Construction Safety Week 2022 – Conference
Safety 2.0

Hong Kong Housing Authority's Experience in Enhancing Site Safety through Construction Methods, Technologies and Safety Culture

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1. Vision and Mission

2. Construction Methods
3. Application of Technologies
4. Safety Culture
5. Remark

1. Vision and Mission

HA's Vision, Mission & Core Values

Vision 願景

People-centric approach

To help low-income and middle-income families with housing needs to gain access to affordable housing

For the Mission of maintaining a competent team, we build Partnership with Contractors towards a Common Project Goal

Core Values : 4C Caring, Customer-focused, Committed, Creative

We are committed to providing a safe and healthy working environment in public housing development

Safety Target

- **No fatal accident**
- **Accident rate per 1000 workers : ≤ 9 accidents**

● Caring ●Customer-focused ●Committed ●Creative

1. Vision and Mission
2. **Construction Methods**
3. Application of Technologies
4. Safety Awareness
5. Remark

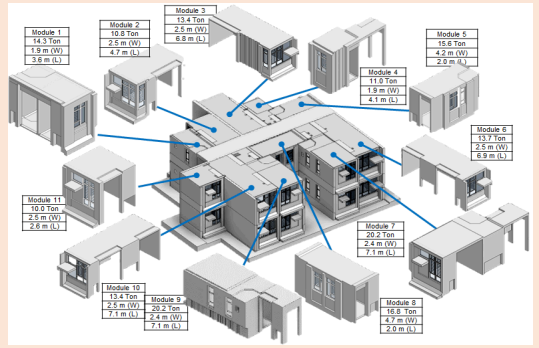
2. Construction Methods

2.1 Enhanced Precast Concrete Construction

- Metal formwork, mechanical construction, precast concrete elements from factory, reduces work processes on site
- Façade, slab, wall, staircase, lift machine room, water tank, manhole, kitchen, bathroom

2.2 Prefabricated steel bar from factory

- Some bars of building and foundation contracts from factory, reduce more work processes on site, reduce chances of site accidents



2.3 Modular Integrated Construction (MiC)

- Reduce more work processes on site, increase productivity, shorten construction time, enhance site safety

2.4 Design for Manufacture and Assembly- Multi-trade Integrated Mechanical, Electrical and Plumbing (DfMA-MiMEP)

- Standardize the design elements of building services installation
- Facilitate manufacture in factory before delivering to site for assembly
- Reduce work processes on site, less work at height

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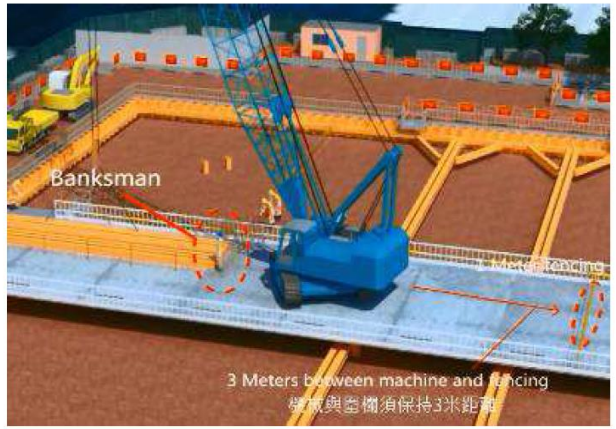
3.1 Building Information Modelling

- Included into standard specification of building and foundation contracts
- Create **3D model** of site for planning construction works
- Identify **design clashes** and conflicts
- Plan site logistics and **visualize working procedures**, e.g. demonstration of precast element storage, lifting and installation of various types of precast units
- Facilitate communication, effective way of explanation of **method statement** and foreseeable **hazards and risks, enhance site safety**

