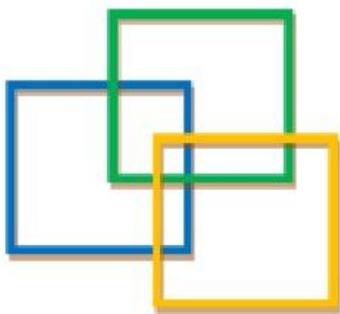




Hong Kong Institute of Utility Specialists  
Non – profit Making Organization

# Method Statement For Manhole Internal Condition Survey (MHICS)



Publisher:



UTILITY TRAINING INSTITUTE (UTI)  
A trade name of UTI (International) Ltd. 管綫學院

Supporting  
Organization:



CCPDC 社建  
Community & Construction Professionals'  
Development Centre  
社區、建造及工程專業發展中心

## **Foreword**

It's been more than ten years now since the disastrous landslip that occurred in Kwun Lung Lau on Hong Kong Island on 23 July, 1994. Since 1995, the Government of HKSAR has awarded tens of millions of dollars in contracts related to detection of leakage from buried water carrying services (BWCS) both on slopes and on the roads throughout the territory. As expected, this sequence of events generated an increasingly large pool of "Utility Specialists (US)", with most working almost independently, devoid of any standardized surveying methods, quality requirements (on survey results) and the "registration" of operation personnel in the market before the establishment of HKIUS in 2002.

In view of the availability of the multitude of method statements, specifications, training manuals, and the contracts documents produced for the vast number of underground utility survey contracts (by government and private projects), the following sections try to provide a comprehensive set of method statement, by addressing the following topics in general and where the abbreviation can be found in the Appendix:

- (1) Standard Operation Procedure
- (2) Standard Report Format
- (3) Standard Safety Precaution

You are welcome to take reference to this method statement for your contract and in case you need further information, please send an e-mail to [info@hkius.org.hk](mailto:info@hkius.org.hk) or call Ir Dr. King Wong.



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Mr, Zico Kai Yip KWOK  
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President, HKIUS (2010-11)  
April, 2011

If any error or mistake is found in this method statement, please kindly contact us.

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# **Manhole Internal Condition Survey (MHICS)**

## **1. Scope of the Works**

The aim of the survey is to investigate all salient features, obtain evidence of the structural and surface condition of the manholes, evidence of leakage or infiltration, record and verify the position of the manhole structure against the layout plan and determine the location. Therefore, it provides detailed information for the design and construction of drainage works.

Investigations can be based on the WRc/WAA Model Contract Documents for Manhole Location and Production of Record Maps (1987).

## **2. Methodology**

The aim of the survey is to investigate existing manholes such as to provide detailed information on the conditions of the manholes and to verify the dimensions of the manholes for other purposes such as, design and construction of drainage works.

All dimensions of the manhole such as manhole size, opening size, cover level, tide level and invert level, should be measured where practicable. The information of incoming/outgoing pipes will be recorded according to the IDMS Pipe Numbering System. Manhole record card will then be filled accurately. Specific manhole reference will be given to each manhole on site in accordance with the IDMS Grid Reference and Manhole Reference System.

The contractor shall submit a detailed method statement for the manhole survey. The contractor shall submit separately a detailed method statement for working in confined spaces, in accordance with the latest Factories and Industrial Undertakings (Confined Spaces) Ordinance. The Contractor shall be responsible for accessing the survey area and carrying out risk assessment and obtaining the relevant permits related to traffic management.

The Contractor shall also submit a method statement for the Contractor's data management system for the approval of the Client or his representative. The Contractor shall host and maintain all checked data on a secured database to be accessed by the Client or his representative.

On completion of the Survey of each 100 manholes or other structures the Contractor shall supply completed computer generated record cards and a copy of the relevant portion of the map in respect of those manholes or other structures and notify in writing to the engineer that in the opinion of the contractor the records are ready for a quality control check to be carried out. The Engineer shall then carry out a performance test as specified below within 4 weeks of the written notification.

### **3. Field Procedures**

#### **3.1 Safety Program and Confined Spaces**

Working in Confined Spaces can be hazardous so strict observance of all safety procedures is paramount. Crew Leaders shall undertake a risk assessment and fully brief all team members to ensure that they all know the tasks they are to perform, in accordance with the Factories and Industrial Undertakings (Confined Spaces) Ordinance 1989 (amended year 2000).

#### **Personnel**

Persons who are required to enter confined spaces should be given a medical examination before commencing employment and, if possible, at reasonable intervals thereafter.

If any of the following disabilities are found, the person should, where possible, be given other work and not enter confined spaces.

- (1) Fits, blackouts or fainting attacks.
- (2) Heart disease or disorder.
- (3) High blood pressure.
- (4) Asthma, bronchitis or shortness of breath, on exertion.
- (5) Deafness.
- (6) Meniere's disease or disease involving giddiness/loss of balance.
- (7) Claustrophobia or other nervous or mental disorders.

