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CREATEHK

INTERIOR DESIGN BODY OF KNOWLEDGE

Book 5

INTERIOR CONSTRUCTION CODES AND REGULATIONS

JOINTLY RESEARCHED AND PUBLISHED
by Hong Kong Interior Design Association & The Hong Kong Polytechnic University

Contents

PREFACE

At present, there are no formal educational materials for Hong Kong interior design learning, and educators can only rely on ad hoc literature produced overseas (particularly in the West), or architectural-based materials to learn about interior design. Given that interior design has already established a unique and well-defined body of professional knowledge, and is firmly rooted in the cultural and social practices of a place, there is a need for interior design textbooks to reflect this context and allow interior design students to keep pace with rapid development of the industry. This series of interior design textbooks is aimed at satisfying the needs of Hong Kong interior design students at different academic levels from diploma, higher diploma to bachelor's degree. Filled with case studies of award winning works from across the Asia-Pacific region and beyond,as well as interviews and articles written by well-known professionals and academics from Hong Kong and around the world, these are the first interior design textbooks researched and written in Asia.

The series contains six books, related to the 6 body of knowledge areas well-defined in the Interior Design Professional Guideline, published by the Hong Kong Interior Design Association (HKIDA) in 2014. Based on research of reputable international standards and confirmed by surveys of local interior design educators and practitioners, this guideline sets out in a systematic way the knowledge and skills that Hong Kong interior designers should possess. The 6 body of knowledge areas covers and follows the typical process of any interior design project, which includes:

- Human Environment Needs
- Design
- Products and Materials
- Communication
- Interior Construction, Codes and Regulations
- Professional Practice

This book 5 "Interior Construction, Codes & Regulations" focuses on the key knowledge that interior designers should be equipped with on Codes & Regulations that safeguard public safety, health & well-being whenever statutory approval is required: topics covered include Legislative Control on Interior Design Practice, Illegal Construction, Means of Escape and Fire Safety Barrier Free Access, Sustainable Interior Construction, Evaluation of Built Environment, Licensing for Specific Interior Design Projects (F&B and Elderly Centre), Adaptive Reuse of Historical Buildings in Hong Kong.

Our greatest challenge in compiling this book series was deciding which key content to select from the vast pool that is relevant to not only global but also local context and turn them into useful teaching resources and materials for educators' future elaboration. For this reason, choosing examples to fit within the physical constraints of a book required a rigorous edit. We hope it will be of enormous benefit to interior design students, educators and practitioners and inspire everyone to look for more.

Horace Pan
Project Chief Investigator

CHAPTER 1

Conforming to Building Code – an Introduction to Legislative Control on Interior Design by Dr. Wong Wah Sang

The practice of interior design seeks to accommodate the myriad functions of modern living space. Since space is molded by physical architectural form, interior design being the complimentary constituent of architecture, both disciplines should focus on the well-being of people as their main goal. However, with continuous societal and technological evolvement in modern living, the work of the interior designer had become more demanding, requiring more complex and flexible solutions, such as spaces that can serve multiple spatial functions as well as allowing for changes in partitions and furniture. The global objective of sustainability has also introduced environmental awareness into ideas of interior design like the choice of materials, construction process and recycling.

In Hong Kong, the local context of high density living and high-rise buildings has brought compactness and efficiency into a variety of interior design issues. For the interior designer, the fundamental consideration of users within a high density and high-rise context is safety and health, regulated primarily through the building code. Although there is no direct statutory requirement for submission and approval of interior plans, the interior designer should have knowledge of the building code, which are the Building Ordinance and related regulations. In addition, the designer should also have awareness of other legislative documents like Land Lease, Town Planning Ordinance, Fire Safety Codes, Regulations for Barrier Free Access, Application of License, etc. Understanding these various systems of legislative control along with the minimum requirements and approval procedures is helpful to the work of interior designers working in Hong Kong.

Fig. 1.1 Hong Kong's dense living conditions

The following is a brief introduction to the legislative control related to interior design. Also, the interior designer is not alone in dealing with these many complicated situations. Other professionals such as the Architect, the Structural Engineer, the Building Service Engineer, Fire Experts or other consultants are also part of the whole design team as the project demands.

Building Control on Interior Spaces

The interior designer may enter a project at various building stages from design, construction and completion to additions and alterations after completion. They may or may not be directly involved with building submission and approval, but they nevertheless should respect the objective of the Buildings Ordinance in terms of health and safety.

The density of inhabitants in a building directly affects their health and safety. From historical records, plague and fire occur mostly in overcrowded buildings, and even though hygienic conditions and firefighting technology have improved for modern buildings, high density and high- rise conditions pose potential risks. In the Building (Planning) Regulations, density in terms of developable space for buildings is controlled by plot ratio and site coverage. The unit for the interpretation of density is gross floor area, which is the floor area surrounded by the external walls. However, the designer should be aware that space occupied by mechanical equipment and pipes as well as voids in shopping arcades are generally exempted from the gross floor area calculation. Hence, it is illegal to expand floor areas into the shopping arcade voids or add extra intermediate floor in
a space with extensive floor height.

Based on health issues, the building code stipulates the minimum standard for lighting and ventilation of the interior, waterproofing, provisions of sanitary wares etc. Lighting and ventilation are effected by windows which are related to the size of the room as stated in the Building (Planning) Regulations, and hence windows should not be blocked off with permanent means. The regulations allow for certain variations; for example, the curtain wall windows of office buildings are usually exempted from the general ventilation requirement of windows. Furthermore, rooms with water supply should be provided with a waterproofed floor as required by the Building (Construction) Regulations. Hence bathrooms, toilets and kitchens should incorporate waterproofing in the construction or renovation of these floor finishes. Also, minimum provisions of sanitary fittings according to the size and use of the rooms are written in the Building (Standards of Sanitary Fitments, Plumbing, Drainage Works and Latrines) Regulations.

Based on safety issues, the interior designer should be aware of fire safety provisions. The Code of Practice for the Provision of Means of Escape in Case of Fire has set up minimum widths of exit routes and doors. It is due to safety reasons that escape passages should be kept clear of occupants and furniture. Large-scale projects such as large shopping centres and housing estates may involve fire engineering in the design of the interior. In these cases, computerized studies are carried out to provide the most appropriate hardware in case of fire. Large scale interiors also need compartmentation, and reference can be made to the Code of Practice for Fire Safety in Buildings. Furthermore, the interior designer should be aware of the firefighting installations and detection systems needing proper maintenance, which can be referenced in the Codes of Practice for Minimum Fire Services Installations.

The building code has also laid down requirements in buildings for persons with disabilities as per Building (Planning) Regulations and the Design Manual of Barrier Free Access. Hence the interior has to be designed for accessibility of the wheelchair and those with hearing and seeing impairment. It is applicable for office buildings, shopping complexes, hotels, religious institutions, schools, restaurants, markets and sport facilities, among others, and special design requirements are needed in paths, lobbies, lifts, toilets, bathrooms and signage etc.

Building Approval Procedures

The plans for interior design are incorporated in the Building Plans for submission to the Buildings Department in Hong Kong if it is a totally new project or an addition or alteration to part of an existing building. Here, the procedure for approval of plans, application for consent to commence works and application for occupation permit are governed by the Building (Administration) Regulations.

Building Plans have to be signed by an Authorized Person who will take full responsibility to coordinate the works. Usually an Authorized Person is an architect but he or she can also be an engineer or surveyor. The formal duties of an Authorized Person are to comply with the building code, notify the Buildings Department on the progress and supervise periodically the works. In the actual building work, there is usually a Registered Structural Engineer who is in charge of the structural design.

In the procedure for making a new building, the Building Plans for submission will contain most of the key dimensions and materials of the building. This will be circulated to other government departments including the Fire Services Department for checking. However, even though the plans will be eventually approved by relevant government departments, the responsibility of compliance still rests with the Authorized Person.

The commencement of any part of the building requires consent from the Buildings Department to ensure proper construction procedure has been followed. For example, the foundations have to be completed and tested for satisfaction before the building can be built on top. Finally, the building has to be shown to be adequately installed with proper water supply, lift operation, fire service installation, material testing etc. before an occupation permit can be issued by the Buildings Department.

Fig. 1.2 Siu mei and *lo mei shops are shops selling barbeque meats, which require special licenses to operate*

Application of Licenses of Operation

In Hong Kong, many types of interiors require the application of license for operation. They usually require demonstration of compliance to the building code with plan submission to the licensing authority with the professional help of the Authorized Person.

Hotels and Guesthouses need licenses from the Home Affairs Department for operation. According to the Hotel and Guesthouse Accommodation Ordinance, this is to ensure the standards of building, fire safety, health and sanitation have been met for the care of the occupants. Submission includes layout plans with information on the interior dimensions and usage, details of the materials used, sanitary fitments, drainage system, window location, mechanical ventilation system and details of finishes and partitions.

Licenses issued by the Food and Environmental Hygiene Department are also required for operation of restaurants, bakeries, cold stores, factory canteens, food factories, temporary food factories, fresh provision shops, frozen confection factories, milk factories, *siu mei* and *lo mei shops* and composite food shops. Details of specific application are listed in the Department website.

Trade licences from the Food and Environmental Hygiene Department are also required for operating (a) commercial bathhouses, funeral parlours, offensive trades, swimming pools and undertakers; (b) places of public entertainment, including cinemas, theatres, entertainment machine centres and exhibition venues; and (c) temporary places of public entertainment.

Furthermore, all residential care homes for the elderly require licenses for operation from the Social Welfare Department, and private healthcare facilities need registration with the Department of Health under the Hospitals, Nursing Homes and Maternity Homes Registration Ordinance. Specific requirement for the latter is laid down in the Code of Practice for Private Hospitals, Nursing homes and Maternity Homes.

Other Legislative Control

From a broader perspective, other legislative control related to the interior includes rules concerning land and town planning. The former control is the land lease administered under the Lands Department and the latter is the Outline Zoning Plan prepared by the Planning Department under the provisions of the Town Planning Ordinance. The impact on the interior lies in its statutory control on the use and bulk of the development. Hence, any deviations from such have to be submitted for modification and it is best to have professional consultants on land and town planning as part of the design team. Depending on the scale and type of interior and the timing of their involvement with the building, interior designers may have a broad range of dealings and co-operations with various government authorities.

Final remarks

Nowadays, interior design works are getting increasingly complicated with respect to design and administration. The complexity of an interior project depends upon meeting all the legislative constraints, which can range from the lease, the Town Planning Ordinance, the Building Ordinance and various codes of practices to satisfy statutory requirement from the different government departments before the work can be completed and set for operation. Besides, the interior designer has to constantly keep up with new legislation and practice requirements. The design talents and problem-solving skills for the interior designer should all serve to meet health and safety standards as well as provide a better interior environment for human life in a sustainable way. This is a challenge faced by the interior design profession working within the high density context of Hong Kong.

