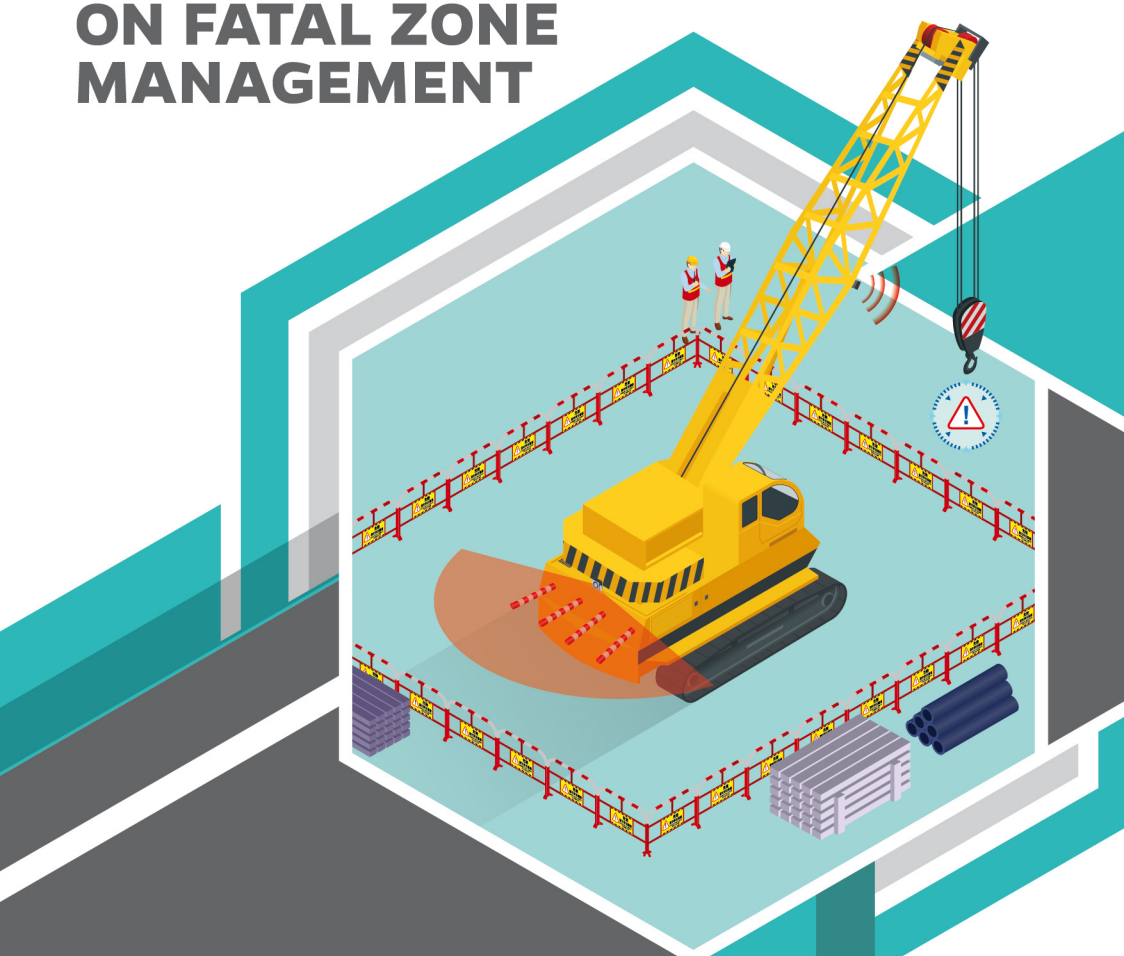
CONSTRUCTION INDUSTRY COUNCIL
建造業議會

生命第一 LIFE FIRST

REFERENCE MATERIAL ON FATAL ZONE MANAGEMENT



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Preface

The Construction Industry Council (CIC) is committed to seeking continuous improvement in all aspects of the construction industry in Hong Kong. To achieve this aim, the CIC forms Committees, Task Forces and other forums to review specific areas of work with the intention of producing Alerts, Reference Materials, Guidelines and Codes of Conduct to assist participants in the industry to strive for excellence.

