



CONSTRUCTION  
INDUSTRY COUNCIL  
建造業議會

# 嚴重傷害(SIF)風險管理 - 關鍵控制措施(CCM)

Critical Control Measures (CCM) for Serious  
Injury and Fatality (SIF) Management

陳熾輝工程師  
香港工程師學會 (土木分部)  
主席

# Critical Control Measures (CCM) for Serious Injury and Fatality (SIF) Management

Paul Chan  
CLP Power Hong Kong Limited  
28 August 2020





# Safety System of Work (SSoW)



## CCM for SIF Management

← Serious Injury and Fatality



Critical



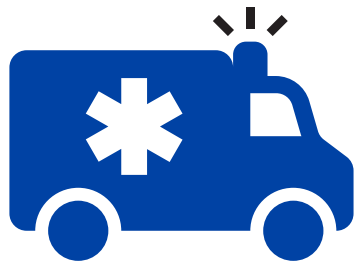
Control

Measures



# Serious Injury and Fatality (SIF)

*Work-related injury or illness that*



required  
**immediate**  
life-preserving  
rescue action



resulted in a  
**permanent** and  
**significant loss** of a  
major body part or  
organ function



**Fatal**



# 10 Focus Risks



**Vehicle and  
Mobile  
Equipment  
(VM)**



**Electrical  
Operations  
(EL)**



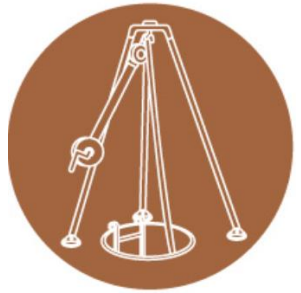
**Working at  
Height  
(WH)**



**Hazardous  
Energy  
(HE)**



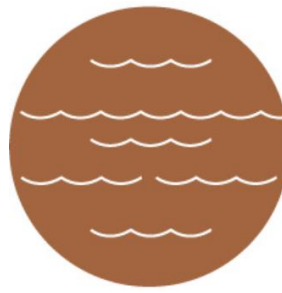
**Lifting  
Operations  
(LO)**



**Confined  
Spaces  
(CS)**



**Power  
Tools  
(PT)**



**Working  
Around Water  
(AW)**



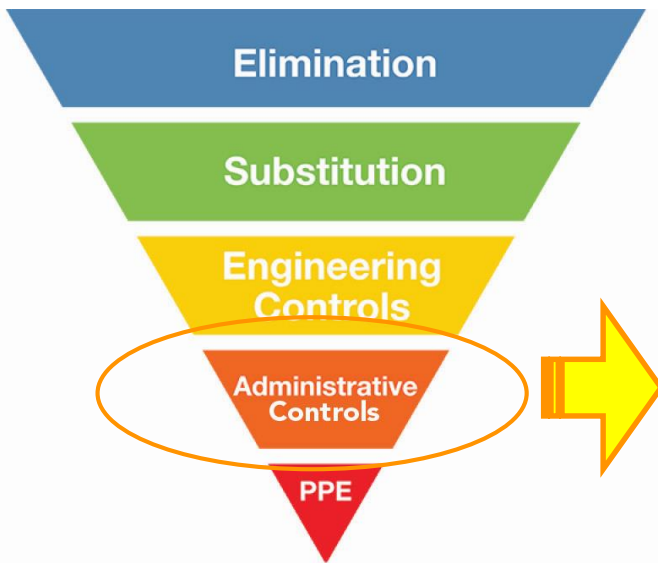
**Excavation  
(EC)**



**Hazardous  
Substances  
(HS)**

# Concept of Critical Control Measures

## Hierarchy of Control (HOC)



From Written Safety Work Procedures  
(WSWP)

Identify **SIF** potential exposure

Identify **Critical Control Measure (CCM)** among safety measures of WSWP

Put **CCM** to Pre-work Risk Assessment (PWRA)

Put **CCM** to Safety Observations

# Definition of Critical Control Measure (CCM)

An essential step (safety measure) of WSWP's that prevents, eliminates or mitigates a SIF potential

- Fail to do the essential step will probably cause a SIF or
- Carry out the essential step can prevent SIF Potential

