



香港管綫
專業學會

HONG KONG INSTITUTE OF UTILITY SPECIALISTS
Non-profit Making Organization Incorporated in Hong Kong

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A Scene Beneath the Ground – The Utility World

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1. Background

A shocked sound “Boom”!, recalled the disaster/unexpected explosion on 11 April, 2006 at Ngau Tau Kok, Kowloon, which leads to one human death and eight injuries including one policeman patrolling nearby. Preliminary investigation revealed that the explosion was caused by the accumulation of explosive gas due to the minor leakage from underground gas ducts. The explosion undoubtedly aroused the awareness of the public on “The World Beneath the Ground”.

In Hong Kong, seven millions of people are stepping on the ground every day, but how many of them know the world on another side – the underground? In fact, the underground world is even denser than above-ground world. Statistics unveiled that there are around 37km of underground utilities under each kilometer of the road. Such tremendous figure is 3.5, 24 and 8 times of that in Singapore, United Kingdom and United States respectively.

2. Type of Underground Utilities

Hong Kong must be one of the most congested cities all over the world with respect to underground utilities. What is the function of underground utility? What exactly they are? How they affect our daily life and work operation? Indeed, all underground utilities are the channel for providing us the essentials for our life and work. These utilities include (1) water mains (i.e. drinking, flushing, watering, etc.); (2) gas mains (i.e. town gas and other tubed gases); (3) drain pipes (i.e. storm and sewerage); (4) power cables (i.e. Hong Kong Electric, CLP Power, etc.), (5) Area Traffic Control (ATC), (6) Electrical and Mechanical Services (E&M), (7) Telecom (i.e. NT&T, New World, Hutchison, HK Board Band, PCCW, etc.), (8) Street Lighting, (9) Cable TV (CATV) and (10) others (i.e. Redfusion, Tram, Train, Fire Services, etc.). Hong Kong, as the most significant international commercial and financial center of the world, stable and efficient communication is of essence. Therefore, vast amount of telecommunication cables were installed in such a small area by different companies, which further makes the underground more congested.

3. Location of Underground Utilities



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Utilities in Hong Kong are basically buried underground. There is a guideline to govern their position / level during installation. According to the guidelines, telecom, ATC, CATV and tram underground services should be laid underground within 1 meter under the ground. Instead, water pipes, power cables and gas ducts should be installed within the range of 1 meter to 2 meters below ground. How about the storm drains and sewerage drains? They should be positioned underground for 1.5 meters to 3 meters, and up to 5 metres respectively. Are there any underground services even deeper? The answer is simply “yes” and it is the major public transport of Hong Kong - the truck (major) mains. It is buried over 10 meters under the ground. However, it is still not the deepest underground service. The deepest one is the channel of Strategy Sewage Disposal Scheme (SSDS) which is situated down to over 100 meters underneath the ground to collect the sewerage from different places of Hong Kong and dispose them into the South China Sea after the treatment in Stone-cutter Island.

However, as a highly congested city like Hong Kong, the underground space is seriously constrained. It is not uncommon to find different utilities under the same or similar level, and in certain circumstances, the utilities are even in contact with each others. Therefore, the location of utilities does not strictly adhere to the established guidelines/standard.

4. Management of Underground Utilities

Currently, different utilities are managed by their corresponding utility undertakers (UUs). For those UUs with long history in Hong Kong, good management systems have already been established and are adopted to maintain their properties in a structured and logical manner. Through their systems, the alignments and sometimes the depth of their corresponding underground service could be easily identified. However, it is arduous for them to locate all types of utilities on the whole even at present moment though an information exchange platform has already been established. Therefore, an integrated repository storing all underground utilities is desirable for better management.

It is a statutory requirement to locate the alignment and depth of utilities in the vicinity of works before the commencement of any excavation works under Gas Safety Ordinance, Cap.51B, Electricity Supply Lines (Protection) regulation, Cap.406H and other contract specifications. Normally, metallic pipes and cables would be located by Pipe and Cable Locators (PCL) through the principle of electromagnetic induction. Ground Penetrating Radars (GPR) would also be utilized to cross-check the survey results of PCL.