The CIC appreciates that some improvements and practices can be implemented immediately whilst others may take more time for implementation. It is for this reason that four separate categories of publication have been adopted, the purposes of which are as follows:

Alerts	The Alerts are reminders in the form of brief leaflets produced quickly to draw the immediate attention of relevant stakeholders to the need to follow some good practices or to implement some preventive measures in relation to the construction industry.
Reference Materials	The Reference Materials are standards or methodologies generally adopted and regarded by the industry as good practices. The CIC recommends the adoption of the Reference Materials by industry stakeholders where appropriate.
Guidelines	The Guidelines provide information and guidance on particular topics relevant to the construction industry. The CIC expects all industry stakeholders to adopt the recommendations set out in the Guidelines where applicable.
Codes of Conduct	The Codes of Conduct set out the principles that all relevant industry participants should follow. Under the Construction Industry Council (Cap 587), the CIC is tasked to formulate codes of conduct and enforce such codes. The CIC may take necessary actions to ensure compliance with the codes.

If you have read this publication, we encourage you to share your feedback with us. Please take a moment to fill out the Feedback Form attached to this publication in order that we can further enhance it for the benefit of all concerned. With our joint efforts, we believe our construction industry will develop further and will continue to prosper for years to come.

Abbreviations

AI	Artificial Intelligence
BIM	Building Information Modelling
DfS	Design for Safety
ELS	Excavation and Lateral Support
IoT	Internet of Things
LD	Labour Department
MEMP	Mobile Elevating Work Platform
RFID	Radio Frequency Identification

1. Introduction

The Construction Industry Council (CIC) is committed to creating a workplace that is safe and healthy, and has been organizing many functions and events to heighten the awareness of workers and the personnel involved in health and safety in the past. The "Life First" campaign was launched recently aiming to (i) raise safety standards on site; (ii) enhance safety awareness of the stakeholders in the construction industry; and (iii) urge them to take up their respective roles and responsibilities to enhance construction safety and "Say No to Danger".

Accidents result from a chain of sequential events, like a line of dominoes falling over. When one of the dominoes falls, it triggers the next one, and the next. Accidents can be avoided when a key factor (such as an unsafe condition or an unsafe act) is removed (Heinrich's Domino Theory)[1]. In construction, there are operations where the risk to personal injury and life is high caused , such as in lifting, excavation and movement of materials involving a slewing plant, loading and unloading of materials from a truck, etc.

By identifying the high-risk operations in a construction site during the planning of the works, and earmarking those high-risk operation areas as a *fatal zone*, measures can be devised to eliminate or control the risks and unsafe conditions, and hence the occurrence of accidents. In this document, a *fatal zone* is defined as a works area within which there is a high risk of personal injury caused by falling object, striking against or struck by moving vehicle (e.g. a slewing plant) or trapping in or between objects / trapping by collapsing or overturning object (e.g. in loading / unloading area). The fatal zone, in this context, includes also *hoisting zone*, which is defined as a dedicated fatal zone earmarked for lifting of materials to control the risk of lifting operations and falling objects in a controlled environment. For this purpose, a single area could be identified for material lifting from ground floor to other construction floors or loading decks in a controlled environment to minimize the risk.

In this reference material, the procedures for managing the fatal zone are given, followed by examples of good practices of barricading the fatal zone, and the technologies applicable to the fatal zone management. Reference has been made to the Standard and Guidance Report on Fatal Zone produced by Gammon (2020) in preparing this reference material.

1. Heinrich H.W., Peterson D. & Roos N. (1980), Industrial Accident Prevention, 5th Edition, Mcgraw Hill, New York.

2. Need for Establishing Fatal Zone in Construction Site

A construction site is an area of land where roads, buildings, or some forms of infrastructure are being built, renovated or demolished. Because of the nature of the work, construction is one of the most dangerous industries in Hong Kong. In 2020, there were 18 industrial fatalities[2] that occurred in the construction industry. The cases mainly involved "fall of person from height" (seven cases), "trapped by collapsing or overturning object" (four cases), "trapped in or between objects" (two cases) and "striking against or struck by moving object" (two cases). The rest included "contact with electricity or electric discharge" (one case), "struck by falling object" (one case) and "drowning" (one case).

As an example, in a fatality case given in LD (2003)[3] , two workers were struck by wooden boards that fell during a lifting operation in a construction site, as shown in Figure 1. The wooden boards were delivered to a high floor from the ground floor by a tower crane for formwork construction. There was a bar-bending yard located on the open ground outside the buildings and seven bar-bending workers were working there.

Figure 1 - An Accident Involving Struck by Falling Object (LD - (2003))

In the course of the lifting operation, the stack of wooden boards passed over the bar-bending yard. Before lifting, the siren of the crane was sounded, but the working environment was noisy. While the stack was being hoisted past the bar-bending yard, it suddenly detached from one of the chain slings. The whole stack fell down to the bar-bending yard. Two bar-bending workers working on the yard were fatally struck by the falling wooden boards.

