

# Guide to Safety to Utility Specialists



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Editor in Chief	Ir Dr. King Wong
Editor	L.M. Cheung, C.C. Chui, C.W. Hui, W.Y. So
Consultant	Ir Wing Lun Lai, Ir Kin Kwong Yung

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## FOREWORD

After the disastrous landslip of 1994 occurred in Kwun Lung Lau on Hong Kong Island, the Government has paid more attention on utility maintenance with particular emphasis on leakage detection of buried water carrying services on both slopes and roads. The Government has increased resources and imposed additional legislation on the detection of underground utilities. As a direct result, the utility profession has been developing rapidly, and over the last decade, the number of “Utility Specialists” (管綫專業監理師) has grown as the Government’s requirements for Competent Persons to carry out the investigations has been implemented, in addition, Recognized Professional Utility Specialist (RPUS) (管綫專業監察師) has been recognized in recent years. However, lack of standard surveying methods, centralized monitoring systems and organized management, have lead to unsatisfactory investigation results.

In order to address these issues, Hong Kong Institute of Utility Specialists (HKIUS) (香港管綫專業學會), targeting the promotion of knowledge and good practice in the utility profession, collaborated with Hong Kong Utility Research Centre (HKURC) and supported by the funding from the Professional Services Development Assistance Scheme (PSDAS) of HKSAR, published a series of guide books and pamphlets in 12 disciplines of the utility profession in order to set standards for the practitioners to follow. As part of HKIUS continual effort to enhance the professionalism of the utility profession, it is the intention of the series that the quality of the survey can be raised and that utility related incidents can be avoided by performing high quality utility practices. Hopefully, the resulting benefits can extend to the general public.

This issue provides methods and their procedures to carry out safe utility works. The document states the role of management in maintaining a safe working environment, on-site safety measures and some common situations that the utility specialists usually encounter. This document is intended to be used by all personnel involved in the works.



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Mr, Zico Kai Yip KWOK  
(郭啟業先生)  
President, HKIUS (2010-11)  
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# 1. INTRODUCTION

Safety issues is a must for any projects especially in the utility industry that involves the encounters with confined space, excavation works and night works that the workers may situate in dangerous situation easily. However, safety issues are always ignored in the utility industry in Hong Kong. Accidents like poisonous gas killing the person working in manhole, cable explosion due to careless excavation, gas leakage due to damage of pipes are sometimes news headlines.

Accidents raise social cost in terms of money, time and more importantly, lives. From the business point of view, accidents imply poor performance of the company, which incurs heavy costs in terms of time-spent investigating the causes of accidents. This in turn results in delayed progress of the work, delayed project completion and lost opportunities for other business. From a social point of view, some permanent damage to the human body and loss of lives will not be able to recover any more. Life is priceless and shall be protected by all means. Therefore, safety issues shall be put at the top of the agenda of a company.

Due to the large demand and large number of utility specialists who carry out such detections, Hong Kong Institute of Utility Specialists (HKIUS) (香港管綫專業學會), aiming at promoting knowledge and good practice in the utility profession, prepared guidelines to provide a standardized method and process of safe working procedures in order to promote a good practice for the practitioners. It shall be noted that such standards are for reference only, any other standards or requirements are acceptable as long as stated in the contract or there are mutual agreements between the Contractor and the Engineer/ Client.

## **2. OBJECTIVE AND SCOPE**

The purpose of this guide is to provide guidance on a safe practice in conducting utility related works. It introduces the steps and process of maintaining a safe working environment including the role of the management level, on-site safety measures and some common situations the utility specialists may encounter. Common situations like confined space works, excavation works and night works will be illustrated. Since the managements setting up and implementing the safety system are crucial to the success of the safety program, their involvement is a great concern. An active involvement of the management imposes a positive effect on the effectiveness of the safety management system. More comprehensive instructions and supervision enable a better safety performance. Reasonable steps and measures shall be carried out before the commencement of every utility job.

This document gives an overall picture of the elements for creating a safe working environment for the utility specialists. Details of each element and situations, specific manuals or guidelines concerning the issue shall be referred to relevant reference manual mentioned in this document. It must be stressed that the guidelines given in this guide are in no way exhaustive, and professional judgment must be employed in all cases.

This guide is intended to be used by all personnel who are involved in the utility industry, including contractors, utility companies, consultants, government departments and other parties concerned.

### **3. ROLE OF MANAGEMENT**

To minimize and even eliminate the possibilities of accidents and dangerous occurrences, cooperation between employers and employees is essential. However, the employer shall act as initiator to ensure a safe working environment. The management can improve the situation in various ways. The employer controls resources provision and determines the safety policies which greatly influence the safety performance.

#### **3.1 Training and Personnel**

Safety training increases the knowledge of the workers and raises the awareness of the workers about the importance of safety. When the workers are well-trained, they shall be able to avoid the occurrence of accidents.

According to the Factories and Industrial Undertakings Ordinance (Cap. 59), all workers who enter the construction sites are required to attend the mandatory basic safety course and obtain a Construction Safety Card (Green Card). Besides mandatory basic safety course, more specific courses shall be attended depends on the position and the needs of the workers.

