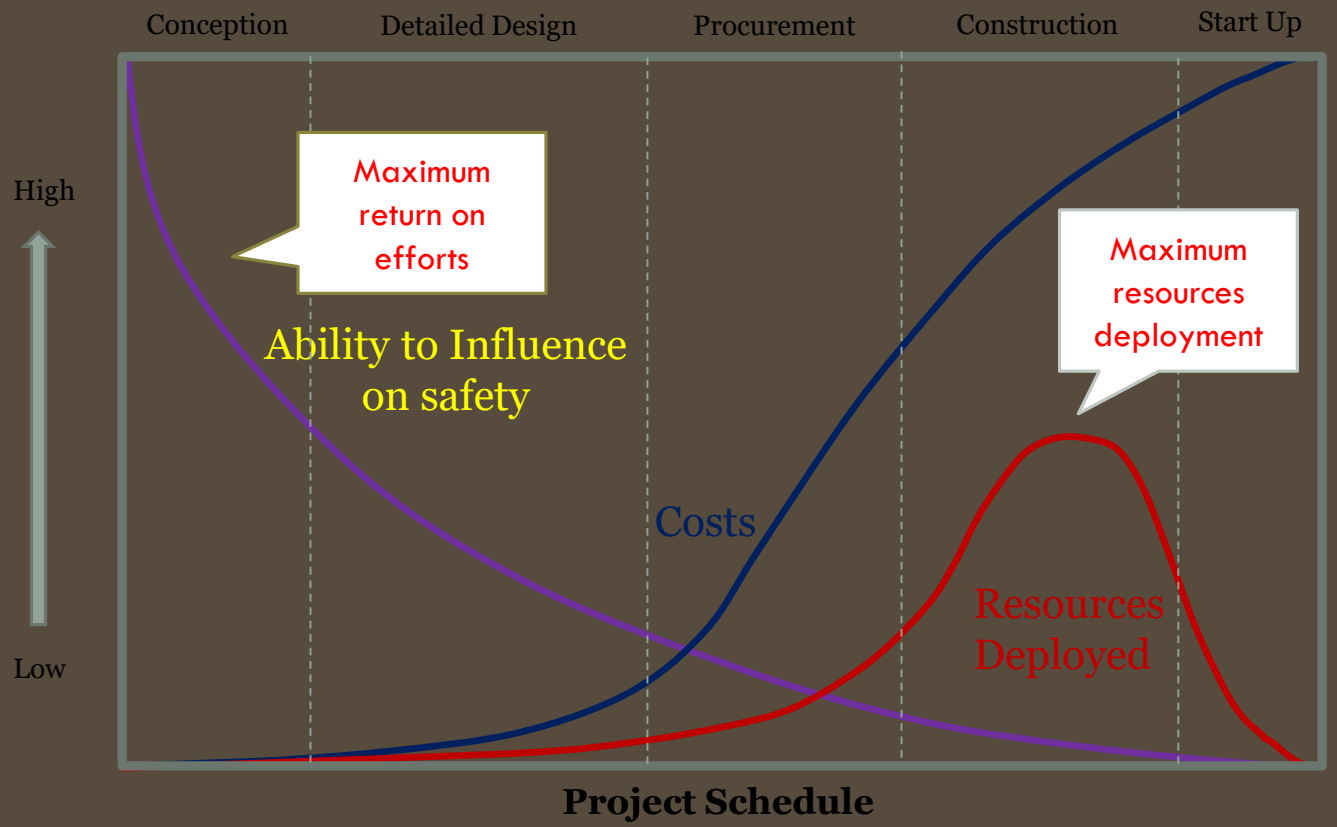
Ability to influence safety

Encourage all parties to take responsibility, by better planning, design & management

Those who can influence OSH during project lifecycle are made responsible

OSH should be treated as an essential, but normal part of the project

Ability to influence safety



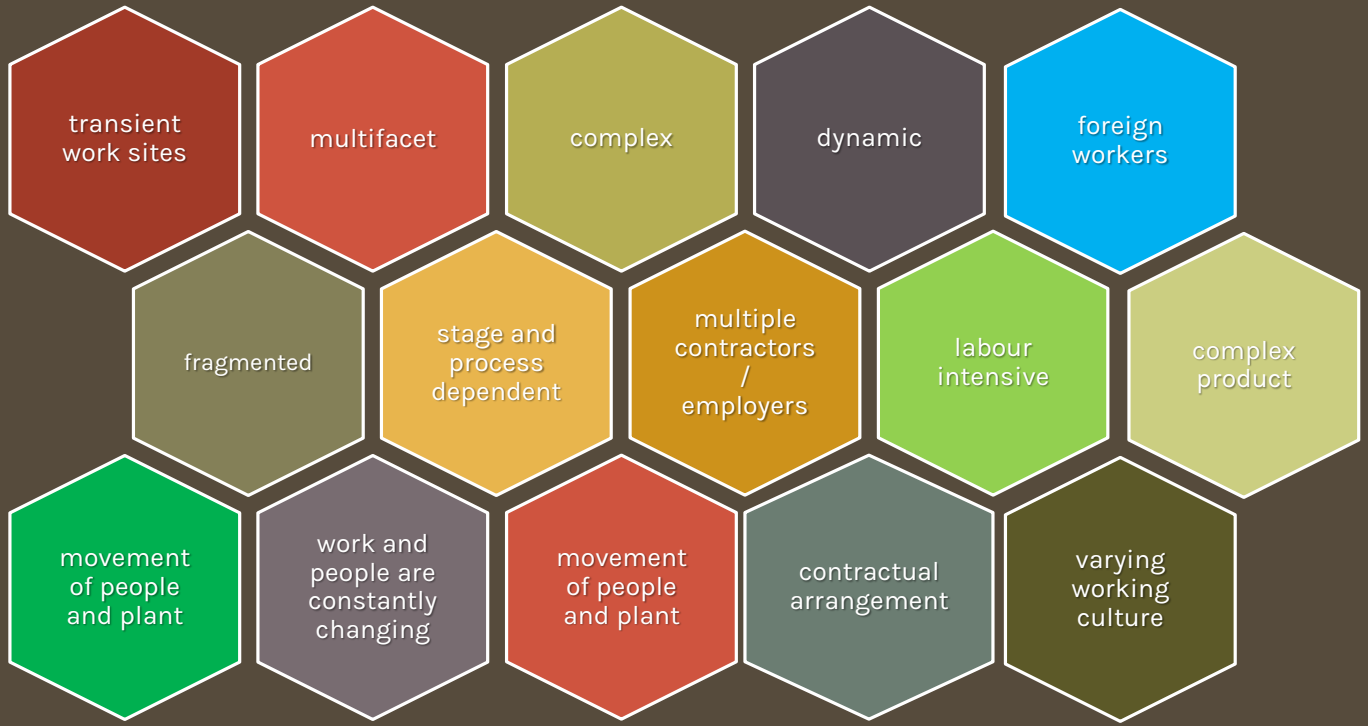
1 R. Szymberski, "Construction Project Safety Planning" TAPPI Journal, 1997.

The design at planning stage

The most effective risk control measure, eliminating the hazard, is often most cost effective and more practical to achieve at the design or planning stage rather than making changes later when the hazards become real risks in the workplace. Safe design can result in many benefits, including:

- prevention of injury and illness
- improved useability of structures
- improved productivity and reduced costs
- better prediction and management of production and operational costs over the lifecycle of a structure
- compliance with legislation
- innovation, in that safe design can demand new thinking to resolve hazards in the construction phase and in end use.

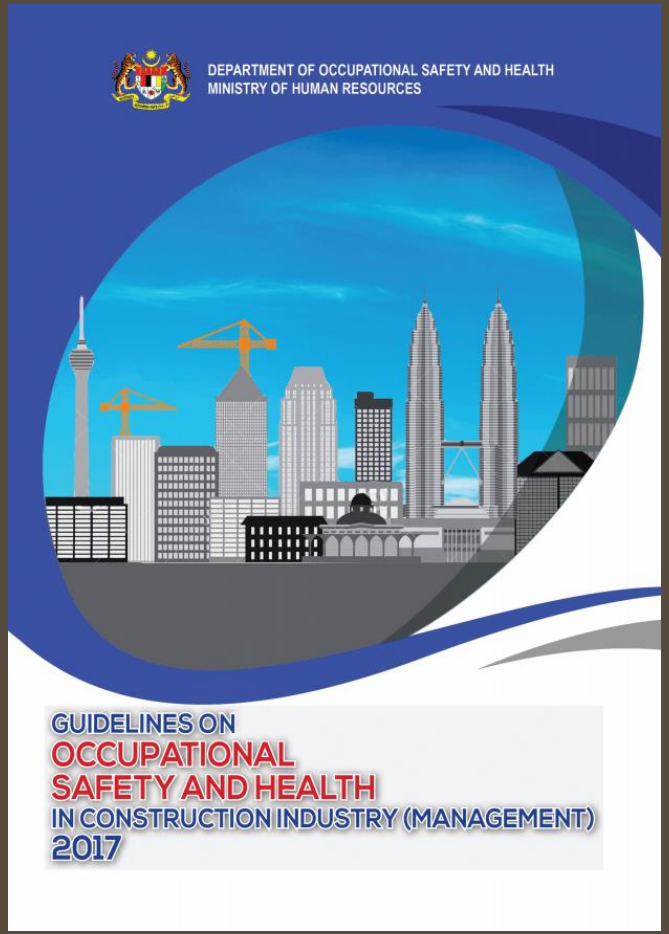
Characteristics of the industry



BIGGEST CHALLENGES TO OSH IN CONSTRUCTION

- Changing the working culture of stakeholders
- Primary responsibility lies with business who creates risk
- DOSH should influence & encourage - punitive actions only to deter