CHAPTER 2

Illegal Construction
by Ming Cheu

Hong Kong is one of the most densely populated cities in the world and its property prices are also among the highest in the region. As such there is great incentive for property owners to make additions to their properties in order to increase their living spaces, which may or may not be done in accordance to building regulations. Illegal constructions present many safety concerns and can often lead to injuries and fatalities. Let us look at some past examples of mishaps in Hong Kong that are related illegal construction.

- A 55-year-old building on Ma Tau Wai Road collapsed in the afternoon of January 29, 2010. Four people inside the building were crushed to death. The contractor employed by the owner of the building was carrying out repair works and removal of unauthorized building works at the building, but he was not a registered contractor under the Buildings Ordinance (BO).

- A subdivided balcony flat on the first floor of the 50 Gillies Avenue South in Hung Hom gave way after days of heavy rain in the early hours of June 21, 2017. No onev was injured, but all of its residents – at least 22 of them – had to move out of the six-storey building due to structural safety concerns.

The spokesman from the Government reminded members of the public that any person intending to carry out building works should consult a building professional before commencing such works. According to the BO (Building Ordinance), the Minor Works Control System has been fully implemented since December 31, 2010 and general building repair works or removal of unauthorised building works have been designated as minor works. Any person intending to carry out the minor works designated under the BO should employ ***prescribed building professionals and/or prescribed registered contractors*** *to carry out the works in order to ensure safety and compliance with the law.*

(News.gov.hk Press Release issued on February 20, 2013)

Fig. 2.1 Aftermath of a collapsed subdivided flat in Hung Hom in 2017 (Source: Ming Ming So via Facebook)

Fig. 2.2 Collapsed building on Ma Tau Wai Road (Source: Baycrest - Wikipedia user - CC-BY-SA-2.5)

The first example was due to illegal modification of the building by the construction of an illegal balcony into an interior space forming part of a sub-divided flat. The second example was caused by a few factors, including illegal construction and the fact that the building's structural condition was compromised by the improper treatment in removing the illegal portions (the owner employed an unqualified contractor to carry out the removal work).

Some of the situations involving illegal construction commonly encountered by interior designers include:

1. Construction and or removal of an internal staircase (i.e., not a fire staircase);
2. Construction of partitions within an interior;
3. Removal of any structural/ non-structural elements of a building (say in a residential flat)
4. Construction and/or removal of a mezzanine floor or adding extra space under ground to increase the GFA (Gross Floor Area);
5. Open Kitchen

Before discussing the above, it is helpful to be aware of the Minor Works Control System (MWCS), introduced by Hong Kong's Buildings Department to regulate the implementation of small-scale building works. It is relevant to interior designers because many kinds of projects undertaken by them fall under its purview.

Minor Works Control System (MWCS)

MWCS, as its name suggests, are works that are 'minor'---- not requiring formal application for approval and consent from the Buildings Department. MWCS was introduced in December 2010 along with an additional contractor register, namely the Registered Minor Works Contractor (MWC).

The other two types of registered contractors are called General Building Contractor (GBC) and Specialist Contractors (SC). For example, SC(D) is a contractor for demolition works. They are not contractors for normal demolition work, as in an interior renovation project, but are contractors with higher caliber, qualified to carry out New Building works or Alteration and Addition works (1AA works)

Minor Works are classified into 3 classes (Class I, Class II and Class III) as per their nature, scale and complexity, as well as the safety risk they pose. Works under Class I are the most complicated, requiring the appointment of **BOTH** Prescribed Building Professionals (AP) and Prescribed Registered Contractors as well as submission of documents before and after the works are carried out, while for Class III works, submission of document after work completion is sufficient.

Fig. 2.3 Various pamphlets published by BD regarding MWCS

Fig. 2.4 Images from: Buildings Department, Minor Works Control System for interior renovation/alteration and subdivision of a flat

A wide range of works fall under the definition of Minor Works, and some of the most common ones include:

- Window replacement work, signage work for retail shops, installation of exterior air-conditioning units, removal and installation of staircase and even construction of brick walls within an apartment (depending on the total length of partition to be installed);
- Exempted works are mostly works (Canopy less than 500mmD, Drying rack less than 750mmD, supporting structure of air-conditioning units, water cooling towers/ associated air duct lower than 1M etc) ;
- Toilet displacement work is acceptable if the main vertical drain pipe (known as 'stack') is not moved and no embedded drain pipe is present (Clause 3.23 of Cap 123, B(MW)D;
- Normal interior renovation work like painting, carpentry works do not fall under MWCS.

Minor works are classified into **three classes** according to their nature, scale and complexity and the risk to safety they posed.

	Class I	Class II	Class III
Authorised Person (AP)	High	Medium	Low
Minor works items	44 items	40 items	42 items
Appointed person to prepare and sign prescribed plans	Prescribed Building Professional and Prescribed Registered Contractor	Prescribed Registered Contractor	Prescribed Registered Contractor
Submit documents before commencement of works	Minimum 7 Days	Minimum 7 Days	Not required
Submit documents after completion of works	Within 14 Days	Within 14 Days	Within 14 Days

Table 2.1 *(Source: Building Department)*

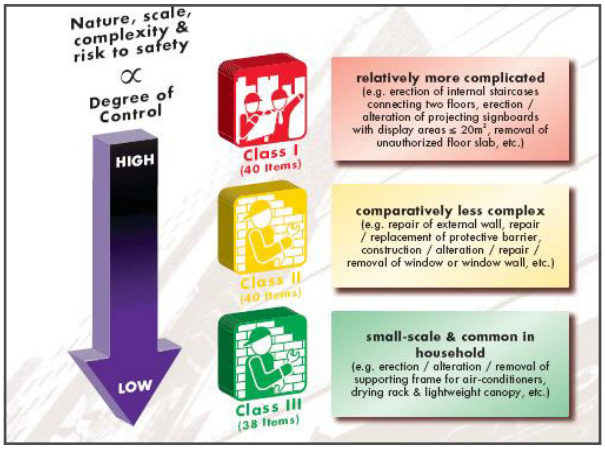


Fig. 2.5 Minor works are divided into 3 classes. The number of work items listed under each class may be updated by the BD as required. (Source: Buildings Department)

Minor Work Contractors (MWC) are registered according to their caliber, and the most basic category is Class III MWC. Some contractors can carry out works of all three classes, and they are known as Class I, II, III contractors.

The Buildings Department has classified 126 work items as falling under the MWCS. These 126 work items are further categorized into **7 main Types/Categories:**

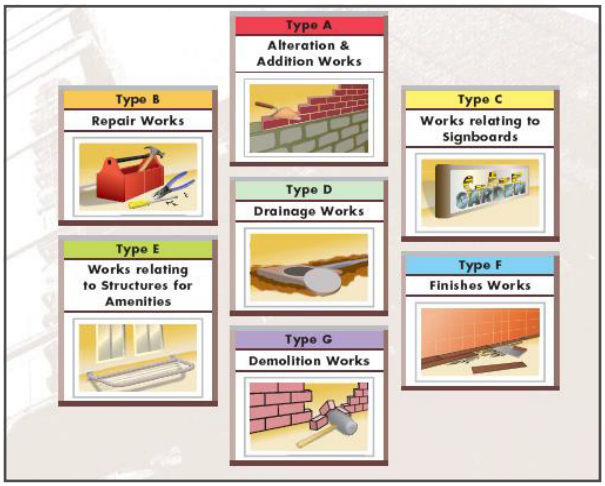


Fig. 2.6 126 minor work items are categorized under 7 main types. (Source: Buildings Department)

To identify whether a particular work is categorized under Class I, II or III, we can first **<u>identify which of the 7 categories the work belongs to.</u>** Say, if it is related to signboards, the work is thus under Type 'C'. Next, we can consult the following table, which can be found in the BD's website:

Appendix I – Types of "Minor Works"

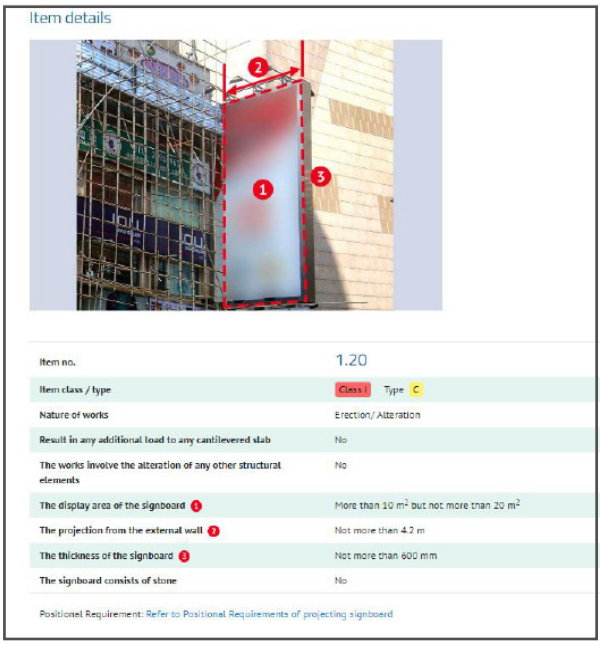
Class I	Type						
Item	A	B	C	D	E	F	G
1.1	■						
1.2	■						
1.3	■						
1.4	■						
1.5	■				■		■
1.6	■						
1.7	■						
1.8	■						
1.9	■						■
1.10	■						■
1.11	■						
1.12	■						
1.13	■						
1.14	■						
1.15	■						
1.16	■						
1.17	■	■			■		
1.18	■				■		
1.19	■						
1.20			■				
1.21			■				
1.22			■				
1.23			■				
1.24			■				■
1.25				■			
1.26				■			
1.27	■				■		
1.28	■				■		
1.29	■				■		
1.30	■						■
1.31	■					■	
1.32	■						■
1.33	■						■
1.34	■						■
1.35	■						
1.36				■			
1.37	■						■
1.38	■						■
1.39	■						■
1.40	■						■

Class II	Type						
Item	A	B	C	D	E	F	G
2.1	■			■			
2.2	■				■		■
2.3	■			■			
2.4	■			■			■
2.5	■						
2.6	■						
2.7	■						
2.8	■						
2.9	■						■
2.10	■						■
2.11	■						
2.12	■						■
2.13	■						
2.14	■						
2.15	■	■					
2.16	■						
2.17	■	■					
2.18	■			■			
2.19	■			■			
2.20	■			■			
2.21	■			■			
2.22	■			■			
2.23	■			■			
2.24	■			■			■
2.25	■			■			■
2.26	■			■			■
2.27	■			■			■
2.28	■				■		
2.29	■				■		
2.30	■				■		
2.31	■					■	■
2.32	■						■
2.33	■					■	
2.34	■					■	
2.35	■						
2.36					■		
2.37	■						■
2.38	■						■
2.39	■						■
2.40	■						■

Class III	Type						
Item	A	B	C	D	E	F	G
3.1	■						■
3.2	■				■		■
3.3	■						
3.4	■						■
3.5	■						■
3.6	■						
3.7	■						■
3.8	■						■
3.9	■						
3.10	■						■
3.11	■						
3.12	■	■					
3.13	■						
3.14	■				■		
3.15	■				■		
3.16			■				
3.17			■				
3.18			■				■
3.19			■				■
3.20			■				■
3.21			■				■
3.22							■
3.23				■			
3.24	■			■			■
3.25	■				■		
3.26	■				■		■
3.27	■				■		
3.28	■				■		
3.29	■				■		
3.30	■				■		■
3.31	■					■	
3.32	■						■
3.33	■						■
3.34	■				■		
3.35	■				■		
3.36	■				■		
3.37	■				■		
3.38	■				■		

Table 2 *(Source: Buildings Department) (https://www.bd.gov.hk/doc/en/building-works/minor-works/minor-works-items/tbl_mwtypes.pdf)*

There are 5 items of Type C work under Class I, 10 items under Class II and 7 items that are under Class III. We can then look for the descriptions of items 1.20 to 1.24; 2.18 to 2.27 and 3.16 to 3.22 in the website (https://www.bd.gov.hk/en/building-works/minor-works/minor-works-items/index.html) to see if the work matches one of the item numbers. Suppose a work matches the description of 1.20, it refers to the erection or alteration of a signboard within a given dimension.