Picture.5



Picture.6

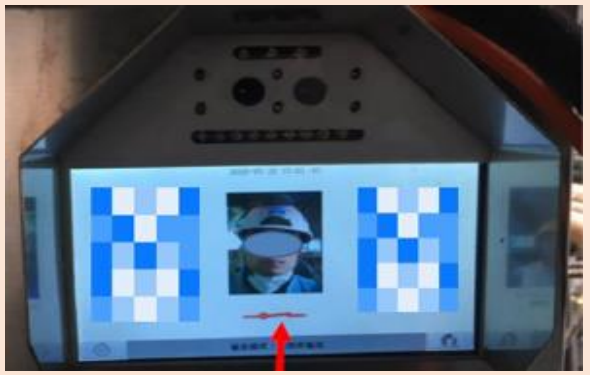
3. Application of Technologies

3.2 Authentication of plant operator

- Apply to mobile plant and material hoist
- Only authorised plant operator can start the machine
- Use of **wireless communication technology**
- For material hoist, **RFID card** and **facial recognition** for identification
- For forklift truck and mobile elevated work platform, install reader at the plant to read RFID card

3.3 Surveillance of material hoist

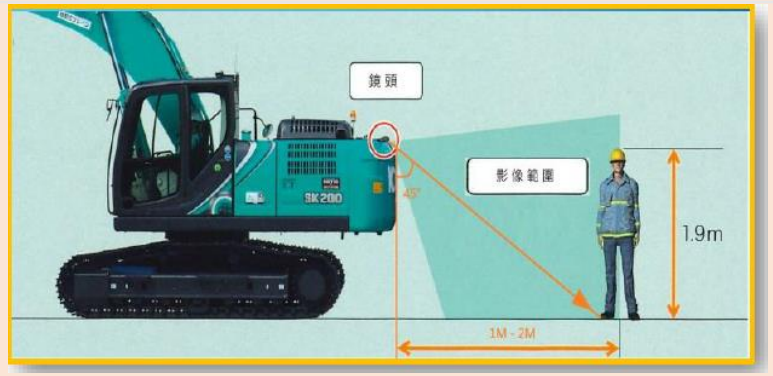
- **Camera** inside the cage
- **Monitor** next to control panel allows operator to monitor safe use of hoist efficiently
- **Video is recorded** for review

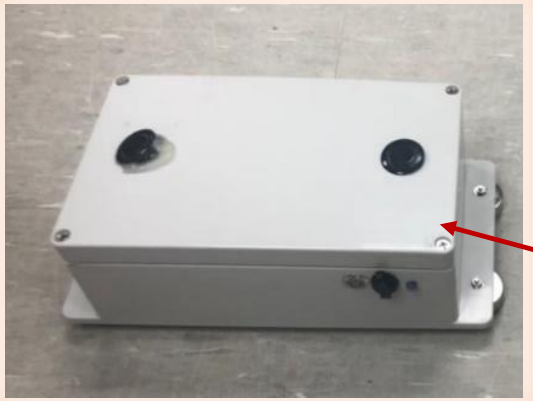


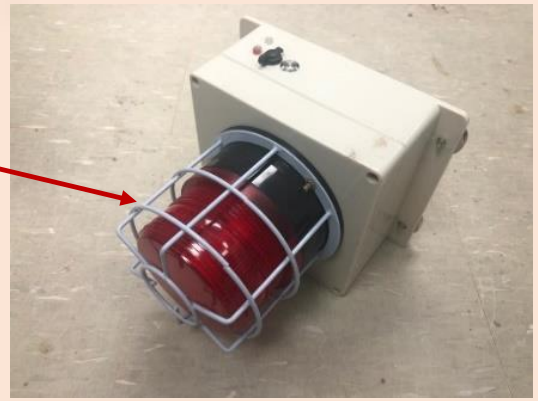
3. Application of Technologies

3.4 Monitoring working zone of mobile plant

- Risk of being hit by mobile plant
- **Fence off** working zone
- Backward movement to be guided by banksman
- Workers inside working zone face risk
- **Wireless communication technologies** (e.g. RFID, ultrasonic, AI), **360⁰ view** around vehicle and plant
- Workers entering preset distance will trigger **visual and audio alert** inside operator cabin, operator can stop plant moving at once