Two common safety-related qualifications required are Confined Space Certificate and Competent Person Certificate. A Confined Space Certificate is required before entering into confined spaces like manholes according to the Factories and Industrial Undertakings (Confined Spaces) Regulation (Cap. 59AE). The Competent Person Certificate is required when carry out excavation works according to the Electricity Supply Lines (Protection) Regulation (Cap. 406H).

Various organizations and companies provide safety training courses as well as refreshment courses. They shall be recognized by the Labour Department. The list of course providers can be visited via the website of the Labour Department.

Job specific training increases the knowledge of a specific job task. This training ensures the workers to be aware of all reasonable steps of the survey, correct usage of equipment and emergency procedures. The employers shall provide suitable training to the workers or at least ensure the workers hold the relevant qualifications before performing the tasks.

In addition, qualified personnel are required to attend refreshment course in every 3 years to refresh and enhance their knowledge.

### **3.2 Resources Input**

The safety performance is directly proportional to the amount of resources input in safety. Resources input can be equipment, personnel, time, etc. The more input of the resources, the better the safety performance.

The employer shall first understand the need of the workers and provide enough resources for them. Safety equipment like personal protective equipment shall be sufficiently provided and make sure that they are fully functional. Survey equipment shall be checked periodically to avoid any dangerous occurrence.

Sufficient number of workers shall be hired so that the workers will not be overloaded. Overloading may lead to exhaustion which is an accident-prone condition. Also, the employer shall employ enough safety officers and supervisors to maintain a safe environment, further elaboration about the safety officers will be stated in section 3.4.

Time is a crucial factor for accident-control. Utility works, like other works in the construction industry, have a tight work schedule. Saving time to catch up the schedule is a common reason for accidents. Therefore, better time management allows the workers to pay more time and attention on safety issues.

### **3.3 Construction Design Management (CDM)**

The CDM program has launched in the United Kingdom since 1994. And Hong Kong has adapted this program in some of the public works since 2002. It is a risk-management tool that assists designers to identify and manage the health and safety risks in early stage and throughout the project. The aim of the program, as stated in the Guidance Notes on CDM (ETWB, 2006), is to achieve:

- 1) Identification of potential health and safety hazards, and cost-effective mitigation measures at early stage of a project and throughout project delivery;
- 2) Early involvement and effective co-operation of all stakeholders through timely provision of relevant and necessary information; and
- 3) Clear demarcation of the roles and responsibilities of the parties responsible for coordinating and providing relevant project data on risks at all stages of a project.

The stakeholders (client, designer and contractor) shall set out the safety requirement. A designer is responsible to carry out risk assessment and draft a safety plan correspondent to the potential hazards. The designer shall reduce or even eliminate the risks by adjusting the design of site settings and work procedures if possible. The Health and Safety Plan designed shall be implemented and maintained by the contractor. In order to let all stakeholders notice about the progress of the project, a Health and Safety File containing all documents at all stages shall be circulated among the stakeholders throughout the project. An example of the work flow of CDM will be shown in Appendix B.

Detailed information of CDM can be found in Guidance Notes on CDM issued by the Environmental, Transport and Works Bureau. ETWB also stated some public work examples implementing CDM in Construction Design and Management – Worked Example for reference.



### **3.4 Supervision**

Lack of supervision is always on the list of the causes of an accident. Close supervision can enforce the safety regulations strictly. According to Factories and Industrial Undertakings (Safety Officers and Safety Supervisors) Regulation (Cap. 59Z), at least one full-time safety officer shall be responsible for a site with less than 200 employers. When the number of workers exceeds 200, the number of full-time Safety Officers shall be as listed in the following table.

Total number of workers	Minimum no. of full-time Safety Officer
201 to 700	2
701 to 1200	3
1201 or above	4

The safety officers shall have been trained properly, they shall attend qualification course with at least 1 year experience. Safety officers shall implement the following duties:

- 1) Carry out safety inspections and prepare inspection reports,
- 2) Supervise and monitor implementation of the Safety Plan,
- 3) Ensure that sub-contractors and all persons working on the Site are aware of and comply with the Safety Plan, and

Carry out internal safety audits for the Safety Plan at intervals of not less than once every six months, which format, scope and program are to be proposed and agreed with the Engineer.

A full-time Safety Supervisor shall be employed on site. When the number of workers exceeds 50, the number of Safety Supervisors shall be increased by one for every additional 50 workers.

The safety supervisor shall assist safety officers to carry out their duties. They shall carry out safety inspections on all active parts of the site for which he is responsible for at least daily intervals using an appropriate comprehensive checklist. All completed safety checklist shall be signed by the safety officer to ensure prompt follow-up actions have been taken.

Safety supervisor shall have at least three year experience on construction work and have completed an appropriate training course for safety supervisors.

Detailed requirements and duties of safety officer and safety supervisor are stated in the Factories and Industrial Undertakings (Safety Officers and Safety Supervisors) Regulations (Cap 59Z). A Guide has been published by Occupational Safety and Health Council regarding the Regulation.