- A very **significant change**
- It places much larger responsibilities on client, designer and contractor
- **Significant challenges**
- Some responsibility for OSH should rest with players upstream in the supply chain.
- Decisions made in the pre-construction phase can have OSH implications in the construction and post-construction phases
- Client and designer becoming an integral part of the construction process



The Challenges

Clients/ developers

- Not our responsibility what happen on site
- We know nothing about construction
- Go speak to the contractors

Designers

- Not for us to say how a structure should be built/ maintain
- We know how to design, not build/ maintain
- Go speak to the contractors

The Challenges

And as for the contractors

- "Please help us!"
- Not enough time/money in the project for OSH
- Left trying to make sense of poor design by people who don't know enough about construction process
- Taking on all the risk

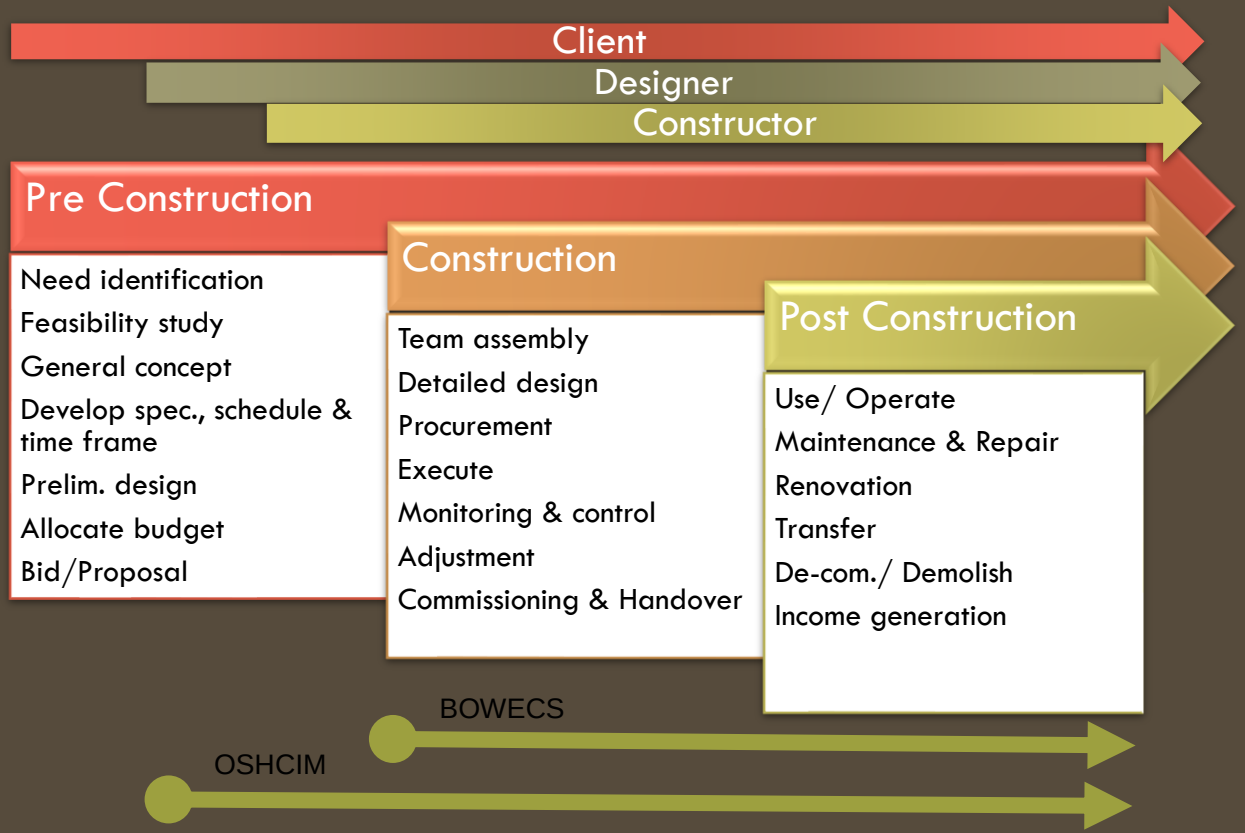
CONSTRUCTION OSH MANAGEMENT GUIDELINES - FUNDAMENTAL

the right information

for the right people

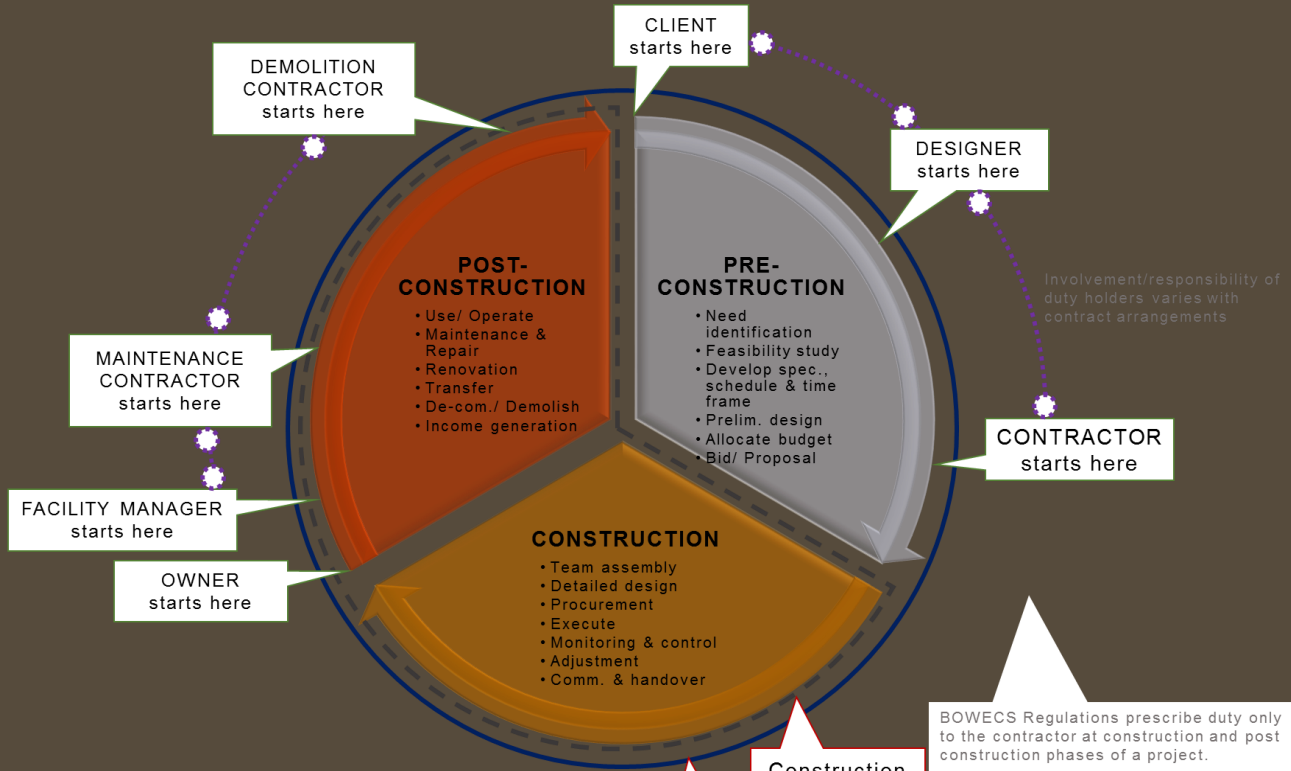
at the right time

CONSTRUCTION PROJECT LIFECYCLE



GUIDELINES ON OCCUPATIONAL SAFETY AND HEALTH IN CONSTRUCTION INDUSTRY (MANAGEMENT) 2017

CONSTRUCTION OSH MANAGEMENT GUIDELINES - OVERVIEW



Concept Phase

- Client
  - Make, maintain and review suitable arrangements for managing a project
  - Structure all contracts to allow duty holders to carry out their duties
  - Ensure that design specification complies with the Safety, Health and Welfare Reg.
  - Ensuring that every person designing the structure and every contractor who has been or likely to be appointed is promptly provided with relevant information, e.g. any as-built drawings or surveys
  - Appoint a competent designer
  - Appoint Principal Designer or consider how to obtain suitable and sufficient advice to manage safety and health obligations
- Principal Designer
  - Inform the client of his duties
  - Plan, manage
  - Propose timetable for pre-construction information
  - Consider contents of the pre-construction safety and health plan
  - Advise the client on competences and resources which designer, principal contractor and contractors will need
  - Take steps to avoid risks to the safety and health of any person involved in all phases of the project from construction to eventual demolition
  - Identify hazards and eliminate hazards which may give rise to risks
  - Ensure that any structure designed for use as a workplace has been designed so as to comply with the provisions of the Safety, Health and Welfare Reg.
- Principal Contractor
  - If involved at this stage consider if you possess the competencies to carry out the project safely
  - Assist in identifying hazards and risks and consider how to eliminate or investigate the effects
  - Consider any temporary works which may be required and liaise with principal designer to ensure that such works can be incorporated into the project with due regard to safety and health