#### **Entry Into Confined Spaces**

##### **Legal Definition**

A '**Confined Space**' means any place in which, by virtue of it's enclosed nature, there arises a reasonably foreseeable **specified risk**, and without limiting the generality of the foregoing, includes any chamber, pit, well, sewer, tunnel, pipe, flue, boiler, pressure receiver, hatch, caisson, shaft or silo in which such risk arises.

A 'Specified Risk' means a risk of:

- (1) Serious injury to any person at work arising from a fire or explosion;
- (2) The loss of consciousness of any person at work arising from an increase in body temperature;
- (3) The loss of consciousness or asphyxiation of any person at work arising from gas, fumes, vapour or the lack of oxygen;
- (4) The drowning of any person at work arising from an increase in the level of liquid; or

- (5) The asphyxiation of any person at work arising from free flowing solids or the inability to reach respirable environment due to entrapment by a free flowing solid.

### Qualifications and Experience of **Competent Persons** and **Certified Workers**:

Under the Factory and Industrial Undertakings Regulations a Competent Person means a person:

- (1) Who has reached the age of 18 years: and
- (2) Who is either:
  - a. A Safety Officer registered under the Factories and Industrial Undertakings (Safety Officers and Safety Supervisors) Regulations; Or
  - b. A person who holds a certificate issued by a person whom the Commissioner has authorised to certify persons as being competent to prepare Risk Assessment Reports; And
- (3) Who has at least one years relevant experience, after obtaining the registration or certification. Referred to in paragraph (b)(i) or (ii) in assessing risk to the safety and health of workers working in confined spaces.

Under the same regulations a **Certified Worker** means a person:

- (1) Who has attained the age of 18 years, and
- (2) Who holds a certificate issued by a person whom the commissioner has authorised to certify workers as being competent to work in a confined space:

This Regulation applies to work in an Industrial Undertaking:

- (1) That takes place within a confined space; and
- (2) As required by the Regulation, that takes place within the immediate vicinity of, and is associated with work occurring in a confined space.

**Source: (CAP 59AE Factories and Industrial Undertakings (Confined Space) Regulation).**

### **3.2 Potential Dangers**

The purpose of this section is to draw attention to the more common hazards likely to occur in sewers and manholes. It is not a complete list of dangers. If there are any doubts to the safety of a confined space, **DO NOT ENTER**. Do not be forced to undertake any tasks considered as dangerous and always contact your safety officer for further advice. The Company will always support your decision for you not to proceed.

#### **Fall hazard**

Due to the fact that sewers are old, sometimes badly constructed and often subject to damage from sewage, it is **unwise to assume** that a sewer **checked yesterday is safe today**.

Manhole ladders and step irons should be regarded with suspicion as they can fail unpredictably under load. Each rung and step iron should be tested prior to weight being placed upon it. Safety harnesses, lifelines and man winches (where required) must be used. Ensure the top man has a firm grip on the rope as you descend, do not allow slack to build up in lines or wires.

### **Atmospheric Hazard**

the atmosphere in a sewer can become potentially dangerous due to the presence of components that are toxic or flammable or through a deficiency or excess of oxygen.

These conditions may arise from the decomposition of deposited solids or from a variety of less predictable occurrences such as leakages from gas mains, the discharge of trade effluents and spillages of petrol or chemicals, some of which may individually be harmless but when mixed can be very dangerous.

Even after a manhole has been tested and found to be safe the atmosphere can gradually or suddenly change for the worse. An unusual smell, dizziness, nausea, throat or eye irritation can be an indication that something is wrong. Should this happen, or should the gas monitor alarm sound, the sewer should be evacuated immediately and further investigations undertaken.

### **Flood Hazard**

a sudden rush of water may occur caused by a rainstorm in an area away from the working site.

The rapid release of a large volume of water from a swimming pool, reservoir etc. This can be caused by the failure or unauthorized operation of valves, penstocks, and stanks, etc.

Therefore it is important to always check local weather conditions and warn colleagues of any rainfall.

Ensure that all valve gear is locked off with a sign stating that men are working in the Pipe. Temporary or old penstocks and stanks should be inspected prior to entry.

Also listen out for the unexpected sound of rushing water or a surge of wind, which may indicate a sudden inflow of water.

It is important, especially during sewer traversing to be aware that flows may rise slowly. Thus depth checks should be undertaken at regular time intervals.

### **Chemical Hazard**

Clients should warn contractors of licensed discharges into sewers and watercourses, which may pose a hazard to health. However, it should not be assumed that where no warning has been issued no hazard exists. Indeed all flows should be treated as suspect as chemicals, which are innocuous on their own, may become noxious when combined together in sewer. Any unusual substances should be investigated and the sewer should not be entered until it is proven safe to do so.

Some symptoms, caused by hazardous chemicals, are irritated eyes, nose, skin and lungs. Difficulty may be experienced in breathing and you may also feel dizzy or sick.

