



香港房屋委員會
Hong Kong Housing Authority

Designing for Safety *Building Secure and Sustainable Communities*

16 Oct 2025

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CONSTRUCTION
INDUSTRY COUNCIL
建造業議會



Agenda for Today

- Objective

- Overview of DfS Management System

- Introduce DfS Risk Control Framework

- How to implement DfS
 - Roles & Responsibilities
 - Templates & Tools



Why Safety Matters

- Construction is recognised as one of the **most hazardous industries globally**.
- In addition to the **human cost**, such accidents contribute to **project delays, financial losses**, and damage to organisational **reputation**.
- Prioritising safety extends beyond mere compliance; it embodies a culture of safety that begins with strong leadership.

Construction Sector Accidents and Fatalities								
No. of Reportable Accidents in Construction Sector					No of Fatal Injuries			
Year	2021	2022	2023	2024	2021	2022	2023	2024
Hong Kong	3109	3046	3097	3097	23	17	20	14
Singapore	139	171	167	166	13	14	18	20



Why Design for Safety

Below is an example of integrating DfS in a live substation: maintaining safe access routes at the 275 kV cable flat.

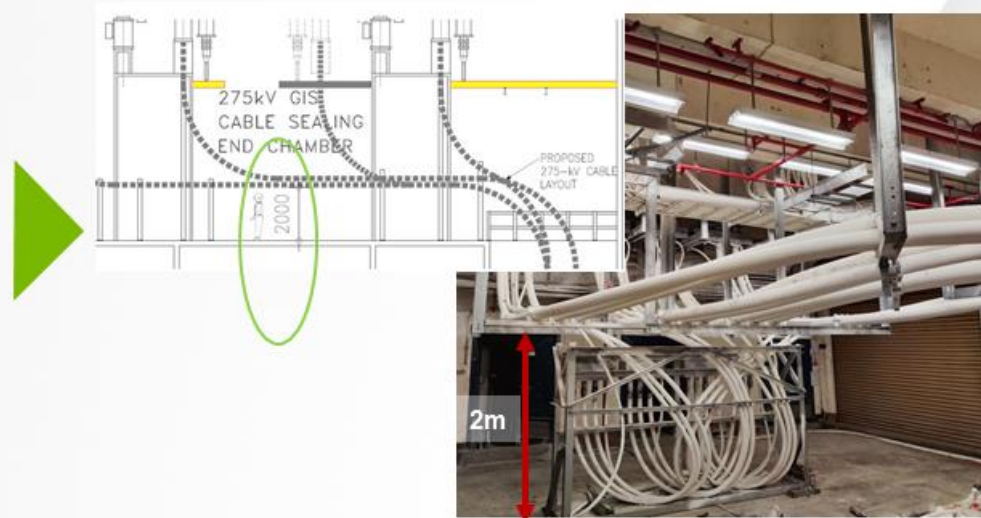
Before



Current Control Measure

- Installation of metallic platforms over transmission cables to maintain access routes
- **Risk: Cannot maintain a flat and clear access routes at ground level**

After



Safety Improvements

- Improved cable installation above ground at about **2 m** for new-built
- Striking a balance between limited height of floor and maintenance requirements
- Maintaining a more safe and clear access routes at ground level
- Providing more space for future cable diversion, maintenance and enhancement

Objectives



Build understanding: Increase awareness of DfS principles and the DfS Management System across project stakeholders.



Enable application: Equip teams to implement DfS using standard templates, checklists, and workflows for consistent delivery from brief through O&M.



Strengthen safety culture: Embed the risk-control hierarchy and proactive hazard identification to reduce incidents, rework, and delay.

Overview of DfS Management System

Overview of the DFS Management System

Background & Introduction

Hong Kong's Journey to Safer Design Practice

- DfS (Design for Safety) in Hong Kong is modeled after the UK's Safety in Design and CDM framework.
- First introduced in 2006, DfS was integrated throughout local construction projects by 2016.
- In 2020, the CIC Task Force established a roadmap to develop a comprehensive DfS Management System.



What is 'Design for Safety'?

Design for Safety **involves identifying and mitigating potential hazards early** in the design process and throughout the project lifecycle.

Key Duty Holders



Client



Designer



Contractor



Maintenance Supervisor



Functional Roles (client rep, architect, AP, PM)

DfS Core Guiding Principles



Communication & Coordination

- Regular Monitoring and Sharing of Key H&S Files
- Regular Review Meetings
- Set up Feedback Mechanism
- Establish Centralised Knowledge Hub to Share Information



Ownership & Leadership

- Integrate H&S into Key Business Decisions
- Ensure Appointment and Resources Competency through Regular Audits and KPI Tracking Mechanism



Risk Prevention & Management

- Reduce Risk at Source
- Early Contractor Involvement
- Manage Key Information in the H&S Files
- Apply Digital Tools to Enhance Risk Identification



Evaluation & Training

- Assess H&S Knowledge, Skills and Experience
- Accredited Training Course with CPD Provided
- Track Lesson Learnt and Assess Key Risks and Design Changes

Stages & Phases

Project set up

Pre-tender

Tender

Construction

Handover

Operation & Maintenance

Introduce DfS Risk Control Framework

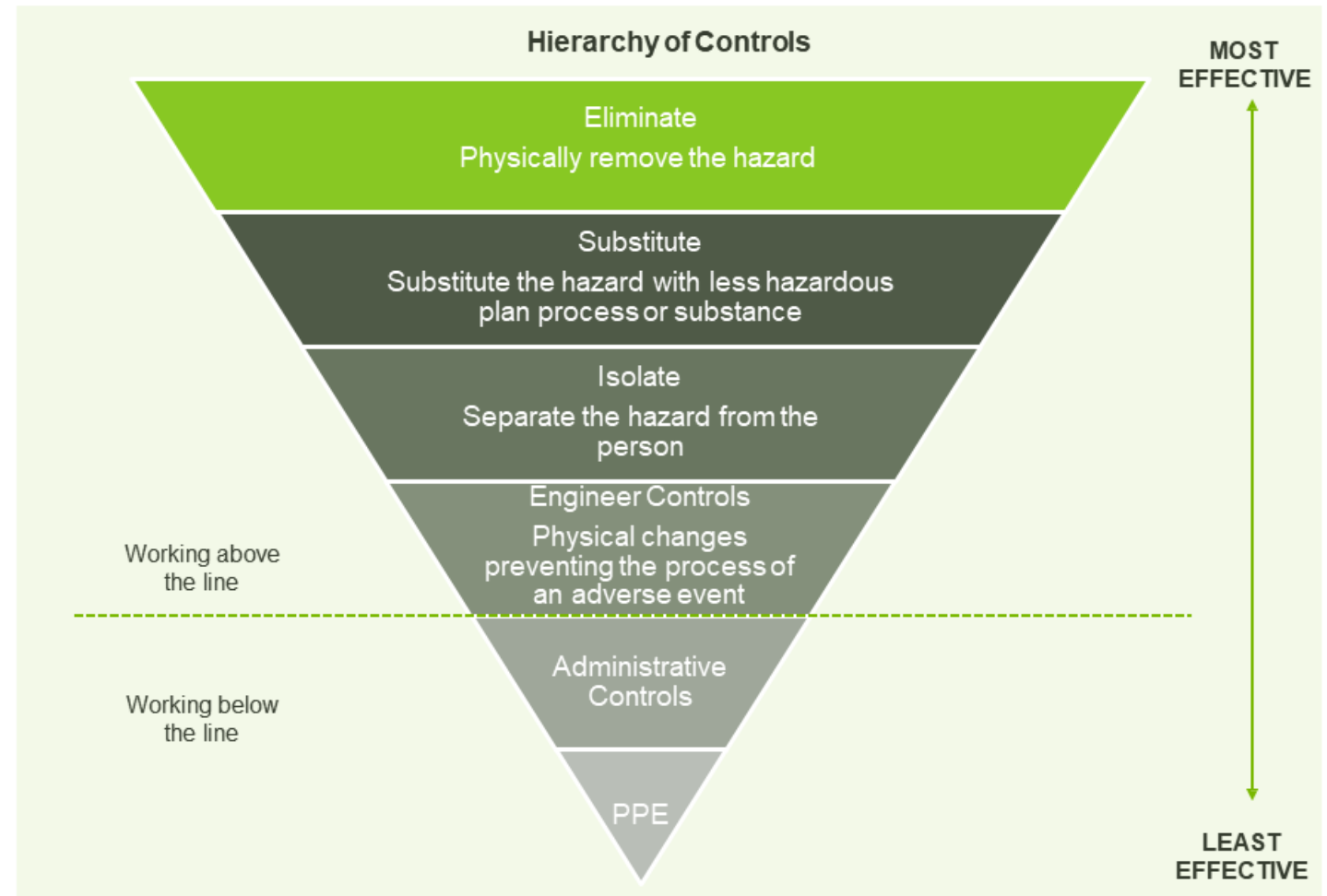
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How to Identify, Assess, and Control Risks Using the Reasonably Practicable Approach (1/2)

We can produce a safe design through:

- Consultation, engagement and drawing on experiences
- Analysis of asset interfaces to identify hazards
- Eliminate hazard or minimise risks
- Use of Hierarchy of Control
- Life of the asset



How to Identify, Assess, and Control Risks Using the Reasonably Practicable Approach (2/2)

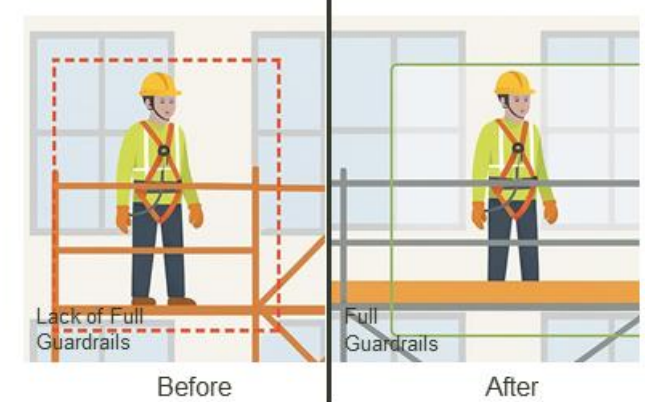
Eliminate



Substitute



Isolate



Engineer Controls



Administrative Controls



PPE



How to Implement DfS

- Roles & Responsibilities
- Detailed Implementation Plan
- Templates & Tools

Roles & Responsibilities

Roles & Responsibilities

Effective DfS implementation relies on clear roles and responsibilities. We have outlined the expectations for the **Client, Designer, and Constructor** throughout the project lifecycle to help with smooth integration of DfS.

