CHAPTER 1

Transport and Housing Bureau
Hong Kong Housing Authority
Housing Department
Buildings Department
Fire Services Department
Water Supplies Department

Maintenance and safety-related improvements of public rental housing flats

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MAINTENANCE AND SAFETY-RELATED IMPROVEMENTS OF PUBLIC RENTAL HOUSING FLATS

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MAINTENANCE AND SAFETY-RELATED IMPROVEMENTS OF PUBLIC RENTAL HOUSING FLATS

Executive Summary

1. As at 31 March 2016, the Housing Authority (HA) had provided 756,272 public rental housing (PRH) flats in 215 estates to meet the housing needs of low-income families that cannot afford private accommodation. To ensure a safe and pleasant living environment for the tenants, as well as sustain the lifespan and economic value of the PRH estates, the Housing Department (HD), as the executive arm of the HA, has introduced various maintenance and improvement programmes, the recurrent expenditure of which totalled about $3,090 million in 2015-16. As at 1 June 2016, the HD had 4,830 staff in its Estate Management Division which is responsible for the estate management and maintenance of the PRH. The Audit Commission (Audit) has recently conducted a review to examine the HD's maintenance and safety-related improvements of PRH flats.

In-flat maintenance of public rental housing flats

2. ***Implementation of the Total Maintenance Scheme (TMS).*** In 2006, the HA launched the TMS to improve the standard of maintenance within all PRH flats by proactively inspecting the in-flat conditions and providing comprehensive repair services. The first TMS cycle covering 177 estates was completed in 2011 at a total cost of $912 million. As at March 2016, the first five years of the second TMS cycle had been rolled out to 134 estates, with inspections and repair works completed in 120 estates at a total cost of $732 million (para. 1.5). Audit has found the following areas for improvement:

(a) ***Need to closely monitor the follow-up actions on inaccessible flats.*** Of the 80,965 flats inaccessible for inspection in the second TMS cycle, 24,455 (30%) were also inaccessible in the first TMS cycle. According to the HD's instructions, estate offices should take follow-up actions on inaccessible flats. However, Audit sample check revealed that for 300 selected PRH flats not inspected from 2011 to 2014, the estate offices concerned had not taken the opportunity to conduct comprehensive in-flat

inspections even when the tenants subsequently made requests for repair works in their flats under the Responsive In-flat Maintenance Services (RIMS — see para. 3 below) (paras. 2.16 to 2.18);

(b) ***Need to improve the in-flat inspection performance of TMS teams.*** In the HD's audits of the TMS teams' performance during 2012-13 to 2015-16, low scores were given to the in-flat inspection and maintenance service process. For example, in 20 (67%) of 30 estates covered by the performance audits, the average number of flats inspected by the TMS teams could not meet the inspection standards (para. 2.19); and

(c) ***Need to enhance maintenance education.*** The HD's surveys showed that 38% of tenants were unclear about the tenant-to-pay items (i.e. repair works for damage arising from improper use). As they might not procure the necessary repair services, such items could deteriorate into major maintenance issues (para. 2.21).

3. ***Implementation of the RIMS.*** To further enhance the maintenance services, the HA implemented the RIMS in 2008 to provide a customer-oriented in-flat maintenance service to tenants' daily works requests. The expenditure under the RIMS was $500.1 million in 2015-16 (para. 1.6). Audit has found the following areas for improvement:

(a) ***Need to ascertain the reasons for the increase in repair works under the RIMS.*** In a review of the TMS in 2008, the HD anticipated that once the repair works for a PRH flat were completed under the TMS, the same flat would not need to undergo major repairs in the following years. From 2011-12 to 2015-16, the number of works orders issued under the RIMS increased from 270,815 by 55% to 420,155. According to the HD, the reasons for increase included the higher awareness of tenants in reporting defects and the ageing of the PRH stock. However, Audit noted cases of repeated works orders involving the same works types and locations within a short period of time. The HD's checking also found unsatisfactory contractors' repair works as shown in paragraph 4(b) below (paras. 2.27 and 2.28); and

(b) ***Need to improve the RIMS service standards of estate offices.*** The performance verifications by the HD of 304 selected estates from 2011 to 2015 revealed that only 25 (8%) estate offices could meet all nine service standards in respect of inspections and repairs works (para. 2.30).

4. ***Monitoring of contractors' repair works.*** The HD conducts checks on contractors' repair works under the TMS and RIMS periodically (para. 2.34). Audit has found the following areas for improvement:

(a) ***Need to comply with the verification requirements.*** The HD's requirement to verify quarterly the effectiveness of water seepage repairs under the RIMS had not been complied with in three of six selected estates for two to six quarters from 2014 and 2015. Moreover, the same verification requirement had not been applied to water seepage repairs under the TMS (para. 2.35); and

(b) ***Need to strengthen the final inspections of repair works.*** Of 133 flats selected for checking by the HD from February 2014 to March 2016, 118 (89%) flats had 385 items of unsatisfactory TMS repair works requiring replacement/rectification works. The quality of RIMS repair works was also generally unsatisfactory and on a deteriorating trend. For example, in respect of workmanship, 349 (65%) of 535 estate works orders checked by the HD from 2011 to 2015 required partial or complete replacement/rectification works. The percentage of estate works orders requiring partial or complete replacement/rectification works increased from 50% in 2011 to 88% in 2015 (paras. 2.37 and 2.40).

Follow-up actions on public rental housing's water sampling tests for lead

5. Exposure to lead may adversely affect human health. Since the start of "excess lead in drinking water" incident in July 2015, the HA and the Government had conducted water sampling tests for all PRH estates and found that water samples from 11 PRH developments had lead content above the World Health Organization's provisional guideline value. Three investigations conducted by the Government and the HA had addressed the cause of excess lead in drinking water of PRH developments and recommended control/monitoring measures to prevent recurrence of similar problems. This audit review has focused on follow-up actions on PRH's water sampling tests for lead (paras. 1.7 to 1.9).

6. ***Discrepancies between the announced sampling test results and source data of the sampling tests.*** The HD had provided the HA and the Legislative Council (LegCo) with regular updates on the "excess lead in drinking water" incident. In March and July 2016, the HA and the LegCo House Committee respectively were informed of the confirmed sample numbers for water sampling tests conducted from July to November 2015. In July 2016, Audit examination of the source data of the water sampling test results revealed some discrepancies with the information reported to the HA and the LegCo House Committee. In response to Audit's enquiries in August 2016, the HD said that there was an omission in reporting two non-compliant samples taken from Kai Ching Estate after it had been declared as an affected estate. As a result, the total number of non-compliant samples taken from the 11 affected PRH developments reported to the HA and LegCo should have been 93 instead of 91. Moreover, the announced numbers of water samples taken from three developments were also inaccurate. Notwithstanding the discrepancies identified, the total number of affected PRH developments remained unchanged (paras. 3.3 to 3.6).

7. ***Records of decisions on non-compliant and discarded samples not fully maintained.*** From 20 July to 18 November 2015, 29 inter-departmental meetings which were chaired by the Permanent Secretary for Transport and Housing (Housing) and comprised representatives from the HD, the Water Supplies Department (WSD), the Government Laboratory and the Department of Health, had been held to discuss and coordinate matters relating to the sampling of drinking water in PRH developments. However, the HD only prepared decision notes for 22 inter-departmental meetings held from 12 August to 18 November 2015. Decision notes had not been prepared for 7 (24% of the total 29) inter-departmental meetings held from 20 July to 7 August 2015 where important decisions had been made on 55 non-compliant samples (taking follow-up action on 49 of them and discarding the remaining six)(paras. 3.8, 3.10 and 3.12).

8. ***Developing appropriate sampling protocol.*** In July 2016, the LegCo House Committee was informed that: (a) the WSD had commenced follow-up work on the recommendations of the Commission of Inquiry, including engaging expert consultants to conduct a study on developing an appropriate sampling protocol; and (b) the pertinent work was targeted to be completed in six to nine months. An international expert panel was also set up in June 2016 to provide advice on the

proposed sampling protocol. As the retesting of drinking water of all PRH estates using an appropriate protocol could point to the need for further measures to be taken to safeguard tenants' drinking water safety, the WSD needs to closely monitor the progress of developing an appropriate sampling protocol to ensure that the target completion date will be met (para. 3.15).

9. ***Water sampling/screening tests not conducted for PRH flats in Tenants Purchase Scheme (TPS) estates.*** On 7 August 2015, the Secretary for Transport and Housing cum Chairman of the HA responded to the media that the nature of TPS and Home Ownership Scheme estates was more akin to private residential buildings and the decision to conduct water sampling tests rested with the Owners' Corporations (OCs) concerned. According to HD records, as at 31 March 2016, there were 54,493 PRH flats in 39 TPS estates under the ownership and management of the HA. While the mixed ownership in TPS estates might complicate the conducting of water sampling tests for pipe connections in common areas, there was no evidence to show that the HD had made efforts to liaise with the OCs concerned to sort out the issue. The HD also has full discretion to conduct tests in the same way it provides other maintenance services to the PRH flats in these estates. In response to Audit's enquiry, the HD said that there were practical and technical difficulties in conducting water sampling tests for PRH flats in TPS estates due to the mixed ownership of these estates. The HD also informed Audit that, given the wide and sustained publicity by the Government and the HA, the OCs of TPS estates had been alerted to the issue and had presumably been making decisions as they deemed fit (paras. 3.17, 3.19 and 3.20).

10. ***Relief measures and rectification works for the 11 affected PRH developments.*** Since the incident of excess lead in water came to light in July 2015, the HD and WSD had taken the following measures to provide safe drinking water to tenants of the 11 affected PRH developments:

(a) ***Relief measures.*** Relief measures included the provision of water wagons/tanks and standpipes, supply of bottled water, installation of temporary water points on each floor of the affected PRH developments and installation of water filters for the affected domestic households free of charge. The HD had also informed tenants of the risk of taking water for consumption directly from taps in the affected estates through a number of channels. According to HD records, as at July 2016, 2,138 (7.4%) of 29,077 domestic premises in the 11 affected PRH

developments had not been installed with water filters because some households had refused to install filters or returned filters after use or could not be contacted for arranging the installation works. Given the health risk of excess lead in drinking water, the HD needs to continue its effort in contacting households whose flats had not been installed with water filters to consider installing water filters or take other precautionary measures (paras. 3.24, 3.29 and 3.30); and

(b) ***Permanent rectification works.*** The HA had requested the four contractors concerned to replace at their own expense the non-compliant pipes in the 11 affected PRH developments. As at July 2016, the progress of rectification works in the common areas of the 11 affected PRH developments ranged from 18.5% to 45.6%. The HD's plan was to replace the non-compliant water pipes inside domestic units after completion of the rectification works in the common areas (paras. 3.26 to 3.28).

Management of asbestos-containing materials in public rental housing estates

11. Asbestos is a proven carcinogen when inhaled. Before the health hazard of asbestos was recognised, it had been widely used for fire-proofing and insulation purposes. Legislative control over asbestos-containing materials (ACMs) in Hong Kong is provided for under the Air Pollution Control Ordinance (APCO — Cap. 311) and the Factories and Industrial Undertakings (Asbestos) Regulation (Cap. 59AD). The HD had banned the use of ACMs in constructing public housing since 1984 and put in place procedures in handling ACMs in 1988. It also conducted a comprehensive survey on ACMs in PRH estates in 1989. According to the HD, the most common building components with ACMs were the balcony/lobby grilles and roof tiles of the HA's older properties (paras. 4.2, 4.5 and 4.6).

12. ***Monitoring of ACMs in PRH estates.*** The HD has laid down guidelines for staff in conducting half-yearly condition surveys of ACMs in balcony/lobby/staircase grilles and chimneys of PRH estates (para. 4.9). Audit has found the following issues:

(a) ***Previously unannounced PRH estates/block with ACMs.*** According to the condition survey records from 2010 to 2015, each survey had covered all PRH estates with ACMs as promulgated on the HA website. However, the June 2016 condition survey included five PRH estates/block which according to the HD had not been promulgated previously as their ACMs were at locations inaccessible to tenants and the public. Without proper management and monitoring through condition surveys before 2016, the condition of such ACMs could have deteriorated over the years, thus increasing the risk of asbestos exposure of construction workers and the HD's maintenance staff. Audit also noted that one of the five previously unannounced PRH estates/block with ACMs was built in 1985, suggesting that ACMs might have been used in housing structures after the HD's ban in 1984 (paras. 4.10 to 4.12);

(b) ***Damaged balcony/lobby grille panels with ACMs.*** In the joint inspections with the HD of two estates with ACMs in balcony grille panels, Audit found six cases of damaged panels warranting more detailed inspections but had not been reported by the condition surveys conducted from 2010 to 2015 under the HD's existing assessment criteria. Audit also found unreported cases of damaged lobby grille panels with un-encapsulated ACMs on two floors of one of the two estates. In the other estate, the record of asbestos-containing balcony grilles which had all along been used for conducting condition surveys and advising tenants of the ACM locations was found to be inaccurate (paras. 4.13 to 4.16); and

(c) ***Need to strengthen in-flat inspections of ACMs in balcony grilles.*** According to the HD, besides the half-yearly condition surveys at external elevation, asbestos-containing balcony grilles located inside flats are inspected during vacant flat refurbishment, upon request for in-flat repair and during TMS in-flat inspections. However, the condition survey reports of an estate from 2010 to 2013 showed that in-flat inspections only covered 13% of the 2,009 flats with ACMs in balcony grilles. In one case, the un-encapsulated condition of an asbestos-containing balcony grille was not reported in a timely manner (paras. 4.18 to 4.20).

13. ***Control over works affecting ACMs in PRH estates.*** According to the APCO, all asbestos abatement works or works involving the use or handling of ACMs must be carried out and supervised by registered personnel in compliance with prescribed standards (para. 4.26). Audit has found the following issues:

(a) ***HD contractors' works affecting ACMs of balcony grilles.*** The HD's guidelines provide that encapsulation of asbestos-containing balcony grille panels in good condition may be handled as normal maintenance works using specified methods. In a case of concrete spalling repair and encapsulation works of the asbestos-containing balcony grille panel in 2015, the photograph taken before works suggested that the condition of the panel might not have been in good condition. However, the repair and encapsulation works involving ACMs were carried out by the HD's RIMS contractor which might not have complied with the APCO requirements/HD's laid-down procedures (para. 4.27);

(b) ***Tenants' works affecting ACMs of balcony grilles.*** While the HD had posted a notice on the HA website on PRH estates with ACMs, the notice did not contain sufficient details about the exact locations of ACMs for estates where not all flats have ACMs. Warning labels of ACMs were rarely used. Uninformed tenants may inadvertently carry out works that would disturb the ACMs. This was evidenced in 17 cases of air-conditioners and one case of towel rack found installed on the asbestos-containing balcony grille panels of an estate. There was a risk that such works could have disturbed the ACMs and exposed the installation workers/tenants to asbestos (paras. 4.28 to 4.32); and

(c) ***Suspected case of removal of a chimney with ACMs not in compliance with the APCO requirements.*** In January 2011, the HD advised the owner of a damaged chimney with ACMs in an estate to engage a qualified contractor to rectify the problem. According to the HD, the subject chimney was removed in late July 2011. However, according to the Environmental Protection Department, it had no record of any asbestos investigation report nor an asbestos abatement plan submitted for the removal of the subject chimney, suggesting that the APCO requirements might not have been complied with. While it was the primary responsibility of the chimney owner to meet the statutory requirements under the APCO in removing the chimney, the HD also had a monitoring role to ensure that works carried out by third parties in its managed estates would not compromise tenants' safety (para. 4.34).

14. ***Follow-up actions on un-encapsulated ACMs in balcony grille panels.*** The HD's Asbestos Management Manual of 2003 stated that "Most asbestos balcony grille panels of properties managed by Housing Department or HA's management agents have been encapsulated. It is intended that the remaining panels also be encapsulated if access and other constraints can be overcome". According to the HD's 1990 ACM records, the interior walls of the asbestos-containing balcony grille panels in 15 flats of Hing Wah (II) Estate had not been encapsulated due to problems in gaining access to these flats. In late July 2016, the HD engaged an asbestos consultant and found that the ACM balcony grille panels of these 15 flats had been fully encapsulated. However, there was no record of the encapsulation works to show whether they had been carried out in compliance with the APCO requirements/HD's laid down procedures. Furthermore, Audit noted that the two un-encapsulated cases as reported in paragraphs 12(c) and 13(a) were not among the 15 flats, indicating that there could be omissions in the HD's 1990 ACM records (paras. 4.37 to 4.39).

Replacement of laundry pole-holders

15. Some 550,000 PRH flats in estates completed before 2005 were installed with laundry pole-holders for drying laundry. In the past years, there were safety concerns over the use of laundry pole-holders by tenants. To enhance the quality and safety of PRH flats, the HA in 2004-05 launched a one-off subsidy scheme under which each household was only required to pay $200 (about half the cost) for replacing the pole-holders with laundry racks. In February 2014, the HA approved the replacement of laundry pole-holders with laundry racks at a total estimated cost of $520 million (paras. 1.11 and 5.2).

16. ***Implementation of the 2004-05 subsidy scheme.*** In 2004 and 2005, the HD implemented the subsidy scheme in two phases. Audit found that the HD only maintained records of laundry rack installation for the first phase. The HA's Subsidised Housing Committee was not informed of the achievement of the subsidy scheme until 2014 when its endorsement for the 2014 replacement programme was sought. The Committee was then informed that based on a large-scale sampling survey, about 10% of the flats with laundry pole-holders had been installed with laundry racks. This was far less than the estimated 30% stated in the 2004 Subsidised Housing Committee's paper when its endorsement of the subsidy scheme was sought (paras. 5.3, 5.4, 5.6 and 5.8).

17. ***Implementation of the 2014 replacement programme.*** In February 2014, the HD informed the Subsidised Housing Committee that: (a) free replacement would be provided for those tenants opting for the installation of laundry racks. For tenants who did not opt for a new rack, the laundry pole-holders of their flats would be sealed up to avoid further use in order to settle prolonged criticism related to the laundry pole-holders once and for all; and (b) the 2014 replacement programme would last for about three years. As at 31 July 2016, there were 493,697 PRH flats included in the 2014 programme. Among them, 249,326 flats were covered by the first batch contracts awarded in 2015 or before. For the remaining 244,371 flats, they would be covered by the second batch contracts awarded in 2016 and thereafter (paras. 5.9 and 5.11).

18. ***Need to closely monitor the progress of the 2014 programme.*** As at 31 July 2016, of the 42 estates reported having completed works or with planned works schedules which had expired, the laundry rack installation works for 2,702 opted-in flats in six estates and the pole-holder sealing-up works for 4,801 opted-out flats in 10 estates were still outstanding. Of the 15 estates with works due for completion from August to September 2016, six estates had 75% of their opted-in flats (ranging from 51% to 94%) pending laundry rack installation works and 10 estates had 76% of their opted-out flats (ranging from 51% to 99%) pending pole-holder sealing-up works (paras. 5.12 and 5.13).

19. ***Partially sealing up of laundry pole-holders.*** In a sample check of some flats on two estates reported by the HD to have completed or almost completed the sealing-up works for their opted-out flats as at 31 July 2016, Audit found 96 cases of unsealed laundry pole-holders in one estate reported to have completed sealing-up works. In another estate, there were 71 cases of partially sealed up or unsealed laundry pole-holders instead of the reported seven outstanding cases (para. 5.17).

20. ***Recent developments.*** In September 2016, the HD obtained the endorsement of the Subsidised Housing Committee to provide laundry rods at the living room façade in specified block types of the PRH estates at an estimated expenditure of $386 million. The HD needs to take on board the observations and recommendations in this Audit Report in pursuing the new initiative of providing laundry rods in specified housing blocks (para. 5.20).

Enhancing fire safety of old public rental housing estates

21. ***Fire Safety (Buildings) Ordinance (FS(B)O — Cap. 572) Requirements.*** Under the FS(B)O which came into effect in 2007, owners of domestic and composite buildings with three storeys or above built on or before 1 March 1987 should comply with the specified fire safety requirements. As at July 2016, there were 64 PRH estates requiring upgrading of their fire safety construction/fire service installations to meet the FS(B)O requirements (paras. 1.12 and 6.10(a)).

22. ***Implementation of the FS(B)O in PRH estates.*** In 2008, the HD agreed with the Buildings Department (BD) and the Fire Services Department (FSD) (i.e. the enforcement authorities of the FS(B)O) on a prototype approach in implementing the FS(B)O in PRH estates. In 2010 and 2014, the HD commissioned three consultancy studies to work out the fire safety improvement proposals for specific PRH block designs for the BD/FSD's vetting. According to the HD's 2014 estimate, the cost of improvement works covering fire safety construction in 51 estates of the slab block design and all fire service installation works, and related consultancy fee would be $851.7 million (paras. 6.6, 6.7, 6.9, 6.10(d) and 6.12).

23. ***Need to closely monitor the implementation progress.*** Up to August 2016 (nine years after the FS(B)O came into effect), fire safety improvement works for the 64 PRH estates had not been fully completed for compliance with the relevant requirements of the FS(B)O. In particular, the progress in respect of fire safety construction was slow. According to the HD's 2014 tentative programme, Phase I fire safety construction works in the 51 estates of the slab block design were only targeted for completion by 2020-21. For Phase II works covering the remaining blocks, budget and programme would be reviewed upon confirmation of the scope by 2016. As for the three consultancy studies for formulating fire safety improvement proposals for specific PRH block designs which were targeted for completion in mid-2016, as at August 2016, only two studies had been completed. The HD needs to closely monitor the progress of implementing the FS(B)O to avoid further slippage (paras. 6.14 and 6.15).

24. ***Need for greater inter-departmental collaboration to implement the FS(B)O in PRH estates.*** While the BD/FSD agreed to offer comments on the HD's fire safety improvement proposals for specific PRH block designs, they also remarked that the comments were to facilitate the HD's self-compliance programme of the FS(B)O in PRH estates. In other words, there was still no agreement on the formal acceptance of the fire safety improvement works for the PRH estates. As the HD's fire safety improvement proposals are intended to provide cost-effective solution to meeting the requirements of the FS(B)O in PRH estates, there is a need for greater collaboration among the HD, the BD and the FSD to ensure that the proposed works are efficiently vetted and formally accepted (para. 6.16).

Audit recommendations

25. **Audit recommendations are made in the respective sections of this Audit Report. Only the key ones are highlighted in this Executive Summary. Audit has *recommended* that the Director of Housing should:**

In-flat maintenance of public rental housing flats

(a) **closely monitor the adequacy of follow-up actions taken by the estate offices on inaccessible flats, in particular those flats which were inaccessible in both the first TMS cycle and the first five years of the second TMS cycle (para. 2.24(b));**

(b) **conduct a review to ascertain whether there are other causes for the increase in RIMS works orders that warrant the HD's management attention (para. 2.32(a));**

(c) **strengthen the final inspections of contractors' repair works under the TMS and the RIMS to ensure that their quality is up to standard before acceptance (para. 2.42(b));**

Management of ACMs in PRH estates

(d) **for the five PRH estates/block with ACMs not previously announced, expedite action to ascertain their condition and take necessary follow-up action (para. 4.24(a));**

(e) **consider providing more guidelines on assessing the nature of damage found in condition surveys of ACMs in PRH estates (para. 4.24(c));**

(f) **closely monitor the extent of in-flat inspections to ensure an adequate coverage of all the asbestos-containing balcony grilles within a reasonable time frame (para. 4.24(g));**

(g) **strengthen the monitoring and control of the maintenance, repair and demolition works involving ACMs in PRH estates, including those undertaken by third parties (para. 4.35(b));**

(h) **take measures to prevent accidental disturbance to ACMs, including labelling all ACMs and posting the ACM notice on the notice boards of relevant estates at all times (para. 4.35(d));**

Replacement of laundry pole-holders

(i) **closely monitor the works progress of the 2014 programme for replacing laundry pole-holders to ensure that the target completion date of 2017 would be met (para. 5.21(c)); and**

(j) **carry out a comprehensive review of the reported cases of completed sealing-up works with a view to identifying any irregularities similar to those found by Audit for taking necessary follow-up actions accordingly (para. 5.21(d)).**

Follow-up actions on public rental housing's water sampling tests for lead

26. **Audit has *recommended* that the Permanent Secretary for Transport and Housing (Housing) should, when carrying out retesting of the drinking water of PRH estates in accordance with the Commission of Inquiry's recommendation:**

(a) **in collaboration with the Director of Water Supplies, strengthen data validation to ensure that information provided to the HA/LegCo is accurate (para. 3.31(a)(i)); and**

(b) **take measures to ensure that proper records on all discussions in respect of sampling matters are maintained to support evidence-based decision making (para. 3.31(a)(ii)).**

Enhancing fire safety of old public rental housing estates

27. **Audit has *recommended* that the Director of Buildings and the Director of Fire Services should work in collaboration with the Director of Housing to ensure that the fire safety improvement works for meeting the FS(B)O requirements in PRH estates are efficiently vetted and formally accepted (para. 6.18).**

Response from the Government

28. The Government generally agrees with the audit recommendations.

PART 1: INTRODUCTION

1.1 This PART describes the background to the audit and outlines the audit objectives and scope.

Background

1.2 ***Hong Kong Housing Authority (HA).*** The HA (Note 1) is a statutory body established in April 1973 under the Housing Ordinance (Cap. 283). It is responsible for implementing a public housing programme to meet the housing needs of low-income families that cannot afford private accommodation. One of its missions is to provide affordable quality housing, management, maintenance and other housing-related services to meet the needs of its customers in a proactive and caring manner.

1.3 ***Housing Department (HD).*** The HD, as the executive arm of the HA, provides secretarial and executive support for the HA and its six standing committees (see Appendix A). The HD also supports the Transport and Housing Bureau in dealing with all housing-related policies and matters. As at 1 June 2016, the HD had 9,080 staff including 4,830 staff in the Estate Management Division, most of them are responsible for the estate management and maintenance of the public rental housing (PRH). An extract of the organisation chart of the HD is at Appendix B.

1.4 ***Maintenance and improvement works.*** As at 31 March 2016, the HA had 756,272 PRH flats in 215 estates (see Table 1), accommodating some two million people or 30% of Hong Kong's total population. To ensure a safe and pleasant living environment for the tenants, and sustain the lifespan and economic value of the PRH estates, the HD has introduced various maintenance and improvement programmes. The recurrent expenditure on maintenance and

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Note 1: *The HA has four official members and 25 non-official members. Appointments are made by the Chief Executive of the Hong Kong Special Administrative Region. The Secretary for Transport and Housing assumes the office of Chairman of the HA while the Permanent Secretary for Transport and Housing (Housing) who is also the Director of Housing assumes the office of Vice-chairman.*

improvement works for all PRH totalled about $3,090 million in 2015-16. Given the diverse nature of the HD's maintenance and improvement works, this Audit Report only focuses on in-flat maintenance and safety-related improvements of PRH flats (see paras. 1.5 to 1.12).

Table 1

PRH flats in 215 estates
(31 March 2016)

Type of estate	Number of estates	Number of PRH flats
PRH/Interim Housing (Note 1)	173	694,433
Tenants Purchase Scheme (TPS) (Note 2)	39	54,493
Buy or Rent Option Scheme (Note 3)	2	4,549
Home Ownership Scheme (Note 4)	1	2,797
Total	215	756,272

Source: HD records

Note 1: Interim housing is used to accommodate persons who are rendered homeless as a result of natural disasters, emergencies or government actions (such as clearance of unauthorised structures); have stayed in a transit centre for three months and fulfilled the prescribed eligibility criteria for PRH. As Po Tin Estate and Shek Lei (II) Estate comprise both PRH and interim housing blocks/flats, they are counted as two instead of four estates by the HD.

Note 2: The TPS was introduced in 1998 by the HA to enable PRH tenants to buy the flats they lived in at a discounted price. While the TPS was discontinued in 2005, PRH tenants of the 39 TPS estates still have the option to buy their flats. As at 31 March 2016, there were 132,770 sold flats in the 39 TPS estates. The unsold PRH flats in these 39 estates are owned and managed by the HA.

Note 3: The Buy or Rent Option Scheme was introduced in 1999 by the HA to offer prospective tenants (i.e. waiting list applicants who were eligible for flat allocation within the year, tenants affected by redevelopment and clearance programme, squatter clearees who had satisfied PRH eligibility criteria and eligible civil servants) a choice to buy or rent PRH flats. The Scheme was discontinued in 2002. As at 31 March 2016, there were 1,429 sold flats in these two Buy or Rent Option Scheme estates. The unsold PRH flats in these two estates are owned and managed by the HA.

Note 4: In a Home Ownership Scheme estate, there are four blocks of PRH flats which are owned and managed by the HA.

In-flat maintenance of PRH flats

1.5 ***Total Maintenance Scheme (TMS).*** In 2006, the HA launched the TMS to improve the standard of maintenance within all PRH flats (in the four types of estates — see Table 1 in para. 1.4). Since 2009, the TMS has become a rolling programme to proactively inspect the conditions of PRH flats and provide comprehensive repair services. The objectives of the TMS are to provide customer-oriented maintenance services and, together with other planned maintenance programmes, lengthen the lifespan of the HA's assets. The first TMS cycle covering 177 estates (Note 2) was completed in 2011 at a cost of $912 million. The second cycle was launched in 2011 with the inspection frequency revamped in 2014, taking into account the improved in-flat condition achieved through the first TMS cycle and the age profile of the PRH stock (see Table 2). Since 2014, TMS inspections have been carried out every 10 years for estates aged between 10 and 30, and every five years for those estates aged over 30. As at March 2016, the first five years of the second TMS cycle had been rolled out to 134 estates, with inspections and repair works completed in 120 estates at a cost of $732 million.

Table 2

Age profile of PRH stock
(31 March 2016)

Age	Number of estates	Number of PRH flats
10 years and less	26	90,365 (12%)
More than 10 years and up to 30 years	116	352,231 (47%)
More than 30 years	73	313,676 (41%)
Total	215	756,272 (100%)

Source: HD records

Note 2: *In 2006, the HA planned to implement the TMS in all PRH flats in five years' time. In 2008, the HA decided to exclude PRH flats in estates aged less than 10.*

1.6 ***Responsive In-flat Maintenance Services (RIMS).*** To further enhance the maintenance services, the HA adopted the TMS model to implement the RIMS progressively in PRH estates in 2008. The RIMS provides a responsive, professional, and customer-oriented in-flat maintenance service to tenants' daily works requests. In 2011, the RIMS was extended to all PRH flats in the four estate types (see Table 1 in para. 1.4). The expenditure under the RIMS was $500.1 million in 2015-16.

Excess lead found in fresh water samples of 11 PRH developments

1.7 In July 2015, a Legislative Council (LegCo) Member announced that water samples from a PRH estate (i.e. Kai Ching Estate) had been found to have lead in excess of the World Health Organization (WHO)'s provisional guideline value (PGV) (Note 3). Exposure to lead may adversely affect human health (Note 4). From July to November 2015, the HA and the Government completed water sampling tests for all PRH estates and found that water samples from 11 PRH developments (Note 5) had lead content above the WHO's PGV.

1.8 ***Investigations conducted.*** In view of the excess lead found in the water samples in PRH estates, the Government and the HA respectively conducted the following investigations:

Note 3: *The WHO produces reference values on water quality and human health in the form of guidelines that are used as the basis for regulation and standard setting in developing and developed countries worldwide. The PGV of lead in drinking water set out in the WHO's Guidelines for Drinking-water Quality published in 2011 is 10 micrograms per litre.*

Note 4: *Three groups of human population are particularly vulnerable to lead exposure including children, pregnant women and lactating mothers. For example, children with high blood lead level may have adverse neurological effects including reduced intelligence, neuropsychological function and academic achievements, and increased incidence of attention-related and other problem behaviours.*

Note 5: *The 11 PRH developments were Ching Ho Estate Phase 1, Choi Fook Estate, Hung Hom Estate Phase 2, Kai Ching Estate, Kwai Luen Estate Phase 2, Lower Ngau Tau Kok Estate Phase 1, Shek Kip Mei Estate Phase 2, Tung Wui Estate, Un Chau Estate Phases 2 and 4, Wing Cheong Estate and Yan On Estate. They were all completed after 2005.*

(a) ***Task Force on Investigation of Excessive Lead Content in Drinking Water (hereinafter referred to as the Task Force — Note 6).*** The Task Force was set up by the Government in July 2015 to carry out an investigation to ascertain the causes in relation to incidents of lead in drinking water in PRH estates, and recommend measures to prevent recurrence of similar incidents in future. The Task Force published its final report in October 2015;

(b) ***Review Committee on Quality Assurance Issues Relating to Fresh Water Supply of Public Housing Estates (hereinafter referred to as the Review Committee — Note 7).*** The Review Committee was set up by the HA in July 2015 to review the arrangements for quality control and monitoring in relation to the installation of fresh water supply systems in PRH estates. The Review Committee published its final report in January 2016; and

(c) ***Commission of Inquiry into Excess Lead Found in Drinking Water (hereinafter referred to as the Commission of Inquiry — Note 8).*** The Commission of Inquiry was appointed by the Chief Executive in Council in August 2015 under the Commissions of Inquiry Ordinance (Cap. 86) to ascertain the causes of excess lead found in drinking water in PRH developments, review and evaluate the adequacy of the regulatory and monitoring system of drinking water, and make recommendations with regard to the safety of drinking water. The Commission of Inquiry issued its report in May 2016.

Note 6: *The Task Force was chaired by the Deputy Director of Water Supplies and its membership included representatives from the Buildings Department, the Department of Health, the Electrical and Mechanical Services Department, the Government Laboratory, the HD and the Water Supplies Department, and academics/experts outside the Government.*

Note 7: *The Review Committee comprised the Chairman and seven members, who were members of the HA.*

Note 8: *The Commission of Inquiry comprised two Commissioners, one of whom was also the Chairman.*

1.9 Both the Task Force and the Commission of Inquiry concluded that leaded solder and/or poor workmanship was the direct cause of excess lead found in drinking water in all the 11 PRH developments (Note 9). In their final reports, the Task Force, the Review Committee and the Commission of Inquiry made a number of recommendations with regard to the safety of drinking water in PRH estates and other developments in Hong Kong. As the causes of excess lead in drinking water of PRH developments and the control/monitoring measures necessary to prevent recurrence of similar problems have been adequately addressed by these investigations, this Audit Report mainly focuses on the follow-up actions on the PRH's water sampling tests for lead.