Item details

Item no.	1.20
Item class / type	Class I Type C
Nature of works	Erection/ Alteration
Result in any additional load to any cantilevered slab	No
The works involve the alteration of any other structural elements	No
The display area of the signboard 1	More than 10 m^2 but not more than 20 m^2
The projection from the external wall 2	Not more than 4.2 m
The thickness of the signboard 3	Not more than 600 mm
The signboard consists of stone	No

Positional Requirement: Refer to Positional Requirements of projecting signboard

Fig. 2.7 Description of a Class I, Type C minor work involving signage

This kind of work belongs to Class I, requiring the employment of an AP as well as submission of document to BD 7 days ahead before work commencement, and submission of document within 14 days after completion. This document needs to be submitted to BD through the Class I MWC, not by the designer (unless the design company is also a Class I MWC).

It is not necessary for interior designers to remember all of the 126 minor work items and the classes they belong to. However, they should have the ability to identify the works they undertake by consulting Building Department's website. The department has also developed an app for mobile devices and is a handy tool in identifying the type and Class of minor work items. The app divides the 126 items of work into 5 Scenario or 26 Categories, and by answering some true or false questions, one can determine whether a particular project falls under the definition of minor works.

Here are a few more examples of minor works:

1. Construction and or removal of an internal staircase (i.e., not a fire staircase itself): items 1.1, 1.32, 1.42, 3.1; 19

2. Construction of partitions within an interior space: items 1.43, 3.39, 3.40. Say a 2-bedroom flat is converted into a 5-bedroom one, then the quantity of partition will need to be evaluated to see whether the total linear meterage exceeds the allowed perimeter.

The above two types of minor works require the appointment of appropriate Prescribed Persons (such as Authorized Persons or Prescribed Registered Contractors), otherwise, the work can be considered illegal. If the work is more substantial, like the construction of a staircase or creation of a doorway on a structural wall requiring the modification of any structural elements of a building, it falls outside of the definition of Minor Works and requires the formal application for approval and consent from the Building Department. In such cases, the employment of an Authorized Person and a Registered Structural Engineer (RSE) are needed. Another common type of Addition and Alteration works involve the addition of a mezzanine floor or adding an extra floor to a building, which has bearing on the Gross Floor Area (GFA) of a building.

Plot Ratio and Gross Floor Area

Before understanding GFA, it is necessary to be acquainted with the concept of Plot Ratio (地積比率).

Plot Ratio is determined by the HKSAR's Planning Department in order to limit the public and private development density of a region. For example, the Planning Department has set the plot ratio of a region for residential development to be '9'. If a site area is 100 m2, the total GFA of this residential development is 100 m2 x 9=900 m2. Thus, 900 m2 is the maximum GFA of this development.

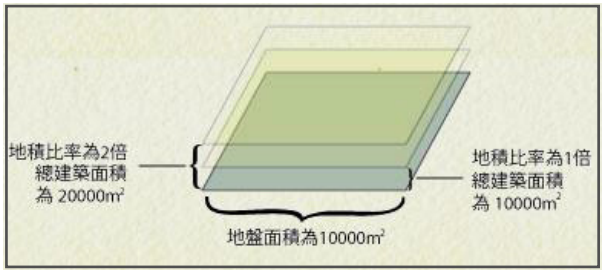


Fig. 2.8 Plot ratio and gross floor area (Source: Education Bureau)

If the building covers the whole 100 m2 of the site, the maximum height of the building is 9 stories, but if the building covers only 50 m2 in area, the building can be built up to 18 stories (assuming there is no maximum height limit) to fully take advantage of the site's maximum conferred GFA.

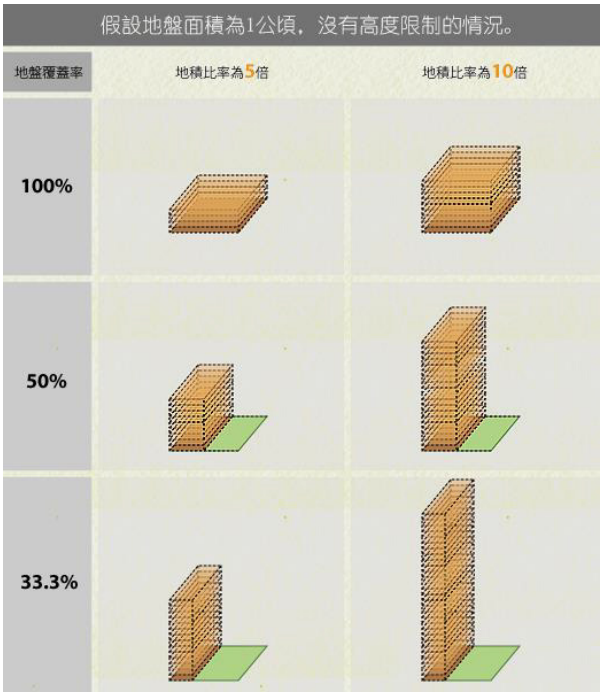


Fig. 2.9 Plot ratio utilization. (Source: Education Bureau)

Normally, some facilities in a building such as electrical and mechanical provisions, watchman and caretaker's office, etc. can be exempted from GFA calculation, but this is normally the concern of architects. Interior designers should simply be aware that they cannot increase the GFA of a building such that it exceeds the maximum GFA of building. In addition, adding GFA to a current building needs approval by the Buildings Department. For example, it is illegal to construct an extra floor to a village house in the New Territories, for such village houses are limited to 3 stories. Having said so, if a licensed builder is employed to build a village house and if all the set parameters are met, even an interior designer can design a village house!

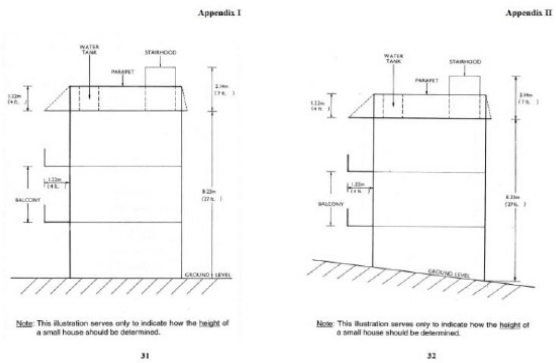


Fig. 2.10 Specifications of a New Territories small house

A **legal** example of building an extra floor is seen in the construction of an operating theatre for the Adventist Hospital building on Stubb's Road, which was completed in 2013. The extra floor was allowed given that the existing structure was able to sustain its weight, and also because the hospital building had not used up all of its GFA.

Fig. 2.11-13 Adventist Hospital mezzanine floor addition (Source: Adventist Hospital, Stubb's Road website)

In some retail shops or industrial buildings, owners illegally construct mezzanine floors. Some owners of residential houses even add a basement without obtaining the approval of the Buildings Department. If a commercial space with an illegal mezzanine floor is converted into a restaurant, restaurant license cannot be issued as it is not possible for a restaurant to have illegal constructions. Making use of the high ceilings of industrial buildings to build mezzanine floors for extra storage is possible, but it is best to seek opinions from APs to see how it can be done in accordance with the law.

The reason why specialist licenses are needed for restaurants, schools, guest houses, etc. is because these operations are closely related to public's health and safety. In obtaining operating licenses and license renewal, the operators of these setups must adhere to relevant rules and regulations so as to avoid endangering the public's health and well-being.

Open Kitchen

For residential units with enclosed kitchens, the Code of Practice for Fire Safety in Building Construction stipulates that it should be separated from the rest of the domestic space by fire rated walls and doors.

Clause C13.3

In any Use Classification 1 provided with a single exit door, a kitchen adjacent to such door should be separated from the rest of the flat by walls having an FRR of not less than -/30/30 and the entrance to the kitchen should be provided with a fire rated door having an FRR of not less than -/30/30.

The door of an enclosed kitchen should be self-closing and fire rated. From this perspective, removing the door of this enclosed kitchen contravenes the Code. If there is a fire and the fire is found not contained within the kitchen due to the removal of the fire rated separation, there is a possibility that the insurance company can reject any insurance compensation. Using induction cooker may help reduce the occurrence of fire (the 'Code' has not specified the use of cooking stove, i.e., gas stove is not an absolute 'no-go' in open kitchens), but some studies have indicated that cooking oil can be ignited in a frying pan on an induction cooker within ten minutes.[1]

However, nowadays, many new apartments are equipped with open kitchens. The law states that such apartments must have certain fire safety features installed, such as smoke detectors and sprinkler heads. If owners want to convert their enclosed kitchen into an open kitchen, an AP should be consulted to ensure the fulfillment of fire safety requirements. In addition, these facilities must be regularly maintained and inspected annually by the licensed contractors.

