Life First
Walk the Talk

生命第一 行出安全

Seminar on Continuous Promotion of
Design for Safety

HKIE THE HONG KONG INSTITUTION OF ENGINEERS 香港工程師學會

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生命第一 LIFE FIRST

WALK THE TALK 行出安全

CONSTRUCTION INDUSTRY COUNCIL 建造業議會

Design for Safety “

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Design for Safety –
What more a professional engineer shall do

Ir. Victor Tse

The Hong Kong Institution of Engineers
- Safety Specialist Committee - Chairman

BEng(hons), MSc(BS), MHKIE, MCIBSE, MIMECHE, CEng, BEAM Pro, MHKIBIM, CCBM, MCIPHE

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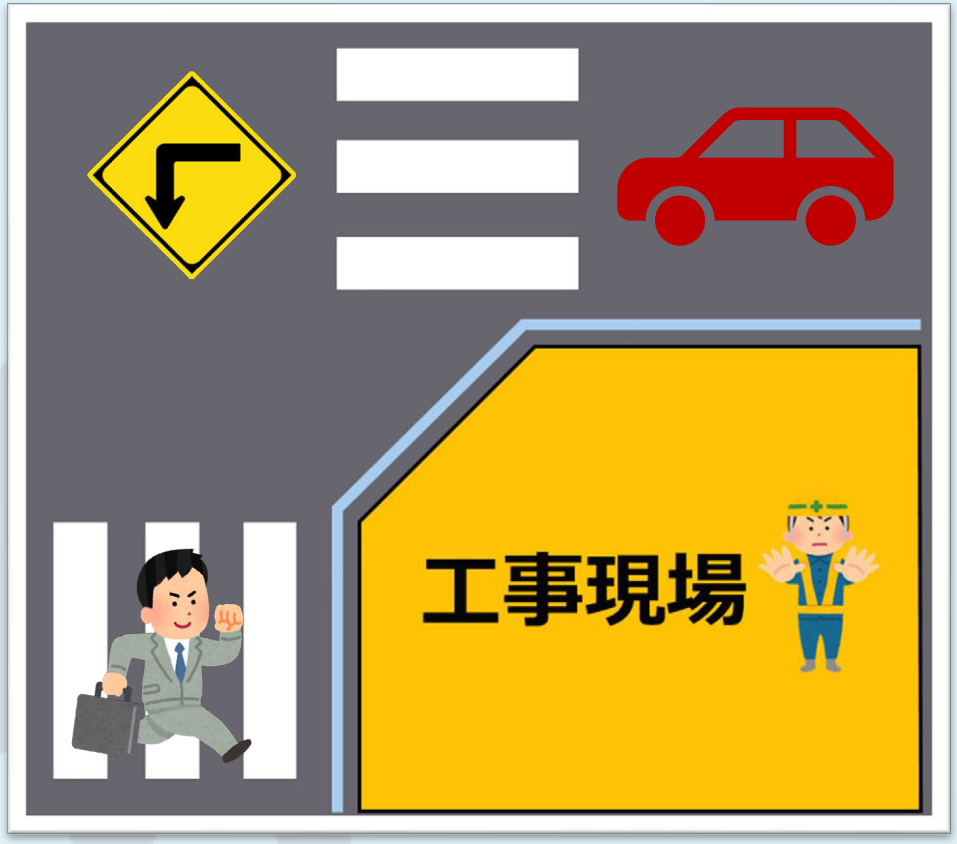
Design for Safety is

People Oriented　以人為本

is identify , and tackle significant and unusual risk by design and planning.