### **3.5 Safety culture**

Culture can be said to be the 'root cause' of accidents as it underlines human behavior. Culture is a set of values, which is based on understood beliefs, mutual trust and shared perception. With mutual interaction and influence, everyone participates in formulating culture and then shares the culture. It is related to safety concern and safety ranking in daily operational functions. It would first underline attitude, which shapes behavior, and later on dictate management organization and structure.

The management shall build up a correct attitude towards safety especially for the workforce that are the most vulnerable to accidents and have lower safety awareness.

The Safety Climate Survey and the Work Safe Behavior (WSB) Programme was introduced from U.K. to Hong Kong in the early 2000s to measure and improve safety culture. OSHC developed the 'Construction Industry Safety Culture Index Software' in 2006 and 2008 for companies to consult their staff's views upon safety. OSHC provides training courses and developed Tool Kit for the Programme.

The Work Safe Behavior (WSB) Programme aims at improving safety performances by changing people's behaviors. The WSB Programme has the following characteristics:

- Each company could tailor-made its WSB programme.
- To encourage all stakeholders' participation from sub-contracting to senior management and frontline employees.
- 'No naming, No blame and No fault' approach to correct at-risk behaviour and reinforce safety behaviour.
- Develop a caring culture for colleague and co-worker.

The observers are trained to have good communication skills. When the observers notice any worker violated the rules, they would explain and encourage the workers instead of blaming or even threatening them. A good relationship can be built up between each other which facilitates the communication as well.

The programme has six stages/ step:

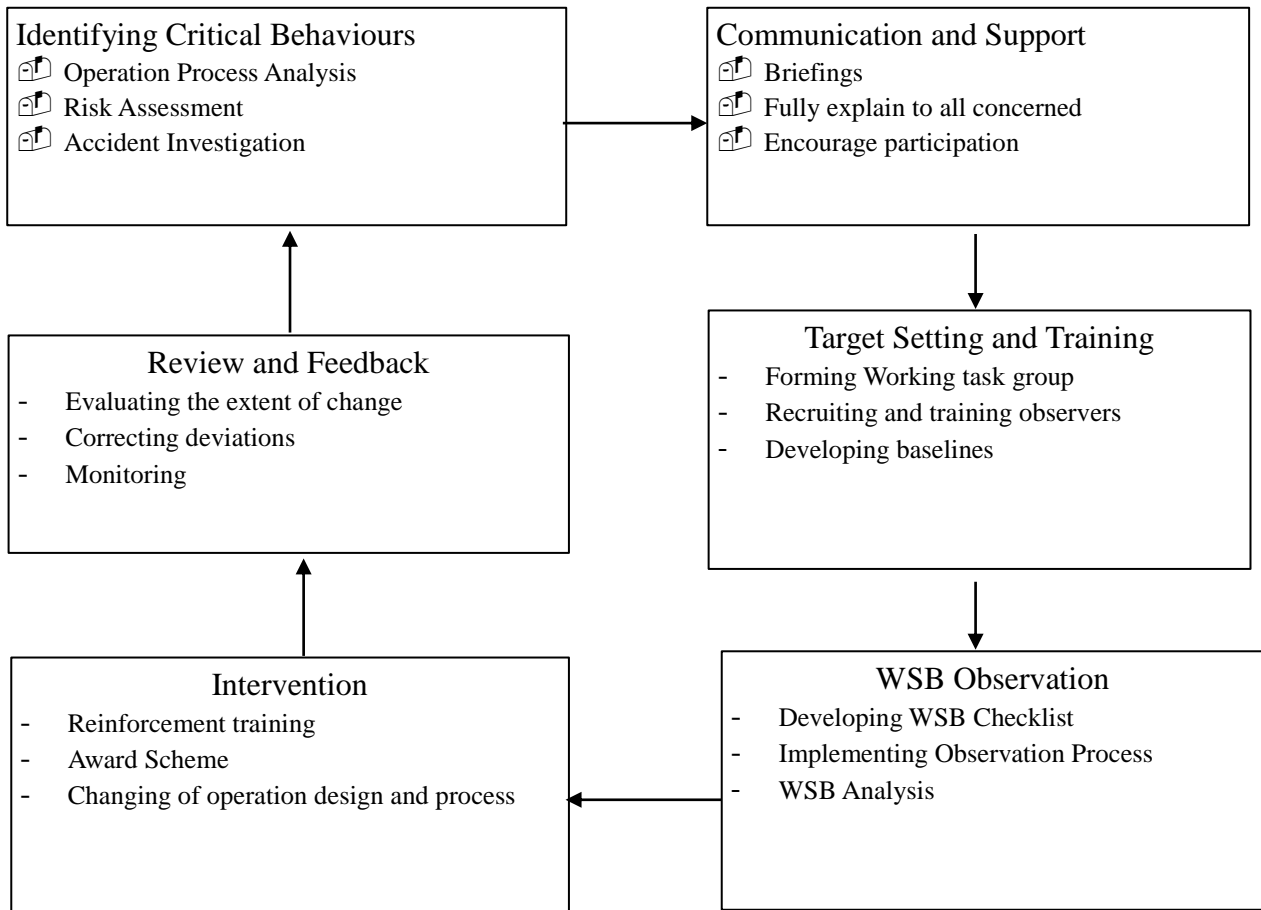


Figure 3.1 Work Safe Behaviour Flow Chart

Besides, Supervisors can act as a role model for the subordinates and workers. As people influence each other, the positive safety behaviour of supervisors would pose effect on the workers and the workers would affect each other so that a safe working atmosphere is then built up.

