



香港房屋委員會
Hong Kong Housing Authority

Designing for Safety *Building Secure and Sustainable Communities*

16 Oct 2025

aurecon
Bringing ideas to life



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.

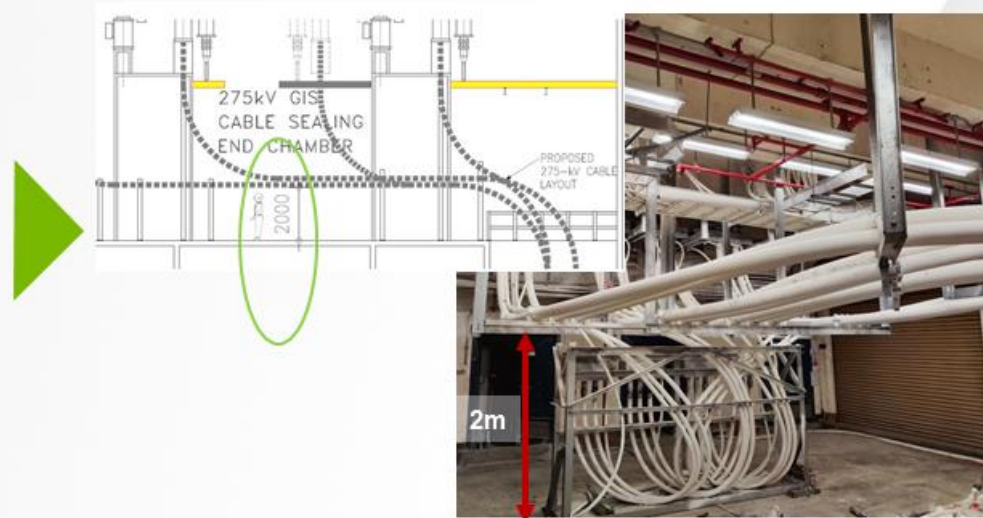
Before



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

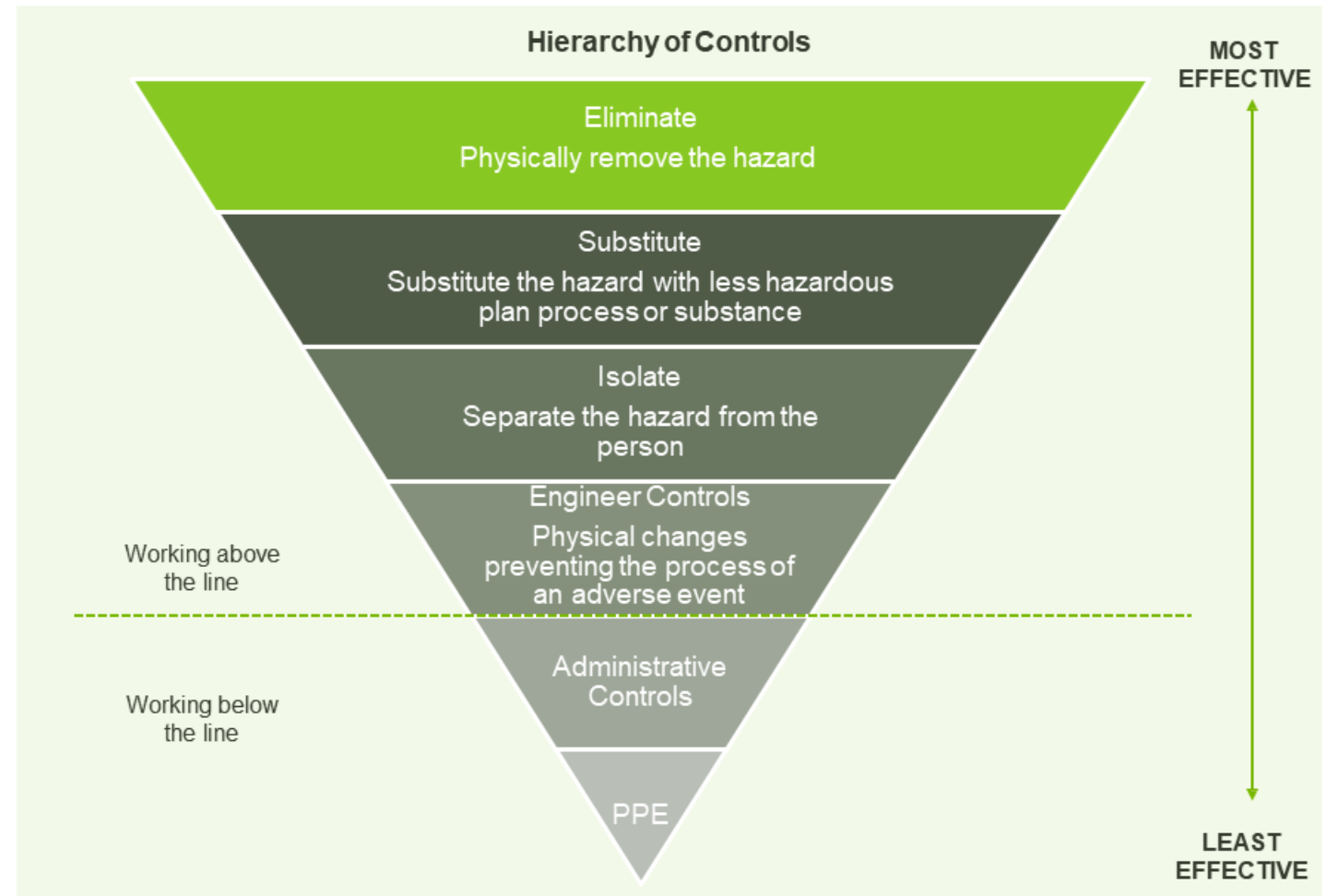
aurecon
Bringing ideas to life



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)

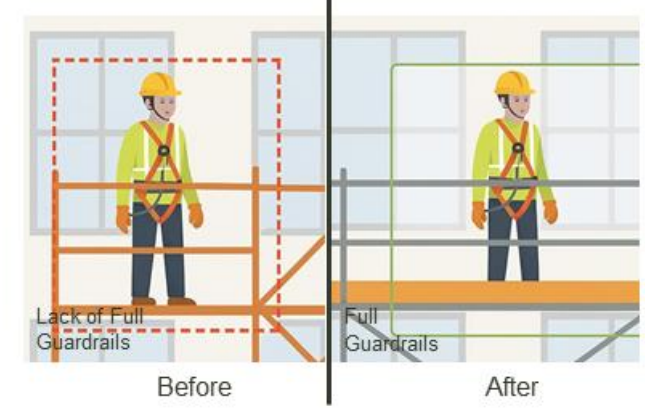
Eliminate



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
		- A Designer to comply with their duties in terms of DfS
		Group duty holder leads into a project review team
	Design Phase	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)

- 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.