Design Phase

- Client
  - Provide information for pre-construction information and tender documents
  - Consider how contractors will fulfill his obligation to provide welfare facilities and how quickly this could be achieved
  - Where contracts allow, involve the principal contractor and any specialist contractors in to ensure that designs can be constructed safely
  - Ensure that designers have robust procedures to ensure that safety and health is properly considered at all stages of design development
- Principal Designer
  - Plan, manage, monitor and coordinate the pre-construction phase
  - Collect and distribute information from client. It must go all involved in the design and must be incorporated in the pre-construction information to be issued to all tenderers
  - Make sure all parties talk to each other
  - Continue to develop design in accordance with principles of criteria set out in concept phase
  - Help prepare tender documentation and input to pre-construction information
- Principal Contractor
  - Continue duties identified for the concept phase

Tender Phase

- Client
  - Ensure that the pre-construction information forms part of the tender documentation
  - Ensuring the tender documents inform the contractor of any arrangements for providing welfare facilities for the workforce
  - Ensure that contractors on the tender list have sufficient and suitable competencies and resources appropriate for the project
  - Allocate a proper and reasonable time for contractors to plan and to price the project with sufficient regard to safety and health
  - Appoint principal contractor
- Principal Designer
  - Provide and distribute the pre-construction information to accompany the tender documents
  - If required, advise the client in selecting the principal contractor
  - Plan and structure the safety and health file and include information on it in the tender document
  - Ensure that principal contractor and contractors have systems to manage safety and health in their temporary works procedures
  - If required, continue to develop design
- Principal Contractor
  - Ensure that the tender includes plans for providing welfare facilities from the start of construction work
  - Consider the pre-construction information when compiling their tender
  - Identify contractors and ensure that they provide input into safety and health at an early stage

Construction Phase

- Client
  - Ensure principal contractor has adequate time to develop a construction phase plan prior to work commencing
  - On completion receive safety and health file from principal designer and pass to maintenance and construction workers
- Principal Designer
  - Talk to all parties about their safety and health responsibilities
  - Advise the client of the adequacy of the principal contractor's construction phase plan
  - Ensure that principal contractor and contractors have systems to manage safety and health in temporary works
  - On completion of the phase, hand the safety and health file to the client
  - Continue to develop design – in the case of additional work or changed scope of works ensure the principal contractor and contractors are fully involved at an early stage
- Principal Contractor
  - Plan, manage, monitor and coordinate the construction phase in a waywhich ensures it is carried out without risks to safety and health
  - Do not commence construction work until they know the client is aware of their duties
  - Suitable and adequate welfare facilities are available
  - A suitably developed construction phase plan has been approved by the client
  - Ensure that contractors have adequate and appropriate competencies
  - Ensure that contractors are informed of the amount of time allowed for planning and preparation
  - Ensure workforce and that of contractors are provided with information, instructions, training and supervision
  - Take reasonable steps to prevent access by unauthorized persons to the site
  - Pass on all relevant information promptly to the principal designer to compile the safety and health file
  - Consult and engage with workers

- Everyone
  - Check own competence – Cooperate with others and coordinate work to ensure the safety and health of construction workers and others who may be affected by the work – Report obvious risks – Take account of and apply the general principles of prevention when carrying out duties

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Client...

WHO IS THE CLIENT?

- Clients are persons for whom or on whose behalf a construction project is carried out in connection with business whether the business operates for profit or not.
- Homeowners or domestic clients who engage contractors to build or rebuild houses for personal dwelling not intended for use as business are not intended to be covered under this guidelines.
- If the project have more than one clients, all the possible clients should agree that only one of them should be responsible for carrying out the recommendations of these guidelines.

What should client do?

1. Making suitable arrangement for managing a project

2. Appointing principal designers and principal contractors

3. Assembling the project team

4. Providing pre-construction information

5. Ensuring preparation of the construction phase plan

6. Ensuring preparation of the safety and health file

7. Maintaining and reviewing the management arrangement

1. MAKING SUITABLE ARRANGEMENT FOR MANAGING A PROJECT

The arrangements should focus on the needs of particular project and be proportionate to the size of project and risk involved in the work. Arrangements should include :

a) Assembling the project team;
b) Ensuring the roles, function and responsibilities of the project team are clear;
c) Ensuring sufficient time, budget and resources are allocated at each stage of the project;
d) Ensuring effective mechanisms are in place for team members of the project team to communicate and cooperate with each other;
e) How the client will take reasonable steps to ensure that the principal designer and principal contractor comply with their separate duties.(could take place in project progress meeting or via written updates);
f) Setting out the means to ensure that the safety and health performance of designers and contractors is maintained throughout; and
g) Ensuring the workers are provided with suitable welfare facilities for the duration of construction work.

2. APPOINTING PRINCIPAL DESIGNERS AND PRINCIPAL CONTRACTORS

Principal Designer

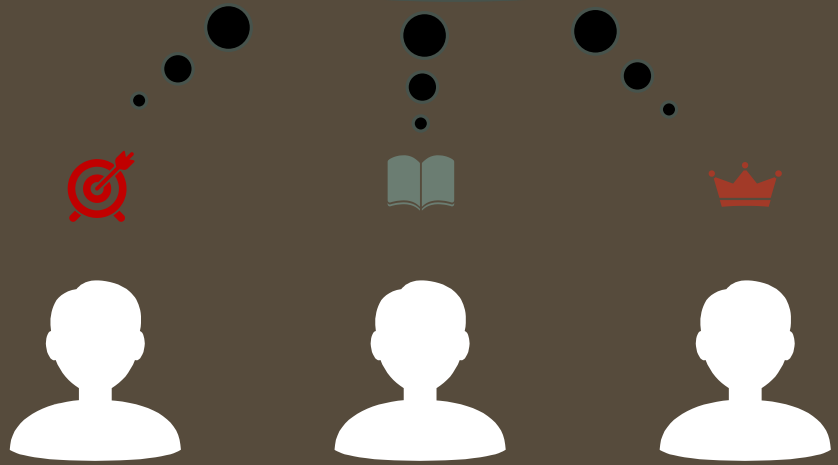
- Should be appointed as early as possible in the design process, if practicable at concept stage to ensure the designer could provide help to client in matters such as pulling together pre-construction information. This will give the principal designer enough time to carry out their duties. They should be in place for as long as there is a need for their role to be performed. If the principal designer's appointment finishes before the project ends, the client should ensure the principal contractor is fully briefed on matters arising from designs relevant to any subsequent construction work.

Principal Contractor

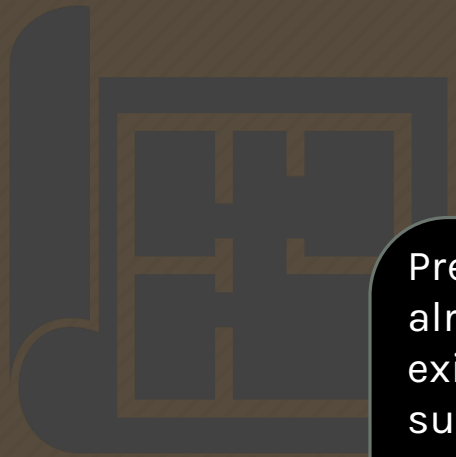
- The principal contractor should be appointed early enough in pre-construction phase to help the client meet their duty to ensure a construction phase plan is drawn up before the construction phase starts. This also gives the principal contractor time to carry out their duties

3. Assembling the project team

The managements arrangements should cover what clients will do to ensure that the people and organization they appoint will have the skills, knowledge, experience and capability to manage safety and health risks.



4. PROVIDING PRE-CONSTRUCTION INFORMATION



Pre-construction Information is an info already in client's possession (such as an existing safety and health file, asbestos survey, structural drawings, SI reports, etc.) or which is reasonable to obtain through sensible enquiry. The information must be relevant to the project, have an appropriate level of detail and proportionate to the nature of risks.

PRE CONSTRUCTION INFORMATION NEEDED BY

-Bidding for work on the project.

-Who have already been appointed to carry out their duties.

-For planning, managing, monitoring and coordinating the work of the project

PRE-CONSTRUCTION INFORMATION

(a) be relevant to the particular project;
(b) have an appropriate level of detail; and
(c) be proportionate to the risks involved.