Management of asbestos-containing materials in PRH estates

1.10 Asbestos is a proven carcinogen which can cause asbestosis, lung cancer and mesothelioma (Note 10) when inhaled. Since 1984, the HD has banned the use of asbestos-containing materials (ACMs) in constructing public housing. According to the HD, the majority of ACMs used in pre-1984 PRH estates were either removed, encapsulated or left intact and under monitoring, with the remaining ACMs mainly found in the balcony grilles, lobby or staircase grilles and chimneys of 36 blocks in 17 PRH estates (see Appendix C).

Replacement of laundry pole-holders

1.11 Some 550,000 PRH flats in estates completed before 2005 were installed with laundry pole-holders for drying laundry (see Photograph 1). Laundry pole-holder design had been replaced by laundry racks for PRH estates completed between 2005 and 2010 and by parallel type laundry rods for PRH estates completed from 2011 onwards. In the past years, there were safety concerns over the use of laundry pole-holders by tenants. To encourage the change of laundry pole-holders to laundry racks, the HA in 2004-05 launched a one-off subsidy scheme under which each household was only required to pay $200 (about half the cost) for

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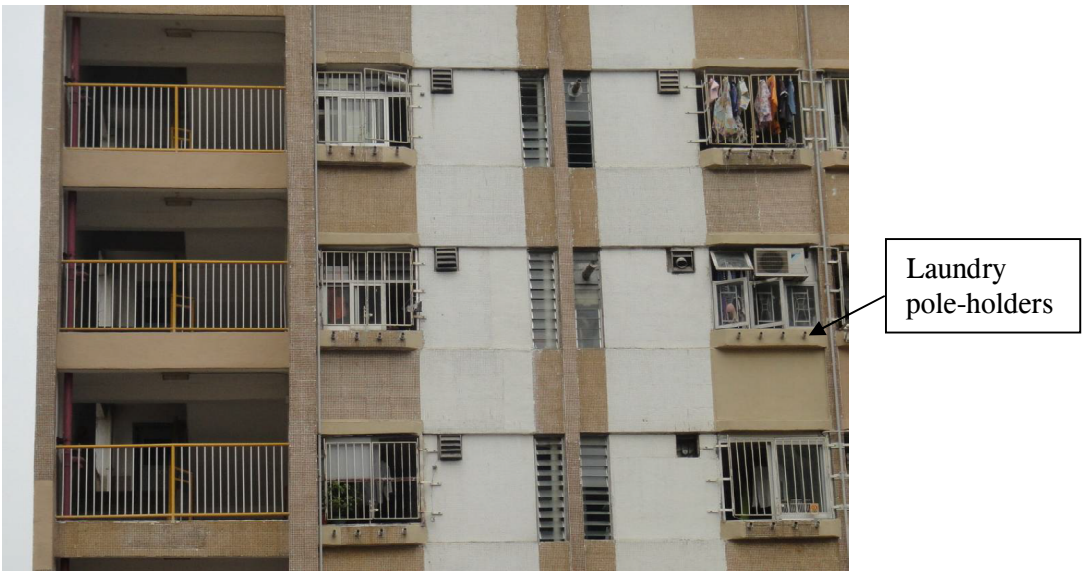
Note 9: *According to the Task Force, solder materials could seep into the pipes due to poor workmanship by overheating for an extended period of time and/or applying excessive solder.*

Note 10: *Mesothelioma is a rare form of cancer that develops from the protective lining that covers body's internal organs mainly caused by exposure to asbestos.*

replacing the pole-holders with laundry racks (see Photographs 2 and 3 for examples). Tenants might also install the HD's approved types of laundry racks at their own costs. According to the HD, up to February 2014 about 55,000 PRH flats had carried out the replacement works. To enhance the quality and safety of PRH flats, the HA in February 2014 approved the replacement of laundry pole-holders with laundry racks at a total estimated cost of $520 million.

Photograph 1

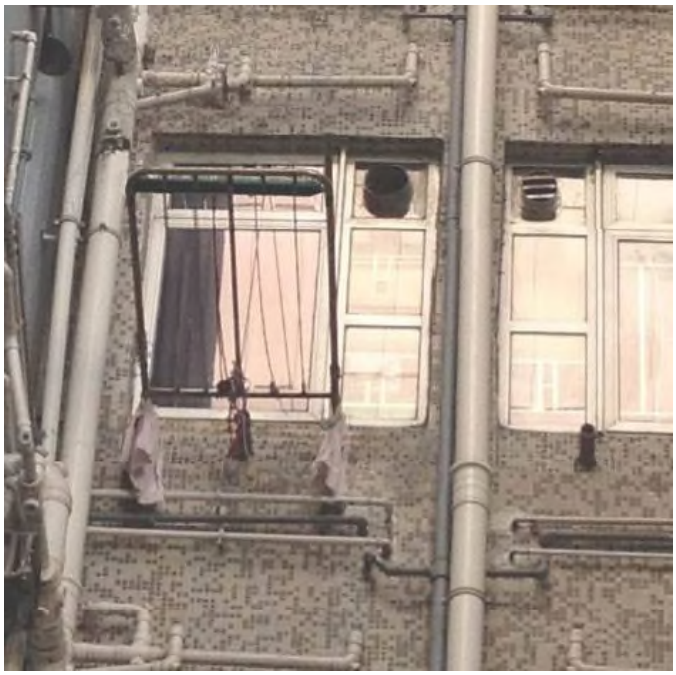
Laundry pole-holders



Source: HD records

Photograph 2

Perpendicular-type laundry rack



Source: HD records

Photograph 3

Parallel-type laundry rack

Source: HD records

Enhancing fire safety of old PRH estates

1.12 Under the Fire Safety (Buildings) Ordinance (FS(B)O — Cap. 572) which came into effect in 2007, owners of domestic and composite buildings with three storeys or above built on or before 1 March 1987 should comply with the specified fire safety requirements. According to the HD's implementation programme in 2014, there were 62 PRH estates involving 238,034 flats built on or before 1 March 1987 which required the upgrading of their fire safety construction/fire service installations (Note 11). Two estates (Ping Shek and Fuk Loi) had been selected as pilot projects (see para. 6.8) for fire safety construction/fire service installations, which were scheduled for completion in 2018-19 and 2019-20 at a total estimated cost of $27.2 million. For the remaining 60 estates, the fire safety construction would be carried out in two phases. Phase I fire safety construction covering the blocks with slab block design in 51 estates were targeted for completion by 2020-21. Review on budget and programme for Phase II fire safety construction covering the other blocks with non-slab block design would be conducted upon confirmation of the scope by 2016. All fire service installation works for 60 estates were scheduled for completion within Phase I. The total estimated cost of Phase I works and related consultancy fee was $851.7 million.

Audit review

1.13 In April 2016, the Audit Commission (Audit) commenced a review to examine the HD's maintenance and safety-related improvements of PRH flats with a view to identifying room for improvement. The review has focused on the following areas:

(a) in-flat maintenance of PRH flats (PART 2);

(b) follow-up actions on PRH's water sampling tests for lead (PART 3);

(c) management of ACMs in PRH estates (PART 4);

Note 11: *Fire safety construction refers to structurally built fire safety elements. Examples are means of escape and fire fighting access. Examples of fire service installations are fire alarm system, fire hydrant and hose reel system.*

(d) replacement of laundry pole-holders (PART 5); and

(e) enhancing fire safety of old PRH estates (PART 6 — Note 12).

Audit has found room for improvement in the above areas and has made a number of recommendations to address the issues.

General response from the Government

1.14 The Director of Housing in general agrees with the observations and recommendations in this Audit Report. He has said that:

(a) the audit review has been of great value to the HD; and

(b) on PART 4 of the Audit Report, as management of ACMs concerns the health of tenants and workers, the HD has been working with relevant government departments to identify issues and act on them as soon as possible.

Acknowledgement

1.15 Audit would like to acknowledge with gratitude the assistance and full cooperation of the staff of the HD, the Buildings Department (BD), the Environmental Protection Department (EPD), the Fire Services Department (FSD) and the Water Supplies Department (WSD) during the course of the audit review.

Note 12: *In October 2013, Audit completed a review of "Government's efforts to enhance fire safety of old buildings" focusing on the implementation of the Fire Safety (Commercial Premises) Ordinance (Cap. 502) and the FS(B)O by the Buildings Department and the Fire Services Department.*

PART 2: IN-FLAT MAINTENANCE OF PUBLIC RENTAL HOUSING FLATS

2.1 This PART examines the in-flat maintenance provided for PRH flats, focusing on the following areas:

(a) implementation of the TMS, including access rate, inspection standard/quality control, education and manpower arrangements (paras. 2.12 to 2.23);

(b) implementation of the RIMS, including increase in repair works and compliance with service standards (paras. 2.26 to 2.31);

(c) monitoring of the contractors' repair works, including compliance with verification requirements and unsatisfactory repair works (paras. 2.34 to 2.41); and

(d) management information system (paras. 2.44 to 2.46).

Maintenance programmes for public rental housing flats

TMS

2.2 In 2006, the HA launched the TMS with the objectives to provide customer-oriented maintenance services and, together with other planned maintenance programmes, lengthen the lifespan of the HA's assets. A TMS Unit (Note 13) was set up in the Estate Management Division to implement the initiatives.

Note 13: *The TMS Unit, headed by a Senior Maintenance Surveyor, is now under the Project Management Section of the Estate Management Sub-Division (3) (see Appendix B). As at 30 June 2016, the TMS Unit had a strength of 70 professional, technical and supporting staff, 115 In-flat Inspection Ambassadors and 16 Building Services Ambassadors.*

2.3 ***Operational arrangements of the TMS.*** According to the inspection cycle of the TMS (Note 14), the TMS Unit coordinates with the HD's estate offices (Note 15) or Property Services Agents (PSAs — Note 16) to arrange in-flat inspections of PRH flats in estates. The inspection is carried out by TMS teams, each comprising an In-flat Inspection Ambassador (IIA — see para. 2.22) and two staff of the HD's maintenance contractor. According to the inspection checklist issued to the TMS teams, the inspection covers 12 common wear-and-tear elements which may affect the in-flat structural, safety and hygiene conditions, including ceiling, wall, floor, window, drainage, plumbing, door, gate, electrical installation, communal aerial broadcast distribution, security system and gas installation. The major stages of the TMS's work in an estate are shown at Appendix D.

2.4 ***Progress of the TMS.*** The first five-year cycle of the TMS was launched in 2006 and completed in 2011, with 468,622 (77.6%) of the 603,792 PRH flats in 177 estates inspected and provided with repair services. The second TMS cycle commenced in 2011. As at 31 March 2016, the first five years of the second TMS cycle had been rolled out to 134 estates (in accordance with the revised inspection frequency — see para. 1.5) with inspections and repair works completed in 294,738 (78.4%) of 375,703 PRH flats in 120 estates. A comparison of the operational data of the first TMS cycle and the first five years of the second TMS cycle (including the number of flats inspected, works orders issued and costs involved) is shown at Appendix E.

Note 14: *According to the HD, older estates would be given higher priority for in-flat inspection. To spread out the workloads amongst regions, the oldest estates of each region would be selected for in-flat inspection first.*

Note 15: *Each estate office of the HD is responsible for the tenancy and property management in an estate.*

Note 16: *The HD has outsourced the property management of about 60% of the PRH estates to PSAs. Depending on the scope of services under the PSA contracts, they may perform a range of property management duties including cleaning, security, rent collection, minor maintenance and repairs, and improvement works. The PSAs are supervised by the HD's Property Service Administration Unit under the six regions (see Appendix B).*

2.5 ***HD's reviews of the TMS.*** The HD had conducted reviews of the TMS from time to time. In its review of January 2008, the HD recommended the implementation of the TMS as a permanent programme and the launch of the RIMS (see para. 2.7). In another review after completion of the first cycle of the TMS in March 2011, the HD recommended:

(a) making arrangements to ensure access for inspection/repair to previously inaccessible flats. For the enhancement of access rate, a new promotion and publicity exercise should be re-introduced. For un-cooperative tenants who persistently denied access to their flats for inspection/repair, consideration should be given to imposing penalty (see para. 2.14);

(b) inclusion of the requirements of the Mandatory Window Inspection Scheme (MWIS — Note 17) in the window inspections and repair works of the TMS (see para. 2.15);

(c) enhancing publicity in estates where the TMS was about to start to arouse tenants' interest in in-flat maintenance (see para. 2.20); and

(d) conducting more frequent quality auditing and performance verifications to ensure that the TMS's work would be carried out with quality (see para. 2.34).

In the 2014 review, the HD noted that works orders issued for four major repair items (including water seepage and concrete spalling) in 48 estates (for which in-flat inspections under the two TMS cycles had been completed as at December 2014) had decreased from 146,680 in the first cycle by 43% to 83,750 in the second cycle. The HD's inspection findings also revealed that the physical quality of the PRH estates had been greatly improved with the implementation of the TMS.

Note 17: *The MWIS introduced under the Buildings Ordinance (Cap. 123) requires owners of buildings aged 10 or above and served with statutory notices to appoint a Qualified Person to carry out the prescribed inspection and supervise the prescribed repair works found necessary of all windows of the buildings. Under a Memorandum of Understanding between the HA and the BD, the HA is committed to adhering to the requirements of the Buildings Ordinance. For PRH estates which were partly or wholly sold, such as estates under the TPS, they are subject to the Buildings Ordinance.*

2.6 ***User surveys.*** The HA conducts regular customer satisfaction surveys to collect tenants' opinions on the implementation of the TMS. The survey covers the scope and workflow of the TMS teams, the standard of service, the satisfactory level on the repair works, tenants' awareness regarding their responsibility for the in-flat facilities, and tenants' expectation on the TMS. According to the results of the surveys conducted during 2011 to 2015, the overall satisfaction rate of respondents was maintained at about 80%.

RIMS

2.7 Drawing on the success of the TMS and aiming at enhancing the maintenance services for PRH flats, the HD rolled out the RIMS in 2008. The RIMS aims to provide quality minor in-flat maintenance service in a responsive manner through prompt response to works requests, close liaison with tenants and better control of works quality.

2.8 ***Operational arrangements of the RIMS.*** Dedicated In-flat Technical Teams (ITTs) mirroring the TMS teams have been set up in District Maintenance Offices (DMOs — see Appendix B) or PSAs (see Note 16 to para. 2.3) of the HD to promptly respond to tenants' repair requests. Each ITT, comprising a DMO/PSA staff and one or two maintenance contractor's staff, carries out in-flat inspections of the PRH flats and issues minor works orders or estate works orders (for more complicated works) to the contractors to carry out the repair works. ITTs make use of the Personal Digital Assistant and the HD's computer system for the processing of works requests, inspection and repair works. The major stages of the RIMS's work are shown at Appendix F.

2.9 ***Progress of the RIMS.*** The RIMS was introduced progressively for existing estates in 2008 and extended to newly completed PRH estates in 2011. As at March 2016, the RIMS was fully implemented in the 215 estates with PRH flats. An analysis of operational data of the RIMS from 2011-12 to 2015-16 (including the number of works orders issued and costs involved) is shown at Appendix G.

2.10 ***HD's reviews of the RIMS.*** In January 2011, the HD conducted a review to determine the workflow and the way forward for the RIMS. It was proposed to implement the RIMS for all newly completed PRH estates upon handover to the Estate Management Division. In May 2012, the HD conducted a review of service standards of the RIMS (see para. 2.29).

2.11 ***User surveys.*** The HA conducts regular customer satisfaction surveys to collect tenants' views on the RIMS. According to the results of the surveys conducted during 2012 to September 2015, the overall satisfaction rates of respondents on the RIMS ranged from 75% to 81.5%.

Implementation of the Total Maintenance Scheme

2.12 The implementation of the TMS uses a three-pronged approach: (a) identifying maintenance problems by proactively inspecting PRH flats; (b) responding promptly to tenants' maintenance requests; and (c) enhancing publicity and education. Audit has found room for improvement in a number of areas (see paras. 2.13 to 2.23).

Measures to improve the access rate of in-flat inspections

2.13 The TMS, together with other planned maintenance programmes, would help lengthen the lifespan of the HA's assets. To this end, in-flat inspections and repair works should be completed for all PRH flats. The HD has laid down the following guidelines on conducting in-flat inspections:

(a) three attempts to visit each PRH flat should be made by the TMS teams. Tenants may also make appointments for in-flat inspections; and

(b) inspections should be conducted generally from 9:30 a.m. to 5:00 p.m. from Monday to Saturday. Inspection operations on Sundays or public holidays shall be made by appointment and agreed by the HD's Assistant Clerk of Works in-charge or above.

2.14 ***HD's measures to enhance access rate.*** In the 2011 review of the TMS, the HD proposed the following improvement measures to enhance the access rate of the TMS and to ensure access for inspection/repair for those inaccessible flats:

(a) introducing an incentive scheme (e.g. giving award to the block with the highest access rate) to encourage tenants giving access for inspection;

(b) re-introducing a new promotion and publicity exercise in the coming programme; and

(c) considering imposing penalties on un-cooperative tenants who deny the TMS teams' access to their flats for inspection or repair. These include issuing warnings, deducting points under the Marking Scheme for Estate Management Enforcement (hereinafter referred to as the Marking Scheme — Note 18) and enforcing the Tenancy Agreement as the last resort to gain access to their flats.

According to the HD, over the years, Estate Management Advisory Committees' (Note 19) members were requested to encourage tenants to allow access for the TMS. To promote the TMS, a mini Mobile Education Booth (see Note 24 to para. 2.20) was set up at the lobby of the block running the TMS. In respect of the proposed penalties, the HD informed Audit in August 2016 that warning letters had been issued on some occasions. However, no points had been deducted under the Marking Scheme in relation to the TMS inspections and repairs.

Note 18: *The Marking Scheme was introduced by the HA to ensure environmental hygiene and effective management of PRH estates. The Marking Scheme covers 28 misdeeds, each of which carries 3, 5, 7 or 15 penalty points according to the degree of seriousness involved. When a PRH household has accrued 16 points within two years, its tenancy is liable to termination.*

Note 19: *The Estate Management Advisory Committee, comprising HD staff and representatives of tenants, is an estate-based committee. The establishment of such committees aims to promote communication between tenants and front-line management staff, and encourage tenants' participation in estate matters with a view to enhancing effectiveness and efficiency of estate management.*

2.15 The 2011 review also endorsed the inclusion of the requirements of the MWIS in the window inspections and repair works of the TMS (see para. 2.5(b)). The Independent Checking Unit (Note 20) under the Permanent Secretary for Transport and Housing (Housing)'s Office was responsible for selecting blocks in estates for MWIS inspection. For PRH blocks selected for MWIS inspection, a Qualified Person would join the relevant TMS team to conduct a TMS cum MWIS inspection of each PRH flat. For the inaccessible flats, the HD takes stringent actions including deducting points under the Marking Scheme and enforcing the Tenancy Agreement. Audit analysed the access rates for the TMS in-flat inspections with and without MWIS inspections and the results are shown in Table 3.

Note 20: *The Independent Checking Unit was set up by the HA in 2000 for implementing administrative building control measures in parallel to the practices of the BD on the HA's new construction projects and alteration and addition works for existing properties in estates which are not subject to the Buildings Ordinance. The Unit subsequently also took up the role for enforcing the Buildings Ordinance under the authority delegated by the BD concerning existing properties in estates and courts which were developed by the HA and had been partly or wholly sold (e.g. processing of applications for approval and consent of alteration and addition works). The Unit has been further detached from the HD in organisation and placed under the Transport and Housing Bureau since 2015.*

Table 3

Comparison of access rates for TMS in-flat inspections with and without MWIS inspections (2011 to March 2016)

Item	TMS in-flat inspections		
	With MWIS inspections	Without MWIS inspections	Overall
Number of estates involved (a)	18	102	120
Number of flats involved (b)	32,894	342,809	375,703
Number of flats inspected (c)	31,857	262,881	294,738
Access rate (d) = ((c)/(b) × 100%)	96.8%	76.7%	78.4%

Source: Audit analysis of HD records

2.16 ***Areas for improvement.*** As can be seen from Table 3, TMS in-flat inspections with MWIS inspections which were backed up by penalty measures for inaccessible flats achieved a higher access rate of 96.8% than the 76.7% for those without MWIS inspections. This shows that penalty measures could serve as an effective deterrent for inaccessible cases. While the overall access rate for in-flat inspections was 78.4% which was higher than 77.6% of the first TMS cycle (see Appendix E), the lower access rate of 76.7% for the TMS without MWIS inspections warranted the HD's management attention. In particular, of the 80,965 (375,703 minus 294,738) inaccessible flats, 24,455 (30%) flats were inaccessible in both the first TMS cycle and the first five years of the second TMS cycle. In Audit's view, the HD needs to step up measures to improve the access rate of in-flat inspections, including imposing penalty on those repeatedly un-cooperative tenants. In this connection, Audit noted other areas for improvement:

(a) ***Appointment services.*** The HD's guidelines have provided for inspections on Sundays and public holidays on an appointment basis (see para. 2.13(b)). In response to Audit's enquiries, the HD in August 2016 said that inspections were not normally arranged on Sundays and public holidays as repair works causing noise nuisance could not be carried out due to legislative control. In Audit's view, there is still a need to arrange inspections/repair works on Sundays and public holidays as far as practicable to cater for tenants' genuine needs; and

(b) ***Use of management information.*** While the TMS teams had input into the HD's computer system the reasons for not gaining access for each unsuccessful visit, the management report generated by the computer system only showed the total numbers of unsuccessful visits, tenants' refusal cases and not-at-home cases. There was no analysis on an individual-flat basis to facilitate the identification of which inaccessible flats were due to tenants' refusal or not-at-home for planning specific follow-up actions (see para. 2.46).

2.17 ***Need to closely monitor the follow-up actions on inaccessible flats.*** After completion of TMS in an estate, the estate office or PSA concerned should take follow-up actions on the following cases of inaccessible flats:

(a) according to the briefing materials for staff when launching the RIMS, for flats inaccessible for inspection after three unsuccessful attempts by the TMS teams, the estate office or PSA should watch out for any requests for repair works from the tenants concerned under the RIMS and take the opportunity to conduct a comprehensive in-flat inspection (see para. 2.3); and

(b) according to HD guidelines, for flats inaccessible for TMS repair works (e.g. due to tenants' refusal), the estate office or PSA should continue to arrange access to the flats concerned for the necessary repair works.

2.18 Audit sample check of the records in six selected estate offices (Note 21) revealed that:

Note 21: *The selected estates cover the six regions of the Estate Management Division (see Appendix B).*

(a) for 300 selected PRH flats which had not been inspected under the TMS from 2011 to 2014, no comprehensive in-flat inspection was conducted even when the tenants concerned subsequently made requests for repair works in their flats under the RIMS; and

(b) for another 300 selected PRH flats of which TMS repair works on concrete spalling could not proceed due to tenants' refusal or flats inaccessible from 2011 to 2014, the estate offices/PSAs were only able to complete the repair works for 76 (25%) flats. Concrete spalling poses a safety risk to tenants.

In Audit's view, the HD needs to closely monitor the adequacy of follow-up actions taken by the estate offices/PSAs on inaccessible flats, in particular those flats which were inaccessible in both the first TMS cycle and the first five years of the second TMS cycle.

Need to improve the in-flat inspection performance of TMS teams

2.19 The HD has set inspection standards for monitoring the performance of the TMS teams. The Service Audit Team set up under the TMS Unit conducts performance audits regularly to assess the service level of the TMS teams (Note 22). Eight estates should be selected for performance audits each year. In each performance audit, the Service Audit Team assesses the activities of the TMS team including the preparation process, in-flat inspection and maintenance service process, and handy works monitoring process and closure arrangement. Audit review of the results of the Service Audit Team's checking of the TMS teams' performance in 30 estates during 2012-13 to 2015-16 revealed that the TMS teams achieved total scores of 60 to 90 marks for each of the 30 estates (against a passing mark of 60). However, the Service Audit Team generally gave low scores to the TMS teams' in-flat inspection and maintenance service process as follows:

Note 22: *The Service Audit Team, comprising professional, site supervisory staff and Assistant Training Managers, assesses the service level of the TMS teams by means of actual field observations and collecting information and records from relevant personnel. On completion of a performance audit, the Service Audit Team submits a report summarising the findings with recommendations to the management of the TMS Unit.*

(a) in 20 (67%) estates, the average number of flats inspected by the TMS teams per day could not meet the inspection standards (see Appendix H); and

(b) in 23 (77%) estates, the performance of the IIAs could not meet the service standard mark of 65 (i.e. ranging from 51 to 64.7 — Note 23).

In light of the checking results, there is a need for the HD to strengthen the training and assistance for the TMS teams with a view to improving their performance in the in-flat inspection and maintenance service process.

Need to enhance maintenance education programme

2.20 ***Greater efforts needed to set up Mobile Education Booths.*** Maintenance education is one of the main objectives of the TMS (see para. 2.12(c)). The HD has used Mobile Education Booths (Note 24) in estates to promote the TMS and solicit tenants' cooperation for smooth implementation of the TMS. Prior to the commencement of the TMS in an estate, a Mobile Education Booth should be set up in the estate for two days to strengthen communication with the tenants. From May 2011 to March 2016, the TMS was rolled out in 134 estates. However, a Mobile Education Booth was not set up in 25 (19%) estates, of which 22 were TPS estates and three were on outlying islands. Of these 25 estates, nine had access rates below the average of 78.4% (see Table 3 in para. 2.15), ranging from 42% to 78%. In response to Audit's enquiries, the HD said that a Mobile Education Booth was not set up in these estates because it was considered less economical to do so as there were fewer PRH flats, and the legitimate right of Owners' Corporations (OCs) in TPS estates for not granting access for the set up of booths needed to be respected. However, Audit noted from the HD's 2011 review that more than 95% of respondents had expressed that the Mobile Education Booth should be regularly held at their estates in view of its usefulness. In view of the users' positive feedback, the HD needs to make greater efforts to set up a Mobile Education Booth

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Note 23: *During the performance audit, the Service Audit Team participates in the in-flat inspections and evaluates the performance of the IIAs. If the scores of the IIAs are below the service standard mark, responsible Clerk of Works staff will be informed to coach and guide the IIAs to improve their customer service skill.*

Note 24: *A Mobile Education Booth provides exhibition panels, model of water closet, wash basin, aluminium window and an interactive game to promote in-flat maintenance of the TMS.*

in estates (in particular those with records of below-average access rates) with a view to promoting the TMS and soliciting the tenants' cooperation for its implementation.

2.21 ***Need to enhance education for tenants on tenant-to-pay items.*** The repair works of PRH flats might involve some tenant-to-pay items (e.g. for wilful damage or damage arising from improper use). There are 24 tenant-to-pay items (e.g. replacement of door lock and water cistern) and the amounts chargeable to tenants per item range from $300 to $4,950. Charges are reduced for households with financial hardship. During the in-flat inspections, the TMS teams would explain the arrangement of the tenant-to-pay items to the tenants. However, according to the HD's 2011 to March 2015 customer satisfaction surveys on TMS (see para. 2.6), on average, 38% of the tenants expressed that they were unclear/very unclear about the tenant-to-pay items. According to the HD, for defects which belonged to the tenant-to-pay items, tenants might not procure the necessary repair services. However, such minor tenant-to-pay items, if not tackled properly, could deteriorate into major maintenance issues. In Audit's view, the HD needs to enhance the education for tenants on their responsibility for the tenant-to-pay items and on home caring to help them prevent damage arising from improper use.

Need to review manpower arrangements for the TMS

2.22 ***Need to address high turnover of IIAs.*** As at March 2016, the HD engaged a total of 114 IIAs from the consultancy firms for carrying out in-flat inspections. Over the years, there was a high turnover of IIAs. From 2011-12 to 2015-16, on average, 57 (50%) of the 114 IIAs resigned each year. The high turnover of the IIAs could result in low productivity of in-flat inspections and wastage of the HD's resources on their training. In the 2011 review, in view of the TMS becoming a regular programme, the HD considered that it was more desirable for the in-flat inspections and arrangement of repair works to be taken up by the in-house staff rather than the staff from the consultancy firms. The HD subsequently converted 10 IIA posts into civil service posts. In Audit's view, the HD needs to take effective measures to address the high turnover of IIAs with a view to minimising the adverse effects on the operation of the TMS.

2.23 ***Need to review manpower requirement of IIAs and TMS teams.*** The HD has engaged, on average, 114 IIAs each year since 2011-12 for carrying out the in-flat inspections of PRH flats. Audit review of the TMS records noted the following:

(a) ***Reduced workload due to revised inspection frequency.*** Following the revamp of inspection frequency in 2014, in-flat inspections would be conducted every 10 years (instead of five years in the first TMS cycle) for estates aged between 10 and 30 years (see para. 1.5). As a result, the number of estates completed in the first five years of the second TMS cycle from 2011 up to March 2016 was 120, i.e. 57 (32%) less than the 177 in the first cycle (see para. 2.4); and

(b) ***Reduced workload due to fewer works orders.*** According to the HD, the physical quality of PRH estates had been greatly improved since the implementation of the first TMS cycle. As a result, works orders issued for four major repair items in 48 PRH estates in the second TMS cycle had dropped by 43% when compared with those in the first cycle (see para. 2.5).

In view of the above observations, the HD needs to review the manpower requirement for the TMS's work with a view to optimising the TMS resources.

Audit recommendations

2.24 **Audit has *recommended* that the Director of Housing should:**

(a) **step up measures to improve the access rate of in-flat inspections, including imposing penalty on those repeatedly un-cooperative tenants;**

(b) **closely monitor the adequacy of follow-up actions taken by the estate offices/PSAs on inaccessible flats, in particular those flats which were inaccessible in both the first TMS cycle and the first five years of the second TMS cycle;**

(c) **strengthen the training and assistance for the TMS teams with a view to improving their performance in the in-flat inspections and maintenance service process;**

(d) **make greater efforts to set up a Mobile Education Booth in estates (in particular those with records of below-average access rates) with a view to promoting the TMS and soliciting the tenants' cooperation for its implementation;**

(e) **enhance the education for tenants on their responsibility for the tenant-to-pay items and on home caring to help them prevent damage arising from improper use; and**

(f) **take effective measures to address the high turnover of IIAs with a view to minimising the adverse effects on the operation of the TMS and review the manpower requirement for the TMS's work with a view to optimising the TMS resources.**

Response from the Government

2.25 The Director of Housing agrees with the audit recommendations. He has said that:

(a) the TMS is a proactive customer-oriented maintenance services scheme. The HD has from time to time reviewed the effectiveness of the scheme and devised measures to increase the access rate of in-flat inspections. It will continue to implement these measures and explore opportunities to enhance the access rate. It will also review the effectiveness of the current operations and may consider setting target on access rate as a key performance indicator for the TMS;

(b) the HD will continue to review the current operations to ensure that repairs are carried out in a cost-effective way and seek opportunity to enhance the follow up process for inaccessible flats. However, the TMS and the RIMS are designed for different purposes and hence their set-ups are different. The TMS is a planned maintenance service while the RIMS aims to provide quick responses to tenants' requests. Due to tenants' preference, the HD can only take the RIMS as the occasion to remind the tenants for arrangement of a comprehensive inspection;

(c) for the continued improvement in the TMS, the HD has initiated the internal audit by the Service Audit Team to review the service standard, explore areas for improvement and identify training needs to TMS teams. The HD agrees to continue to strengthen the training and assistance for the TMS teams especially for those relatively inexperienced IIAs as necessary;

(d) the HD agrees to set up a Mobile Education Booth in all estates, including TPS estates subject to permission of their OCs;

(e) the HD agrees to continue to educate tenants about their responsibility of proper in-flat maintenance. Customer satisfaction surveys have been regularly used as a tool to identify areas for improvement. Education effort in the past enabled the majority of tenants understand the tenant-to-pay items; and

(f) the HD has noted the high turnover of IIAs and has explored measures to tackle the situation, including reviewing the means for better mode of process control for TMS inspection and works supervision. The HD agrees to continue to review the function of IIAs and their effectiveness with a view to optimising the TMS resources.

Implementation of the Responsive In-flat Maintenance Services

2.26 The objective of the RIMS is to provide responsive quality in-flat minor maintenance services to PRH tenants. Audit noted an increasing trend of repair works orders and service standards not always met.

Need to ascertain the reasons for the increase in repair works under the RIMS

2.27 In the 2008 review of the TMS (see para. 2.5), the HD anticipated that once the repair works for a PRH flat were completed under the TMS, the same flat would not need to undergo major repairs in the following years. The increase of the cost for PRH flats under the TMS was considered justifiable as it reflected the cost involved in providing proactive and prompt services. In the 2014 review, the HD noted that despite the improved internal condition of domestic flats through the implementation of the TMS, works orders issued under the RIMS had increased by 26.7% from 2012 to 2013. The HD attributed the increase to the following:

(a) one of the objectives of the TMS was to educate tenants on the basic maintenance knowledge during the in-flat inspections so as to raise their awareness in reporting defects inside their flats for timely repair thus preventing minor maintenance problems developing into serious ones; and

(b) the increase in works orders under the RIMS reflected tenants' higher awareness in reporting the in-flat defects.

2.28 Audit noted that the works orders issued under the RIMS had increased from 270,815 in 2011-12 by 55% to 420,155 in 2015-16 (see Appendix G). In response to Audit's enquiry, the HD said that the RIMS performance in estates had been regularly reviewed by making reference to the flats with large number of works orders issued (i.e. 10 or more). The HD considered that the reasons for the increase of RIMS works orders also included:

(a) ***Ageing of the PRH stock.*** The PRH stock over 30 years of age increased from 24% in March 2011 to over 40% in March 2016;

(b) ***Increase of the PRH stock.*** Between 2011-12 and 2015-16, there was an increase of 4.6% of PRH flats; and

(c) ***Effect of the initial pick up upon the full implementation of RIMS in 2011.*** With the success of its promotion and improved maintenance service to tenants, the number of works orders increased progressively in the first two years and became more or less steady from 2013-14.