	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

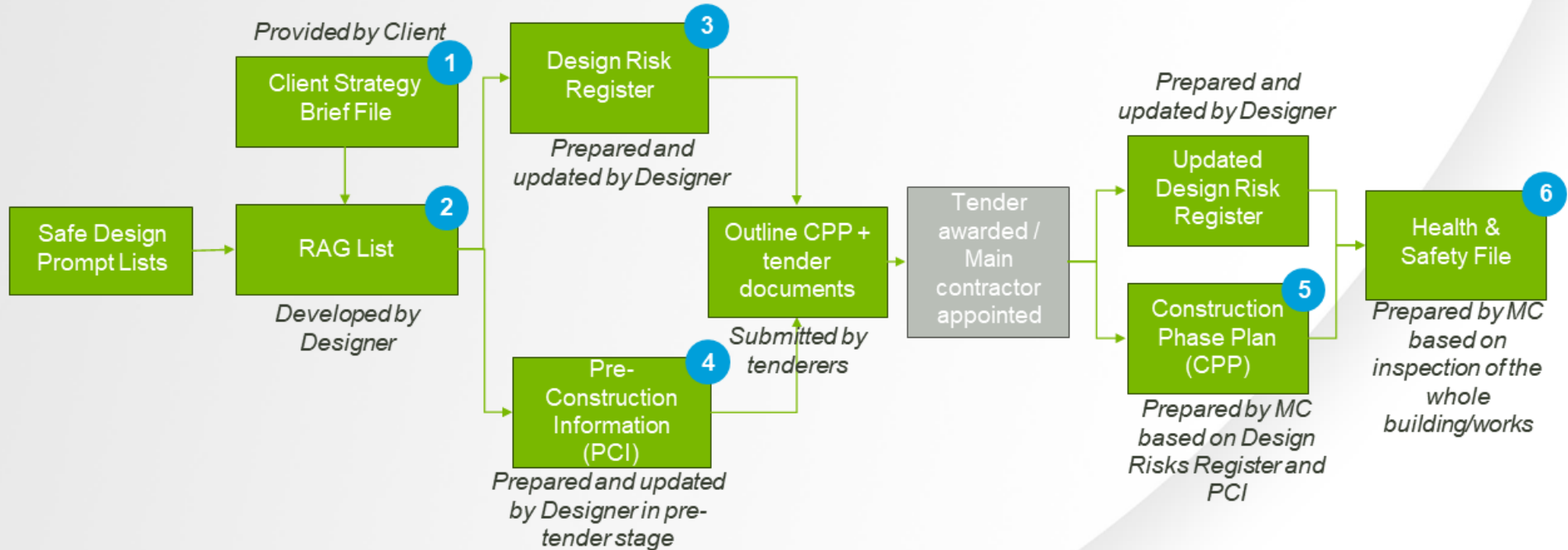
3 For Contractor (Functional role to coordinate DfS) (2/2)

- 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

	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 - CUR I J 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				
	0 - Eliminated	1 - Rare	2 - Unlikely	3 - Possible	4 - Likely	5 - Almost Certain
Consequence	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

-  linkedin.com/company/Aurecon
-  youtube.com/user/AureconGroup
-  twitter.com/Aurecon
-  facebook.com/Aurecon
-  instagram.com/Aurecon
-  aurecongroup.com/podcast

This is a clip from the 16 October, 2025 recording of the
Hong Kong Housing Authority
“Site Safety Seminar for Capital Works New Works Contracts”
The speaker on stage is Ms Gabriella ZHANG
Director of Infrastructure Advisory - Greater China, Aurecon
Her topic is
“Designing for Safety - Building Secure and Sustainable Communities”

(00:24)

I would like to thank the Housing Authority for the invitation
I am pleased to share with everyone today
some key points about Design for Safety
The main purpose of today’s session
is to introduce Design for Safety

Next, I will introduce some risk control frameworks
which I hope you can apply in your daily work

Finally, I will also explain
the roles and responsibilities in Design for Safety
as well as the key templates and tools
within this Design for Safety system

Before formally explaining Design for Safety
I would like everyone to look at this set of figures
I believe many of you are very familiar with these figures
We have chosen Singapore as our benchmarking reference
As we can see
that whether in terms of the number of accidents or the fatality rate
there is still a considerable gap between Hong Kong and Singapore

This tells us
that Hong Kong has many unique urban characteristics
including very high building

and very high population densities
Because of this, we need to pay even greater attention
to construction safety

In our daily work
whether in design, construction
or even operation and maintenance
safety must always be the top priority
at every stage of the work process
Before introducing some terms and concepts

I would like to use a simple example
to explain what Design for Safety means
I believe Mr James LAM will share more examples later
but I will first use a small case study
to show everyone a before-and-after comparison

The photo on the left
shows a place that everyone is familiar with
which is a switch room
In fact, many cable trays
or rooms with extensive cable trunking and water pipes
look like this

When you look at this photo
can you identify any safety issues?