1 For Client (1/3)

The Client is responsible for ensuring the successful implementation of DfS by **providing management support, appointing and empowering key roles, promoting a strong safety culture, coordinating risk management, and overseeing all phases** from project setup through to completion.

Duty Holders	Stage	Responsibilities
	All Stages	Promote Safety Culture
		Ensure a "safety first" mentality is embedded across all project phases.
		Apply H&S incentives or benchmarks to duty holders.
		Address cost concerns that could hinder health and safety.
		Risk Management
		Coordinate sharing of identified risks to eliminate or mitigate them throughout the project.
		Require all duty holders to remove or minimize significant risks at their source.
		Management Arrangements
		Ensure management arrangements are established, maintained, and actioned throughout the project lifecycle.
		Allocate sufficient time and resources for the project's success.
		Lessons Learned
		Set and review lessons learned with the Designer, Contractor, and Maintenance Supervisor throughout the project lifecycle.

Roles & Responsibilities

1 For Client (2/3)

The Client is responsible for ensuring the successful implementation of DfS by **providing management support, appointing and empowering key roles, promoting a strong safety culture, coordinating risk management, and overseeing all phases** from project setup through to completion.

Client	Project Set Up Phase	Establish Information
		Provide relevant information to the project team for proper planning and execution.
		Embed DfS principals and practices in the contract documents
		Role Assignments
		Appoint and empower the Designer.
		- A Designer to undertake the project and ensure other roles are competent by accessing qualifications, experience, and professional membership status
	Design Phase	- A Designer to comply with their duties in terms of DfS
		Group duty holder leads into a project review team
		KPI Setting
		Set and review KPIs, both Lead & Lagging Indicators, for the Designer and other involved parties.
		Safety Consultation
		Be advised by the Designer on safety and health aspects, including design finalisation and material selection.
		Risk Reduction in Design
		Work with the Designer to reduce significant risks during the design process.
		Pre-Construction Plan
		Provide Pre-Construction Information before work commences.
		KPI Review
		Review performance against KPIs during the construction phase.
		Welfare Facilities

Roles & Responsibilities

1 For Client (3/3)

The Client is responsible for ensuring the successful implementation of DfS by **providing management support, appointing and empowering key roles, promoting a strong safety culture, coordinating risk management, and overseeing all phases** from project setup through to completion.

	Construction Phase	Welfare Facilities
		Ensure that sufficient welfare facilities are provided by the Main Contractor and checked at the start and maintained throughout the project.
		Construction Phase Plan
		Ensure the Contractor's Construction Phase Plan has adequate arrangements to manage identified risks.
		Ensure construction can be carried out safely without health risks to anyone involved.
		Rehearsals and Risk Identification
		Promote rehearsals to identify and eliminate or reduce significant risks.
		Completion and Handover
		Check completion and handover arrangements before project completion.
		KPI Review
		Review performance against KPIs during the construction phase.

Roles & Responsibilities

Effective DfS implementation relies on clear roles and responsibilities. We have outlined the expectations for the **Client**, **Designer** (Functional role to coordinate DfS), and **Constructor** throughout the project lifecycle to help with smooth integration of DfS.

2 For Designer (Functional role to coordinate DfS) (1/3)

- The coordination role of the Designer, **appointed by the client**, is essential for **leading and integrating DfS** throughout the project. This role can be filled by a **Client Representative, Architect, Authorized Person, or Project Manager**.
- If the designer lacks DfS capabilities and there are no in-house health and safety resources available, the Client can appoint a coordinator or team to handle the role.
- The functional role ensures that DfS principles are integrated throughout the project. This role involves **coordinating with stakeholders, leading DfS meetings, maintaining documentation, and using digital tools** to identify and reduce risks.

Duty Holders	Stage	Responsibilities
	All Stages	Coordination with Design Team
		Check, monitor, and coordinate to ensure that designers are fulfilling their duties.
		Review lessons learnt with the Design Team
		Documentation & Information Sharing
		Ensure that all relevant information on significant risks and their mitigation is provided to the Client.
		Demonstrate that information has been shared effectively and is accessible (such as using a Common Data Environment) to all relevant parties.
		Use standardised templates and auditable procedures to maintain uniform documentation.
	Project Set Up Phase	Establish DfS Processes
		Set up regular DfS review meetings.
		Maintain the DfS Register and Pre-Construction Information (PCI).
		Establish key relevant information and processes for the project.

Roles & Responsibilities

2 For Designer (Functional role to coordinate DfS) (2/3)

- The coordination role of the Designer, **appointed by the client**, is essential for **leading and integrating DfS** throughout the project. This role can be filled by a **Client Representative, Architect, Authorized Person, or Project Manager**.
- If the designer lacks DfS capabilities and there are no in-house health and safety resources available, the Client can appoint a coordinator or team to handle the role.
- The functional role ensures that DfS principles are integrated throughout the project. This role involves **coordinating with stakeholders, leading DfS meetings, maintaining documentation, and using digital tools** to identify and reduce risks.

Designer	Design Phase	Planning & Monitoring
		Plan, manage, and monitor the design work, ensuring Health & Safety considerations are integrated.
		Oversee and coordinate with designers to identify modern building techniques and mitigate significant risks.
		Information Flow & Coordination
		Assist the Client in gathering pre-construction information.
		Provide pre-construction information to the Designer (lead/coordinating role) and Contractors, including the Main Contractor.
		Risk Identification & Mitigation
		Identify and analyse risks at the source and ensure all duty holders work to remove or minimise these risks.
		Provide all relevant information on each foreseeable significant risk* identified and its mitigation to the Client
		Lead the use of digital tools (like BIM) to visualise and reduce risks.

Roles & Responsibilities

2 For Designer (Functional role to coordinate DfS) (3/3)

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- If the designer lacks DfS capabilities and there are no in-house health and safety resources available, the Client can appoint a coordinator or team to handle the role.
- The functional role ensures that DfS principles are integrated throughout the project. This role involves **coordinating with stakeholders, leading DfS meetings, maintaining documentation, and using digital tools** to identify and reduce risks.

	Construction Phase	Coordination with Contractors
		Coordinate with the Main Contractor to ensure that the design is aligned with safety and construction requirements.
		Liaise with the Main Contractor to ensure design coordination throughout the construction phase.
		Provide construction information and updates to the Main Contractor, including any design changes or potential issues.
	Post Construction Phase	Future Improvement
		Gather and incorporate feedback from users to improve future designs, through methods such as:
		Post-occupancy evaluations
		Defect reports
		Accident investigation reports
		User difficulties

Roles & Responsibilities

Effective DfS implementation relies on clear roles and responsibilities. We have outlined the expectations for the **Client**, **Designer** (Functional roles to coordinate DfS), and **Constructor** throughout the project lifecycle to help with smooth integration of DfS.

3 For Contractor (Functional role to coordinate DfS) (1/2)

- The coordination role of the Contractor, **appointed by the client**, is essential for **leading and integrating DfS** throughout the project. This role can be filled by a Main Contractor when the project engage more than one contractor.
- Client can also appoint a coordinator or team with functional role of DfS if there is lack of DfS capability of Main Contractor
- The functional role and responsibilities of a Main Contractor involves ensuring **collaboration and communication among all stakeholders throughout the construction phase**, managing health and safety risks, and maintaining compliance with safety protocols

Duty Holders	Stage	Responsibilities
Contractor	All Stages	Informing Duty Holders on H&S Risks
		Continuously communicate identified health and safety (H&S) risks and control measures to relevant duty holders throughout the project lifecycle.
		Cooperating and Coordinating Work
		Collaborate with other contractors and project stakeholders to ensure coordinated work efforts and safety management across the project.
		Regularly review and revise the CPP as needed to address any changes during construction.
		Review lessons learned, particularly if there are multiple contractors on the project.
	Pre-Construction	Preparing for Construction
		If the contractor is the only one on the project, ensure that the arrangements in the Construction Phase Plan (CPP) are adequate before construction begins.
		Provision of Information
		Ensure that all workers receive appropriate site inductions, including emergency procedures, where not provided by the Main Contractor.
		Risk Assessment Communication
		Provide information to the workforce on risks and required control measures identified through risk assessments.
		Ensure that the Construction Phase Plan (CPP) reflects the complexity of the project, incorporating updates from the Design Risk Register.