However, as shown in Appendix G, the average number of works orders issued per PRH flat continued to increase from 0.50 in 2013-14 to 0.56 in 2015-16. Audit also noted from the HD's reviewed cases that there were some repeated orders involving the same works types and locations within a short period of time (Note 25), suggesting that there could be unsatisfactory contractors' repair works (also see para. 2.40). In Audit's view, the HD needs to conduct a further review to ascertain whether there are other causes for the increase in RIMS works orders that warrant the HD's management attention. In this connection, the HD may make use of the

Note 25: *For example, in one case, three works orders for the replacement of drainage pipes for the toilet of a flat were issued on 22, 27 September and 16 December 2011.*

Maintenance Information Sub-system (see para. 2.46) to assist in trend analysis of repair works by works types and identifying cases of recurring defects after repair works. The HD may also consider including questions in the customer satisfaction surveys to gauge tenants' views.

Need to improve the RIMS service standards of estate offices

2.29 In March 2011, the Estate Management Division of the HD issued an instruction setting out nine service standards which would be applicable to all works requests referred to the ITTs under the RIMS. The six regions of the Estate Management Division (see Appendix B) should aim to meet the service standards each month. The Performance Verification Team of the Estate Management Division conducts performance verifications periodically (Note 26) in selected estates to review the operation of DMOs/PSAs including the evaluation of target achievement and repair works of the RIMS. In each month, the HD compiles management reports showing the achievement of three service standards of the RIMS (i.e. in respect of inspection, minor repair works and estate works orders — see Items 1 to 3 in Appendix I) in all estate offices. For the other six service standards (i.e. Items 4 to 9 in Appendix I), the HD assesses the achievement of selected estate offices based on the results of performance verifications conducted by the Performance Verification Team.

2.30 ***Service standards not always met in estates.*** According to the HD's monthly management reports from 2011 to 2015, the service standards 1 to 3 had been met since December 2012 each month. However, Audit review of the results of performance verifications conducted in 304 selected estates (Note 27) during 2011 to 2015 revealed that only 25 (8%) of them could meet all the nine service

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Note 26: *The Performance Verification Team, comprising Chief Technical Officers, Maintenance Surveyors and site staff, conducts performance verifications to review the operation of DMOs, PSAs and TMS teams periodically on the quality of works performance monitoring and staff management. Performance verification reports summarising the findings and recommendations are distributed to the relevant Senior Clerk of Works and Clerk of Works for taking follow-up actions. According to the HD, the performance verifications will be utilised as a training tool to cultivate a quality culture amongst technical staff and promote quality consciousness but not fault findings.*

Note 27: *Some estates were selected more than once for conducting performance verifications.*

standards (see Appendix I). For the remaining 279 (304 minus 25) selected estates not fully meeting the nine services standards, their overall non-compliance rates for individual service standards ranged from 14% to 57%. In Audit's view, the HD needs to take measures to improve the performance of the estate offices, in particular those which failed to meet the service standards repeatedly.

Need to review the arrangements of selecting estates for conducting performance verifications

2.31 From 2011 to 2015, the Performance Verification Team conducted performance verifications in 131 (65%) of the 202 estates with PRH flats completed on or before 2011. While 71 (202 minus 131) estates were not selected for performance verification for the past five years, 85 (65%) of the 131 estates were each selected twice or more. In Audit's view, the HD needs to review the arrangements of selecting estates for performance verification taking into account the need to cover all estates within a reasonable time frame among other risk factors.

Audit recommendations

2.32 **Audit has *recommended* that the Director of Housing should:**

(a) **conduct a review to ascertain whether there are other causes for the increase in RIMS works orders that warrant the HD's management attention;**

(b) **take measures to improve the performance of the estate offices, in particular those which failed to meet the service standards repeatedly; and**

(c) **review the arrangements of selecting estates for performance verification taking into account the need to cover all estates within a reasonable time frame among other risk factors.**

Response from the Government

2.33 The Director of Housing generally agrees with the audit recommendations. He has said that:

(a) the HD will continue to review the RIMS operation regularly to explore areas for improvement;

(b) the service standards were internal targets set when the RIMS was launched in 2011. In light of the experience of the past years, the HD will review these targets taking into consideration the resource input and other constraints; and

(c) the identification of target estates for performance verification is on a need basis. Estates suspected with performance issue or with higher potential risk will warrant more frequent visits. The HD agrees to continue to review from time to time the selection criteria of estates for performance verification.

Monitoring of contractors' repair works

2.34 Through tendering, the HD awards district term maintenance contracts to contractors for carrying out maintenance and improvement works for PRH flats under the TMS and the RIMS. For monitoring the contractors' repair works for PRH flats under the TMS and the RIMS, the TMS teams and ITTs check the process of all concrete spalling repair works, water seepage repair works and tiling works. The TMS teams and ITTs also select at least 5% to 10% of completed works orders for final inspection before certification of works completion (see Appendices D and F). The Performance Verification Team and Surprise Check Teams conduct periodic checking to review the operation of the TMS and RIMS including the quality of repair works (see paras. 2.29 and 2.36).

Need to comply with the requirements of verifying contractors' repair works

2.35 According to the HD, water seepage warrants special attention due to the possible nuisance caused. The HD's guidelines require DMOs' or PSAs' staff to

verify the effectiveness of seepage repairs carried out under the RIMS (by revisiting the lower flat to measure its moisture level) for not less than 10% of the repaired flats on a quarterly basis. Audit examination of the records of the quarterly verification work conducted in the six selected estates (see Note 21 to para. 2.18) from 2014 and 2015 revealed that the verification requirement had not been complied with in three estates for two to six quarters. Audit also noted that the verification requirement had not been applied to water seepage repairs carried out under the TMS. In Audit's view, the HD needs to take measures to ensure that the verification requirement on water seepage repairs under the RIMS is complied with. The HD also needs to consider applying the same verification requirement to water seepage repairs under the TMS.

Unsatisfactory contractors' repair works under the TMS

2.36 The Surprise Check Teams of the TMS Unit (Note 28) conduct surprise checks of at least one PRH estate each month with a view to aligning the technical standards of the TMS services and ensuring timely correction to be made. The scope of the surprise checks includes quality of works, site administration, works supervision and documentation. Repair works in progress and completed repair works in selected PRH flats are examined for assessing their quality. Responsible Clerk of Works staff are required to review the non-compliance and deficiencies as highlighted in the surprise check reports and take follow-up action. Audit examination of the monthly surprise check reports from February 2014 to March 2016 revealed room for improvement as set out in paragraphs 2.37 and 2.38.

2.37 ***Need to strengthen the final inspections of TMS repair works.*** From February 2014 to March 2016, on average, about five PRH flats in a selected estate were chosen for monthly inspection by the Surprise Check Teams. Of 133 flats chosen for inspection, 385 items of unsatisfactory repair works were found in 118 (89%) flats. On average, about three items of repair works in each of these 118 flats required replacement/rectification works, mainly for doors, water cistern, concrete spalling, windows and re-tiling. In addition, 107 items of repair works were found to have improper work practices (such as inadequate protective

Note 28: *Surprise Check Teams (each comprising a Chief Technical Officer or two Senior Clerk of Works staff as leaders and staff of the Clerk of Works and Assistant Clerk of Works ranks) visit the estates regularly for conducting in-flat inspections. The aim of the surprise checks is to give technical support to the TMS teams.*

measures and improper use of tools). Audit review of the records of the unsatisfactory repair works also revealed that some cases could give rise to safety concerns (Note 29). In view of the unsatisfactory repair works found in a large number of selected flats, the HD needs to strengthen the final inspections of contractors' repair works to ensure that their quality is up to standard before acceptance. The HD also needs to consider taking regulatory actions against those contractors found with frequent unsatisfactory repair works.

2.38 ***Need to ensure that deficiencies identified are rectified.*** Audit review of the surprise check records revealed that in some cases, the deficiencies (Note 30) identified were found again in subsequent surprise checks. These indicated that the deficiencies might not have been properly followed up by the contractors concerned. In Audit's view, the HD needs to remind the TMS teams to follow up with the contractors concerned on deficiencies identified in surprise checks to ensure that they are rectified in a timely manner.

Unsatisfactory contractors' repair works under the RIMS

2.39 As mentioned in paragraph 2.29, the Performance Verification Team conducts performance verifications periodically in selected estates including the review of the target achievement and repair works of the RIMS. In each selected estate, the Performance Verification Team reviews the minor works orders of two flats and estate works orders of another two flats to assess the quality of repair works on material used and workmanship. Audit examination of the records of repair works checked by the Performance Verification Team during 2011 to 2015 revealed room for improvement as set out in paragraphs 2.40 and 2.41.

2.40 ***Need to strengthen the final inspections of RIMS repair works.*** Of the 531 minor works orders and 535 estate works orders selected by the Performance Verification Team for assessing the quality of the repair works, the following issues were noted:

Note 29: *For example, in three cases, the earth bonding was not properly connected. In another case, all window grilles were taken away for repair but no safety precautions were taken.*

Note 30: *For example, material storage areas were not tidied up by contractors and material checking records of the estates were not available.*

(a) regarding the workmanship, 84 (16%) of the 531 minor works orders and 349 (65%) of the 535 estate works orders were rated Grades C or D, requiring partial or complete replacement/rectification works (see Appendix J). Of the defective repair works identified in 349 estate works orders, 25 cases had potential safety concerns (Note 31);

(b) the percentages of minor works orders rated Grades C or D in respect of material and workmanship increased from 6% and 17% in 2011 to 33% and 22% in 2015 (see Appendix J). Similarly, the percentage of estate works orders rated Grades C or D in respect of workmanship increased from 50% in 2011 to 88% in 2015; and

(c) for seven categories of repair works (including water seepage and concrete spalling repair), more than 50% of works orders required replacement or rectification works.

The results of the Performance Verification Team's assessments indicated that the quality of RIMS repair works was generally unsatisfactory and on a deteriorating trend. In Audit's view, the HD needs to step up the final inspections of the contractors' repair works to ensure that their quality is up to standard before acceptance. The HD also needs to consider taking regulatory actions against those contractors found with frequent unsatisfactory repair works.

2.41 ***Need to strengthen training for ITTs.*** In examining the estate works orders checked by the Performance Verification Team, Audit found that two works orders had also been subject to the ITT's final inspections. For both works orders, the material and workmanship were all rated Grade A by the ITT. However, the Performance Verification Team rated both works orders Grade D in material and Grade C/D in workmanship, suggesting that there had been over-rating by the ITT. The HD needs to strengthen training for ITTs on assessing the quality of contractors' repair works.

Note 31: *For example, in 22 cases, the earth bonding was not provided or not properly connected.*

Audit recommendations

2.42 **Audit has *recommended* that the Director of Housing should:**

(a) **take measures to ensure that the requirement of verifying the effectiveness of water seepage repairs under the RIMS is complied with and consider applying the same verification requirement to those repairs under the TMS;**

(b) **strengthen the final inspections of contractors' repair works under the TMS and the RIMS to ensure that their quality is up to standard before acceptance and consider taking regulatory actions against those contractors found with frequent unsatisfactory repair works;**

(c) **remind the TMS teams to follow up with the contractors concerned on deficiencies identified in surprise checks to ensure that they are rectified in a timely manner; and**

(d) **strengthen training for ITTs on assessing the quality of contractors' repair works.**

Response from the Government

2.43 The Director of Housing generally agrees with the audit recommendations. He has said that:

(a) the requirement of verifying the effectiveness of water seepage repairs in certain period after completion of works was introduced as an additional procedure on top of the routine site supervision during progress of works and the certification of completed works. This is a proactive approach to study the frequency and possible causes of relapse cases. Past experience has demonstrated that the routine site supervision and certification of works upon completion have provided adequate control for quality assurance of the effectiveness of water seepage repairs. The HD will review the need to maintain additional verification under the RIMS and whether this extra assurance procedure provides value for money;

(b) monthly inspection by the Surprise Check Teams for the purpose of performance verification of repair orders has been used by the HD as an internal monitoring tool to enhance the quality of works. The HD agrees to continue to review the site supervision to ensure that the repair works are at an acceptable standard. For unsatisfactory repair works, the HD will continue to follow up and hold the concerned contractors accountable as part of the contract administration;

(c) the HD has recognised the need to monitor contractors' works. Deficiencies in materials and/or workmanship may be observed in different estates under different contractors. The HD always instructs the contractors to rectify the defects in accordance with the contract requirements as soon as they are identified; and

(d) the HD will continue to arrange training for the ITTs and strengthen the aspects of assessing the quality of contractors' repair works.

Management information system

2.44 Since 2007, the HD has developed a computerised TMS System at a cost of $7.2 million to facilitate the effective management of in-flat inspection records, issuing and processing of works orders, and scheduling of inspection and repair works appointment under the TMS and the RIMS. The TMS System comprises the In-flat Inspection Sub-system, Appointment and Scheduling Sub-system and Maintenance Information Sub-system. The Maintenance Information Sub-system can generate a number of management information reports on the TMS and the RIMS.

2.45 ***Need to address the software problems of the Maintenance Information Sub-system.*** In May 2016, Audit obtained from the HD management reports generated by the Maintenance Information Sub-system for analysing the in-flat inspections. However, Audit found that some information in the reports was inaccurate (e.g. the numbers of flats in some PRH estates were double-counted). Upon enquiry, the HD informed Audit that there were software problems in the Sub-system. While the HD subsequently provided Audit with the requested information in July 2016 without using the Sub-system, the HD still needs to address the software problems to ensure that the functionality of the Sub-system is not compromised.

2.46 ***Need to make effective use of the Maintenance Information Sub-system.*** In response to Audit's enquiry on the inaccurate reports generated from the Maintenance Information Sub-system in August 2016, the HD informed Audit that its staff did not use the management reports generated by the Sub-system often and hence the software problems had not been identified earlier. Audit noted that the Sub-system had captured various TMS and RIMS data that could be used for compiling management information for monitoring and planning the in-flat maintenance and repair works. For example, the reasons for not gaining access to individual flats in TMS inspections could be used for formulating specific follow-up action (see para. 2.16(b)). The Maintenance Information Sub-system may also be used for analysing the contributing factors to the continued increase in RIMS works orders (see para. 2.28). In Audit's view, the HD needs to make effective use of the Sub-system for monitoring and planning the in-flat maintenance and repair works under the TMS and the RIMS.

Audit recommendations

2.47 **Audit has *recommended* that the Director of Housing should:**

(a) **address the software problems of the Maintenance Information Sub-system to ensure that its functionality is not compromised; and**

(b) **make effective use of the Sub-system for monitoring and planning the in-flat maintenance and repair works under the TMS and the RIMS.**

Response from the Government

2.48 The Director of Housing agrees with the audit recommendations. He has said that the HD:

(a) has reviewed the existing management reports in the Maintenance Information Sub-system and will remove those which are no longer used and re-test all the remaining reports to ensure the software problems are rectified; and

(b) will continue to seek opportunity for better use of the data as management information.

PART 3: FOLLOW-UP ACTIONS ON PUBLIC RENTAL HOUSING'S WATER SAMPLING TESTS FOR LEAD

3.1 This PART examines the follow-up actions on the PRH's water sampling tests for lead, focusing on:

(a) discrepancies between the announced sampling test results and source data of the sampling tests (paras. 3.5 to 3.7);

(b) arrangements for reviewing the water sampling test results (paras. 3.8 to 3.20);

(c) re-sampling arrangements for discarded samples (paras. 3.21 to 3.23); and

(d) relief measures and rectification works for the 11 affected PRH developments (paras. 3.24 to 3.30).

Water sampling tests

3.2 Since the start of the "excess lead in drinking water" incident in July 2015 (see para. 1.7), the HA and the Government had conducted water sampling tests, initially for Kai Ching Estate (where excess lead in drinking water was first found) and then a number of developments with pipes installed by the same Licensed Plumber. On 24 July 2015, the Chairman of the HA announced that the water sampling tests (Note 32) would be carried out for all PRH estates in a systematic way. The tests were completed in two stages as follows:

Note 32: *While the tests focused on the domestic blocks of PRH estates, tests were also conducted for the non-domestic facilities used for commercial, social services and educational purposes in PRH estates. Starting from August 2015, the tests for the non-domestic facilities were conducted in a more systematic manner.*

(a) ***Systematic sampling tests for 83 developments in 46 PRH estates.*** According to the Task Force, leaded solder used on water pipe joints was found to be the cause of excess lead in drinking water (see para. 1.9). In general, water pipes in PRH estates completed in or after 2005 are mainly copper pipes joined by soldering. On 24 September 2015, the HA announced that systematic water sampling tests for each block of 83 PRH developments, which comprised: (i) 80 PRH developments completed in or after 2005 (although 12 of them did not use soldering); and (ii) three PRH developments completed before 2005 but used soldering in their pipe connections, had been completed. Of a total of 4,740 water samples taken, 91 were found to contain lead in excess of WHO's PGV; and

(b) ***Screening tests for 144 PRH estates (Note 33) completed before 2005.*** In general, water pipes in PRH estates completed before 2005 are connected mechanically and not by soldering. It was believed that there was a lower risk leading to excess lead in drinking water for these estates. Such a lower risk was confirmed by the test results of water samples (all below the WHO's PGV) taken from the 12 PRH developments that did not use soldering but had also been covered under the systematic water sampling tests (see (a) above). The two-step water screening test involved firstly a representative screening of these estates by batches. Depending on the size of the estates, the HD would select several blocks from each of them, and water samples would be taken from each of the selected blocks. If individual estates were found to have water samples containing excess lead in the first stage, systematic water sampling tests (as with tests conducted for estates completed in or after 2005) would be conducted for each block within that estate. On 18 November 2015, the HA announced that water screening tests for 144 PRH estates, which were completed before 2005 and did not use soldering, had been completed. A total of 2,634 water samples were taken and all of them complied with the WHO's PGV.

Note 33: *Among the 144 estates, 16 estates had some of their developments completed in or after 2005 and such developments had been covered in the systematic sampling tests (see para. 3.2(a)). The screening tests covered Shek Lei (II) Estate and Shek Lei (2) Estate (Interim Housing) which are separate blocks with their own water supply systems. They are counted as two estates for screening test purpose although they are normally counted as one estate by the HD (see Note 1 to Table 1 in para. 1.4).*

Announced test results

3.3 Since the "excess lead in drinking water" incident, the HD had been updating the public through various channels (including press releases and press conferences) on the latest developments of the various follow-up actions. It had also provided the HA and LegCo with regular updates on the incident (Note 34). According to the HD/WSD, the total number of samples taken for all PRH estates (including non-domestic portions) was only finalised by March 2016. The HD then took the earliest opportunity to update the public of the finalised statistics. In March 2016, the HD informed the HA of the confirmed sample numbers (Note 35) for water sampling tests conducted from July to November 2015 for all PRH estates (including non-domestic portions) totalling 7,456 (Note 36), as follows:

(a) ***Systematic sampling test results for 83 developments of 46 PRH estates.*** A total of 4,821 water samples were taken from the 83 developments in the 46 PRH estates. Amongst them, 91 water samples taken from 11 PRH developments (see Note 5 to para. 1.7) exceeded the WHO's PGV of 10 micrograms per litre (μg/L); and

(b) ***Screening test results for 144 PRH estates.*** A total of 2,635 water samples were taken from the 144 PRH estates completed before 2005, and all of them met the WHO's PGV.

Note 34: *For example, updates on the incident were provided to LegCo at its meetings on 14 and 16 October 2015, at the LegCo Panel on Housing's meetings on 22 July 2015, 2 November 2015 and 1 February 2016, as well as at the special House Committee meetings on 1 September 2015, 8 October 2015 and 11 July 2016.*

Note 35: *In its paper issued to the HA on 4 March 2016, the HD mentioned that the confirmed number of samples taken for the 46 PRH estates involving 83 developments for which systematic sampling tests had been conducted was 4,821, as opposed to 4,740 announced earlier. The confirmed number of samples taken for the 144 PRH estates for which screening tests had been conducted was 2,635, as opposed to 2,634 announced earlier.*

Note 36: *With the exception of 22 samples which were collected and tested by two laboratories commissioned by the HD, all other samples were collected by the WSD and tested by the WSD or the Government Laboratory.*

A breakdown of the 7,456 samples taken (i.e. a list of the sampled PRH developments with the corresponding number of samples taken and for each of the 11 affected PRH developments, also the number of samples found with excess lead) was also provided to the HA.

3.4 In its updates on "excess lead in drinking water" incident of May 2016, the HD informed the HA that:

(a) during the hearings of the Commission of Inquiry, there were queries about certain water samples being discarded. In response to press enquiries, the HD issued a press statement on 5 February 2016 to repeat some of the information that had previously been published and the reasons for discarding some water samples; and

(b) based on the WSD's confirmation, 49 samples were discarded (Note 37). Among them, 27 (Note 38) were discarded for two main reasons, namely: (i) the samples were affected by environmental factors; or (ii) the fresh water supply systems from which the samples were taken were installed by the tenants themselves. Another 22 were discarded as they had been taken inadvertently from premises that were not existing PRH estates (Note 39).

In July 2016, the LegCo House Committee was also updated on the confirmed number of samples. The information provided to the LegCo House Committee was the same as that provided to the HA in March 2016 (see para. 3.3). Audit noted that the information provided to the HA/LegCo House Committee was compiled by the HD, and the HD had sought comments from the WSD in regard to their updated sample numbers for water sampling tests for the HA paper of March 2016.

Note 37: *All 49 samples were not included in the 7,456 water sampling test results reported to the HA in March 2016 (see para. 3.3) because they had been discarded.*

Note 38: *These 27 samples were all taken from the PRH developments completed in or after 2005 (see para. 3.2(a)).*

Note 39: *Of the 22 discarded samples, 14 were taken from a block uncompleted at the time, and 8 were taken from Link's properties.*

Discrepancies between the announced sampling test results and source data of the sampling tests

3.5 On 21 July 2016, Audit obtained through the HD the source data of the water sampling test results which were prepared by the WSD for examination. After cross-checking the source data against the test results reported to the HA in March 2016 and the LegCo House Committee in July 2016 (see paras. 3.3 and 3.4), Audit found some discrepancies and sought clarifications through the HD on 1 August 2016. In response to Audit's enquiries, the inter-departmental meeting chaired by the Permanent Secretary for Transport and Housing (Housing) (see para. 3.8) re-visited the relevant data and the HD informed Audit on 25 August 2016 of the reasons for the discrepancies as shown in Table 4:

Table 4

Discrepancies between the announced test results and source data

Item	Estate	Sampling test results		Reasons for the discrepancies provided by the HD
		Per information reported to the HA and LegCo (see paras. 3.3 and 3.4)	Per WSD's source data	
1.	Kai Ching	7 of 121 samples taken were found with excess lead	9 of 121 samples taken were found with excess lead	On 11 July 2015, it was announced that 115 samples were taken from the estate, of which seven had excess lead and the estate was classified as an affected PRH estate. Subsequently, six more samples were taken from the non-domestic facilities in the estate, of which two had excess lead. These two non-compliant samples taken from non-domestic units located on ground floor of domestic blocks sharing the same water supply system with the domestic units already found with excess lead were inadvertently left out from the figure announced previously. However, this did not affect the categorisation of Kai Ching Estate as an affected estate because these samples were taken on 15 August 2015, which was after declaration of Kai Ching Estate as an affected estate at the press conference held on 11 July 2015.

Table 4 (Cont'd)

Item	Estate	Sampling test results		Reasons for the discrepancies provided by the HD
		Per information reported to the HA and LegCo (see paras. 3.3 and 3.4)	**Per WSD's source data**	
2.	Yan On	74 samples taken	73 samples taken	On 7 August 2015, it was announced that 69 samples were taken, of which five samples had excess lead. Subsequently, five more samples were taken (making up a total of 74 samples), of which one non-domestic sample had excess lead but was discarded because tenant's alteration was involved. The discarded sample which should have been excluded (see Note 37 to para. 3.4(b)) had been inadvertently included in the figure announced previously.
3.	Shek Kip Mei Phase 2	59 samples taken	54 samples taken	On 3 August 2015, it was announced that 59 samples were taken. Subsequently, one more non-domestic sample was taken from the estate. Of the total 60 samples, six were taken from the Ancillary Facilities Block (see Item 4 below) but had been inadvertently included whereas the non-domestic sample which should be included had been inadvertently left out from the figure announced previously.
4.	Shek Kip Mei Phase 2 (Ancillary Facilities Block)	6 samples taken	12 samples taken	Six samples were inadvertently included in the 59 samples in Item 3 above.

Source: HD records and source data provided by the WSD

3.6 ***Need to strengthen data validation.*** As a result of the omission of two non-compliant samples for Kai Ching Estate mentioned in Item 1 of Table 4 in paragraph 3.5, the total number of non-compliant samples for the 11 affected PRH developments reported to the HA and LegCo should have been 93 instead of 91 (see paras. 3.3(a) and 3.4). The announced numbers of samples taken from

three developments (Yan On, Shek Kip Mei Phase 2 and Shek Kip Mei Phase 2 (Ancillary Facilities Block)) were also inaccurate (see Items 2 to 4 of Table 4). Audit noted that notwithstanding the discrepancies identified, the total number of affected PRH developments remained unchanged. However, as the announced sampling test tallies were important for the public's understanding of the extent of the "excess lead in drinking water" problem in PRH estates, the HD, in collaboration with the WSD, needs to make improvement in this regard, e.g. by strengthening data validation to ensure that information provided to the HA/LegCo is accurate.

Recent developments

3.7 On 11 October 2016, the HD provided the HA with an update on the issues arising from the "excess lead in drinking water in PRH estates" incident. In the update, the HA was informed of the discrepancies between the water sampling source data and the information reported to the HA in March 2016 and the LegCo House Committee in July 2016.

Arrangements for reviewing the water sampling test results

3.8 Since the discovery of excess lead in water samples in July 2015, inter-departmental meetings which were chaired by the Permanent Secretary for Transport and Housing (Housing) and comprised representatives from the HD, the WSD, the Government Laboratory and the Department of Health, had been held to discuss and coordinate matters relating to the sampling of drinking water in PRH developments.

3.9 For the purpose of determining whether follow-up actions were required on the water sampling test results of a PRH development, the Government had adopted an action level that as long as there was a sample exceeding the WHO's PGV of 10 μg/L for lead, the entire PRH development would be classified as an affected estate, regardless of the number of blocks within the PRH development concerned. According to the Commission of Inquiry, this was a cautious approach given that in the United States, the authorities would only be required to take steps to reduce exposure if the lead concentration of more than 10% of the samples collected had exceeded the action level of 15 μg/L.

3.10 In June and August 2016, Audit requested the HD to provide details of the inter-departmental meetings' deliberations of the water sampling test results. In July and August 2016, the HD informed Audit that:

(a) the first inter-departmental meeting was held on 20 July 2015. Initially these inter-departmental meetings were held on a need basis. From 6 August to 24 September 2015, they had been held regularly twice a week. From 20 July to 18 November 2015, a total of 29 inter-departmental meetings (Note 40) had been held to review the water sampling test results and decide on the follow-up actions required; and

(b) after consolidating experiences in early August 2015, the HD saw the need to start consolidating and recording the water sampling data discussed at the inter-departmental meetings in order to advise the HA and the public. For the 22 inter-departmental meetings held from 12 August to 18 November 2015, the HD prepared 15 decision notes (Note 41) which had been agreed by all attending parties.

Audit examination of decision notes of the inter-departmental meetings

3.11 As the inter-departmental meeting was set up to review the water sampling tests results and determine the follow-up actions required to safeguard tenants' drinking water safety, Audit examined the 15 decision notes of the meetings provided by the HD, which documented the inter-departmental meetings' deliberations and the decisions on the non-compliant samples and the discarded

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Note 40: *The 29 inter-departmental meetings comprised: (a) seven meetings held from 20 July to 7 August 2015; (b) seven Technical Review Meetings to review preliminary results and seven Final Conclusion Meetings on the following days to conclude results for announcement held from 12 August to 24 September 2015; and (c) eight meetings held from 30 September to 18 November 2015.*

Note 41: *One set of decision notes was prepared for each pair of Technical Review Meeting and Final Conclusion Meeting which were held consecutively to discuss the same batch of water samples. Thus, for these 14 meetings held from 12 August to 24 September 2015, seven decision notes were prepared. For the eight meetings held from 30 September to 18 November 2015, decision notes were prepared for each of them.*

samples, against the source records provided by the WSD. Audit's findings are summarised in Table 5.

Table 5

Audit analysis of the documentation of the inter-departmental meetings' review of water sampling test results

Water sampling test results per WSD source data (a)	Water sampling test results reviewed by the inter-departmental meetings	
	As recorded in the 15 decision notes of 22 meetings (b)	Without decision notes prepared for 7 meetings (c) = (a) − (b)
93 non-compliant samples (see para. 3.6)	44 non-compliant samples	49 non-compliant samples (Note 1)
49 discarded samples (see para. 3.4(b))	43 discarded samples (Note 2)	6 discarded samples (Note 3)

Source: Audit analysis of HD and WSD records

Note 1: According to the WSD's source data, the sampling dates of all 49 samples were before the HD started to maintain decision notes. These 49 samples were included in the water sampling test results reported by the WSD to the HD/Department of Health/Government Laboratory in its e-mails of 14 July 2015 to 7 August 2015.

Note 2: According to the WSD's source data, of the 43 discarded samples, 15 had lead levels exceeding the WHO's PGV and the remaining 28 were compliant samples.

Note 3: According to the WSD's source data, the sampling dates of the six samples were before the HD started to maintain decision notes and all of them had lead levels exceeding the WHO's PGV (see paras. 3.12 and 3.13 for details of these six samples).

3.12 ***Records of decisions on non-compliant and discarded samples not fully maintained.*** As mentioned in paragraphs 3.8 to 3.10, of the 29 inter-departmental meetings held since 20 July 2015 to discuss and coordinate matters relating to the sampling of drinking water in PRH developments, decision notes were only prepared for 22 inter-departmental meetings starting from 12 August 2015 (see para. 3.10(b)). No decision notes were prepared for the seven meetings held from

20 July to 7 August 2015, and therefore the relevant deliberations and decisions were not recorded. Given the great public concern over the "excess lead in drinking water" incident and the significant role of the inter-departmental meetings in determining the follow-up actions on water sampling test results, it was unsatisfactory that decision notes were not maintained for 7 (24% of the total 29) inter-departmental meetings where important decisions had been made on 55 non-compliant samples, i.e. taking follow-up actions on 49 of them and discarding the remaining six (see column (c) of Table 5 in para. 3.11). For the 6 discarded samples reviewed by the inter-departmental meetings but for which decision notes had not been prepared, the HD provided Audit with the details as shown in Table 6.

Table 6

Details of the six samples discarded but without decision notes of the inter-departmental meetings

Sample	Location	Lead level (μg/L)	Sampling date	Reason for being discarded by the inter-departmental meetings
4 of the 6 discarded samples taken from 2 of the 11 affected PRH developments				
1	Shek Kip Mei Estate Phase 2	100	28/7/2015	Environmental contamination and sampling issues
2	Shek Kip Mei Estate Phase 2	830	28/7/2015	
3	Hung Hom Estate Phase 2 (a store room)	713	30/7/2015	
4	Hung Hom Estate Phase 2 (meter position outside a store room)	88	31/7/2015	
2 of the 6 discarded samples taken from 2 unaffected PRH developments				
5	Shui Chuen O Estate	14	13/7/2015	Environmental contamination and sampling issues
6	Yee Ming Estate	15	20/7/2015	

Source: HD and WSD records

3.13 In September and October 2016, the HD and the WSD also informed Audit that:

(a) for Samples 1 to 3 of Table 6, the reasons for discarding them were recorded in the WSD's e-mail of 2 August 2015 to members of the inter-departmental meeting (Note 42);

(b) the reason for discarding Sample 5 of Table 6 was announced by the WSD in the press conferences on 14 and 15 July 2015;

(c) for Sample 6 of Table 6, according to the WSD's internal e-mail of 23 July 2015 which was also copied to the HD, the test result was considered doubtful by the WSD, taking into account the sampling condition (a vacant flat), other test results in the flat and in other flats in the estate; and

(d) for Sample 4 of Table 6, neither the HD nor the WSD could find any relevant e-mail correspondence concerning the reason for discarding the sample. Nevertheless, according to recollection of the concerned staff of the WSD, Sample 3 of Table 6 was taken on 30 July 2015 from a store room. It was discarded due to environmental contamination and sampling issues as stated in Table 6 in paragraph 3.12 and item (a) above. Further samples were taken on 31 July 2015, i.e. one sample inside the store room and another sample (i.e. Sample 4) at the meter position outside the store room. Both samples were found to have lead content in excess of the WHO's PGV. The test result of the sample taken inside the store room was later accepted as the result representing the quality of water supplied to the store room while Sample 4 taken at the meter position outside the store room was discarded due to the inappropriate sampling location given the circumstances.

Note 42: *As stated in the e-mail, the preliminary investigation revealed that unsatisfactory sampling environment (dirty air filter above the sampling point), transient surge of accumulated lead deposit in the system, low water usage, small number of users in the supply zone etc. might have contributed to the abnormal results which were not considered valid and representative of the consistent quality of water at taps. In view of this and lack of repeatability, the abnormal results at these points should be superseded by the consistent test results of re-sampling.*

3.14 One of the recommendations of the Commission of Inquiry (see para. 1.9) is that given the inadequacy of the sampling protocol adopted by the WSD in 2015, the Government should undertake to test the drinking water of all PRH estates again using an appropriate sampling protocol that would include the testing of stagnant water. In Audit's view, to prevent recurrence of similar problems mentioned in paragraph 3.12 when carrying out retesting of the drinking water of PRH estates in accordance with the Commission of Inquiry's recommendation, the HD needs to take measures to ensure that proper records on all discussions in respect of sampling matters are maintained to support evidence-based decision making.

3.15 ***Developing appropriate sampling protocol.*** In July 2016, the LegCo House Committee was informed that: (a) the WSD had commenced follow-up work on the recommendations of the Commission of Inquiry, including engaging expert consultants to conduct a study on, among other things, developing an appropriate sampling protocol; and (b) the pertinent work was targeted to be completed in six to nine months (i.e. by March 2017). An international expert panel was also set up by the Development Bureau in June 2016 to provide advice on the proposed sampling protocol. As the retesting of drinking water of all PRH estates using an appropriate protocol could point to the need for further measures to be taken to safeguard tenants' drinking water safety, the WSD needs to closely monitor the progress of developing an appropriate sampling protocol to ensure that the target completion date will be met.