a Japan Job Site



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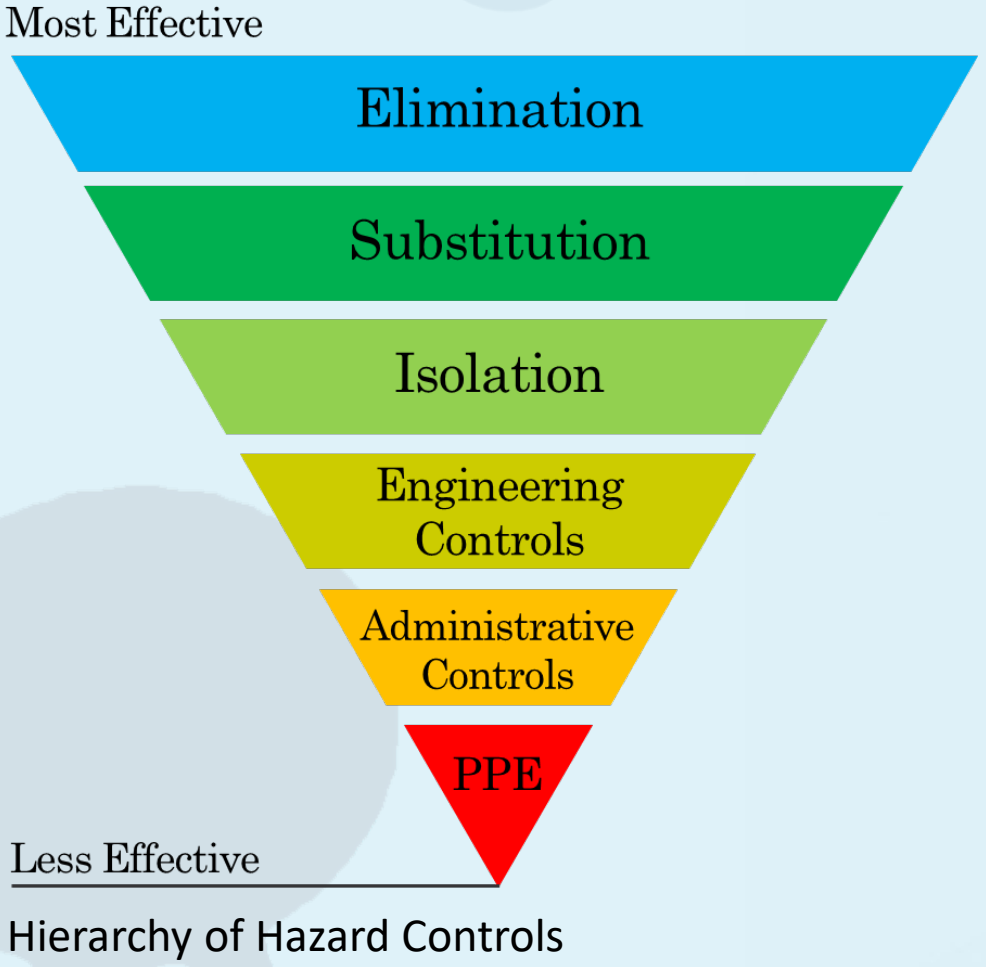

Hierarchy of Hazard Controls

Why Design for Safety?

The purpose of DfS is to *improve the overall management of health, safety and welfare* in the construction industry.

Safe Design is the *most effective risk control measure which is achieved by eliminating the hazards at source.*

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“ What more

With engineers’ pr ”

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DFS
Excellence Award
Gold
Award Winner

HKIE Design For Safety Excellence Award 2025

Fanling North New Development Area Phase 1: Fanling Bypass Eastern Section (Shung Him Tong to Kau Lung Hang)

Applicant:
Client: Civil Engineering & Development Department (CEDD)
Consultant: AECOM Asia Company Limited
Main Contractor: CRCC-Paul Y. Joint Venture
Designer: YWL Engineering Pte Ltd (YWL)

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1. Site Constraints & Engineering Solutions

Advantages of Bridge Rotation vs. Conventional Segment Erection


Before Rotation


1st Rotation Completed


2nd Rotation Completed

	Conventional segment lifting	Bridge rotation
No. of nightworks above ERL	100 nights	2 nights
Construction period/risks above ERL	2 years	2 nights
Safety and impacts on railway	Works **outside** ERL	Works **above** ERL
Equipment	Light strand jacks	Heavy lifting frame

Eliminate Risk above ERL
Mitigate Risk time above ERL

Ensure Safety
Workers + Publics

轉得**動**
轉得**穩**
轉得**準**

Ensure Stability for derivative Risks

Design for Safety should not bounded by Site.
建築設計安全 不只限制於工業地盤 保障公衆亦屬我們的職責

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DFS Excellence Award

Silver

Award Winner

CEDD | AECOM | 中國路橋工程有限責任公司 CHINA ROAD AND BRIDGE CORPORATION

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Proceed mega off-site fabrication to offer a safer workplace.
透過大型場外預製 為同業工友提供更安全的工作場所。