Although there is a platform here for access
it is actually a major tripping hazard
Items also cannot be easily moved into the room
and there is not enough space to use a trolley
As a result, workers must carry heavy items, equipment
or tools have to be carried manually
In future, maintenance personnel working in this room
will face many difficulties in their daily routines

If we had considered these issues when designing this room
before installing these cables or other equipment
we could have changed the layout
to the arrangement shown on the right
We can install the cables about two metres above the ground
so workers can use trolleys
and move freely underneath
to transport materials and tools
This makes maintenance relatively easier
and significantly raises the overall safety level
So this is a simple example to show everyone
that if we consider future operations during the design stage
we can create a much safer working environment

Next, let us return to today's main topic
and introduce to everyone the principles of Design for Safety
We hope these can be integrated into your daily work
and that everyone can use this approach
When was Design for Safety introduced to Hong Kong?
In fact, this Design for Safety system
comes from the UK Construction (Design and Management)
Regulations framework
It was first introduced to Hong Kong in 2006
But it was only around 2020
that the Construction Industry Council set up a dedicated task force
to study this subject

At that time, a set of reference materials was also published
I helped the Construction Industry Council
prepare those reference materials at the time
These reference materials
have already been applied in 20 pilot projects
Of course, the Housing Department was also involved

Therefore, we hope that the principles and materials of Design for Safety can be applied more widely across the industry

In fact, Design for Safety

as introduced in the diagram just now

means that we hope to consider

the hazards, difficulties and obstacles

that may be encountered during future construction

or future operation and maintenance

as early as the design stage or even the planning stage

and try to address them first through design

so as to minimise potential future hazards and accidents

as far as possible

In Design for Safety

there are four key stakeholders

which are also listed at the lower left

including the client, designer, contractor and maintenance supervisor

As we all know

that design and construction may only take a few years

but the operation of a building

may last for 50 or 60 years in Hong Kong

Therefore, the role of the maintenance supervisor

can provide many risk-related feedback

on future operations and maintenance at the early stage

In addition, for Design for Safety

we have established a functional role

This role can be taken up by the client representative

architect, authorised person or project manager

The purpose of this functional role

is to coordinate the entire Design for Safety initiative

so that voices, opinions, experience and feedback from different sectors

can be coordinated and integrated across all stages and perspectives

The core guiding principles of Design for Safety are listed on the right

The word CORE is shown here

C stands for Communication and Coordination

We hope key health and safety information

concerns and feedback mechanisms

can be properly communicated among different teams

Because everyone may view issues from different angle

So we hope to have a proper feedback mechanism

where different views can be heard

O stands for Ownership and Leadership

This means incorporating health and safety

into our key business decisions

Everyone knows what matters most when delivering a project

Quite often, people first consider cost

then time, and perhaps quality after that

Compared to budget and schedule

people may set different priorities

When making business decisions

or selecting materials

people will consider cost and time

but does anyone consider safety?

Probably not enough

The Housing Department has really done very well in this respect

So we hope that health and safety

can also become a primary business decision

In other words, apart from considering time and money

safety must always be factored in

R stands for Risk Prevention and Management

I believe everyone should already be doing this in your own projects

for example, identifying hazards

and then formulating risk mitigation measures

Design for Safety aims to reduce these risks
starting from the source, which is the design
E stands for Evaluation and Training
Through sharing sessions like today's seminar
we hope everyone can learn different approaches
and help raise safety standards across the industry

As for the stages and steps
they may be different from what everyone imagines
Because our Design for Safety
covers the planning stage
all the way to future operation and maintenance

Therefore, the tools and templates introduced later
will also cover these different stages

Next, I would like to introduce the Hierarchy of Controls
I believe Mr James LAM is already very familiar with this
Have you seen this inverted triangle before?
I believe everyone has seen it on different occasions
In fact, we can start by looking at the bottom of the triangle
What lies at the very bottom?
It is Personal Protective Equipment (PPE)
which everyone should be familiar with

The level above that is Administrative Controls
You may not always use this exact term directly
but Administrative Controls in fact include
permit-to-work systems, daily briefings and joint safety inspections
Everyone may be curious
because what the industry does most at present
is PPE and Administrative Controls
But in this Hierarchy of Controls
we actually regard them as the least effective measures

Why is that?