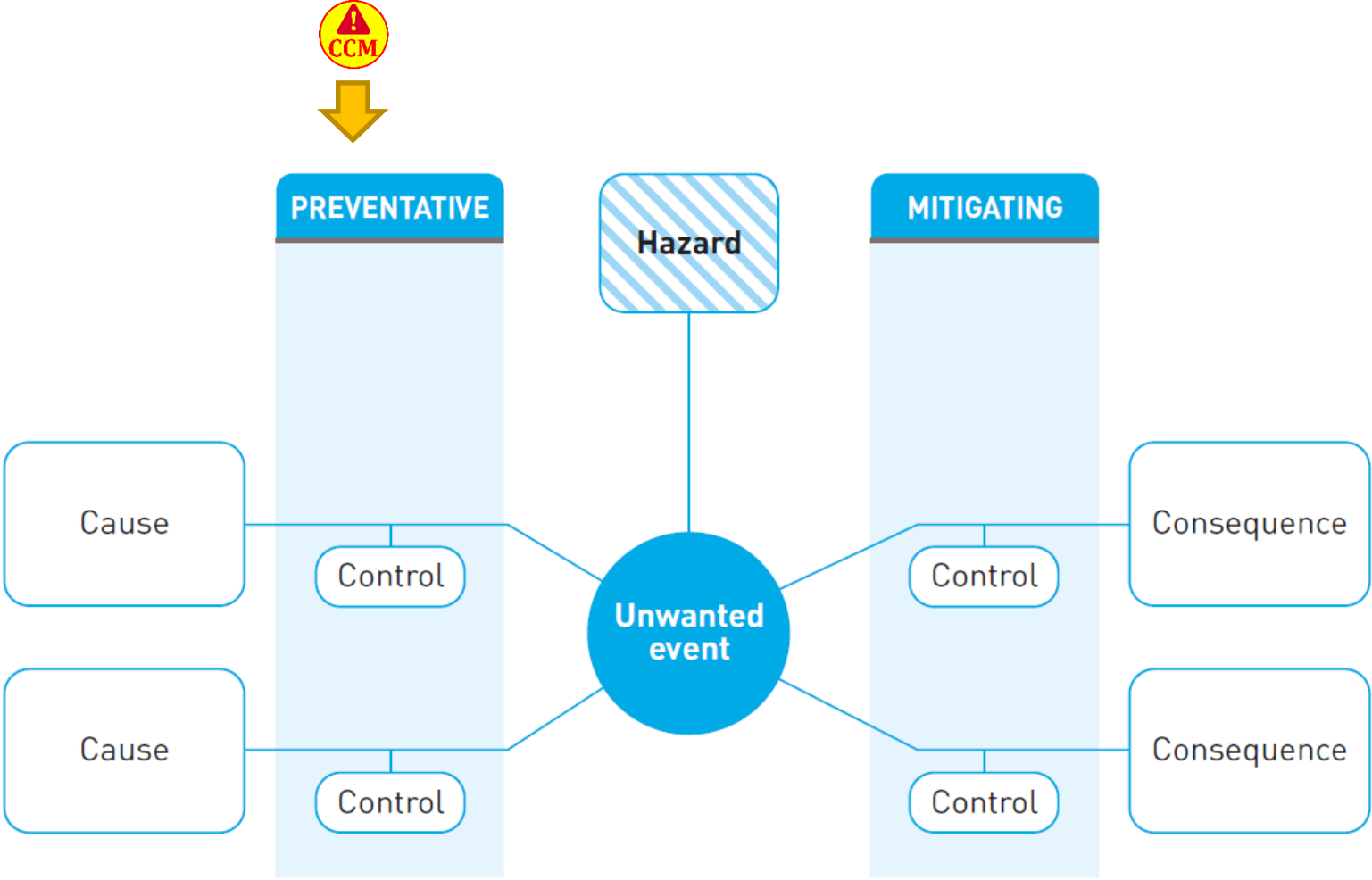
## 【CCM 參考表】





# Adopt Bowtie Concept

Preferably select CCM from "Preventive" side





# Principles of Classifying CCM

## 1. CCM is an ultra-important safety measure of WSWP

- Remind frontline staff to execute on site effectively
- Other safety measures are still required to be carried out on site

## 2. Be focus

- Work steps
- Interact with environment  
e.g. exposed live conducting when using mobile crane
- “**Preventive**” measures instead of “migrating” measures  
e.g. fence off danger zone is migrating measures
- Equipment integrity check should not be classified as CCM