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DFS Excellence Award Silver Award Winner

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Ensure Planning,

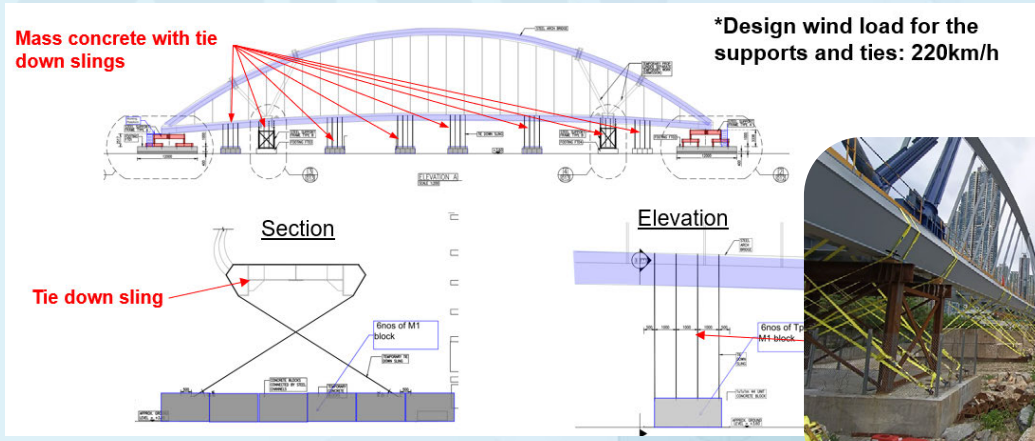
Comprehensive,

Meticulous

確保全面，細緻，

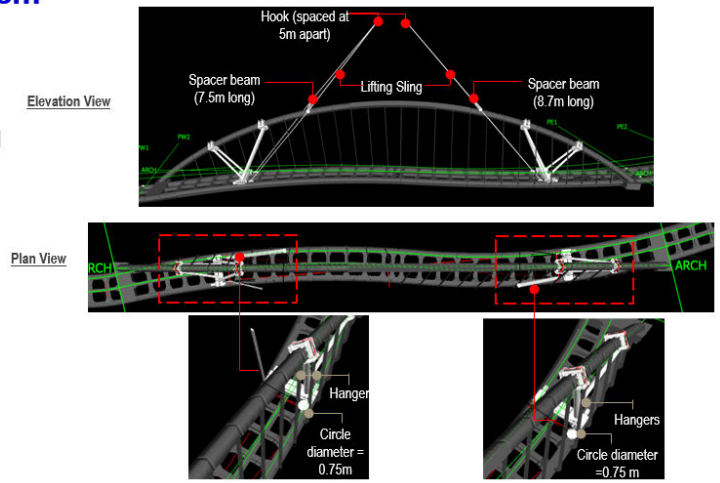
施工計劃

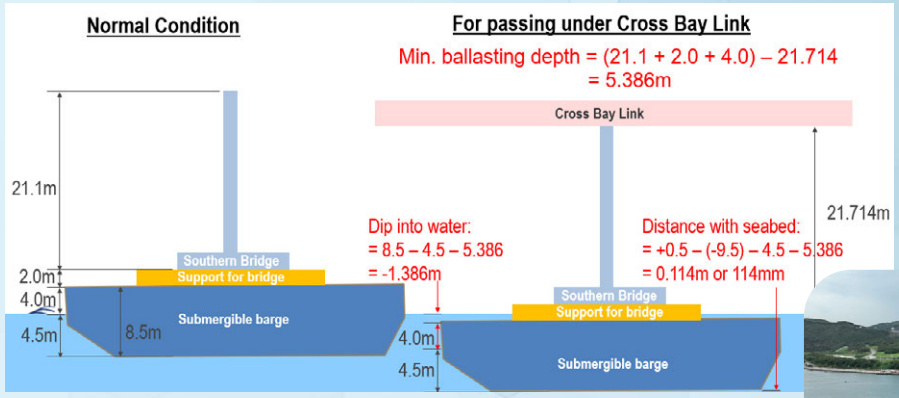
風險評估



Tseung Kwan O Promenade Southern Bridge – Lifting System

Checking by BIM to ensure no clashing between lifting gears and bridge structure





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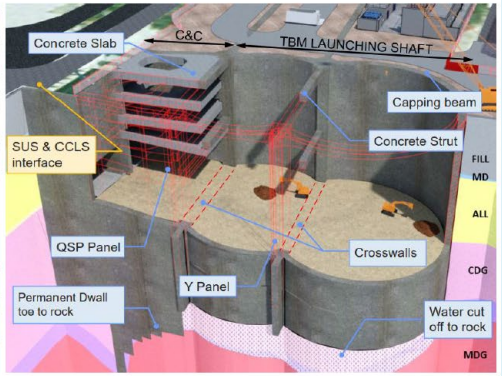
ELS for the Launching Shaft Cut & Cover

T2主幹路及茶果嶺隧道
TRUNK ROAD T2 AND CHA KWO LING TUNNEL

Double circular cell 'peanut' shaft
- Two large, open, strut-free circular cells, connected to a cut & cover section



ELS for the Launching Shaft Cut & Cover

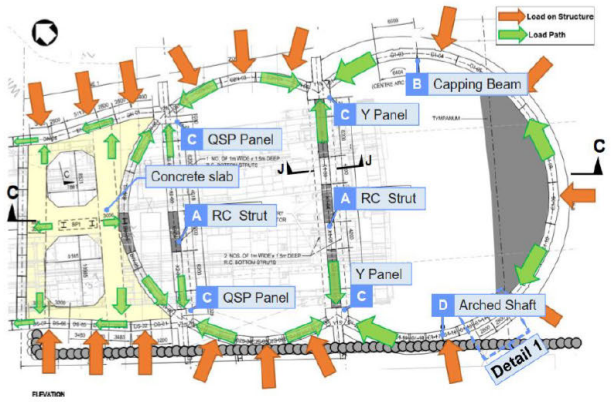
T2主幹路及茶果嶺隧道
TRUNK ROAD T2 AND CHA KWO LING TUNNEL

