THE HONG KONG HOUSING AUTHORITY

Memorandum for the Building Committee

Research on the Proposed Relaxation of Window Requirements for Bathroom and Kitchen in Standard Domestic Blocks

PURPOSE

To report on the findings of the consultancy report of the captioned research and the consideration for future implementation.

BACKGROUND

2. The Building Authority issued the Practice Note for Authorized Persons and Registered Structural Engineers (PNAP) no. 219 in December 1997 to permit the relaxation of window requirements for bathrooms in new domestic buildings. The Buildings Department will further study the relaxation of window requirements for kitchens regarding gas leakage and fire safety aspects.

3. The Building Committee endorsed the commissioning of the captioned research to study the implications on Housing Authority’s standard domestic blocks. (Paper No. BC 75/98 refers).

4. Four universities were invited to submit a quotation for the research work. The lowest quotation in the sum of $380,000.00 submitted by the University of Hong Kong’s Contract Research and Design Unit of the Department of Architecture, was accepted.

INFORMATION

5. The purposes of the research are to determine the following -

(a) feasibility to adopt the relaxation of window requirements in the current and future design for standard domestic blocks;
(b) the general user’s preferences and acceptability of the mechanical ventilation system; and

(c) the most efficient system and back-up arrangement for the provisions of revised building services installations.

6. The scope of the research covers feasibility study, experimental environment simulation, user’s concern survey and cost estimation of various standard blocks on both options: Scheme A - Windowless bathroom; Scheme B - Windowless bathroom and kitchen.

7. The user’s concern survey, as part of the research, is a public consultation exercise to understand the public perception, the general usage pattern and the user’s concerns in relation to the proposals.

RESEARCH FINDINGS

8. The executive summary of the research report prepared by the consultant is at Appendix 1. Full research report is available at the Committees’ Secretary. The research findings and proposals are summarised as follows -

Feasibility Study on the Current Domestic Blocks

9. The application of PNAP 219 to the current block types such as Harmony, Concord and New Cruciform Block are feasible, with corresponding flat layout changes, on condition that the proposals for mechanical ventilation, lighting, gas supply and plumbing & drainage installations are adopted.

Proposed Building Services Installations

10. Mechanical Ventilation Design

(a) The study concluded that individual mechanical ventilation within each flat is more efficient than centralized mechanical ventilation system on reliability, maintenance management, effectiveness, initial and running costs; (Refer to Appendix 2)
(b) Straight-flow radial exhaust fans with ducts are suggested for individual mechanical ventilation. A ventilation rate of 20 air changes/hour (ACH) is proposed for the windowless bathroom for better air quality than the required min. 5 ACH. It is necessary to allow an air inlet to the windowless bathroom by means of louvre in bathroom door or at transom; and

(c) An interlocking system connecting lighting and gas appliances to an exhaust fan would be required to ensure safety and hygiene of the windowless kitchen. For the windowless bathroom, interlocking between lighting and exhaust fan is sufficient.

11. Artificial Lighting Design

To compensate for the omission of natural lighting in a windowless kitchen, the task light level should be upgraded to the international standard of 300 lux. For the windowless bathroom, an average artificial lighting level of 100 lux is proposed.

12. Gas Supply and Gas Appliance Installation

(a) For the windowless bathroom, gas supply pipework and the balanced flue box of the gas water heater are suggested to remain at the exterior wall similar to existing standard blocks designs. The gas heater can be installed in the kitchen or in another bathroom with a window to serve both locations, with the option of a remote control switch in the windowless bathroom for convenience of use.

(b) For the windowless bathroom and kitchen, 2 hours fire rated continuous duct risers with natural ventilation to outside air are required for main gas supply pipes if they are to run inside the building. It is also necessary to have a continuous fresh air supply to ensure proper combustion of gas cooking appliances and safety in an internal kitchen.

EVALUATION

13. The relaxation of window requirements would bring certain positive benefits but with some considerations in implementation are required.
Improved Interior Space Efficiency, Adaptability and Flexibility

14. Greater flexibility in the design of the building envelope and the location of interior partitioning which may result in a more compact layout and improved efficiency. There are however some space and headroom implications caused by the exhaust air duct.

Improved Natural Lighting and Ventilation to Main Living Areas

15. By moving the bathroom and kitchen inwards, the main functional spaces, such as living, dining and bedrooms may be given increased exterior wall area. Major household activities would enjoy increased natural lighting, ventilation and a view out from flats. This is a positive selling-point for marketing to compensate the extra electricity running cost.

Site Coverage Reduction and Potential Saving of Land Use

16. The site coverage of all the three standard blocks (Harmony, Concord and NCB) can be reduced compared with the original standard block while the flat unit area remains constant. The decreased site coverage percentage ranges from 2.1% to 8.8%. (See Appendix 3)

17. The potential land use savings are nominal since the physical size of the housing blocks govern much of site layout. As a result the actual gain will be a slight increase of open space and improved day-lighting.

Enhanced Buildability

18. The buildability of a typical block will be enhanced by eliminating the re-entrant area usually required to accommodate both the bathroom and kitchen windows but offset by the necessary internal pipe-duct or with a shortened re-entrant to accommodate the drainage, water supply and gas supply pipeworks. If the windowless bathroom scheme is pursued alone, the benefit is not as significant as the windowless kitchen and bathroom scheme as illustrated at Appendix 4.

Back-up System for Mechanical Failure

19. The windowless bathrooms and kitchens will not function hygienically and safely in the event of equipment failure. Individual ventilation systems will minimize the impact of equipment failure and with built-in stand-by ventilator, may possibly extend the service life of the equipment if used alternatively but there will be more cost to the initial installation and equipment cost.
Increased Management and Maintenance Work

20. Mechanical ventilation systems that require regular maintenance and servicing may become complicated due to additional ductworks and fire-dampers which cannot be maintained by the average occupant.