## **4. ON-SITE SAFETY MEASUREMENTS**

Safety strategies set up by the management shall be implemented strictly on-site as safety measurements or precautions. Before the commencement of the survey works, reasonable steps shall be taken to ensure a safe environment and all the workers involved are aware of situation of the site.

### **4.1 Work Permit**

Issue of work permit is required before carrying out the survey works. The two common work permits for works of utilities are confined space work permit and excavation work permit.

Confined space is potentially hazardous to both workers inside and nearby. A permit-to-work system is established to try to ensure the safety and health of the workers who enter and work in confined space. A contractor shall determine to issue the Permit-to-work certificate after receiving a risk assessment report from the Competent Person. No worker shall enter the confined space until the issue of Permit-to-work certificate by the contractor. The certificate shall include the findings in the risk assessment report, features and conditions of the confined space, and safety related information. All safety requirements and precautions stated in the certificate shall be strictly supervised and followed by all workers involved. During the work process, the certificate shall be displayed conspicuously at the entrance of the confined space.

For excavation permit, the utility undertakers shall register the road opening works to the Highways Department. The application may take one to six months, depending on the types of roads affected and duration of works. In order to minimize the disturbance to the public, the computerized Utility Management System implemented by the Highways Department will figure out conflicting works and the applicants shall make correspondent coordination to reduce the number of road opening works. The Police, Highways Department and Transport Department shall also be noticed if the opening area is significant. For busy areas, Traffic Impact Assessment shall also be carried out before the application. The Conditions of the Permit shall be strictly complied to ensure the safety of the road users, road workers. Details of the permit can refer to Excavation Permit Processing Manual (2010) issued by the Highways Department. The manual can be accessed via [www.hyd.gov.hk](http://www.hyd.gov.hk).

### **4.2 Temporary Traffic Arrangement**

All road works can lead to inconvenience and potential hazards to road users and workers. To minimize the negative effects of the road works, proper temporary traffic arrangement (TTA) shall be made. The TTA shall be well-planned as many of the obstructions can be identified before the commencement of works. Correct signing, lighting and guarding shall be provided in reference to relevant laws and regulations. The cost of TTA shall be included in the Bill of Quantities for the contractor to price.

The TTA of different work scale in different area may vary. The requirements and standards are listed in the Code of Practice for the Lighting, Signing and Guarding of Road Works (1996) published by the Highways Department. For special or other circumstances, consultation with the Police, Transport Department and Highways Department shall take place.

### **4.3 On-site Training**

Workers shall have basic safety training (i.e. obtained a Green Card) before working in the construction site. On-site training gives more specific safety related information to the workers so that they will be more familiarized with the condition of the site. Talk or briefing shall be delivered to all persons working in the site and new comers. The aim of the briefing is to ensure all workers are aware of the health risks associated with their works and are fully informed of the necessary precautions in controlling the risks. For example, misuses of dangerous chemicals, explosion due to damage to underground cables are always due to ignorance of the site and low safety awareness.

Besides training, safety related notice, remainders and signs shall be displayed conspicuously in the site so that the workers can access them easily. Warning signs shall be displayed clearly in suitable place to prevent any dangerous occurrences.

### **4.4 Equipment**

All equipment shall be checked periodically to ensure they are working in good order. Also, operators shall be familiar with the usage of the equipment and use them correctly according to the user manual. Both safety equipment and survey equipment shall be well maintained.

Survey equipment shall be handled carefully. For example, in high pressure water jetting, the pressure of the water is very high that it can cut a limb. Operators may get electric shock if the cable have not insulated properly in utility survey.

Operators shall use Personal Protective Equipment (PPE) and shall have sufficient knowledge in both usage and maintenance of the equipment. PPE shall include:

- Steel toe cap, rubber safety boots
- Safety helmet
- Safety vest (reflective at night)
- Safety goggles/Anti-glare glasses
- Breathing apparatus/Disposable respirator
- Harness and Fall arrester
- Gloves
- Ear muffs / ear plugs
- Handy gas detector
- Audio-visual alarm
- Resuscitator

PPE shall be regarded as the last resort in control measures. Engineering controls and safety system work shall always be considered first. If there are other methods that can complete the job safely within the use of PPE, adopt that method. For example, avoid entering the manhole if there are other ways to investigate the pipe.

Whenever PPE is used, suitable PPE shall be chosen. Also, PPE shall be in suitable size, well maintained and properly used so that the maximum protection level could be achieved. More information of PPE can be obtained from Guidelines for the Use of Personal Protective Equipment (OSHC, 2010).

## 5. COMMON SITUATIONS

Potential hazardous environment often occur in utility related works. Some common situations are confined space, excavation and working at night.

