

CONSERVATION GUIDELINES
TECHNICAL SUPPLEMENT



UNDERSTANDING

MECHANICAL &
ELECTRICAL SERVICES

June 1998

SINGAPORE

CONSERVATION GUIDELINES TECHNICAL SUPPLEMENT



UNDERSTANDING

MECHANICAL & ELECTRICAL SERVICES

June 1998



Office Address: URBAN REDEVELOPMENT AUTHORITY BUILDING 45 Maxwell Road, Singapore 069118. Telephone No.: 2216666

Mailing Address: Robinson Road, P.O. Box 1393, Singapore 902743. Cable Address: SINURA. Telex: SINURA RS 20703

Telebox: GVT 380 Fax: 2248752

This document is subject to revision from time to time. Nothing herein shall be construed to exempt the person submitting an application or any plans from otherwise complying with the provisions of the Planning Act (Cap 232, Revised Edition 1990) or any rules and/or guidelines made thereunder or any Act or rules and/or guidelines for the time being in force.

The applicant shall not commence any works or carry out or make any renovation, alterations or additions to the building or any part or parts thereof without first obtaining the approval of the Urban Redevelopment Authority and all relevant Competent Authorities. The approval shall be at their absolute discretion and is subject to such terms and conditions as deemed fit.

While every endeavour is made to ensure that the information provided in this document is current and that any changes thereto will be updated periodically, the Competent Authority and the Urban Redevelopment Authority disclaim all liability for any damage or loss that may be caused as a result of any error, omission or change.

All rights reserved. Reproduction in any form of editorial contents or photographs is strictly prohibited unless written permission is first obtained from the Urban Redevelopment Authority.



INTRODUCTION

Adapting historic buildings to meet current day needs often entails the introduction of modern conveniences. The sensitive installation of modern plumbing, electrical systems, lighting, communication, air-conditioning and fire protection systems in the interior of historic buildings poses a great challenge to architects and owners.

This technical supplement outlines the importance of careful planning in order to balance conservation objectives with adaptive reuse of the buildings. It will identify some of the problems associated with installing mechanical and electrical (M&E) services in conservation buildings and recommends ways to minimise visual and physical damage associated with such installations.

Assessment

The visible decorative features of historic mechanical systems such as fans, grilles, lighting fixtures and ornamental switch plates which contribute to the character of the buildings should be retained and repaired where possible. Their identification and evaluation needs to take place before actual restoration begins. However, many of the existing systems such as wiring, pipes and ducts often need to be replaced in total so as to accommodate the new use and comply with current code requirements.

In restoring a conservation building, it is best to have the advice and input of trained professionals who can:

- assess and evaluate the condition of the conservation building.

- understand the impact of introducing a new interior climate on the historic materials.
- integrate conservation needs with the M&E requirements.
- maximise the advantages of the most current M&E systems.
- understand the visual and physical impact of the M&E systems.
- highlight to the owner/users the maintenance and monitoring requirements for the new M&E systems.
- plan for the future removal or replacement of the M&E systems.

Planning the New Services

As a rule, professionals should bear the following in mind when designing new M&E services:

- Do not install a new system if there is no need to, e.g. there is no necessity to add air-conditioning if it is not absolutely necessary.
- Do not over-design the new system. A realistic level of occupant comfort should be determined so that the building is not adversely affected.
- Do not damage any existing finishes and features when installing the new system.
- Do not drop ceiling across window openings.
- Do not seal up windows.
- Do not place any mechanical and electrical systems on visible parts of the building.
- Do not impose stress on the building arising from the vibration of the new equipment.

A systematic approach of planning and design, and a follow-up program of monitoring and maintenance will ensure the success of the new M&E systems while conserving the historic building. Most M&E systems require upgrading or replacement within 10-15 years due to wear and tear or the availability of improved technology. Therefore, conservation buildings should not be greatly altered in an effort to meet short-term systems objectives.


MECHANICAL
 &
ELECTRICAL
SERVICES

In order to maintain the facades of shophouses without them being marred by M&E installations, all such works should be located within the shophouse or at locations such that they are least obtrusive from the exterior. These locations should be acceptable to the Fire Safety Bureau (FSB), Public Utilities Board (PUB) and Urban Redevelopment Authority (URA).