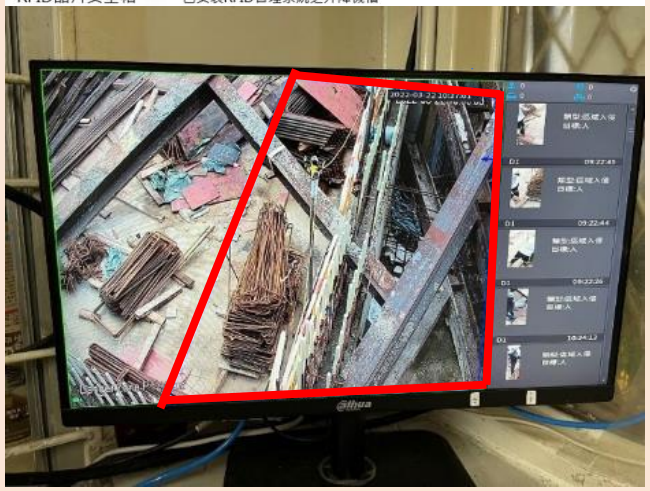
3. Application of Technologies

3.5 Overseeing entry to danger zone

- **Wireless communication technology** to monitor entry to danger zone
- Lift shaft

  Internet of things sensor (RFID emitter and sensor) at each lift lobby, RFID tag to safety helmet of workers permitted to enter lift shaft, other workers without RFID tags entering lift shaft will trigger alert
- Excavation area

  Artificial intelligence computer vision to oversee and analyse entry of workers into excavation area, unauthorized entry will trigger alert



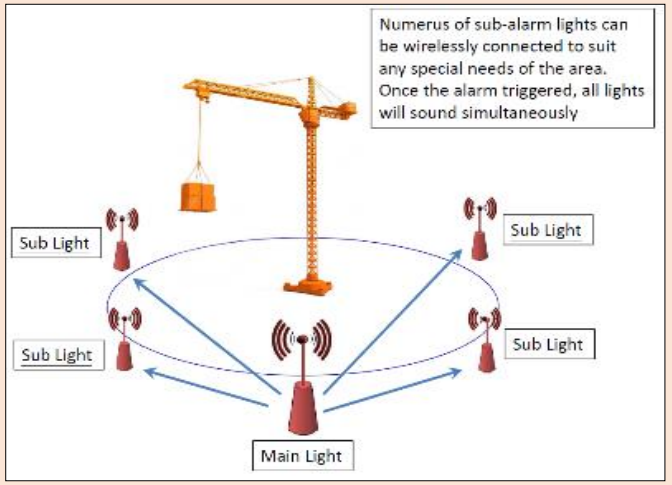
3.6 Analysing unsafe act of workers

- **Artificial intelligence computer vision** to analyze condition of workers
- CCTV image captured from lifting zone sent to AI for analysis
- Identify workers not wearing safety helmets or reflective vest
- Message sent to area foremen for action

3. Application of Technologies

3.7 Alert system in lifting zone of tower crane

- **Emitter and sensor** are installed, RFID tag stuck on lifting hook
- Audio and visual alerts are triggered when hook is lowered to a preset height



3.8 Height detector at site entrance

- **Infra-red emitter and sensor** are installed at site entrance
- Audio and visual alerts are triggered when height of vehicle exceeds the preset level

3.9 Remote control of crane

- Remote control of lorry-mounted crane allows operator to leave danger zone
- Grade A* in PASS assessment for grab crane in case remote control is provided and other basic requirements are fulfilled

3.10 Checking data of personnel, plant and equipment

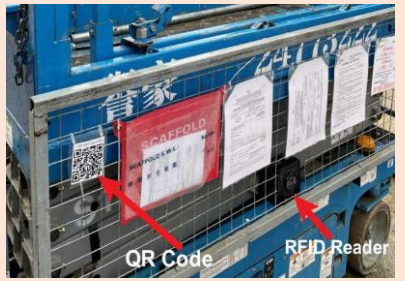
- Use **electronic device and mobile application** to check and update data

plant : manufacture date, records of test and examination, list of authorized operator, certificate of overhaul and risk assessment, etc