Should you have any of these symptoms or generally feel unwell, leave the confined space immediately and make further inquiries and report the incident to your Safety Officer. **DO NOT RE-ENTER UNTIL THE CONFINED SPACE HAS BEEN PROVEN SAFE.**

The preparation kit includes utility drawings; all necessary permits for field works and safety precaution procedures will be issued to the survey team before the commencement of field works.

Safety equipment such as bright colored barricades, road signs, personal protective equipment (PPE) and gas detectors are equipped on the working vehicle.

## **4. Survey Requirements**

### **4.1 Dimensional Requirements**

All dimensions should be measured in accordance with the description stated in Figure 4.1 and 4.2. Team leader should counter check this for accuracy and logicity before leaving the site.

### **4.2 Numbering System**

IDMS Pipe Numbering System will be adopted as shown in Figure 4.3.

### **4.3 Survey Field Record**

The Manhole record card should be filled in by the team leader (MHKIUS) or by well experienced staff in accordance with the format as shown in Figure 4.4

### **4.4 Dimensional Requirements**

Manhole reference will be given to a manhole on site in accordance with the IDMS Grid Reference and Manhole Reference System as shown in Figure 4.5.

### **4.1 Accuracy of Survey Data**

The standard of accuracy required in the survey are as follow:

- (1) All textural information shall be correct.
- (2) All measurements shall be accurate within the following:
  - a. Grid Reference  $\pm 1\text{m}$
  - b. Location Measurement  $\pm 300\text{mm}$
  - c. Levels  $\pm 25\text{mm}$
  - d. Relative levels of pipe inverts within the chamber  $\pm 20\text{mm}$
  - e. Pipe Size  $\pm 20\text{mm}$
  - f. Box-culverts  $\pm 20\text{mm}$
  - g. All other dimensions  $\pm 50\text{mm}$