Clause C13.4

If fire barrier is not provided in accordance with Clause C13.3 (i.e. an open kitchen), the following fire safety provisions should be provided:

(a) smoke detector(s) fitted with sounder base should be provided inside the subject flat. The alarm signal of the smoke detector(s) should be connected to the local fire services control panel of the building and should not be linked to the Fire Services Communication Centre;

(b) smoke detector(s) should be provided at the common area outside the subject flat. The alarm signal of the smoke detector(s) should be connected to the local fire services control panel, the common fire alarm system of the building and the Fire Services Communication Centre;

(c) sprinkler head(s) should be provided to cover the notional open kitchen area. The alarm signal of the system should be connected to the local fire services control panel, the common fire alarm system of the building and the Fire Services Communication Centre;

(d) a full height wall having an FRR of not less than -/30/30 should be provided adjacent to the flat exit door. The width of the wall should not be less than 600mm; and

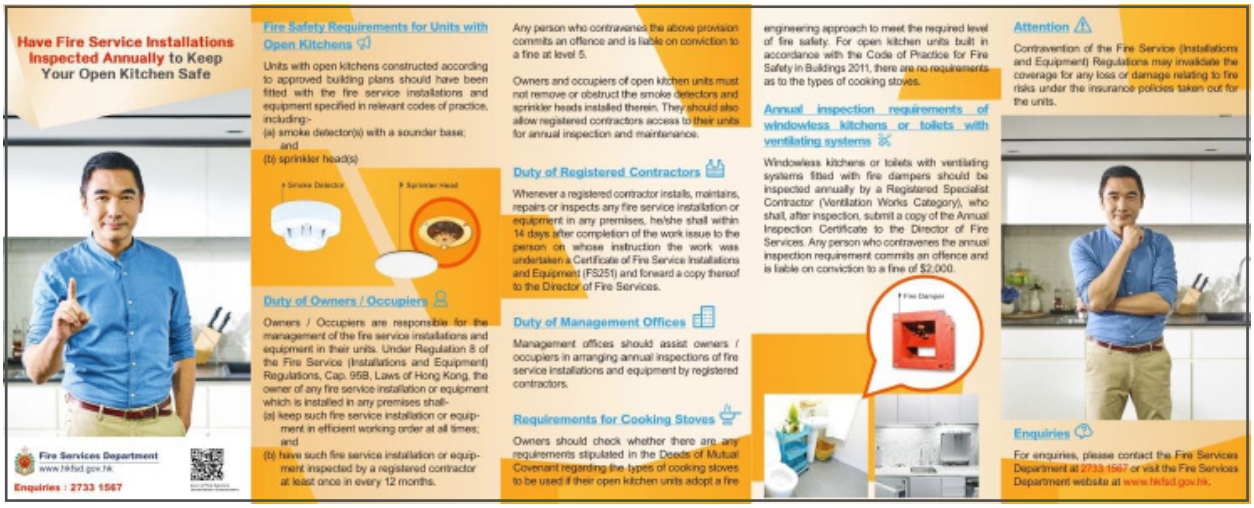
(e) For open kitchen in premises with internal staircase(s), a barrier of not less than 450mm measured vertically downwards from the underside of the floor shall be provided. The barrier should surround the notional open kitchen area and should have an FRR of not less than -/30/- and be non-combustible complying with the requirements in Part E. If false ceilings are hung in the open kitchen, the barrier should extend not less than 450mm below the false ceilings.

Commentary

The specification and location of the smoke detectors should be considered carefully when they are installed inside the flats to minimize false alarms. Also taking into account the effect of humidity, medium or low sensitivity smoke detectors are recommended to be installed in living areas and placed away from the cooking range(s) and bathroom.

The smoke detectors and sprinklers are fire service installations designed in accordance with the Code of Practice for Minimum Fire Service Installations and Equipment and should be subject to annual inspection and certification by a registered fire service installation contractor.

The full height wall having an FRR of not less than -/30/30 should be erected with a material that is not easily removable (e.g. reinforced concrete construction).



Have Fire Service Installations Inspected Annually to Keep Your Open Kitchen Safe

Fire Safety Requirements for Units with Open Kitchens

Units with open kitchens constructed according to approved building plans should have been fitted with the fire service installations and equipment specified in relevant codes of practice, including:-
(a) smoke detector(s) with a sounder base; and
(b) sprinkler head(s)

Smoke Detector
Sprinkler Head

Duty of Owners / Occupiers

Owners / Occupiers are responsible for the management of the fire service installations and equipment in their units. Under Regulation 8 of the Fire Service (Installations and Equipment) Regulations, Cap. 95B, Laws of Hong Kong, the owner of any fire service installation or equipment which is installed in any premises shall-
(a) keep such fire service installation or equipment in efficient working order at all times; and
(b) have such fire service installation or equipment inspected by a registered contractor at least once in every 12 months.

Any person who contravenes the above provision commits an offence and is liable on conviction to a fine at level 5.

Owners and occupiers of open kitchen units must not remove or obstruct the smoke detectors and sprinkler heads installed therein. They should also allow registered contractors access to their units for annual inspection and maintenance.

Duty of Registered Contractors

Whenever a registered contractor installs, maintains, repairs or inspects any fire service installation or equipment in any premises, he/she shall within 14 days after completion of the work issue to the person on whose instruction the work was undertaken a Certificate of Fire Service Installations and Equipment (FS251) and forward a copy thereof to the Director of Fire Services.

Duty of Management Offices

Management offices should assist owners / occupiers in arranging annual inspections of fire service installations and equipment by registered contractors.

Requirements for Cooking Stoves

Owners should check whether there are any requirements stipulated in the Deeds of Mutual Covenant regarding the types of cooking stoves to be used if their open kitchen units adopt a fire engineering approach to meet the required level of fire safety. For open kitchen units built in accordance with the Code of Practice for Fire Safety in Buildings 2011, there are no requirements as to the types of cooking stoves.

Annual inspection requirements of windowless kitchens or toilets with ventilating systems

Windowless kitchens or toilets with ventilating systems fitted with fire dampers should be inspected annually by a Registered Specialist Contractor (Ventilation Works Category), who shall, after inspection, submit a copy of the Annual Inspection Certificate to the Director of Fire Services. Any person who contravenes the annual inspection requirement commits an offence and is liable on conviction to a fine of $2,000.

Fire Damper

Attention

Contravention of the Fire Service (Installations and Equipment) Regulations may invalidate the coverage for any loss or damage relating to fire risks under the insurance policies taken out for the units.

Enquiries

For enquiries, please contact the Fire Services Department at 2733 1567 or visit the Fire Services Department website at www.hkfsd.gov.hk.

Fire Services Department
www.hkfsd.gov.hk
Enquiries : 2733 1567

Fig. 2.14 Fire Services Department pamphlet regarding fire safety for open kitchens

This chapter presents only a small part of the Code for discussion, with emphasis placed on sections most relevant to interior design. Most spaces that interior designers work with can be considered the 'post completed' stage of a building, i.e., a premises that is already approved for construction or completed construction, so there is no practical needs for an interior designers to be fully conversant with the Code as long as they know when to seek the assistance of other professionals when needed.

To sum up, during the course of the design process, interior designers need to be aware of the following areas to ensure that their works adhere to relevant codes and regulations. These include:

- **gross floor area** (which cannot be adjusted freely by an interior designer like adding a mezzanine floor to a space without approval by the Buildings Department);
- **ventilation and lighting consideration:** bedrooms must have windows for light and ventilation);
- **obtaining licenses for various commercial operations** (fulfilling spatial requirements related to ensuring the health and safety of the public);
- **quantity of sanitary facilities for a space** (commercial and public spaces such as restaurants, cinemas and schools have regulations concerning the number of toilets for a given size of the venue);
- **Plan submission due to AA work** (if a client requests that a designer removes a partition between two separate flats, they need to seek help from Authorized Persons as well as structural engineers to see if such removal is structurally feasible and whether it requires approval and consent from the Buildings Department).

CHAPTER 3

Means of Escape and Fire Safety
by Ming Cheu

In Hong Kong, many people risk their lives by choosing to live in sub-divided flats because they are relatively cheaper to rent (yet ironically, based on price per square feet, rents in sub-divided flats in Hong Kong are often higher than normal-sized flats). In addition to residential spaces, many commercial buildings also try to accommodate as many offices/rooms or retail display units as possible. The above scenarios are all due to the high-density context in Hong Kong.

Should interior designers put up partitions into premises and help relieve the pressure of space shortage by creating sub-divided flats, and if so, how? Interior designers need to provide professional advice to clients instead of just fulfilling their expectation of maximizing the use of space, particularly since the outcome can be life threatening for residents and users of such spaces.

Say an interior designer designed an office for a client who gets injured or even killed in a fire because they cannot escape from the scene due to the difficulty of passing through numerous enclosed dark rooms (power may be cut off during the fire), the designer may be liable for the client's injury or death. The casualties caused by recent fires in sub-divided buildings in Hong Kong illustrates the serious consequences that can result if relevant local laws are ignored, although it should be noted that these illegal structures may or may not have been constructed with interior designers' involvement.

- 3 people were killed in a blaze at a 45 year-old industrial building in Kwai Chung in Aug 2017, which contained 17 separate rooms that were illegally constructed;
- 1 person was killed and 30 people were injured when fire broke out in an old residential building in Sham Shui Po in Feb 2017;
- a man was killed in a fire in Apr 2017 in a subdivided flat in Sham Shui Po.

The above casualties were probably caused by one or more of the following factors:

1. the routes of fire escape being narrowed/blocked/altered, with the original design of their **Means of Escape** (MOE) changed;
2. fire rated doors removed/modified;
3. improper ventilation;
4. improper fire service installation;
5. Means of Access for firemen blocked/narrowed.

Fig. 3.1 Collapse of the roof of Hu Fa Kuang Sports Centre at City University in 2016

In addition to causing safety issues, there are also other fundamental legal ramifications resulting from improper alteration, such as:

1. Planned land use is negated—for example, industrial buildings are not designated for domestic use under the Town Planning Ordinance Cap 131;
2. Modified plumbing/drainage design--leading to hygiene problems by overloading the original plumbing/drainage design;
3. Structural design of the building altered without prior approval by the Buildings Department. This may have been the cause of the collapse of a five-story tenement building in Ma Tau Wai in 2010 and that of the roof of the gymnasium at the City University of Hong Kong in 2016.

For more information on safety, hygienic and other issues associated with unauthorized subdivided units, visit the BD website at https://www.bd.gov.hk.