For shophouses with a separate staircase enclosure at the front leading to the upper storeys, the electrical and water meters, telecom distribution board and telecom trunking are allowed to be located within the protected staircase enclosure. However, they are to be boxed-up with fire-rated materials, such as non-combustible boards or metal casing. (See Fig 1) The meter box may be ventilated as required by PUB. For shophouses without a separate staircase enclosure, the meters, etc should be located on the rear boundary walls.

Fig 1: Electrical and water meter compartment boxed up with metal louvred casing.



Fig 2: Electrical meter and telecom distribution board positioned within a niche in the wall and well concealed by a timber louvred door.

Electricity and Telecom

Electrical wiring should be concealed in trunking or conduits and the installation of cables should be concealed wherever possible within false ceiling or behind interior panels. (See Fig 2) It is not advisable to chase the brick partition to conceal them.

Gas-piping

Generally, gas pipes are required to be of exposed installation.

Water and Sanitary

The ducts and pipes should be concealed in closets, service rooms or other forms of concealed spaces. (See Fig 3) Although reinforced concrete (r.c.) floors are allowed for wet areas, retention of the existing timber floor is preferred. (See Fig 4) Wet areas should preferably be confined to areas with existing r.c. floor, e.g. at the rear service block.



Fig 3: Pipes installed above the false ceiling.

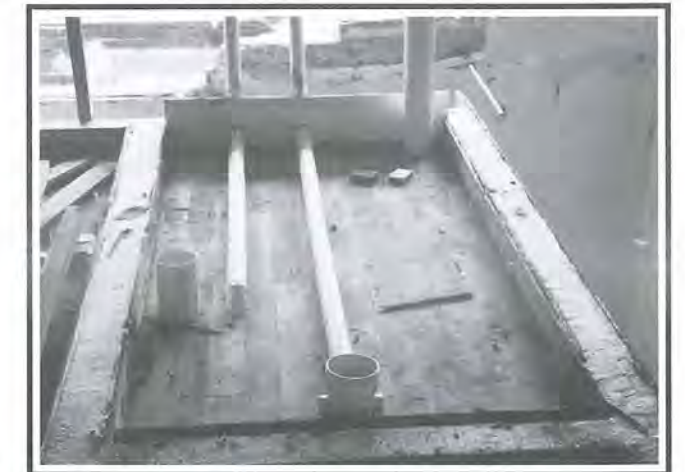


Fig 4: Pre-cast concrete ring beam at the perimeter of the toilet area to conceal the pipes which run on the existing timber floor. The toilet floor finish will be installed above the timber floor to prevent damaging it.



Fig 5: For buildings without roofs over the rear courts, the air-conditioning units should be installed within the rear courts such that they are least visible from the exterior.

Air-conditioning

Air-conditioning units should be as compact as possible. Whilst catering to the needs of the users, their possible visual impact on the building design should be taken into consideration. They should be located such that they are least visible from the exterior. The specific location will depend on the building typology and nature of the project.

(See Figs 5 to 7) Window type units should not be used as they would mar the facades. (See Fig 8) Direct expansion, split air-conditioning systems should be well integrated with the interior of the building. (See Fig 9) The ducting from the condensing units should preferably be concealed or sensitively installed so that it is not visually obvious. (See Fig 10)

Fig 6: For buildings with roofs over the rear courts, the air-conditioning units should be installed at a maximum distance from the rear boundary wall and at the lowest position such that they are least visible from the exterior.



Fig 7: For projects with 3 or more connecting shophouses without rear courts, the rear of the shophouses could be modified to create balconies. The condensing units can then be located within the proposed rear balconies.

Fig 8: Window air-condensing units should not be used as they mar the facade of the conservation building.



Fig 9: An example of a split air-conditioning system well integrated with the interior of the building.



Fig 10: The ducting from the compressor units is well concealed within the casing which has been painted to blend with the wall of the rear service block.





Fig 11: Existing flues abutting the rear service blocks of conservation buildings.

Fig 12: Unsightly exposed flue which mars the rear elevation of the conservation building.