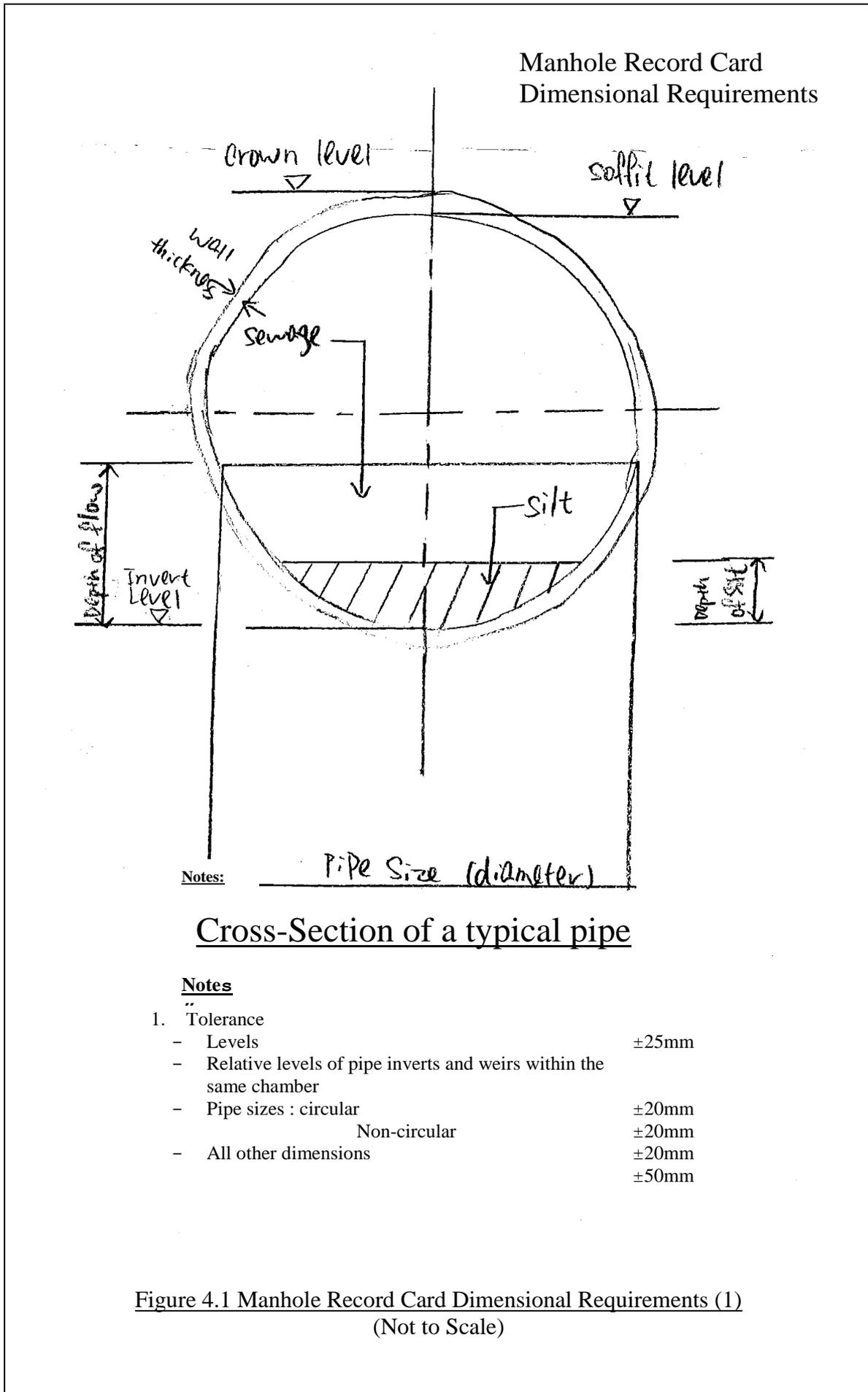
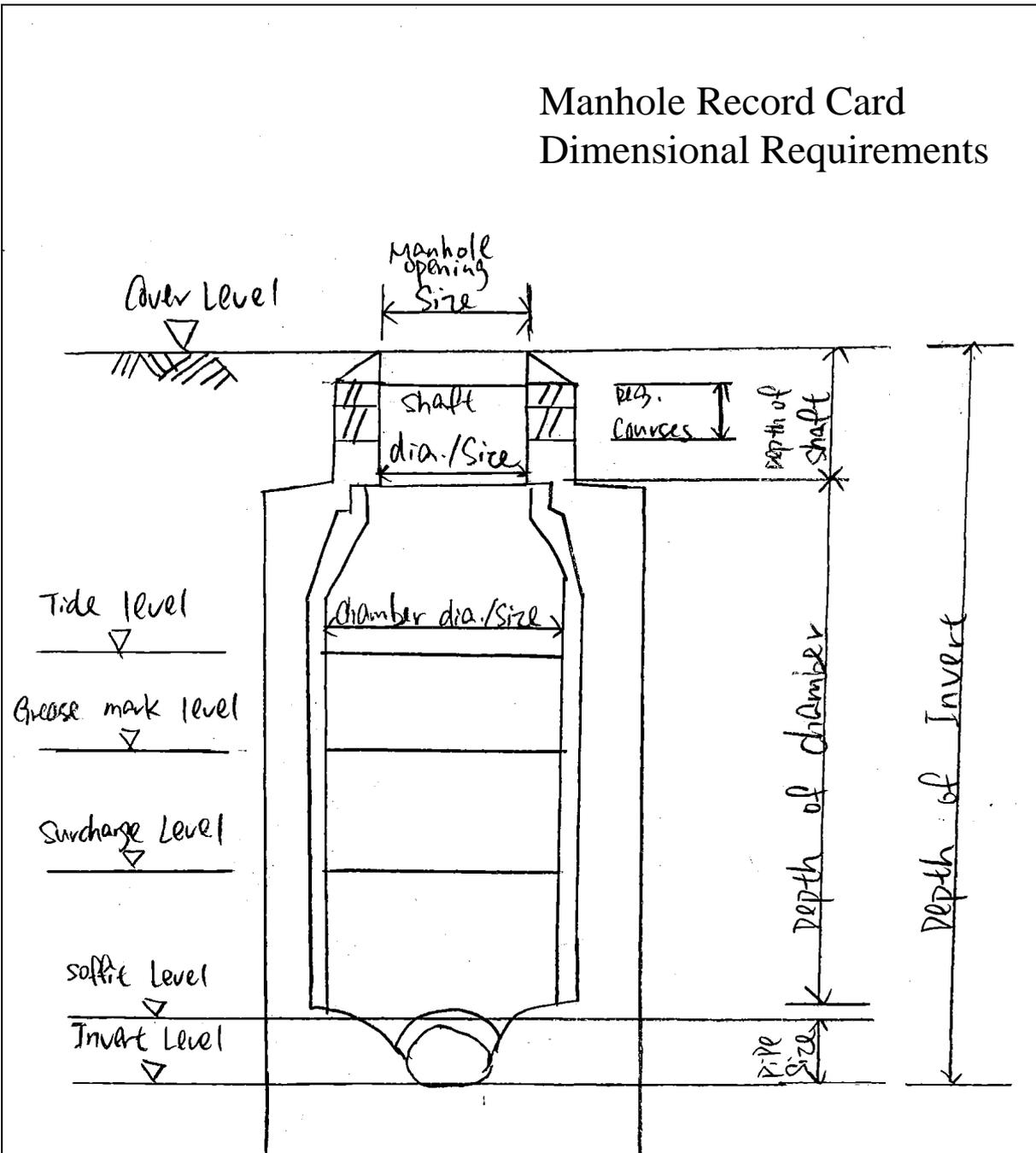


Figure 4.1 Manhole Record Card Dimensional Requirements (1)  
(Not to Scale)

## Manhole Record Card Dimensional Requirements



### Cross-section of a typical manhole

**Notes:**

1. Tolerance
  - Levels ±25mm
  - Relative levels of pipe inverts and weirs within the same chamber
  - Pipe sizes : circular ±20mm
  - Non-circular ±20mm
  - All other dimensions ±20mm
  - ±50mm

