

Brief Note on Central Policy Unit (CPU)-Funded Project for HKAES website (updated 20151011)

Enhancing Policy on Building Maintenance:

Solving the Residential Seepage Problem

鞏固屋宇維修政策：解決滲漏問題

總結報告 摘要

高密度高空發展是香港城市建設的成功因素之一。可是發高層住宅樓宇的維修卻較為複雜。其中調查滲漏更是多年來業主們未能解決的難題。一國兩制實施後，政府加大了支援及領導的角色。可是已經實施的資助計劃和強制驗樓制度，均未能解決大廈維修難題。政府直接介入處理滲漏問題，也未見十分成功。

大廈維修的難題有兩個關鍵。其一是在市場經濟的主體下，樓宇維修的行政措施必須同步優化社會公益目標與業主個人的目標。其二是工程作業方式必須在配合這兩個目標的條件下，達到最好的成本效益。

在行政措施方面，有專業能力的退休人士是新的可以動用的人力資本。研究工作指出了因此而成功解決樓宇難題的實例。優化的行政措施，應該盡量利用此新資源，使政府支援維修的政策得以增強及取得更好成效。並減少直接的介入。

在工程作業方面，這項研究使用新方法深入調查了三棟樓宇的滲漏情況。新法使用市場已使用多年的微波測量儀器，在滲漏出現處附近的石屎樓板或牆壁進行素描。從得到的濕度讀數製作“等濕線”圖。由此便可以鑑定滲漏流徑。猶如從地形等高線找出地面水的流徑。研究工作確立了這種無破壞性追查滲源的新方法及其可靠性，並建立了實際應用的程序。

研究報告根據上述兩方面的研究結果，對樓宇滲漏問題提出了解決辦法，並對鞏固現行維修政策提出了建議。研究報告也討論了如何應用這工程研究方法，以處理其他社會與科技混合屬性的維修問題。希望或有助相關政策的制定。

關鍵詞

公共政策；滲漏；樓宇維修及檢測

鳴謝

本研究項目(項目編號: 2014.C.006.14C)獲香港特別行政區政府中央政策組公共政策研究資助計劃撥款資助。

Summary of Final Report

Study Objective

The objective of the study is to develop the practical application of a new scanning method for identifying seepage source and based thereon to propose enhancements to the existing policy on building maintenance. The longer term purpose is to illustrate the new general approach to solving long standing problems of high-rise residential buildings

Current Practice and Deficiency

The Joint Offices (JO) of Buildings Department and Food and Environmental Hygiene Department undertake the investigation of seepage reports at no cost to building owners and takes actions to require abatement of seepage nuisance. As not all seepage cases constitute health hazard, part of the actions is inconsistent with the Government's fundamental policy that owners are responsible for building maintenance

Dye tests are used to determine whether a suspected location is the origin of seepage. The engineering investigation practice is deficient in 3 aspects:

1. Inability to handle intermittent infiltration from external wall.
2. Lack of reliable basis to identify likely water ingress points
3. Inadequate distinction of false positive or false negative results in the dye test assessment criteria.

The root causes of deficiency are

- Inappropriate design of the investigation approach and procedures
- Inadequate scientific basis of dye transport analysis.

New Method of Moisture Scanning

1) Validation

In the study of a complicated seepage case, seepage was seen dripping at the same locations of the ceiling of the complainant's flat in 3 separate periods between December 2006 and March 2014. Investigations were carried out using the current practice. During each of the first 2 incidents, 2 dye-water ponding tests (PT) were conducted on the alleged floor respectively in March 2007, June 2009; and in March 2010, June 2010. The results alternated between "positive" and "negative" in each incident. The alleged floor slab was kept dry throughout the period from before the first PT to 2014. There was no alteration to the floor slab until 2014. During the third incident the new method of moisture scanning was used and successfully located the seepage path which was verified by opening up. A subsequent dye test confirmed leakage in a section of the vertical sewer pipe.

The new method has been fully validated in the seepage investigation of 2 buildings respectively in Tung Chung and Fan Ling. Results of the investigations confirm the

following.

- Consistency of flow paths identified from upper side and lower side scanning of a slab, (Fig 1)
- Invariance of flow path with time and background moisture conditions, (by comparing Fig 1 and 2)
- Consistency of flow paths identified from scanning of a wall under different background moisture conditions (by comparing Fig 3 and 4).

Results of the investigation of seepage in a Sham Shui Po building demonstrated the practicality of investigation using scanning under difficult condition.

2) Practical Application Procedures have been proposed. The main points are:

- Include salinity and E coli tests to distinguish between health hazard and general seepage
- Preliminary scanning to identify appropriate scanning area
- Special points on the use of instrument and taking readings.
- Scanning procedures
- Analysis of results to produce moisture contours

3) Enhancement of Ponding Test for Verification of Seepage Source.