Flue / Exhaust ducts

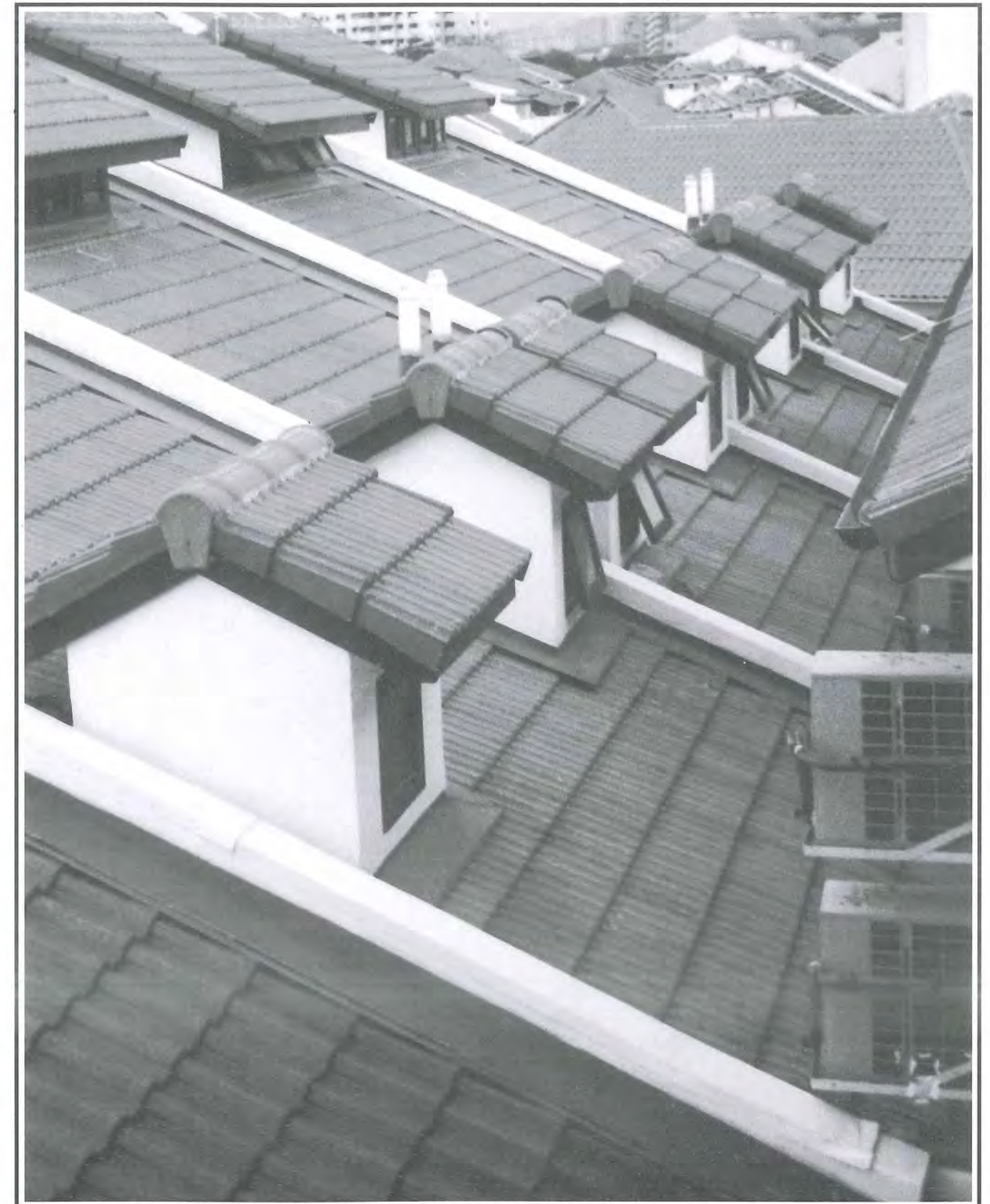
Existing flues should be retained and reused where possible. (See Fig 11) Repositioning of flues or addition of new flues could be either within the building envelope, on the rear slope of the main roof, on the secondary roof, or abutting the wall of the rear facade/rear service block within the rear court. (See Figs 13 and 14)

The roof of the flue can be pitched or flat but must not be higher than the ridge of the main roof. All vent stacks, exhaust pipes and other means of providing mechanical ventilation should only have their openings on the rear slope of the main roof or on the secondary roofs. The number of openings should be kept to a minimum.

Fig 13: New flues on the rear slope of the secondary roof.



Fig 14: New flues on the rear slope of the main roof.