Figure 4.2 Manhole Record Card Dimensional Requirements (2)  
(Not to Scale)

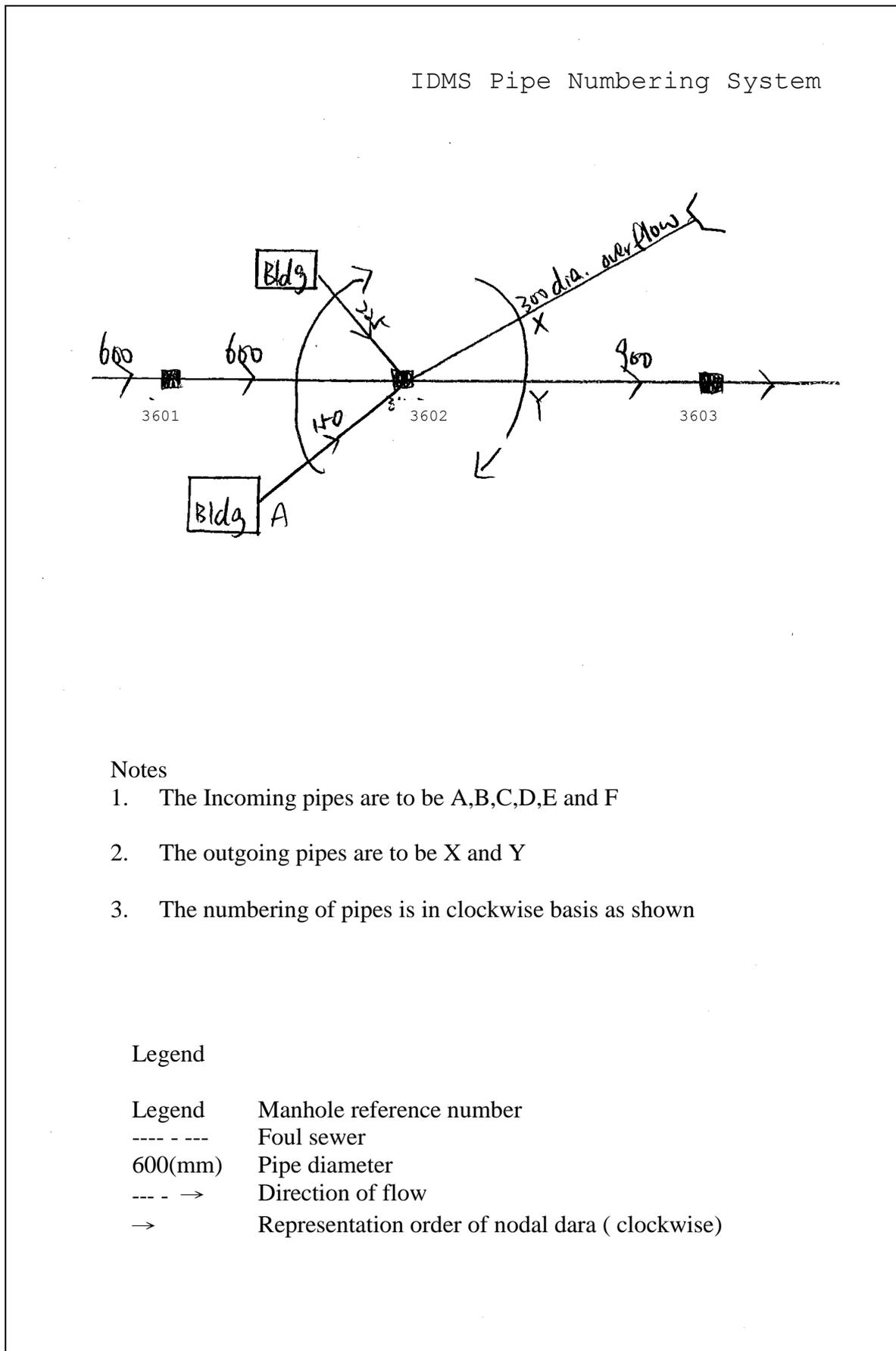


Figure 4.3 IDMS Pipe Numbering System  
(Not to Scale)