### 5.1 Confined space

Manhole is the window to the underground utility system. Nearly all kinds of surveys involve opening and entrance of manholes or nodes. According to the Factories and Industrial Undertakings (Confined Spaces) Regulation, 'a confined spaces is defined to mean any place in which, by virtue of its enclosed nature, there arises a reasonably foreseeable specified risk, and without limiting the generality of the foregoing, includes any chamber, tank, vat, pit, well, sewer, tunnel, pipe, flue, boiler, pressure receiver, hatch, caisson, shaft or silo in which such risk arises.'

Entrance of confined space shall be avoided as far as possible. If it is necessary to enter the confined space, risk assessment shall be carried out to identify the hazards to the workers. Risk assessment shall be carried out by the Competent Person. The risk assessment shall cover the following aspects which are also possible hazards that will happen in the confined space:

- The presence of hazardous gas, vapour, dust or fume;
- Deficiency of oxygen
- Free flowing solid
- Fire or explosion
- Loss of consciousness due to increase of body temperature

A series steps shall be followed before commencement of works. First is to identify whether the workplace is a confined space, then competent person and certified worker shall do the risk assessment, to control and minimize the risk. The contractor shall perform the safety precautions according to the potential dangers that mentioned in the risk assessment report. The permit-to-work can then be issued with a working period. When the period expired, risk assessment shall be carried out once again. Also, emergency procedures shall be planned before working so that they can react promptly when unpredicted situation occurs.

Before entering the manhole, sufficient period of time shall be given to allow ventilation. Then, put the gas detection apparatus into the manhole to check if it is safe to enter, even the result is a safe condition, do not enter if there is peculiar smell.

When working in the manhole, the workmen shall wear full range of protective clothing and a safety harness with lifeline. He shall also check the gas detector for gas frequently. There shall be a top man arranged outside the manhole to keep in touch and communicating with the man work underground. The workman shall obey the instructions given by the top man.

In case of emergency, the injured man shall be brought out of the manhole as soon as possible. First aid shall be given immediately and decision shall be made on whether further medical assistance is needed depending on the seriousness of the injuries. If the workman collapsed, any men with him shall signal the top man and leave the manhole as quickly as possible unless they can drag the casualty clear at once. Whenever there is no breathing apparatus, no further rescue shall be made and dial 999 immediately for assistance.

When finished the inspection, ensure all men worked underground have returned to the surface and all manhole covers shall be replaced properly.

For further information on the regulations and steps of working in the confined space, please refer to the Factories and Industrial Undertakings (Confined Spaces) Regulation (Cap 59 AE) which can be accessed via homepage of Occupational Health and Safety Council at [www.oshc.org.hk](http://www.oshc.org.hk) or the “Code of Practice for Safety and Health at Work in Confined Spaces” prepared by the Labour Department and can be accessed via its website at [www.labour.gov.hk](http://www.labour.gov.hk).

## **5.2 Excavation**

Excavating the road/ground may cause various kinds of accidents. Damage to underground cables can lead to electric shock to the operator, fire or explosion. Damage to gas pipe can cause leakage of the gas or explosion. Trench related accidents are not uncommon. Trench without proper supporting can hurt the worker by a sudden collapse of the trench. Therefore, excavation shall be well-planned and carried out carefully.

Reasonable steps and requirements have been established for safer excavation. Before digging the ground, utility survey shall be carried out to detect any live cables and confirm their alignment and depth so that they will not be damaged.

In order to ensure the operator has sufficient knowledge to handle the excavation work, a competent person (CP) shall be employed. A competent person shall be well-trained with at least 6 month’s practical experience.

The first step is to collect information of the existing utilities from different utility undertakers. The record plans provide clues for the location of the underground utilities. Possible sources of information are power companies, gas suppliers, telecommunication companies and government departments. Reconnaissance survey shall be carried out to define the boundary and check for any missing or incorrect surface installations. Note that the record plans shall be taken as reference only as the data may contain incorrect or outdated information. The record plans will expire in three months and new record plans shall be obtained. Try to collect comprehensive information before investigation in order to obtain a more accurate result in the utility survey.

The alignment of the utilities is then located by cable detection. Utilities can be located by the pipe/cable locator. Passive detection is carried out to search for cables and active detection is then carried out to confirm the alignment of the cables.

Safety rules shall be followed when excavating the ground. There shall be adequate minimum clearance from the U/G cable and the equipment if mechanical excavators and hand-held power tools is used. The distance of clearance shall be 250-500mm when hand-held power tool is used and 1-3m when mechanical excavator is used. Hand tools like spades and shovels, picks or forks are commonly used in exposing the lines. The excavation shall take place alongside the services instead of directly above the services.

Where the cables are uncovered, the trench shall be supported by suitable means such as shoring, timbering or sheet piling. The supporting can ensure the stability of the trench that protects both the U/G cables and the workers working inside the trench.

After the excavation, the site shall be restored. The operator shall reinstate all warning tapes, tiles, protection plates or other protection materials in the original position. The backfilling materials shall be the same of the original one unless otherwise agreed with the power company. Materials with suitable fineness shall be used; coarse materials shall not be used to prevent damage to the U/G cable.