**FIRE
PROTECTION**

Most residential shophouses only need passive fire protection. Passive fire protection measures include fire-rated doors, floor boards impregnated with fire retardant chemicals to prevent flame spread, partywalls (separating walls), air vents, mechanical ventilation, fire compartmented internal staircases and escape routes. Depending on the use, active fire protection installations such as fire and smoke detection systems or fire alarms are generally not required in residential shophouses.

For commercial shophouses, an automatic or manual fire alarm system and hose reels or fire extinguishers on each floor are normally required.

The following is a list of the minimum requirements for general fire protection in conservation buildings. Additional fire safety provisions may be imposed by the relevant authority depending on the assessment of the fire risk involved.

Fire extinguishers

Fire extinguishers should be provided, installed and clearly marked according to the FSB's requirements. (See Fig 15)

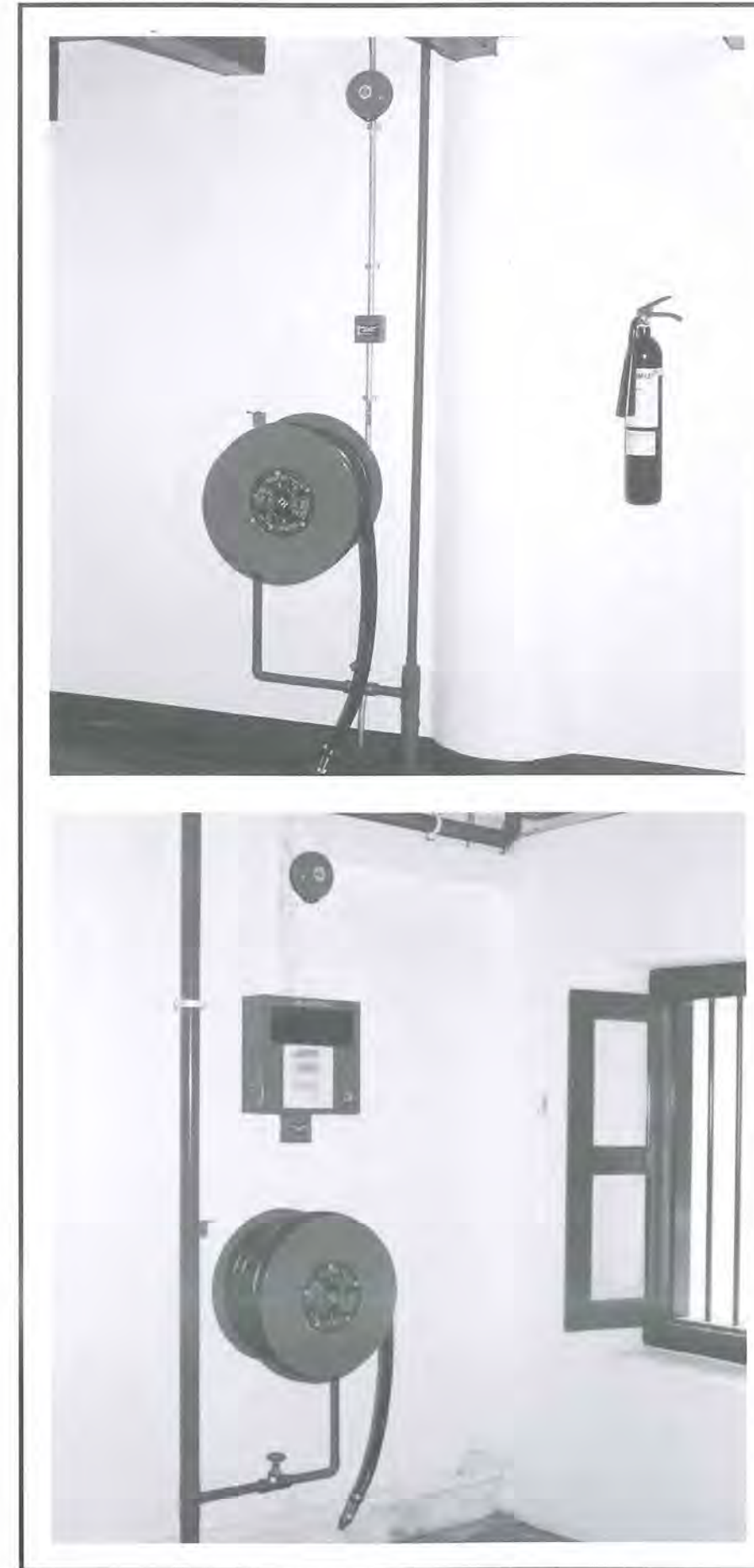


Fig 15: Locations of the fire hose reel, fire extinguisher and fire alarm system on the 2nd storey (Top) and 1st storey (Bottom).