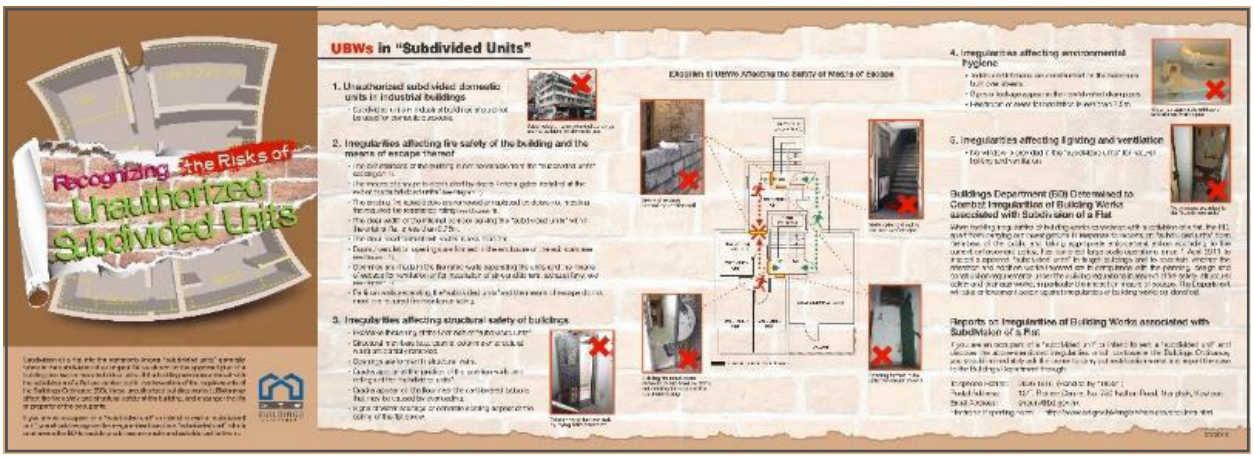


Fig. 3.2 Pamphlet published by the Buildings Department regarding the risks of unauthorized subdivided units. (Source: Buildings Department)

In fact, if the correct procedures are followed and work is done by qualified professionals, sub-divided flats are not an absolute 'no-go'. Many commercial buildings are examples of legal sub-divided units, and the number of divided units within the same floor of a commercial building may change every few years when new tenants move in.

I. Code of Practice for Fire Safety

The Building Department (BD) has published a Code of Practice for Fire Safety in Building 2011 (The Code thereafter) for the construction industry, which can be downloaded through the link below: https://www.bd.gov.hk/en/resources/codes-and-references/codes-and-designmanuals/e_fs2011.html

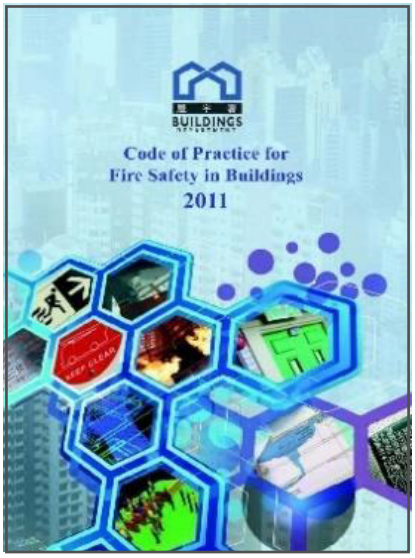


Fig. 3.3 Code of Practice for Fire Safety in Buildings 2011

This Code may be updated by the BD from time to time, and the latest publications can be accessed from the link below:

https://www.bd.gov.hk/english/documents/index_crlist.html

The Code is especially relevant for the design of **new buildings** or any **Addition and Alteration Works** (A-A Works). Unlike architects and building surveyors, interior designers are not supposed to be conversant with the Code as they are not responsible for designing buildings, yet they should be aware of its general requirements and know how to access it when needed. Upon the accumulation of sufficient working experience, interior designers may even carry out some initial evaluation of spaces and, where necessary, seek the assistance of appropriate professionals, such as Building Surveyors.

The following sections will cover a few areas in the Code of Practice that are especially relevant for interior design, including:

1. Exit staircases, number of doors and direction of door openings;
2. Building types that are designated with different occupant capacity (Use Classification as in Table A1 from the Code) associated with different MOE requirements (such as the quantity of total exit door from a space);
3. Protected Lobby of a building, which requires fire rated doors, walls or even ceilings;
4. Fire Resistance Rating (FRR).

Before proceeding, it is first necessary to understand a few important concepts or terms by looking at some tables/drawings extracted from the Code:

II. Use Classification

Table A1 is extracted from Section A of the Code and it indicates that there are 8 major premises types classified for cross referencing under the Code. The classification was developed according to the potential fire hazard and with consideration to the characteristics of occupancy and building type.

Subsection A7 - Use Classification

Use Classifications are stipulated in Table A1.

Table A1: Use Classification

Types of Premises		Typical Examples / Interpretations
1. Residential	1a. House type dwellings	Single family house up to three storeys high
	1b. Flats	Flats including service apartments
	1c. Tenement houses	A building in the domestic part of which any living room, as a place for cooking or sleeping, is intended or adapted for the use of more than one tenant or sub-tenant
2. Hotel and similar Transient Accommodation		Hotels, guesthouses, barracks, canteens, hostels, boarding houses, motels, etc.
3. Institutional	3a. Health/child care facilities	Hospitals, purpose-built clinic, nurseries, child care centres, day care centres, drug dependent person treatment areas, homes for the elderly.
	3b. Detention and correctional centres	Detention centres, correctional centres, etc.
4. Commercial	4a. Business facilities	Offices and associated business spaces.
	4b. Mercantile facilities	Retail shops, markets, supermarkets, department stores, food courts, stalls, restaurants, lounges, bars and pubs, karaoke halls, betting halls, showrooms, etc.
5. Assembly	5a. Places of Public Entertainment	The uses listed in Places of Public Entertainment Ordinance (Cap. 172), such as cinemas, theatres, exhibition centres, stadia.
	5b. Educational establishments	Classrooms, lecture rooms, libraries and study rooms in schools, kindergartens, colleges or universities.
	5c. Transport facilities	Passenger terminals for air, rail, road or sea. Airports, bus terminus, railway stations, etc.
	5d. Other Assembly Premises	Places of assembly not specifically listed in Type 5(a-c), such as conference centres, skating rinks, gymnasia, churches, public halls and columbaria, etc.
6. Industrial	6a. Industrial workplaces	Industrial workplaces for manufacturing and processing any article, power generation facilities, depots, aircraft maintenance facilities, film production facilities, commercial kitchens, commercial laundries, commercial laboratories etc.
	6b. Warehouses	Container terminals, freight stations, warehouses for general goods storage and logistic centres.
	6c. Storage, manufacturing of hazardous/ dangerous goods premises	Storage or manufacturing premises for flammable goods, explosive goods, explosives production and flammable/hazardous chemical processing.
7. Carparks		Parking structures and garages, including carports.
8. Plant rooms & the like		Mechanical and electrical plant rooms, IT equipment room, access facilities for telecommunication and broadcasting services etc.

Note:

1. In respect of some Use Classifications, there are specific requirements under the relevant Ordinances, Regulations as well as Codes of Practice/Guides issued by relevant licensing authorities.

Table A1 as extracted from Section A of the Code

III. Assessment of Occupant Capacity

Section 2 – Provisions of Means of Escape

Subsection B4 – Assessment of Occupant Capacity

Clause B4.1

As a guide to assessing the requirements on means of escape, the following Table B1 should be used as the basis for calculating the occupant capacity of a building or part of a building.

Table B1: Assessment of Occupant Capacity

Use Classification	Type of Accommodation	Occupancy Factor (usable floor area in m^2 per person) or otherwise as specified
1b	Flats:	
	- with corridor or balcony access having five or more flats on each floor served by each staircase	4.5
	- flats not covered by the above	9
1c	Tenement houses	3
2	Boarding houses, hostels, hotels, motels, Guesthouses	Number of bedspaces
	Dormitories	3
3a	Day care centres, nurseries, child care centres	4
	Hospitals (areas other than the patient care areas)	9
	Patient care areas	Number of bedspaces
3b	Detention and Correctional Centres	Number of bedspaces
4a	Offices	9
	- Board rooms, conference rooms, function rooms	10
	- Staff rooms	9
4b	Retail shops / Department Stores (including arcade and common areas)	
	Basement, G/F, 1/F & 2/F	3
	3rd floor & above	4.5
	Markets, supermarkets, showrooms, jewellery and goldsmith shops, pawn shops and money changers	2
	Café, restaurants, dining areas, lounges, bars and pubs	1
	Banking halls (areas accessible to the public)	0.5
	Betting halls (areas accessible to the public)	0.5
	Places where public information or service counters are provided (areas accessible to the public)	0.5
5a	Art galleries, exhibition areas, museums	2
	Cinemas:	
	Seating areas	Number of seats
	Foyer areas	0.5
	Dance floors	0.75
	Sports Stadia	
	standing	0.5
	removable seating	0.5
	fixed seating	Number of seats
	bench seating	450mm/person
	Indoor sports facilities:	
	Sports / activity areas	10
	standing	0.5
	removable seating	0.5
	fixed seating	Number of seats
	bench seating	450mm/person
	Theatres:	
	Seating areas	Number of seats
	Foyer areas	0.5
5b	Libraries	2
	Reading rooms, study rooms	1
	Classrooms of school not covered by the Education Ordinance, lecture rooms	2 or number of seats

Table B1 as extracted from Section B of the Code

Table B1 is extracted from Section B in the Code and each of the type of premises in Table A1 is associated with an Occupancy Factor, which is defined as the usable floor area in m² per person. For Type 4a-office, for example, the Occupancy Factor is 9, thus a 1000 m² office should accommodate a (maximum) of 111 persons (1000/9).

For Type 4b (say a Supermarket), its Occupancy Factor is 2, thus a 500m² supermarket should accommodate 250 persons (500/2).

Use Classification	Type of Accommodation	Occupancy Factor (usable floor area in m^2 per person) or otherwise as specified
5c	Transport facilities like passenger terminals, railway stations, etc.	Based on actual design and layout
5d	Public halls, assembly halls, conference halls	
	removable seating	0.5
	fixed seating	Number of seats
	Gymnasia	3
	Swimming Pool	3
	Columbaria	2
	Viewing galleries	0.5
6a	Commercial Laundries	10
	Commercial Laboratories	10
	Factories / Workshops	4.5
	Commercial Kitchens	4.5
6b	Warehouses	30
6c	Storage, manufacturing of hazardous/ dangerous goods premises	30
7	Carparks	30
8	Plant rooms, switch rooms, transformer rooms, etc.	30

Large Factor number indicates low occupancy expected for warehous-es, carparks etc

Notes:

1. The occupant capacity in a single user specialised industrial workplace will be determined by the Commissioner for Labour according to the specialised trade process proposed.
2. For any use not specified in this Table, the Building Authority should determine the factor to be used.
3. The Building Authority recognises actual counting as a reliable way to establish the occupant capacity of a building.
4. The occupant capacity in Karaoke Establishments should refer to "A Guide to Application for Karaoke Establishment Permits in Restaurant" issued by the Food and Environmental Hygiene Department.
5. The usable floor area for assessing the occupant capacity in the swimming pool in Use Classification 5d refers to the water surface area of the swimming pool.