Roles & Responsibilities

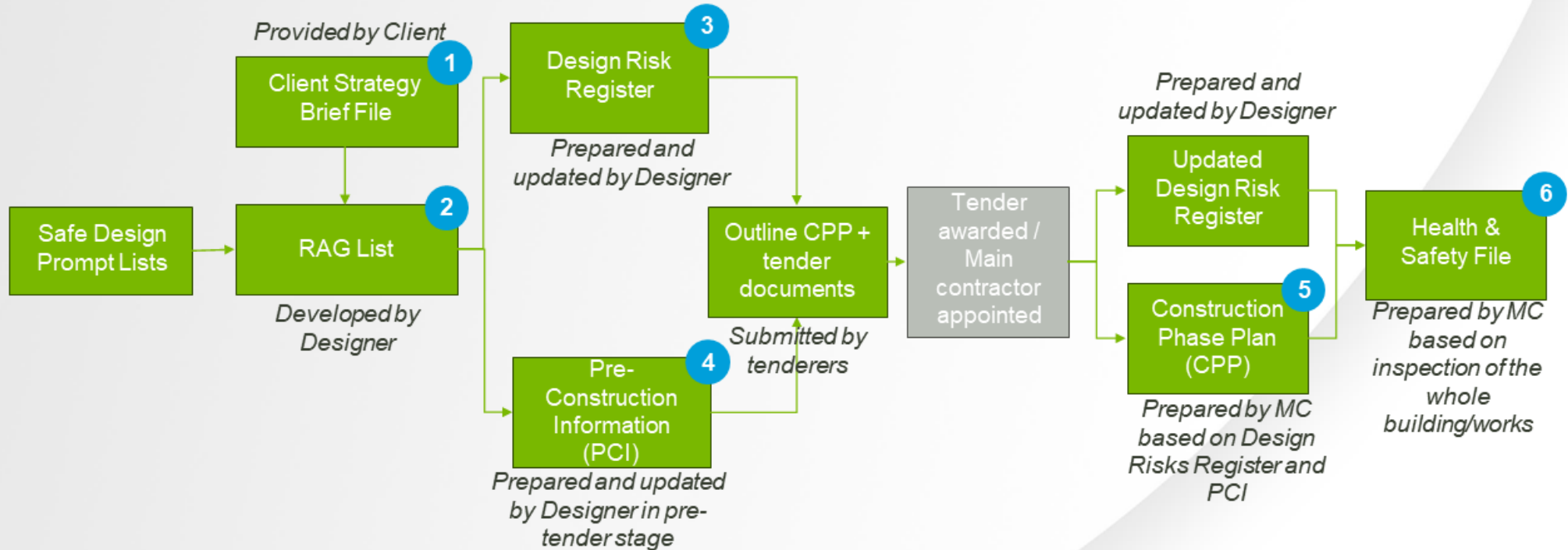
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- The functional role and responsibilities of a Main Contractor involves ensuring **collaboration and communication among all stakeholders throughout the construction phase**, managing health and safety risks, and maintaining compliance with safety protocols

	Construction	Health and Safety Management
		Plan, manage, and monitor the construction stage to ensure health and safety for all workers.
		Ensure suitable welfare facilities are provided at the start and maintained throughout the works.
		Update and review the Health & Safety (H&S) File regularly throughout construction.
		Take reasonable steps to manage and mitigate H&S risks identified in the Pre-Construction Information (PCI) and during the construction stage.
		Site Management
		Keep full records of all safety and health issues, including accidents and any prosecutions.
		Provide health and safety inductions, information, and training to all workers.
		Monitoring & Coordination
		Check, monitor, and coordinate to ensure that managers, supervisors, and workers are fulfilling their health and safety duties.
		Report DfS issues on time to the design and client team when they find any potential risks.
		Share and provide relevant health and safety information with all stakeholders.

Templates & Tools

Overview of DfS Documents



Client Strategy Brief 1

The Client Strategy Brief document outlines key information for construction projects, detailing essential information to align stakeholders with the client's objectives. It includes **preferred project delivery methods, timelines, resources to be deployed, communication plans, and health and safety goals**. The document is updated as needed to **address changes and maintain safety standards** throughout the project lifecycle.

Client Strategy Brief File Template			
Project Overview			
Project Owner Information			
Name/Organization			
Email Address			
Telephone Number			
Address			
Project Description			
Type of Construction Work			
Brief description of the construction work			
Project site location			
Foreseeable site constraints and limitations? e.g. next to slope, reclaimed			
Health & Safety (H&S) Requirements			
Client H&S Expectations (if above Statutory requirements)			
H&S File – Format & Index			
Procurement Strategy			
Contract Type (e.g., Design-Bid-Build, Design-Build).			
Design for Safety (DfS) Resources			
Is there sufficient time and resources allocated for the implementation of Design for Safety (DfS), and are there any specific rules or requirements in the contract related to this?			
Project Timescale (What are the key stages and how long will they run for?) Please attach the detailed work program or provide a screenshot of it.			
Concept / feasibility			
Scheme Design / Planning			
Detailed Design			
Tender / Selection			
Construction / decommissioning			
Commission / handover			
Time allocation for DfS process			
Strategic Risk((what are the significant or unusual H&S risks?))			
Overall H&S Risks (e.g. challenges from major temporary works, structural			
High-Risk Work Activities (e.g. work at heights, confined space operations, or			
Is there any pre-existing risk register or relevant information & where?			
Duty Holders Involve			
Duty Holder 1			
Name		Role	
Email Address		Telephone Number	
Address			
Duty Holder 2			
Name		Role	
Email Address		Telephone Number	
Address			
Duty Holder 3			
Name		Role	
Email Address		Telephone Number	
Address			
Duty Holder 4			
Name		Role	
Email Address		Telephone Number	
Address			
Duty Holder 5			
Name		Role	
Email Address		Telephone Number	
Address			
Are the roles and responsibilities for the DfS implementation of the duty holders			
Communication Strategy			
DfS Team Meetings (Specify the frequency, duration and location)			
Feedback Mechanism (How feedback will be gathered and how any issues or action items will be tracked and			
Communication Plan (Provide details on additional communication channels or protocols to ensure all team members stay informed)			

Red, Amber, Green (RAG) List for Building Work (1/4) 2

The RAG List is a tool designed to help designers identify and mitigate hazards **during the design stages** of a construction project. The lists will be used across various project phases **by designers and contractors** to continuously update and communicate potential risks, ensuring safety and compliance throughout the project lifecycle.

- Systematically categorised the **principal risk types** associated with the road asset class in various work types
- Highlighted the **key risk areas** of the work types.
- The structured approach enables designers to
 - identify project-specific risks
 - develop a tailored RAG list and design risk register

Asset Class	Work Type	Aspect	Details	Risk Exists? (Y/N)	RAG
	Foundations / Services Trenched / Inground Works	Working / Inspecting in trench	Lack of adequate safety measures in place for protection while working and inspecting in trenches	Yes	Red
		Underpinning of existing structure / infrastructure	Unstable and insecure underpinning of the existing structure/infrastructure	Yes	Amber
		Contaminants in soil	Harmful contaminants present in the soil	Yes	Red
		Groundwater	Polluted groundwater or adverse conditions that could affect safety or health	Yes	Red
	Excavations	Below ground water obstacles	Encountering unexpected utilities or remnants below ground can cause delays and increased costs.	Yes	Amber
		Installation / noise / vibration / dust	Drilling and pile driving generate noise and vibration	Yes	Red
		Effects on Adjacent Structures and Services	Excavations cause subsidence or damage to nearby buildings and disrupt utilities	No	NA
		Stability / Local / General / Rock Fall	Excavations risk endangers workers and passersby	No	NA
		Groundwater / Inflow / Diversion / Disposal	Groundwater inflow leads to additional costs and environmental concerns	Yes	Amber
		Storing / Retention / Fall Protection	Improper storage and retention lead to material falls	Yes	Red
		Loads and Access Adjacent Excavations	Adjacent loads and limited access compromise excavation stability and efficiency	Yes	Amber
		Flat Surface / Sloping Surface / Abrupt Level Changes	Uneven surfaces and level changes increase the risk of slips, trips, and falls.	Yes	Amber
		Effects of Water	Accumulated water causes erosion, weakens structures, and creates hazardous conditions.	Yes	Red
		Liquefaction	Saturated soils causes ground instability and structural damage.	No	NA
	Structural Works (Construction phase)	Access over reinforcement mats / cages – bar spacing	Narrow bar spacing creates trip hazards and limit worker movement	No	NA
		Reinforcement congestion limiting soffit access	Congested reinforcement bars restrict access, complicating installation and potentially causing delays.	Yes	Amber
		Installation of heavy reinforcement cages	Handling and installing heavy reinforcement cages leads to injury.	No	NA
		Exposed ends of reinforcement	Exposed reinforcement ends causes injuries due to improperly managed.	Yes	Red
		Glare and sunburn from metal surfaces (metal deck formwork, roof sheeting)	Reflective metal surfaces cause glare and increase the risk of sunburn for workers.	Yes	Red
		Shop and site applied paints (chemicals, access)	Poor access causes injuries.	No	NA
		Construction staging / phasing / temporary works	Poorly planned construction stages or temporary works lead to safety risks and project delays	Yes	Red
		Plant access	Restricted or unsafe access for plant machinery leads to delays, equipment damage, or accidents involving workers and machinery.		
		Construction staging / phasing / temporary works	Inadequate planning results in conflicts between trades, causing delays, increased costs, and safety hazards.		
		Commissioning / start up	Poorly managed commissioning leads to system failures, accidents, or hazardous conditions during the initial operation phase.		