21. Additional clauses may be required in the Deed of Mutual Covenant (DMC) for HOS to have regular hygienic checking of the exhaust duct and such regular maintenance should also be clearly defined in the future PRH tenancy agreement.

Low User Acceptance

22. Two user’s surveys have been conducted. About 81% of respondents in the first survey were reluctant to accept a windowless bathroom and kitchen. In the second survey about 30% accepted a windowless bathroom scheme, while only 6% accepted a windowless bathroom and kitchen scheme.

23. The survey also reveals that about 43% of public housing households rely solely on natural ventilation in their present bathroom while 57% are using both window-type exhaust fan and open window for ventilation. (See detail at Appendix 5) It is foreseeable that certain households would be more willing to accept the windowless proposal given more popularity in time but some initial strong resistance is expected.

24. The second survey’s slightly more favourable responses on the windowless bathroom suggest that more concrete information to the potential users may lead to still higher acceptance. More public consultation by the use of mock-ups may be advantageous to gauge public acceptance.

COST IMPLICATIONS

Construction Cost

25. The cost study on all the proposed schemes, which are limited to the flat unit itself, indicated a nett increase in construction cost mainly due to the additional building services installation which has offset any saving in builder’s works.
26. The study reported that the average RIC per flat of the proposed Concord, Harmony and NCB schemes range from $11,903 to $14,903 for a windowless bathroom and $14,984 to $17,017 for a windowless bathroom and kitchen using an individual ventilation system but without back-up stand-by fan. Details at Appendix 6.

Running Cost and Environmental Concerns

27. The running cost of individual mechanical ventilation and artificial lighting are estimated to be an extra of around $15 extra per month for a windowless bathroom and $23 extra per month for a windowless bathroom and kitchen over the regular electricity bill respectively.

28. The extra electricity running cost, strictly speaking, is contrary to current energy conservation aims and may be environmentally controversial if it is implemented on a wide scale. However, it can be argued that about 57% of the average household use window-type exhaust fans in their existing standard bathrooms anyway.

Windowless Bathrooms in Recent Private Developments

29. Many private developers are adopting PNAP 219 with a keen but cautious approach mainly introducing the windowless bathroom in the second bathroom of a flat. There are also limited cases of a single windowless bathroom for very small flats or developments, but often to take advantage of site planning constraints. (See Appendix 7)

Public Image on Potential Controversial Issues

30. The major gain in private development is the enhanced premium on sale value by offering better views or more window frontage for living area and bedrooms which can easily offset the extra construction cost since their land cost is much higher than the construction cost. Maximizing the value of the site frontages is a high priority while the user’s concerns such as the extra electricity running cost may be a lower priority.

31. With the research study as a basis, further study and any future implementation must be geared towards the balanced benefits of lowering constructing cost, and improved buildability to assist high flat production. The benefits to the public should follow.
CONCLUSION

32. The second round survey has shown that about 30% of respondents accept the windowless bathroom. With a generally low user acceptance, at this time, there is no urgency to implement the change immediately and more public consultation is required.

33. The Building Authority has not yet relaxed the window requirements on the kitchen of domestic buildings and are unlikely to do so in the near future since windowless kitchens that rely solely on mechanical ventilation present a higher safety risk. The windowless kitchen is not to be pursued for public housing development at this time.

34. It is concluded that the windowless bathroom is technically feasible as an alternative in future public housing planning, design and construction to allow more flexibility in housing supply. However, due to the low acceptance rate by the public, windowless bathrooms will only be adopted in special circumstances where the design warrants such as in-fill site projects.

PROPOSALS

35. As a medium term study and for more public consultation to be carried out, mock-up flats of a revised Concord flat incorporating a windowless bathroom and a Housing for Senior Citizens (HSC) with an ensuite shower room are to be included in the Mock-up Centre at Fat Kwong Street, Homantin.

36. In parallel with the mock-ups, a revised Concord flat is based on a modified block design with 10 flats per floor which is under development for the Home Ownership Scheme (HOS) review. This will consider the flexibility and possible buildability gains from the window relaxation requirements in bathrooms. The HSC is also seen as a potential candidate to adopt a windowless bathroom, given that the HSC has been commonly used for in-filled sites. Pilot schemes will be considered and advised under separate cover.
RECOMMENDATIONS

37. It is recommended for Member’s consideration -

(a) to adopt the windowless bathroom design as a technically feasible alternative in special circumstances where the design warrants;

(b) to carry-out mock-ups for public consultation as proposed in above paragraph 35; and

(c) to further study the development of new modular flats and block designs for future consideration as proposed in above paragraph 36.

DISCUSSION

38. In the next meeting of the Building Committee on 22 July 1999, Members will be invited to endorse the recommendations under paragraph 37.

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File Ref. : HD(C)DS 722/1

Date : 16 July 1999
APPENDICES

Appendix 1 - The Executive Summary of the Research Report prepared by Contract Research and Design Unit of Department of Architecture, The University of Hong Kong (including the survey questionnaires)

Appendix 2 - Comparison of Individual System and Centralized System

Appendix 3 - Site Coverage comparison between original schemes and revised schemes

Appendix 4 - Harmony Block (Option 10) Revised Typical Floor Plan (Scheme A & B)

Appendix 5 - Survey on Use of Exhaust Fan in Bathroom

Appendix 6 - Preliminary Indication of Costs

Appendix 7 - Windowless bathroom in Recent Private Development