## 3. Procedures Owners have their **final discretion** to determine CCMs’ of their WSWPs

# Examples of CCM



工人在高於2米或以上沒有圍欄的平台工作時，要時刻扣緊有效的防墮設備（可包括約束行動設備）。

WH-08



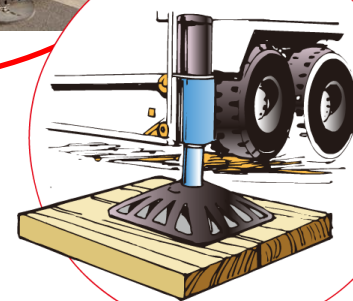
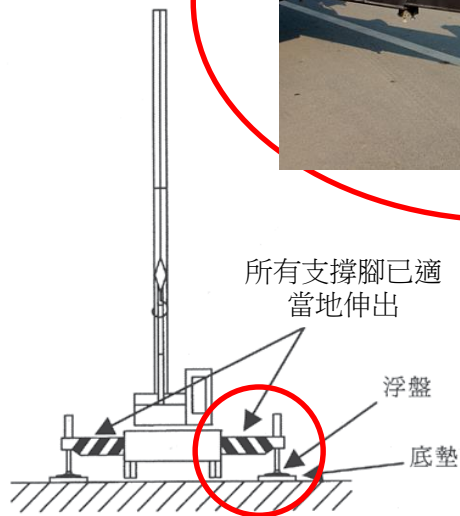
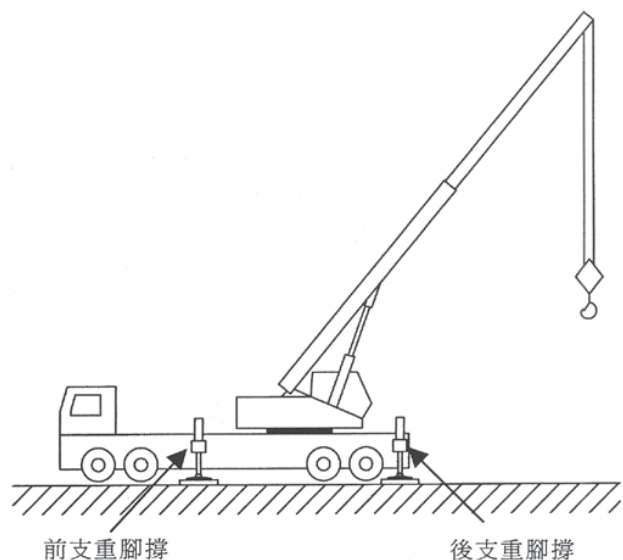