Among others, one of the most obvious ways to prevent this accident from happening is to remove the unsafe conditions of allowing the load from lifting past over persons. This could be achieved by delineating the area below the moving path of the lifting operation as a fatal zone, barricading the area and alerting the bar-benders to stop working and leave the fatal zone before the loads were being lifted over the fatal zone.

2. LD (2021). Occupational Safety and Health Statistics 2020.
3. LD (2003). An Analysis on Occupational Fatalities - Casebook Volume No. 2.

3. Procedures for Managing Fatal Zone

3.1 Planning of Works

The commitment of the top management to site safety is important.

Prior to commencement of works, a competent person should be appointed to lead and form a team to work out the strategy for fatal zone management and operations. This person could be the Project-in-charge.

The Project-in-charge should lead the project team members, including engineer(s), frontline management, safety officer, etc., to conduct a task-specificrisk assessment to identify the risks related to the works in the fatal zone, assess their likelihood and the possible consequence.

The following circumstances should be considered in the evaluation of risks in the fatal zone in the assessment:

(a) size and layout of fatal zone;
(b) type of slewing of mobile plant / equipment used;
(c) slewing / working radius of mobile plant / equipment;
(d) location of mobile plant / equipment, loading / unloading area and entry / exit points, and path of movements of mobile plant / equipment;
(e) movement of workers and other personnel;
(f) activities affecting or affected by the works; and
(g) duration of the works, etc.

Based on the risk assessment, the team should review the works holistically covering all the phases of works involved (i.e. from ground investigation to site formation, foundation works, excavation and laterial support (ELS) works, superstructure works, etc.), and then adopting a design for safety[4] (DfS) approach, produce a work plan to eliminate the risks at source. For example, a conveyor belt, instead of a slewing lifting plant, could be used in moving excavated soils, and works in the fatal zone could be arranged so that there is no overhead work carried out during the same period.

If it is not practically reasonable to eliminate the risks at source, then the team should make use of the engineering/administrative control measures to control the risks. Some of measures considered include:

(a) developing one way haul road system;
(b) making use of turntable (truck);
(c) increasing the size of fatal zone to encapsulate all the risks associated with the operations inside the fatal zone;
(d) providing facilities / measures to facilitate safe movement of authorized personnel, and prohibit unauthorized entry;
(e) providing designated walkway with suitable barriers as direct route to workers, and designated pedestrian crossing points (Figure 2(a));
(f) blocking-off the whole area to fully enclose the fatal zone by continuous and interlocked barriers (Figure 2(b));
(g) enlarging the block-off area when there are slewing plants in operation;
(h) providing water-filled barriers to fatal zone in close proximity to the route of mobile plant / equipment, and when the walkway is in close proximity to the haul road (to provide protection for loss of control of trucks) (Figure 2(c)).

Figure 2 - Designated Walkway with Barriers For Workers and Block-off on One Side

A Logistics Plan[5] showing all the details as described in Items (A) to (G) above should be prepared. Pedestrian routes, haul road direction, location of roundabout or 3-points turn, responsible persons and their contacts (e.g. lookout man and traffic controller), etc., should be included. Appropriate documents, including method statement, step-by-step sequential procedure, "Hold Point" control procedure, etc. should be prepared. The Logistics Plan, and the appropriate control documents, should be reviewed and updated regularly during operation to account for the changes made. The revised plan and documents should be conveyed to the relevant parties promptly.

Other responsibilities of the team during planning of the works include:

(a) provide training specific to the work (e.g. fatal zone training), including safe operation procedures and precautionary measures, to workers, lookout men / traffic controllers[6], riggers, plant and equipment operators, as appropriate;
(b) ensure the fatal zone is clear of any worker;
(c) develop a monitoring and review system to assess the effectiveness of the fatal zone implementation;
(d) investigate incidents arising from the implementation of the fatal zone requirements and take any necessary preventive / corrective actions following an incident or in the identification of a risk or hazard; and
(e) explore use of the technologies given in Section 6 in the implementation and management of fatal zone.

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4 The principle of "Design for Safety (DfS)" is to bring the consideration of the actual potential hazards and risks to each project to the forefront of a designer's work. Designers can quantify the risk and develop a framework within which design, specification, and planning of project and operation activities can either be used to prevent such hazards materializing or be employed to mitigate their effects. Safe Design is the most effective risk control measure which is achieved by eliminating the hazards at source (DEVB).