3.16 In September and October 2016, the WSD informed Audit that:

(a) there were different sampling protocols being adopted overseas. Since the release of the Commission of Inquiry Report, the WSD had been working on a tight schedule and in full swing, amongst others, to develop an appropriate sampling protocol for investigating lead contamination in the plumbing systems of the PRH estates; and

(b) in conjunction with the development of this sampling protocol, other key water safety issues had to be holistically reviewed and studied, such as the drinking water quality standards, the formulation of a territory-wide compliance monitoring programme and water safety plan. The WSD had engaged an expert consultant from the United Kingdom to review, amongst others, the water sampling protocols of various organisations (e.g. the European Union) and developed countries. The Development

Bureau, the WSD, the international expert panel and the United Kingdom expert consultant were deliberating on the relevant issues, including the purposes and limitations of the various sampling protocols, and their applicability in Hong Kong's situation. The WSD was fully aware of the need to accomplish these tasks as quickly as possible and was making full effort to complete the work by March 2017.

Water sampling/screening tests not conducted for PRH flats in TPS estates

3.17 According to the HA Chairman's announcement of 24 July 2015, water sampling tests would be carried out for all PRH estates in a systematic way. In November 2015, the Transport and Housing Bureau informed the LegCo Panel on Housing that the Government had been attaching great importance to the incident of excess lead in drinking water and adhered to three principles in addressing the issues of "excess lead in drinking water" incident, i.e. keeping information open and transparent, adopting a people-oriented approach, and carrying out thorough investigations. On 7 August 2015, in response to media enquiries, the Secretary for Transport and Housing cum Chairman of the HA said that the nature of TPS and Home Ownership Scheme estates was more akin to private residential buildings and the decision to conduct water sampling tests rested with the OCs concerned. At that time, the HA was conducting systematic water sampling tests for PRH estates completed in and after 2005. The 39 TPS estates concerned were all completed before 2005 which did not use soldering in general. In response to Audit's enquiries on the position of water sampling tests for the 39 TPS estates (see Note 2 to Table 1 in para. 1.4), the HD replied the same in June and July 2016.

3.18 On 3 August 2016, Audit requested the HD to make enquiries with the OCs concerned on whether they had carried out water sampling tests for lead in their estates and if so the results of the tests. On 17 August 2016, the HD reiterated that the decision to conduct water sampling tests in TPS estates rested with the OCs concerned.

3.19 According to HD records, as at 31 March 2016, there were 54,493 PRH flats in 39 TPS estates under the ownership and management of the HA. While the mixed ownership in TPS estates might complicate the conducting of water sampling tests for pipe connections in common areas, there was no evidence to show that the HD had made efforts to liaise with the OCs concerned to sort out the issue. As for

the pipe connections in individual PRH flats, the HD has full discretion to conduct any tests deemed necessary in the same way it provides other maintenance services (e.g. TMS and RIMS) for these flats. In fact, for the non-domestic portion of PRH estates where only the fresh water supply systems of the common areas were installed by the HD's contractors, the HD also conducted water sampling tests for its responsible areas. Given the large number of PRH flats in the 39 TPS estates, Audit enquired whether the HD would reconsider conducting water sampling tests/screening tests for the PRH flats in the TPS estates and other estates under the HA's ownership and management if the OCs concerned had not done so.

3.20 In October 2016, the HD informed Audit that:

(a) it understood Audit's concern regarding the safety of drinking water for TPS tenants. However, there were practical and technical difficulties in conducting water sampling tests for units occupied by HA tenants given the mixed ownership of these estates. This was because the level of lead in the water of such a unit was affected by parts of the water supply system outside of these HA rental units. Given the wide and sustained publicity in the press and the information published by the Government and the HA, the OCs of TPS estates along with owners of private housing had been alerted to the issue and had presumably been making decisions as they deemed fit; and

(b) in the case of TPS estates, relevant information that had been published by the Government and HA included:

(i) according to the Task Force, leaded solder used on water pipe joints was found to be the cause of excess lead in drinking water;

(ii) water pipes in PRH estates completed before 2005 did not use soldering in general; and

(iii) in the water sampling tests completed for PRH estates last year, all samples taken from PRH estates completed before 2005 complied with the WHO's PGV.

Re-sampling arrangements for discarded samples

3.21 Based on information provided by the HD, 28 of the 49 discarded samples had not exceeded the WHO's PGV of 10 μg/L (see Note 2 to Table 5 in para. 3.11). They were discarded because 6 of them were taken from flats with tenants' alteration to the original plumbing fittings, 14 from uncompleted housing flats and 8 from premises that were not the HA's properties. For the remaining 21 discarded samples, their test results had exceeded the WHO's PGV. There were no decision notes for six non-compliant samples discarded (see Table 6 in para. 3.12). Audit reviewed the 15 decision notes to ascertain the reasons for discarding the other 15 non-compliant samples and whether re-sampling had been carried out. The findings are summarised in Table 7.

Table 7

Reasons for discarding 21 samples which had exceeded the WHO's PGV of 10 μg/L

Sample	Location	First sample		Re-sample		Decision note	Reason for being discarded
		Lead level (μg/L)	Sampling date	Lead level (μg/L)	Sampling date		
8 of the 21 samples taken from 4 of the 11 affected PRH developments							
1	Shek Kip Mei Estate Phase 2	100	28/7/2015	11	30/7/2015	No	Environmental contamination and sampling issues (see para. 3.12)
2	Shek Kip Mei Estate Phase 2	830	28/7/2015	3	30/7/2015		
3	Hung Hom Estate Phase 2	713	30/7/2015	17	31/7/2015		
4	Hung Hom Estate Phase 2	88	31/7/2015	13	1/8/2015		
5	Un Chau Estate	47	7/8/2015	Re-sampling not conducted (see para. 3.23)		Yes	Tenants' alteration
6	Un Chau Estate	11	7/8/2015				
7	Un Chau Estate	36	11/8/2015				
8	Yan On Estate	11	12/8/2015				
13 of the 21 samples taken from 7 unaffected PRH developments							
9	Shui Chuen O Estate	14	13/7/2015	2	15/7/2015	No	Environmental contamination and sampling issues (see para. 3.12)
10	Yee Ming Estate	15	20/7/2015	2	21/7/2015		
11	Tin Ching Estate Phase 3	46	5/8/2015	3	6/8/2015	Yes	Discarded after re-sampling (Note 1)
12	Choi Tak Estate	19	5/8/2015	9	6/8/2015		Samples were considered outliers and discarded after re-sampling (Note 1)
13	Choi Tak Estate	30	5/8/2015	< 1	6/8/2015		

Table 7 (Cont'd)

Sample	Location	First sample		Re-sample		Decision note	Reason for being discarded
		Lead level (μg/L)	Sampling date	Lead level (μg/L)	Sampling date		
14	Yat Tung (II) Estate	14	27/8/2015	1	1/9/2015	Yes	Re-sampling was taken to confirm the repeatability of the data. The first sampling results were discarded after re-sampling (Note 1).
				< 1	4/9/2015		
15	Yat Tung (II) Estate	17	28/8/2015	< 1	11/9/2015		
				5	15/9/2015		
16	Kwai Chung Estate	12	29/8/2015	2	4/9/2015		
				< 1	7/9/2015		
17	Kwai Chung Estate	150	31/8/2015	Re-sampling not conducted (see para. 3.23)			Tenants' alteration and sampling issues (Note 2)
18	Kwai Chung Estate	65	31/8/2015				
19	Kwai Chung Estate	72	31/8/2015				
20	Kwai Chung Estate	110	31/8/2015				
21	Kwai Chung Estate	51	31/8/2015	< 1	4/9/2015		Re-sampling was taken to confirm the repeatability of the data. The first sampling result was considered an outlier and discarded after re-sampling (Note 1).
				< 1	7/9/2015		

Source: *Audit analysis of HD and WSD records*

Note 1: *In October 2016, the HD informed Audit that in essence, the reasons for discarding these samples could be categorised as environmental contamination and sampling issues.*

Note 2: *According to the inter-departmental meeting, one of the reasons for discarding these samples was that they were inadvertently taken from the water meter position and improper sampling method was used, namely, flushing for two to five minutes had not been carried out. In October 2016, the HD informed Audit that the reasons for discarding this sample also included environmental contamination.*

Remarks: *The re-sampling results for Items 1, 3 and 4 were counted towards the 93 non-compliant samples.*

3.22 As shown in Table 7 in paragraph 3.21, of the 21 discarded samples not complying with the WHO's PGV, re-sampling had been conducted for 13 flats concerned for testing the repeatability of the first sample results before the first non-compliant test results were discarded.

3.23 For the remaining 8 of the 21 discarded samples where tenants' alteration to the original plumbing fittings was the sole reason or a contributing factor for being discarded (see Items 5 to 8 and 17 to 20 of Table 7 in para. 3.21), re-sampling had not been conducted for the eight flats concerned. Instead, water samples were taken from adjacent flats (i.e. those without alteration to their original plumbing fittings) to confirm that their lead levels did not exceed the WHO's PGV before the inter-departmental meetings decided to discard the non-compliant test results of the eight flats. Audit understood that for the purpose of obtaining reference of the water supply system of the PRH estates concerned, sampling tests for flats with the original plumbing fittings unaltered were more relevant than those with alteration made to the original plumbing fittings. Of the eight flats without re-sampling conducted, four were not within the 11 affected PRH developments (Items 17 to 20 of Table 7). On 30 September 2016, the HD informed Audit that: (a) alterations to the plumbing fittings of the three flats (Items 17, 18 and 20 in Table 7) were observed by the WSD/HD staff on the dates of sampling and these were recorded in the WSD's e-mail of 9 September 2015 to members of the inter-departmental meeting; and (b) while there was no similar record for the remaining flat (Item 19 in Table 7), the HD had checked with its staff who were present on the date of sampling that alteration to the plumbing fitting of the flat was observed on site.

Relief measures and rectification works for the 11 affected public rental housing developments

Relief measures

3.24 Since the incident of excess lead in water came to light in July 2015, the HD and the WSD had taken a series of measures to minimise the inconvenience caused to tenants of the 11 affected PRH developments in gaining access to safe drinking water. These measures included the provision of water wagons/tanks and

standpipes, supply of bottled water, requesting the contractors concerned to install temporary water points by connecting pipes from the roof-top tank to each floor at their own expense, as well as to install water filters and replace filter cartridges for two years after installation for the affected domestic households free of charge.

3.25 In July 2016, the LegCo House Committee was informed of the latest position of the relief measures as follows:

(a) ***Water wagons/tanks and standpipes.*** Currently, only the standpipes remained in use. With the installation of water filters and temporary water points (see (c) and (d) below), water consumption through the standpipes had also decreased gradually;

(b) ***Bottled water.*** On 28 December 2015, the distribution of bottled water was ceased. The HA had distributed 9.96 million bottles of bottled water to the affected tenants at a total cost of some $60 million;

(c) ***Water filters.*** Filter installation had been completed in all 11 affected PRH developments by October 2015, save for a small number of households who refused the installation of filters and those with whom the HD had difficulty in getting in touch (Note 43). To ease tenants' concerns about the effectiveness of the water filters, water tests were conducted again for the units in the 11 affected PRH developments in which samples with excess lead content had been found and filters were subsequently installed by the contractors. On 2 November 2015, the HA announced that all test results complied with the WHO's PGV; and

(d) ***Temporary water points on each floor.*** The temporary water points in all 11 affected PRH developments had been put into use by 9 December 2015.

Note 43: *According to the HD, it had notified the affected households of the arrangements for installing water filters by posting notices in the lobbies of the 11 affected PRH developments and distributing newsletters to tenants' mailboxes. As at October 2015, 1,030 households had refused to install filters and 679 could not be contacted, making up a total of 1,709 (or 6% of the 29,077 affected households).*

Permanent rectification works

3.26 In order to rectify the problem of excess lead in water, the HA had requested the four contractors concerned to replace at their own expense the non-compliant pipes in the 11 affected PRH developments. In February 2016, the HA obtained performance bonds from the contractors as an additional commitment for providing safe water supply to the affected residents (see para. 3.25(c) and (d)) and completing the necessary rectification works.

3.27 ***Works in common areas.*** On 14 March 2016, the four contractors started rectification works in the common areas of the 11 affected PRH developments. Since February 2016, the HD has set up a liaison group on the rectification works to improve communication with the contractors and to resolve important issues promptly through regular biweekly meetings. According to information provided by the contractors to the liaison group meeting, the progress of works in the common areas of the 11 affected PRH developments ranged from 18.5% to 45.6% as at July 2016.

3.28 ***Works inside flats.*** The current plan of the HD was to replace the non-compliant water pipes inside domestic units after completion of the rectification works for those in the common areas. According to the HD, there were some issues that would have to be resolved first. For example, some tenants had expressed concern about damage that might be caused to their furnishings by the rectification works. The HA had asked the contractors to assess the different scenarios that might be encountered inside flats. To prepare for the eventual works inside flats, the four contractors had each chosen a vacant flat to carry out trial works. In July 2016, the LegCo House Committee was informed that the HA would closely monitor the progress of works in order to ensure that the rectification works could be completed as soon as possible. In its update to the HA of October 2016 (see para. 3.7), the HD announced that the rectification works in the common area of Kwai Yuet House at Lower Ngau Tau Kok Estate Phase I had been substantially completed. A trial for works inside flats to test contractors' method would be conducted there. Works inside flats for the rest of the affected PRH developments would be rolled out subsequently in light of the experiences of the trial works at Kwai Yuet House.

Need to follow up with affected premises not installed with water filters

3.29 According to HD records, there are 29,077 domestic premises in the 11 affected PRH developments. Based on information provided by the HD, as at July 2016, 2,138 domestic premises (7.4% of the 29,077 affected premises) had not been installed with filters provided by the contractors (because 1,117 households had refused to install filters, 846 households had returned filters after use and 175 households could not be contacted for arranging the installation works). In July 2016, the LegCo House Committee was informed that a small number of households refused the installation of filters and the HD also had difficulty in contacting some other households for arranging the installation works (see para. 3.25(c)). In response to Audit's enquiry on the position of water filter installation for the premises found with non-compliant water samples, the HD said that as at September 2016, of the 86 premises found with non-compliant water samples (Note 44), 69 out of 75 domestics premises (92%) had been installed with water filters as shown in Table 8. According to the HD, it had informed the tenants/users of the 86 affected premises that the water samples taken from their flats had exceeded the WHO's PGV.

Note 44: *Among the 86 premises found with non-compliant water samples, more than one sample had been taken from six premises (i.e. one additional sample each from five premises and two additional samples from one premises) and all of which exceeded the WHO's PGV. So the total number of non-compliant samples for the 86 premises was 93 (86 + 5 + 2).*

Table 8

Water filters installation for 86 premises found with non-compliant samples (September 2016)

Type	Number of premises		
	found with non-compliant water samples (a)	installed with water filters (b)	not installed with water filters (c) = (a) − (b)
Domestic	75	69	6 (Note 1)
Non-domestic	11	2	9 (Note 2)
Total	86	71	15

Source: Audit analysis of HD records

Note 1: According to the HD, of the six domestic premises, tenants of five premises had returned the filter after use and one had refused the installation of filter.

Note 2: According to the HD, all water points within the nine non-domestic premises were not used for drinking purposes (e.g. guard toilets, cleansing contractors' workshops and maintenance storeroom). There was no request from the tenants/users of these nine non-domestic units for filter installation. In addition, the water filters provided by the four contractors were not suitable or in some cases technically not feasible for installation in the non-domestic units.

3.30 Audit was concerned that 2,138 (7.4%) of the 29,077 domestic premises in the 11 affected PRH developments had not been installed with water filters (see para. 3.29). According to the HD, it had informed tenants of the risk of taking water for consumption directly from taps in the affected estates through a number of channels including paying visits to households for which the water test results exceeded the WHO's PGV, posting notices on the ground floor lobby, distribution of health advice leaflets to letter boxes, holding resident forums at which representatives of Department of Health were present to provide health advice and respond to enquiries, holding press conferences and issuing press releases.

However, given the health risk of excess lead in drinking water, there is still a need to continue the effort in contacting households, whose flats had not been installed with water filters, to consider installing water filters or take other precautionary measures such as drawing water from the temporary water points for consumption.

Audit recommendations

3.31 **Audit has *recommended* that the Permanent Secretary for Transport and Housing (Housing) should:**

(a) **when carrying out retesting of the drinking water of PRH estates in accordance with the Commission of Inquiry's recommendation:**

(i) **in collaboration with the Director of Water Supplies, strengthen data validation to ensure that information provided to the HA/LegCo is accurate; and**

(ii) **take measures to ensure that proper records on all discussions in respect of sampling matters are maintained to support evidence-based decision making; and**

(b) **continue the effort in contacting those households in the 11 affected PRH developments, whose flats had not been installed with water filters, to consider installing water filters or take other precautionary measures such as drawing water from the temporary water points for consumption.**

3.32 **Audit has also *recommended* that the Director of Water Supplies should closely monitor the progress of developing an appropriate sampling protocol to ensure that the target completion date of March 2017 will be met.**

Response from the Government

3.33 The Permanent Secretary for Transport and Housing (Housing) agrees with the audit recommendations in paragraph 3.31. He has said that:

(a) at the start of the "excess-lead-in-water" incident, inter-departmental meetings were held irregularly on a need basis. At the time, efforts were focused on taking follow-up actions in respect of the water sampling test results. Records on decisions made at the inter-departmental meetings had been maintained since mid-August 2015 when the HD started to consolidate the discussions and decisions on water sampling data; and

(b) for those households with whom the HD has had difficulty in getting in touch, the HD has been trying to contact them outside working hours including on Sundays and would continue to do so. The HD has also requested contractors to post notices at the lobbies and distribute notices to tenants' mail boxes to encourage households whose premises had not been installed with water filters to consider installing water filters. The HD will also continue to provide health advice tips in the newsletters for the 11 affected PRH developments from time to time.

3.34 The Director of Water Supplies agrees with the audit recommendation in paragraph 3.32 and will closely monitor the progress of developing the sampling protocol. He has said that:

(a) in order to ensure the timely completion of developing sampling protocol, and reviewing and studying of the key water safety issues, the WSD had implemented the following:

(i) increasing staff resources by employing retired officers and redeploying existing staff;

(ii) personal participation of senior management (including the Director, the Deputy Director and relevant Assistant Directors of the WSD) in collaboration with the expert consultants and international expert panel; and

(iii) implementation of a progress monitoring mechanism involving branch/section heads responsible for taking follow-up actions of respective water safety issues to update the progress reports every week using a web-based system; and

(b) on 11 October 2016, the Development Bureau issued a press release to provide an update on the follow-up work taken by the Development Bureau and the WSD in response to the recommendations by the Commission of Inquiry, which included the development of the sampling protocol. As announced in the press release, the WSD has been making full effort, and will strive to develop the sampling protocol and put forward the proposal by March 2017.

PART 4: MANAGEMENT OF ASBESTOS-CONTAINING MATERIALS IN PUBLIC RENTAL HOUSING ESTATES

4.1 This PART examines the HD's management of ACMs in PRH estates, focusing on:

(a) monitoring of ACMs in PRH estates (paras. 4.10 to 4.23);

(b) control over works affecting ACMs in PRH estates (paras. 4.26 to 4.34); and

(c) follow-up actions on un-encapsulated ACMs in balcony grille panels (paras. 4.37 to 4.39).

Legislative control over asbestos-containing materials

4.2 Asbestos is a proven carcinogen which can cause asbestosis, lung cancer and mesothelioma when inhaled. Before the health hazard of asbestos was recognised, it had been widely used in fire-proofing, thermal and electrical insulation, and sound absorption materials. Legislative control over ACMs in Hong Kong is provided for under the Air Pollution Control Ordinance (APCO — Cap. 311) as follows:

(a) import, transhipment, supply and use of asbestos are banned in Hong Kong (Note 45);

Note 45: *Asbestos is a generic group of naturally occurring fibrous material. The three most common types of asbestos are white asbestos, brown asbestos and blue asbestos. According to the HD, the former type (white asbestos) is the least harmful to health and was the major type of asbestos adopted in the grille panels in PRH estates. The latter two are regarded as more hazardous types of asbestos. Since 1996, the importation and sale of brown and blue asbestos have been banned. With effect from April 2014, the import, transhipment, supply and use of all forms of asbestos have been banned.*

(b) asbestos works are controlled by a registration system administered by the EPD. Asbestos consultants, contractors, supervisors and laboratories must register if they want to practice in the asbestos abatement profession;

(c) before carrying out any asbestos removal/abatement works or works involving the use or handling of ACMs, the owner of the premises concerned is required to submit an asbestos investigation report and abatement plan prepared by a registered asbestos consultant to the EPD at least 28 days in advance. The owner is also required to notify the EPD of the date of commencement of such works at least 28 days in advance. All asbestos abatement works or works involving the use or handling of ACMs must be carried out and supervised by registered personnel in compliance with prescribed standards; and

(d) for premises found with ACMs and required by the Ordinance, the owner concerned shall submit to the EPD an asbestos management plan prepared by a registered asbestos consultant. The asbestos management plan shall include:

(i) an operation and maintenance plan for ACMs not requiring removal works; and

(ii) an abatement plan for asbestos abatement works or works involving the use or handling of ACMs.

4.3 In exercise of the power under section 69(2) of the APCO in 1997, the then Secretary for Planning, Environment and Lands (Note 46) exempted the HD from the requirement of submitting an asbestos investigation report and an abatement plan for maintenance, repair, handling or abatement of balcony/staircase asbestos cement grille panels.

4.4 The EPD has issued guidance on the content of the statutorily required operation and maintenance plan (see para. 4.2(d)(i)), summarised as follows:

Note 46: *The policy responsibilities for environment have now been taken up by the Secretary for the Environment.*

(a) ***Policies and procedures.*** Policies and procedures tailored to the need of the specific building should be laid down;

(b) ***Details of identified ACMs.*** The type, quantity and physical condition of all identified ACMs should be depicted clearly on building plans or sketches to indicate their exact locations. The remedial abatement method to be adopted for each identified ACM, such as removal, encapsulation (Note 47), or deferred action should be included. Asbestos abatement works can be deferred when the exposure risk is considered negligible or the ACM is well-protected so that fibre release is very unlikely. However, the situation should be monitored by regular surveillance to make sure no disturbance would be made to the ACMs during normal use, repair or refurbishment;

(c) ***Surveillance scheme.*** A registered asbestos consultant should be appointed to carry out a comprehensive re-inspection of all the ACMs at least once every two years;

(d) ***Advising all people who may be affected.*** It is always advisable to take an honest and open approach to keep workers, tenants and other users of the premises fully informed of the locations and physical condition of ACMs which they might disturb, and to encourage them to report any evidence of disturbance or damage of ACMs to the owner for corrective action;

(e) ***Labelling the ACMs.*** All identified ACMs not requiring removal should be labelled (in English and Chinese) to the specifications as shown in Figure 1;

(f) ***Methods to avoid disturbing the ACMs.*** Workers, tenants and other users of the premises should be encouraged to notify the owner of even small planned maintenance and renovation before any works are carried out. In addition, an authorisation system should be adopted to monitor any operation and maintenance, and prevent accidental disturbance of the ACMs; and

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Note 47: *Encapsulation means treatment of the ACMs with a sealant that surrounds or embeds asbestos fibres in an adhesive matrix to prevent the release of fibres.*

(g) ***Record keeping scheme.*** The scheme should include all asbestos management documents, e.g. investigation and assessment reports, and maintenance and renovation notifications.

Figure 1

ACM warning label recommended by the EPD

Source: EPD records

4.5 ***Factories and Industrial Undertakings (Asbestos) Regulation (Cap. 59AD).*** The Commissioner for Labour is responsible for enforcing the Regulation which requires a proprietor of an industrial undertaking (including any construction works) to notify the Commissioner at least 28 days before the commencement of asbestos works and to prevent/reduce workers' exposure to asbestos.

Management strategy for handling asbestos-containing materials in public rental housing estates

4.6 Since 1984, the HD had banned the use of ACMs in constructing public housing. Since 1988, the HD had also put in place procedures in handling ACMs. In 1989, the HD appointed an asbestos consultant to conduct a comprehensive

survey on ACMs in PRH estates. In 1990, in collaboration with the EPD and the Labour Department, the HD promulgated an asbestos manual. In March 2009, there were public and media concerns about ACMs in the older PRH estates drawing particular attention to Ngau Tau Kok Lower (II) Estate which was included in a demolition programme, and the potential hazard to the health of workers and nearby public in ACM removal during demolition. In April 2009, the HD informed the Building Committee of the HA of the then practices in handling ACMs within PRH estates and in removing ACMs during demolition, as follows:

(a) ***Established practice.*** Most of the existing ACMs within the HA's older properties had been identified and the type, location and condition recorded. The most common building components with ACMs were the staircase or lift lobby grilles, balcony grilles and roof tiles. The asbestos in these building materials was mainly white asbestos (see Note 45 to para. 4.2(a)) with fibres embedded in cement and posed no risk to health when being left intact. Broadly speaking, treatments to ACMs in older estates included the following:

(i) ACMs vulnerable to deterioration were encapsulated by cement plaster, e.g. the balcony grilles;

(ii) ACMs in good condition were left intact without any treatment, e.g. the staircase and lift lobby grilles; and

(iii) the remaining ACMs in the older estates were being regularly monitored to ensure that they would be maintained in a safe condition until demolition of the buildings.

An Asbestos Working Group comprising representatives of the HD (as Chairman), the EPD and the Labour Department had been set up to advise on the HD's ACM abatement strategy, receive and consider ACM data and review ACM removal procedures; and

(b) ***Control of removal works.*** The HD had proven experience in removal of ACMs. It had developed with advice from the EPD and the Labour Department detailed procedures to ensure compliance with all relevant regulations and ordinances and to safeguard the well-being of the workers, the nearby tenants and the public. Such requirements had been clearly specified in the demolition contracts.

4.7 In June 2009, the HD's Estate Management Division also reviewed the management strategy for handling ACMs in PRH estates and formulated the following improvement measures:

(a) ***Improvement to regular monitoring and abatement plan.*** Basically visual inspections would continue to be adopted to verify the surface integrity of the ACMs against cracks and broken parts that might result in friable asbestos releasing into the air:

(i) ***For staircase grilles and chimneys.*** In the course of daily patrol by the estate office staff, any suspected defects would be referred to the relevant DMO for further checking. In addition, DMO staff would conduct half-yearly inspections to the staircase grilles and chimneys and update the condition records accordingly; and

(ii) ***For encapsulated balcony grilles.*** Encapsulated balcony grilles located inside flats would be inspected half-yearly at external elevation, during vacant flat refurbishment, upon request for in-flat repair (i.e. RIMS) and during TMS in-flat inspections.

In case of doubts, staff might seek advice from the Research and Development Unit (RDU — Note 48) to engage a registered asbestos consultant for detailed inspections and recommended actions;

(b) ***Engagement of a term registered asbestos consultant.*** To ensure the remaining ACMs in PRH estates would be managed properly and effectively, a term consultancy on a yearly basis for the advisory, monitoring and removal/repair works supervision to ACM-related issues was proposed to provide specialist support when necessary; and

(c) ***Enhanced communication.*** Measures to enhance communication included the following:

Note 48: *The RDU, under the Estate Management Division of the HD, is responsible for maintaining the asbestos abatement programme.*

(i) ***Internal staff briefing.*** Briefing sessions would be conducted to refresh those technical and management staff concerned on detailed guidelines and arrangements of monitoring and handling asbestos; and

(ii) ***Communication to public.*** Apart from the current practice of keeping ACM records of individual estates at estate offices for viewing by tenants, the ACM records would be posted up on notice boards of estates and the full set of ACM records would be uploaded to the HA website for public information (Note 49).

4.8 From 2011-12 to 2015-16, the Transport and Housing Bureau submitted a total of four reports (Note 50) on the HA's environmental performance to the LegCo Panel on Housing informing members that the ACMs in existing PRH estates had been maintained in satisfactory condition by conducting two condition surveys each year.

Condition surveys of ACMs in PRH estates

4.9 The HD has laid down the following guidance for staff in conducting half-yearly condition surveys of ACMs in balcony/lobby/staircase grilles and chimneys of PRH estates:

(a) ***Assessment criteria.*** An ACM unit (e.g. a whole panel or a roof tile) is initially inspected and considered independently. Those damaged parts that are clustered at one point are defined as localised. Single cracks that can be found in various locations on the ACM unit are taken as scattered. If localised damage exceeds 10% of the total area or length of that ACM unit, or if scattered damage exceeds 5% of the total area or length of that ACM unit, that ACM unit will be considered as in poor condition. For balcony and lobby/staircase grilles, initial inspection is conducted on the exterior using binoculars. For those grilles classified as poor (e.g. with major cracks or chipping), they are to be inspected at close range. The

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Note 49: *According to the HD, only estates with ACMs accessible to tenants and the public would be promulgated on the HA website for public information.*

Note 50: *No such report was submitted for the year 2012-13.*

potential for further deterioration is assessed. Those that can be easily reached by occupants are classified as accessible. Where this is the case, the grille is recorded and put on an immediate removal programme. For chimneys, every section of the chimney body is surveyed if applicable;

(b) ***Reporting of survey results.*** DMO/PSA staff are responsible for conducting half-yearly condition surveys of ACMs and recording the results in a specified report form (Form F04) for submission to the RDU. Form F04 has stipulated that the results of in-flat inspections of balcony grilles conducted during routine in-flat repair and vacant flat refurbishment (see para. 4.7(a)(ii)) should be included therein together with the condition survey results; and

(c) ***Random check of survey results.*** The RDU carries out a random check of the submitted survey results as contained in Form F04s and advises the DMO/PSA of any discrepancies.

Monitoring of asbestos-containing materials in public rental housing estates

Previously unannounced PRH estates/block with ACMs

4.10 In June 2016, Audit obtained from the HD the results of half-yearly condition surveys conducted from 2010 to 2015 for examination. Audit noted that each survey covered all the PRH estates containing ACMs as promulgated on the HA website (see para. 4.7(c)(ii)). With the redevelopment programme, the number of estates with ACMs posted on the HA website decreased from 20 in June 2010 to 17 in October 2013 which had since remained unchanged up to 17 October 2016. The building elements with ACM in the 17 PRH estates were balcony grilles, staircase/lobby grilles and chimneys (see Appendix C). However, according to the list of PRH estates with ACMs distributed to the DMOs/PSAs for conducting the June 2016 condition survey, the number of PRH estates with ACMs was 21, four more than the 17 then promulgated on the HA website (Note 51). One of the promulgated 17 estates (i.e. Fu Shan Estate) was also shown to have ACMs in an additional block (i.e. Fu Lai House). The details of the five unannounced PRH estates/block with ACMs are shown in Table 9.

Note 51: *On 18 October 2016, the number of PRH estates with ACMs on the HA's website was updated to 21.*

Table 9

Five unannounced PRH estates/block with ACMs (June 2016)

Estate	Number of blocks	Year of completion of construction	Building element with ACMs
Choi Hung	9	1962	Roof vent pipe
Fu Shan (Fu Lai House)	1	1978	Internal chimney
Fuk Loi	2	1963	Roof vent pipe of refuse chute
Tai Yuen	1	1980	Corrugated cement sheet
Long Bin Interim Housing	1 (Note 1)	1985 (Note 2)	Corrugated cement sheet

Source: HD records

Note 1: The Long Bin Interim Housing has 9 blocks, 8 of which were built in 1999. The remaining block with ACM is a single-storey structure which was part of the former Long Bin Temporary Housing Area but retained for use as an estate office and a non-government organisation facility. In May 2016, the Long Bin Interim Housing was vacated pending redevelopment.

Note 2: According to the authorised drawing provided by the HD, the design of Long Bin Temporary Housing Area was approved in August 1984. According to the HD's press release of July 1985, construction of the single-storey structure of the Long Bin Temporary Housing Area for use as an office was completed at that time.

4.11 On 16 August 2016, Audit requested the HD to provide the background information of the five unannounced PRH estates/block with ACMs. In August and September 2016, the HD informed Audit that:

(a) ACMs in the five unannounced PRH estates/block were at roofs/refuse room inaccessible to tenants and the public. In July 2016, the HD engaged a consultant to survey and review the existing ACM monitoring system. The HD would discuss the review findings with the EPD and the Labour Department (see para. 4.6(a)); and

(b) according to the HD's records, the five unannounced PRH estates/block with ACMs were not newly identified cases and there were no other unannounced estates with ACMs.

On 27 September 2016, the HD provided Audit with records on PRH estates/block with ACMs. However, such records could not clearly show when the ACMs in five unannounced PRH estates/block were identified, and that there were no other unannounced estates with ACMs.

4.12 Based on information available, Audit had the following concerns on the previously unannounced PRH estates/block with ACMs:

(a) ***Use of ACMs after the HD's ban.*** According to the HD, ACMs had been used for housing estates built before 1984 and banned thereafter (see para. 4.6). However, as shown in Table 9, the single-storey structure with ACMs within the Long Bin Interim Housing was built in 1985, suggesting that ACMs might have been used in housing structures after the HD's ban; and

(b) ***Possible deterioration over the years.*** The five previously unannounced PRH estates/block with ACMs were built from 1962 to 1985. Without proper management and monitoring through condition surveys before 2016, their condition could have deteriorated over the years, thus increasing the risk of asbestos exposure of construction workers and the HD's maintenance staff.

The HD needs to expedite action to ascertain the condition of ACMs in these estates/block and take necessary follow-up action.