Nevertheless, it is not an easy task to operate the PCL/GPR precisely and interpret the survey result accurately and logically. Frankly speaking, only small portion of practitioners / operators have spent their endeavour to understand the underlying principle of PCL and GPR, which may lead to significant discrepancies in survey results by different operators. Therefore, proper training is inevitable to uplift the professional standard of the



utility industry. For instance, regular pipe and cable locating courses are organized by Hong Kong Polytechnic University (PolyU), and UtilityINFO Institute (UTI), one of the company members of Hong Kong Institute of Utility Surveyors (HKIUS). Operators could be equipped with both theoretical and practical knowledge by accredited trainers who are professionals and experts in the utility survey industry through the courses.

In order to have a better quality control on utility survey, many contractors, consultants, surveyors and developers are currently adopting the specifications established by HKIUS in their contract requirements. These specifications cover Utility Mapping, Water Leakage Detection, Manhole Internal Condition Survey and Conduit Condition Evaluation (CCTV Survey).

5. Failure of Underground Utilities

The design life of underground utilities is normally ranged from 30 to 50 years. Despite the deterioration due to time flies, third party damages (i.e. excavation work) are the main causes of utilities failure. The failure of utilities would always impact the society seriously and even put human life on the spot. For example, the power dip due to the failure of power cable may lead to suspension of manufacturing production or stock exchange. Therefore, proper control system should be implemented to avoid and minimize any third party damages.

6. Protection of Underground Utilities

6.1. Challenges

Due to many current constraints, it is somehow a challenging task to protect the underground utilities properly. These constraints include (1) the lack of standards; (2) lack of quality checking procedures; (3) lack of properly trained personnel; (4) lack of social status of utility profession; and (5) vigorous bid price competition. All these factors are always conducive to less accurate survey results as compared to original expectation. Due to the lack of public awareness, some “bad / unethical” companies may cut off the necessary steps during utility survey so as to maximize their profit, and hence produce inaccurate survey result and low quality work.

6.2. Remedial Measures

In view of the need to protect underground utilities, several remedial measures should be taken without any reservations. First of all, universal standards should be developed for each type of the underground utility surveys. In addition, all industry undertakers should be properly trained in an accredited institute, and be awarded with a professional title. Finally, a professional roster should be maintained by an accredited institute in order to allow the public to identify the companies and professionals to be employed for a quality utility survey.



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Besides the boost of professional standard, the awareness of public should be emphasized. The public should be equipped with the basic information and knowledge on the underground world by different means such as the seminars, talks, technical visits, etc. conducted by government bodies and institutes. In fact, some institutes have already paid their effort to arouse the public awareness on underground utility protection and the most representative one is HKIUS. HKIUS organizes various events every year to promote the professional standard and educate the public on underground utility protection. HKIUS, together with some other parties, are currently organizing a large-scale competition related to utility and slope protection. The event has a broad coverage which includes drawing/poster design competition for primary students, slogan creation competition for secondary students, proposal writing competition for tertiary students and practical competition for the industry undertakers. Furthermore, a comic-coloring activity is planned for the kindergartens.

7. Conclusion and Future Recommendation

Underground utilities directly relate to our daily life and operation. Any damages may lead to serious social impact. In order to have effective slope management, and underground utility protection and maintenance, some future recommendations are stated as follows:

- ✧ Utility companies should provide adequate training to all management staff and operators, and require them to apply for HKIUS membership as a professional recognition.
- ✧ Utility companies should apply as HKIUS company members and a list of registered specialist should be compiled to facilitate professional supervision.
- ✧ Utility companies should submit a list of professionals of their company to HKIUS to have a better monitoring on the industry.
- ✧ To establish universal sets of standard, procedures and accuracy requirements pertinent to different types of utility survey to facilitate quality check and minimize the discrepancy of result.
- ✧ To allow utility specialist companies to submit tender directly to project client instead of the main contractor to achieve cost-effectiveness and prevent from any losses arisen from improper control.