5 A Logistics Plan is a holistic plan in which locations of mobile plant/equipment, haul road, pedestrian walkways and routes, roundabout or 3-points turn, etc., path of movement of the mobile plant/equipment, etc., are shown. The plan should be developed during planning of the works, and reviewed regularly during the works to account for the changes made during operation.

6 The lookout man is responsible for warning unnecessary personnel to stay away from the fatal zone and to ensure the fatal zone is clear of personnel at all times. A traffic controller is responsible for ensuring that that the haul road is free from obstruction. The lookout man and the traffic controller must have the ability to ensure safety of pedestrians, and warn and stop unauthorized person from entering the fatal zone.

3.2 Operation

During operation, the team should review the risk assessment regularly to monitor the effectiveness of the fatal zone implementation and check if changes to the fatal zone arrangements are needed in response to changes in the actual site conditions, risks of plant movement, slewing movement of mobile plant / equipment, etc. The team should stop the operations if the implementation deviates from that shown in the Logistics Plan and control documents.

The team should consider use of drones on a daily basis to capture the actual conditions of the fatal zone implementation, as well as the technologies given in Section 6, to help planning and make further improvements, as shown in Figure 3.

Figure 3 - Use of Drones for Fatal Zone Management

The following actions may be taken after the review: (i) upgrading of the fatal zone protection from red plastic barriers to water filled barriers or equivalent for more robust protection; (ii) providing a clearer demarcation between the fatal zone and normal fence off area; (iii) providing better connection between fencing; and (iv) providing more supervision personnel to cover the fatal zone implementation.

If a high-resolution camera has been mounted on a tower crane (see Section 6), then the team should, making use of the AI solutions available, look for the opportunity to extend its use to monitor and check the effectiveness of the fatal zone implementation, as shown in Figure 4, for spotting workers entering the fatal zone and monitoring the operation of plant / equipment within the fatal zone.

Figure 4 - Use of High-resolution Camera and AI Solutions for Fatal Zone Management

Other responsibilities of the team during operation include:

(a) provide a debriefing to workers involved to ensure that they understand the process, prior to the commencement of works in the fatal zone;

(b) supervise, co-ordinate and monitor the site operations in the fatal zone to implement the procedures as stated in the Logistics Plan and the associated documents;

(c) check that safety signage and barriers selected are suitable for the intended purpose and have been properly installed and maintained; and

(d) check that an effective signaling/communication arrangement for giving and receiving instructions among different parties is in place and used by the workers.

A workflow for managing the fatal zone is given in Appendix A.

4. Guide To Barricading

Barriers are provided in a construction site for fatal zone management and traffic management, as described below:

(a) Fatal Zone Management. Interlocking red (or any specific colour) plastic barriers are used for fatal zone management (Figure 5(a)). They are used to restrict unnecessary and unauthorized access of vehicles, equipment, and people into the fatal zone. The barriers must be interlocked and continuous so that no unauthorised person can enter the fatal zone. The barriers should be placed to encompass the whole area of the fatal zone taking into account the following factors: (i) distance to / from the hazard; (ii) possible movement of an object inside the barricade if it falls; (iii) access and egress; and (iv) sparks or slag generated from hot work activities. Appropriate sign should be affixed to the barriers at all access points, indicating that the hazards present within the barricaded area, and the name and contact details of the person in charge of the barricaded area.

(b) Traffic Management. Yellow flipping gates and water-filled barriers are used for traffic management (Figures 5(b) and (c)). They are used to (i) protect works items against damage, and (ii) restrict unnecessary and unauthorized access of vehicles, equipment, and people into the prohibited areas of the construction site. The flipping gates are a free standing, portable hard barrier. Water-filled barriers are used to segregate areas where there is plant/equipment working as a traffic safety control. They are high-impact barriers and water can be filled and emptied on-site for easier transport. Provision of water-filled barriers is recommended for the following conditions: (i) in a fatal zone close to a plant / machine route; and (ii) along a walkway close to a haul road.