DESCRIPTION OF THE PROJECT

(a) The project description and programme details, including
(i) key dates (including the planned start and finish of the construction phase); and
(ii) the minimum time to be allowed between the appointment of the principal contractor and instruction to commence work on the site;

(b) Details of the client, designers and other consultants;
(c) Whether or not the structure will be used as a workplace (in which case the finished design will need to take account of the relevant requirements of the Factories and Machinery (Safety, Health and Welfare) Regulations);
(d) The extent and location of existing records and plans;

CLIENT'S CONSIDERATIONS AND MANAGEMENT REQUIREMENTS

(a) Arrangements for

(i) planning for and managing the construction work, including any safety and health goals for the project;
(ii) communication and liaison between the client and others;
(iii) security of the site;
(iv) welfare provisions;

CLIENT'S CONSIDERATIONS AND MANAGEMENT REQUIREMENTS

(b) Requirements relating to the safety and health of the client's employees or customers or those involved in the project such as

(i) site hoarding, safety nets, peripheral nets and waste chutes requirements;
(ii) site transport arrangements or vehicle movement restrictions;
(iii) client permit-to-work systems
(iv) fire precautions;
(v) emergency procedures and means of escape;
(vi) 'no-go' areas or other authorisation requirements for those involved in the project;
(vii) any areas that the client has designated as confined spaces;
(viii) smoking and parking restrictions; and
(ix) the client's workplace details, for example construction board displaying information

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ENVIRONMENTAL RESTRICTIONS AND EXISTING ON-SITE RISKS (A) SAFETY HAZARDS, INCLUDING

(i) boundaries and access, including temporary access (for example, narrow streets, or lack of parking, turning or storage space);

(ii) any restrictions on deliveries or waste collection or storage;

(iii) adjacent land uses (for example, schools, railway lines or busy roads);

(iv) the existing storage of hazardous materials;

(v) the location of existing services, particularly those that are concealed (for example, water, electricity or gas);

(vi) ground conditions, underground structures or water courses where this might affect the safe use of plant (for example, crane or piling rig) or the safety of groundwork;

(vii) information about existing structures (for example, stability, structural form, fragile or hazardous materials, or anchorage points for fall arrest systems – particularly where demolition is involved);

(viii) previous structural modifications, including weakening or strengthening of the structure – particularly where demolition is involved;

(ix) fire damage, ground shrinkage, movement or poor maintenance that may have adversely affected the structure;

(x) any difficulties relating to plant and equipment in the premises, such as overhead gantries whose height restricts access;

(xi) safety and health information in earlier design, construction or 'as-built' material such as drawings (for example, details of pre-stresses or posttensioned structures);

ENVIRONMENTAL RESTRICTIONS AND EXISTING ON-SITE RISKS (B) HEALTH HAZARDS, INCLUDING

(i) asbestos, including results of surveys (particularly where demolition is involved);
(ii) the existing storage of hazardous materials;
(iii) contaminated land, including results of surveys;
(iv) existing structures containing hazardous materials;
(v) health risks arising from the client's activities.
(vi) the safety and health hazards of the site, including design and construction hazards and how they will be addressed;

SIGNIFICANT DESIGN AND CONSTRUCTION HAZARD

(i) Significant design assumptions and suggested work methods, sequences or other control measures;
(ii) Arrangements for the coordination of ongoing design work and handling design changes;
(iii) Information on significant risks identified during design; and
(iv) Materials requiring particular precautions.

5. ENSURING PREPARATION OF THE CONSTRUCTION PHASE PLAN

The client should ensure that the construction phase plan prepared before the construction phase begins. The plan outlines the safety and health arrangements, site rules and specific measures concerning any work involving particular risks. For single-contractor projects, the contractor should ensure the plan is prepared while for projects involving more than one contractor, it is the duty of principal contractor to ensure the plan is prepared.

A CONSTRUCTION PHASE PLAN IS A DOCUMENT THAT SHOULD RECORD THE

(a) safety and health arrangements for the construction phase;
(b) site rules; and
(c) where relevant, specific measures concerning work that falls within one or more of the categories listed in Appendix 4.

(A) A DESCRIPTION OF THE PROJECT, THAT INCLUDES

(i) name and address of the client;
(ii) name and address of the principal designer;
(iii) names and addresses of the designers;
(iv) names and addresses of the contractors;
(v) description of the project and identification of specific structures;
(vi) project programme with key dates; and
(vii) statement of the principal contractor's safety and health policy

(B) THE SAFETY AND HEALTH MANAGEMENT OF THE WORK INCLUDING:

(i) management structure of the principal contractor and all other participants in the management structure, and for the project, identifying responsibilities generally but, in particular, with regard to safety and health

(ii) guidelines for monitoring and review of safety and health performance and safety and health targets for the project;

(iii) arrangements for the site rules;

(iv) arrangements to ensure cooperation between project team members and coordination of their work, for example regular site meetings and other means to promote cooperation and coordination between parties on the site;

(v) arrangements for consultation and involving employees and workers;

(vi) arrangements for disseminating design information as suggested in paragraphs 70–71;

(B) THE SAFETY AND HEALTH MANAGEMENT OF THE WORK INCLUDING:

(vii) arrangements for implementation and communication of design changes during the project;

(viii) arrangements for selection and supervision of contractors;

(ix) arrangements for the implementation of relevant legal requirements for safety and health information between all affected parties;

(x) arrangements for site security;

(xi) arrangements for site induction and specific trainings;

(xii) arrangements for welfare facilities, as mentioned in Appendix 5, and first aid;

(xiii) arrangements for reporting and investigation of accidents and other incidents including near misses;

(xiv) arrangements for production and approval of risk assessments and method statements and systems of work; and

(xv) arrangements for fire and emergency procedures;

(C) IDENTIFICATION OF SIGNIFICANT SITE RISKS, THE ELIMINATION OR MITIGATION OF ANY OF THE SPECIFIC SITE RISKS LISTED IN APPENDIX 4

1 Work which puts workers at risk of burial under earthfalls, engulfment in swampland or falling from a height, where the risk is particularly aggravated by the nature of the work or processes used or by the environment at the place of work or site.

2 Work which puts workers at risk from chemical or biological substances constituting a particular danger to the safety or health of workers or involving a legal requirement for health monitoring.

3 Work with ionizing radiation.

4 Work near high voltage power lines.

5 Work exposing workers to the risk of drowning.

6 Work on wells, underground earthworks and tunnels.

7 Work carried out by divers having a system of air supply.

8 Work carried out by workers in caissons with a compressed air atmosphere.

9 Work involving the use of explosives.

10 Work involving the assembly or dismantling of heavy prefabricated components.

6. ENSURING PREPARATION OF THE SAFETY AND HEALTH FILE

A safety and health file is only required for projects involving more than one contractor. The client should ensure that the principal designer prepares a safety and health file for their project. It is to ensure at the end of a project, the client has info that anyone carrying out subsequent construction work on the building will need to know about in order to be able to plan and carry out the work safely and without risks to health.

SAFETY AND HEALTH FILE INFORMATION

(a) a brief description of the work carried out;
(b) historic site data;
(c) any hazards that have not been eliminated through the design and construction processes, and how they have been addressed, ground investigation reports and records (for example, surveys or other information concerning asbestos or contaminated land), site survey information and pre- and post-construction phase;
(d) investigation reports and records;
(e) photographic records of essential site elements;
(f) statement of design philosophy, key structural principles (for example, bracing, sources of substantial stored energy – including pre- or post-tensioned members) and safe working loads for floors and roofs, calculations and applicable design standards;
(g) drawings and plans used throughout the construction process, including drawings prepared for tender purposes;
(h) record drawings and plans of the completed structure showing, where appropriate, means of safe access to service voids;

SAFETY AND HEALTH FILE INFORMATION

(i). materials used in the structure identifying, in particular, hazardous materials (for example, lead paints and special coatings), including data sheets prepared and supplied by suppliers and information provided by the client;

(j). information regarding the handling and/or operation together with the relevant maintenance manuals, with particular regard to removal or dismantling of installed plant and equipment (for example, any special arrangements for lifting such equipment);

(k) safety and health information about equipment provided for cleaning or maintaining the structure;

(l) the results of proofing or load tests;

(m) the commissioning test results;

(n) the nature, location and markings of significant services, including underground cables; gas or fuel supply equipment; in-built safety features, for example emergency fire-fighting systems and fail-safe devices;

(o) information and as-built drawings of the building, its plant and equipment (for example, the means of safe access to and from service voids and fire doors).

7. MAINTAINING AND REVIEWING THE MANAGEMENT ARRANGEMENT

The client should maintain and review their arrangements to ensure they remain relevant throughout the life of the project. Examples of actions the clients can take to maintain and review their arrangements are :

a) Establishing key milestones so they can assess the progress of the project and determine whether safety and health standards are being met;
b) Where necessary, seek advice from SHO or consultant if they are required to appoint such person. On larger projects, the clients may value an independent review of the standards; and
c) Ensuring the arrangements for handing over the building to a new user are sufficient to protect anyone who may be affected by risks arising from any ongoing construction work.

Designer & Principal Designer...

WHO IS THE DESIGNER & PRINCIPAL DESIGNER?

- **Designer**

A designer is an organisation or individual , who in the course or furtherance of a business :

a) Prepares or modifies a design for a construction project; or
b) Arranges for, or instructs someone else under their control to do so, relating to structure, or to a procduct or mechanical or electrical system intended for a particular structure.

- **Principal Designer**

A principal designer is the designer with control over the pre-construction phase of the project.
The principal designer can be an organisation or an individual that has :

a) The technical knowledge of contruction industry relevant to the project;
b) The skills, knowledge and experience to understand, manage and coordinate pre-construction phase, including any design work carried out after construction begins.