Because when things are only handled on site
from a construction perspective

this is already the final line of defence

Very often, it is only when no other methods
that we have to rely on workers or site colleagues
to implement these measures on-site to maintain safety

Therefore, we consider this the least effective approach

So what is the most effective?

It is the four methods above

The first is Elimination

If the hazard can be eliminated entirely at the source
that is of course the best solution

This is the most thorough method

However, it may not be possible in every case

If we cannot eliminate it completely, what else can we do?

The answer is Substitution

Substitution means using lower-risk work processes
to replace higher-risk work processes

or using lower-risk designs

to replace higher-risk designs

This is Substitution

The third is Isolation

This means separating the hazard from people

For example, by providing an enclosure

or more simply, using robots to carry out the work

If people do not need to carry out the work,
the risk to them is naturally removed

The fourth is Engineer Controls

Engineer Controls refer to reducing risks
through physical changes

In fact, during the design stage
and even with our current Smart Site Safety System (SSSS)
these can all be regarded as part of Engineer Controls
Here are some examples, starting with Elimination
On the left, we can see a worker standing on a working platform
installing something on an external wall

If we could avoid working on the external wall
or if the external wall does not require
so much maintenance and installation
would this risk then be eliminated?
Of course, this is a very extreme example

However, we have discussed this with some contractors before
and they said that using fair-faced concrete for the external wall
is one of the safest options

Once construction is completed
it can be left as finished without further work
There is no need for bricklaying or glass installation
which helps reduce the related safety risks
Of course, if factors such as appearance are considered
not every project may be able to do this

This example shows that, on some occasions
avoiding additional work can actually be the safest approach

The second example is Substitution

On the left is traditional scaffolding
If we use the mobile elevating work platform on the right
it will be safer

Another example of Substitution
which the Housing Department has also done very well
is Modular Integrated Construction (MiC) and
Multi-trade Integrated Mechanical, Electrical and Plumbing (MiMEP)
because they can greatly

reduce work processes on site hazards
and move part of the work to a factory setting
thereby reducing the hazards of working on site

In addition, different arrangements can sometimes
be considered for work processes

For example, very often in construction
we build from the lower floors up to the top
But sometimes, a top-down approach can also be considered
Work processes that originally had to be completed at height
can be changed to be handled at ground level
This can in fact greatly reduce the risks of site operations

As for Isolation, it can include fully enclosed guardrails
or the robots, drones and mechanical technologies mentioned just now
These all form part of isolation

As for Engineer Controls
there is also a very simple example here
In the example on the left
there is water on the floor, making it very easy to slip when walking on it
In fact, a very simple method
is to use anti-slip surfaces or materials
This can prevent these risks from arising in the future
The solution you are now seeing is used at piers
Piers often use this type of anti-slip material

As for Administrative Controls and PPE
everyone is very familiar with them

For example, Administrative Controls
include work plans, permit-to-work systems and restricted-entry zones
Personal protective equipment
includes safety shoes, safety helmets, safety devices and safety ropes

Everyone should be very familiar with these
so I will not emphasise them further

Therefore, the most important function of the Hierarchy of Controls
is to help us establish a way of thinking
When we encounter a hazard
and need to develop mitigation measures
we can use this hierarchy to consider
the best way to reduce that risk