貨車吊機的支撐腳已適當地伸出及支撐腳的落腳位置要堅實。支撐腳的底墊面積為最少腳撐面積三倍。

LO-04

所有支撐腳已適當地伸出



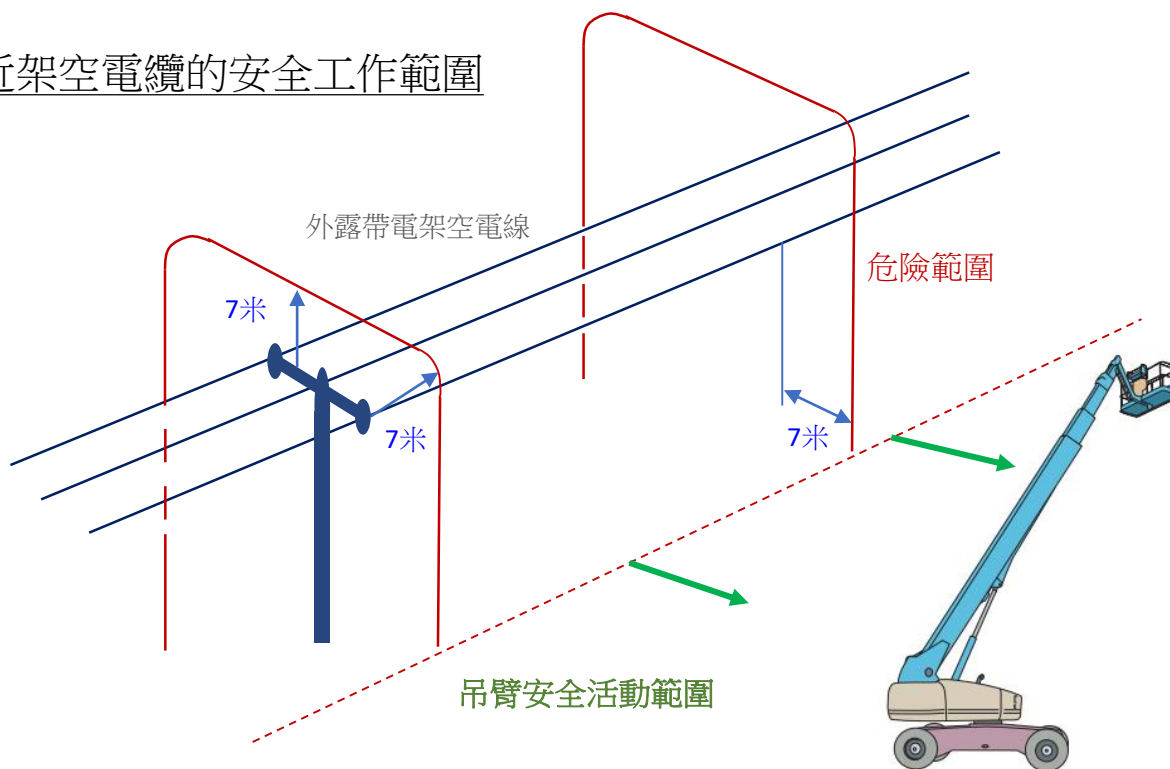
支撐腳的落腳位置要堅實



若使用升降台車進行修樹，吊籃在移動時與外露帶電架空電線保持足夠安全距離。

HE-03

### 靠近架空電纜的安全工作範圍



# Generic



# Specified

*for each work type*

## PWRA Form

People	==	==	==
Machine	==	==	==
Materials	==	==	==
Methods	==	==	==
Environment	==	==	==

## Safety Observation Form

1. Not at the line of fire
2. Follow rules, procedures
3. Work environment
4. Manual lifting
5. Site setting
6. Use of tool/equipment
7. Use of ladder/working platform
8. Use of PPE
9. Use of hazardous substances
10. Control of pollution
11. Handling of waste

## PWRA 2.0

Part 1 - CCM			
	CCM 1		
	CCM 2		
	CCM 3		
	CCM 4		
Part 2 - Other Hazards			
==	==	==	==
==	==	==	==
==	==	==	==

## Safety Observation 2.0

Part 1 - CCM			
	CCM 1		
	CCM 2		
	CCM 3		
	CCM 4		
Part 2 - Other Hazards			
==	==	==	==
==	==	==	==
==	==	==	==



Pair up each other with same CCM items / other hazards observations in order to *align the standard of observations*

# Original Work Process

## Work Planning

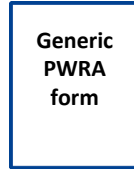
1



- Dispatch **Job Instructions (JI)** (Based on **WSWP**)

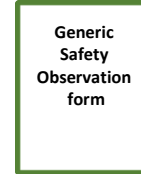
## On Site

2



- Conduct Pre-Work Risk Assessment (**PWRA**)
- carry out work on site

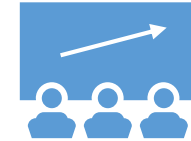
3



- Observe work team' behaviour

## Data Analytic

4



- Report high level figures for safety observations

# Work Process with Critical Control Measure for SIF Management

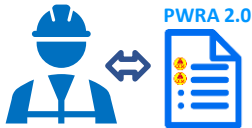
1



### WSWP Owners

- identify relevant **CCMs** on WSWPs
- work out PWRA 2.0 Template

2



### Responsible Engineers (RE)

- confirm adequate **CCMs** on PWRA 2.0 with the consideration of site environment

3



### Work Leader + Team members

- conduct PWRA with listed **specific CCMs** as the reminder;

### Work Leader

- ensure team members execute CCM effectively;

4



### Responsible Engineers (RE)

- conduct **sample field verification** on CCM's execution

5



### Analyse SIF Critical Control Indicators

- Indicator 1: Field verification Rate
- Indicator 2: CCM Effective Execution measurement

**Reinforce roles and responsibility for CCM implementation**



# CCM Dashboard

## Indicator 1

Sample Field Verification Rate (in Average)

$$\frac{\text{Total No. of Classified Jobs with CCM(Observed)}}{\text{Total No. of Classified Jobs with CCM}}$$