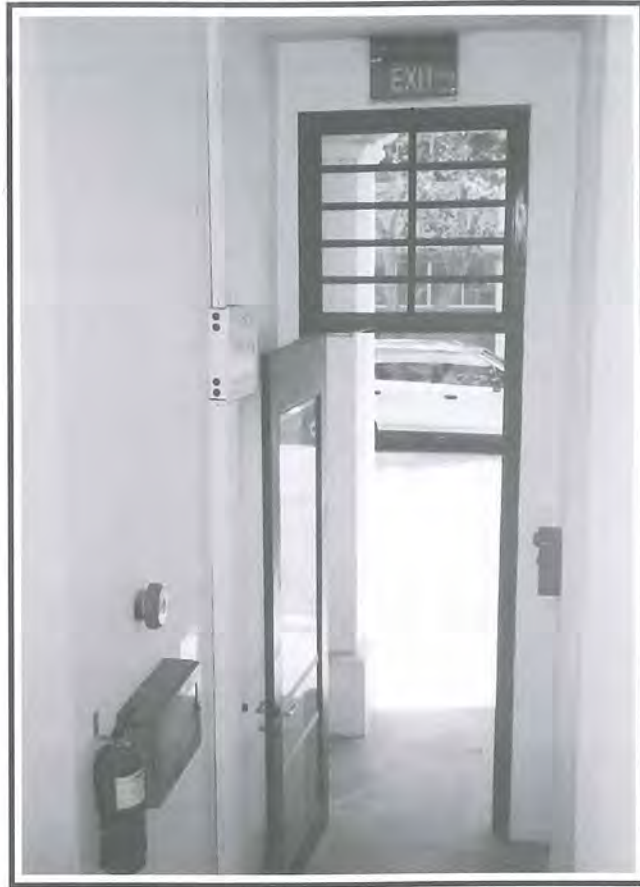


Fig 16: Exit sign, fire extinguisher and manual call point located within a fire compartmented staircase.

Fig 17: A hosereel is necessary for a compartmented attic floor.



Hosereels

These should be located within the shophouse and near the exit doorways (See Fig 16) or other locations acceptable to the FSB. A hosereel should also be provided for an attic which is compartmented from the lower floor. (See Fig 17)