Table B2

Table B2: Minimum number and width of exit doors and exit routes from a room, fire compartment or storey

Occupant Capacity of room, fire compartment or storey (No. of persons)	Minimum No. of exit doors or exit routes	Minimum total width (in mm)		Minimum Width (in mm) of each	
		Exit doors	Exit routes	Exit door	Exit route
4- 30	1			750	1050
31-200	2	1750	2100	850	1050
201-300	2	2500	2500	1050	1050
301-500	2	3000	3000	1050	1050
501-750	3	4500	4500	1200	1200
751-1000	4	6000	6000	1200	1200
1001-1250	5	7500	7500	1350	1350
1251-1500	6	9000	9000	1350	1350
1501-1750	7	10500	10500	1500	1500
1751-2000	8	12000	12000	1500	1500
2001-2250	9	13500	13500	1500	1500
2251-2500	10	15000	15000	1500	1500
2501-2750	11	16500	16500	1500	1500
2751-3000	12	18000	18000	1500	1500
>3000 persons - the number of exit doors, exit routes and their width to be determined by the Building Authority					

Notes:

1. In the case of Places of Public Entertainment (Use Classification 5a), the requirements in Section 3 should be complied with.
2. The width of an exit door should be the least clear width measured between the vertical members of the door frame.
3. The width of a required staircase, staircase landing, passage or corridor comprising an exit route should be measured between the finished surfaces of the walls or of the inner sides of any balustrade and should not be decreased by the introduction of any projections other than handrails the projection of which should not exceed 90mm.
4. The Table shows the minimum requirement on the assumption that doors can be readily and freely opened by occupants in case of fire.

Table B2 as extracted from Section B of the Code

The occupant capacity has implication for the total number of exit doors as well as the total width of exit openings and the width of exit routes. This information can be seen in the next Table (Table B2 extracted from the Code).

From Table B2, it can be seen that the above-mentioned office space, which accommodates a maximum of 111 persons, requires a minimum of 2 exit doors, and each exit door needs to have an opening of at least 850mm wide and the minimal required exit corridor width is 1050mm. Under Note 2 of the table, the width of an exit door is defined as the clear width measured between the vertical members of the door frame. Thus, if the exit door is installed with floor springs, the opening should be made wider as the pivot point of the floor springs will take up about 100 mm of the exit door opening space. The above-mentioned supermarket also requires a minimum of 2 exit doors, but each exit door needs to have an opening of at least 1050mm wide. In this case, it would make sense to have 2 sets of double doors (one of them can be a shop front which is of normal width) instead in order to achieve the required door width. (A typical single door is seldom wider than 1050mm.)

IV. Travel Distance

Having discussed the guideline for the required number of exit doors and corridor width based on Occupant Capacity, there are other elements that are relevant to interior designers, namely <u>the length of exit routes and the separation criteria between these exit doors in the same compartment.</u>

Let's first look at the definitions of the following terms:

"Protected exit" means a required staircase, or ramp, or passageway, being enclosed by fire barriers, that leads to an ultimate place of safety.

"Protected lobby" means a lobby formed by fire and smoke resisting construction in accordance with Part C to prevent the spread of heat and smoke.

"Required staircase" means an access staircase, whether in a firefighting and rescue stairway or not, or a staircase required for means of escape in case of fire.

"Travel distance" means the horizontal distance measured on the floor along the centreline of the exit route between the furthest point (most remote point) on a storey or within a fire compartment to:

(a) the centre of the fire rated door to a protected exit or a required staircase, as the case may be; or

(b) if there is no such door, the first tread of the required staircase; or

(c) if the exit route leads directly to an ultimate place of safety, any one of the discharge points to the ultimate place of safety.

Diagram B2 is extracted from the Code and is a typical building type that is common with two exit staircases.

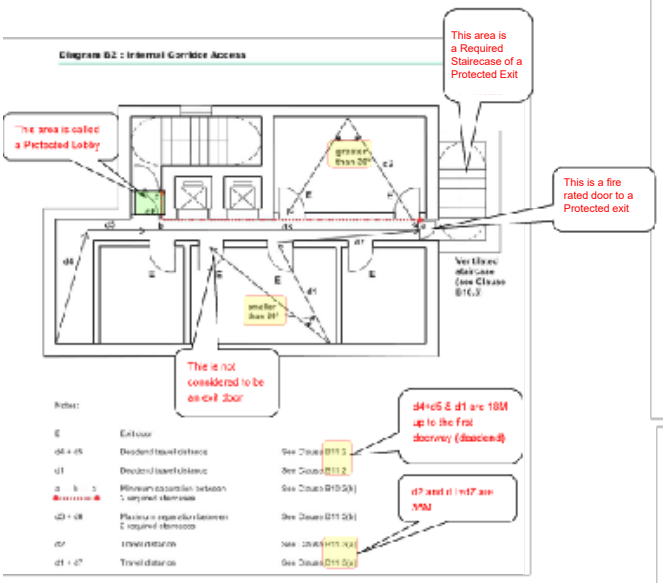


Fig. 3.4 Travel distance of fire exits and protected lobby

Under Clauses B11.2 and B11.3 below (extracted from the Code), there are different maximum travel distance requirements for different Use Classification. For example, for Office (4a):

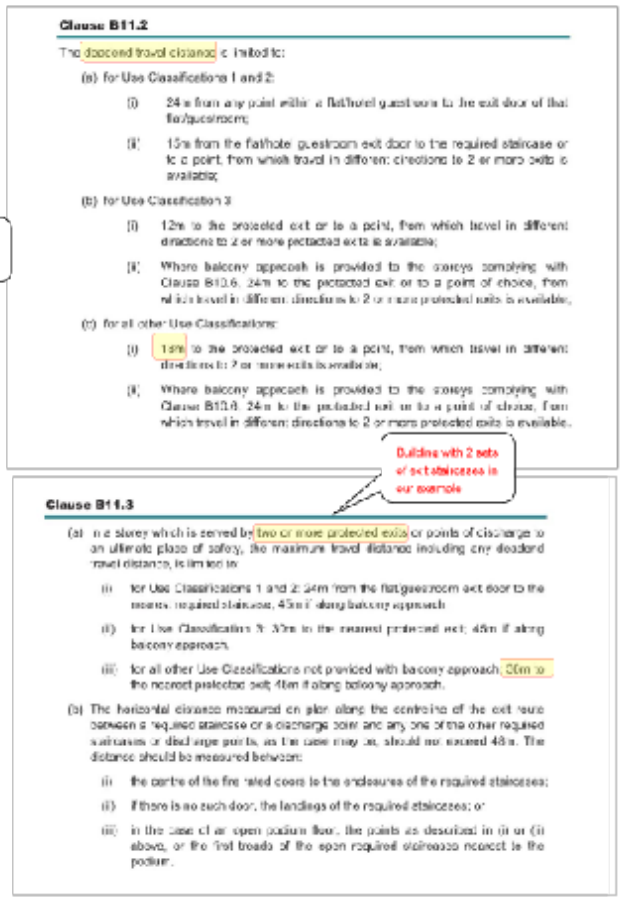
- d1= 18M max; although the compartment in question has 2 doors, the separation between them is less than 30° from the same farthermost point in the compartment, so this compartment CANNOT be considered to be with 2 exit doors, rendering the run from the farthermost point to the first doorway to be 18M (dead-end travel distance)

This 'larger than 30° requirement is related to Clause B11.6 from the Code:

Clause B11.6

For any room or storey where two or more exit doors are required to be provided under Table B2, a line measured from any point on the floor of that room and storey to one of the exit doors should form an angle of not less than 30° with a line measured from the same point to any other exit door.

- d1+d7 = **36M** max as per Clause B11.3a
- d2 (Travel distance up to the fire rated door to a protected exit) = **36M**



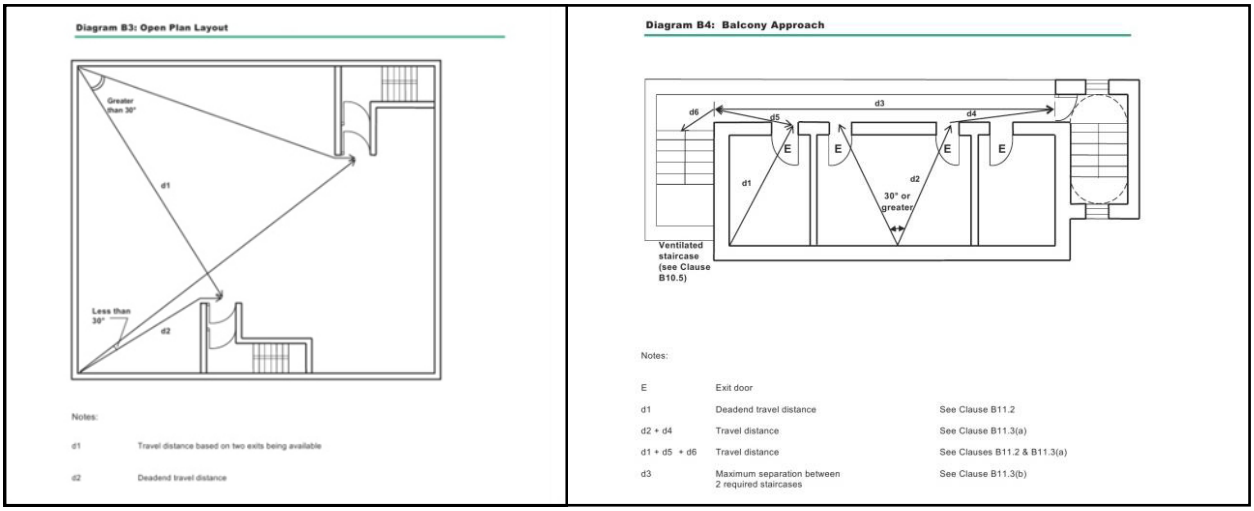


Fig. 3.5 Open Plan Layout and Balcony Approach.

There are other building types with different MOE requirements, called Open Plan Layout and Balcony Approach.

Another clause that is worth noting for interior designers is Clause B13.1, which states that the exit doors should open outwards in the direction of exit if the occupant capacity exceeds 30:

Subsection B13 - Doors in Relation to Exits

Clause B13.1

Every door across an exit, or into an exit route from a room or storey with the occupant capacity exceeding 30, should:

(a) open in the direction of exit; or

(b) if constructed to open both ways, have a transparent upper view panel.

With the knowledge discussed above, interior designers should be able to provide the type of doors and the quantity and width of exit doors in their proposed layout plans based on the size and usage of a space. In the example below, the interior designer in charge of the project had invited an architect (AP) to provide MOE advice. The architect had analyzed the MOE provision of the building along with the layout plan then provided the comments in view of the then Code of Practice. In professional practice, it is common for interior designers to seek help from other professionals such as Authorized Persons (AP.)