Next, I would like to introduce to everyone
the roles and responsibilities
as well as the templates and tools in our Design for Safety system
I will not introduce them in detail here
because the content is relatively long
In fact, the roles and responsibilities
have already been briefly introduced just now
We divide them into three parts
the Client, the Designer and the Contractor
I believe there are probably more colleagues
from the client side here today

For the client side
the most important thing is to establish a safety culture
a safety-first mindset and a risk management system
and ensure that safety comes first
throughout the entire project cycle

At the same time, experience should also
be shared with different stakeholders
At the project setup stage, includes the allocation of roles
and the setting of key performance indicators (KPIs)
At the design stage
designers should be empowered to develop safer designs

and sufficient communication should be maintained with designers so that they understand our expectations

As for the construction stage

this includes welfare facilities

so that workers can work with greater peace of mind

and without too many concerns

especially in terms of time

workers will be able to carry out safety procedures properly

and reduce risks in their daily work

There are also other methods such as rehearsals, risk identification

and carrying out a complete document check

at the completion and handover stage

These mainly belong to the client's part

Moving on to Designers

I believe there may not be many designers here today

so I will not explain too much

However, in the whole Design for Safety process

designers are in fact major contributors

Because when they design

apart from considering appearance and practicality

they also need to consider safety issues

Not only safety issues during construction

but also how the whole design can be constructed safely

and from the perspective of future residents or maintenance supervisors

they need to consider future maintenance access

especially access and safety issues at locations such as rooftops

air-conditioning plant rooms and switch rooms

This is the role and responsibility of designers

Finally, for Contractors during the construction stage

they are key players in Design for Safety

They must have sufficient safety measures

and we have also prepared a document
called the Construction Phase Plan (CPP)
I will also introduce this document later
We hope it can help contractors establish
a more complete and safer management system

In addition, of course, it also includes health and safety management
design management, monitoring and coordination

These are the series of documents for Design for Safety

We developed these templates and tools
to make it easier for clients, designers and contractors
to put Design for Safety into practice

There are six templates and tools in total

The first is the Client Strategic Brief File

This document is mainly for everyone to include
possible risks at the planning stage

In many cases, during the planning stage
there will already be a document
containing basic project information

In the Client Strategic Brief File
we particularly hope that everyone will record
the potential risks of the project

For example, there may be a slope next to the project site
so slope safety must be considered during excavation
Or the project site may be at a lower ground level with a river nearby
which means flooding risk may need to be considered
Or there may be underground water pipes during excavation
These are all site constraints and also potential hazards

Therefore, we hope this information can first be recorded
in the Client Strategic Brief File
so that later, whether during design, construction

or future operation and maintenance
everyone will be aware of these inherent risks

The second document is the Red-Amber-Green List

This is a system we have specially developed

It can be treated as a practical checklist

We have organised the possible risks

those different types of projects

or different stages of a project may encounter

So for each project

we can use this checklist as a reference

to see whether these risks are present

If they are

we suggest recording the identified risks in the third document

which is the Design Risk Register

I believe everyone should be quite familiar with risk registers

The six documents are shown on the screen

As for the Red-Amber-Green List

we have now developed different versions for different project types

including one for infrastructure projects

such as highways, tunnels, roads and bridges

There are also checklists for building projects

as well as RMAA (Repair, Maintenance, Alteration and Addition) works

In other words, for different types of construction projects

we have corresponding checklists for everyone's reference

because very often, we may not be able to think of every risk

immediately

By referring to these checklists

we can better identify potential risks

As for the Design Risk Register

its purpose is to help everyone think further about mitigation measures

Generally speaking

everyone should be familiar with the usual columns in a risk register

For example, it lists out the risks

then gives each risk a rating based on likelihood and severity

and includes a safety mitigation plan

This is in fact the typical content of a risk register

The reason we call it a Design Risk Register

is that we hope everyone

can go one step further beyond existing risk mitigation measures

and consider whether the problem can be solved directly through design

For example, if work at height is involved

the common measures at present may be to arrange a scissor lift

strengthen worker management, provide training,

and arrange dedicated supervision

as well as establish more rules and procedures

so that workers receive more training and guidance

on using the scissor lift

But if we think one step further

from the perspective of Design for Safety

can we avoid using the scissor lift altogether

and adopt a safer measure instead?