Key features of Double Circular Cell Shaft

Strut-free design reduces:
- ↓ Risk of depropping
- ↓ Risk of heavy lifting
- ↓ Risk of excavation within a congested environment
- → Enhance tolerances and margins of safety
- → Balance Simplicity and Complexity

Less embedment + No Rock Socket:
- Reduce Drilling & Vibration
- Offers robust solution for low-strength materials
- Minimizing ground risks
- → Offers environment benefits

Leveraging the strong axial resistance of RC element:
- Arching effect → Compressive hoop force
- Enhance stability & provide higher redundancy
- → Robust design for load variation stressors



Seamless collaboration between design and construction requires professionals to stay fully engaged at all times.

設計與施工需要緊密合作，互補所需，專業人員須時刻投入崗位，無得偷懶。

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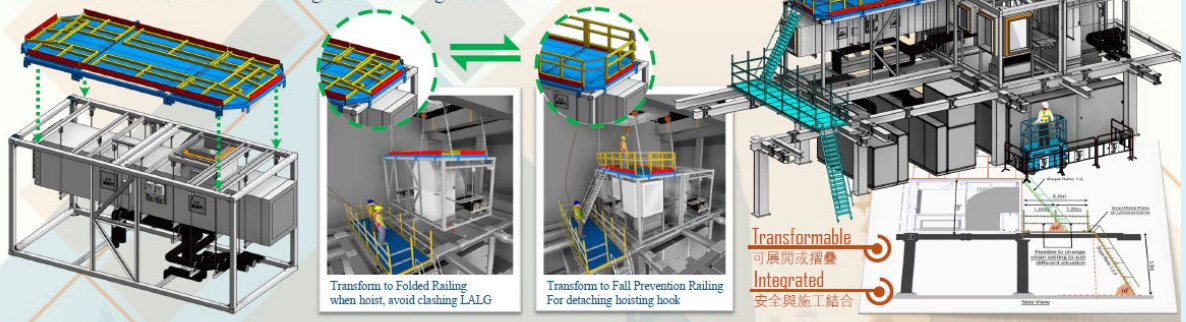
Mega MiMEP 3.0 Package in Hong Kong Infrastructure
Engineering Elements | 工程思維與元素的應用