Red, Amber, Green (RAG) List for Building Work (2/4) 2

Asset Class	Work Type	Aspect	Details	Risk Exists? (Y/N)	RAG
Building	Work at Height	Falling from construction platforms and floors	Falls from heights result in severe injuries or fatalities.		
		Falling objects - item dropped etc	Dropped objects cause serious injuries or fatalities to workers below.		
		Edge protection	Provide adequate edge protection to avoid severe injuries or death.		
		Inadequate back propping	Insufficient back propping results in structural collapse, causing injuries or fatalities.		
		Use of ladders	Operating cranes beyond safe limits result in tipping or collapse, endangering workers and causing significant damage.		
		Use of scaffolds	Poorly erected or maintained scaffolding causes injuries or fatalities.		
		Use of scissor / booms	Misuse or failure of scissor lifts and boom lifts results in falls or crushing injuries		
		Roof access provisions	Unsafe roof access leads to falls, resulting in serious injuries or fatalities		
		Fall arrest provisions	Lack of fall arrest systems increases the risk of severe injury or death in the event of a fall.		
	Heavy Machinery / Plant	Heavy machinery access for excavation / compaction	Limited access results in machinery accidents, equipment damage, and delays.		
		Misuse of equipment	Misuse of heavy machinery results in crushing injuries or fatalities.		
		Craneage / load lifting overhead	Poorly planned or executed crane operations lead to injuries, fatalities, or damage to structures.		
		Excessive lift or reach	Operating cranes beyond safe limits results in tipping or collapse		
		Clash of crane jibs	Collisions between cranes lead to catastrophic equipment failure and severe injuries.		
		Handling of large / bulky items	Improper handling of large items causes strain injuries or accidents, resulting in worker injury or material damage.		
	General Machinery / Plant	Egress and access	Poorly planned access routes lead to accidents, delays, and inefficient operations		
		Manual handling	Excessive manual handling causes musculoskeletal injuries and reduces worker productivity.		
		Adjacent stakeholders	Lack of coordination with nearby stakeholders leads to disruptions, safety hazards, and potential conflicts.		
		Site hygiene / cleanliness	Poor site cleanliness results in slip, trip, and fall hazards.		
	Structural Design Issues (project life)	Handrails and balustrades – types, heights, loading	Inadequate handrails or balustrades lead to falls, resulting in injuries or fatalities.		
		Impact resistance / protection / redundancy	Lack of impact resistance or redundancy leads to structural failure during an impact event, endangering lives and property.		
		Floor design loads / provisions	Underestimating floor loads results in structural failure, causing injuries, fatalities, or significant damage.		
		Access / hanging points	Insufficient access or hanging points hinder maintenance, leading to safety risks or operational inefficiencies.		

Red, Amber, Green (RAG) List for Building Work (3/4) 2

Asset Class	Work Type	Aspect	Details	Risk Exists? (Y/N)	RAG
	Services Design Issues (project life)	Lightning protection	Inadequate lightning protection leads to electrical fires, equipment damage, or injury during a lightning event.		
		Earthing and bonding	Poor earthing and bonding result in electric shock hazards, equipment failure, and increased risk of fire.		
		Depth of services	Incorrect service depths lead to accidental damage during future excavation or maintenance, disrupting operations and increasing costs.		
		Temporary service provisions / future proofing	Failure to consider temporary or future service needs results in costly retrofits, operational disruptions, and safety risks.		
	Maintenance	Cleaning / maintaining facades	Lack of access or space for regular cleaning and inspection leads to material deterioration and safety hazards.		
		Cleaning / maintaining roof and gutters	Blocked access to gutters or insufficient maintenance results in water accumulation, leading to leaks and structural damage.		
		Access to elevated plant (ceilings, soffits, roofs, plant rooms)	Inadequate access to elevated plant areas hinders maintenance activities and pose safety risks.		
		Plant platforms - access, circulation, egress, testing, replacement	Insufficient space or poor design of plant platforms restricts access for maintenance		
		Cleaning / maintaining / replacing services (lighting, fire services, A/C plant etc.)	Inadequate maintenance of critical services like lighting and HVAC causes equipment failure and safety risks.		
		Cleaning / maintaining / replacing steelwork protective coatings	Failure to maintain protective coatings on steelwork leads to corrosion.		
		Hazardous substances / chemicals	Improper handling or storage of hazardous substances leads to serious health risks and environmental hazards		
		Confined / restricted spaces	Inadequate safety measures in confined spaces result in accidents such as asphyxiation or toxic exposure.		
	Operations	Egress and access	Obstructed egress and access routes delay emergency evacuations and hinder daily operations.		
		sight lines	Poor sight lines in critical areas increase the risk of accidents.		
		Clearances	Insufficient clearances cause obstructions and accidents during equipment operation.		
		Fire and smoke management	Inadequate fire and smoke management leads to catastrophic damage and loss of life.		
		Air quality	Poor air quality negatively impacts health and operational efficiency.		
		Water quality	Inadequate water quality management leads to health hazards.		
		Rubbish management	Inefficient rubbish management causes hygiene issues and operational disruptions.		
		Delivery / traffic management	Poor traffic management leads to congestion and accidents.		
		Ambulance access (stretcher/barouche)	Inadequate access for emergency vehicles delays critical response times.		
		Signage	Insufficient or unclear signage leads to confusion and accidents.		

Red, Amber, Green (RAG) List for Building Work (4/4) 2

Asset Class	Work Type	Aspect	Details	Risk Exists? (Y/N)	RAG
	Operations	Ambulance access (stretcher/barouche)	Inadequate access for emergency vehicles delays critical response times.		
		Signage	Insufficient or unclear signage leads to confusion and accidents.		
		Slips and Trips / Slippery. wet or uneven surfaces	Slippery or uneven surfaces result in serious accidents.		
		Slopes and cross falls	Improperly designed slopes cause water accumulation and hazardous conditions.		
		Steps and changes in levels	Poorly designed steps and level changes cause trips and falls.		
		Electrical safety	Inadequate electrical safety results in shocks and fires.		
		Security	Insufficient security measures lead to unauthorized access and vandalism.		
		Vandalism(deliberate and accidental)	Failure to prevent vandalism results in property damage.		
		Pollutants / hazardous materials management and disposal	Improper disposal of pollutants leads to environmental contamination.		
		Lighting	Inadequate lighting reduces safety and productivity.		
		Flooding	Poor drainage leads to flooding, causing damage and disruptions.		
	Demolition(end of project life)	Falling objects in demolition	Uncontrolled falling objects during demolition cause serious injuries.		
		Damage to in ground services	Demolition can damage underground services, leading to service interruptions and hazards.		
		Damage to live services	Accidental damage to live services results in shocks and leaks.		
		Hazardous materials	Improper handling of hazardous materials leads to contamination and health risks.		
		Exposure to asbestos	Inadequate asbestos management exposes workers to severe health risks.		
		Struck by plant	Workers be struck by heavy machinery if safety protocols are not followed.		
		Post tensioning / prestressing	Improper handling during demolition leads to sudden failures and injuries.		
		Design loading	Failure to consider loading during demolition leads to structural collapse.		
		Construction staging / phasing / temporary works	Poor planning creates unsafe conditions and operational delays.		
		Disposal	Improper disposal of demolition waste leads to environmental damage.		
		Adjoining structures / infrastructure	Demolition activities inadvertently damage nearby structures or infrastructure.		

Design Risk Register (1/5)

3

The Design Risk Register is designed to identify and evaluate hazards **during the design and construction phases of a project**. It assesses the severity of potential accidents, mitigates construction hazards, and documents significant risks. It is updated by the design team during the design and tender stage, and by the Main Contractor during the Construction Phase to incorporate any relevant design changes and address emerging hazards.