Damaged balcony/lobby grille panels with ACMs

4.13 ***Damaged balcony grille panels with ACMs.*** On 7 July and 10 August 2016, Audit carried out joint inspections with HD staff of Hing Wah (II) Estate and Shek Lei (2) Estate (Interim Housing) (the two estates with ACMs in balcony grille panels). Based on visual inspections from the ground level using binoculars, the following problems were identified in six flats:

(a) ***Hing Wah (II) Estate.*** A flat was found with two drilled holes and another one with cracks on the asbestos-containing balcony grille panels (see Photographs 4 and 5); and

(b) ***Shek Lei (2) Estate (Interim Housing).*** Two flats were found with damaged parts on the asbestos-containing balcony grille panels (see an example in Photograph 6) and two other flats were found with objects protruding from the panels (see an example in Photograph 7 showing a protruding pipe).

Photograph 4

Drilled holes on asbestos-containing balcony grille panel in Hing Wah (II) Estate

Source: Photograph taken by Audit staff on 7 July 2016

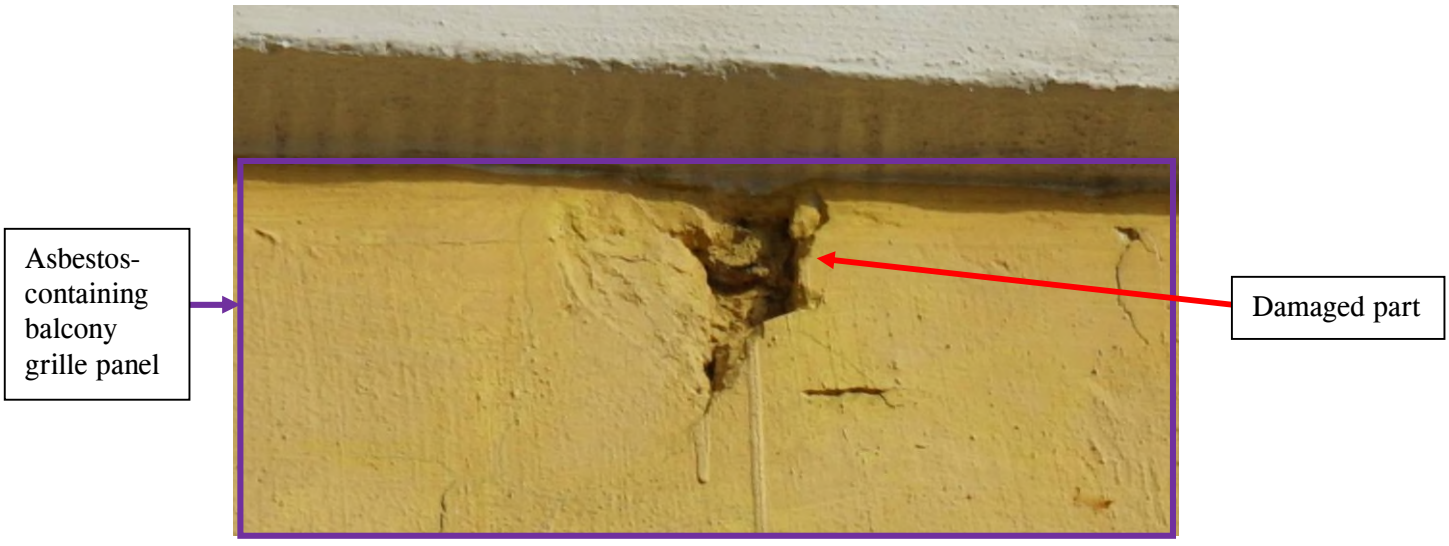
Photograph 5

Cracks on asbestos-containing balcony grille panel in Hing Wah (II) Estate

Source: Photograph taken by Audit staff on 7 July 2016

Photograph 6

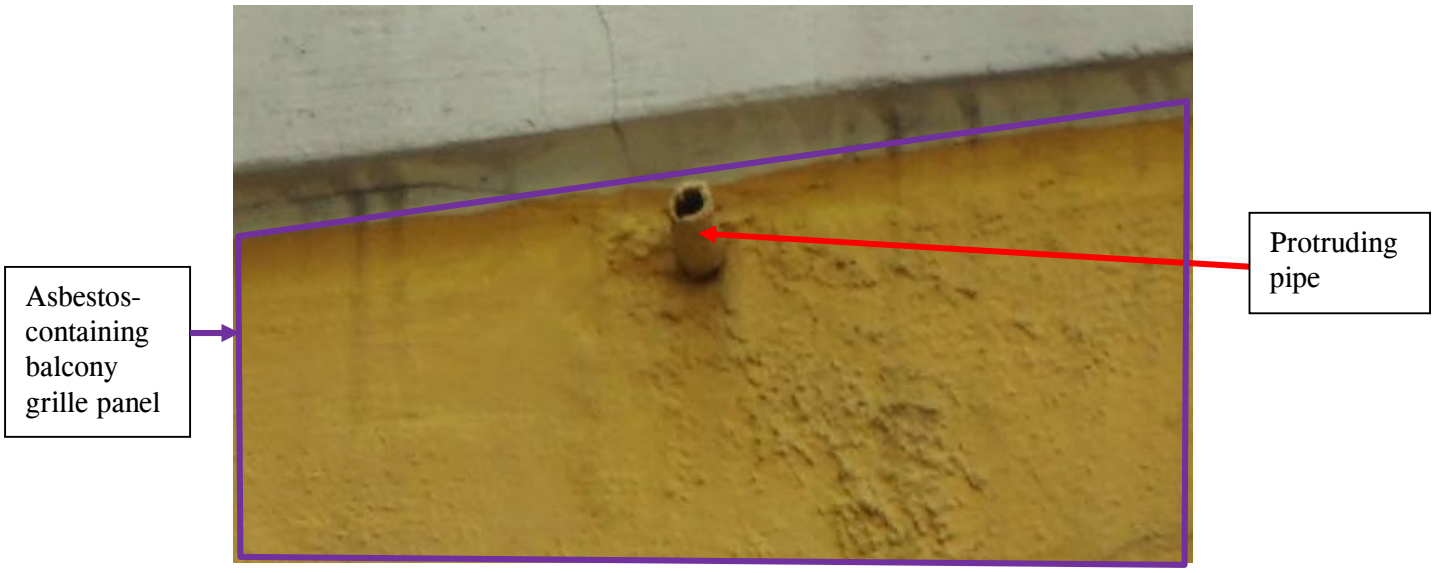
Damaged part on asbestos-containing balcony grille panel in Shek Lei (2) Estate (Interim Housing)



Source: Photograph taken by Audit staff on 10 August 2016

Photograph 7

Protruding pipe on asbestos-containing balcony grille panel in Shek Lei (2) Estate (Interim Housing)



Source: Photograph taken by Audit staff on 10 August 2016

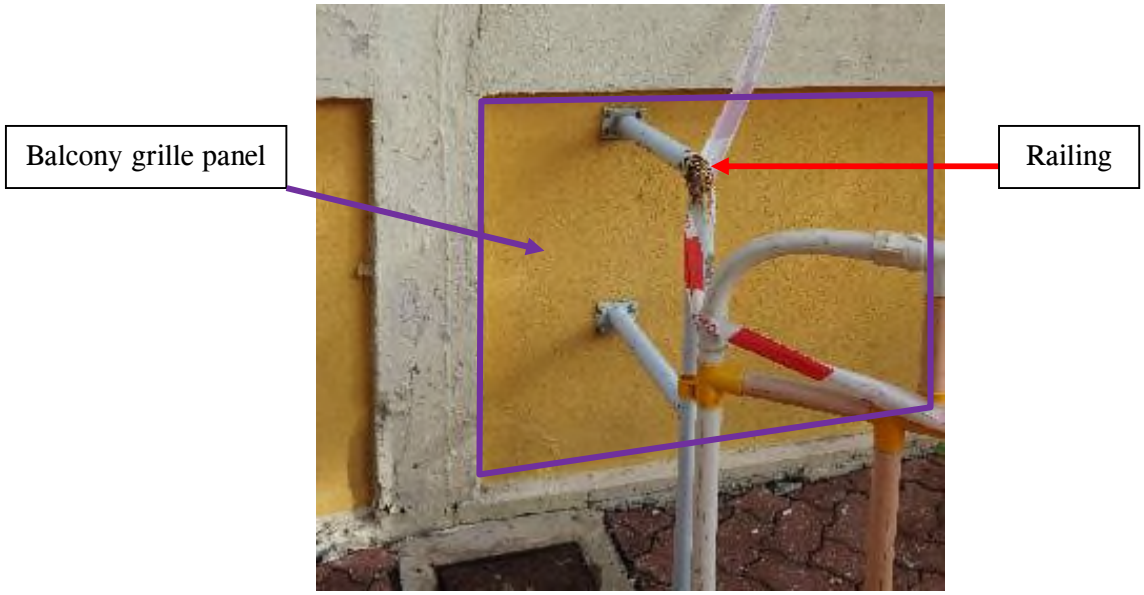
4.14 All these six cases had not been reported by the HD's condition surveys conducted from 2010 to 2015 under the HD's existing assessment criteria (which were based on the length and surface area of the damage) for triggering a close range inspection (see para. 4.9(a)). However, the nature of these damaged parts (e.g. the drilled holes and protruding objects) suggested that there could be damage beneath the surface that warranted more detailed inspections. In Audit's view, the HD needs to review these six cases to see if any necessary follow-up action is required. The HD also needs to consider providing more guidelines on assessing the nature of damage found in condition surveys in light of the six cases.

4.15 In the joint inspection of Shek Lei (2) Estate (Interim Housing) (see para. 4.13), Audit also noted that a railing was installed on the balcony grille panel of a ground floor flat, which according to the records kept by the PSA (see Note 16 to para. 2.3), contained ACMs (see Photograph 8). In September 2016, the HD informed Audit that after verification, the PSA's records were found to be

inaccurate and the balcony grille panel in question did not contain ACMs (Note 52). It was unsatisfactory that the ACM records which had all along been used by the Shek Lei (2) Estate (Interim Housing) PSA for conducting condition surveys and advising tenants of the ACM locations were inaccurate. In Audit's view, the HD needs to carry out a review on all ACM records maintained by its PSA/DMO/estate offices to ascertain their accuracy and completeness.

Photograph 8

Railing installed on the balcony grille panel of a ground floor flat in Shek Lei (2) Estate (Interim Housing)



Source: Photograph taken by Audit staff on 10 August 2016

Note 52: *In response to Audit's request for viewing the supporting records that the balcony grille panel in question did not contain ACMs, the HD could only provide Audit with the building plan of a Mark V type PRH estate which had the same design as Shek Lei (2) Estate (Interim Housing).*

4.16 ***Damaged lobby grille panel with un-encapsulated ACMs.*** According to the HD, ACMs in good condition such as the lobby/staircase grilles could be left intact without any treatment (see para. 4.6(a)(ii)). As set out in the EPD's guidelines, the situation of untreated ACMs should be monitored by regular surveillance to make sure that no disturbance would be made to the ACMs during normal use, repair or refurbishment (see para. 4.4(b)). However, Audit's inspection of selected lobby/staircase grilles of Hing Wah (II) Estate (Note 53) revealed that an asbestos-containing lobby grille on the seventh floor of Fung Hing House had two damaged parts. One of them appeared to be an opening to allow room for the running of a drainage pipe from inside to the exterior (see Photograph 9). Another asbestos-containing lobby grille on the twelfth floor of Yu Hing House was found to have one damaged part (see Photograph 10). There was a risk of exposure to asbestos for workers/tenants nearby when the damage was inflicted/opening was made. However, these damaged parts had not been reported in the condition surveys from 2010 to 2015 under the HD's existing assessment criteria (see para. 4.9(a)).

Note 53: *The inspection conducted on 8 August 2016 covered the seventh, eighth and twelfth floors in each of Fung Hing House, Lok Hing House and Yu Hing House selected from the HD's ACM records.*

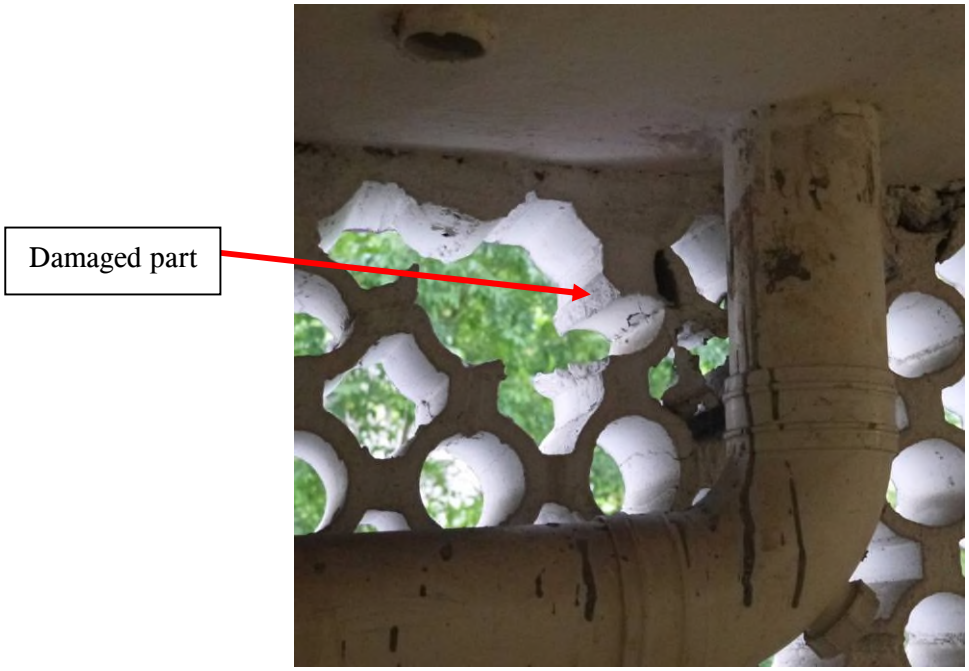
Photograph 9

Asbestos-containing lobby grille with damaged parts on the seventh floor of Fung Hing House, Hing Wah (II) Estate

Source: Photograph taken by Audit staff on 8 August 2016

Photograph 10

Asbestos-containing lobby grille with a damaged part on the twelfth floor of Yu Hing House, Hing Wah (II) Estate



Source: Photograph taken by Audit staff on 8 August 2016

4.17 The damaged lobby grilles with un-encapsulated ACMs could increase the risk of tenants' exposure to asbestos. On 25 August 2016, the HD informed Audit that:

(a) during the HD's June 2016 condition survey, the lobby grilles with ACM on the seventh floor of Fung Hing House and the twelfth floor of Yu Hing House were found to have some parts removed and openings left at several spots. DMO staff assessed that the localised damage was less than 10% of the grille panel and thus concluded that the grille panels were in satisfactory condition. For the replacement of the drain pipe completed last year at the seventh floor of Fung Hing House, there was no damage to the exiting grilles during the replacement work. No sign of deterioration was observed; and

(b) the said grille panels in Hing Wah (II) Estate had been inspected recently by its consultant who advised that the hazard level of ACM at the grille panels was low and no immediate action was required.

In Audit's view, the HD needs to inspect all lobby/staircase grilles with un-encapsulated ACMs to ascertain whether there are similar damaged cases and take follow-up actions as needed.

In-flat inspections of ACMs in balcony grilles

4.18 According to the HD, besides the half-yearly condition surveys at external elevation, asbestos-containing balcony grilles located inside flats are inspected during vacant flat refurbishment, upon request for in-flat repair and during TMS in-flat inspections (see para. 4.7(a)(ii)). The results of these in-flat inspections should also be recorded in the Form F04s used for reporting the condition survey results (see para. 4.9(b)). Based on a review of the Form F04s submitted to the RDU from 2010 to 2015, Audit found that there is room for improvement in conducting the in-flat inspections (see paras. 4.19 to 4.21).

4.19 ***Need to strengthen TMS in-flat inspection procedures.*** In the Form F04 of December 2012, it was reported that part of the asbestos-containing balcony grille of a flat in Hing Wah (II) Estate was exposed inside the flat. In 2013, the asbestos-containing balcony grille in the subject flat, which had been confirmed to be un-encapsulated during vacant flat refurbishment, was removed. Audit found that an in-flat inspection of the same flat was also conducted by the TMS team in 2007 but the un-encapsulated ACM condition was not reported for carrying out necessary abatement works in a timely manner (see Case 1 for details).

Case 1

Un-encapsulated ACMs found in the balcony grille of a flat of Hing Wah (II) Estate

1. In May 2012, a flat of Hing Wah (II) Estate was surrendered to the HD. In the HD's inspection of the flat for refurbishment, the asbestos-containing balcony grille panel was found to be un-encapsulated and spalling/cracks were apparent (see Photograph 11). In an internal e-mail of the HD of October 2012, the RDU advised the estate office that the un-encapsulated grille panel had been missed for encapsulation works in the early 1990s (see para. 4.39). The HD sought advice from its asbestos consultant who recommended the removal of ACMs in the balcony grille panel due to poor condition of concrete of the balcony.

2. In August 2013, the HD obtained the EPD's approval of the asbestos investigation report and asbestos abatement plan in accordance with the APCO requirements. In September 2013, the asbestos removal works by a registered asbestos contractor were completed and the flat was then refurbished for letting.

Audit comments

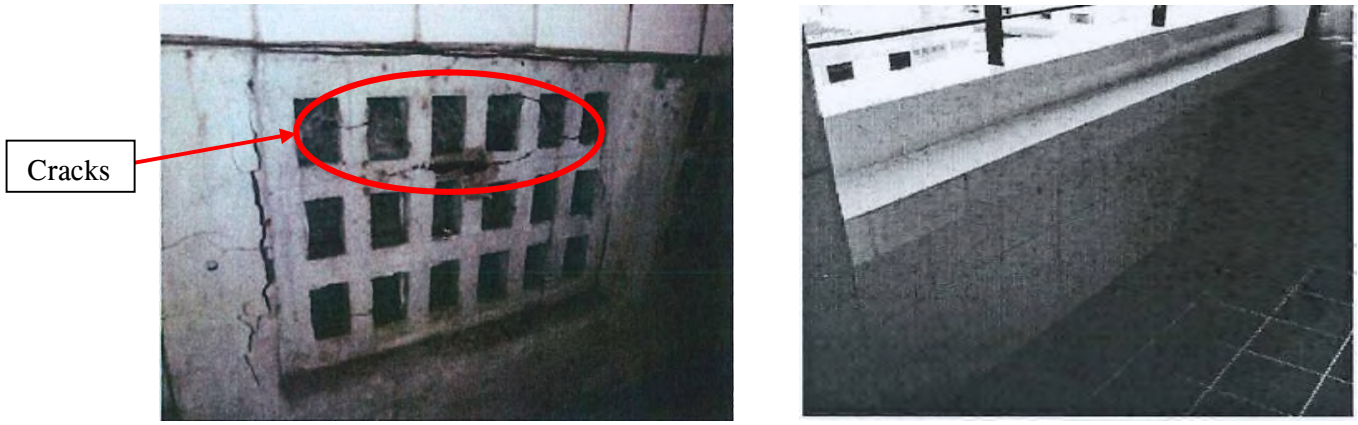
3. According to the HD's Asbestos Management Manual issued in 2003, un-encapsulated asbestos-containing balcony grille panels should be encapsulated if access and other constraints could be overcome (see para. 4.37). Audit examined the TMS records and found that an in-flat inspection of the subject flat was conducted in May 2007. However, the un-encapsulated condition of the balcony grille panel was not reported in 2007. In this connection, Audit noted that the inspection checklist for TMS staff had not drawn their attention to the asbestos management manual requirements. As asbestos in balcony grilles is vulnerable to deterioration (see para. 4.6(a)(i)), spalling/cracks were apparent when the un-encapsulated condition was detected and reported during vacant flat refurbishment in 2012. In Audit's view, the HD needs to draw lessons from this case and take measures to strengthen the TMS in-flat inspection procedures of asbestos-containing balcony grilles.

Source: Audit analysis of HD records

Photograph 11

Condition of asbestos-containing balcony grille panel before and after ACM removal works in a vacated flat of Hing Wah (II) Estate in 2013

Before works **After works**



Source: HD records

4.20 ***Need to closely monitor the extent of in-flat inspections of asbestos-containing balcony grilles.*** According to HD records, 2,009 flats (74% of the total 2,710 flats) in four blocks of Hing Wah (II) Estate have ACMs in balcony grilles. However, based on the submitted Form F04s from 2010 to 2015, only 266 in-flat inspection results of balcony grilles had been reported during the four years from 2010 to 2013 (see para. 4.21). As the 266 reported results included both those with defects found (one case) and those without (265 cases), they were indicative of the total number of in-flat inspections conducted in these four years, which only covered 13% of the 2,009 flats with ACMs in balcony grilles in Hing Wah (II) Estate. In Audit's view, the HD needs to closely monitor the extent of in-flat inspections to ensure an adequate coverage of all the asbestos-containing balcony grilles within a reasonable time frame.

4.21 ***Need to always report in-flat inspection results.*** As the HD's guidelines require the RDU to conduct a random check on the submitted inspection results (see para. 4.9(c)), it is necessary to report the inspection results on Form F04s even when no defects have been found. Otherwise, the RDU would not be in a position to select samples for conducting the stipulated random check. However, for Shek Lei (2) Estate (Interim Housing) which has ACMs in the balcony grilles of 1,143 flats (59% of the total 1,928 flats), no in-flat inspection results had been

reported throughout the six years from 2010 to 2015. For Hing Wah (II) Estate, no in-flat inspection results had been reported in the submitted Form F04s for two years in 2014 and 2015. In this connection, Audit found an unreported case of un-encapsulated asbestos-containing balcony grilles in Hing Wah (II) Estate in 2015 which apparently had gone unnoticed by the RDU (see Case 2 in para. 4.27). In Audit's view, the HD needs to remind staff concerned to always report in-flat inspection results in Form F04.

4.22 ***Monitoring of ACM condition surveys.*** In June and September 2016, in response to Audit's request for records of the RDU's random check on ACM condition surveys, the HD said that:

(a) the RDU scrutinised the half-yearly condition survey forms submitted by front-line staff and requested clarification from them in case of discrepancies found in the forms;

(b) the RDU selected the estates randomly and arranged a registered asbestos consultant to carry out condition surveys and air sampling/monitoring tests to ascertain the condition of the ACMs in the estates; and

(c) the consultant's random checks from 2011 to 2015 covered the following:

  (i) air sampling/monitoring tests at Hing Wah (II) Estate and Shek Lei (2) Estate (Interim Housing) in 2015;

  (ii) air sampling/monitoring tests at Tung Tau (I) Estate, Hing Wah (II) Estate and Shek Lei (2) Estate (Interim Housing) in 2012; and

  (iii) condition surveys at five estates in 2011 including chimneys of Wah Fu (I) Estate and Wan Tsui Estate, staircase grilles of Yue Wan Estate and Kwai Shing West Estate, and balcony grilles of Hing Wah (II) Estate (1 of the 4 blocks).

4.23 In Audit's view, the HD needs to step up monitoring of ACM condition surveys, because the RDU's scrutiny of the half-yearly condition survey forms (without cross-checking other relevant documents, e.g. RIMS records) could not detect unreported problems (such as Case 2 in para. 4.27). The HD consultant's condition surveys were conducted only once in the past five years whereas the EPD's guidance advises that a registered asbestos consultant should be appointed to carry out a comprehensive re-inspection of all the ACMs at least once every two years (see para. 4.4(c)). Audit also noted that in the condition survey report of Hing Wah (II) Estate of April 2011 (see para. 4.22(c)(iii)), the consultant submitted close-up photos of some inspected balcony grille panels. However, all the panels shown in these photos were on the lower floors which according to the HD's ACM records did not contain ACMs (see para. 4.20). There was no record to show that the HD had sought clarification from the consultant concerned. The HD needs to step up monitoring of the condition surveys conducted by consultants to prevent recurrence of similar problem.

Audit recommendations

4.24 **Audit has *recommended* that the Director of Housing should:**

(a) **for the five PRH estates/block with ACMs not previously announced, expedite action to ascertain their condition and take necessary follow-up action;**

(b) **review the six cases of damaged asbestos-containing balcony grille panels in Hing Wah (II) Estate and Shek Lei (2) Estate (Interim Housing) (see para. 4.14) to see if any necessary follow-up action is required;**

(c) **consider providing more guidelines on assessing the nature of damage found in condition surveys of ACMs in PRH estates in light of the six cases;**

(d) **carry out a review on all ACM records maintained by the PSA/DMO/estate offices to ascertain their accuracy and completeness;**

(e) **inspect all lobby/staircase grilles with un-encapsulated ACMs to ascertain whether there are damaged cases similar to those mentioned in paragraph 4.16 for taking necessary follow-up actions;**

(f) **strengthen the TMS in-flat inspection procedures, such as stipulating in the inspection checklist a requirement of examining/reporting on the condition of asbestos-containing balcony grilles;**

(g) **closely monitor the extent of in-flat inspections to ensure an adequate coverage of all the asbestos-containing balcony grilles within a reasonable time frame;**

(h) **remind staff concerned to always report all in-flat inspection results of asbestos-containing balcony grilles in Form F04; and**

(i) **step up monitoring of ACM condition surveys conducted by HD staff and consultants.**

Response from the Government

4.25 The Director of Housing agrees with the audit recommendations. He has said that:

(a) for the five previously unannounced PRH estates/block, the HD has been fully aware of the existence of ACMs and their locations. These ACMs have been incorporated in the HD's established monitoring list. Site inspection has been conducted to all these five estates/block and ascertained that they are in good condition. The HD will continue to monitor the condition of ACMs and carry out half-yearly inspections;

(b) the HD had requested the asbestos consultant to specifically examine the six cases. The consultant advised that the defects were minor in nature and did not exceed the 10% or 5% assessment criteria (see para. 4.9(a)). The HD will continue to monitor the grille panels with ACMs and issue additional guidelines on the assessment method on the condition of ACMs;

(c) the HD has reviewed the ACM records kept at the PSA/DMO/estate offices to ensure their accuracy and completeness;

(d) the HD had already arranged the asbestos consultant to conduct a comprehensive inspection in July 2016. The lobby/staircase grilles with ACMs at all three estates (see Appendix C) had been inspected by the consultant and confirmed that no major defects/damage of lobby/staircase grilles which exceeded the 10% or 5% assessment criteria were identified. All air samples collected were in order. The HD will continue to monitor the grille panels with ACMs;

(e) the condition of the balcony grilles with ACMs had been included in the TMS in-flat inspection. The HD considers that the TMS in-flat inspection is not an adequate means to monitor the condition of the balcony grilles with ACMs in view of its functions and frequency. The HD will introduce new measures to step up the monitoring of the balcony grilles with ACMs:

(i) including in-flat inspections of the balcony grilles with ACMs in the half-yearly condition survey;

(ii) assigning an Asbestos Manager for each of the concerned estates to coordinate ACMs matters;

(iii) enhancing training for the front-line staff to raise awareness;

(iv) labelling all ACMs; and

(v) enhancing publicity to alert tenants not to disturb the ACMs at balcony grilles and to report any defects indentified; and

(f) the HD will review and enhance the existing monitoring system and implement the new measures mentioned in (e) above. Training classes and seminars will be arranged for the front-line staff to enhance their awareness and remind the technical staff about the key points in preparing the inspection report.

Control over works affecting asbestos-containing materials in public rental housing estates

4.26 According to the APCO, all asbestos abatement works or works involving the use or handling of ACMs must be carried out and supervised by registered personnel in compliance with prescribed standards (see para. 4.2(c)). The EPD's guidelines have advised that workers, tenants and other users of the premises should be encouraged to notify the owner of even small planned maintenance and renovation before any works are carried out (see para. 4.4(f)). In addition, an authorisation system should be adopted to monitor any operation and maintenance, and prevent accidental disturbance of ACMs.

HD contractors' works affecting ACMs of balcony grilles

4.27 ***Repair works for balcony grille panel with un-encapsulated ACMs.*** With the assistance of the DMO, Audit selected records of balcony wall concrete spalling repair works carried out by the HD in Hing Wah (II) Estate from 2014 to 2015 for examination. Audit found a case of concrete spalling repair works for balcony grille panel with un-encapsulated ACMs in 2015. The repair and encapsulation works were carried out by the HD's RIMS contractor which might not have complied with the APCO requirements/HD's laid-down procedures (see Case 2 for details).

Case 2

Concrete spalling repair and encapsulation works of asbestos-containing balcony grille panel carried out by the RIMS contractor

1. In July 2015, the HD's RIMS contractor carried out repair of concrete spalling of the balcony grille panel of a flat in Hing Wah (II) Estate. According to HD records, the balcony grille panel of the subject flat contained asbestos. The HD's photograph taken before works (see Photograph 12) showed that the ACMs were un-encapsulated.

Case 2 (Cont'd)

2. According to the HD's Asbestos Technical Guides, where the asbestos-containing balcony grille panels are in good condition, encapsulation may be handled as normal maintenance works using specified methods (Note). While Photograph 12 suggested that the condition of the panel before encapsulation works might not have been in good condition, there was no record to show that the RDU or the Maintenance Surveyor of the DMO concerned had been consulted before proceeding with the repair and encapsulation works by the RIMS contractor instead of a registered asbestos contractor in accordance with the APCO requirements. There was also no record to show that the specified methods had been used for the encapsulation works and the prescribed encapsulation works report form had been submitted by a project Maintenance Surveyor to the RDU after works.

Audit comments

3. Audit was concerned that the repair and encapsulation works involving ACMs might not have complied with the APCO requirements or the HD's encapsulation works procedures. The case indicated that HD front-line staff concerned did not have adequate training/alertness in handling repair works in PRH estates with ACMs despite the HD's undertaking to enhance staff training in monitoring and handling asbestos in 2009 (see para. 4.7(c)(i)).

4. As mentioned in paragraphs 4.21 and 4.23, the RDU failed to detect this case as in-flat inspection results were not reported in Form F04s for Hing Wah (II) Estate in 2015.

5. In Audit's view, the HD needs to draw lessons from this case and strengthen the monitoring and control of maintenance and repair works involving ACMs.

Source: *Audit analysis of HD records*

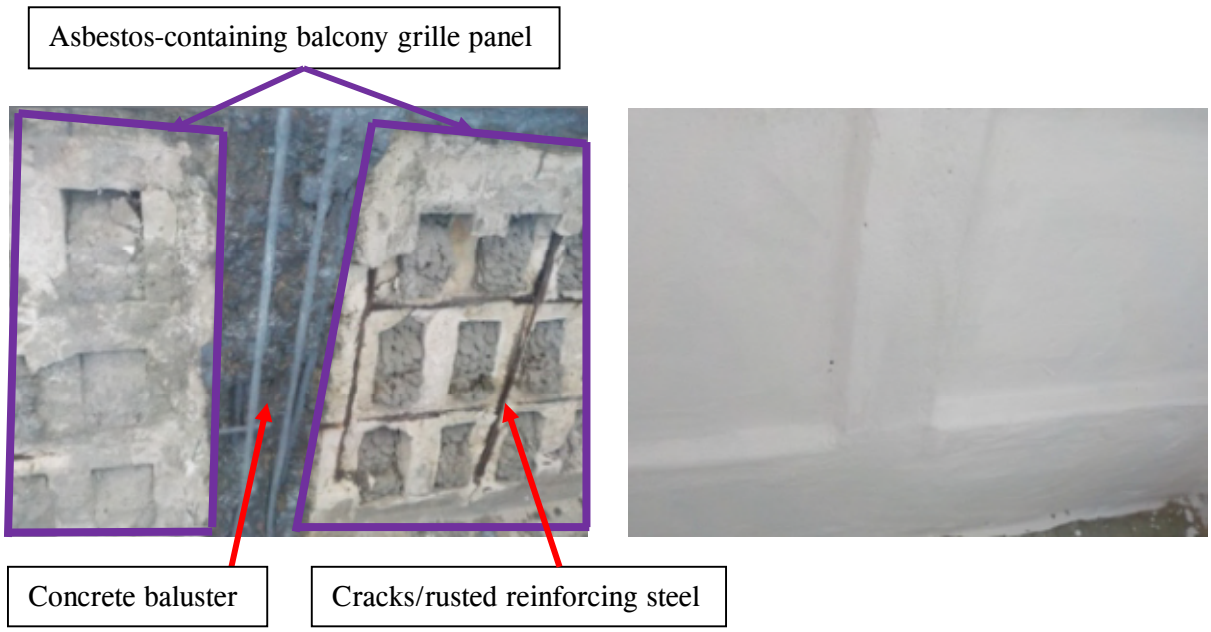
Note: *According to the HD, the Asbestos Technical Guides had been agreed with the EPD.*

Remarks: *Similar to Case 1 in paragraph 4.19, an in-flat inspection of the flat was conducted under the TMS in June 2007 but the un-encapsulated ACM condition had not been reported.*

Photograph 12

Condition of balcony grille with un-encapsulated ACMs before and after encapsulation works in 2015 in Hing Wah (II) Estate

Before encapsulation **After encapsulation**



Source: HD records

Tenants' works affecting ACMs of balcony grilles

4.28 ***Air-conditioner works outside flat.*** In the joint inspection of Hing Wah (II) Estate on 7 July 2016 (see para. 4.13), Audit found that air-conditioner supporting frames were mounted on the asbestos-containing balcony grille panels of 11 flats (see Photograph 13 for an example). On 8 July 2016, HD staff found 6 other similar cases in Hing Wah (II) Estate, making up a total of 17 such cases.