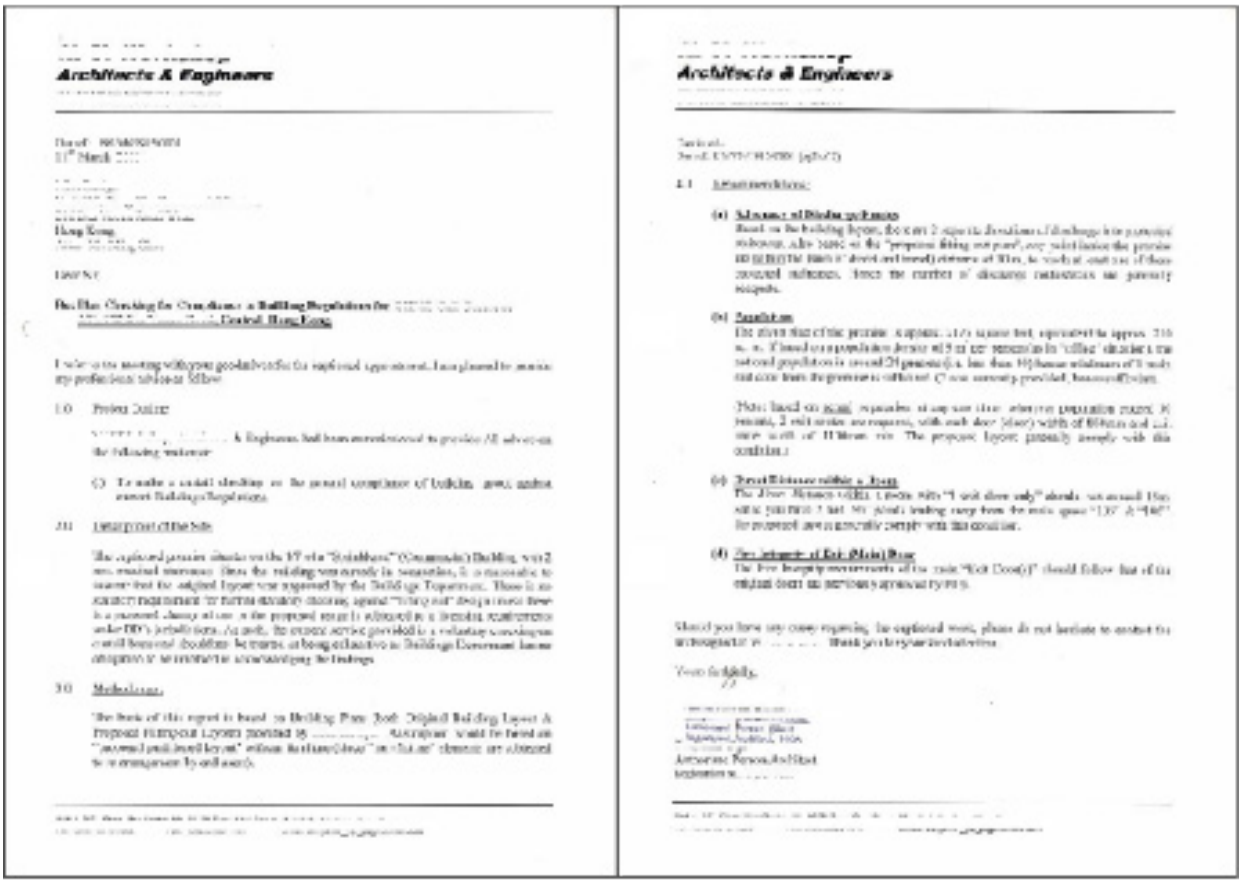


Fig. 3.6 Architect's analysis of the MOE provision of a building

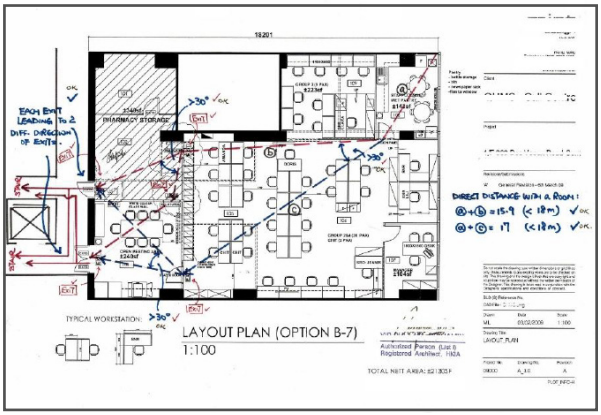


Fig. 3.7 Layout plan outlining MOE provisions by an architect

V. Fire Containment

Concept of Protected Exit and Protected Lobby

In addition to spatial consideration, there is also a need for interior designers to understand the use of materials specified for use in a fire compartment, which is particularly important for 'protected exit' and 'protected lobby' because they are integral parts of a building as required by the law. The definitions of these items within the Code are as follows:

> **"Protected exit"** means a required staircase, or ramp, or passageway, being enclosed by fire barriers, that leads to an ultimate place of safety.
>
> **"Protected lobby"** means a lobby formed by fire and smoke resisting construction in accordance with Part C to prevent the spread of heat and smoke.

These protected areas are needed to provide safe exit routes for occupiers to escape in case of fire, access for fire fighters, and to inhibit the spread of smoke and fire within one building and to adjacent buildings as well. In the Code, different Use Classification has different required FRR (Fire Resistance Rating) for the associated building elements; Table C1 shows the different required FRR and Fire Compartment Limitations associated with different Use Classification:

Table C1 – Fire Resistance Rating and Fire Compartment Limitations

Use Classification	Compartment Area/ Volume	Fire Resistance Rating (minutes)
1. Residential	Not limited	60
2. Hotel and similar Transient Accommodation	Not limited	60
3. Institutional	Not exceeding 2,500m²	60
4. Commercial		
4a. Business Facilities	Not exceeding 10,500m²	60
4b. Mercantile Facilities	Not exceeding 2,500m²	60
	Exceeding 2,500m² but not exceeding 10,500m²	120
5. Assembly		
5a & 5d. PPE & Other assembly premises	Not exceeding 2,500m²	60
	Exceeding 2,500m² but not exceeding 10,500m²	120
5b Educational establishments	Not exceeding 2,500m²	60
	Exceeding 2,500m² but not exceeding 10,500m²	120
5c. Transport facilities	Not exceeding 10,500m²	120
6. Industrial		
6a. Industrial workplaces	Not exceeding 10,500m²	120
6b. Bulk storage, Warehouses	Not exceeding 28,000m² and 10,500m²	120
6c. Storage, manufacturing of hazardous/dangerous goods premises	Not exceeding 7,000m²	120
7. Carparks	Not exceeding 10,500m²	60

Definition of FRR is defined below as extracted from the Code:

> **"Fire resistance rating (FRR)"** means the period of time that a building element is capable of resisting the action of fire when tested in accordance with ISO 834, BS 476: Parts 20 to 24 or equivalent. Fire resistance ratings are designated by three terms, to represent the make up of the element of construction, i.e. X/Y/Z, where:
>
> - X - Stability fire resistance rating (minutes)
> - Y - Integrity fire resistance rating (minutes)
> - Z - Insulation fire resistance rating (minutes)

Stability fire resistance rating (X) is mostly related to the integral part of a building like its structural wall, beam, floor, lift shaft etc. Y and Z are related to all other smaller components like doors, non- load bearing wall that serve as a fire barrier, and fixed light/glazed partition that serves, as a fire barrier but can also be applicable for those integral parts requiring 'X' (see Table C2 extracted from the Code):

Table C2: Fire Resistance Rating Criteria for Elements of Construction, Fire Barriers and Other Components

Elements of construction or other components		Criteria to be satisfied			Method of Exposure
		Stability	Integrity	Insulation	
1	Structural frame, beam or column	Y	N	N	Exposed faces only
2	Floor including fire compartment floor	Y	Y	Y	Each side separately
3	Roof forming part of an exit route or performing the function of the floor	Y	Y	Y	From underside
4	Loadbearing wall not being a fire barrier	Y	N	N	Each side separately
5	External wall	Y*	Y	Y	Each side separately
6	Loadbearing wall being a fire barrier	Y	Y	Y	Each side separately
7	Non-loadbearing wall being a fire barrier	N	Y	Y	Each side separately
8	Protected shaft, lobby and corridor	Y*	Y	Y	Each side separately
9	Fire shutter, fire stop, fire dampers, sealing system	N	Y	N (unless specified)	Each side separately
10	Smoke outlet shaft	Y	Y	Y	From outside
11	Enclosure around services other than Item 14	N	Y	Y	From outside
12	Door (including frame and fixing)	N	Y	N (unless specified)	Each side separately (except lift doors – from landing side only)
13	Fixed light (including frame, glazing & fixing)	N	Y	Y	Each side separately
14	Enclosure around services in required staircase/protected lobby	N	Y	Y	Each side separately

Notes:

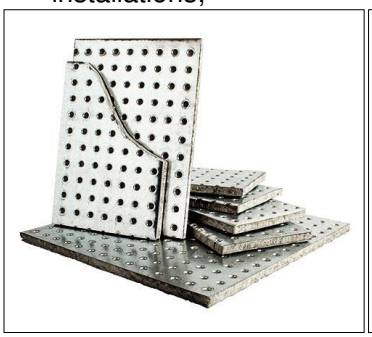
1. Y = required; N = not applicable; Y* = required for load bearing elements only.
2. Lintels, posts or jambs of an opening in a fire barrier should be regarded as an integral part of that wall.
3. Subject to Subsection C5 and Clause C9.7, curtain wall glazing does not require to have an FRR.
4. FRR requirements for different Use Classification are listed in Table C1.
5. Any restriction of the cross-section area of the smoke outlet shaft to 75% or less of its original area should be deemed to constitute failure in stability.
6. When an FRR is specified for a fire barrier which consists of different items in this Table, each of such items should satisfy the criteria as specified in this Table.

For example, the FRR of a door installed in Use Classification 4a (business facilities) can be represented as :
-/60/-; if 'Z' is also specified, -/60/60.

Most projects interior designers are engaged to work on are interior spaces, and such spaces should have been designated with the Protected Areas. **As a rule of thumb, if a space <u>has been built with protected corridor or exits</u>, designers must ensure that they stay protected by the required FRR materials even though they are to make modification to the space, such as changing new fire doors.** If unsure about whether the space is protected, it is best to consult an AP.