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*IDMS Manhole Record Form*

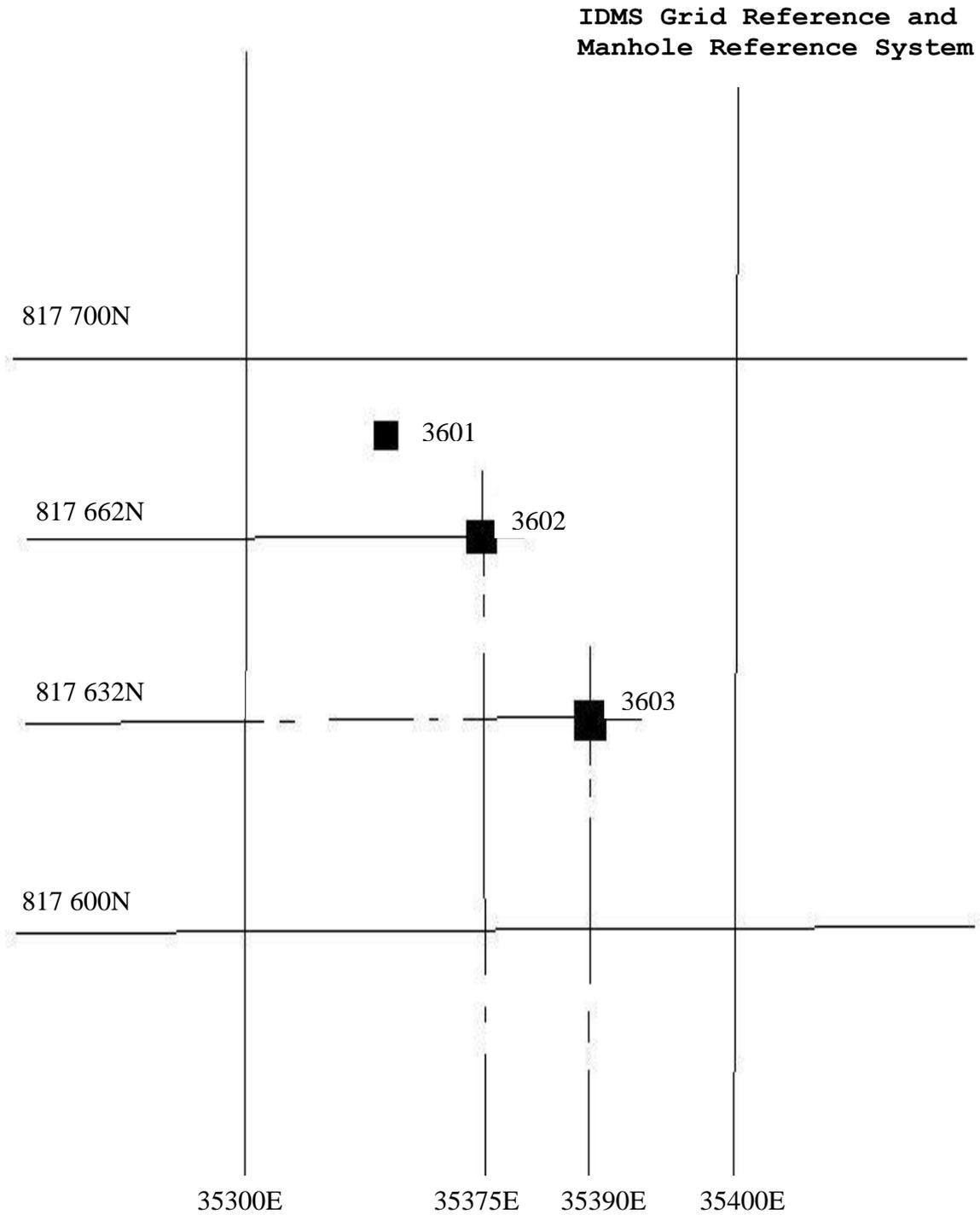
  

(6) PROJECT NO.		(8) IDMS MANHOLE ID		(1) NODE REF.	
(7) WO NO.		(9) DSD REF.		(2) GRID REF.	N E
(10) LOCATION				(3) DRAINAGE AREA CODE	
(11) YEAR LAID (YYYY)		(12) STATUS	Y / N	(4) SURVEYED BY	
		(13) FUNCTION	Y / N	(5) SURVEY DATE (DD/MM/YYYY)	
		(14) NODE TYPE			
COVER (15) SHAPE		(16) HINGED	Y / N	(17) LOCK	Y / N
SHAFT (20) SIDE ENTRY	Y / N	(21) REGULAR COURSES		(18) DUTY	
CHAMBER (24) SOFFIT		(25) STEPS		(19) COVER SIZE (dia. 1 (mm))	X
		(26) LADDERS		(23) SHAFT SIZE	X
				CHAMBER SIZE (28)	X
(32) DEPTH OF FLOW (mm)		(33) DEPTH OF SILT (mm)		(27) LNDGS	
				(29) TONIC ATMOSPHERE	Y / N
				(30) EVIDENCE OF VERMIN	Y / N
				CONSTRUCT CODE (31)	
				(35) COVER LEVEL (mPD)	
(36) UPSTREAM REF.		(37) PIPE SHAPE		(38) PIPE SIZE (dia. 110 (mm))	
			(W) (mm)	(39) BACKDROP (mm)	
				(40) PIPE MATERIAL	
				(41) LINING	
				(42) PIPE DEPTH	
				(43) INVERT LEVEL (m)	
INCOMING PIPES	A			X	
	B			X	
	C			X	
	D			X	
	E			X	
	F			X	
	G			X	
	H			X	
	(36) DOWNSTREAM REF.			(44) COND	Y / N
				(45) CRITY	A / B / C
OUTGOING PIPES	X			X	
	Y			X	
CONDITIONS (Y if attention required)					
(46) COVER	Y / N	(47) IRON/ LADDER	Y / N	(48) SHAFT	Y / N
(49) CHAMBER	Y / N	(50) BENCHING	Y / N	(51) OTHER	Y / N
(52) PHOTO NO					
(53) UTR	Y / N	(59) LOCATION PHOTO		(63) REMARKS	
(54) UTL	Y / N				
(55) UTGA	Y / N	(60) INTERNAL PHOTO		(64) RECORD PLAN DIFFERENCE	Y / N (Y if attention required)
(56) UTS	Y / N			(65) COVER TYPE	
(57) JETTING	Y / N	(61) MH DEPTH		STANDARD	LARGE
(58) ON-SLOPE	Y / N			MULTIPLE COVER	DOUBLE TRIANGULAR
SLOPE NO.:		(62) WATER DEPTH (UTS)		WITH DECORATION COVER	OTHERS: ( )
(66) Location Sketch				(67) Plan of MH	