Photograph 13

Air-conditioner supporting frame mounted on asbestos-containing balcony grille panel in Hing Wah (II) Estate

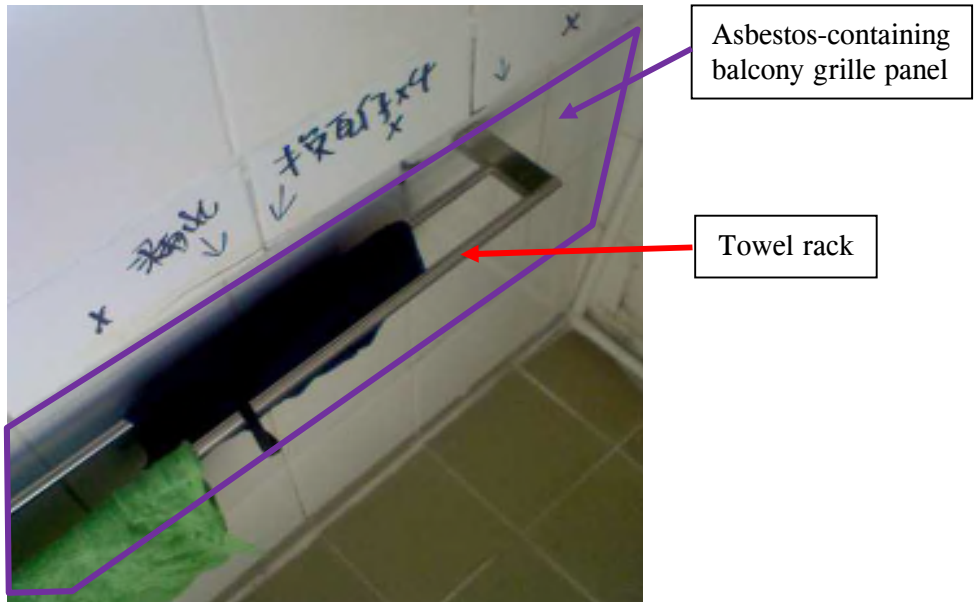
Source: Photograph taken by Audit staff on 7 July 2016

4.29 ***Need to tighten the control over unauthorised works.*** HD staff had confirmed that all the 17 cases of air-conditioners mounted on the balcony grille panels were unauthorised as they had protrusions exceeding the HD allowed 100 mm from the external walls. There was a risk that the installation of these air-conditioners without the HD's authorisation and hence monitoring could have disturbed the ACMs and exposed the installation workers to asbestos thus released. In Audit's view, the HD needs to tighten the control over unauthorised works undertaken by tenants which could disturb ACMs and expose the tenants and workers to asbestos, and alert them to the risk of ACMs (see para. 4.32).

4.30 ***In-flat minor works.*** In the review of the balcony repair works records of Hing Wah (II) Estate (see para. 4.27), Audit found that a tenant had installed a towel rack on the asbestos-containing balcony grille panel (see Photograph 14). This case illustrates that uninformed tenants may inadvertently carry out works disturbing the ACMs.

Photograph 14

Towel rack installed by a tenant on the encapsulated asbestos-containing balcony grille panel in Hing Wah (II) Estate



Source: HD records

Need to prevent accidental disturbance to ACMs

4.31 ***Advising all people of the exact locations of ACMs.*** The HD had posted a notice on the HA website showing the name of the 17 PRH estates and their building elements containing asbestos (see Appendix C). However, the notice did not contain sufficient details about the exact locations of ACMs for estates such as Hing Wah (II) Estate and Shek Lei (2) Estate (Interim Housing) where not all flats have ACMs (see paras. 4.20 and 4.21). Tenants still need to approach the estate offices concerned to ascertain whether their flats have ACMs. In Audit's view, there is room for improvement in disseminating ACM information in a more user-friendly manner.

4.32 ***Labelling of ACMs.*** According to the EPD's guidelines on asbestos management plan, all ACMs should be labelled (see para. 4.4(e)). Audit considers that this is an effective way of communicating the exact locations of ACMs to stakeholders and alerting them to the risk of accidental disturbance of the ACMs. However, Audit's inspections revealed that warning label was rarely used:

(a) ***Balcony grille panels.*** In the joint inspections of 26 vacant flats with ACMs in Hing Wah (II) Estate and Shek Lei (2) Estate (Interim Housing) (see para. 4.13), only one flat was found to have the ACM warning label. According to the HD, the label was used to alert workers to the presence of ACMs in the balcony grille panel during the vacant flat refurbishment; and

(b) ***Lobby/staircase grille panels.*** Audit's inspection of the asbestos-containing lobby/staircase grilles on three selected floors in each of three blocks of Hing Wah (II) Estate (see Note 53 to para. 4.16) revealed that no ACM warning label was displayed.

Uninformed tenants may inadvertently carry out works that would disturb the ACMs. Examples are the 17 cases of air-conditioners and one case of towel rack installed on the asbestos-containing balcony grille panels of Hing Wah (II) Estate (see paras. 4.29 and 4.30). In Audit's view, the HD needs to take measures to prevent accidental disturbance to ACMs in the PRH estates, including labelling all ACMs and posting the ACM notice on the notice boards of relevant estates at all times.

Removal of a chimney with ACMs

4.33 In 2001, the Chairman of the HD's Asbestos Working Group (see para. 4.6(a)):

(a) drew regional staff's attention to the EPD's advice that:

(i) high risk asbestos such as asbestos thermal insulation lagging should be removed as soon as practicable once it was identified; and

(ii) chimneys with ACMs often contained the asbestos thermal insulation lagging; and

(b) reminded them to arrange surveys of chimneys under their purview and implement asbestos abatement works where necessary.

4.34 In the review of the HD's condition survey results from 2010 to 2015 (see para. 4.10), Audit found a suspected case of removal of a chimney with ACMs in an estate without complying with the APCO requirements (see Case 3 for details).

Case 3

Suspected case of removal of a chimney with ACMs not in compliance with the APCO requirements

1. According to the December 2010 condition survey report, a chimney with ACMs in an estate in Kowloon was found to be in poor condition, i.e. with 5 damaged parts scattered on the ground, second, third, sixth and seventh floors. In January 2011, the HD issued a letter to the owner of the chimney (a non-domestic unit tenant) advising him to engage a qualified contractor to rectify the problem. In another letter to the tenant in May 2011, the HD declined the tenant's request for the HD to repair the chimney on his behalf but advised him to make reference to the EPD website for selecting a registered asbestos contractor to undertake the repair works.

2. In the June 2011 condition survey report, the chimney was again reported to be in poor condition, as follows:

(a) in addition to those reported previously, another damaged part was also spotted on the fifth floor (see Photograph 15); and

(b) the damaged parts were near the common corridors of domestic units on the respective floors.

3. In December 2011, an updated list of PRH estates with ACMs was distributed to the DMOs/PSAs for conducting the half-yearly condition survey and the subject estate was not included in the list. There was no documented reason for the unlisting or follow-up report on the status of the chimney.

Case 3 (Cont'd)

4. On 14 August 2016, Audit inspected the subject estate and found that the chimney had been removed (see Photograph 16). According to the APCO, works involving the removal of ACMs should be undertaken by a registered asbestos contractor and an abatement plan should be submitted to the EPD at least 28 days in advance (see para. 4.2(c)). Upon enquiry on 22 August 2016, the EPD informed Audit that it had no record of any asbestos investigation report nor asbestos abatement plan submitted for the removal of the chimney in the subject estate.

5. On 1 September 2016, the HD informed Audit that:

(a) there was no chimney in the original record plan of the subject estate. The chimney concerned might have been constructed by the non-domestic unit tenant; and

(b) the tenant concerned informed the HD on 31 May 2011 and 16 July 2011 that he would remove the ACM chimney. The HD noticed that the said ACM chimney was removed in late July 2011 and hence deleted the item for the condition survey of December 2011.

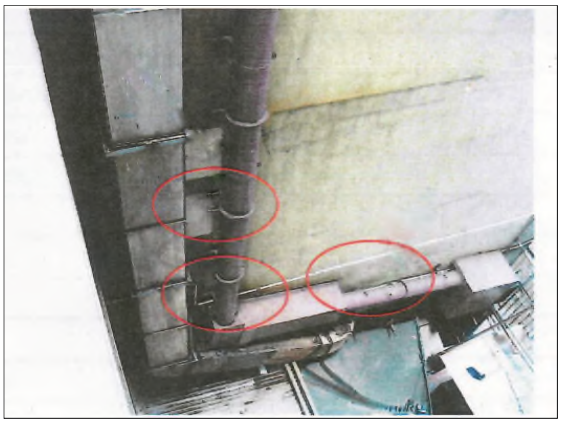
Audit comments

6. Audit was concerned that the chimney could have been removed without complying with the APCO requirements. There was a risk that workers and nearby tenants had been exposed to asbestos during the removal process. While it was the primary responsibility of the chimney owner to meet the statutory requirements under the APCO in removing the chimney, the HD also had a monitoring role to ensure that works carried out by third parties in its managed estates would not compromise tenants' safety. The HD needs to strengthen the monitoring and control of works involving ACMs in PRH estates undertaken by third parties.

Source: Audit analysis of HD records

Photograph 15

**Damaged chimney with ACMs
in an estate (2011)**

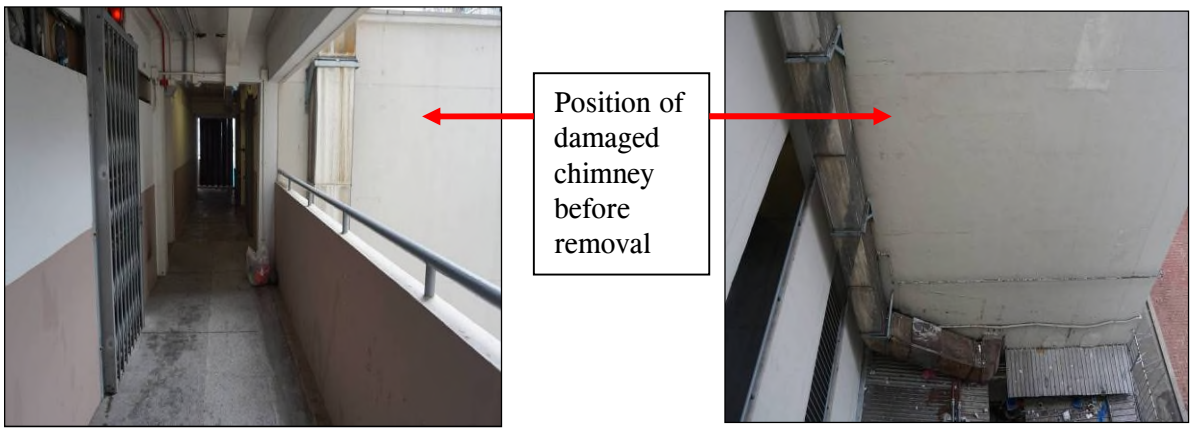


Legend: Damage found on the chimney

Source: HD records

Photograph 16

**Damaged chimney in an estate
near the common corridor of domestic units before removal**



Source: Photographs taken by Audit staff on 14 August 2016

Audit recommendations

4.35 **Audit has *recommended* that the Director of Housing should:**

(a) **enhance training for both technical and management staff concerned on the statutory requirements and proper procedures in handling works involving ACMs;**

(b) **strengthen the monitoring and control of the maintenance, repair and demolition works involving ACMs in PRH estates, including those undertaken by third parties;**

(c) **tighten the control over unauthorised works undertaken by tenants which could impact on ACMs; and**

(d) **take measures to prevent accidental disturbance to ACMs, including labelling all ACMs and posting the ACM notice on the notice boards of relevant estates at all times.**

Response from the Government

4.36 The Director of Housing agrees with the audit recommendations. He has said that:

(a) the HD will enhance training for staff to raise their awareness in handling ACMs and alert front-line staff to report any defect/damage/poor condition of ACMs once it is noted. The HD has established a set of asbestos management policy in handling ACMs in PRH estates, which has been agreed by the EPD and the Labour Department since 1990. This includes the establishment of the Asbestos Management Manual and Asbestos Technical Guides;

(b) training classes and seminars will be arranged for the front-line staff to enhance their awareness of the statutory requirements and the proper handling of works involving ACMs. Besides, the contract provisions will be strengthened to require contractors to appoint a site superintendent designated for those estates having ACMs to arrange training for workers to ensure their awareness of the ACMs locations and necessary

report/procedure when ACMs are encountered. With respect to the concrete repair at the balcony reported in Case 2 (see para. 4.27), the repair works were carried out at the concrete balusters which contained no ACMs, instead of the grille panels with ACMs;

(c) the HD will strengthen the control of works undertaken by tenants or their agents and require them to engage a registered asbestos consultant and a registered asbestos contractor to handle any works which may involve ACMs. To this end, the HD will raise tenants' awareness on asbestos and the locations of ACMs in the PRH estates through issuing pamphlets, household advices and letters to individual tenants concerned and labelling the ACMs. The HD will continue to post notices at ground floor lobbies to those buildings having ACMs and issue estate newsletters regularly and arrange briefings to the concerned Estate Management Advisory Committees, local councillors and other stakeholders;

(d) the HD will continue to educate the tenants and take enforcement actions according to the provisions in the tenancy agreement to control against unauthorised works; and

(e) the HD agrees that it is essential that tenants and other stakeholders are aware of the ACMs in their estates and take part in monitoring the ACMs. To this end, the HD will step up the publicity of the ACM information and take measures as mentioned in (c) above.

Follow-up actions on un-encapsulated asbestos-containing materials in balcony grille panels

4.37 On 5 February 2007, in response to LegCo Panel on Housing members' enquiries about ACMs in old PRH estates, the HD assured members that the HD had kept detailed records on ACMs inside PRH flats and that these ACMs had either been removed or properly encapsulated. However, the HD's Asbestos Management Manual issued in 2003 had stated that "Most asbestos balcony grille panels of properties managed by Housing Department or HA's management agents have been encapsulated. It is intended that the remaining panels also be encapsulated if access and other constraints can be overcome". Cases 1 and 2 in paragraphs 4.19 and 4.27 illustrated that un-encapsulated ACM in balcony grille panels existed up to 2013 and 2015 respectively.

4.38 Hing Wah (II) Estate and Shek Lei (2) Estate (Interim Housing) were built in 1976 and the 1960s respectively. With the lapse of time, any un-encapsulated ACMs in balcony grille panels could have been subject to deterioration (see para. 4.6(a)(i)). The cracks and spalling found in Cases 1 and 2 demonstrated the extent of deterioration of aged balcony grilles with un-encapsulated ACMs. On 8 July 2016, Audit requested the HD to provide the ACM encapsulation works records of Hing Wah (II) Estate and Shek Lei (2) Estate (Interim Housing) with a view to identifying any other cases of un-encapsulated ACMs. On 24 August 2016, the HD informed Audit that:

(a) ***Hing Wah (II) Estate.*** According to an internal memorandum of February 1990, all balcony encapsulation works had been completed for Hing Wah (II) Estate from October 1989 to January 1990, except for 15 flats in 3 blocks where only the exterior walls of ACM balcony grille panels had been encapsulated due to problems in gaining access to these flats;

(b) ***Shek Lei (2) Estate (Interim Housing).*** According to an internal memorandum of June 1991, all balcony encapsulation works for Shek Lei (2) Estate (Interim Housing) had been completed; and

(c) ***In-flat inspection.*** It had engaged an asbestos consultant in late July 2016 to conduct in-flat inspections of the 15 flats in Hing Wah (II) Estate and found that their ACM balcony grille panels had been fully encapsulated.

4.39 However, the HD had no records of works in relation to the encapsulation of the 15 flats. In the circumstances, there is no assurance that the encapsulation works for the 15 flats had been carried out in compliance with the APCO requirements/HD's laid-down procedures. Audit also noted that Cases 1 and 2 were not among the 15 flats, indicating that there could be omissions in the HD's February 1990 encapsulation works records (see para. 4.38(a)). In Audit's view, the HD needs to carry out a comprehensive review of the asbestos-containing balcony grille panels of Hing Wah (II) Estate to ascertain whether there are un-encapsulated cases and take prompt remedial action accordingly. In light of the inaccurate information on encapsulation of ACMs in PRH flats provided to the LegCo Panel on Housing in 2007 (see para. 4.37), the HD also needs to take measures (such as strengthening data validation on ACMs) to prevent recurrence of similar problems.

Audit recommendations

4.40 **Audit has *recommended* that the Director of Housing should:**

(a) **carry out a comprehensive review in Hing Wah (II) Estate to ascertain whether there are un-encapsulated cases and take prompt remedial action accordingly; and**

(b) **take measures to ensure that all information on ACMs provided to LegCo/Panel on Housing is accurate, such as strengthening data validation.**

4.41 **In light of the suspected cases of non-compliance with the APCO requirements highlighted in this Audit Report (such as Case 3 in para. 4.34), Audit has *recommended* that the Director of Environmental Protection should look into these cases to see if any follow-up action is required.**

4.42 **Audit has also *recommended* that the Commissioner for Labour should look into such cases to see if any follow-up action is required under the Factories and Industrial Undertakings (Asbestos) Regulation.**

Response from the Government

4.43 The Director of Housing agrees with the audit recommendations in paragraph 4.40. He has said that:

(a) the HD has arranged the asbestos consultant to conduct a comprehensive condition survey of the balcony grilles with ACMs for all of the two estates and has taken follow-up actions in liaison with the EPD and the Labour Department; and

(b) the information that the HD has been providing to LegCo/Panel on Housing and the public is accurate. The information of ACMs provided to the public has been focusing on the ACMs which are accessible to the tenants/public. The HD will take measures to ensure that all information provided to LegCo/Panel on Housing is accurate.

4.44 The Director of Environmental Protection agrees with the audit recommendation in paragraph 4.41.

4.45 The Commissioner for Labour accepts the audit recommendation in paragraph 4.42. He has said that:

(a) the Factories and Industrial Undertakings (Asbestos) Regulation aims at protecting the health of workers engaged in asbestos work in industrial undertakings (see para. 4.5); and

(b) the Labour Department has started investigation into the cases which Audit considers may have breached the APCO, and see if any follow-up action is required under the Regulation.

Recent developments

4.46 On 20 October 2016, the HD provided the HA's Building Committee with an update on the asbestos management in existing old PRH estates, as summarised below:

(a) ***Updated situation.*** A comprehensive survey on the conditions of the ACM building components conducted by a registered asbestos consultant in 2016 was substantially completed with the following findings:

(i) staircase/lobby grilles with ACMs in three estates were found to be in good condition except about 4 to 6% having minor defects/been disturbed. All air samples taken at these defective/disturbed grilles were in order. No repair action was required;

(ii) up to mid-October 2016, 99% of balcony grilles with ACMs inside domestic flats of two estates had been inspected. Seven flats were found with defects requiring follow-up action. Two flats were found with internal encapsulation missing. In about 25% of the surveyed flats, tenants had fixed racks, hangers, screws and nails on the encapsulated ACM balcony grilles. Minor cracks, holes, damage and protruding pipes were found at external side of some

encapsulated grilles. Unauthorised air conditioner supporting frames were found mounted on the external walls of 17 flats in one estate. All air samples collected so far were in order. The consultant considered that with the exception of the nine flats requiring follow-up action, other issues were minor in nature and no repair action was required; and

(iii) for external chimneys in four estates and internal chimneys in 12 estates, air samples collected so far at the chimney outlets were in order. Minor defects were found in the enclosures of some chimneys. The consultant considered that no repair action was required in most cases, except in one estate where repair of the enclosure was being arranged;

(b) ***Specific works.*** Using works and methods recommended by the consultant (who had taken into account the advice from the EPD and Labour Department), the HD had taken and would continue to take immediate action to manage those ACMs requiring action:

(i) for the 4 to 6% defective/disturbed staircase/lobby grilles in (a)(i) above, they would be prioritised for removal based on their conditions under a planned programme;

(ii) the HD had removed, re-encapsulated or segregated the balcony grilles in the nine flats and would conduct repair works at the external walls mentioned in (a)(ii) above. Tenants would be reminded not to fix racks, hangers, nails or screws on the encapsulated balcony grilles. They would be advised to relocate the unauthorised air conditioners and the supporting frames would be removed by registered asbestos contractors. In the long term, ACM balcony grilles would be considered for removal during vacant flat refurbishment on a condition-driven basis; and

(iii) immediate repair would be made to the enclosure of the defective chimneys. Where opportunity arose, the ACM chimneys not in use would be sealed up or removed altogether. For chimneys belonging to other owners, the HD would share with them its information on the ACMs and their maintenance obligations; and

(c) ***Enhancing ACM management system.*** The enhancement measures included the following:

(i) an Asbestos Manager would be assigned for each of the concerned estates to handle and co-ordinate ACM matters, and to ensure the improvement measures were in place;

(ii) in-flat inspections would be included during the half-yearly condition survey to step up regular monitoring plan;

(iii) regular internal staff briefings would be held and record of ACMs would be posted at estate offices, and staff, contractors and their workers would be alerted with enhancement of contract conditions;

(iv) contractors would be required to appoint an estate-specific asbestos site agent/supervisor to ensure workers' awareness of the locations, risks and necessary report/procedures when ACMs were encountered; and

(v) it was crucial that tenants were aware of the ACMs so that they would report issues to the HD for early action and refrain from doing things that would disturb the ACMs. The HD would therefore distribute pamphlets and letters to individual tenants concerned; install labels on each location of ACMs; continue to post notices at ground floor lobby; issue estate newsletters regularly; update HA/HD website as necessary; and conduct briefings to concerned Estate Management Advisory Committees, local councillors and other stakeholders.

PART 5: REPLACEMENT OF LAUNDRY POLE-HOLDERS

5.1 This PART examines the issues relating to the replacement of laundry pole-holders in PRH estates, focusing on:

(a) implementation of the 2004-05 subsidy scheme for replacing laundry pole-holders (paras. 5.2 to 5.8); and

(b) implementation of the 2014 programme for replacing laundry pole-holders (paras. 5.9 to 5.20).

Implementation of the 2004-05 subsidy scheme for replacing laundry pole-holders

5.2 In April 2004 when seeking the endorsement of the HA's Subsidised Housing Committee for the 2004-05 subsidy scheme for replacing laundry pole-holders in PRH flats, the HD informed the Committee that:

(a) at that time, there were about 520,000 PRH flats provided with laundry pole-holders. Among them, tenants in estates of the harmony design (about 190,000 flats) were allowed to install racks outside their living rooms as alternative laundry facilities. For the remaining 320,000 flats of older design, laundry racks were also provided inside the balcony as alternative facilities. In addition, it had been the HA's policy to provide laundry racks to households with elderly. Over the years, the HD had also approved seven standard designs and specifications for tenants to install their own laundry facilities; and

(b) although the design of laundry pole-holders fully met the required safety standards, the HD was concerned that recent incidents involving the use of laundry poles had led to fatal injuries of tenants. A working group formed to review the laundry pole-holders issues had proposed the following:

(i) more publicity should be done to raise tenants' awareness on the proper use of laundry poles;

(ii) the replacement of laundry pole-holders by laundry racks was technically feasible and could be considered as an enhancement to the present laundry facilities; and

(iii) assuming the installation cost of a laundry rack was about $400, the total cost of installing laundry racks for all existing PRH flats was estimated to be $174 million. Having regard to the significant financial implication, a subsidy scheme was proposed such that the HA could replace the laundry pole-holders by laundry racks on tenants' request. The tenants would have to pay $200 for the replacement, about half of the cost of installation, and assume the subsequent maintenance responsibility. Based on the number of laundry racks installed by tenants in PRH estates of the harmony design, it was estimated that 30% of the tenants would express interest in the scheme. The total cost to be borne by the HA was estimated to be about $26 million.

5.3 ***Implementation instructions.*** In 2004 and 2005, the HD issued instructions to staff concerned on implementing the subsidy scheme for replacing laundry pole-holders in two phases. Through notices posted up on the notice boards on ground floor of every PRH blocks, tenants were invited to submit applications from 1 June to 31 July 2004 for the first phase and from 1 April to 31 May 2005 for the second phase. Staff concerned were required to compile:

(a) biweekly returns on the number of applications received to assess tenants' response; and

(b) installation schedule and conduct random check on a minimum of 15% of the installations through in-flat inspections and telephone enquiries with tenants.

Installation records not fully maintained

5.4 In response to Audit's enquiry on the number of laundry racks installed under the subsidy scheme, the HD could only provide records of the first phase installations which totalled 16,922. The number of laundry racks installed in the second phase was not available.

5.5 Audit noted that in 2014, the HD provided the following information on the number of laundry racks installed under the subsidy scheme to the LegCo Panel on Housing and the Subsidised Housing Committee:

(a) in January 2014, the Panel on Housing was informed that during the 2004-05 replacement exercise, about 50,000 tenants had their laundry pole-holders replaced with laundry racks; and

(b) in February 2014, the Subsidised Housing Committee was informed that about 10% (55,000) of the flats with laundry pole-holders (then estimated to be 550,000) had been installed with laundry racks under the 2004-05 subsidy scheme, or by the tenants themselves according to the HD's specifications. The 10% was derived from a large-scale sampling survey on 30 estates.

5.6 It was unsatisfactory that complete records of the laundry rack installations under the 2004-05 subsidy scheme were not maintained despite the requirements laid down in the departmental instructions (see para. 5.3). As a result, a large-scale sampling survey had to be undertaken to provide relevant information to the Subsidised Housing Committee. The reported figure of 50,000 laundry racks installed under the two phases of the subsidy scheme to the Panel on Housing also appeared to be on the high side when compared with the records of the first phase installations which totalled 16,922 (see para. 5.4), bearing in mind that the lengths of application periods for the two phases were the same (see para. 5.3). The HD needs to draw lesson from this case and take measures to ensure that information on the implementation of the 2014 programme for replacing laundry pole-holders is properly maintained.

Post-implementation review not conducted

5.7 According to the best practice guide entitled "A User Guide to Post Implementation Reviews" issued by the Efficiency Unit in February 2009, conducting a post-implementation review is a good practice of modern day public sector management. It helps bureaux/departments evaluate whether a project has achieved its intended objectives, review its performance and capture learning points to improve the delivery and outputs of future projects.

5.8 However, the HD had not carried out a post-implementation review of the 2004-05 subsidy scheme. The Subsidised Housing Committee was not informed of the achievement of the scheme until 2014 when its endorsement was sought for the 2014 programme for replacing laundry pole-holders. The Committee was then informed that laundry racks installed only accounted for about 10% of the flats provided with laundry pole-holders which was far less than the estimated 30% stated in the 2004 Subsidised Housing Committee's paper when its endorsement of the subsidy scheme was sought (see para. 5.2(b)(iii)). To prevent recurrence of similar problems, the HD needs to carry out a post-implementation review of the 2014 programme (estimated to cost some $520 million) in good time.

Implementation of the 2014 programme for replacing laundry pole-holders

5.9 In 2013, the HD conducted a review of the laundry pole-holder issue with a view to enhancing building sustainability, bringing the facilities up to par and addressing the safety concern of tenants. In January 2014, the Transport and Housing Bureau consulted the LegCo Panel on Housing on the HD's proposal to launch a new subsidy scheme for replacing the laundry pole-holders in PRH flats. After considering the Panel's views on providing free replacement of pole-holders by laundry racks for tenants opting for the provision, the HD obtained the Subsidised Housing Committee's endorsement in February 2014 to launch the programme for replacing laundry pole-holders (hereinafter referred to as the 2014 programme) based on the following considerations:

(a) with a view to enhancing building sustainability and addressing the safety concern of tenants (Note 54), the HD had reviewed the laundry pole-holder facilities. There were about 550,000 rental flats provided with laundry pole-holders. With the implementation of the Estate Improvement Programme (Note 55) in recent years, about 40,000 flats

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Note 54: *According to the HD, from 2004 to 2014, there were some seven accidents involving eight casualties likely due to the incautious use of laundry poles. Audit noted that in December 2015, there was another fatal incident involving the use of laundry poles in a PRH estate.*

Note 55: *The Estate Improvement Programme has been launched by the HA in estates to provide repairs of the building structures, upgrading of common areas and a host of new facilities to meet the needs of tenants.*

had been provided with new laundry racks. Another 10% (or 55,000 flats) had been installed with laundry racks under the 2004-05 subsidy scheme, or by the tenants themselves according to the HD's specifications. However, these racks installed some 10 years ago might require replacement. Hence the number of flats to be attended to was about 510,000;

(b) free replacement would be provided for those opting for the installation of laundry racks. For tenants who did not opt for a new rack, the laundry pole-holders of their flats would be sealed up to avoid further use. The HD would install racks for them individually upon their requests with justification in future. One of the advantages of the arrangement was to settle prolonged criticism related to the laundry pole-holders once and for all;

(c) there were about 220,000 harmony flats with the pole-holders installed at the re-entrant area. As some tenants considered the re-entrant location less desirable for clothes drying with less sunlight and possible presence of cooking fumes from kitchens, they were content to continue using the approved laundry rods outside their living room façade. It was estimated that only about 20% of the harmony flat tenants would opt for the proposed laundry racks. For the older type blocks, a higher participation rate was forecasted, making the total estimated households opting for replacement to be about 290,000 (Note 56). The estimated replacement cost would be $520 million;

(d) the two designs, parallel and perpendicular types of laundry racks (see para. 1.11) currently used by the HD in existing PRH flats, would be used for the 2014 programme as they fulfilled the requirements of the Building (Minor Works) Regulation (Cap. 123N); and

(e) to cater for the large volume of works generated to the supervisory staff, skilled workers and fabrication factories, the target installation works would be about 100,000 annually. Hence the 2014 programme would last

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Note 56: *220,000 harmony flats × 20% + 290,000 other type flats × 85% = 290,000 flats (after rounding).*

for about three years. Prioritising estates for the 2014 programme would be based on the elderly population, participation rate and estate re-decoration programme.

5.10 ***Implementation strategy.*** The HD has issued instructions to staff concerned on the procurement methods to be adopted, as follows:

(a) ***Lump sum contract.*** To ensure a competitive price for the proposed installation of laundry racks, lump sum contracts would generally be adopted. Contracts would be awarded in two batches, i.e. in early 2015 and 2016. Each batch would have a contract period of 15 to 18 months;

(b) ***District term contract.*** Where there were pressing needs to commence works in 2014 or jointly with external wall repair programme, the district term contract would be used;

(c) ***Redecoration contract.*** Where laundry racks installations were part of the redecoration works, the redecoration contract would be used to make avail of the economies in concurrent use of gondola facilities for carrying out works;

(d) ***Estate Improvement Programme contract.*** Where laundry rack installations were endorsed as part of the Estate Improvement Programme, they should be procured under the same Estate Improvement Programme contract; and

(e) ***Vacant flat refurbishment.*** Upon completion of the 2014 programme, all outstanding laundry rack works found in vacant flats could be carried out during vacant flat refurbishment under district term contract (see (b) above).

Implementation progress

5.11 In July 2016, Audit requested the HD to provide information on the progress of the 2014 programme in terms of the numbers of laundry racks installed for flat tenants opting for the replacement (the opted-in cases) and sealing up of the laundry pole-holders for those not opting for the replacement (the opted-out cases).

In August 2016, the HD informed Audit that as at 31 July 2016, there were 493,697 PRH flats included in the 2014 programme. Among them, 249,326 flats were covered by the first batch lump sum contracts/other types of contracts awarded in 2015 or before. The progress of installation works and sealing-up works in these flats is summarised in Tables 10 and 11 respectively. For the remaining 244,371 flats, they would be covered by the second batch lump sum contracts/other types of contracts awarded in 2016 and thereafter.

Table 10

Progress of laundry rack installation
(31 July 2016)

Works status		Number of estates	Number of flats			Number of opted-in flats	
			Total (a)	Opted-in (b)	Opted-out (c) = (a) – (b)	With installation works completed (d)	With installation works outstanding (e) = (b) – (d)
Completed (Note)		42	166,487	98,249	68,238	95,547 (97%)	2,702 (3%)
On-going with scheduled completion	Between 1 August and 30 September 2016	15	41,949	18,592	23,357	11,414 (61%)	7,178 (39%)
	Between 1 October and 31 December 2016	8	36,530	14,466	22,064	9,543 (66%)	4,923 (34%)
	After 2016	2	4,360	1,513	2,847	0 (0%)	1,513 (100%)
Overall		67	249,326	132,820	116,506	116,504 (88%)	16,316 (12%)

Source: Audit analysis of HD records

Note: This refers to cases of completed works reported by the HD and cases with planned works schedules which had expired.

Table 11

Progress of sealing up laundry pole-holders
(31 July 2016)

Works status		Number of estates	Number of flats			
			Opted-out	Opted-out due to the retention of existing laundry racks (Note 1)	Opted-out and without existing laundry racks	
					Pole-holders sealed up	Pole-holders not yet sealed up
			(a)	(b)	(c)	(d) = (a) – (b) – (c)
Completed (Note 2)		42	68,238	11,107	52,330 (92%)	4,801 (8%)
On-going with scheduled completion	Between 1 August and 30 September 2016	15	23,357	2,880	8,902 (43%)	11,575 (57%)
	Between 1 October and 31 December 2016	8	22,064	4,268	10,061 (57%)	7,735 (43%)
	After 2016	2	2,847	0	0 (0%)	2,847 (100%)
Overall		67	116,506	18,255	71,293 (73%)	26,958 (27%)

Source: Audit analysis of HD records

Note 1: According to the HD, these flats included those with laundry racks installed by tenants/HD or flats with deteriorated pole-holders not requiring sealing-up works.

Note 2: This refers to cases of completed works reported by the HD and cases with planned works schedules which had expired.

Need to closely monitor the progress of the 2014 programme

5.12 ***Outstanding installation works for opted-in flats.*** As at 31 July 2016, of the 42 estates reported having completed works or with planned works schedules which had expired (see Table 10), the laundry rack installation works for 2,702 opted-in flats in six estates were still outstanding (see Table 12). Of the 15 estates with works due for completion from August to September 2016 (i.e. within two months from 31 July 2016), six estates were apparently behind schedule as the installation works for 75% of their opted-in flats were outstanding, ranging from 51% to 94% (see Appendix K).

Table 12

Outstanding installation works in six estates reported having completed works or with planned works schedules which had expired (31 July 2016)

Estate	Number of flats		
	Opted-in (a)	Laundry racks installed (b)	Installation works outstanding (c) = (a) – (b)
Cheung Hong	5,185	5,025 (97%)	160 (3%)
Fung Tak (Note)	218	3 (1%)	215 (99%)
Kai Yip	2,451	2,327 (95%)	124 (5%)
Kwong Fuk	3,965	1,823 (46%)	2,142 (54%)
Shek Wai Kok	3,744	3,727 (99.5%)	17 (0.5%)
Wan Tsui	2,081	2,037 (98%)	44 (2%)
Overall	17,644	14,942 (85%)	2,702 (15%)

Source: Audit analysis of HD records

Note: According to the HD, due to objections received from Fung Tak Estate, the works were unable to be commenced and the HD only managed to install three samples on site. The HD has kept liaison with the relevant stakeholders on the arrangement of works.