WHO ARE DESIGNERS

Designers include architects, architectural technologists, consulting engineers, quantity surveyors, interior designers, temporary work engineers, chartered surveyors, technicians or anyone who specifies or alters a design.

This would include Professional Engineers, engineers, architects, and even contractors or clients if they prepare a design plan for permanent or temporary structures.

WHY IS A DESIGNER IMPORTANT?

-Strong influence during the concept and feasibility stage of a project.

-The earliest decisions can fundamentally affect the safety and health of those who will construct, maintain, repair, clean, refurbish and eventually demolish a building.

-Selecting materials that are lighter to handle or windows that can be cleaned from the inside can avoid or reduce the risks involved in constructing the building and maintaining it after construction.

-Decisions such as these have an important influence on the overall safety and health performance of the project and the use and maintenance of the building once it is built

What should designer do?

1. Preparing or modifying design

- Taking account of the general principles of prevention in design work
- Taking account of pre-construction information
- Eliminating, reducing or controlling foreseeable risks through design

2. Providing design information

Provide info to:

- Principal designer;
- Other designer;
- Principal contractor;
- Contractors.

3. Making client aware of their duties

4. Cooperating with other duty holders

What should principal designer do?

Planning, managing, monitoring and coordinating pre-construction phase

Liaising with the principal contractor

Identifying, eliminating or controlling foreseeable risks

Providing pre-construction information

Ensuring coordination and cooperation

Safe design

Safe design means the integration of control measures early in the design process to eliminate or, minimise risks to safety and health throughout the life of the structure being designed.

The safe design including practicability, aesthetics, cost and functionality and does not compromise the safety and health of those who work on or use the structure over its life.

Safe design begins at the concept development phase of a structure when making decisions about:

- the design and its intended purpose
- materials to be used
- possible methods of construction, maintenance, operation, demolition or dismantling and disposal
- what legislation, codes of practice and standards need to be considered and complied with

Contractor & Principal Contractor...

WHO IS THE CONTRACTOR & PRINCIPAL CONTRACTOR?

- **Contractor**

Anyone who directly employs or engage construction workers or manages construction. Contractors include sub-contractors, any individual, sole trader, self-employed worker, or business that carries out, manages or controls construction work on their premises.

- **Principal Contractor**

An organisation or person appaointed by the client that coordinates the work of the construction phase of a project involving more than one contarctor, so it is carried out in a way that secures safety and health.

What should contractor do?

- Providing welfare facilities
- Making clients aware of their duties
- Preventing unauthorized access to the site
- Planning, managing and monitoring construction work
- Providing information and instructions
- Appointing and employing workers
- Providing supervision

What should principal contractor do?

- Planning, managing, monitoring and coordinating the construction phase
- Providing suitable site inductions
- Preventing unauthorized access to the site

- Providing welfare facilities
- Liaising with principal designer
- Consult and engage with workers

5 KEY ELEMENTS TO CONSTRUCTION SAFETY

1. Managing the risks by applying the risk management approach and the **general principles of prevention**;
2. **Appointing** the right people and organizations at the right time;
3. Making sure everyone has the **information, instruction, training and supervision** they need to carry out their jobs in a way that secures safety and health;
4. Duty holders **cooperating and communicating** with each other and **coordinating** their work; and
5. **Consulting workers and engaging** with them to promote and develop effective measures to secure safety, health and welfare

APPOINTING THE RIGHT PEOPLE AND ORGANIZATIONS AT THE RIGHT TIME

1. Individual competency

- Those appointed must have the skills, knowledge, training and experience to carry out the work they will be employed

2. Organizational capability

- Appointed organization must have the policies and systems in place to set acceptable safety and health standards which comply with the law, & resources and people to ensure the standards are delivered

3. Right time

- Appointing consultant or contractor at the right time, so that they have enough time to plan and manage for safety and health

APPOINTING THE RIGHT PEOPLE AND ORGANIZATIONS AT THE RIGHT TIME

- In a proposed mix development, a client required five high-rise buildings to be designed and connected at the mid and top floors via curved sky bridges.

- The client initially appointed a building designer for the design, but subsequently realised that the building designer did not have the experience and knowledge to design the curved sky bridges.

- The client then appointed a bridge designer to design the curved sky bridges while the building designer designed the building.

APPOINTING THE RIGHT PEOPLE AND ORGANIZATIONS AT THE RIGHT TIME

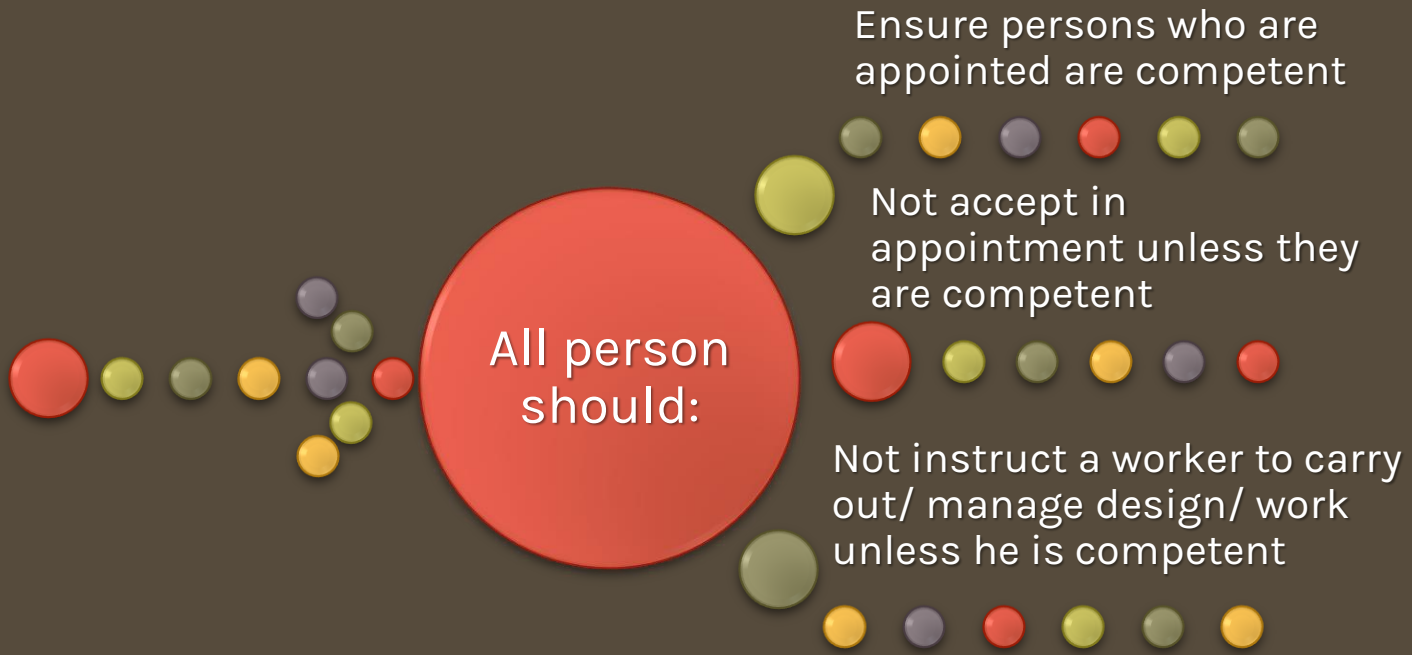
A client awarded a contract to a principal contractor for the demolition of an old shopping complex.

While it was unknown during the tender stage, it was later discovered that the building that was to be demolished had a pre-stressed floors.

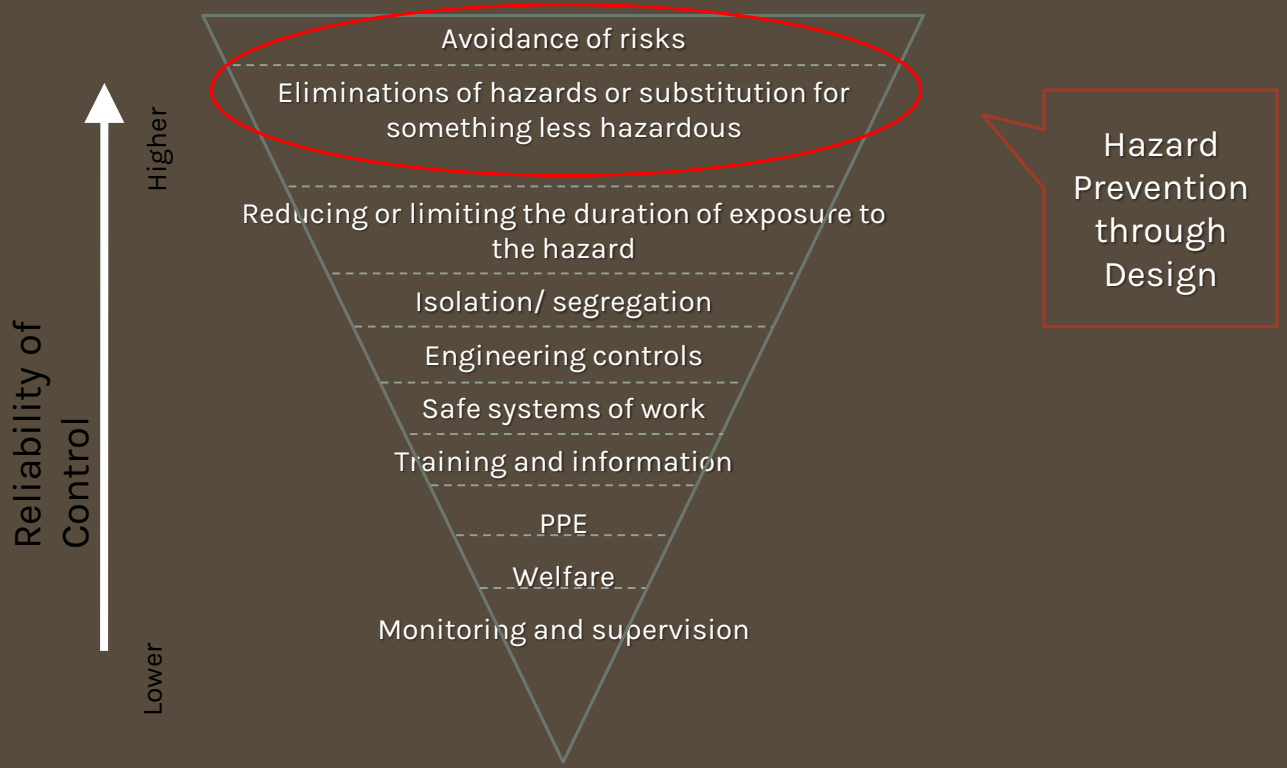
With this new information, the principal contractor would need more time to engage and work with contractors who are pre-stressed specialists to help demolish this building.