For example, for work at height

can we provide a permanent working platform

in advance during the design stage?

In future, whether for routine maintenance, equipment replacement,

air-conditioning inspections

or changing light bulbs, the work can all be done on that platform

This means we no longer need to rely on a scissor lift

and can also reduce the risks associated with it

if we can think one step further at the design stage

we can in fact solve many problems

The Red-Amber-Green List mentioned just now
is divided into work types, categories and details
so that everyone can refer to it in detail
If you think a certain hazard exists
you can fill in “Yes”
and mark it on the Red-Amber-Green List to assess its level
This is a very long checklist

As for the Design Risk Register
as mentioned just now
the green section contains the details of the risks
the black section contains our current measures
For example, we may now use working platforms
together with training, monitoring and inspections
The blue column is a section we have specially added
where we hope everyone can think one step further
In other words, from the perspective of Design for Safety
how can we eliminate the problem at source
and truly resolve this risk?
This is the Design Risk Register

After that, we also have a Pre-Construction Information document
In fact, before tendering
we will include the Design Risk Register, the Red-Amber-Green List
and the Client Strategic Brief file
together in this Pre-Construction Information document
This checklist will set out the site safety conditions, client expectations
safety risks and health risks

We hope these documents
can be included together in the tender documents
so that when contractors prepare their tenders
they already know what risks they may face
and can make preparations in advance

Once the contractor has mobilised to site
and starts constructing the building or facility
the main document they need to follow up on
is the Construction Phase Plan

The Construction Phase Plan is divided into several parts

For example, the joint working plan
which includes some basic information
such as which stakeholders will be involved in the project
who the main contractor is, whether there will be regular meetings
and the emergency response plan

In terms of health and safety management and operational management
we hope contractors can integrate their safety plans
site safety education and training materials
personal protective equipment requirements and site rules

In terms of operation
it also includes logistics, traffic arrangements, welfare facilities
fire prevention measures and emergency procedures

In terms of organisation
we hope that contractors
can formulate corresponding measures for specific risks

For example, work at height will usually be present on construction sites
and very often there will also be confined spaces

Therefore, through this document
we hope to guide contractors in establishing
a more complete safety management system

Very often, we find that it is not that contractors have done nothing
They have in fact done the work
but very often, they may not know how to organise, integrate
or consolidate this information

So we hope this document can become
a main communication channel

between contractors, clients and designers
allowing different parties involved to reach a common understanding
and work together to address safety issues during the construction stage

Once construction is completed
the final document is the Health and Safety File

For this file

we also provide a checklist

This checklist is handed over by the contractor to the end client

You may have heard of this type of document before

It includes as-built drawings

settings and specifications of building management systems

and even asset registers

manuals for various systems

as well as health and safety practices

and requirements for the disposal of equipment and products

It serves as a checklist

allowing the client to check

whether the contractor has provided all the required documents

The reason these documents are important

is that they are very useful for future operation and maintenance

They allow future users to understand the full history of the earlier stages

and also know where the hazards are

so that special attention can be paid to them

Because very often

we may have already identified certain risks at an early stage

such as flooding

At the design stage, it may not be possible to fully resolve the issue

and it may not be possible to resolve it during construction either

But if this information can be handed over

to the operation and maintenance team

they will know that the site may be subject to flooding risk

Then during daily operation
they can take preventive measures
to reduce the serious damage that may be caused by flooding

Therefore, we place great importance on sharing this information
between different stages, different stakeholders
and different responsible parties

That concludes my sharing today

I hope everyone now has a better understanding of Design for Safety

If you would like to know more

you may approach colleagues from the Housing Department

They have already prepared the relevant materials

Thank you

Thank you for watching

(30:26)