- Diffusion and evaporation taken into account in assessment criteria.
- Conditions leading to likely false positive or false negative results are indicated as range of dilution and time interval from end of ponding to first appearance of dye colour at seepage site.

Policy Implications

Capability of new scanning method to identify flow paths and ingress points by scanning within the complainant's unit enables government to reduce intervention in seepage investigation. JO needs only to intervene in case of presence of E coli.

When Government returns the responsibility of seepage investigation to building owners, needy owners may apply for financial assistance in seepage investigation as in the administration of other building maintenance problems.

Financial assistance for building maintenance implies a societal objective of the current policy. Philanthropic service should be included as an additional option of assistance to optimize the objective.

Unresolved building maintenance problems and other long standing problems are reflection of the new **class of social-technical** issues. The problems are suitable topics for development of innovation and technology. Retirees with experience in the relevant fields are potential new human capital for developing new initiatives in public policies on technology and active aging.

Recommended Actions

- Government to take the policy decision to return the responsibility to owners for seepage investigation. The Joint Office should only take up investigation of cases where evidences of health hazard have been clearly established
- Central Policy Unit, Food and Health Bureau and Development Bureau to jointly conduct a half-day seminar or briefing session on building maintenance for stake holders in the construction and property management sectors to disseminate the new practice of seepage investigation and the limitation of the current practice.
- Central Policy Unit and Home Affairs Bureau/Department to jointly conduct public forums or briefing sessions for home owners, OC's and District Councilors to disseminate the availability of the new method of direct detection of seepage source, and to re-educate on owner's responsibility.
- Government to consider ear-marking a certain cross-policy funding to promote contribution by retired professionals and technicians working as volunteers to assist financially needy owner in building maintenance. The related policies are active aging and innovation and technology.

Acknowledgement

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The Final Report of the study project has been submitted to the Central Policy Unit in September 2015.