Replacement of laundry pole-holders

5.13 ***Outstanding sealing-up works for opted-out flats.*** Sealing up the laundry pole-holders for opted-out flats is important to avoid further use. As shown in Table 11, of the 42 estates reported having completed works or with planned works schedules which had expired, the laundry pole-holder sealing-up works for 4,801 opted-out flats in 10 estates were still outstanding as at 31 July 2016 (see Table 13). Of the 15 estates with works due for completion from August to September 2016 (i.e. within two months from 31 July 2016), 10 estates were apparently behind schedule as the sealing-up works for 76% of their opted-out flats were outstanding, ranging from 51% to 99% (see Appendix L).

Table 13

Outstanding sealing-up works in 10 estates reported having completed works or with planned works schedules which had expired (31 July 2016)

Estate	Number of flats			
	Opted-out (a)	Opted-out due to the retention of existing laundry racks (Note 1) (b)	Opted-out and without existing laundry racks	
			Pole-holders sealed up (c)	Pole-holders not yet sealed up (d) = (a) – (b) – (c)
Cheung Hong	3,061	233	2,469 (87%)	359 (13%)
Choi Hung	2,853	1,186	1,641 (98%)	26 (2%)
Chuk Yuen (North) (Note 2)	1,047	27	29 (3%)	991 (97%)
Fung Tak (Note 2)	457	0	3 (1%)	454 (99%)
Hing Wah (II)	2,403	1,033	0 (0%)	1,370 (100%)
Kai Yip	1,849	299	1,426 (92%)	124 (8%)
Kwong Fuk	2,223	21	1,241 (56%)	961 (44%)
Kwong Yuen (Note 2)	547	0	199 (36%)	348 (64%)
Shek Kip Mei (Old blocks)	1,355	194	1,000 (86%)	161 (14%)
Shek Yam East	1,130	618	505 (99%)	7 (1%)
Overall	16,925	3,611	8,513 (64%)	4,801 (36%)

Source: Audit analysis of HD records

Note 1: According to the HD, these flats included those with laundry racks installed by tenants/HD or flats with deteriorated pole-holders not requiring sealing-up works.

Note 2: These estates are TPS estates. According to the HD, due to objections received from Fung Tak Estate, the works were unable to be commenced and the HD only managed to install three samples on site. The HD has kept liaison with the relevant stakeholders on the arrangement of works.

5.14 In September 2016, the HD informed Audit that:

(a) replacement works in some estates were beyond the original completion dates due to unforeseeable site problems, such as tenant's request or complaint, inclement weather and accessibility of flat;

(b) in some TPS estates, OCs refused the HD to install gondola in the façade and the works had to be carried out from inside the tenants' flats, which seriously affected the works progress; and

(c) the HD had monitored the situation, and would assess the delay and extension of time application in straight compliance with the contract provisions. The HD anticipated that all replacement works would be completed at the end of 2017 as scheduled.

5.15 As addressing the safety concerns of tenants is one of the main objectives of the 2014 programme, the HD needs to continue monitoring the works progress to ensure that the target completion date would be met.

Partially sealing up of laundry pole-holders

5.16 In a review of the HD's records of the implementation of the 2014 programme in two districts (Chai Wan and Kwai Chung), Audit noted that:

(a) some tenant representatives had raised at Hing Wah (II) Estate Management Advisory Committee meeting held in January 2015 about the retention of some laundry pole-holders. The HD's representative at the meeting had responded that if tenants did not opt for the installation of laundry racks and insisted on using some of the pole-holders, only the unused pole-holders would be sealed up; and

(b) at a meeting between the HD and the contractor for the installation of laundry racks in Kwai Chung Region held in January 2016, it was reported that some tenants had requested the sealing up of only the middle of the three pole-holders in their flats while retaining the two side pole-holders. At another meeting held in March 2016, the contractor was

instructed not to seal up those pole-holders that could be used for installing laundry racks even when the tenants chose not to do so for the time being.

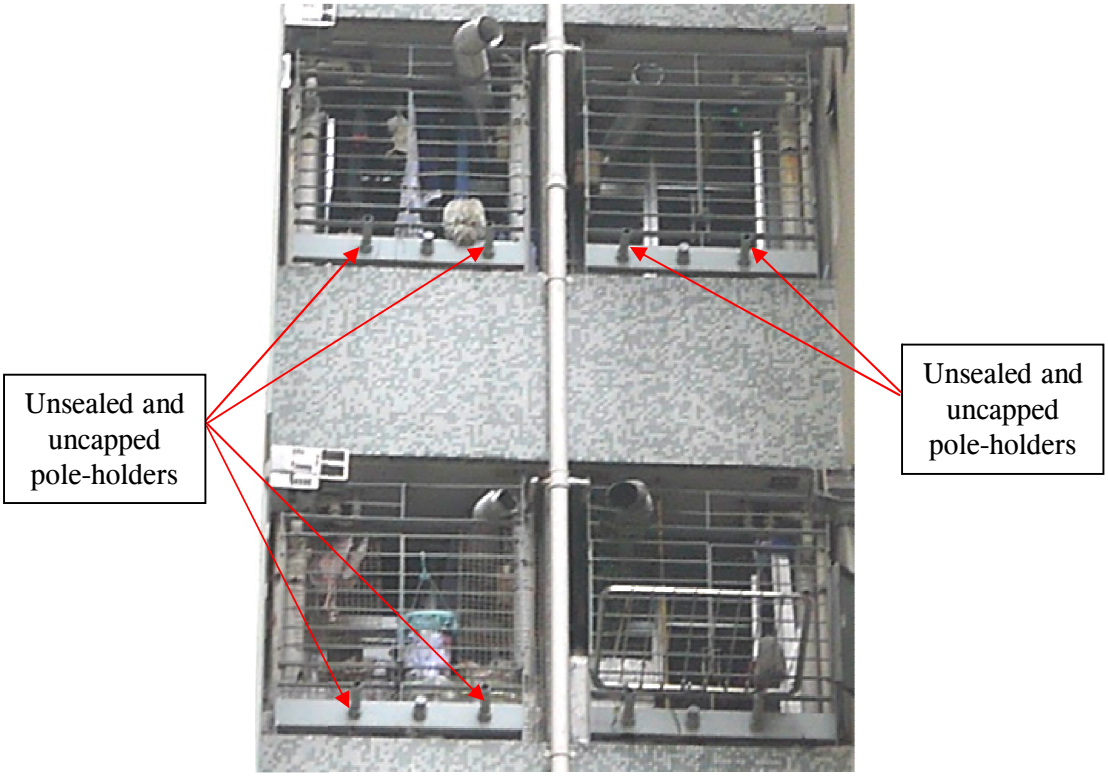
5.17 Partially sealing-up of laundry pole-holders was at variance with the stated objective of the 2014 programme to settle the pole-holder issue once and for all (see para. 5.9(b)). According to the instructions issued by the Estate Management Division in February 2015, regarding the installation of laundry racks, existing pole-holders not used for fixing laundry racks should be trimmed down and sealed up. In Audit's view, given the safety concerns, all unused pole-holders should be promptly sealed up and not be retained for future use by tenants. Audit conducted a sample check of some flats on two estates reported by the HD to have completed or almost completed the sealing-up works for their opted-out flats as at 31 July 2016. Audit found that there were 167 cases of partially sealing up of/unsealed laundry pole-holders as follows:

(a) ***Shek Yam East Estate.*** As shown in Table 13 in paragraph 5.13, the HD reported that of the 1,130 opted-out flats in the estate, 618 flats had existing laundry racks. Of the remaining 512 flats without existing racks, sealing-up works for seven flats were outstanding. However, in a joint inspection with the HD on 23 August 2016 of 78 flats on the first to fifth floors in all three blocks reported to have laundry racks retained by tenants, Audit found that 36 flats did not have laundry racks. Among them, 33 flats each had only one of the three pole-holders sealed up probably due to the instruction mentioned in paragraph 5.16(b) (see examples in Photograph 17) and three had all three pole-holders not sealed up. The observed position was the same as that indicated by the site photographs taken by contractor after completing the works. Audit also noted that, on 18 August 2016, the HD instructed the contractor to carry out sealing-up works for 38 flats (including the three flats found in the joint inspection). In other words, there were at least 71 (36 plus 38 minus 3) flats with outstanding sealing-up works instead of the seven reported by the HD; and

(b) ***Shek Wai Kok Estate.*** According to the HD, as at 31 July 2016, sealing-up works for all 2,712 opted-out flats had been completed while installation works for only 17 out of 3,744 opted-in flats were outstanding. However, Audit's inspection on 24 August 2016 found that the pole-holders of 96 flats on six floors of two blocks had not been sealed up (see Photograph 18 for an example).

Photograph 17

Flats with pole-holders partially sealed up in Shek Yam East Estate



Source: Photograph taken by Audit staff on 23 August 2016

Photograph 18

Flats with pole-holders not sealed up in Shek Wai Kok Estate

Source: Photograph taken by Audit staff on 24 August 2016

5.18 In September 2016, the HD informed Audit that:

(a) its contract manager of the lump sum contract of Shek Yam East Estate (in Kwai Chung Region) had instructed his staff to seal up the middle pole-holder and to cap the remaining pole-holders only (without filling with cement/sand) to allow for the laundry rack installation by tenants in future (see para. 5.16(b)). All pole-holders should either be capped or sealed up. The outstanding sealing-up works would be completed before contract expiry; and

(b) for Shek Wai Kok Estate (see para. 5.17(b)), since gondola could not be installed at some parts of external walls due to obstruction by the water tank on roof, the related sealing-up works would have to be carried out inside the flats pending appointment with tenants for access.

5.19 In light of the unreported outstanding sealing-up works highlighted in paragraph 5.17 (a) and (b) above which were at variance with the HD's instructions, the HD needs to carry out a comprehensive review of the reported cases of completed sealing-up works to see if there are similar cases of non-compliance and take necessary follow-up action accordingly. The HD also needs to take measures to ensure that the front-line staff properly administer the installation/sealing-up works in accordance with the stated objectives of the 2014 programme.

Recent developments

5.20 On 12 September 2016, the HD obtained the endorsement of the Subsidised Housing Committee to provide laundry rods in specified block types of the PRH estates at a total estimated expenditure of $386 million. The Subsidised Housing Committee was informed of the justifications and arrangements for the addition of laundry rods as follows:

(a) under the HA's current policy, tenants of specified blocks i.e. Harmony Blocks, New Harmony 1 Blocks, New Harmony 1 Annex 5 Blocks, New Cruciform Blocks, Single Aspect Blocks, Small Household Blocks and Non-standard Blocks (hereinafter referred to as the specified blocks) were allowed to install, at their own costs, laundry rods at the living room facade subject to their applications to the HD and compliance with the HD's guidelines. According to a sample survey conducted by the HD in

April 2016 for blocks with laundry facilities installed at building re-entrants, more than half of the tenants had installed laundry rods outside living rooms, either at high (i.e. near the ceiling) or low (i.e. under the window) level, with or without the HD's prior approval;

(b) some tenants of the specified blocks considered the location of the laundry facilities installed at the re-entrants undesirable as they did not receive adequate sunlight and natural ventilation, and cooking fumes emitted from kitchens might soil their laundry. Some also considered that the existing laundry provision inadequate as projection from external wall was limited after implementation of the Minor Works Control System under the Building (Minor Works) Regulation effective from 31 December 2010, and the available space at building re-entrants was also limited;

(c) to cater for tenants' genuine needs for laundry facilities and to reduce the potential risk of incautious use of laundry rods at high level, laundry rods would be provided as landlord's fixtures at low level at the living room façade and the associated fixed window grilles would also be replaced by openable type in the specified blocks. Laundry rods previously installed by tenants with the HD's approval and in compliance with the HD's guidelines would be retained, and the HD would take over the maintenance responsibility of these laundry rods. At the same time, the HD would remove those installations not complying with its guidelines. The existing fixed window grilles would be replaced by openable type, subject to individual tenants' agreement; and

(d) the installation of laundry rods in the specified blocks would tie in with the current laundry rack replacement programme as far as practicable, and would be implemented in two phases starting from April 2017 and completed by September 2019. Tenants concerned would be allowed to opt for the installation of laundry racks or replacement of window grilles at any time irrespective of whether they had participated in the 2014 programme or not.

Audit considers that in implementing the new initiative of providing laundry rods in the specified blocks, the HD needs to take on board Audit's observations and recommendations mentioned in this Audit Report.

Audit recommendations

5.21 **Audit has *recommended* that the Director of Housing should:**

(a) **take measures to ensure that information on the implementation of the 2014 programme for replacing laundry pole-holders is properly maintained;**

(b) **carry out a post-implementation review of the 2014 programme for replacing laundry pole-holders in good time;**

(c) **closely monitor the works progress of the 2014 programme for replacing laundry pole-holders to ensure that the target completion date of 2017 would be met;**

(d) **carry out a comprehensive review of the reported cases of completed sealing-up works with a view to identifying any irregularities similar to those found by Audit in paragraphs 5.16 and 5.17 for taking necessary follow-up actions accordingly;**

(e) **take measures to ensure that the front-line staff properly administer the installation/sealing-up works in accordance with the stated objectives of the 2014 programme; and**

(f) **in implementing the new initiative of providing laundry rods in the specified blocks with laundry facilities installed at building re-entrants, take on board the observations and recommendations in this Audit Report.**

Response from the Government

5.22 The Director of Housing agrees with the audit recommendations. He has said that:

(a) the HD has established a central database capturing the details of replacement work in estates;

(b) the HD will carry out a post-implementation review of the 2014 programme upon completion;

(c) the delay of works in individual estates is affected by various factors specific to the estates and the HD has been actively tackling them. The HD will continue to closely monitor the works progress and will complete the replacement work in 2017 as scheduled; and

(d) the HD has briefed the front-line staff to properly administer the installation of laundry racks and sealing up of laundry pole-holders.

PART 6: ENHANCING FIRE SAFETY OF OLD PUBLIC RENTAL HOUSING ESTATES

6.1 This PART examines the HD's efforts in enhancing fire safety of old PRH estates, focusing on the implementation of the FS(B)O requirements.

Fire Safety (Buildings) Ordinance requirements

6.2 The FS(B)O was enacted in 2002 to provide better protection from fire for occupants of composite and domestic buildings. It requires the retrofitting of specified fire service installations/fire safety construction for all domestic and composite buildings (i) either with their plans of building works first submitted to the Building Authority for his approval on or before 1 March 1987; or (ii) constructed on or before 1 March 1987 where no plans of the building works submitted on or before that date to the Building Authority for approval. Some examples of the required fire safety measures for domestic part of composite buildings and domestic buildings are as follows:

(a) ***Fire service installations.*** These include the provision of a fire hydrant and hose reel system, a manual fire alarm system and an emergency lighting within common areas; and

(b) ***Fire safety construction.*** The required improvements include the protection of staircases with separating walls of adequate fire resisting construction, improvement of staircase exits at the level of discharge to street and replacement of doors nearest to the first step of the staircase on each floor with doors of the current fire safety standard.

6.3 The enforcement authorities for fire service installations and fire safety construction under the FS(B)O are the FSD and the BD respectively. The BD/FSD may serve on the owner of a composite building or domestic building a fire safety direction directing him to comply with all or any of the FS(B)O requirements or such other measures if they are of the opinion that it would not be reasonable for the owner to comply with such requirements having regard to the structural integrity of

the building and the technology available to comply with such requirements. In this connection, the BD/FSD must establish an Advisory Committee consisting of such persons with relevant expertise as they consider appropriate to give advice on such matters.

Implications of the FS(B)O on PRH estates

6.4 While PRH estates are exempt from control under the Buildings Ordinance, there is no similar exemption under the FS(B)O. According to the BD:

(a) the fire safety improvement works required under the FS(B)O should comply with the codes specified in the Schedules. The HD could carry out the code-compliant fire safety improvement works to PRH estates under the self-compliance programme. In case any fire safety improvement works involving building works that require approval of plans under the Buildings Ordinance, the plans would be processed by the Independent Checking Unit under the authority delegated by the BD (see Note 20 to para. 2.15); and

(b) if the proposed improvement works do not comply with the codes specified in the FS(B)O and involve alternative proposals, the HD should put forward their justifications, conduct fire engineering assessment and prepare the fire safety improvement study reports. The BD would process and table the study report to the "Advisory Committee for the FS(B)O and the Fire Safety (Commercial Premises) Ordinance" (the Advisory Committee) for comments and acceptance under the FS(B)O.

6.5 In August 2003, the HD's senior management held a meeting to examine the implication of the FS(B)O on PRH estates and noted the following:

(a) the date of implementation of the FS(B)O had yet to be determined as the LegCo Members had expressed concern about the ways to facilitate compliance by all owners in multi-storey buildings with the relevant statutory requirements. Meanwhile, the BD and the FSD had advised that they presumed the implementation of the FS(B)O on PRH estates would be managed by the HD. Since the Independent Checking Unit had been performing independent regulatory checking on new building projects since early 2001 based on the BD's practice in relation to the Buildings

Ordinance, the Independent Checking Unit could, with the delegated authority of the BD, direct the works while the Estate Management Division of HD would be responsible for carrying out the improvement works;

(b) given the significant financial implication in complying with the FS(B)O requirements, criteria had to be established to exclude housing blocks due for re-development. Where there was substantial constraint that would make compliance with the prescribed requirements impractical, fire engineering studies might be undertaken to assess the fire risks and identify alternative safety improvement measures; and

(c) by spreading the works over 10 years, the HD would have an advanced programme in employing resources over 10 years which would be welcome by the BD and the FSD as setting a good example to the private sector.

Implementation of the Fire Safety (Buildings) Ordinance in public rental housing estates

6.6 In July 2007, the FS(B)O came into effect after the Government had addressed the LegCo Members' concern about the ways to facilitate compliance by all owners in multi-storey buildings with the relevant statutory requirements. At a meeting held in March 2008, the HD's senior management noted the progress of the implementation of the FS(B)O as follows:

(a) the enforcement authorities for PRH estates under the FS(B)O would be the BD and the FSD; and

(b) replacement of the flat entrance doors, mainly at dead-ends, in PRH estates to meet the fire safety standards had been largely completed (see para. 6.2(b)).

After discussion, the meeting decided that the improvement works to comply with the FS(B)O requirements would be integrated with the Estate Management Division's maintenance programmes.

6.7 ***Proposed prototype approach.*** In September 2008, the HD, the BD and the FSD held an interdepartmental meeting to discuss the implementation of the FS(B)O in PRH estates. It was considered that in order to streamline the enforcement action, a generic acceptance standard for different types of PRH blocks would be formulated. The meeting agreed in principle that the mode of operation would be that the BD would work together with the HD on a few prototypes. After gaining experience on the required standards or appropriate alternatives, the HD would proceed with the implementation.

6.8 ***Pilot Scheme.*** At another interdepartmental meeting held in May 2010, the HD informed the BD and the FSD of a pilot scheme to work out the improvement items that were acceptable by the concerned departments under the FS(B)O. Fuk Loi Estate of the slab block design and Ping Shek Estate of the single tower design (see Appendix M) had been selected as the pilot projects as the two designs made up a total of 63% of the PRH blocks requiring upgrading works under the FS(B)O. At the meeting, the BD suggested that the approach for implementing the Fire Safety (Commercial Premises) Ordinance (Note 57) could be used for the FS(B)O, i.e. the HD would inspect its own properties against the code of practices to draw up proposals for improvement. The BD and the FSD would go through the improvement proposals and confirm whether they were acceptable and carry out checking after works completion. It was then agreed that more details on implementation of the FS(B)O would be worked out after more experience gained from the pilot scheme.

6.9 In August 2010, the HD awarded a consultancy contract (Consultancy Contract A) for fire safety improvement under the FS(B)O for Ping Shek Estate and another contract (Consultancy Contract B) for Fuk Loi Estate in July 2011. At a meeting held in February 2014, the HD's senior management was informed of the progress of the implementation of the FS(B)O as follows:

Note 57: *In May 1997, the Fire Safety (Commercial Premises) Ordinance came into effect requiring owners/occupiers of prescribed types of commercial premises (such as banks and shopping arcade) to upgrade their fire safety measures. Furthermore, in June 1998, the Fire Safety (Commercial Premises) Ordinance on Specified Commercial Buildings came into effect requiring owners/occupiers of these buildings to upgrade their fire safety measures.*

(a) ***Fuk Loi Estate.*** The fire engineering study report with improvement proposals prepared by the consultant for Fuk Loi Estate had been submitted (in June 2012) to the BD/FSD for comments. The Advisory Committee of the BD (see para. 6.4(b)) had provided comments on the fire engineering study report of Fuk Loi Estate in October 2013. Clarification by the HD had been submitted to the BD in November 2013 and it was expected that the scope of improvement works would be finalised at a second meeting of the Advisory Committee in March 2014;

(b) ***Ping Shek Estate.*** The fire engineering study report for Ping Shek Estate was submitted to the BD in September 2013 and was scheduled for presentation to the BD's Advisory Committee in March 2014;

(c) ***Unresolved issue.*** Several rounds of meetings had been held with the BD and the FSD and both departments had expressed that they would only process the HD's submission of Fuk Loi Estate and Ping Shek Estate as trial for establishment of the fire safety improvement proposals on the HA's typical PRH blocks. The HD had disagreed with the self-compliance approach proposed by the BD/FSD (self-compliance refers to the HD carrying out fire safety improvement works without formal vetting and acceptance by the BD and the FSD). The BD/FSD had declined to handle any further submissions on a project basis or commit a time frame to review the HD's submission for the two pilot estates (Note 58 and see also paras. 6.11 and 6.13(a)); and

(d) ***Consultancy studies and submission framework.*** The HD considered that it was not acceptable to adopt the self-compliance approach proposed by the BD/FSD. However the studies for Fuk Loi Estate and Ping Shek Estate could serve as prototypes to simplify the scope of studies for estates of similar design. To mitigate the delay in implementing the FS(B)O, the following submission framework was suggested:

Note 58: *In October 2016, the FSD informed Audit that as the priority of implementing the FS(B)O would be accorded to composite buildings, the FSD was unable to commit a time frame to review the HD's submissions covering territory-wide PRH blocks.*

(i) consultants would be engaged in three batches to study five selected blocks covering all the typical types of design for the remaining PRH estates. These studies with recommendations would be submitted to the Advisory Committee for comments. The consultants would adopt the principles and comments made by the Advisory Committee for formulating the scope of improvement for estates of similar design; and

(ii) the study reports would be submitted to the BD/FSD since they were the enforcement authorities under the FS(B)O. While they might decline to vet the HD's submission on an estate basis, consultants concerned should still proceed to produce detailed drawings and submissions for each estate to the Independent Checking Unit for approval according to the normal procedures for alteration works (see Note 20 to para. 2.15). Improvement works would commence once the Independent Checking Unit's approval was obtained.

The Permanent Secretary for Transport and Housing (Housing) expressed concern at the meeting that it had taken so long to sort out the submission framework although the FS(B)O had already come into effect since 2007 and directed that the HD should write to the BD/FSD to express disagreement with the self-compliance approach and make submissions to the BD/FSD for their vetting as usual.

Budget and programme for implementing the FS(B)O

6.10 In March 2014, the HD obtained the HA's Building Committee's approval of budget and programme for implementing the FS(B)O in PRH estates. In the funding paper, the Building Committee was informed that:

(a) ***Current progress.*** In general, FS(B)O improvement works should not be implemented for estates unless they were expected to be occupied by tenants for at least six years after completion of works on site. On this basis, an estimated 62 PRH estates comprising 238,034 flats (Note 59) would require fire safety improvement works under the FS(B)O. The implementation of the relatively straightforward improvement items under the FS(B)O had been carried out through the Estate Management Division's maintenance programmes. For example, the improvement works to domestic entrance doors and protection to PVC-type of plastic pipes with fire collars in common area which fell within the fire safety construction improvement items had been completed for all estates. Some of the required fire service installation works such as hose reel, fire hydrant and manual fire alarm system were mostly in place while installation of battery-type emergency lighting was in progress. More complicated items identified would be tackled separately;

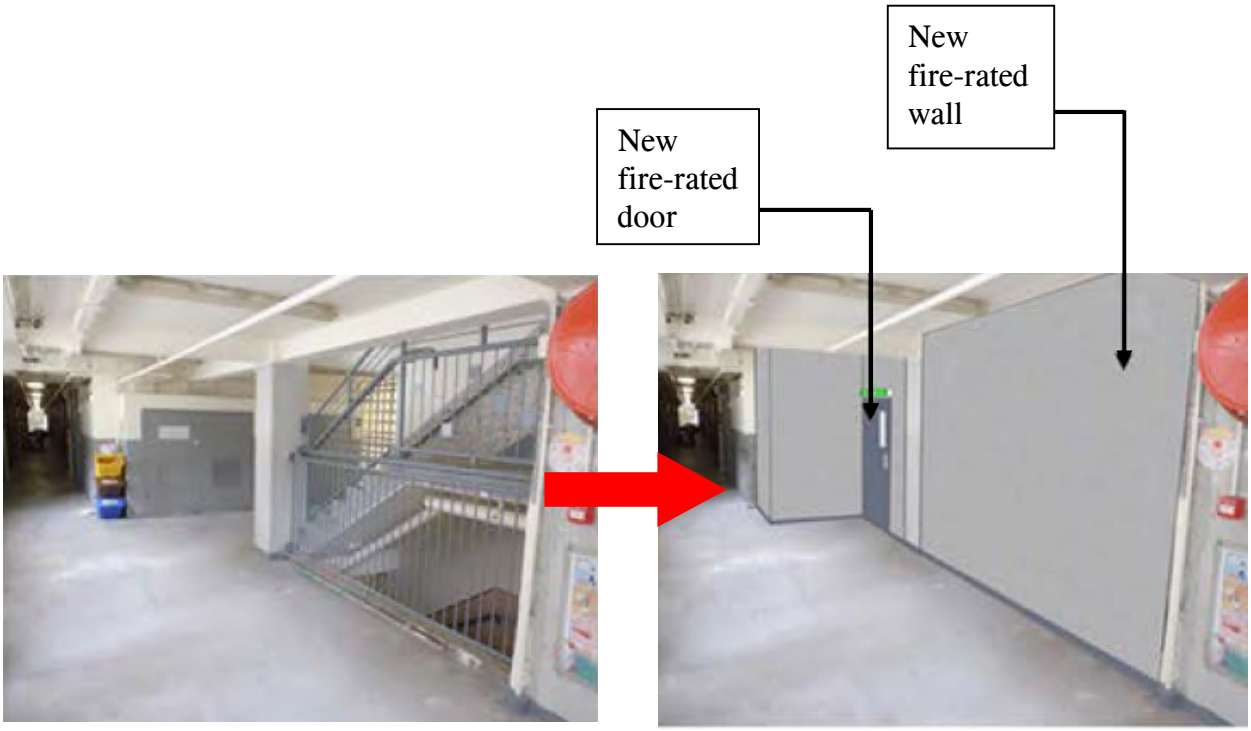
(b) ***Proposed improvement works.*** The scope of fire service installations and construction was subject to interpretation and would greatly affect the overall budget and programme. There were specific provisions in the FS(B)O empowering the BD/FSD to accept alternative improvement measures in lieu of those prescribed by law but which would meet equivalent fire safety standards. Such alternative proposals required expert investigation by fire safety engineers. Two estates (Fuk Loi and Ping Shek) had been selected for pilot studies by specialist consultants to facilitate a pragmatic and cost-effective solution to meet the requirements of the FS(B)O. The BD Advisory Committee had been consulted on the fire engineering study report of Fuk Loi Estate. Having considered the Committee's comments, the HD submitted clarification and study results to the BD in November 2013 and it was expected that the scope of works would be finalised at the Advisory Committee meeting in April 2014.

Note 59: *According to the HD, as at July 2016, there were 64 estates requiring fire safety improvement under the FS(B)O. The estimated 62 estates in March 2014 had excluded the two estates (Wah Fu (I) and (II)) for which redevelopment had been announced in the Chief Executive's policy address of 2014. Wah Fu (I) and (II) Estates had subsequently been reinstated in the fire improvement works programme and the costs of improvement works for these two estates were to be absorbed within the original budget of $851.7 million (see para. 6.10(d) below).*

The anticipated fire safety construction works included construction of fire walls and doors to protect exit staircase (see illustration in Figure 2), separating exit routes at ground floor opening for domestic and non-domestic premises, sealing up domestic flat louver openings at corridors with fire resisting boards, provision of protected lobbies for refuse rooms and installation of fire door of service ducts inside staircase enclosures. For fire service installations, the scope included the improvised sprinkler systems and other minor improvement works. Improvement proposals for Ping Shek Estate had been submitted to the BD in September 2013 and were scheduled for presentation to the Advisory Committee in April 2014. The improvement works for the two pilot estates could be executed once the comments of the Advisory Committee were addressed;

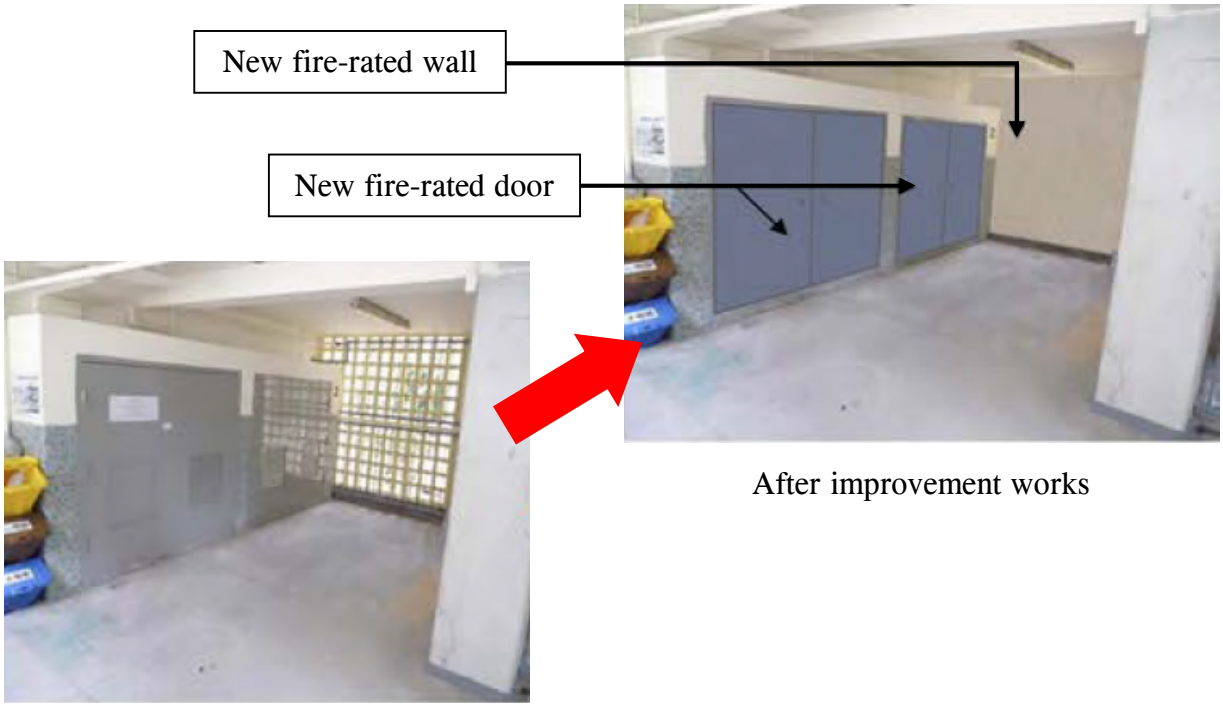
Figure 2

Illustration of fire-rated walls and fire-rated doors for staircase



Before improvement works

After improvement works



After improvement works

Before improvement works

Source: HD records

(c) ***Consultancy studies and submission framework.*** The scope of studies (i.e. Consultancy Contracts A and B — see paras. 6.8 and 6.9) on Fuk Loi Estate and Ping Shek Estate could serve as prototypes to simplify the scope of studies for estates of similar designs, i.e. covering 63% of all the PRH blocks requiring improvement works under the FS(B)O. As a caring and responsible owner and for public interest, the HD was obliged to meet the enforcement authorities' target of completing inspection of all concerned building blocks by mid-2016 (Note 60) and draw up fire safety improvement proposal for implementation of the FS(B)O. It was unacceptable to adopt a self-compliance approach as proposed by the BD/FSD. Consultants would be engaged in three batches to work out the detailed fire safety improvement for the remaining estates and act as authorised persons in preparing detailed drawings of the recommended alteration works for submission on estate basis in accordance with the submission framework as mentioned in paragraph 6.9(d); and

(d) ***Budget and tentative programme.*** It was targeted to complete all consultancy studies on the remaining estates and submission procedures by mid-2016. Improvement works for fire safety construction would be carried out in two phases. Phase I works covering fire safety construction for 214 blocks in the 51 estates (of the slab block design similar to Fuk Loi Estate) and all fire service installation works were targeted for completion by 2020-21 at an estimated cost of $851.7 million (Note 61).

Note 60: *According to the implementation plan of the BD/FSD, inspection for target composite buildings was scheduled to be completed by June 2016 and inspection for target domestic buildings would commence after that for composite buildings. After the joint review by the BD/FSD of the annual inspection target of private target composite buildings under the FS(B)O to commensurate with the two departments' capacities in issuing directions within four months after inspection as recommended in the Director of Audit's Report of October 2013 (see Note 12 to para. 1.13), the inspection programme for private target composite buildings has been extended beyond 2016.*

Note 61: *The costs included the consultancy fees and costs of improvement works for 60 PRH estates (i.e. excluding Fuk Loi, Ping Shek, Wah Fu (I) and (II)) and the non-domestic premises owned by the HA in 42 composite blocks of TPS estates/Home Ownership Scheme courts that would also require improvement works under the FS(B)O. According to the HD, the improvement works in common areas are the shared responsibility with the private owners while improvement works in non-domestic portions owned by the HA are the responsibility of the HA. According to the HD, the cost of improvement works for Fuk Loi and Ping Shek Estates was $27.2 million.*

Review on budget and programme for Phase II fire safety construction works covering the remaining 214 blocks would be conducted upon confirmation of the scope by 2016.