worker : name, employers, trade, training record, safety performance

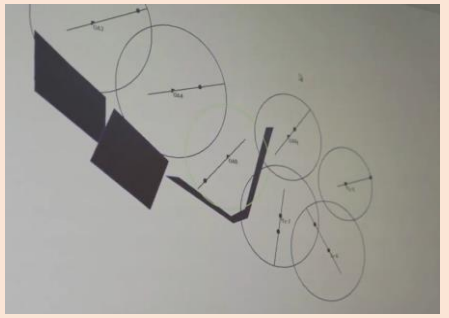
equipment : safe working load, date of examination

- Set up and update **computerized database** regularly



3.11 Anti-collision system for tower crane

- covering tower cranes with overlapping working zone
- monitored by contractor at site office with recording system

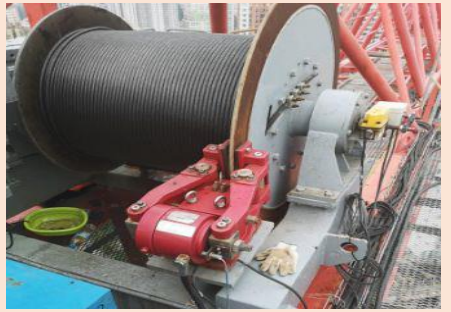


3.12 CCTV at lifting zone for tower crane operator

- camera at trolley of jib and at low level above lifting zone
- monitored by crane operator with recording system

3.13 CCTV in tower crane cabin

- safeguard proper control of lifting operations by crane operators
- monitored by contractor at site office with recording system



3.14 Secondary brake for tower crane

- stop the drum in case malfunctioning of primary brake

3.15 Monitoring and alarming system for RCD clamping device

- visual and audio alerts when pressure of clamping device is inadequate

3.16 Bar bending machine angle indicator and interlocking system

- interlocking system requires putting down the cover shield before bending process
- angle indicator shows the angle of bending and avoids striking

	
90° blue light on	180° red light on
	
Sight line	instruction

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4. **Safety Culture**
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4.1 Aligning safety standard by training

(i) Induction training

- To be held on the **first day of worker arriving** on site
- Repeat every 6 months as refresher

(ii) Tool box talks

- Conduct once a week
- **VR training** to simulate work at height, lifting and electrical work
- Covering site activities and prevailing safety concern

(iii) Safety talks through Safety Committee Meeting

- Conduct once a month
- Sharing accident / incidents
- Covering site management, workers' representative

4.2 Aligning safety standard by listing management & tender

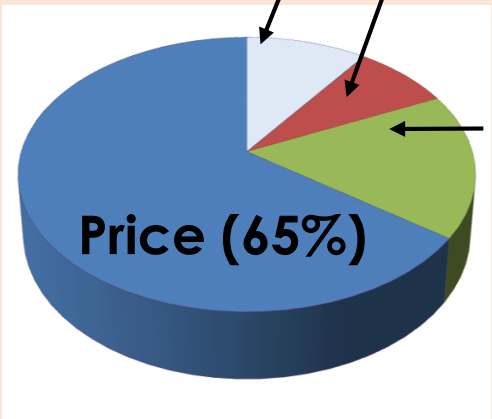
(i) Listing

- ISO 45001
- Regulatory action on contractors for poor safety performance

(ii) Tender assessment

- **Past safety performance** (in HK construction industry)
- Technical submission in tender

(attribute score in technical assessment)



PASS (17%)

Corporate Score (8%)

- Serious Accident (2%)
- Convictions (3%)
- Wage Monitoring (3%)

Technical Proposal (10%)

- Contractor's capability / Experience (1.5%)
- Contractor's Manpower and Plant (1.5%)
- Planning and Programme of works (2%)
- Risk Identification and Management (5%)

(iii) Regulatory actions due to unsatisfactory performance

- Temporary suspension from tendering
- Removal from status of Premier League
- Demotion to probation status
- Removal from the list, etc