Interlocking red plastic barriers (Fatal zone management)

Flipping gates (Traffic management)

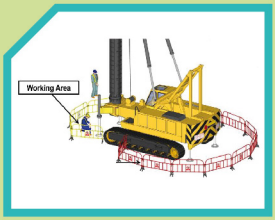
Water-filled barriers (Traffic management)

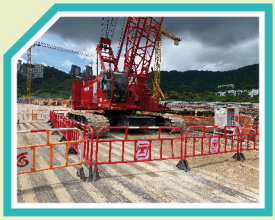
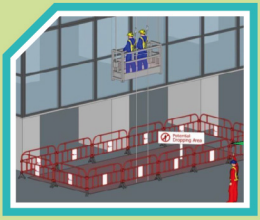
Figure 5 - Common Types of Barriers Used

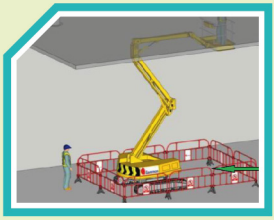
5. Examples of Good Practices of Barricading Fatal Zone

Some examples of good practices of barricading a fatal zone are given in Figure 6.

Piling Rigs / Swing Leader	(i) Size of fatal zone should be big enough to encapsulate the risks of movement of piling rigs / slewing motion. (ii) Number of red barriers needed will depend on the size of the fatal zone. (iii) No unauthorised people should enter the fatal zone and the lookout man should stay outside the fatal zone to check that the fatal zone is clear of pedestrian at all times. (iv) Walkway should be not less than 400 mm for passage of workers, and 650 mm for passage of materials.



Crawler Cranes / Mobile Cranes	(i) Size of fatal zone should be big enough to encapsulate the risks of movement of crawler cranes / slewing motion. (ii) Number of red barriers needed will depend on the size of the fatal zone. (iii) No unauthorised people should enter the fatal zone and the lookout man should stay outside the fatal zone to check that the fatal zone is clear of pedestrian at all times. The operator / lookout man / rigger should be provided with suitable communication device such as radio and warning signal to allow him / her to stop the mobile cranes quickly.   
Curtain Wall Installation / Use of Suspended Working Platform (Gondola)	(i) Size of fatal zone should be big enough to encapsulate the risks of falling objects, and to capture the load lifted. (ii) No unauthorised people should enter the fatal zone. 

Mobile Elevated Work Platform (MEWP)	(i) Size of the fatal zone should be big enough to encapsulate the risks of falling objects / slewing motion. (ii) Number of red barriers needed would depend on many factors such as size of MEWP, working area, etc.. Adequate red barriers should be provided at all times. (iii) No unauthorised people should enter the fatal zone and the lookout man should stay outside the fatal zone to check that the fatal zone is clear of pedestrian at all times. (iv) Walkway should not less than 400 mm for passage of workers, and 650 mm for passage of materials.  
Excavator	(i) Size of the fatal zone should be big enough to encapsulate the risks of the dipper arm slewing. (ii) Number of red barriers needed would depend on the radius of the dipper arm. (iii) No unauthorised people should enter the fatal zone and the lookout man should stay outside the fatal zone to check that the fatal zone is clear of pedestrian at all times. The operator / lookout man / rigger should be provided with radio and warning signal to allow him / her to stop the excavator quickly.

Excavator	(iv) Walkway should be wider than 400 mm for passage for workers, and 650 mm for the passage of materials. 
Loading / Unloading of Plant	(i) Size of the fatal zone should be big enough to encapsulate the risks of falling objects / slewing motion during loading/unloading. (ii) Number of red barriers needed would depend on the size of the plant and working radius of lifting arm (in case of mobile crane). Adequate red barriers should be provided at all times. (iii) No unauthorised people should enter the fatal zone and the lookout man should stay outside the fatal zone to check that the fatal zone is clear of pedestrian at all times. 

Figure 6 - Examples of Good Practices of Barricading Fatal Zone

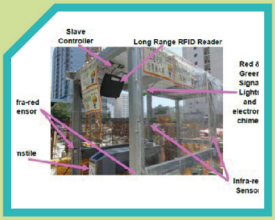
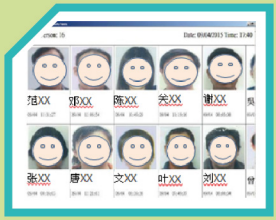
6. Technologies Applicable to Fatal Zone Management

Different types of technologies are available to facilitate the fatal zone management. The common types of technologies used are given in Figure 7.

Type of Technologies	Description
AI Solutions and Data Analytics	A suite of AI solutions for fatal zone management has been developed by Megvii[7], which is a technology company that designs image recognition and deep-learning software. The system can be used for vehicle control and area control. IP cameras are installed at strategic locations, and images are sent to an AI box for data processing. Movement of vehicles and people in the operation and restricted zones can be detected, and alert messages can be issued when the prescribed criteria are breached.  