Exit Signs

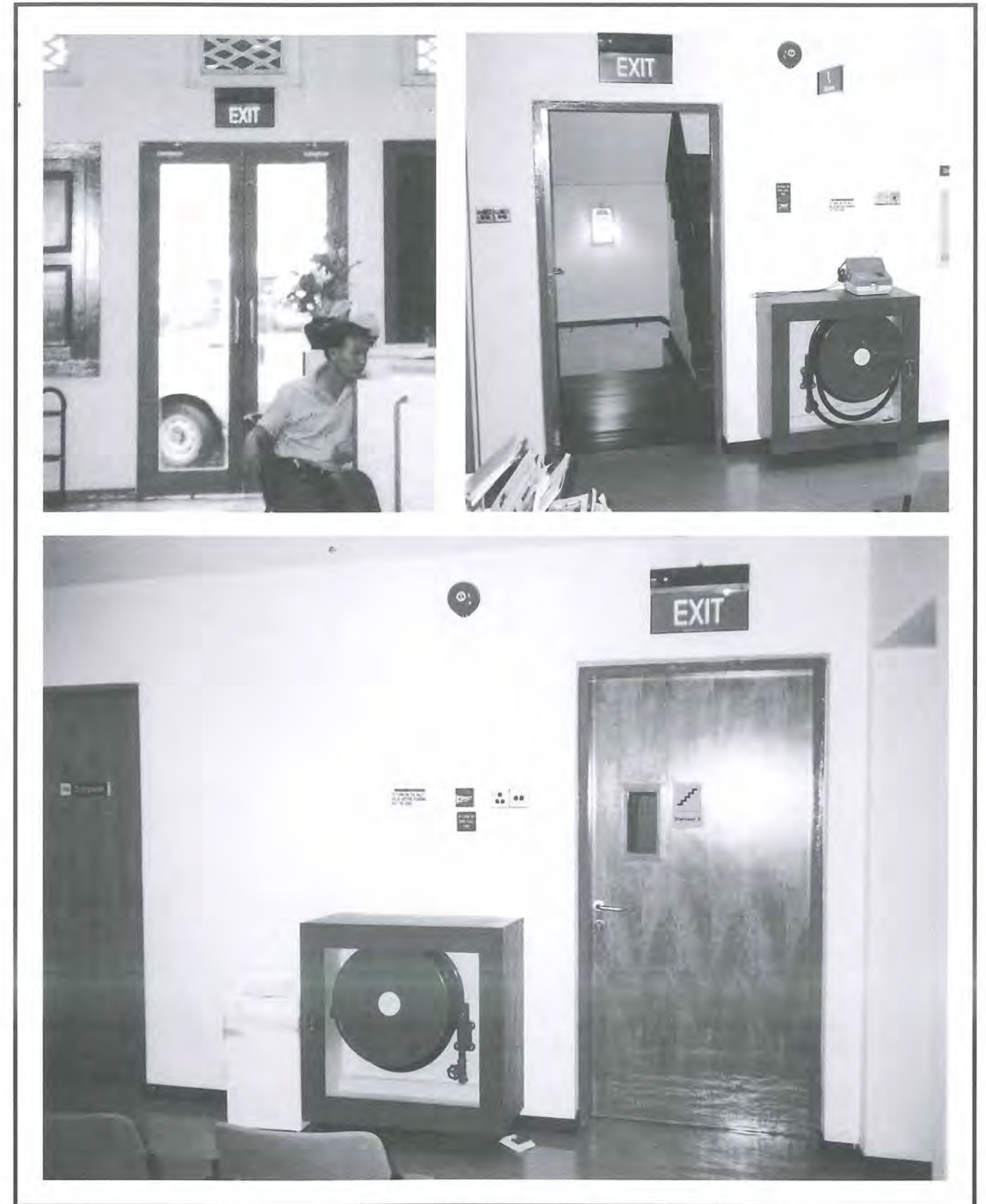
Exit signs and lights should be appropriately located to provide clear indication of the exit points. Recently developed self-luminous fire safety signs have also been approved by the FSB. (See Fig 18)

Fire Alarm System

The Qualified Person has to ensure that the requirements stipulated by the FSB are complied with. Generally, for shophouses not exceeding 3 storeys and/or an amalgamation of not more than 2 shophouse units, the manual alarm system complete with call points is acceptable. However, for shophouses exceeding 3 storeys or having an amalgamation of more than 2 units, the automatic alarm system complete with detectors and call points must be provided.

For multi-occupancy, the fire alarm panel can be located within the compartmented staircase at the first storey next to the five-footway. For single-occupancy, the fire alarm panel is not necessary.

Fig 18: Exit signs, hosereels and automatic alarm systems within 3 shophouses which have been amalgamated.



A schedule of on-going maintenance will ensure that the historic building is in a good state of repair. The manual of routine maintenance should outline the recommended procedures and the frequency at which each should be carried out. Owners should also keep an up-to-date log of repairs and note all deteriorated conditions.

Once the M&E systems are installed, it is necessary to carry out routine maintenance and balancing to ensure that the proper performance levels are achieved.

Routine maintenance of fire safety equipment must be done at regular intervals. This should include regular inspection, servicing and testing of the equipment such as fire extinguishers, hoses, exit lighting/signs and fire alarm systems.

In addition to regular cyclical maintenance, thorough inspections should be undertaken from time to time to evaluate the continued performance of the M&E systems. If there is damage as a result of the new systems to the building fabric, e.g. staining or wet patches on the wall surfaces, the M&E system and the building fabric should be repaired immediately. They should then be closely monitored to ensure complete repair.

It is important that the M&E services are easily accessible with flexibility for change as most of these systems require upgrading or replacement over time. Care should be taken not to damage the existing fabric of the conservation buildings.

The successful integration of M&E services in conservation buildings can be challenging. Meeting modern requirements for human comfort can result in visual and physical damage to the buildings. The historic character of the buildings

should however always be respected. A successful restoration project is one where there is a careful balance between meeting the need for modern human comfort and retaining the historic and architectural qualities of the conservation buildings.



CONCLUSION

Fig 19: The architectural heritage of shophouses can still be retained without compromising the standards for modern comfort.