Integration of Safety Features:
Pre-Installed Transformable Railing with Working Platform

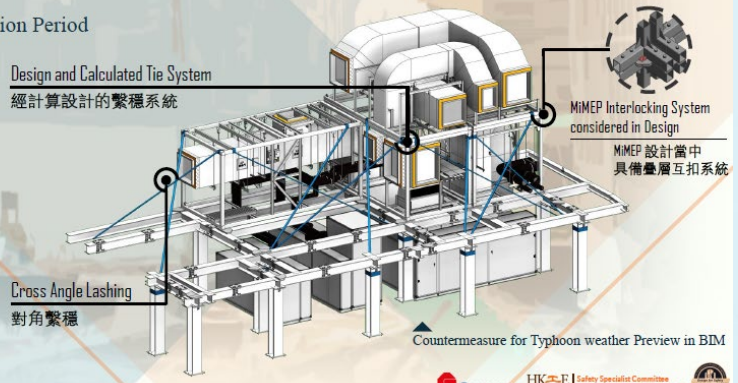


Working at height during installation and equipment maintenance considerations are integrated into MiMEP module development.
Portable working platforms with ladders and fencing are incorporated into the modules, ensuring safe access for workers during hoisting.

Countermeasure for Extreme Weather in Construction Period

10 9 8 8 NE 東北 SE 東南 ⚠極端情況

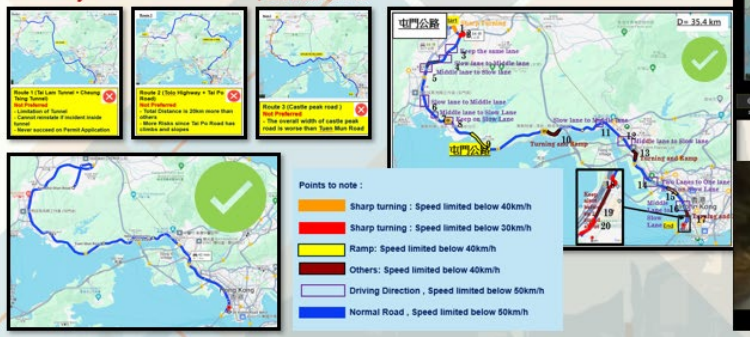
A design calculated tie system is prepared as Extreme Weather Condition Plan to secure module groups integrity during extreme weather conditions, such as typhoons.



Gammon E&M Application of HKIESSC Design for Safety Excellence Award 2025

Mega MiMEP 3.0 Package in Hong Kong Infrastructure
Engineering Elements | 工程思維與元素的應用

Countermeasure Executed for Enhancing Design Robustness:
Logistic Temporary Measurement for Safety
Delivery Routes Evaluation | 道路風險評估



Route Trial & Caution Points (Digital Recording)

Summary :
Trial Run Time : 56mins
Starting from 2:03am to 2:59am
Speed Recommendation :
30km/h to 50km/h
20 Points to note.
Briefing will be conducted to driver.

Driver Restrictions | 駕駛員限制

- NO Speeding/ Speed under 50km/h 車速設限
- NO Drive Drowsy/ Restrict Driver 禁止疲勞駕駛
- Pre-Screening of Driver/ Experience Validation & Safety Record 駕駛經驗要求及安全記錄篩查

Collapse Prevention | 防止貨物下墮的措施

Temporary works are designed to address potential stressors during module transportation and installation.
Delivery routes are carefully assessed to ensure safety. Modules are secured using a temporary locking system, brackets, and cross-angle lashing to mitigate extreme weather risks.
Driver restrictions, such as a speed limit of 50km/h, pre-screening, and no drowsy driving, are enforced.
Additionally, pre-installed transformable railings with working platforms improve safety and efficiency during on-site module installation.

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Maximized Design for Safety through Advance Integration.
透過進階的一體化，提升建築設計安全的效益

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Maximized Design for Safety through Advance Integration.