Design Risk Register Sample														
Identify Safe Design Risk							Analyse Safe Design Risk - Current Exposure				Implement Safe Design Risk Treatment			
ID	Risk Title	Event / Cause / Consequence	Persons Affected	Applicable Phases	Applicable Disciplines	Inherent Sequence	(Risk Treatment) Current Controls	Residual Sequence	Residual Likelihood	Risk Level	Risk Owner	Re-evaluation	(Risk Treatment) Action Summary	Comments
▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
1	Alignment Constraints	Limited space along Wai Yip Street may restrict optimal alignment, causing accessibility or approval issues	Public	Design	Multi-Discipline	B - Major	Conduct initial site layout review with project team including civil, architectural, and traffic engineers. Assess site constraints; Set up design coordination meetings	C - Moderate	4 - Likely	High	PM - Peter	Intolerable	Arrange joint site visits for all disciplines; Conduct workshops to evaluate alignment options; Document findings and integrate feedback into early design drawings.	24Nov2025 Peter - The risk has been mitigated
2	Unclear Interface with Travellers	Ambiguity on responsibilities or technical requirements for traveller integration leads to interface issues in later stages	Designer Contractor	Design	Multi-Discipline	B - Major	Hold interface coordination meetings with traveller supplier and all design disciplines. Draft and circulate interface responsibility matrix	B - Major	3 - Possible	Critical	M&E Coordinator - Ken	Intolerable	Prepare detailed interface control document with clear responsibilities and technical requirements; Review and update matrix at each design stage.	
3	Climate Resilience Not Addressed	Failure to consider future climate (flooding, heat) leads to maintenance or safety issues	Public	Design	Civil	C - Moderate	Preliminary climate risk assessment; Review historical weather data	C - Moderate	2 - Unlikely	Medium	PM - Peter	Intolerable	Engage expert for climate adaptation review; Integrate higher drainage capacity and shade features into early design..	
4	Insufficient Allowance for Maintenance	Design does not provide for safe/easy maintenance access (e.g., to travellers, lighting)	Maintenance Staff	Design	Structural	C - Moderate	Preliminary maintenance review; Draft O&M requirements	C - Moderate	3 - Possible	High	PM - Peter	Intolerable	Incorporate maintenance access points and working platforms in design; Review design with future maintenance team.	
5														
6														
7														

Design Risk Register (2/5) 3

The Design Risk Register is designed to identify and evaluate hazards **during the design and construction phases of a project**. It assesses the severity of potential accidents, mitigates construction hazards, and documents significant risks. It is updated by the design team during the design and tender stage, and by the Main Contractor during the Construction Phase to incorporate any relevant design changes and address emerging hazards.

IDENTIFY SAFETY RISK						
A	B	C	D	E	F	G
ID	Risk Title	Event / Cause / Consequence	Persons Affected	Applicable Phases	Applicable Disciplines	Inherent Consequence
1	Alignment Constraints	Limited space along Wai Yip Street may restrict optimal alignment, causing accessibility or approval issues	Public	Design	Multi-Discipline	B - Major
2	Unclear Interface with Travellers	Ambiguity on responsibilities or technical requirements for traveller integration leads to interface issues in later stages	Designer Contractor	Design	Multi-Discipline	B - Major
3	Climate Resilience Not Addressed	Failure to consider future climate (flooding, heat) leads to maintenance or safety issues	Public	Design	Civil	C - Moderate
4	Insufficient Allowance for Maintenance	Design does not provide for safe/easy maintenance access (e.g., to travellers, lighting)	Maintenance Staff	Design	Structural	C - Moderate
5						
6						
7						

Item	Column Name	Description
A	ID	A unique identifier for each item
B	Risk Title	This should be a simple descriptor for the purpose of reporting. The shorter the better as long as it achieves the purpose of informing what the item is.
C	Event / Cause / Consequence	This cell contains a combined descriptor for the risk, its causes, and its consequences. If the current consequence differs from the inherent consequence, this should be noted within this cell.
D	Persons Affected	Some safe design assessments require the identifications of persons who may be affected if the risk is realised.
E	Applicable Phases	Some safe design assessments require the identifications of the project phases within which the risk may realised.
F	Applicable Disciplines	Users may wish to identify the engineering disciplines associated with the risk. This enables for example the Electric Lead to quickly filter the register for risks associated with the electrical discipline.
G	Inherent Consequence	The inherent consequence is the maximum reasonably foreseeable consequence were the controls described in the <Current Controls> column not in place and effective.

Design Risk Register (3/5) 3

The Design Risk Register is designed to identify and evaluate hazards **during the design and construction phases of a project**. It assesses the severity of potential accidents, mitigates construction hazards, and documents significant risks. It is updated by the design team during the design and tender stage, and by the Main Contractor during the Construction Phase to incorporate any relevant design changes and address emerging hazards.

Risk Register Sample			
ANALYSE SA H DESIGN RISK - CURRENT E JSURE K			
(Risk Treatment) Current Controls	Consequence	Likelihood	Risk Level
Conduct initial site layout review with project team including civil, architectural, and traffic engineers. Assess site constraints; Set up design coordination meetings	C - Moderate	4 - Likely	High
Hold interface coordination meetings with traveller supplier and all design disciplines. Draft and circulate interface responsibility matrix	B - Major	3 - Possible	Critical
Preliminary climate risk assessment; Review historical weather data	C - Moderate	2 - Unlikely	Medium
Preliminary maintenance review; Draft O&M requirements	C - Moderate	3 - Possible	High

Item	Column Name	Description
H	(Risk Treatment) Current Control Measures	The controls that are important in achieving the current risk level should be listed in this column. Controls should be listed as bullets.
I	Consequence	Per the header this is the maximum reasonably foreseeable consequence given the "Current Controls" identified in that column. The value selected in this column must match the description provided in the <Event/Cause/Consequence> column.
J	Likelihood	Per the header this is the likelihood of realising the maximum reasonably foreseeable consequence given the "Current Controls" identified in that column. It is not the likelihood of the risk event itself.
K	Risk Level	This value is returned as a fnc of the selected likelihood and consequence values using the heat map in the next page

Design Risk Register (4/5)

3

How to Conduct Risk Assessment

		Likelihood Analysis Descriptions		
		Descriptor	Likelihood (i.e. % chance of realisation during applicable period: construction phase, operating cycle or decommissioning)	Industry Incidences (only applicable to common systems/assets)
Category	5 - Almost Certain	The threat is expected to be realised.	90% < Likelihood ≤ 100%	Common incident
	4 - Likely	The threat is likely to be realised.	5% < Likelihood ≤ 90%	Several incidents nationally
	3 - Possible	The threat may be realised.	1% < Likelihood ≤ 5%	One or a few incidents nationally
	2 - Unlikely	The threat is not expected to be realised.	0.1% < Likelihood ≤ 1%	No known national incidents. One or a few incidents in comparable international operating regimes.
	1 - Rare	The threat may be realised in reasonably foreseeable but exceptional circumstances.	0% < Likelihood ≤ 0.1%	No known incidents in comparable international operating regimes.

		Consequence Analysis Descriptions			
		People	Property	Environment	Community
Categor	A - Catastrophic	Single or multiple fatality	Virtual complete loss of plant or system	Permanent / irreversible widespread ecological damage not able to be remediated	Outrage by a sizeable community or many communities. Riots.
	B - Major	Disabling injury or illness i.e. amputation and/or permanent loss of bodily function, or any kind of permanent health impact	Extensive damage to plant or system	Extensive ecological damage, lengthy remediation process	Community/NGO legal actions. Pickets, demonstrations.
	C - Moderate	Any Lost Time Incident (LTI), i.e. an illness or injury resulting in one or more consecutive days or shifts off work	Significant damage to plant or system	Substantial ecological damage but able to be remediated	Persistent formal community complaints. Formal complaints to politicians or comparable representatives.
	D - Minor	A medical treatment case (MTC) / or restricted work case (RWC)	Damages impact on budget and program	Localised ecological damage, easily remediated	Formal complaints from local Community complaints locally
	E - Incidental	First Aid Case, or an injury or illness not requiring treatment	Minor damage to plant or system	Negligible ecological damage, may not require remediation	No informal community complaints &/or negative comments / views.

Risk Level Matrix						
		Likelihood				
		1 - Rare	2 - Unlikely	3 - Possible	4 - Likely	5 - Almost Certain
Consequence	0 - Eliminated					
	A - Catastrophic	High	Critical	Critical	Critical	Critical
	B - Major	High	High	Critical	Critical	Critical
	C - Moderate	Medium	Medium	High	High	Critical
	D - Minor	Low	Low	Medium	High	High
	E - Incidental	Low	Low	Low	Medium	Medium

Design Risk Register (5/5) 3

The Design Risk Register is designed to identify and evaluate hazards **during the design and construction phases of a project**. It assesses the severity of potential accidents, mitigates construction hazards, and documents significant risks. It is updated by the design team during the design and tender stage, and by the Main Contractor during the Construction Phase to incorporate any relevant design changes and address emerging hazards.

IMPLEMENT SAFE DESIGN RISK TREATMENT			
L	M	N	O
Risk Owner	Evaluation	(Risk Treatment) Action Summary	Comments
PM - Peter	Intolerable	Arrange joint site visits for all disciplines; Conduct workshops to evaluate alignment options; Document findings and integrate feedback into early design drawings.	24Nov2025 Peter - The risk has been mitigated
M&E Coordinator - Ken	Intolerable	Prepare detailed interface control document with clear responsibilities and technical requirements; Review and update matrix at each design stage.	
PM - Peter	Intolerable	Engage expert for climate adaptation review; Integrate higher drainage capacity and shade features into early design..	
PM - Peter	Intolerable	Incorporate maintenance access points and working platforms in design; Review design with future maintenance team.	

Item	Column Name	Description
L	Risk Owner	Per the header this is the person who should be responsible for the risk.
M	Evaluation	This column reflects the decision of the authorised person as to whether it is OK to expose harm receptors to the risk &/or whether additional actions are required to modify the risk exposure.
N	(Risk Treatment) Action Summary	This column lists actions required to bring the risk to an acceptable level . It should be empty if the risk has been evaluated as retired (eliminated) or acceptable. If actions are required the list should be preceded by the leader line "The risk will be actioned to an acceptable level by:".
O	Comments	The comments column is used to record the development of the entries.

Pre-Construction Information 4

The Pre-Construction Information (PCI) **centralises essential project details and health and safety considerations**. It serves as an essential component throughout the project lifecycle, from pre-tender to construction stages, guiding the planning, management, and communication of safety-related information among all designers and contractors. The PCI is **initiated by the client** at the project set-up stage, continuously **updated by the design team** during the design stages, **included with tender documents** during the tender stage, and **reviewed and transferred to the Health & Safety file** by the main contractor in the construction stage.