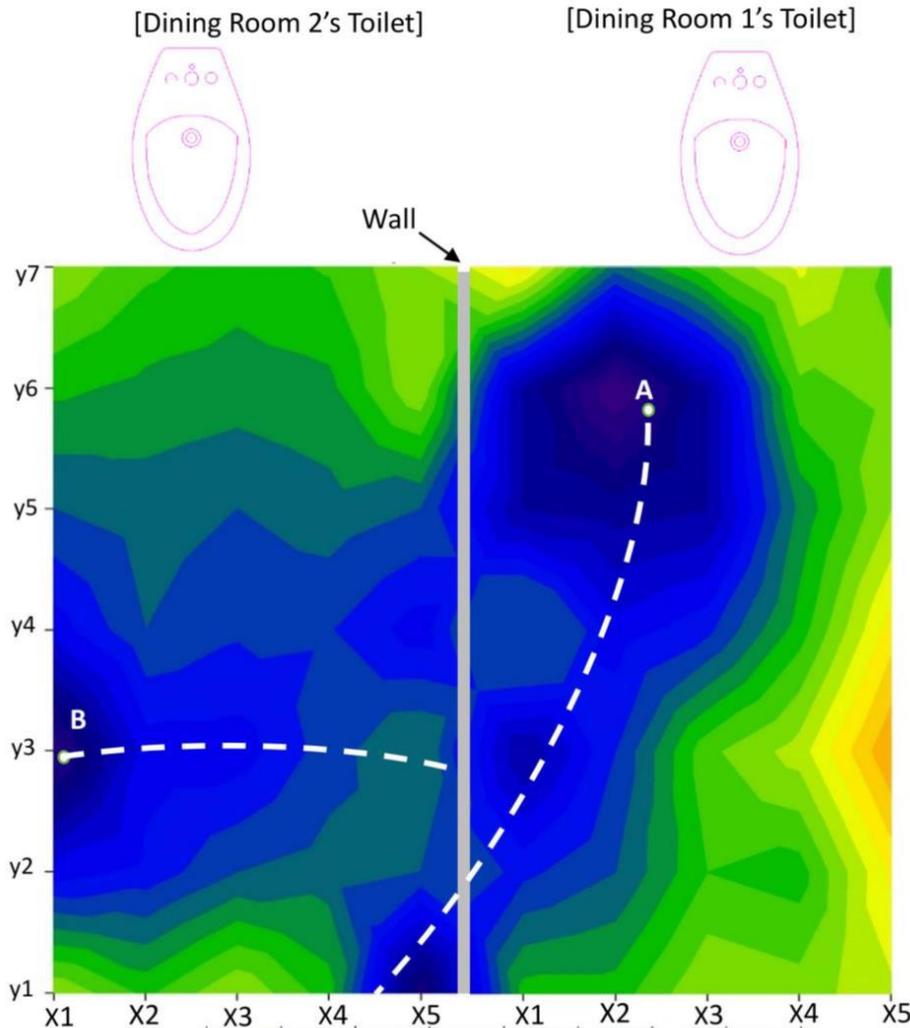
Project Team

Dr. Choi Yu Leuk (Principal Investigator), Prof. A W Jayawardena, Mr. Lam Siu Tong, Mr. Lui Ping Hon, Mr. Mo Kim Ming, Prof. Pun Kwok Leung,, Dr. Gordon Leung Lai Ming, Mr. Kwong Tsz Shun (1/2/2015 to 31/7/2015, seconded from Development Bureau)

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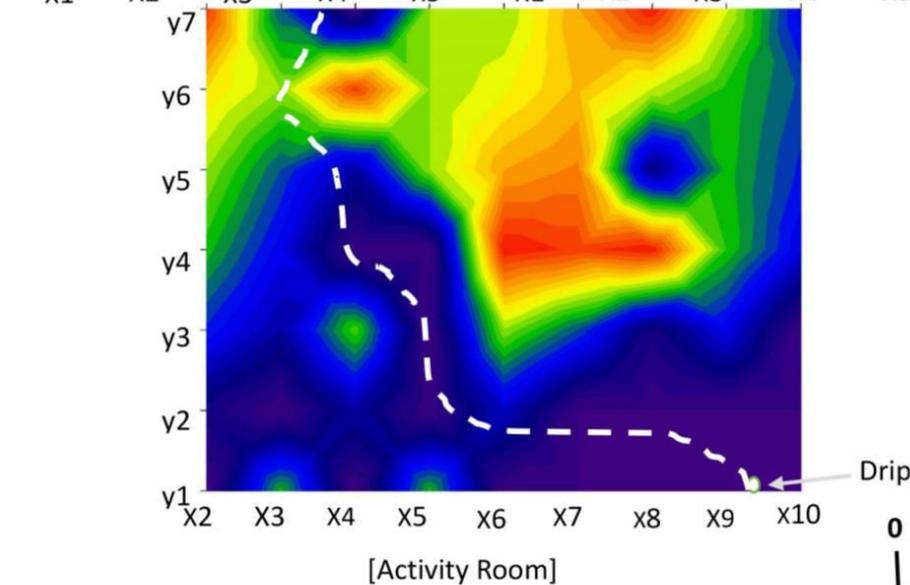
Figure 1. Moisture Contour Map in ceiling of Activity Room & floor of Dining Room Toilets in Tung Chung building on 17/3/2015

Moisture Contours of the floor slab in the toilets of Dining Room No.1 & No.2 and the ceiling of the Activity Room below (measured on 17 March 2015)



Notes:

1. Contours are at 100mm below floor level in upper maps and 100mm above ceiling level in lower map.
2. Coordinates in each map are those used in field data records.



Legend:

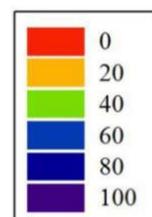


Figure 2. Moisture Contour Map in ceiling of Activity Room & floor of Dining Room Toilets in Tung Chung building on 11/6/2015

Moisture Contours of the floor slab in the toilets of Dining Room No.1 & No.2 and the ceiling of the Activity Room below (measured on 11 June 2015)

