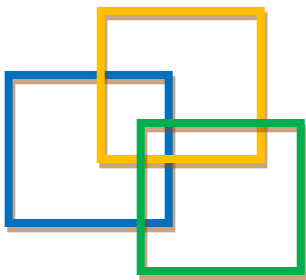




Hong Kong Institute of Utility Specialists  
Non – profit Making Organization

# Work Procedure For Buried Water Carrying Services Affecting Slopes (BWCS)



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## Foreword

Since the disastrous landslip that occurred in Kwun Lung Lau on Hong Kong Island on 23 July, 1994. Since 1995, the Government of HKSAR is investing 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 new profession in the Hong Kong market, Utility Specialists (US). Most of the Utility Specialist working almost independently, devoid of any standardized surveying methods and quality requirements (on survey results). No formal registration system was in place for Utility Specialist in the industry as recognized operational personnel in the market before the establishment of HKIUS in 2002.

In addition to the above, HKIUS consider it is the best to have a standardized work procedure for the industry to execute survey works and report under a standardized guideline. By consolidating all various method statements, specifications, training manuals, and the contracts documents produced for the vast number of underground utility survey contracts (government and private projects) available in the market, a comprehensive and standardized work procedure is produced. The standardized work procedure basically addressing the following topics in general:

- Planning and Preparation on Utility Services Information to be investigated
- Requirement of Personnel and Equipment for the Investigation Works
- Level of Accuracies
- Scheduling and Reporting
- Requirement of Deliverables in report format.

Such work procedure provides a straight forward and easy to follow to enable anyone from Client to Contractors and all Utility Specialist to understand. From here HKIUS unify all utility specialists in the Hong Kong market and become world class professionals.

You are welcome to take reference to this Particular Specification 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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**May, 2011**

If any error or mistake is found in this work procedure, please kindly contact us.

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## Work Procedures for Advanced Leakage Detection of Buried Water Carrying Services Affecting Slopes

Note: The working procedures is mainly for ease of site operation checking, details shall refer to relevant method statement submitted separately

### I) Plan for inspection:

Steps 步驟	Part 1. Plan for inspection: 勘察計劃	Completed by 檢測者
1.	Checking past record. 翻查紀錄	
2.	For private services, collect all information available regarding the assets from the client (asset owner). 若是私用設施，向客戶/ 資產擁有者索取所有相關資料  For public services, information can be obtained from various relevant Government Departments. 若是公用設施，可從相關政府部門獲取相關資料	
3.	The full extent of assets (manholes, pipes, catchpits and other ancillaries) located within the survey extents. 搜尋檢測範圍的所有相關結構（沙井、管道、截留井及其他有關結構）	
4.	Any other manholes and additional features not shown on the base mapping or layout plans, and/or revisions to match existing conditions on site. 有否其他圖則遺漏了的沙井及其他結構，及有甚麼需要按現況作修改	
5.	Safety precautions include Permit-to-work (PTW), Temporary Traffic Arrangement (TTA), Personal Protective Equipment (PPE), etc. 執行安全措施，包括工作許可証(PTW)、臨時交通安排、個人保護措施等。	

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II) Operation:

Steps 步驟	Part 2. Operation: 操作說明	Completed by 檢測者
1.	Locating existing water-carrying services: 探測地下帶水管道位置: Work procedure For Utility Mapping By Non-Destructive Methods (Ref.: HKIUS-WP-C) 詳細參考 HKIUS-WP-C- part2	
2.	Observe surface installations. 觀察與管綫相關的地面設施	
3.	Carry out utility survey. 進行管綫測量	
4.	Electromagnetic method (PCL) for metallic pipes . 以電磁法(管綫探測儀)探測金屬電纜	
5.	GPR for non-metallic pipes 以探地雷達探測非金屬電纜	
6.	Visual inspection to find out clues of leakage like water spots and seepage. 觀察地面有否水漬或滲水。	
7.	Inspection of drains by closed circuit television survey: 以閉路電視儀器檢測水渠: Work procedure For Conduit Condition Evaluation (Ref.: HKIUS-WP-A) 詳細參考 HKIUS-WP-A-part2	
8.	High pressure water jetting if found suitable. 如有需要，先進行高壓清洗。	
9.	CCTV survey / Man-entry survey if necessary. 閉路電視檢測 / 人員進入管內檢測(如有需要)	
10.	Manhole internal condition survey. 沙井內部狀況評估 Work procedure Manhole Internal Condition Survey (Ref.: HKIUS-WP-B) 詳細參考 HKIUS-WP-B-part2	
11.	Inspection for water mains by water testing (water leakage detection): 以水管測漏法檢測水管: Work procedure For Water Leakage Detection and Control (Ref.: HKIUS-WP-D) 詳細參考 HKIUS-WP-D-part2	
12.	Leak Noise Correlation Survey. 噪聲相關檢測	
13.	Mechanical Leak Detection/ Electronic Leak Detection. 使用機械測漏儀/電子測漏儀	
14.	Quick check of data recorded on site 在工作範圍內即場對已記錄的資料作出快速檢查	