Agreement to process five additional typical blocks of PRH

6.11 On 31 March 2014, pursuant to the Permanent Secretary for Transport and Housing (Housing)'s direction (see para. 6.9), an Assistant Director of the HD wrote to the Deputy Director of Buildings seeking the BD's agreement to process the fire safety improvement proposals for five additional block types to cover the remaining PRH estates. In April 2014, the BD replied that to facilitate the HD's self-compliance programme of the FS(B)O in PRH estates, the BD agreed in principle to offer comments on the HD's fire safety improvement proposals for five additional buildings (one building for each of the five typical blocks — Note 62). The BD also reminded the HD to provide justifications demonstrating impracticableness of code compliance and sound fire engineering assessment for seeking advice from the Advisory Committee. In May 2014, the FSD similarly informed the HD of its agreement to offer comments on the fire service installations for the five additional typical blocks.

6.12 Subsequently, the HD awarded three consultancy contracts (Consultancy Contracts C to E) in October 2014, February and September 2015 for the preparation of fire safety improvement proposals, and alteration and addition works plan for the 62 estates (see Table 14). Consultancy Contract C also covered the fire safety improvement proposals for the five additional block types (see Note 62 to para. 6.11), i.e. serving as prototypes for specific PRH block designs similar to Consultancy Contracts A and B (see para. 6.10(c)).

Note 62: *These included Ziggural/Trident type, Cruciform-1 type, Cruciform-2 type, Linear type and H type (see Appendix M).*

Table 14

Consultancy contract for
Fire Safety Improvement Study under FS(B)O for PRH estates

Consultancy contract	Number of estates covered	Contract sum ($ million)	Contract period
C	19	15	October 2014 to September 2017
D	18	8.8	February 2015 to January 2018
E	25	8.5	September 2015 to August 2018

Source: HD records

Latest development

6.13 In response to Audit's enquiries on the latest development on implementation of the FS(B)O in PRH estates, in August and September 2016, the HD and the BD provided the following information:

(a) ***Fuk Loi Estate and Ping Shek Estate.*** In May 2014, the Advisory Committee accepted in principle the fire engineering study reports for Fuk Loi Estate and Ping Shek Estate (under Consultancy Contracts A and B) subject to satisfactory clarification of certain issues. In October 2015, after clarification on the Advisory Committee's comments, the BD advised the HD that there were no further comments. In February and May 2016, the FSD's general support for the two batches of 102 slab block projects for water connection of improvised sprinkler systems (Note 63) were obtained. In April 2016, the HD submitted the fire service installation drawings for Ping Shek Estate to the FSD. Fire safety

Note 63: *According to FSD Circular Letter No. 3/2007, if there are structural or space constraints for retrofitting a standard sprinkler system, an improvised sprinkler system connecting to direct water main or existing fire hydrant/hose reel system or a sprinkler water tank of reduced capacity may be considered acceptable.*

construction and fire service installations for the two estates (Ping Shek and Fuk Loi) were scheduled for completion in 2018-19 and 2019-20 respectively at a total estimated cost of $27.2 million;

(b) ***Consultancy Contract C.*** The HD submitted the fire engineering study reports under Consultancy Contract C for Wo Che Estate and Butterfly Estate in September 2015, and Tai Hing Estate in June 2016. The progress was as follows:

(i) ***Wo Che Estate.*** The proposal of Wo Che Estate case was accepted by the BD in August 2016;

(ii) ***Butterfly Estate.*** The Butterfly Estate case was pending resubmission from the HD after the BD had issued comments in May 2016; and

(iii) ***Tai Hing Estate.*** The Tai Hing Estate case was pending resubmission from the HD after the BD had issued comments in September 2016; and

(c) ***Emergency lighting installation.*** In May 2016, the programme of emergency lighting installation was completed.

Areas for improvement

6.14 Up to August 2016 (nine years after the FS(B)O came into effect), fire safety improvement works for the 64 PRH estates had not been fully completed for compliance with the relevant requirements of the FS(B)O. In particular, the progress in respect of fire safety construction was slow (see para. 6.10(a) and (b)). According to the HD's 2014 tentative programme, Phase I fire safety construction works were only targeted for completion by 2020-21 (see para. 6.10(d)). For Phase II works, budget and programme would be reviewed upon confirmation of the scope. As for the three consultancy studies (see para. 6.12) for formulating fire safety improvement proposals for specific PRH block designs which were targeted for completion in mid-2016 (see para. 6.10(d)), as at August 2016, only two studies (Consultancy Contracts A and B) had been completed (see para. 6.13).

6.15 ***Need to closely monitor the implementation progress.*** Fire is a risk for the densely populated PRH estates. Audit considers that the HD needs to closely monitor the progress of implementing the FS(B)O to avoid further slippage. In this connection, there is a need for the HD's senior management to provide timely direction and input to implementation problems, as evidenced by the following:

(a) since the implementation of the FS(B)O in 2007, the progress was reported to the senior management meeting only on two occasions, i.e. in 2008 and 2014 notwithstanding that:

  (i) the inter-departmental meetings with the BD and the FSD had failed to reach agreement on the vetting/formal acceptance of the HD's fire safety improvement proposals after rounds of discussion (see para. 6.9(c)); and

  (ii) implementation of the two pilot scheme projects had taken a long time. While Consultancy Contract A for Ping Shek Estate was awarded in August 2010, submission of the fire engineering study report to the BD was made in September 2013 (three years later) and final comments from the BD were received in October 2015 (see paras. 6.9(b) and 6.13(a)). For Fuk Loi Estate, Consultancy Contract B was awarded in July 2011. While the final engineering study report had been submitted to the BD in June 2012, final comments from the BD were received in October 2015 (almost three years later — see paras. 6.9(a) and 6.13(a)); and

(b) the inter-departmental meetings on implementation of the FS(B)O in PRH estates held before 2014 were led by senior professional staff. It was only after the Permanent Secretary for Transport and Housing (Housing) had expressed concern on the slow progress in February 2014 that the subsequent meetings were led by directorate staff.

6.16 ***Need for greater inter-departmental collaboration to implement the FS(B)O in PRH estates.*** While the BD/FSD agreed in 2014 to offer comments on the HD's fire safety improvement proposals for five additional buildings (one building for each of the five typical blocks), they also remarked that the comments were to facilitate the HD's self-compliance programme of the FS(B)O in PRH estates (see para. 6.11). In other words, there was still no agreement on the formal acceptance of the fire safety improvement works for the PRH estates. This

was unsatisfactory in view of the substantial financial implication of the proposed works (i.e. $851.7 million for Phase I works — see para. 6.10(d)). Moreover, the vetting of the HD's fire engineering study reports for the two pilot scheme projects had taken a long time (see para. 6.15(a)(ii)). As the HD's fire safety improvement proposals are intended to provide cost-effective solution to meeting the requirements of the FS(B)O in PRH estates (see para. 6.10(b)), there is a need for greater collaboration among the HD, the BD and the FSD to ensure that the proposed works are efficiently vetted and formally accepted.

Audit recommendations

6.17 **Audit has *recommended* that the Director of Housing should closely monitor the progress of implementation of the FS(B)O in the 64 PRH estates and provide timely direction and input to address implementation problems.**

6.18 **Audit has also *recommended* that the Director of Buildings and the Director of Fire Services as the enforcing authorities of the FS(B)O should work in collaboration with the Director of Housing to ensure that the fire safety improvement works for meeting the FS(B)O requirements in PRH estates are efficiently vetted and formally accepted.**

Response from the Government

6.19 The Director of Housing agrees with the audit recommendation in paragraph 6.17. He has said that:

(a) the HD will continue to closely liaise with the two enforcement authorities for full implementation of the FS(B)O as soon as possible; and

(b) throughout the years, the HD has carried out various kinds of fire safety improvement works. Examples include the replacement of flat entrance doors (see para. 6.6(b)), protection to PVC-type of plastic pipes with fire collars in common areas (see para. 6.10(a)), provision of fire rated doors for service rooms and installation of emergency lighting (see para. 6.13(c)), and the installation of improvised sprinkler system which is in progress.

6.20 The Director of Buildings agrees with the audit recommendation in paragraph 6.18.

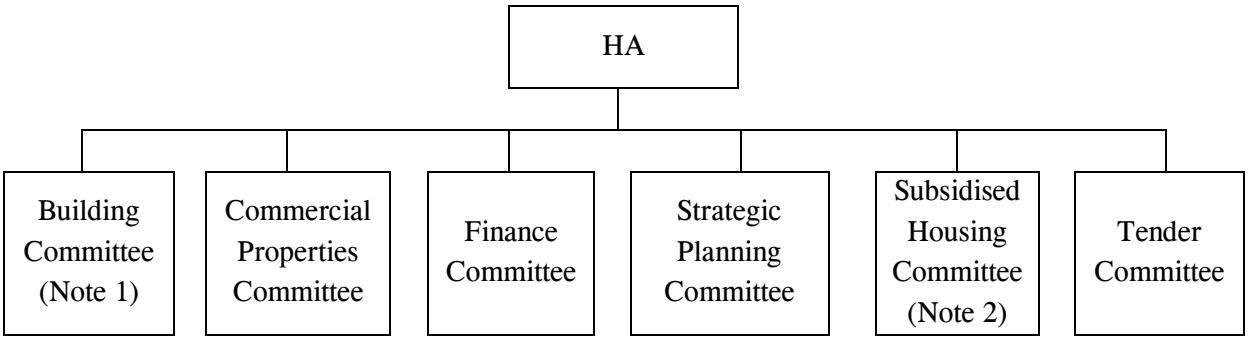
6.21 The Director of Fire Services agrees with the audit recommendation in paragraph 6.18. He has said that:

(a) the FSD has all along been providing assistance and advice to the HD in the improvement projects of several selected typical PRH blocks; and

(b) the FSD will continue to closely liaise and enhance the coordination with the HD to ensure that the fire safety improvement works for meeting the FS(B)O requirements in PRH estates are efficiently carried out.

Appendix A
(para. 1.3 refers)

Committees of the Hong Kong Housing Authority



Source: HD records

Note 1: The terms of reference of the Building Committee are:

(1) to advise the HA on policies related to the implementation of the construction and major improvement, renovation and rehabilitation programmes, and to monitor progress on these programmes; and

(2) to exercise the powers and functions of the HA in accordance with the relevant prevailing policies:

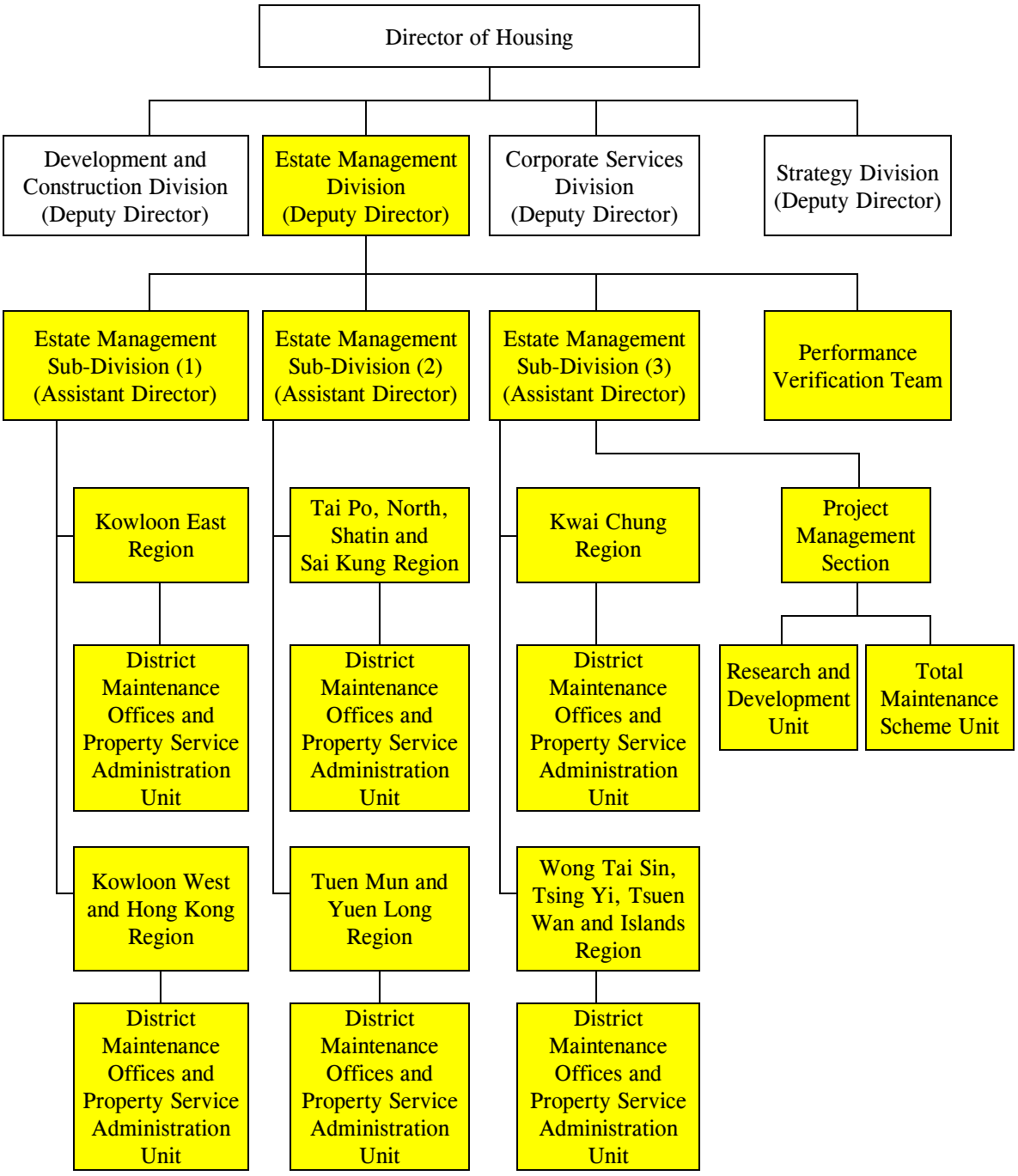
(a) to endorse programmes of activities and monitor their performance, and to approve the financial targets, service standards and performance measures within the policies and objectives set by the HA for submission to the HA for approval; and

(b) to approve project budget, master layout plans and scheme designs for public housing projects and projects under subsidised home ownership schemes.

Note 2: The Subsidised Housing Committee, amongst others, advises the HA on policies concerning the management and maintenance of the HA's housing estates and ancillary facilities, exercises the powers and functions of the HA in accordance with the relevant prevailing policies to manage, maintain and improve the HA's housing estates and ancillary facilities.

Appendix B
(paras. 1.3, 2.8 & 2.29, Note 13 to para. 2.2, Note 16 to para. 2.3 and Note 21 to para. 2.18 refer)

Housing Department
Organisation chart (extract)
(1 June 2016)



Legend: *Divisions/offices covered in this Audit Report*

Source: *HD records*

Appendix C
(paras. 1.10, 4.10, 4.25(d) and 4.31 refer)

Records of asbestos-containing materials in public rental housing estates (October 2013 to 17 October 2016)

Item	PRH estate	Block	ACMs
1	Cheung Hong	Hong Kwai	ic
		Hong Tai	ic
2	Choi Wan (I)	Cheung Bor	ic
		Fei Fung	ic
3	Chuk Yuen (South)	Sau Yuen	ic
4	Fu Shan	Fu Yan	ec
5	Hing Wah (II)	Chin Hing	bg, sg
		Lok Hing	bg, sg
		On Hing	bg, sg
		Wo Hing	bg, sg
		Fung Hing	sg
		Ning Hing	sg
		Yu Hing	sg
6	Kai Yip	Kai Yin	ic
7	Kwai Shing (West)	Block 6	sg
		Block 8	sg
		Block 9	sg
		Block 10	sg
8	Lai Kok	Lai Mei	ic

Appendix C
(Cont'd)
(paras. 1.10, 4.10,
4.25(d) and 4.31 refer)

Item	PRH estate	Block	ACMs
9	Oi Man	Chiu Man	ic
		Chung Man	ic
		Kin Man	ec
		Lai Man	ec
10	On Ting	Ting Cheung	ic
11	Sha Kok	Sand Martin	ic
12	Shek Lei (2) (Interim Housing)	Block 10	bg
		Block 11	bg
13	Shun Lee	Lee Foo	ic
		Lee Yat	ic
14	Wah Fu (I)	Wah Kwong	ec
15	Wan Tsui	Chak Tsui	ic
16	Yau Oi	Oi Yung	ic
17	Yue Wan	Yue Fung	sg
		Yue On	sg, ec
		Yue Shun	sg
		Yue Tai	sg

Legend: bg — balcony grille (encapsulated)
ec — external chimney
ic — internal chimney
sg — staircase and lobby grille

Source: HA website

Appendix D
(paras. 2.3 and 2.34 refer)

Major stages of the Total Maintenance Scheme's work

Major stage	Workflow
Pre-entry arrangements	The estate office/PSA concerned announces the TMS programme in the estate and the TMS Unit sends notification letters to tenants. A service counter manned by a contractor's staff as the Public Relations Officer is set up in the estate to provide enquiry and appointment services.
In-flat inspections	The TMS teams pay visits to each PRH flat in the estate, conduct in-flat inspection, record defects using an electronic Personal Digital Assistant which is linked to the HD's computer system, and carry out minor repair works on the spot. For more complicated repair works, the TMS teams issue works orders to the maintenance contractor. For repair works relating to building services, the TMS teams refer the cases to the Building Services Team (Note). The TMS teams also educate tenants on in-flat maintenance.
Monitoring and certification of repair works under works orders	After receiving the works orders, the contractor arranges with the tenants for carrying out repair works. The TMS teams check the process of all spalling repair works, water seepage repair works and tiling works. The TMS teams also select at least 10% of completed works for final inspection before certification of the relevant works orders. For other completed works not inspected by the TMS teams, HD staff certify the completion of the works orders based on the contractor's submitted works records, which may include tenants' acknowledgement on completion of works at their flats.

Source: HD records

Note: The building services include electrical installation, communal aerial broadcast distribution, security system and gas installation. After receiving the referrals from the TMS teams, the Building Services Team (also formed under the TMS Unit) conducts in-flat inspection of PRH flats concerned, and refers the cases to the contractors or advises the tenants to contact the relevant parties (such as the gas company or the television broadcasting company) for repair works. From 2011-12 to 2015-16, the Building Services Team had an average strength of 14 Building Services Ambassadors. All of them were employees of consultancy firms and supervised by HD staff.

Appendix E
(paras. 2.4 and 2.16 refer)

A comparison of operational data for the first Total Maintenance Scheme cycle and the first five years of the second cycle

Item	First TMS cycle (2006 to 2011)	First five years of the second TMS cycle (2011 to 2016) (Note 1)
(a) Number of estates completed	177	120
(b) Number of flats involved	603,792	375,703
(c) Number of flats inspected	468,622	294,738
(d) Access rate ((c)/(b)×100%)	77.6%	78.4%
(e) Number of estate works orders issued	306,582	170,228
(f) Total cost of estate works orders issued ($ million)	450	367
(g) Average number of estate works orders issued per inspected flat ((e)/(c))	0.65	0.58
(h) Average cost per estate works order issued ((f)/(e))($)	1,468	2,156
(i) Other-related cost ($ million)	462 (Note 2)	365 (Note 3)
(j) Total maintenance cost ((f)+(i)) ($ million)	912	732
(k) Average maintenance cost per inspected flat ((j)/(c))($)	1,946	2,484

Source: Audit analysis of HD records

Note 1: As at 31 March 2016, the first five years of the second TMS cycle had been rolled out to 134 estates with inspections and repair works completed in 120 estates. For the remaining 14 estates with TMS in progress, about 22,000 estate works orders were issued and the total maintenance cost incurred was $96 million.

Note 2: The cost included $452 million for the engagement of the TMS teams and $10 million for the repair of building services under about 34,000 works orders.

Note 3: The cost included $360 million for the engagement of the TMS teams and $5 million for the repair of building services under about 18,000 works orders.

Appendix F
(paras. 2.8 and 2.34 refer)

Major stages of the Responsive In-flat Maintenance Services' work

Major stage	Workflow
Receipt of works requests	In each estate, a contractor's staff is assigned as the Public Relations Officer to liaise with tenants and the ITT. After receiving the works requests from tenants, the estate office identifies the nature of works requests and refers them to the Public Relations Officer and ITT as appropriate (Note).
In-flat inspections	The ITT contacts the tenants to conduct in-flat inspections. During inspections, the ITT arranges appointments with the tenants on the spot for the repair works by issuing minor works orders or estate works orders.
Monitoring and certification of repair works under works orders	The ITT checks the process of all concrete spalling repair works and water seepage repair works. The ITT also selects at least 5% of completed minor works orders and 10% of completed estate works orders for final inspection before certification of works completion.

Source: HD records

Note: Repair works relating to building services for which the HD is responsible are referred to the building services staff of the DMOs/PSAs for taking follow-up actions. For other building services cases, the tenants will be advised to contact the relevant parties (such as the gas company or the television broadcasting company) for repair works.

Appendix G
(paras. 2.9 and 2.28 refer)

An analysis of works orders issued and costs involved in the Responsive In-flat Maintenance Services (2011-12 to 2015-16)

Item	2011-12	2012-13	2013-14	2014-15	2015-16
(a) Average number of PRH flats	719,737	729,770	740,618	749,140	752,973
(b) Number of minor works orders issued	176,741	214,131	237,258	258,526	276,266
(c) Number of estate works orders issued	94,074	107,553	136,057	135,080	143,889
(d) Total number of works orders issued ((b)+(c))	270,815	321,684	373,315	393,606	420,155
(e) Cost of minor works orders issued ($ million)	55.6	69.7	80.6	82.7	85.8
(f) Cost of estate works orders issued ($ million)	131.4	204.4	277.1	320.1	373.2
(g) Other-related cost (Note) ($ million)	26.7	30.4	32.8	36.6	41.1
(h) Total maintenance cost ((e)+(f)+(g)) ($ million)	213.7	304.5	390.5	439.4	500.1
(i) Average number of works orders issued per PRH flat ((d)/(a))	0.38	0.44	0.50	0.53	0.56
(j) Average cost per works order ([(e)+(f)]/(d)) ($)	691	852	958	1,023	1,092
(k) Average maintenance cost per PRH flat ((h)/(a)) ($)	297	417	527	587	664

Source: Audit analysis of HD records

Note: The cost included costs for the engagement of Public Relations Officers, provision of computer equipment and call centre support services.

Appendix H
(para. 2.19(a) refers)

Total Maintenance Scheme teams' inspections of public rental housing flats not meeting prescribed standards (2012-13 to 2015-16)

Age of estates	Inspection standard (Flats/day)	Number of inspected estates checked by HD's Service Audit Team	Inspections not meeting prescribed standard	
			Number of estates involved	Average number of flats inspected (Flats/day)
11 to 20 years	10	0	N/A	N/A
21 to 40 years	6	22	15 (68%)	3.2 to 5.7
Over 40 years	4	8	5 (63%)	2.0 to 3.8
	Total	30	20 (67%)	

Source: Audit analysis of HD records

Appendix I
(paras. 2.29 and 2.30 refer)

Actual performance of selected estates against service standards for the Responsive In-flat Maintenance Services (2011 to 2015)

Service standard		2011	2012	2013	2014	2015	Overall
Number of selected estates		54	86	56	57	51	304
Number of estates not meeting service standards							
1	Inspection should be conducted within the day when the works request is made by the tenant, targeting 80% of the inspections achievable in each month	13	20	8	5	3	49 (16%)
2	Minor repair works should be completed within 2 days from the works request made by the tenant, targeting 80% of the flats with such repair achievable in each month	17	18	6	3	0	44 (14%)
3	Estate works orders issued should be completed by the contractor within 14 days from the works request made by the tenant, targeting 70% of the flats with such repair achievable in each month	40	50	27	21	13	151 (50%)
4	The tenant should be contacted for appointment for inspection within 2 hours from the receipt of tenant's works request	12	22	11	16	30	91 (30%)
5	Prior to inspection, an advance telephone call should be given to the tenant within 15 to 30 minutes before arrival	3	11	19	19	11	63 (21%)
6	Prior to repair, an advance telephone call should be given to the tenant within 15 to 30 minutes before arrival	5	11	28	21	13	78 (26%)
7	Tenant's feedback should be collected within 14 days after completion of repair works	20	49	36	31	36	172 (57%)
8	Appointment for minor repair works should be arranged with the tenant on spot after inspection	2	9	12	12	8	43 (14%)
9	Monthly notice on the progress of works should be served to the tenant when tanking works are required at that tenant's immediate upper flat until completion of works	8	29	27	24	4	92 (30%)
Number of estates meeting all service standards		5 (9%)	9 (10%)	2 (4%)	5 (9%)	4 (8%)	25 (8%)

Source: Audit analysis of HD records

Appendix J
(para. 2.40(a) and (b) refers)

Results of the Housing Department's performance verifications of repair works orders under the Responsive In-flat Maintenance Services (2011 to 2015)

Repair works	2011	2012	2013	2014	2015	Overall
Minor works orders						
(a) Material						
Grade A	5	15	11	11	6	48
Grade B	11	4	0	0	0	15
Grade C	1 } 1 (6%)	1	0	0	0 } 3 (33%)	2 } 7 (10%)
Grade D	0	0	1	1	3	5
Total	17	20	12	12	9	70
(b) Workmanship						
Grade A	21	95	5	0	0	121
Grade B	18	41	88	99	80	326
Grade C	7 } 8 (17%)	21	18	11	21 } 22 (22%)	78 } 84 (16%)
Grade D	1	0	0	4	1	6
Total	47	157	111	114	102	531
Estate works orders						
(a) Material						
Grade A	20	73	72	71	79	315
Grade B	16	14	0	2	0	32
Grade C	3 } 6 (14%)	10	1	0	0 } 5 (6%)	14 } 33 (9%)
Grade D	3	2	4	5	5	19
Total	42	99	77	78	84	380

Appendix J
(Cont'd)
(para. 2.40(a) and (b) refers)

Repair works	2011	2012	2013	2014	2015	Overall
(b) Workmanship						
Grade A	6	29	0	0	0	35
Grade B	18	49	41	31	12	151
Grade C	18	77	70	75	73	313
Grade D	6	4	1	8	17	36
	24 (50%)				90 (88%)	349 (65%)
Total	48	159	112	114	102	535

Source: Audit analysis of HD records

Remarks 1: Grade A denotes full compliance with the approved standard. Grade B means minor non-conformity/defect is found and replacement/rectification works may not be necessary. Grade C means non-conformity is found and partial replacement/rectification works are required. Grade D means substantial rectification/complete re-execution works are required.

2: The number of works orders involved might not be equal to the total number of works orders selected for review as the repair works of each works order might not involve both material and workmanship.

Appendix K
(para. 5.12 refers)

Six estates with works scheduled for completion in August and September 2016 but more than 50% installation works still outstanding (31 July 2016)

Estate	Works period	Number of flats		
		Opted-in (a)	Laundry racks installed (b)	Installation works outstanding (c) = (a) – (b)
Choi Ha (Note)	15 June 2015 to 14 September 2016	103	51 (49%)	52 (51%)
Kwai Chung (Phase 1)	28 October 2015 to 18 August 2016	980	59 (6%)	921 (94%)
Kwong Tin	15 June 2015 to 14 September 2016	464	81 (17%)	383 (83%)
Sau Mau Ping	15 June 2015 to 14 September 2016	1,955	869 (44%)	1,086 (56%)
Shun On (Phases 1 and 2)	15 June 2015 to 14 September 2016	1,758	190 (11%)	1,568 (89%)
Tak Tin (Note)	15 June 2015 to 14 September 2016	312	154 (49%)	158 (51%)
	Overall	5,572	1,404 (25%)	4,168 (75%)

Source: *Audit analysis of HD records*

Note: *These estates are TPS estates.*

Appendix L
(para. 5.13 refers)

Ten estates with works scheduled for completion in August and September 2016 but more than 50% sealing-up works still outstanding (31 July 2016)

Estate	Works period	Number of flats			
		Opted-out	Opted-out due to the retention of existing laundry racks (Note 1)	Opted-out and without existing laundry racks	
				Pole-holders sealed up	Pole-holders not yet sealed up
		(a)	(b)	(c)	(d) = (a) − (b) − (c)
Choi Ha (Note 2)	15 June 2015 to 14 September 2016	231	88	13 (9%)	130 (91%)
Hing Tin (Note 2)	15 June 2015 to 14 September 2016	311	1	6 (2%)	304 (98%)
Ko Yee	15 June 2015 to 14 September 2016	802	120	188 (28%)	494 (72%)
Kwai Chung (Phase 1)	28 October 2015 to 18 August 2016	1,480	222	105 (8%)	1,153 (92%)
Kwong Tin	15 June 2015 to 14 September 2016	1,989	47	391 (20%)	1,551 (80%)
Oi Man	15 June 2015 to 14 September 2016	2,107	186	933 (49%)	988 (51%)
Sau Mau Ping	15 June 2015 to 14 September 2016	4,507	1,424	1,193 (39%)	1,890 (61%)
Shun On (Phases 1 & 2)	15 June 2015 to 14 September 2016	1,244	46	167 (14%)	1,031 (86%)
Tsui Ping North (Note 2)	15 June 2015 to 14 September 2016	1,178	98	15 (1%)	1,065 (99%)
Tak Tin (Note 2)	15 June 2015 to 14 September 2016	1,170	29	9 (1%)	1,132 (99%)
	Overall	15,019	2,261	3,020 (24% of 12,758)	9,738 (76% of 12,758)

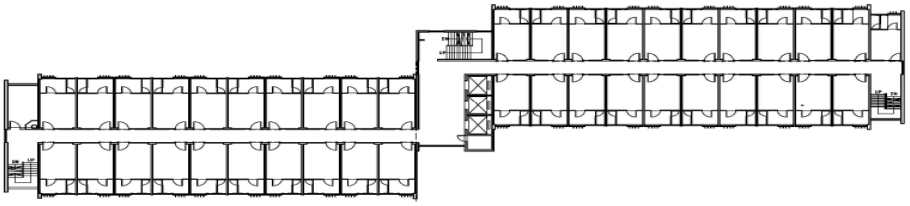
Source: Audit analysis of HD records

Note 1: According to the HD, these flats included those with laundry racks installed by tenants/HD.

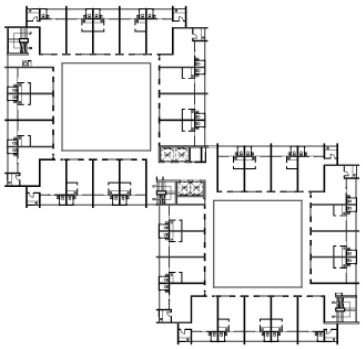
Note 2: These estates are TPS estates.

Appendix M
(paras. 6.8 and 6.11 refer)

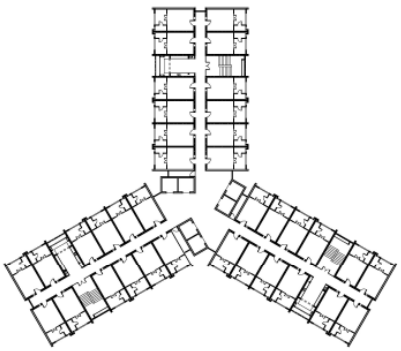
Seven block designs of PRH estates



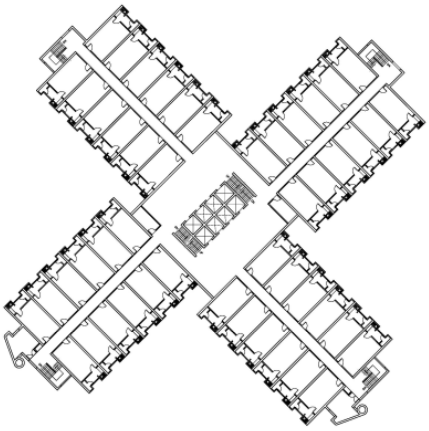
Slab block



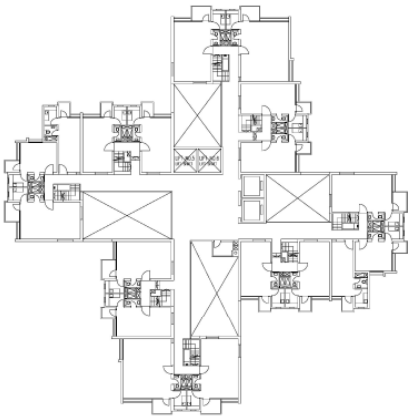
Tower



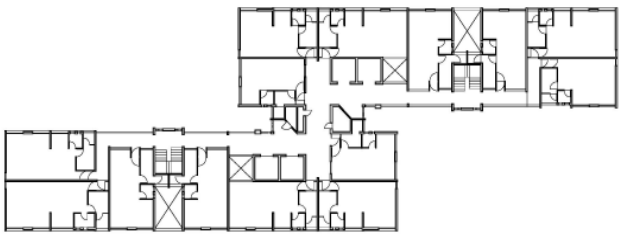
Ziggural/Trident



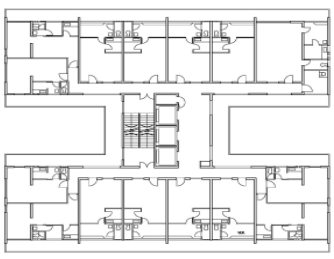
Cruciform-1



Cruciform-2



Linear



H type

Source: HD records

Acronyms and abbreviations

ACM	Asbestos-containing material
APCO	Air Pollution Control Ordinance
Audit	Audit Commission
BD	Buildings Department
DMO	District Maintenance Office
EPD	Environmental Protection Department
FS(B)O	Fire Safety (Buildings) Ordinance
FSD	Fire Services Department
HA	Hong Kong Housing Authority
HD	Housing Department
IIA	In-flat Inspection Ambassador
ITT	In-flat Technical Team
LegCo	Legislative Council
MWIS	Mandatory Window Inspection Scheme
μg/L	Micrograms per litre
OC	Owners' Corporation
PGV	Provisional guideline value
PRH	Public rental housing
PSA	Property Services Agent
RDU	Research and Development Unit
RIMS	Responsive In-flat Maintenance Services
TMS	Total Maintenance Scheme
TPS	Tenants Purchase Scheme
WHO	World Health Organization
WSD	Water Supplies Department