透過進階的一體化，提升建築設計安全的效益

Design for Safety "

DFS
Excellence Award
Outstanding Merit

Towngas

Towngas

Our Approach - Innovative Safety Solutions

FOCUS

Gas appliance Installation	Gas appliance Maintenance	Pipe work at height

CONTROL STRATEGY

(Risk Elimination)		(Risk Reduction)	
			
Smart Pipe (Elimination)	Safety Sword (Elimination)	Balcony Safety Fencing (Reduction)	Smart Gondola (Reduction)

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DFS
Excellence Award
Outstanding
Merit

香港特別行政區政府
建築署

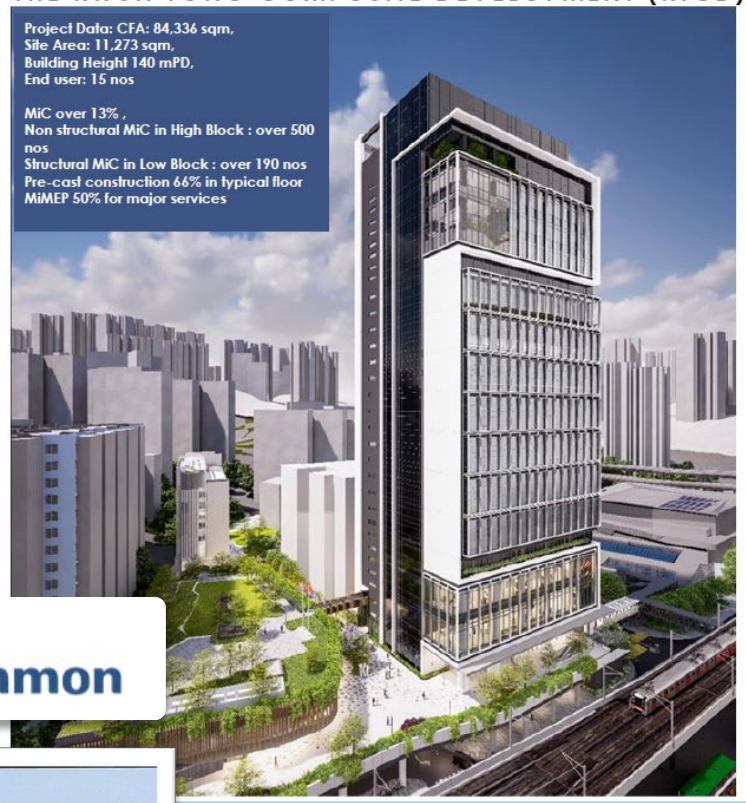
Gammon

[1] INTRODUCTION

THE KWUN TONG COMPOSITE DEVELOPMENT (KTCD)

Project Data: CFA: 84,336 sqm,
Site Area: 11,273 sqm,
Building Height 140 mPD,
End user: 15 nos

MiC over 13% ,
Non structural MiC in High Block : over 500 nos
Structural MiC in Low Block : over 190 nos
Pre-cast construction 66% in typical floor
MiMEP 50% for major services



香港特別行政區政府 建築署 Gammon

The Kwun Tong Community Development (KTCD) project aims to **revitalize Kwun Tong** with nature-inspired spaces and enhanced connectivity. It integrates infrastructure like the MTR, public transport, and pedestrian networks into a multi-functional hub, featuring two key buildings, the **High Block and Low Block**. These structures form a **green community spine** linked by bridges. KTCD promotes **sustainability and accessibility**, transforming Kwun Tong into a **vibrant, modern, and balanced urban district.**

[2] JUDGING CRITERIA

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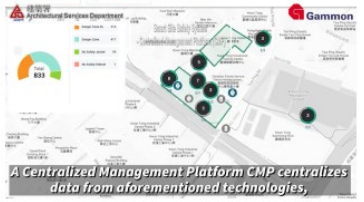
Risk Management:

Actions for **risk management** include: risk assessment reports and meetings, regular safety site walks, ongoing safety training, Smart Site Safety System for instant alerts, and a digital Central Management Platform and Dashboard to ensure safety throughout the project.