Detailed requirement and reasonable steps of excavation near cables can be found in Code of Practice on Working Near Electricity Supply Lines (2005) issued by the Electrical and Mechanical Services Department. For excavation near gas pipes can, please take reference to Gas Production & Supply: Code of Practice – Avoiding danger from gas pipes (1997) issued by The Gas Authority.

### **5.3 Working at night**

Working at night is sometimes inevitable to get a better result for surveys. For example, a quite environment is good for listening to the leak noise and pinpoints the leak location. CCTV survey and Flow survey are sometimes necessary to be carried out in a low flow period, which is usually the night time.

The adverse effect of night shift can be environmental and physical. Environmentally, a dark environment limiting the sight creates a dangerous environment for work. Therefore, sufficient lighting shall be installed to enable a smooth working progress. A brighter environment can give a clearer vision and raise the alertness of the workers, however, reflective surface of the surrounding area may create glare. Regulation of direct light and indirect light may ease this problem.

All operators shall wear reflective clothes when working at night to show their existence. Headlights can also be used for the same purpose and facilitate the work.

Physically, working at night disrupts the body clock which may lead to sleeplessness or poor quality of sleep. This may lead to fatigue and ill health that the worker may lose concentration and becomes vulnerable to accidents. Fast rotating shift every two to three days are recommended as the body can reset quickly before adapting the adjustment of the body clock. Slow rotation of at least three-weeks can maximize the body's adaptation to the adjustment. Works overtime at night shall be avoided.



## **6. REPORT AND REVIEW**

If accident happened, it shall be reported to the person responsible for the workplace. Any dangerous occurrences shall also be reported. The safety policy shall subject to review periodically for amendments and improvements.

### **6.1 Reporting of incidents**

Regulations for reporting incidents are stated in Section 13 of the Occupational Safety and Health Ordinance (CAP. 509). If the worker is dead or seriously injured, the accident shall be notified to the occupational safety officers within 24 hours and reported to the safety office within 7 days. The report shall contain the details including injury and whether death or incapacity ensued.

First aid shall be rendered if the injury is not serious. If the injury is serious, dial '999' to request an ambulance so that medical attention can be given as soon as possible. Deliver the injured to the hospital as soon as possible by all means. Do not waste time.

Dangerous occurrences such as explosion, fire, short circuit and collapse shall also be reported to the occupational safety officers within 24 hours. The report shall contain the time, circumstances of the occurrences.

Further information can refer to Reporting Workplace Accidents and Dangerous Occurrences (1999) issued by the Labour Department.

### **6.2 Review of Safety Policy**

Safety policy shall be reviewed periodically to reinforce, maintain and develop its ability to reduce risks to the fullest extent and ensure continue effectiveness of the safety management system. According to the Code of Practice on Safety Management (2004), safety review means 'reviewing the effectiveness of a safety management system and considering improvements to the effectiveness of the system.'

The review consists of Document review and Physical condition check. Document review mean checking the relevant document such as risk assessment report, safety inspection reports, in-house regulations and rules, etc. that proves an actual implementation and maintenance of the safety policies. Physical condition check includes checking of premises, equipment and also the visual observation of work and behaviour of the workers by the safety reviewer.

With reference to the review findings and the overall performance, evaluation of the safety policy implementation shall be carried out and further improvements shall be considered.

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## Appendix A: Abbreviations

Company/ Organization	
Code	Description
BD	Buildings Department, HKSARG
CEDD	Civil Engineering and Development, HKSARG
DSD	Drainage Services Department, HKSARG
EMSD	Electrical and Mechanical Services Department, HKSARG
EPD	Environmental Protection Department, HKSARG
HA	Hong Kong Housing Authority, HKSARG
HKIUS	Hong Kong Institute of Utility Specialists
HKURC	Hong Kong Utility Research Centre
HyD	Highways Department, HKSARG
LandsD	Lands Department, HKSARG
LD	Labour Department, HKSARG
PolyU	The Hong Kong Polytechnic University
UTI	Utility Training Institute
WRc	Water Research Centre
WSAA	Water Services Association Australia
WSD	Water Supplies Department, HKSARG
WTI	Water Training Institute
Others	
Code	Description
%	Percentage
BMP	Bitmap (Picture Format)
BWCS	Buried Water Carrying Service
CCE	Conduit Condition Evaluation

<b>Company/ Organization</b>	
CCE(CCTV & ME)	Conduit Condition Evaluation(Closed Circuit Television & Man- Entry)
CCES	Conduit Condition Evaluation Specialists
CCTV	Closed Circuit Television
CD	Compact Disc
CL	Cover Level
COP	Code of practice
CP	Competent Person
DN	Nominal Diameter
DP	Design Pressure
DVD	Digital Versatile Disc
e.g.	Exempli Gratia
GIS	Geo-Information System
EPR	Environmental Protection Requirements
etc.	et cetera
GL	Ground Level
H	Height
HKCCEC	Hong Kong Conduit Condition Evaluation Codes
HPWJ	High Pressure Water Jetting
hr	Hour
Hz	Hertz
ICG	Internal Condition Grade
ID	Internal Diameter
IDMS	Integrated Data Management System
IL	Invert Level
ISO	International Standards Organization
JPEG	Joint Photographic Experts Group (Picture Format)