(68) With Risk Assessment	Y / N	NODE TYPE: A: Catch Pit; B: Hydrobrake; C: Cascade; D: Dual function Manhole; E: Ejector; F: Outfall; G: Ghost; H: Hatchbox; I: Inlet; J: Junction (Saddle); K: Combined; L: Lamphole; M: Manhole; N: Dead End; O: Oil Interceptor; P: Pumping station; Q: Transition; R: Rodding eye; S: Soakaway; T: Vent Column; U: Unspecified; V: Storm Overflow; W: Treatment works; X: Unreliable; Y: Gully; Z: Ghost in rising main
(69) With Permit to Work	Y / N	
(70) With Traffic Permit	Y / N	

Figure 4.4 Manhole Record Card Format



**Notes**

1. The co-ordinates of the 100m x 100m grid are 835300E, 817400N and of the second manhole in the grid are 835375, 817462N
2. The IDMS grid reference for the manhole will be 35/17/375/462 – 3517375462
3. The manhole reference will be 35/17/3/4/02 - 35173402

**Figure 4.5 IDMS Grid Reference and Manhole Reference System  
(Not to Scale)**

## **5. Quality Assurance and Quality Control**

### **5.1 General**

Quality assurance is to reduce the possible errors induced in the various processes in the project and maintain the survey results with acceptable accuracy, which should include:

- (1) Well-experienced Crew Leaders (O/MHKIUS) to control site activities.
- (2) Well-trained technical staff.
- (3) Maintained in good condition our survey equipment by undertaking calibration on a regular basis.
- (4) Standardized field procedures
- (5) Spot checking (re-survey the site randomly by other crews where necessary) to identify any improvements if required.

### **5.2 Field Sheets**

- (1) Check that the correct area is marked.
- (2) Check that the location details are correct and that all spelling is correct.
- (3) Check that the correct 8 figure. IDMS Grid Reference has been used.
- (4) Check that there is a survey sheet number and that it has not been duplicated.
- (5) Check that the pipe size and material agrees with the CCTV details and the drawing.
- (6) Check that Man Hole cover levels are consistent with the u/s & d/s manholes.
- (7) Check that all depths are consistent with u/s & d/s manholes.
- (8) Check that the calculation of levels is correct.
- (9) Check that orientation is logical.
- (10) Check that any damage or fault identified from the photographs is marked.
- (11) Check that flow speeds and flow depths are recorded.
- (12) Check that any backdrop manholes are correctly recorded.
- (13) Check that the co-ordinates are recorded to the nearest 0.5m.
- (14) Check that all levels are recorded to the nearest 5mm.

**5.3 Manhole Surveys - Photographs / Photograph Sheets**

- (1) Check that the photograph gives a comprehensive account of the internal condition of the manhole.
- (2) Check that any faults have separate photographs.
- (3) Check that the photographs are of good quality
- (4) Check that the manhole number can be correctly identified.
- (5) Check that all photographs are correctly adhered to the photograph sheet.
- (6) Check that the correct information is written on the photograph sheet: photograph number; 8-figure IDMS Grid Reference; any comments; any descriptions.

**5.3 Manhole Surveys - Photographs / Photograph Sheets**

- (1) Check that the area is marked and is correct.
- (2) Check that the co-ordinates are marked and that they agree with the field sheet from the topographical survey.
- (3) Check that the correct sewer category has been marked to and from the subject manhole.
- (4) Check that the flow direction arrows are present and depict the correct flow direction.
- (5) Check that tie lines are clear and not easily mistaken for incoming/ outgoing pipes.
- (6) Check that pipe size agrees with field sheet, CCTV inspection and drainage schedule.
- (7) Check that manhole sketch is correctly oriented with the location sketch.
- (8) Check that all incoming and outgoing pipes are marked and agree with the field sheet orientation.
- (9) Ensure that any down pipes are marked and also any backdrops.
- (10) Check that the pipe size and material is marked and that it agrees with the field sheet, drawing and CCTV report.
- (11) Check that all pipe sizes and materials agree with the u/s & d/s manhole in fall/ outfall.