CMP and Smart Site Control Center



CRITERION 2: DESIGN FOR SAFETY

Innovative Technology:

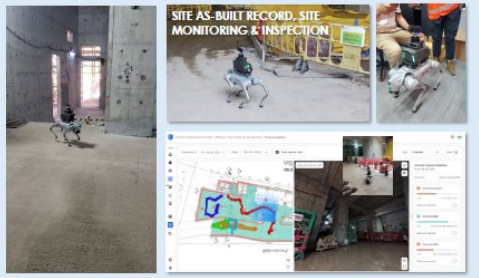
BIM Revit
Enhances accuracy in ARCH, STR, MEP, and FAÇADE

Asite
Serves as a central documentation hub

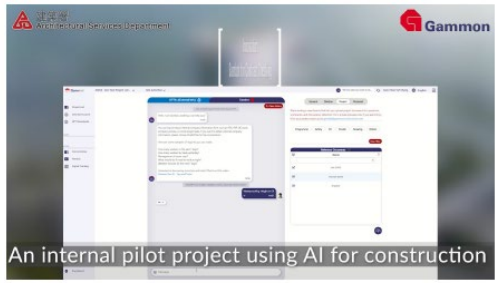
Revizto
Digital visualization tool and AR improve collaboration and efficiency

ChatGPT
AI checks contracts, while AI cameras monitor safety, alerting for mobile plant dangers and PPE compliance.

Robotic Dog
Implementation of AI for site progress analysis



Gambot for contract checking, Asite and Revizto



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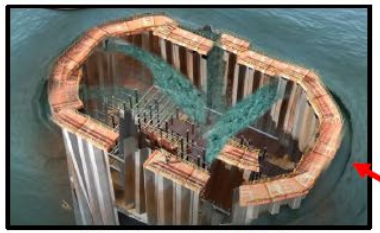
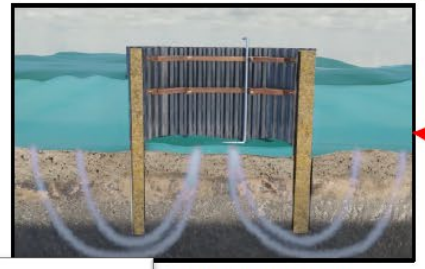
Outstanding Merit

CEDD | Kat Yue | Wings | ARUP

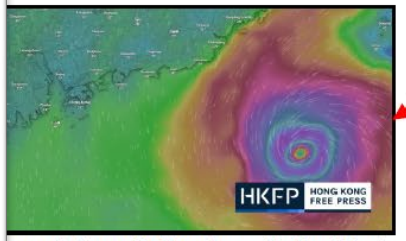
Challenges and Risk Identified in Original Design



Water Ingress of Cofferdam
(Photo Source from internet)



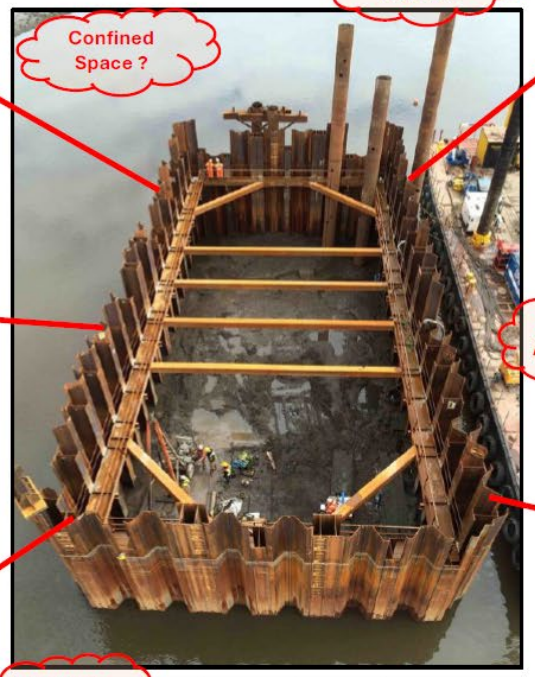
oundation at Cofferdam
oto Source from internet)



equent Severe Typhoon Impact in Hong Kong
(Photo Source from internet)

Drowning Hazard ?