Hence, the client should provide the principal contractor with additional time and resources to resolve this situation.

APPOINTING THE RIGHT PEOPLE AND ORGANIZATIONS AT THE RIGHT TIME



MANAGING THE RISK BY APPLYING THE RISK MANAGEMENT APPROACH & GENERAL PRINCIPLES OF PREVENTION



MANAGING THE RISK BY APPLYING THE RISK MANAGEMENT APPROACH & GENERAL PRINCIPLES OF PREVENTION

1. *Avoid risks*
2. *Evaluate risks which cannot be avoided*
3. *Combat the risks at source*
4. *Adapt the work to the individual*
5. *Adapt to technical progress*
6. *Replace dangerous by non-dangerous or less dangerous*
7. *Develop a coherent overall prevention policy*
8. *Give collective protective measures priority over individual protective measures*
9. *Give appropriate instructions to employees*

MANAGING THE RISK BY APPLYING THE RISK MANAGEMENT APPROACH & GENERAL PRINCIPLES OF PREVENTION

Avoid risk where possible;

Evaluate those risks that cannot be avoided; and

Put in place proportionate measures that control them at source.

MAKING SURE EVERYONE HAS THE INFORMATION, INSTRUCTION, TRAINING AND SUPERVISION

Information

Instruction

Training

Supervision

Required level will depend on the risks involved in the project, complexity and scale of the project and the level of skills, knowledge, training and experience of the workforce

MAKING SURE EVERYONE HAS THE INFORMATION, INSTRUCTION, TRAINING AND SUPERVISION

Information | **Instruction** | Training | Supervision

Workers are provided with information and instruction that include:

a. suitable site induction;
b. emergency procedures; and
c. information on hazards, risks and control measures put in place.

MAKING SURE EVERYONE HAS THE INFORMATION, INSTRUCTION, TRAINING AND SUPERVISION

Information | Instruction | **Training** | Supervision

Establishing training needs to workers:

a. assess the existing safety and health skills, knowledge, training and experience;
b. compare these attributes with the range of skills, knowledge, training and experience they will need for the job; and
c. identify any shortfall between (a) and (b). The difference between the two will be the 'necessary training'.

As a general rule, if the person being assessed demonstrates the required qualities, no further training should be needed.

MAKING SURE EVERYONE HAS THE INFORMATION, INSTRUCTION, TRAINING AND SUPERVISION

Information

Instruction

Training

Supervision

Appropriate supervision must be provided.

a. Closer supervision if they are inexperienced/ starting new work
b. Assess level of safety awareness, education, physical agility, literacy and attitude

Let them know how to get supervisory help, even when supervisor is not present.

BOWECS Reg. requires SSS and CSS, for several work activities designated person must be appointed to provide supervision

MAKING SURE EVERYONE HAS THE INFORMATION, INSTRUCTION, TRAINING AND SUPERVISION

PRE-CONSTRUCTION INFORMATION

- Description of the project;
- Client's considerations and management requirements;
- Environmental restrictions and existing on-site risks;
- Significant design and construction hazards; and etc.

CONSTRUCTION PHASE PLAN

- Description of the project;
- Safety and health management of the work;
- Identification of significant site risks.

SAFETY AND HEALTH FILE

- A brief description of the work carried out;
- Historic site data;
- Any hazards that have not been eliminated;
- Investigation reports & records;
- Statement of design philosophy, key structural principles; and etc.

EVERYONE COOPERATING AND COMMUNICATING WITH EACH OTHER AND COORDINATING THEIR WORK

Cooperating

- to ensure safety and health
- to ensure everyone complies with the law

Communicating

- to make sure everyone understands the risks and the measures to control those risk
- between main contractors of different sites

Coordinating

- among sub-contractors who start at different stages
- flow of information and instruction

Review meeting by clients

EVERYONE COOPERATING AND COMMUNICATING WITH EACH OTHER AND COORDINATING THEIR WORK

with designers and contractors, who may affect design, construction and maintenance at various key stages of the project

during which identified foreseeable design risk, if not eliminated, is reduced, and residual risks are recorded and communicated

is typically conducted during pre-construction phase, but can be done during construction phase

looks at design risks which begins on the drawing board, and considers how a building or structure can be constructed, maintained, cleaned and demolished safely

CONSULTING WORKERS AND ENGAGING WITH THEM TO PROMOTE AND DEVELOP EFFECTIVE MEASURES

Consultation and engagement

- It is required under the law!
- Helping spot workplace risks and knowing what to do about them
- Making sure safety and health controls are appropriate
- Increasing level of commitment to working in a safe and healthy way

Example of implementation...

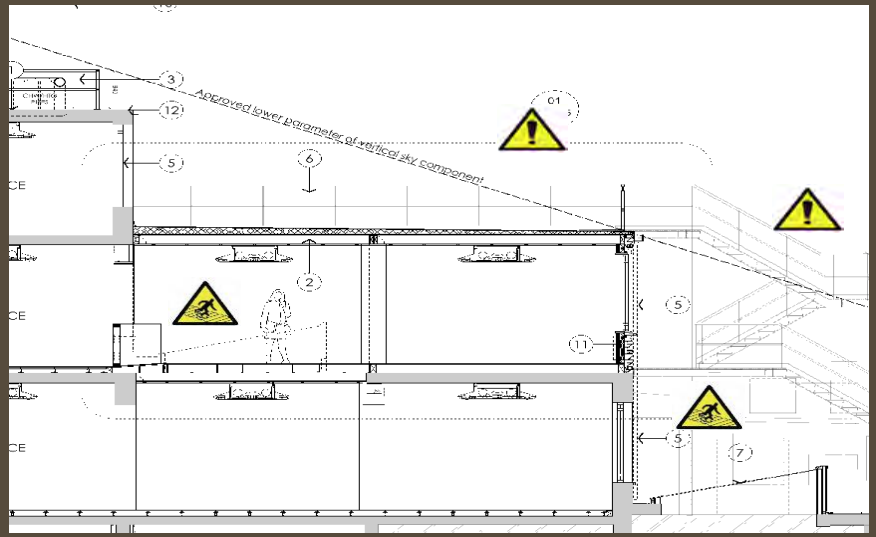
Contractor & Designer Guidance – Site Drawing Safety Symbols & Signage

Detail Design – Highlighting residual construction risks in design

The Problem / Challenge
Highlighting significant residual risks hidden or outside of competent contractors' normal experience.

The risks
If these risks are not identified pre-tender it is possible that the contractor will underestimate the cost and details of the temporary works solution for safe construction.

The solution
Simple drawing and survey annotation techniques showing existing features, new proposals and possible temporary works solution with commonly recognized symbols.



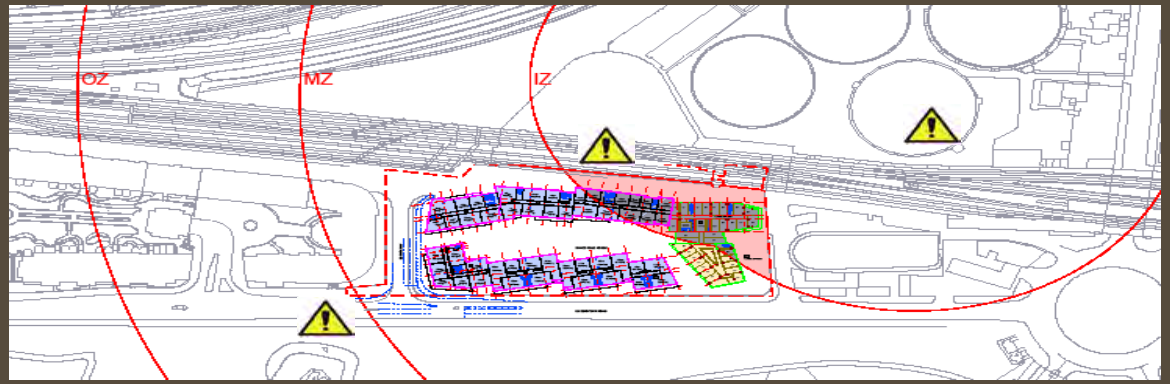
Fragile roof symbol

Site Hazard Analysis to facilitate Initial Design & Construction Phase Decisions

The Problem / Challenge
To find the best building location on the site, from the site analysis, and the optimum footprint, orientation, size, scale, geometry and sculptural form.