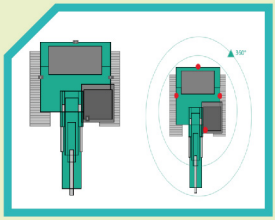
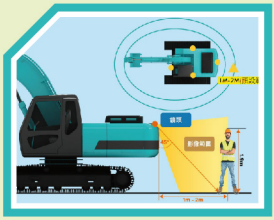
Type of Technologies	Description
High-resolution Camera Mounted on Tower Crane	The systems mounted on a tower crane can be used for spotting workers entering the fatal zone and monitoring the operation of plant / equipment within the fatal zone. Two systems are described herein: Anavision[8] and Versatile[9]. In the Anavision's system, a high-resolution camera is mounted on the jib to take pictures for the entire duration of the construction project. Through AI image analysis and 3D reconstruction, a high-resolution floor plan can be produced. By overlaying the Computer Aided Design (CAD) drawings for comparison, the tower crane camera solution is able to detect construction errors, such as external wall errors before building the next new floor, and allow on-site corrections in advance to avoid high rework costs in the future, thereby greatly improving the working efficiency of site surveyors and reducing the manpower. The camera can be used as a long-time aerial standby to take high-density measurement of a large area within the construction site. It also greatly reduces the number of workers to work in the danger area, and improves the safety of the working environment on the site. Inspection report can be sent via email, which helps speed up follow-up actions and decision-making.

7. https://megvii.com/
8. https://anavision.com/blog/tower-crane-camera-solution/
9. https://www.versatile.ai/craneview-solutions/

Type of Technologies	Description
High-resolution Camera Mounted on Tower Crane	In the Versatile's CraneView system, an IoT sensor device is mounted to the crane hook, which is used to collect and analyzes data on the flow and handling of materials, production rates, and crane utilization. A camera affixed to the device records all crane activity allowing a view of the live feed or a lift sequence from any point in the schedule. Using AI, the device learns and classifies each item picked, captures the weight of the item, and records the cycle time of the lift so the team can understand exactly how the crane is being used. Through an online and mobile dashboard, project teams review data, set custom alerts and notifications, and view weekly reports generated. 
RFID Access Monitoring & Recording System	A long range RFID reader and two sets of infra-red sensors are installed at the entrance of the fatal zone area to detect the RFID tags on the safety helmet worn by workers. The system stores the real time records in the computer system and prevents unauthorized access.  

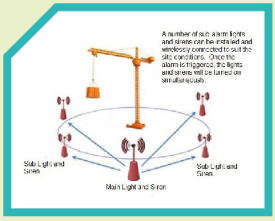
Type of Technologies	Description
Tower Crane Lifting Warning System	A RFID tag is installed on the hook, and antennas and processors are installed in the lifting zones. A signal will be emitted when the hook is raised. The RFID tag detects the signal, and the alarm and buzzer will be triggered.  
RFID Applied to Mobile Plant and Workers for Safety	Information of mobile plant, authorized operators and workers is stored in a Plant Permit built in a RFID chip. This method can be applied to different plant, and the information can be updated easily. **<u>CITF Pre-approved Items</u>** *- BLE Material & Attendance Tracker*[10] *- Raspect-ACE-Safety*[11] *- A.I. Surveillance System for Construction Site Safety*[12] 

10. PA20-085. Hornbird Technology Limited.
11. PA22-011. RaSpect Intelligence Inspection Limited.
12. PA22-005. iSafety Limited.

Type of Technologies	Description
Excavator Proximity Warning System	RFID receivers are installed on a slewing plant, such as an excavator (two on the side and one on the back). Workers, who need to enter the fatal zone, are issued with a RFID tag. The plant operator will be alerted when there are workers within 2 m from the plant. **<u>CITF Pre-approved Items</u>** *- UWB Collision Warning System*[13] *- Vision Smart Monitoring System*[14] *- Danger Zone Alert Sensoring System*[15] *- Driver Status Monitor System*[16] *- Advanced Driving Assistance System (ADAS) & Drowsiness Monitoring System (DMS)*[17]     By combining images captured with cameras mounted at four locations (front ,back, left and right of the machine), the system displays a 3D bird's eye-view through a full 360° around the machine.

13. PA20-055. Beeinventor Limited.
14. PA20-073. Kong Chun Construction Machinery Services Centre Limited.
15. PA20-090. Customindz Limited.
16. PA21-031. Transcendence Company Limited.
17. PA21-044. GreenSafety Technology Limited.

Type of Technologies	Description
Smart Card Control System and Interlocking System Beneath Seat for Forklift Truck	This system will prevent unauthorized control of forklift truck and unintended movement of the forklift truck when the driver is not in the truck. 
BIM Video for Safety Training	BIM is used to demonstrate the lifting operation. Training materials will be provided. This will improve the safety awareness and mindset of crane operators and signalmen. 