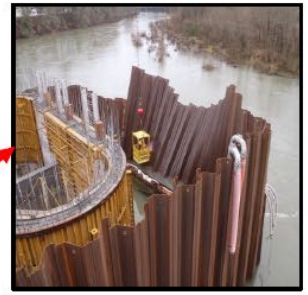
Confined Space ?



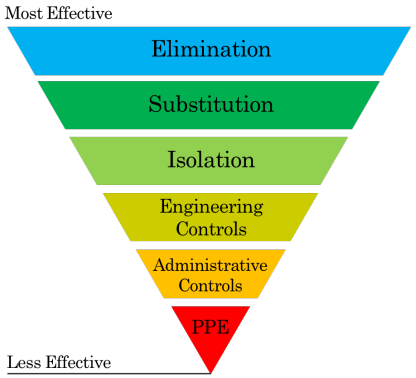
Cofferdam Construction
(Photo Source from internet)

Safety Access ?

Removal of Piles ?



Failure on Cofferdam Construction
(Photo Source from internet)



Civil Engineering and Development Department | ARUP | Kat Yue Construction Engineering Limited 吉裕建築工程有限公司 | Wings & Associates Consulting Engineers Ltd. 翰翔顧問工程師有限公司

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All awardees' success

Supported by 3 fundamentals

1. **People Oriented**
   以人為本
2. **Comprehensive Planning**
   全面細緻的施工設計計劃
3. **Architect, Structural Engineer, Consultant, Client involvement in DFS**
   建築師、結構工程師、顧問、業主對建築設計安全的參與

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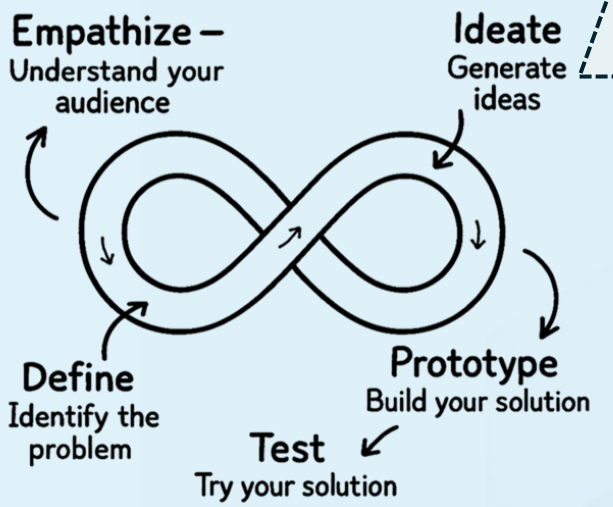
Rethink the process...
What more a professional can do.

Construction 2.0+ New Era
建造業2.0+　新時代



- Raise in Client Engagement needs
  DFS對業主方參與的需求增大
- Call for Collaboration of Client Designer & Contractor
  講求業主,設計師及承建商緊密合作
- Demand for Trade-to-trade interface detail work method statement
  交付對接的施工方案需求
- Focus on Significant & Unusual risk
  焦點需落在重大且不常見的風險
- "Business as usual" risk handle with culture change
  恆常風險需由改變安全文化著手

All Professionals - Rethink budget allocation for DFS.

重新審視DFS在項目中的預算

Pay for Safety Scheme
安全支付計劃
Introduced in 1996
於1996年在香港工程項目推行

- Promote safety accountability
  將安全費用獨立列出
- Prevent cost-cutting on safety
  防止安全成本削減
- Encourage consistent safety performance
  鼓勵恆常的安全表現

All Professionals - Advancing Guidelines on DFS.

考慮優化DFS的標準指引

All Professionals - Consideration to End-user & FM.

為使用者與物業管理安全考慮

Client - propose a marking scheme in Tender Stage.

在招標時考慮提出DFS評分機制

Designers - Setup Data Base of DFS.

為DFS設立資料庫把良好設計納入參考

Trade Designers - Collaboration on Safety.

從設計者的角度為建築安全投入專業

Contractors - Implement comprehensive construction planning for High-Risk activities.

為高風險工作落實全面施工方案計劃

Contractors - proactively optimize the discrepancies in design concept & buildability.

提出優化設計概念與現實施工的偏差

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Contribute with our Engineers’ Professional”

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