<b>Company/ Organization</b>	
kHz	Kilo- Hertz
kPa	Kilopascal
m	Meter(s)
ME	Man Entry
MHICS	Manhole Internal Condition Survey
mm	Millimetre(s)
Mpa	Megapascal
MPEG	Motion Picture Experts Group (Video Format)
MS	Method Statement
MSCC	Manual of Sewer Condition Classification, UK
OHSAS	Occupational Health and Safety Assessment Series
PPE	Personal Protective Equipment
ppm	Parts per million
PS	Particular Specification
PSI	Pound Per Square Inch
QA/ QC	Quality Assurance/ Quality Control
Ref.	Reference
RMSE	Root Mean Square Error
RPUS	Recognized Professional Utility Specialist
RTO	Recognized Training Organization
SCG	Service Condition Grades
SOPs	Safe Operator Procedures
SPF	Sun Protection Factor
SPG	Structural Performance Grade
SRM	Sewer Rehabilitation Manual
STP	System Test Pressure
TTA	Temporary Traffic Arrangement

<b>Company/ Organization</b>	
US	Utility Specialist
VHS	Video High Speed
W	Width
WLD	Water Leakage Detection
WO	Works Order
WP	Work Procedure

## Appendix B: Related Photographs



A: Personal protective equipment shall be used when entering the manhole.



B: The manhole shall be sufficiently ventilated before investigation.



C: Operators shall wear reflective vest when working at night.



D: Temporary traffic arrangement shall take place if traffic is interrupted.



E: Sufficient equipment shall be provided by the employer.



F: Warning sign of "High Voltage Cable Beneath" is erected in the site.

# Appendix D: An Example of Permit-to-work Certificate for Entry into Confined Space (form HKIUS sample form)



Permit to work Certificate

Field No	: _____		
檔案號碼(Ref. No.)	: _____		
工作編號(Project Ref.)	: _____	檢查日期(Date):	_____
地點 (Location)	: _____		
工作內容 (Job Description)	: _____		
<b>(A) 氣體測試記錄 (Gas Detection Record) :</b>			
測試結果 (Result) :			
測試時間 (Time)		(1)	(2)
氧氣 O <sub>2</sub>	19.5% - 23 %		
易燃氣體 LEL	< 10 %		
一氧化碳 CO	< 25 PPM		
硫化氫 H <sub>2</sub> S	< 10 PPM		
註: 本人證實已依照本證書親自測試該場地, 並聲明證書之內容為真實和滿意。			
使用儀器 (Testing Tools): _____			
Name and Signature :			
氣體測試員姓名: _____		Signature : ( _____ ) CP No.: _____	
<b>(B) 許可工作証 (Permit to Work) :</b>			
<input type="checkbox"/> 上述施工地點安全, 可以不需配戴呼吸器進入。Safe Work Without B.A.			
<input type="checkbox"/> 已提供合適及足夠通風設備。Ventilation Provided			
<input type="checkbox"/> 已提供拯救設備在現場環境, 如下: 呼吸器具體(2套), 復甦器具, 救生繩, 降傘式安全帶(2套), 個人警報器及急救設備。 Safety Equipment Provided includes: B.A., Resuscitator, Audio/Visible alarm, Safety Line, Full Body Harness and First Aid Box.			
核准工人 (Certified Workers) :			
	姓名 (Name)	註冊編號 (Certificate No.)	有效日期 (Valid Until)
1			
2			
3			
4			
5			
茲准許上述分判商及其工人合共 _____ 人, 進入上述指定時間以外或未得批准人士, 皆不准入此場地。 Only the above named persons are allowed to enter for works.			
合資格人員姓名: _____ 簽署: _____			
Name of Competent Person: _____		Signature : ( _____ ) CP No.: _____	
日期: _____		時間: _____	
Date: _____		Time: _____	
<b>(C) 許可工作証註銷 (Cancellation) :</b>			
此許可工作証於 _____ 年 _____ 月 _____ 日 上午 / 下午 _____ 時 _____ 分 予以註銷。			
註銷人簽署 (Cancelled By): _____ ( _____ ) 職位 (Position): _____			
注意: 1. 此(許可工作証)必須由合資格人員填妥所有資料及簽署, 方為有效。 Permit valid only with completed details and signature			
Note: 2. 施工時必須將此(許可工作証)張貼於工作地點的入口或當眼處。施工完畢, 必須交還寫字樓。 Permit must show at the working site and return to office after works.			



# Appendix E: An example of Excavation Permit from Highways Department

Excavation Permit Application Form 挖掘准許證申請表格

HYD 14 (Rev. 7/2005)

Our Permit Ref. 檔號: .....