Sample Outline of Pre-Construction Information			
Item	Section	Exist in the document? (Y/N)	Comment / Notes
1. Project Information			
1.1	A description of the Project		
1.2	Key dates		
1.3	Contact details for the project team		
1.4	The extent and location of the existing information		
1.5	Project arrangements:		
1.5.1	- Planning and managing the construction work		
1.5.2	- Communication and liaison		
1.5.3	- Security		
1.5.4	- Site hoarding - preventing unauthorised access		
1.5.5	- Site transport - access routes		
1.5.6	- Permit-to-work systems		
1.5.7	- Fire precautions		
1.5.8	- Emergency procedures		
1.5.9	- Means of escape		
1.5.10	- Authorisation requirements		
1.5.11	- Ground works - excavations confined spaces		
1.5.12	- Smoking and parking restrictions		
2. Safety Hazards			
2.1	Boundaries and access including traffics		
2.2	Restrictions on deliveries, waste collection or storage		
2.3	Adjacent land uses and projects		
2.4	Existing live and redundant services (i.e. overhead HV and underground utility services including gas, drainage, telecommunications, etc.)		
2.5	Ground conditions (i.e. stability, contamination)		
2.6	Existing stability of structures (i.e. permanent and temporary)		
2.7	Issues relating to plant and equipment		
2.8	Health and safety information in earlier design, construction or 'as-built' drawings		

3. Health Hazards	
3.1	Asbestos
3.2	Contaminated land
3.3	Client's activities
3.4	Storage of hazardous materials
3.5	Significant design and construction hazards
3.5.1	- Assumptions and working methods
3.5.2	- Arrangements for co-ordination of ongoing design work
3.5.3	- Significant risks identified during design
3.5.4	- Materials requiring particular precautions
4. Information in Existing Health & Safety File	
4.1	A description of the Health and Safety File and any conditions relating to its content
4.2	Asset or Building Manual

Construction Phase Plan (1/3) 5

The Construction Phase Plan (CPP) is crucial for identifying and mitigating significant health and safety risks throughout the construction project. It is a key document for communicating risk management strategies to all pertinent duty holders during the construction phase. The **initial CPP is developed by the Main Contractor** before construction begins, and both the **Main Contractor and sub-contractors collaboratively update** it with safety details as the project progresses through the construction stage.

Construction Phase Plan		
PLAN		
Project Name		
Client's Information		
Name	Address	
Project Details		
Job Description		
Client-Specific Considerations (if any)		
Project Milestones	Start	
	Finish	
	Others	Progress Review Date:
WORK TOGETHER		
Stakeholder & Roles		
List of Parties on Site	Main Contractor	
	Subcontractors	
	Design Team	
	Client Representative	
	Safety Consultant	
	Other	
Main Contractor Designation	Project Manager	
	Site Supervisor	
	DfS Coordinator	
Communication & Coordination	Regular Meetings (frequency, time, and location)	
	On-Site Notice Board	
	Emergency Communication Method	

Construction Phase Plan (2/3) 5

The Construction Phase Plan (CPP) is crucial for identifying and mitigating significant health and safety risks throughout the construction project. It is a key document for communicating risk management strategies to all pertinent duty holders during the construction phase. The **initial CPP is developed by the Main Contractor** before construction begins, and both the **Main Contractor and sub-contractors collaboratively update** it with safety details as the project progresses through the construction stage.

Health & Safety Management		
Safety Documentation & Inspections	H&S Plan	
	Safety Audits (frequency and responsible party)	
	Daily Inspection (checklist and responsible party)	
Site Rules and Induction	Site Inductions	
	PPE Requirements	
	Site Rules	
Induction Procedures	Site Induction Process (Describe how the induction will be managed.)	
Operational Management		
Traffic Management	Traffic Management Measures (Describe the system for managing vehicle movements on site to ensure safety.)	
Welfare Facilities	On-Site Amenities (Describe the welfare facilities provided on site. E.g. Sanitation, Hydration Points, Locker Rooms and Break Areas)	
Fire Prevention and Emergency Procedures	Emergency Equipment and Procedures (Detail location and maintenance of fire extinguishers, fire watch assignments, evacuation plans, and storage protocols for hazardous materials.)	

Health & Safety File 6

The Health & Safety File is designed to **cover all relevant information about a building's construction, operation, and maintenance to ensure safe future practices**. It aims to enhance the health and safety of maintenance personnel and building users by guiding informed decision-making and effective risk management. The Health & Safety File is updated throughout the project lifecycle: specified by the client pre-tender, compiled by the designer in design stage and collaboration with contractor during construction, and the main contractor delivers the updated file at handover

Sample Outline of Health & Safety File (Asset or Building Manual)		
Section	Description	Details
-	Front Page	Title of the project, the particular element of the project covered by the manual, the relevant manual reference, and the date of issue of the manual.
-	Content Page	A fully detailed index of the Operation and Maintenance Manual. Title/Page number etc.
1	Introduction	Description of the manual content and structure. How to use it and why it is being issued. [could be standardized across all your projects]
2	Project Information	Include detailed information on the project. [can take information from the Owner's Project Requirements (OPR), Basis of Design (BOD), Specifications, Commissioning Plan/Cx Plan]
3	Project Specifications	Include a register of Specifications that were utilized on the project.
3.1	Building Management System (BMS) Specification	Include BMS Systems Specification.
3.2	Extra Low Voltage (ELV) Systems Specification	Include ELV Systems Specification.
3.3	Electrical Systems Specification	Include Electrical Systems Specification.
3.4	Fire Systems Specification	Include Fire Systems Specification.
3.5	Mechanical/ Heating, ventilation, and air conditioning (HVAC) Systems Specification	Include Mechanical/ Heating, ventilation, and air conditioning (HVAC) Systems Specification.
3.6	Plumbing and Drainage Systems Specification	Include Plumbing & Drainage Systems Specification.
4	As-Built Drawings	
4.1	BMS System As-Built Drawings	Include a register of BMS Systems As-Built drawings.
4.1.1	Schematics/Single Line	Include a set of as-built schematics/single line diagrams for the BMS Systems.
4.1.2	Layouts	Include a set of as-built layouts for the BMS Systems.
4.1.3	Controls System As-Built Drawings	Include a register of Control Logics As-Built drawings.
4.2.1	Control Logics	Include a set of as-built Control Logics.
4.3	ELV System As-Built Drawings	Include a register of ELV Systems As-Built drawings.
4.3.1	Schematics/Single Line	Include a set of as-built schematics/single line diagrams for the ELV Systems.
4.3.2	Layouts	Include a set of as-built layouts for the ELV Systems.
4.4	Electrical System As-Built Drawings	Include a register of Electrical Systems As-Built drawings.
4.4.1	Schematics/Single Line	Include a set of as-built schematics/single line diagrams for the Electrical Systems.
4.4.2	Layouts	Include a set of as-built layouts for the Electrical Systems.
4.5	Fire System As-Built Drawings	Include a register of Fire Systems As-Built drawings.
4.5.1	Schematics/Single Line	Include a set of as-built schematics/single line diagrams for the Fire Systems.
4.5.2	Layouts	Include a set of as-built layouts for the Fire Systems.
4.6	Mechanical/HVAC System As-Built Drawings	Include a register of Mechanical/HVAC Systems As-Built drawings.
4.6.1	Schematics/Single Line	Include a set of as-built schematics/single line diagrams for the Mechanical/HVAC Systems.
4.6.2	Layouts	Include a set of as-built layouts for the Mechanical/HVAC Systems.
4.7	Plumbing and Drainage Systems As-Built Drawings	Include a register of Plumbing Systems As-Built drawings.
4.7.1	Schematics/Single Line	Include a set of as-built schematics/single line diagrams for the Plumbing and Drainage Systems.
4.7.2	Layouts	Include a set of as-built layouts for the Plumbing & Drainage Systems.

5.0	Electrical Discrimination Study	Include the approved discrimination study report for the electrical systems.
6.0	BMS Graphic Document	Include the approved BMS Graphic document.
7.0	BMS Access/Messaging As-Built Information	Include the approved information relating to access to the BMS/control systems and programming.
8.0	Summary of Systems Installed	Provide a summary of each system's components, location, and how they are designed to operate. [can take from specifications, drawings, control logics]
9.0	Asset Register	Include a detailed list of equipment for each type of system that has been installed. 1. Equipment ID 2. Type 3. Manufacturer 4. Model 5. Size/Rating 6. Building/Floor/Room [usually taken from the progress trackers that were created through the project]
10.0	System Operation	Expand on the way in which each of the systems operates: 1. Start-Up, interfaces/interlocks 2. Setpoints 3. Running 4. Shut down, interfaces/interlocks 5. Fault finding/problem solving [Use specifications, drawings, control logics, manufacturers data, and information].
11.0	Manufacturers Literature/Information	Include all the manufacturer's information relating to the equipment, ancillaries, and systems. [Use the asset register for reference of what would be needed]
11.1	[Add each type]...	
11.2	[Add each type]...	
11.3	[Add each type]...	
12.0	Health and Safety	
12.1	Safety Procedures	Include all safety processes and procedures related to the operation, access, and maintenance of the equipment and systems. Don't forget a register/index to show what is included. [Use the project health and safety file for examples and reference]
12.2	Control of Chemical/ Substances Hazardous to Health	Include all Chemical/substances hazardous to health data sheets for items related to the maintenance, cleaning, and disposal of chemicals [paint, adhesives, gases, and chemicals]. Don't forget a register/index to show what is included. [Use the project health and safety file for examples and reference]
12.3	Risk Assessments	Include all risk assessments related to the operation, access, and maintenance of the equipment and systems. Don't forget a register/index to show what is included [Use the project health and safety file for examples and reference]
12.4	Arc Flash Study	Include the approved Arc Flash Study for the electrical systems.
13.0	Disposal of Equipment/Products	Provide information on how equipment and products should be disposed of.