Type of Technologies	Description
Virtual Reality Training	Combining BIM and Virtual Reality (VR) technology, more realistic hazardous situations covering electrocution, falling object, fall of person, drown and collapse of lifting appliance, can be created for training of workers. **CITF Pre-approved Items** *- Trimble XR10 with Hololens 2*[18]  
Use of Technology to alert Workers of Descending Hook	A number of lights and sirens are installed in the proximity of the crane with radio frequency identification (RFID) tags attached. A continuous audible sound and light will be produced to alert workers when the hook is lowered to a designated height. **CITF Pre-approved Items** *- Construction Machines Crash Detection System*[19]  

18. PA20-075. Beijing Tiantuo Tianbao Technology Co., Ltd.
19. PA22-035. Hong Kong Telecommunications (HKT) Limited.

Type of Technologies	Description
Use of Smart Devices in Safety Control[20]	In the Housing Society's Hung Shui Kiu Phase 1A project, a MobiSafety Robot, making use of 5G and ultra wide band (UWB) technology, was used to patrol around the site to provide virtual fencing and security alerts for lifting and installation clearance for the MiC modules. 

Figure 7 - Technologies Applicable to Fatal Zone Management

20. Cheung (2021).

Bibliography

Cheung, F.K.W. (2021). Hong Kong Housing Society MiC Projects, MiC Workshop on Lifting, Logistics and Transport of Modules, CIC.

DEVB (2016). Guidance Notes of Design for Safety.

Gammon (2020). Standard and Guidance on Fatal Zone – Revision 0.

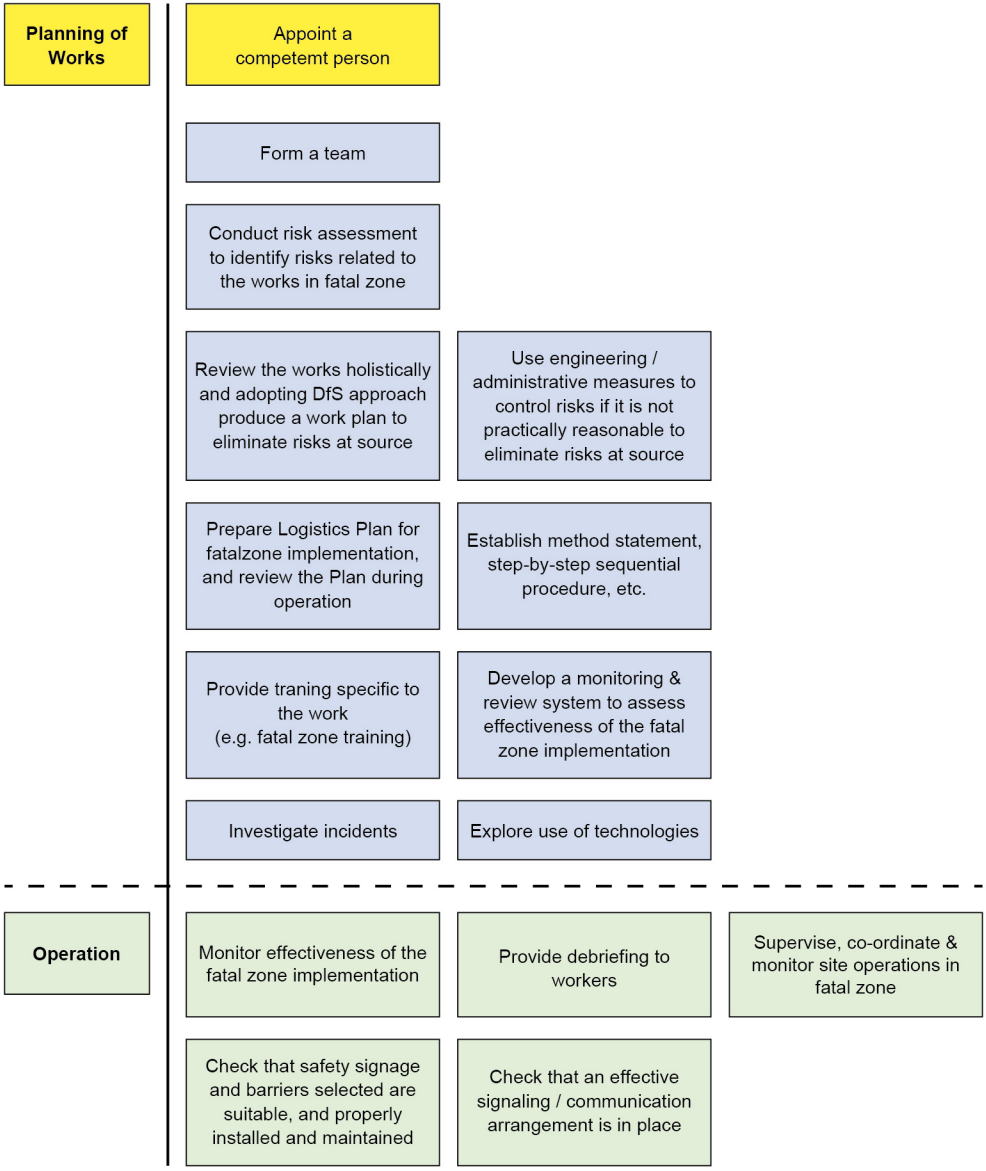
Heinrich, H.W., Peterson, D. & Roos, N. (1980). Industrial Accident Prevention, 5th Edition, Mcgraw Hill, New York.