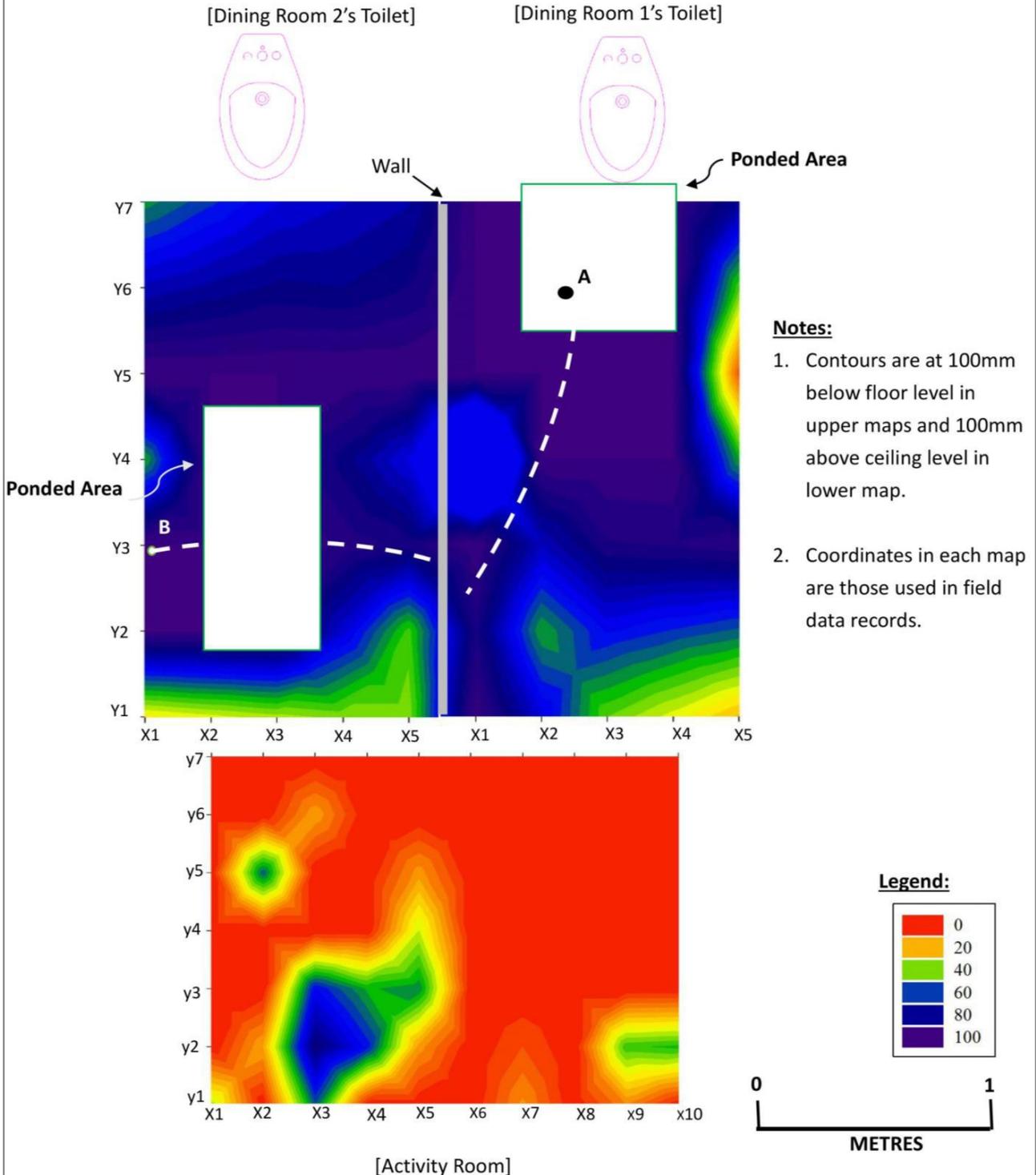


Figure 3. Moisture contour map in wall of Fan Ling building on 17/4/2015 after pre-wetting of all possible ingress points

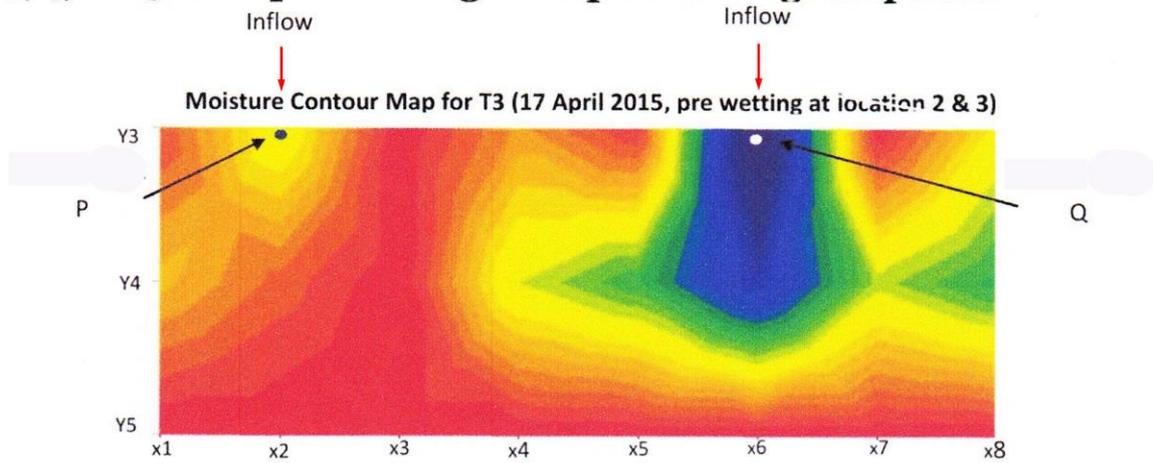


Figure 4. Moisture contour map in wall of Fan Ling building on 16/6/2015 after ponding of two identified ingress points only