Bringing
ideas
to life

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現在放映的是2025年10月16日

香港房屋委員會

「新工程合約工地安全講座」的片段

台上的講者是澳豔冠大中華區基礎設施諮詢總監

掌晶女士

她的講題是

「建築設計 - 打造安全與可持續發展的社區」

(00:24)

感謝房委會的邀請

今天很高興可以和大家分享

建築設計安全的一些知識

今天的議程主題目的

向大家介紹建築設計安全

接着，我會介紹一些風險控制框架

希望大家在日常工作中都能夠應用

最後，我亦會介紹

建築設計安全的一些角色與責任

以及這個建築設計安全系統中的

重點範本和工具

在正式講解建築設計安全之前

我也很想先讓大家看看這組數字

相信很多人對這些數字都非常熟悉
我們選擇了新加坡
作為一個基準對象
我們都看到
無論是意外的數字，或是死亡率
香港和新加坡之間仍然有頗長的一段距離
這樣告訴我們
香港城市本身有很多很有特色的地方
包括建築密集度
以及人口密度都相當高
正因如此，我們更加要關注建築安全
在日常工作當中
無論是設計、建造
甚至是營運和維修
其實在每一個工序裡
安全都絕對是優先的
接着，在介紹一些文字和概念之前
我很想先用一個簡單例子
說明什麼是建築設計安全

相信一會兒林凱帆先生應該會有更多例子
不過這裡先用一個小小的例子
讓大家看看一些前後對比
左邊那張相片

是一個大家認識的地方

就是電掣房

其實很多電纜橋架

或是一些有很多電纜槽、水喉喉管的房間

都會是這個樣子

當大家看到這張相片時

能不能找到安全問題？

雖然這裡有一個平台讓人可以上落

但其實很容易絆倒

而且東西搬不進去

沒有空間能使用手推車

所以一些重物、機械

或者較重的工具都要靠人手搬運

將來在這間房間進行維修的維修人員

在日常工作時，面對很多困難

如果我們在設計這房間的時候

在安裝這些電纜或安裝其他設備之前

已經想到這個問題

就可以把設計改為右邊這種方法

我們把電纜安裝在離地約兩米的位置

工友就可以使用手推車

很自由地在下面通行

運送物料和工具

維修也會相對容易

整體安全指數也會較高

所以一個很簡單的例子

想告訴大家

如果我們在設計時已經想到將來的使用情況

其實就可以設計一個更安全的工作環境

接着回到今天的主題

把建築設計安全的原則

介紹給大家

希望能融入在大家的日常工作中

可以使用這方法

建築設計安全是什麼時候來到香港的？

其實這套建築設計安全系統

是來自英國的建築設計及管理規例框架

它在2006年第一次被引入香港

但差不多到2020年

建造業議會才成立了一個專責小組

去研究這件事

當時亦出版了一份參考資料

當時我有協助建造業議會製作這份參考資料

已將這些參考資料

應用在20個先導項目當中

當然，房屋署有參與其中

所以，我們希望可以將建築設計安全的原則和一些資料
在業界作更廣泛的應用

其實，建築設計安全

正如剛才那張圖所介紹

就是希望我們在設計階段

甚至在規劃階段

已經想到將來在建築上或將來營運和維修時

會遇到的一些危險、困難和阻礙

並盡量在設計上先行處理

以最大程度減少未來可能出現的危險和事故

在建築設計安全當中

我們有四個關鍵持份者

在左下方也有列出

包括客戶、設計師、承建商和維修主管

因為大家都明白

設計和建築可能只是涉及數年

但其實大廈的運作

在香港可能長達五十年、六十年

所以，維修主管這個角色

可以在前期階段對將來的營運和維修

提出很多風險方面的意見

另外，我們為建築設計安全

創造了一個功能性職位

這個職位可以由客戶代表、建築師、認可人士
或者項目經理擔任

這個所謂的功能性職位

其實就是幫助協調整個建築設計安全的倡議

讓不同界別的聲音、不同意見、不同經驗和分享
可以在不同階段、不同角度之下得到協調和整合

而建築設計安全的核心指導原則就在右邊列明

這裡所寫的CORE(核心)

C代表Communication(溝通)和Coordination(協調)

我們希望一些主要的健康與安全檔案
關注事項和反饋機制

以及不同團隊之間都可以有足夠的溝通

因為大家看問題的角度可能會有所不同

所以我們希望有一個良好的反饋機制

讓不同聲音都可以被聽到

O就代表Ownership(擁有權)和Leadership(領導能力)

意思就是把健康與安全

放在我們一個關鍵商業決策裡面

大家都知道

執行項目時，最重要的是什麼

很多時候，大家先考慮的是成本

然後是時間，再之後可能是質量

可能與成本和時間比較

大家會有不同的優先次序
所以如果要進行商業決策
在選擇材料時
大家會考慮成本和時間
但有沒有人考慮安全呢？

應該會比較少
房屋署真的做得非常好
所以，我們很希望將健康與安全
也變成一個關鍵商業決策
即是說，在考慮時間和金錢之外
都必須同時考慮安全

R就是Risk Prevention(風險預防)和Management(管理)
這一點，我相信大家在自己的項目裡面應該都有進行
例如識別風險
再制定一些風險緩解措施