LD (2003). An Analysis on Occupational Fatalities - Casebook Volume No. 2. *https://www.labour.gov.hk/eng/public/os/D/Fatalcase2.pdf*

LD (2004). Safe Systems of Work. *https://www.labour.gov.hk/eng/public/os/D/SafeSystem.pdf*

LD (2021). Occupational Safety and Health Statistics 2020. *https://www.labour.gov.hk/common/osh/pdf/archive/statistics/OSH_Statistics_2020_en.pdf*

Appendix A – Workflow for managing fatal zone



Appendix B – Checklist for Barricading Fatal Zone

Items	Good	Needs Improvements	Needs Immediate Improvements
A. Piling Rigs / Swing Leader			
1. Is the size of the fatal zone big enough to encapsulate the risks of movement of piling rigs / slewing motion?			
2. Is adequate number of red barriers provided to cover the fatal zone?			
3. Are unauthorised people prohibited from entering the fatal zone? Is the lookout man staying outside the fatal zone to check that the fatal zone is clear of pedestrian at all times?			
4. Is the walkway not less than 400 mm for passage of workers, and 650 mm for passage of materials?			
B. Crawler Cranes / Mobile Cranes			
1. Is the size of the fatal zone big enough to encapsulate the risks of movement of crawler cranes / slewing motion?			
2. Is adequate number of red barriers provided to cover the fatal zone?			
3. Are unauthorised people prohibited from entering the fatal zone? Is the lookout man staying outside the fatal zone to check that the fatal zone is clear of pedestrian at all times?			
4. Is the operator/ lookout man/ rigger provided with radio and warning signal to allow him/her to stop the mobile crane quickly?			
C. Curtain Wall Installation / Use of Suspended Working Platform (Gondola)			
1. Is the size of the fatal zone big enough to encapsulate the risks of falling objects, and to capture the load lifted?			
2. Is adequate number of red barriers provided?			
3. Are unauthorised people prohibited from entering the fatal zone?			

Items	Good	Needs Improvements	Needs Immediate Improvements
D. MEWP			
1. Is the size of the fatal zone big enough to encapsulate the risks of falling objects/ slewing motion?			
2. Is adequate number of red barriers provided?			
3. Are unauthorised people prohibited from entering the fatal zone? Is the lookout man staying outside the fatal zone to check that the fatal zone is clear of pedestrian at all times?			
4. Is the walkway not less than 400 mm for passage of workers, and 650 mm for passage of materials?			
E. Excavator			
1. Is the size of the fatal zone big enough to encapsulate the risks of the dipper arm slewing?			
2. Is adequate number of red barriers provided?			
3. Are unauthorised people prohibited from entering the fatal zone? Is the lookout man staying outside the fatal zone to check that the fatal zone is clear of pedestrian at all times?			
4. Is the operator/lookout man/ rigger provided with radio and warning signal to allow them to stop the excavator quickly?			
5. Is the walkway not less than 400 mm for passage for workers, and 650 mm for the passage of materials?			
F. Loading / Unloading of Plant			
1. Is the size of the fatal zone big enough to encapsulate the risks of falling objects/ slewing motion during loading/unloading?			
2. Is adequate number of red barriers provided?			
3. Are unauthorised people prohibited from entering the fatal zone? Is the lookout man staying outside the fatal zone to check that the fatal zone is clear of pedestrian at all times?			

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