Technical scores of 6% or below → NOT open price envelope

4.3 Aligning safety standard by performance assessment

(i) Performance Assessment Scoring System (PASS)

- Quarterly PASS by project team & independent team

[PASS score will have impact on building tender]

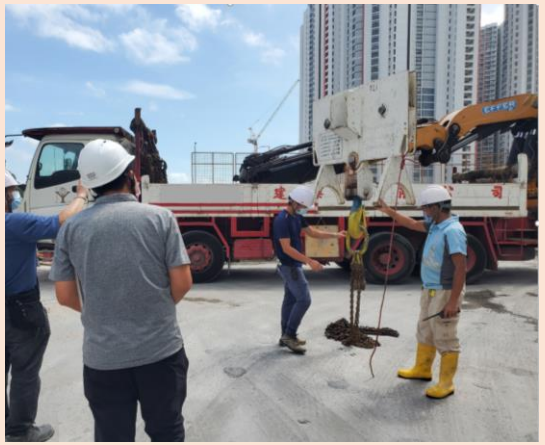
(ii) Quarterly safety audits and surprise inspections

- safety audits by independent safety auditor
- surprise safety inspections by safety inspector, coaching of workers and areas supervisors concerned for unsafe act

*[Audit and inspection scores are included **into contractor's PASS score**]*

(iii) Inspection by Client's Represenatives

- adhoc inspections by site CTOs, audit team, etc
- Findings for rectification by contractors

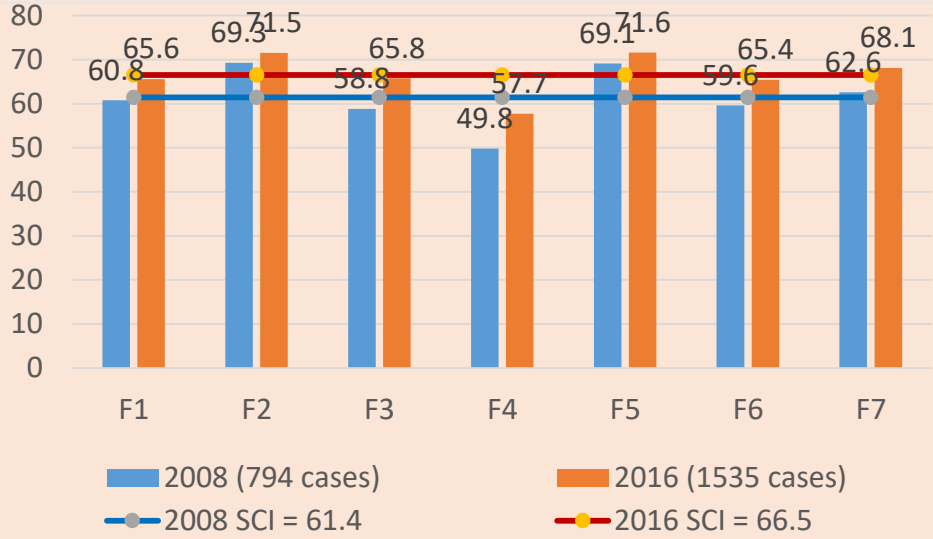


4. Safety Culture

4.4 Aligning safety standard by survey and incentive

(i) Safety Climate Index Survey

- Safety awareness of management team and workers
- Reveal areas for improvement to be made



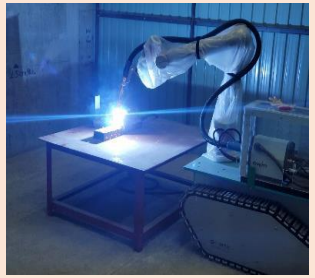
(ii) Work Safe Behaviour Programme

- Conduct observations for behaviour interventions
- Identify unsafe practice and analyse work safe behaviour result
- Develop action plan based on the findings

(iii) Pay for Safety Scheme

- Payment for site safety awards, entry to / winning in territory wide safety campaign, and safety innovations
- Encouraging high level of safety awareness on site