## III) Report:

Steps 步驟	Part 3. Report: 報告	Completed by 檢測者
1.	<b>Process raw data from site team.</b> 由測量小組在進行資料處理: <b>Record and check</b> 記錄及核對	
2.	<b>Data entry to assigned folder corresponding devices with site no.</b> 將資料由相關儀器下載到記錄儀並附上工地編號	
3.	<b>QA/QC before reporting by MHKIUS (at least 5 years' experience).</b> 報告前由管綫專業監理師進行品質監控程序(最少五年經驗)	
4.	<b>Report shall consist of the followings:</b> 報告需包含以下項目:  <b>For Utility survey:</b> 地下管線探測: i. <b>Survey report – name and certificate number of competent person, mandatory information, survey result, recommendation.</b> 檢測報告－合資格人士的名稱及證明書號碼、基本資料、測量結果、建議。 ii. <b>Site photographs.</b> 現場相片 iii. <b>Information of equipment used.</b> 所用儀器的資料 iv. <b>Utility survey drawing – alignment, depth, diameter, direction (drainage services), type of the services, location of manholes and other related surface installations.</b> 管綫測量繪圖－設施的路由、深度、直徑、方向（渠務設施）及種類、沙井及其他地面設施的位置。  <b>Reference: Work procedure For Utility Mapping By Non-Destructive Methods</b> <b>參考資料: HKIUS-WP-C-part3</b>  <b>For CCTV survey:</b> 閉路電視檢測: i. <b>Operator's report – background information, summary of pipes, summary of defects, recommendations</b> 檢測報告－背景資料、管道摘要、缺陷摘要、建議。 ii. <b>Layout plan</b> 工作現場圖 iii. <b>Video record – video record of the entire inspection</b> 影像紀錄－檢測全程的影像紀錄。 iv. <b>Survey result</b>	

	<p>檢測結果</p> <p>v. Photographs – general photographs at 5m interval (if no defect is found) defect photographs capturing defects and defects shall be clearly seen 相片 – 每五米一張一般相片 (如無發現缺陷) 紀錄缺陷的缺陷相片，缺陷必須清楚顯示</p> <p>Reference: Work procedure For Conduit Condition Evaluation 參考資料: HKIUS-WP-A-part3</p> <p>For manhole internal condition survey: 沙井內部狀況評估:</p> <p>i. Location plan with all the manholes plotted within the survey extent. 已標記檢測範圍內所有沙井的位置圖。</p> <p>ii. Manhole record card. 沙井紀錄卡</p> <p>iii. At least 2 photographs (location photo (refer to Fig.2) and internal photo (refer to Fig.3)). 最少兩張相片 (位置相片 (參考圖二) 及內部相片 (參考圖三))</p> <p>iv. Condition photos for any other circumstances (refer to Fig.4). 如有其他狀況，亦須拍照紀錄 (參考圖四)。</p> <p>Reference: Work procedure Manhole Internal Condition Survey 參考資料: HKIUS-WP-B-part3</p> <p>For water leakage detection: 水管測漏</p> <p>i. Name of Operator(s), (A/O/M/FHKIUS) 操作員記錄 (姓名及註冊編號)</p> <p>ii. Location of Survey, 測量地點</p> <p>iii. Date and Time of Survey, 測量日期及時間</p> <p>iv. Total length of survey, 測量總長</p> <p>v. Number of survey setups, 已建立測量點的總數</p> <p>vi. Results (LNC print outs), 結果</p> <p>vii. Analysis of Results, 結果分析</p> <p>viii. Suspected or confirmed leak location with plan, 檢查及確定漏水位置</p>
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	<p>ix. Any difficulties encountered, 特殊/困難情況備註</p> <p>x. Recommendations 建議採取行動</p> <p>Reference: Work procedure For Water Leakage Detection and Control 參考資料: HKIUS-WP-D-part3</p>	
<p>5.</p>	<p>Report approved by RPUS (at least 8 year experience) 最終報告由管綫專業監察師(至少八年經驗)監定</p>	



Fig. 1 Open a manhole  
圖一. 開沙井



Fig. 2 Manhole location photo  
圖二. 沙井位置相片



Fig.3 Manhole internal photo  
圖三. 沙井內部相片



Fig. 4 Other condition: Invert was found broken.  
圖四. 其他狀況: 行水破裂

**References:**

1. Work Procedure for Conduit Condition Evaluation (CCTV and Man Entry Survey). (June, 2011). Hong Kong, China: HKIUS.
2. Work Procedure for Manhole Internal Condition Survey (MHICS). (June, 2011). Hong Kong, China: HKIUS.
3. Work Procedure for Utility Mapping By Non-Destructive Methods. (June, 2011). Hong Kong, China: HKIUS.
4. Work Procedure for Water Leakage Detection Survey. (June, 2011). Hong Kong, China: HKIUS.