The risks
Hazardous local gas installations, railway structures, tracks, viaducts, roads , etc. below ground services, tunnels and foundations, retained structures etc.

The solution
Drawings were produced that show proximity to the gasholders. Shows how close structure, temporary works, scaffolding, hoardings , welfare facilities



Gasholders Site Plan with significant hazards indicated

Site Analysis – Underground Services for Initial Design and Construction Phase

Underground electrical cable

The Problem / Challenge
The identification and location of existing underground services prior to the positioning of future structures on site to minimize the need for excavations.

The risks
Electrical services and gas supplies are potentially highly hazardous with the ability to cause death and injury if accidentally struck during the construction phase, and all excavations pose potential risks.

The solution
Designer clearly identified hazardous underground services on the drawings and showed other services such as water, fibre optics and drainage

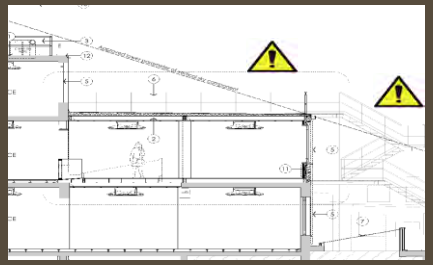
Subscan Survey -hazards identified with symbols

Tender / Contract Stage Design – Temporary Fall Protection Issues

The Problem / Challenge
To alert the contractor's temporary works designers to unprotected slab and roof edges where the designer could insert temporary protection works aides instead of a traditional perimeter scaffolding system.

The risks
Falls from height during construction or maintenance.

The solution
Designers to highlight typical roof edges and slab edges which need to be considered by contractors whilst pricing for temporary works. Project drawings can be used for site risk identification to all contracting staff irrespective of language and ability to understand drawings. It enables contractor to identify key safety issues that he needs to respond to by traditional methods eg. full scaffolding. Or by means of proprietary edge guarding methods to which designers can contribute eg. sockets in slabs, fixing points in steel, etc.

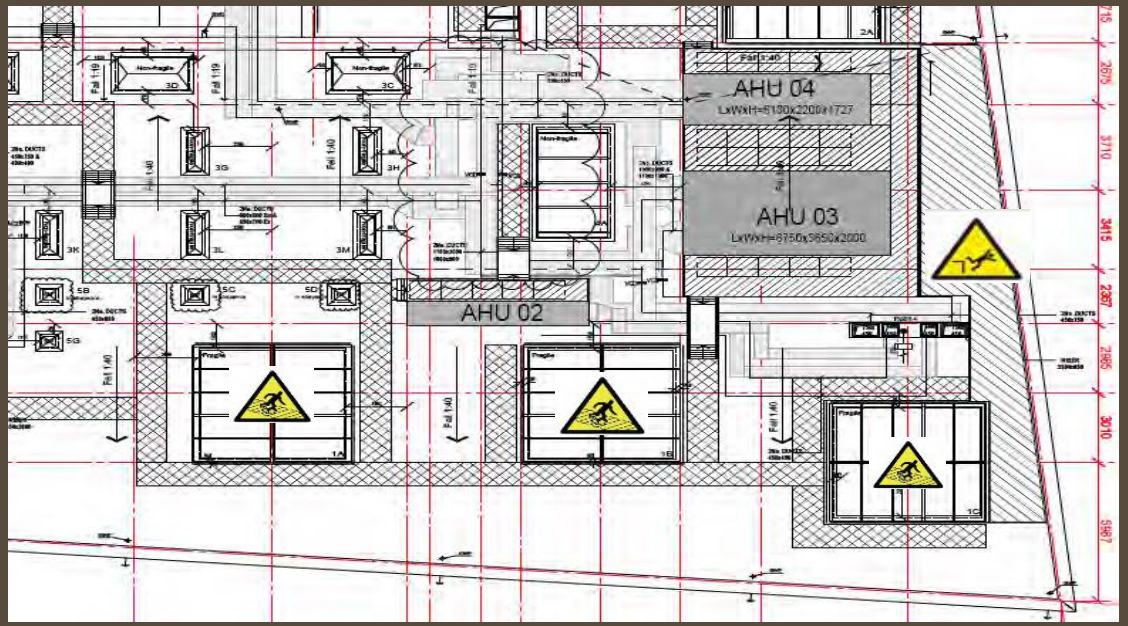


Areas requiring edge guarding simply indicated on drawings

Holes in steel for net guards

Sockets in slabs for edge panels

Construction Stage - Plant and Personnel Roof Access Details



KEY

- ROOF ACCESS
- PLANT ROOM ACCESS FROM STAIRS
- VALLEY LINE
- TAPERED INSULATION
- WALKWAYS (PROTECTIVE MATTING)
- SERVICE ACCESS PLATFORM WITH REMOVABLE PANELS & HANDRAILS
- HANDRAIL
- OVERFLOW
- FALL RESTRAINT SYSTEM
- AHU SUPPORT STEELS

Risks of falling

Fragile roof symbol

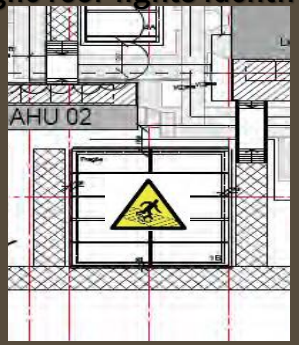
Construction Stage - Plant and Personnel Roof Access Details

The Problem / Challenge
Roof-lights and fragile roofing materials are economic, sustainable and aesthetically desirable features which should not be eliminated from design projects purely for reasons of safety.

The risks
Falls through fragile roofing materials are statistically high and often highly injurious or fatal.

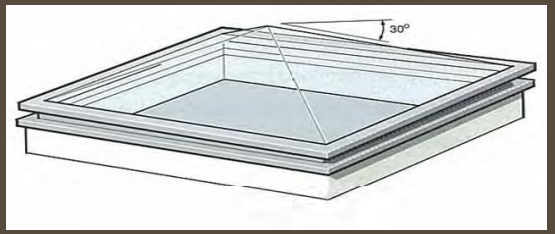
The solution
Construction Phase -Important to identify existing and new fragile roof lights and other fragile roofing materials on drawings as a method of informing the contractor to control the risk of falls through these materials during construction. Contractors to recommend methods of temporary protection in tender or construction phase plan proposals to show their response .

Fragile roof-lights identified



Protection Methods

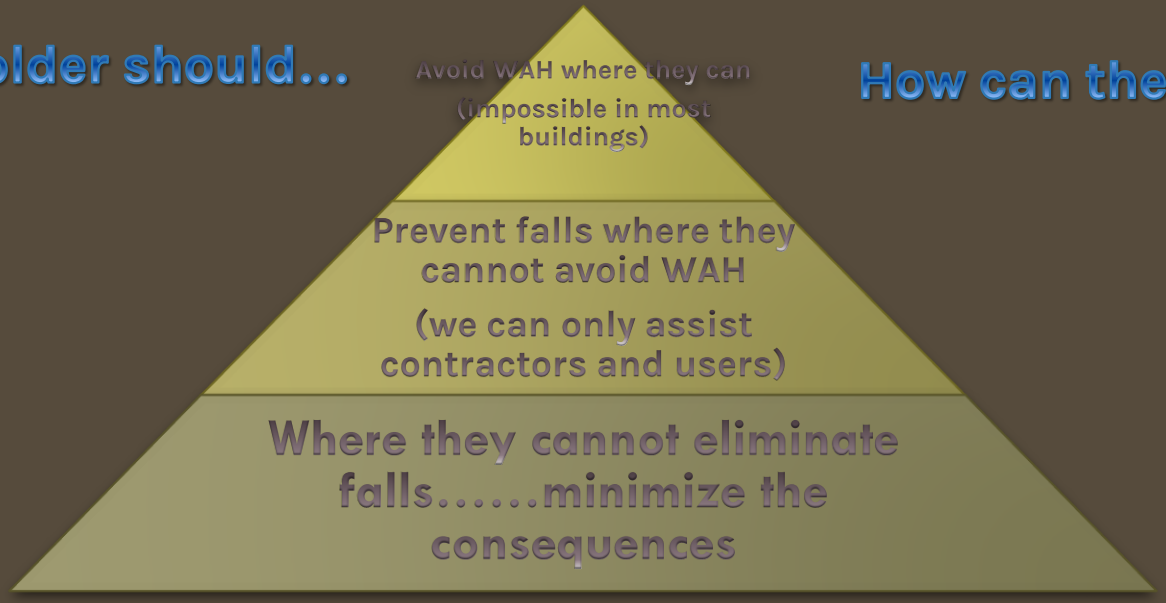
Mesh fall protection



Fragile and Non-fragile roof-lights can be used

Working at Height - Single largest cause of construction accidents

The duty holder should…



How can they do this?