Mobile Welding Robot



Hoist

AI Monitoring System

4. Safety Culture

4.5 Aligning safety standard by experience sharing

Safety forums, workshops and seminars

5. Remark

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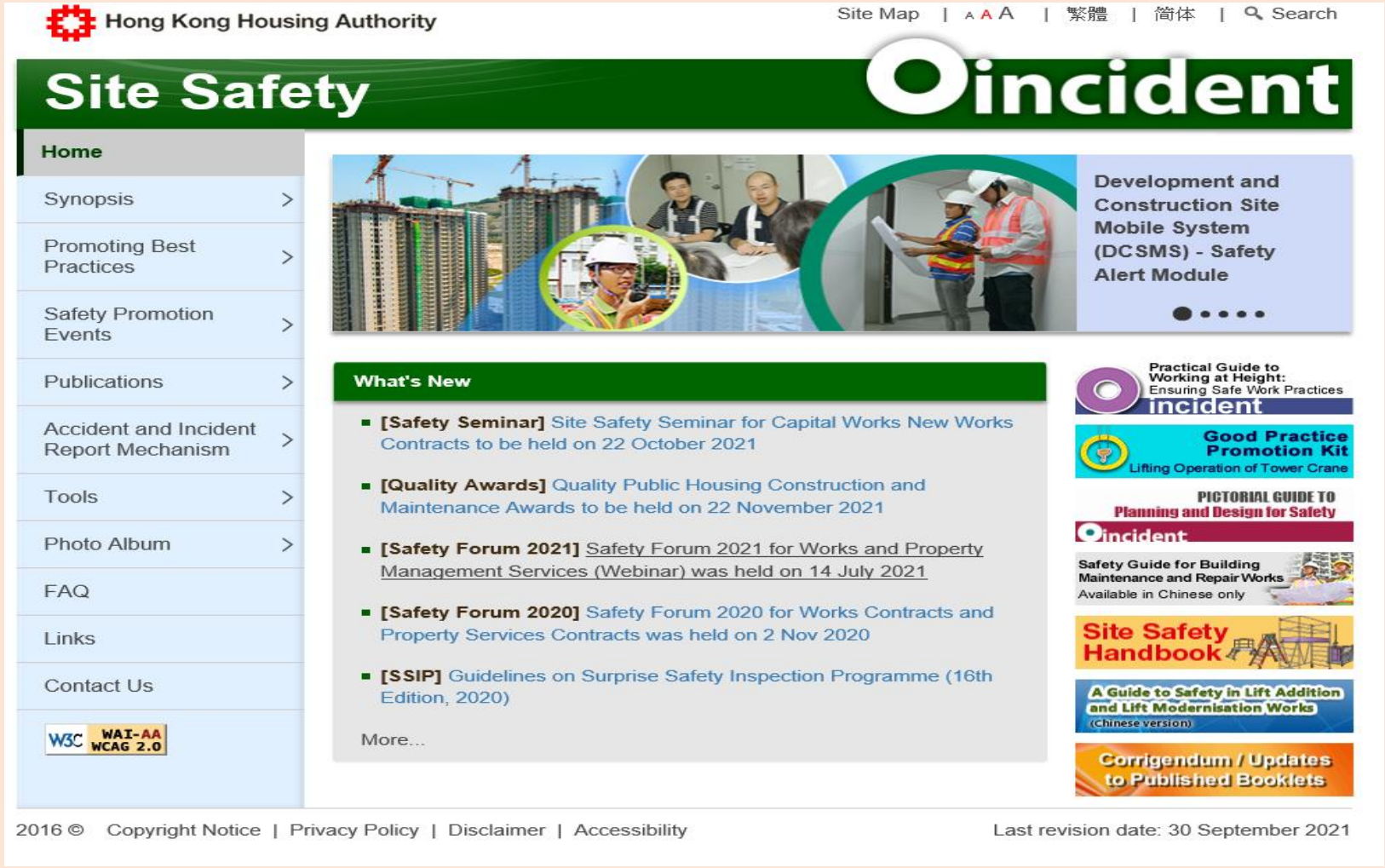
http://www.housingauthority.gov.hk/sitesafety



Thank You

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