而建築設計安全
就是希望可以從設計這個源頭開始
減少這些風險

E就是Evaluation(評估)和Training(培訓)
正如今天這樣，我們希望透過更多分享
讓大家知道不同的方法
令整個業界可以變得更加安全

至於階段和步驟

可能和大家想像的不一樣

因為我們的建築設計安全

是覆蓋由規劃階段

一直到將來的營運和維修階段

所以稍後介紹的一些工具和範本

也都會覆蓋這些不同環節

接着，我很想介紹一下控制等級

我想林凱帆先生應該對這個很熟悉

大家有沒有看過這個倒三角？

相信大家不同場合都曾經看過

其實，我們可以由最底部開始看

最底部是什麼呢？

就是個人防護裝備

這個大家一定很熟悉

再上一層就是行政控制

這個字眼大家可能未必常常直接這樣說

但其實行政控制包括

工作許可證系統、每日簡報、聯合安全檢查等

大家可能會很好奇

因為我們現在業界做得最多的

就是個人防護裝備和行政控制

但在這個控制等級裡面

我們反而認為它們是效率最差的
為什麼呢？

因為當事情已經在工地才處理
在建築的角度來說

其實已經是最後一個步驟才去做

很多時候，只是因為再沒有其他方法
所以才要依靠工友或依靠工地同事
在現場執行這些措施才能維持安全

因此，我們認為這是效率最差的做法

那什麼是最有效呢？

就是上面的四個方法

第一個，就是消除

如果可以直接消除危險

當然是最好

這是最徹底的方法

不過，未必每一個個案都可以做到

如果無法完全消除，我們還可以做什麼呢？

就是替代

替代就是用一些風險較低的工序

去取代風險較高的工序

或者用一些風險較低的設計

去取代一些風險較高的設計

這就是替代

第三個就是隔離

這就是把風險從人身上移除

例如做一些圍封

或者更簡單地說，用機械人去進行工序

不用人去執行，自然就沒有風險

第四個就是工程控制

工程控制是指透過一些物理的改變

去防止一些風險的過程

其實在設計階段

甚至我們現時的安全智慧工地系統

都可以看作是工程控制的一部分

這裡我也有一些例子，例如消除的對比

左邊可見，有一位工友站在工作平台上

在外牆上安裝一些東西

如果我們不需要在外牆上工作

或者外牆根本不需要那麼多維修和安裝

那是不是就可以消除這個風險呢？

這當然是一個很極端的例子

我們曾經和一些承建商討論

他們都說如果外牆採用清水混凝土設計

其實已經是最安全的

因為建成之後

不需要再進行工序就可以直接使用

不需要再結磚，也不需要安裝玻璃

所以最安全

當然，若考慮美觀等因素

未必每個項目都做得好

但這個例子就是想讓大家知道

有時不進行額外工序，反而是最安全

第二個例子就是替代

左邊是傳統棚架

如果我們使用右邊的移動式升降工作平台

便會更加安全

另外一個替代的例子

房屋署也做得很好的

就是組裝合成建築法和機電裝備合成法

因為它們可以很大程度上

減低工地的工序

把部分工作轉移到工場完成

從而減少在工地工作的危險性

另外，在工序上有時也可以考慮不同安排

例如很多時候我們建築都是由底層一直做到頂部

但有時也可以考慮一些由上而下的方法

將一些原本需要在高空完成的工序

改為在地面處理

這其實已經可以很大程度上減少工地作業的風險

至於隔離，可以包括一些全封閉式護欄

又或者剛才提到的機械人、無人機、機械技術等

這些都屬於隔離的一部分

至於工程控制

這裡也有一個很簡單的例子

左邊那個例子中

地面有水，在上面行走就很容易滑倒

其實一個很簡單的方法

就是使用一些防滑的表面或物料

這樣便可以避免將來出現這些風險

這個解決方案

大家現在看到的是在碼頭使用

碼頭很多時候都會使用這種防滑的物料

至於行政控制和個人防護裝備

大家都非常熟悉

例如行政控制

包括工作計劃、工作許可證系統、禁止進入系統等

而個人防護裝備

則包括安全鞋、安全帽、安全裝置、安全繩等

這些大家應該都很清楚

我就不再強調了

所以，這個控制等級系統
最重要是幫助大家建立一種思維模式
當我們遇到一些風險
要構思緩解措施的時候
就可以遵循這個等級去思考
看看怎樣才是減低風險的最佳方法
接着，我想向大家介紹
我們這個建築設計安全系統的角色與職責以及範本與工具
這裡我不會詳細介紹
因為內容比較長
其實角色與職責
剛才也已經簡單介紹過
我們把它分成三個部分：
客戶、設計師、承建商
今天現場，我估計比較多的是客戶方的同事
對業主方來說
最重要的是建立一個安全文化
以及安全第一的心態和建立風險管理系統
並確保整個項目週期之中
都能夠做到安全第一
同時，亦應該和不同的持份者去分享一些經驗
在項目設置階段

當然包括一些角色的分配
以及關鍵績效指標的設定
在設計階段
則要授權設計師去做一些更安全的設計
並和設計師保持充分溝通
讓他們知道我們的期望

至於建築階段
則包括一些福利設施
令工友工作時可以更安心
不需要有太多顧慮
特別是在時間方面
工友就可以做多一些安全相關的事情
令日常工作變得更加安全
另外亦有其他方法
例如彩排、風險識別
以及在完成和移交階段做好一個完整文件的檢查
這些主要屬於客戶的部分
至於設計師
我估計今天現場應該不算多
所以我不會說明太多

不過，設計師在整個安全設計過程中
其實是一個主要的貢獻者
因為他們在設計時

除了考慮美觀、實用之外
亦需要考慮安全的問題
不只是建造時的安全
更要考慮整個設計
究竟怎樣才能安全地建造出來
以及從將來住戶或維修主管的角度
思考將來的維修通道
特別是天台、冷氣房、電掣房等位置的
通道和安全問題
這就是設計師的角色與責任

至於承建商在施工階段
其實就是一個建築設計安全的主要角色
他們必須有足夠的安全措施
而我們亦準備了一份文件
文件的名稱是施工階段計劃
稍後我也會介紹這份文件
希望幫助承建商建立一個更完整、更安全的管理體系

另外，當然也包括健康與安全管理
設計管理監控和協調
這些就是建築設計安全一系列的文件
我們設計這些範本和工具
其實是想幫助業主方、設計師和承建商
令他們可以更方便地推行建築設計安全

一共有六個範本和工具

第一個，就是客戶策略簡報

這份文件主要是讓大家在計劃階段

要包括一些可能發生的風險

其實很多時候大家在計劃時

也會有一份文件

載有一些項目的基本資訊

而在這份客戶策略簡報裡

我們特別希望大家寫下

這個項目的一些潛在風險

例如，這個項目旁邊可能有斜坡

那麼在挖掘時便要考慮斜坡安全

又例如，這個項目地勢較低

旁邊有河流

那就可能要考慮水浸風險

又或者在挖掘時，地下有水管

這些都屬於工地限制

亦即是潛在風險

所以，我們希望在客戶策略簡報文件中

先把這些資料記錄下來

讓之後不論是設計、建設

還是將來的營運維護

也知道這些固有的風險

第二份文件就是紅黃綠清單

這是我們特意開發出來的紅黃綠清單系統

這其實可以視作為一份檢查清單

我們把不同的項目類型

或一個項目在不同階段

可能會遇到的風險全部整理出來

所以對每一個項目來說

我們都可以對照這份清單

看看這個項目有沒有這些風險

如果有的話

我們建議把識別出來的風險寫進第三份文件

即設計風險登記冊

其實大家對風險登記冊應該都很熟悉

畫面上就是我的六份文件

至於這個紅黃綠清單

我們現在已經針對不同項目類型開發了不同版本

包括基礎設施類別

例如高速公路、隧道、道路、橋樑等項目

另外，也有針對建築物的清單

以及針對維修、保養、改建及加建工程的清單

也就是說，針對不同的建築類型

我們都設有相應的清單讓大家參考

因為很多時候，我們未必能即時想到所有風險

若可以參考這些清單

就可以幫助我們去識別風險

至於設計風險登記冊

它的作用就是幫助大家進一步思考緩解措施

一般來說

一份風險登記冊通常包括哪些欄目

大家都很熟悉

例如列出風險、再按照嚴重性發生的頻率給予一個評級

然後加入安全的緩解計劃

這其實是一個很典型的風險登記冊的內容

之所以稱為設計風險登記冊

是因為我們希望

大家在現有的一些風險緩解基礎上再多想一層

看看能否從設計那裡直接解決問題

例如，如果涉及高空工作

現在常見的措施可能是安排剪刀式升降台

加強對員工的管理、提供訓練、安排專人監督

以及制定更多規則和程序

提供更多的訓練和規則給工友去使用剪刀式升降台

但如果我們再進一步思考

從建築設計安全的角度出發

是不是可以不使用這個剪刀式升降台

而是使用一個更安全的措施呢？

例如，對於高空工作
我們是否可以在設計階段
預先設置一個永久工作台
將來不論是維修、更換設備、檢查冷氣
或換燈泡，都可以在那個平台完成
這樣就不需要依賴剪刀式升降台
亦可以減少由此帶來的風險
如果我們在設計階段可以多想一步
其實就可以解決很多問題

剛才提到的紅黃綠清單
我們將它分成工作類型、範疇和細節
讓大家可以有詳細地參考
若你覺得某項風險是存在的
便可以填上「是」
並在紅黃綠清單上標記
以判斷其程度

這是一份很長的清單
至於設計風險登記冊
剛才也提過
綠色是風險的細節
黑色是我們現行的措施
例如，我們現在可能會用一些工作台
去進行訓練、監察和檢查

而藍色那一欄
是我們特別設立出來
希望大家再多想一層的部分
也就是說，從建築設計安全的角度
怎樣可以從根源杜絕這個問題
真正解決這個風險
這就是設計風險登記冊
之後，我們還有一份施工前的資訊文件
其實在投標之前
我們會把設計風險登記冊、紅黃綠清單
和客戶策略簡報
一併放進這份施工前資訊
這一份清單會說明工地安全狀況、客戶期望
安全風險和健康風險
我們希望這些文件
可以一同放進投標文件裡
讓承建商在投標時

已經知道自己會面對哪些風險
從而可以提早準備
當承建商進場後
開始建造樓宇或建設設施時
他們需要跟進的一份主要文件
就是施工階段計劃

施工階段計劃分為幾部分

例如共同工作計劃

包括一些基本資料

例如有哪些持份者會參與這個項目

誰是總承建商、有沒有定期會議

以及緊急應變方案

另外，在健康及安全管理和營運管理方面

我們希望承建商可以整合其安全計劃

工地安全教育培訓的材料

個人防護裝備的要求以及工地規則

在營運方面

亦包括物流安排、交通安排、福利設施安排

防火安排以及緊急程序

在組織方面

我們很希望承建商

能夠針對一些特定風險制定相應措施

例如，工地通常都一定會有高空工作

很多時候也會有密閉空間

所以，我們希望透過這份文件

指導承建商建立一個更完整的安全管理系統

我們很多時候發現

其實承建商並不是沒有做事

他們是有做的

但很多時候，他們未必懂得怎樣去組織、整合
或統一這些資料

所以我們希望這份文件可以成為

承建商、業主和設計師之間

一個主要的溝通渠道

令不同參與方都可以達成共識

一起去面對建築階段的安全問題

當建築完成後

我們最終的文件就是健康及安全檔案

這份檔案

我們同樣提供了一份檢查清單

這份檢查清單是由承建商交給最終業主方的

大家可能都聽過這類文件內容

裡面包括竣工圖

一些樓宇管理系統的設定和規格

甚至一些資產的登記冊

很多不同系統的手冊

以及一些健康與安全的實踐

還有一些設備與產品處置的要求

它本身就是作為一份檢查清單

讓業主方可以去檢查承建商

是否已提供所有文件

而這些文件之所以重要
就是因為對將來的營運和維修非常有幫助
讓之後的使用者可以知道前期所有的歷史
也知道哪些地方有危險
需要特別留意
因為很多時候
我們在前期已經想到某些風險
例如水浸
可能在設計階段，未必能完全解決這個問題
在建設階段，亦未必能解決
但如果這些資訊可以移交給營運和維修團隊
他們便知道這個工地可能存在水浸的風險
那麼在日常營運中
便可以採取一些預防措施
去減少水浸所造成的嚴重損害
所以，我們非常重視這些資訊
在不同階段、不同持份者
以及不同責任人之間的分享
我今天的分享就到這裡
希望大家可以更了解建築設計安全
如果大家想知道更多資訊
都可以找房屋署的同事

他們已經備妥了相關資料

多謝大家

謝謝觀看

(30:26)