To: Director of Highways  
致: 路政署署長

## Application for ~~Principal~~ Excavation Permit 申請挖掘准許證

Application is hereby made under Section 10A(1) of the Land (Miscellaneous Provisions) Ordinance (Cap.28) to make and maintain excavation(s) in the street(s) maintained by the Highways Department described below and as shown in the attached plan.  
現根據《土地(雜項條文)條例》(第28章)第10A(1)條的規定,申請在下文所述及附圖說明由路政署維修的街道進行和維持挖掘工程。

The location of the proposed excavation(s) is: .....  
建議挖掘工程的地點

The purpose of the excavation(s) is: .....  
挖掘工程的目的

Proposed commencement date: ..... and completion date: .....  
建議動工日期 建議完工日期

The approximate sizes (in meter) of the excavation(s) are as follows:  
挖掘工程的大約容積如下 (以米為單位):

Item 項目	Length 長度	Width 闊度	Depth 深度	Location (e.g. carriageway, footpath, slope, cycle track, etc.) 位置 (例如: 行車路、行人路、斜坡、單車徑等)

Name of Applicant<sup>1</sup>: .....  
申請機構的名稱

Applicant's address: .....  
申請機構的地址

Applicant's office hours tel. no.: ..... Fax no.: ..... E-mail address: .....  
申請機構的聯絡電話(辦公時間) 圖文傳真號碼 電郵地址

Applicant's contact person: ..... 24-hour tel. no.: .....  
申請機構的聯絡人 聯絡人的24小時聯絡電話

Name of Contractor<sup>2</sup>: .....  
承建商名稱

Contractor's address: .....  
承建商的地址

Contractor's office hours tel. no.: ..... Fax no.: ..... E-mail address: .....  
承建商的聯絡電話(辦公時間) 圖文傳真號碼 電郵地址

Contractor's contact person: ..... 24-hour tel. no.: .....  
承建商的聯絡人 聯絡人的24小時聯絡電話

The above Contractor will \*be/not be nominated to be the nominated permittee when this permit application is approved.  
當此挖掘准許證申請獲得當局批准後,以上提及的承建商將\*會/不會被提名為指定持准許證人。

Prescribed Fee to be paid by applicant:  
申請機構將需繳交的訂明費用:

One off fee 一次過費用			Amount 款額
Issue of excavation permit 發出挖掘准許證			(1) \$1,860
Fees paid on daily basis 按日計算的費用	Daily rate 每日收費	Permit Duration (days) 准許證有效期(日)	Amount 款額
Daily fee 按日費用	\$32		(2)
Total 總計 (1)+(2)			

Signature 簽署: .....

Name of the person signing for and on behalf of the Applicant: .....  
申請機構代表的姓名 (in block letters 正楷填寫)

Date 日期: .....

<sup>1</sup> If the applicant is a company, a copy of the company's business registration certificate must be attached. If the applicant is a joint venture company, copy of all partners' business registration certificates must be attached. If the applicant is an individual, a copy of his/her identity card must be attached. 如以公司名義申請,須附上商業登記證副本。如以聯營公司名義申請,須附上各合伙公司的商業登記證副本。如以個人名義申請,須附上其個人身份證副本。

<sup>2</sup> A copy of the contractor's business registration certificate must be attached. If the contractor is a joint venture company, copy of all partners' business registration certificates must be attached. 承建商的商業登記證副本須一併附上。如該承建商是一間聯營公司,各合伙公司的商業登記證副本亦須一併附上。

\*Delete as appropriate. 將不適用部份刪去。

**Utility Training Institute (UTI)**  
 Suite 209, Favor Industrial Centre,  
 2-6 Kin Hong Street,  
 Kwai Chung, New Territories  
 HKSAR, China



**UTILITY  
 TRAINING  
 INSTITUTE**  
 管綫學院

Tel: (+852) 2690 3899

Fax: (+852) 2618 4500

Email: [info@uti.hk](mailto:info@uti.hk)

**Guideline Amendment Form**

Please fill in the following form if any error or mistake is found in this manual. We thank for your support and appreciate your continuous help in improving this manual.

Discipline*	Page No.	Description of Existing Content	Suggested Amendment

- \* A. Conduit Condition Evaluation (CCTV and ME Survey)  
 B. Manhole Internal Condition Survey  
 C. Utility Survey (Pipe Cable Locator Survey, PCL)  
 D. Water Leakage Detection and Control  
 E. Advanced Leakage Detection of Buried Water Carrying Services Affecting Slopes  
 F. Pipe Rehabilitation by Trenchless Technology  
 G. GPR(Ground Penetrating Radar) Survey  
 H. Flow Study in Drainage Conduit (流量監控)  
 I. Pipe Condition Surveys by other non-destructive methods  
 J. Data Management for Utility Records  
 K. Utility Management  
 L. Safety

Please fill in your contact information in case follow up is needed.

First Name: \_\_\_\_\_ Second Name: \_\_\_\_\_ Last Name: \_\_\_\_\_

Title: \_\_\_\_\_

Organization: \_\_\_\_\_

#Telephone No.: \_\_\_\_\_ #Email Address: \_\_\_\_\_

#Address: \_\_\_\_\_

# Please fill in one or more contact information in the blanks provided  
 This amendment form is available at: [www.uti.hk](http://www.uti.hk)

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# Safety

Any opinions, findings, conclusion, or recommendations expressed in this material/ any event organized under this project do not reflect the view of the Government of the Hong Kong Special Administrative Region or the Vetting Committee for the Professional Service Development Assistance Scheme.

Professional Service Development Assistance Scheme (PSDAS)  
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