**References**

- (1) 16/WSD/97, Leakage Detection of Buried Watermains Affecting Slopes - Stage I, Water Supplies Department
- (2) Constitution, Hong Kong Institute of Utility Specialists (2011).
- (3) Course Note, Advanced Manhole Condition Survey for Operators, Engineers/Surveyors and Managers, UTI, 2007.
- (4) DC96/19, Investigation of Sewers and Drains Behind and Adjacent Fill Slopes and Retaining Walls, Drainage Services Department.
- (5) King Wong(2009), Hong Kong Conduit Condition Evaluation Codes(HKCCEC) The Code of Practice on Conduit Condition Evaluation using CCTV in Hong Kong, 4th Edition.
- (6) HKHA161/95, Detection of Leakage from buried water carrying services in the vicinity of slopes 'and retaining walls within the lands 'maintained by Housing Authority.
- (7) Particular Specification for Manhole Internal Condition Survey, HKIUS, 2011.
- (8) Sample report for Manhole Internal Condition Survey, HKIUS, 2011
- (9) Work procedures for Manhole Internal Condition Survey, HKIUS, 2011
- (10) Code of Practice on Monitoring & Maintenance of Water Carrying Services Affecting Slopes, ETWB (2006), Hong Kong SAR Government.

## **Appendix**

### **A1 Abbreviations**

<b>Company/ Organization</b>	
<b>Code</b>	<b>Description</b>
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, HKSARG
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
<b>Others</b>	
<b>Code</b>	<b>Description</b>
%	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

**A2 Requirements for Personnel Carrying Out Inspection**

Training and Experience Requirements for Personnel Carrying Out Inspection (HKIUS standard, 2011)			
Title	Role	Minimum Training Requirement	Qualification
Project Leader	Responsible for contract administration and preparation, checking and certifying of reports for compliance with the technical specification.	<ul style="list-style-type: none"> <li>➤ At least 35 hours of CPD every year</li> <li>➤ At least 14 hours for refreshment training in every three years</li> <li>➤ Relevant training in RTO (e.g. PolyU, UTI) for surveys and data collection</li> <li>➤ Has attended training courses for relevant survey/detection methods, and Possesses a valid training certificate for relevant survey/detection methods used</li> </ul>	Either: M/FHKIUS, RPUS plus CP, CW or MHKIE/ R.P.E. plus CP, CW and relevant training in RTO (e.g. PolyU, UTI) for surveys and data management
Deputy Project Leader	Responsible for assisting project leader and acting the post of project leader when project leader temporary not with the team	<ul style="list-style-type: none"> <li>➤ At least 35 hours of CPD every year</li> <li>➤ At least 14 hours for refreshment training in every three years</li> <li>➤ Relevant training in RTO (e.g. PolyU, UTI) for surveys and data collection</li> <li>➤ Has attended training courses for relevant survey/detection methods, and Possesses a valid training certificate for relevant survey/detection methods used</li> </ul>	Either: M/FHKIUS, RPUS plus CP, CW or MHKIE/ R.P.E. plus CP, CW and relevant training in RTO (e.g. PolyU, UTI) for surveys and data management
Team Leader	Responsible for works arrangement and data processing including checking of raw data for quality and consistency.	<ul style="list-style-type: none"> <li>➤ At least 35 hours of CPD every year</li> <li>➤ At least 14 hours for refreshment training in every three years</li> <li>➤ Relevant training in RTO (e.g. PolyU, UTI) for surveys and data collection</li> <li>➤ Has attended training courses for relevant survey/detection methods, and Possesses a valid training certificate for relevant survey/detection methods used</li> </ul>	M/FHKIUS, RPUS, CP, CW
Crew Leader	Responsible for supervising the field works and site safety.	<ul style="list-style-type: none"> <li>➤ At least 35 hours of CPD every year</li> <li>➤ At least 14 hours for refreshment training in every three years</li> <li>➤ Relevant training in RTO (e.g. PolyU, UTI) for surveys and data collection</li> <li>➤ Has attended training courses for relevant survey/detection methods, and Possesses a valid training certificate for relevant survey/detection methods used</li> </ul>	O/MHKIUS, CP, CW
Operators	Responsible for operating equipment and carrying out inspection and survey.	<ul style="list-style-type: none"> <li>➤ At least 35 hours of CPD every year</li> <li>➤ At least 14 hours for refreshment training in every three years</li> <li>➤ Relevant training in RTO (e.g. PolyU, UTI) for surveys and data collection</li> <li>➤ Has attended training courses for relevant survey/detection methods, and Possesses a valid training certificate for relevant survey/detection methods used</li> </ul>	AMHKIUS, CP, CW