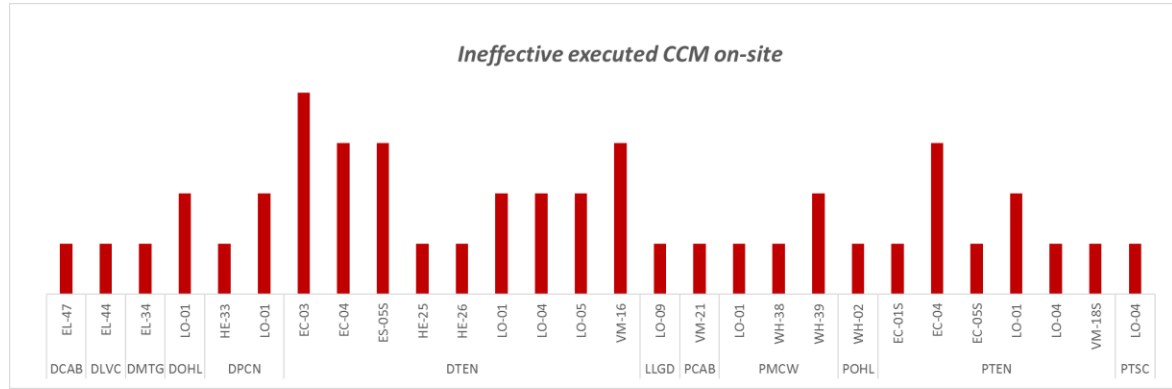
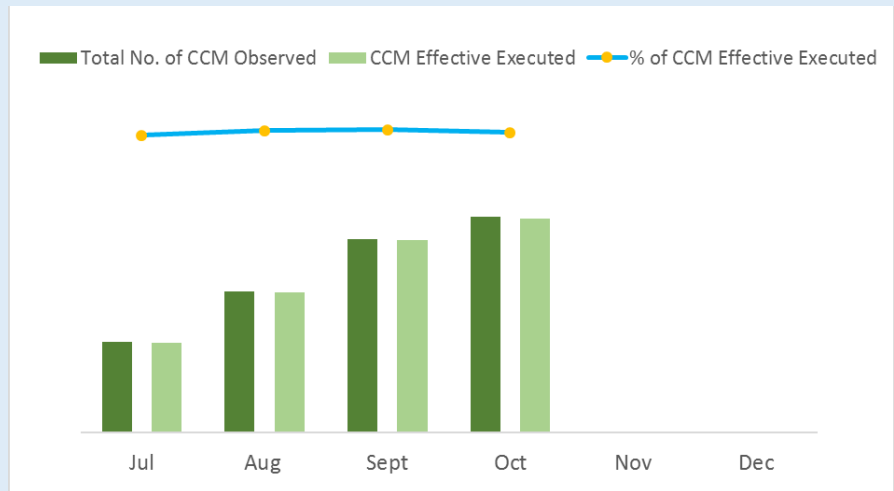
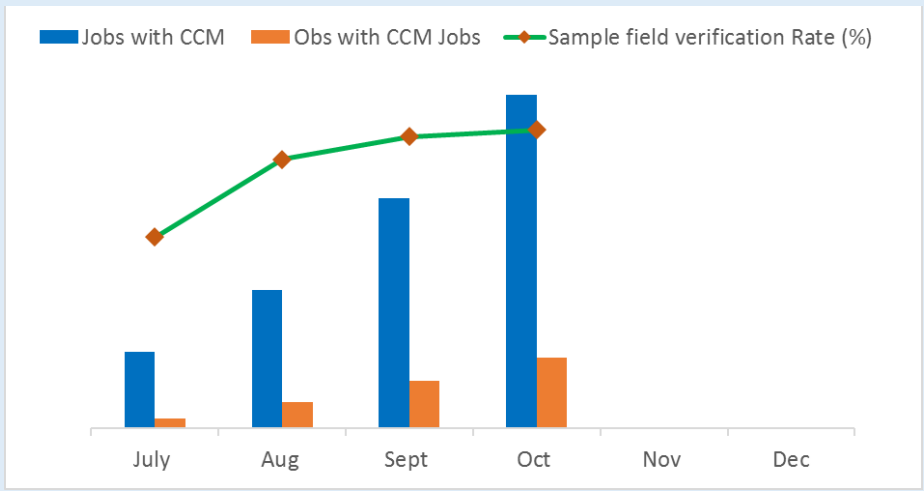
**X %**

## Indicator 2

CCM Effective Execution (%) (in Average)

$$\frac{\text{No. of CCM observed (executed effectively)}}{\text{Total No. of CCM Observed}}$$

**Y %**





謝謝

THANK YOU