Initial Design – Window cleaning and maintenance (Mechanically based)

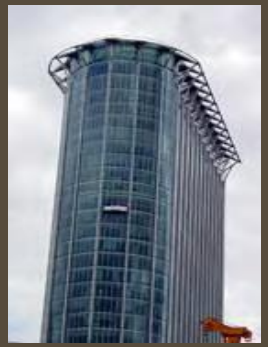
The Problem / Challenge
Cleaning and maintaining glazing to elevations at high level in a safe manner.

The risks
Falls from height due to unsuitable systems or inappropriately designed building fabric. Systems of work that require high levels of supervision for their effectiveness are susceptible to human error. Falling objects can endanger people

The solution
Early consideration of cleaning options should be made in relation to building form, scale and site constraints. Careful selection of engineered mechanical systems is needed to ensure that the required cleaning and maintenance tasks can be undertaken.

MEWP
Mobile Elevating work Platform

BMU
Building Maintance Unit



Cradle

Robotic

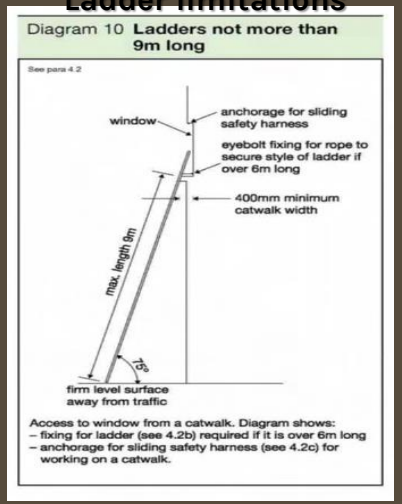
Initial Design – Window cleaning and maintenance (Manually based)

The Problem / Challenge
Cleaning glazing to elevations at high level and in difficult locations.

The risks
Falls from height due to inappropriate work systems, poorly designed fabric or operative error.

The solution
Early design consideration of cleaning options. Relatively low technology and low cost techniques to be considered ,more reliant on manual efforts than mechanical assistance. Ladders, opening windows, long water-fed pole, reach and wash and roped access systems all rely on trained operators and good management control systems for their safety. All are inherently safe in the appropriate situations and when implemented correctly. Limitations of use to be fully understood.

Ladder limitations



Special roped access areas

Water-fed poles

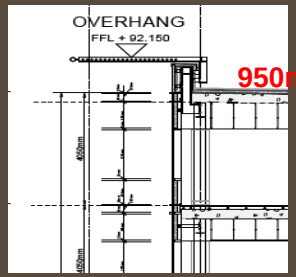
Initial Design – Roof Edge Protection

The Problem / Challenge
To provide collective roof edge protection all around the new building where regular access to roof plant is required. Visual roof edge details were important to the design team and planners.

The risks
Falls from height by maintenance operatives during roof and plant maintenance operations.

The solution
A built-in 950mm parapet up stand design with integral sun shading brise-soliel feature.

Visually hidden edge guarding integrated into cladding



950mm high guarding

View of room upstand

Initial Design- Roof Access - Permanent Fall Prevention Methods

The Problem / Challenge
Roof access fall prevention methods proportionate to the frequency of access requirements for maintenance activities whilst considering the aesthetic and cost considerations.

The risks
Falls from height by plant maintenance operatives or roof workers. Access is unlikely to be entirely eliminated on any roof due to inspections, clearance of rainwater outlets, etc.

The solution
Collective protection measures should be selected in preference to other methods of protection, especially in areas requiring plant maintenance on a frequent basis. Where other factors prevent the addition of roof edge parapets, balustrading or railings, man safe type fall restraint systems may be appropriate, set back from roof perimeters. Consider adequate means of safe access to roof level for operatives with tools and kit.

Man safe cable and lanyard system

Edge Protection railings

Fall Restraint protection, prevents falls


thank you
danke
謝謝
ngiyabonga
شكراً جزيلاً
teşekkür ederim
gracias
спасибо
Баярлалаа
рахмат
mersi
barka
welalin
tack
dank je
misaotra
matondo
paldies
grazzi
blagodaram
vinaka
taafetai lava
kiitos
dankie
dhanyavad
hvala
maururu
bedankt
enkosi
dziękuję
obrigado
sukriya
kop khun krap
go raibh maith agat
mochchakkeram
djiere dieuf
arigatô
dakujem
trugarez
grazie
мерси
merci
terima kasih
ありがとう
감사합니다
xiexie
tanemirt
rahmet
diolch
dhanyavadagalu
shukriya
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sulpay
dekuji
sobodi
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asante
manana
obrigada
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takk

DESIGN CONSIDERATIONS

Providing adequate clearance between the structure and overhead electric lines by burying, disconnecting or re-routing cables before construction begins, to avoid ‘contact’ when operating cranes and other tall equipment.
Designing components that can be pre-fabricated off-site or on the ground to avoid assembling or erecting at heights and to reduce worker exposure to falls from heights or being struck by falling objects, for example fixing windows in place at ground level prior to erection of panels.
Designing parapets to a height that complies with guardrail requirements, eliminating the need to construct guardrails during construction and future roof maintenance.
Using continual support beams for beam-to-column double connections, be it adding a beam seat, extra bolt hole, or other redundant connection points during the connection process. This will provide continual support for beams during erection – to eliminate falls due to unexpected vibrations, misalignment and unexpected construction loads.
Designing and constructing permanent stairways to help prevent falls and other hazards associated with temporary stairs and scaffolding, and schedule these at the beginning of construction.
Reducing the space between roof trusses and battens to reduce the risk of internal falls during roof construction.
Choosing construction materials that are safe to handle.
Limiting the size of pre-fabricated wall panels where site access is restricted.
Selecting paints or other finishes that emit low volatile organic compound emissions.
Indicating, where practicable, the position and height of all electric lines to assist with site safety procedures.

Design to facilitate safe use

Consider the intended function of the structure, including the likely systems of use, and the type of machinery and equipment that may be used.
Consider whether the structure may be exposed to specific hazards, such as manual tasks in health facilities, occupational violence in banks or dangerous goods storage in warehouses.
Risks relating to the function of a structure can be controlled by:
Designing traffic areas to separate vehicles and pedestrians.
Using non-slip materials on floor surfaces in areas exposed to the weather or dedicated wet areas.
Providing sufficient space to safely install, operate and maintain plant and machinery.
Providing adequate lighting for intended tasks in the structure.
Designing spaces which accommodate or incorporate mechanical devices to reduce manual task risks.
Designing adequate access, for example, allowing wide enough corridors in hospitals and nursing homes for the movement of wheelchairs and beds.
Designing effective noise barriers and acoustical treatments to walls and ceilings.
Specifying plant with low noise emissions or designing the structure to isolate noisy plant.
Designing floor loadings to accommodate heavy machinery that may be used in the building and clearly indicating on documents design loads for the different parts of the structure.

Design for safe maintenance

Risks relating to cleaning, servicing and maintaining a structure can be controlled by:

Designing the structure so that maintenance can be performed at ground level or safely from the structure, for example, positioning air-conditioning units and lift plant at ground level, designing inward opening windows, integrating window cleaning bays or gangways into the structural frame.

Designing features to avoid dirt traps.

Designing and positioning permanent anchorage and hoisting points into structures where maintenance needs to be undertaken at height.

Designing safe access, such as fixed ladders, and sufficient space to undertake structure maintenance activities.

Eliminating or minimising the need for entry into confined spaces (refer to the Code of Practice: *Confined Spaces* for further guidance)

Using durable materials that do not need to be re-coated or treated.

Modification

Design is not always focussed on the generation of an entirely new structure. It can involve the alteration of an existing structure which may require demolition in part or whole.

Any modification of a structure requires reapplication of the processes detailed in the design phases. Consultation with professional engineers or other experts may be necessary in order to assess the impact of any proposed modifications or changes in design, for example changes in the load spread across a building floor when heavy equipment is relocated,modified or replaced.

This ensures that any new hazards and risks are identified and controlled,and that the safety features already incorporated into the design are not affected. Additional design issues identified in these phases should bepassed back to the designer.

Demolition and dismantling

This is particularly important with modern designs where ‘limit state’ design techniques are used by the structure designer. In this system, the designer considers the structure in its completed form with all the structural components, including bracing, installed. The completed structure can withstand much higher loads (for example, wind and other live loads) than when the structure is in the construction or demolition stage.

A structure should be designed to enable demolition using existing techniques. The designer should provide information so that potential demolishers can understand the structure, load paths and any features incorporated to assist demolition, as well as any features that require unusual demolition techniques or sequencing.

Designers of new structures are well placed to influence the ultimate demolition of a structure by designing-in facilities such as lifting lugs on beams or columns and protecting inserts in pre-cast panels so that they may be utilised for disassembly. Materials and finishes specified for the original structure may require special attention at the time of demolition and any special requirements for the disposal and/or recycling of those materials or finishes should be advised to the client through the risk assessment documentation.