<u>How to identify protected areas in a building?</u>
A few features may help to identify a protected space, which are one or more of the following:

1. Exit staircase of a building;
2. Spaces that have no combustible materials installed (for example, an exit staircase is commonly seen with metal railing, tiled floor and or walls);
3. A space that is separated by fire rated doors/ walls;
4. Items (mostly likely M&E services) covered by some kind of sturdy boards (they are normally fire rated boards and commonly known products like Promat Durasteel boards, Promatect boards, fire rated gypsum boards etc.). If one sees exposed M&E services within an exit staircase (protected exit), it is possible that they are illegal installations;



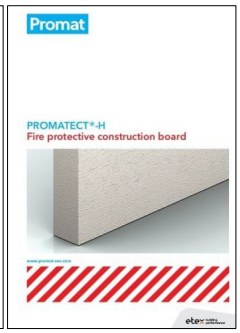


Fig. 3.8 Promat Durasteel board (Source: www.promat.co.uk)

Fig. 3.9 Promatect fire protective board

Fig. 3.10 Gypsum board, with fire-proof gypsum board on the far right. Grey coloured gypsum board is most commonlyused, while green gypsum board is moisture proof (Source: www.newwangypsum.com)

5. The separated space leads to an ultimate place of safety like the street level;
6. Protected lobby is normally connected to an exit staircase and has its entry/exit ways installed with **fire rated doors,** which have the following features:
   i. normally self-closing--installed with door closers / self-closing hinges/ floor springs;
   ii. edges that are installed with intumescent strips (the strip would expand to seal the gaps between the door and the door frame to reduce spreading of smoke, also called smoke seal);
   iii. vision panels installed on the doors (normally not more than 25% of the door pane, some can be made of wired safety glass);
   iv. for glazed doors, framed with door stiles and rails and intumescent strips can also be seen either on the door edges or on the side of the door frame facing the edges of the doors. The glass material installed is made of a special fire rated glass;
   v. they are labeled with a sign saying 'Fire Door to be kept closed" (although the main entrance door of a domestic flat is a fire door is normally not required to be labeled with this statement);
   vi. minimal doorway opening is 2 meters high, the gap between the bottom of the door and the floor should not be more than 10mm. The door is usually without lock, or can be unlocked manually without the` need of a key.

** Note that the main entrance door of a domestic apartment or a commercial toilet's door within a protected lobby are also fire rated doors, but since they are not the key entry/exit doors separating a protected lobby, vision panels are not needed.

Fig. 3.11 A typical fire rated door. (Source: Buildings Department)

Fig. 3.12 Intumescent strip installed on a door frame of a smoke lobby door.

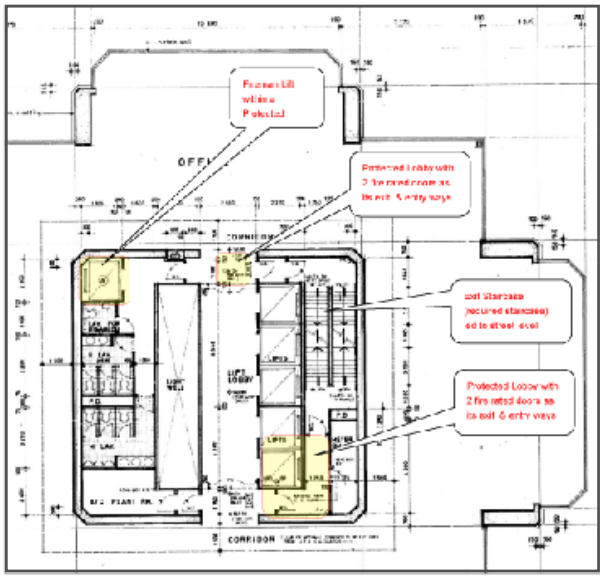
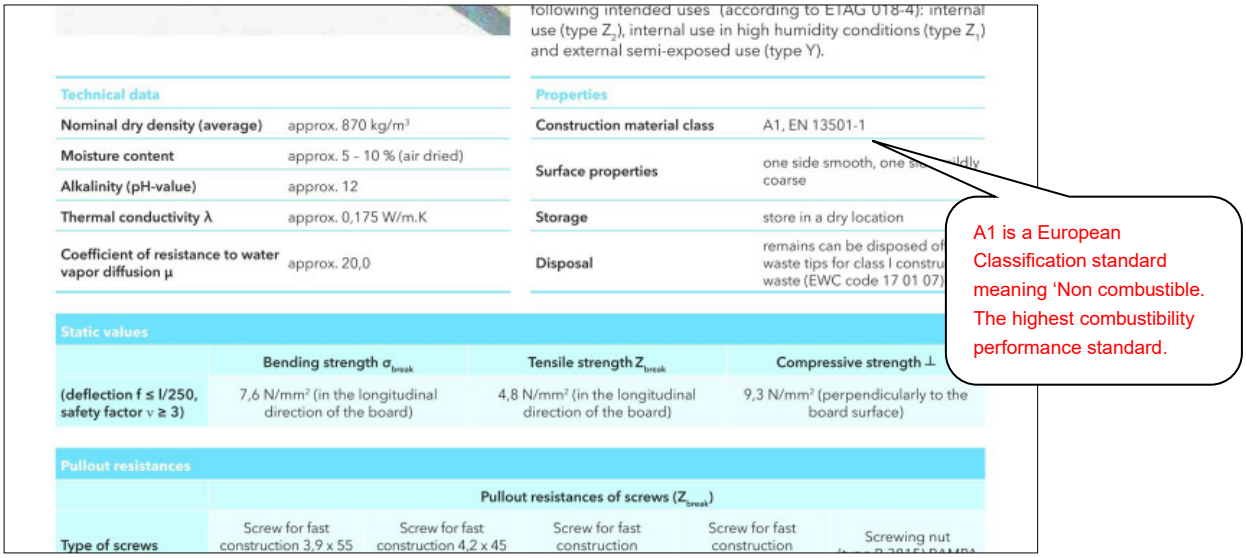


Fig. 3.13 Floor plan of a commercial building with protected lobbies separating the fire staircase (required staircase) from the other part of the building and having a fireman's lift within a protected lobby

With regards to the required FRR of the materials of the fire barriers, see Table C1. To achieve certain FRR, these building elements must meet certain international fire testing standards (eg BS EN 16341:2008 which is a fire resistance and smoke control test for door, shutter and openable window assemblies and elements of building hardware). Suppliers of these building components should be able to provide their product data sheet testifying that their products meet the standard required by the Building Department. An example below shows the product information of a fire rated board (Promatect board), the product's material class meeting the requirements of A1, EN 13501-1:



following intended uses (according to ETAG 018-4): internal use (type Z_2), internal use in high humidity conditions (type Z_1) and external semi-exposed use (type Y).

Technical data	
Nominal dry density (average)	approx. 870 kg/m³
Moisture content	approx. 5 – 10 % (air dried)
Alkalinity (pH-value)	approx. 12
Thermal conductivity λ	approx. 0,175 W/m.K
Coefficient of resistance to water vapor diffusion μ	approx. 20,0

Properties	
Construction material class	A1, EN 13501-1
Surface properties	one side smooth, one s[illegible]ildly coarse
Storage	store in a dry location
Disposal	remains can be disposed of[illegible] waste tips for class I constru[illegible] waste (EWC code 17 01 07)

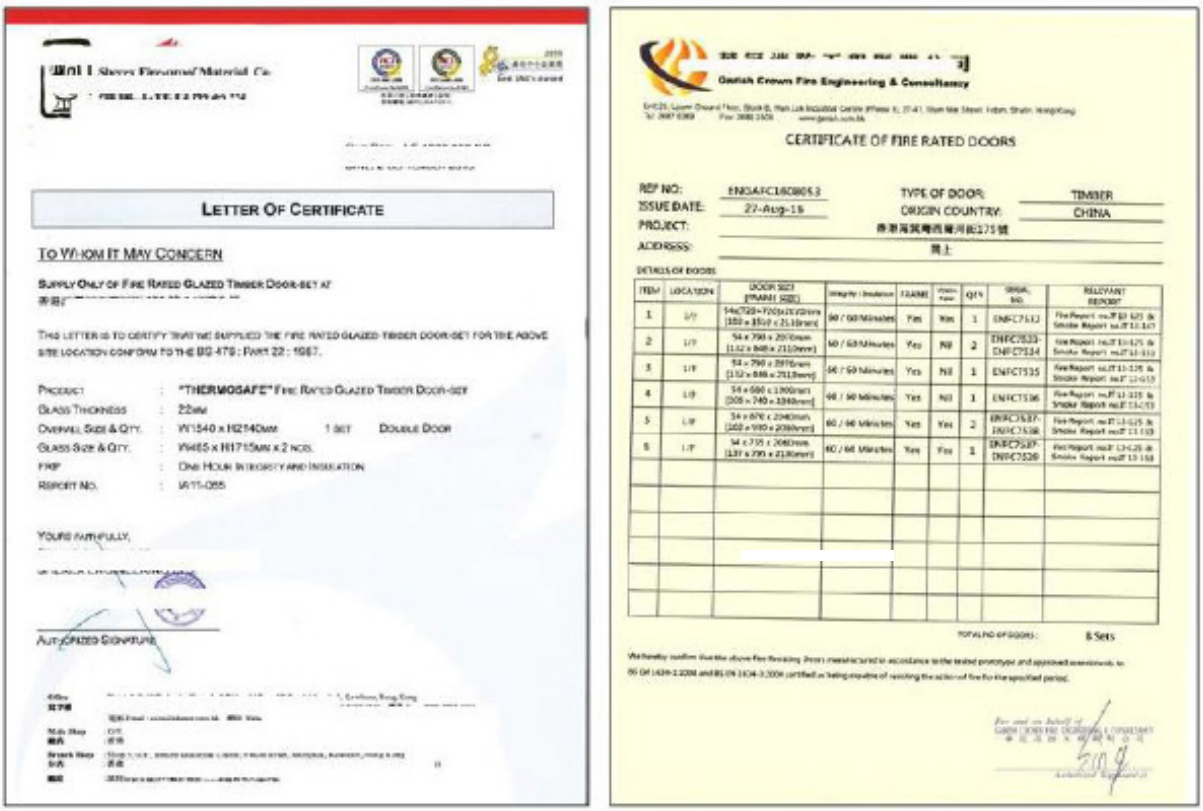
A1 is a European Classification standard meaning 'Non combustible. The highest combustibility performance standard.

Static values	Bending strength σ_{break}	Tensile strength Z_{break}	Compressive strength ⊥
(deflection f ≤ l/250, safety factor ν ≥ 3)	7,6 N/mm² (in the longitudinal direction of the board)	4,8 N/mm² (in the longitudinal direction of the board)	9,3 N/mm² (perpendicularly to the board surface)

Pullout resistances	Pullout resistances of screws (Z_{break})				
Type of screws	Screw for fast construction 3,9 x 55	Screw for fast construction 4,2 x 45	Screw for fast construction	Screw for fast construction	Screwing nut

Fig, 3.14 A fire certificate

Suppliers of fire rated doors should be able to provide fire certificates provided by laboratories accredited by the HKAS (Hong Kong Accreditation Services under HOKLAS (Hong Kong Laboratory Accreditation Scheme) or other laboratory accreditation bodies recognized by the HOKLAS



LETTER OF CERTIFICATE

TO WHOM IT MAY CONCERN

SUPPLY ONLY OF FIRE RATED GLAZED TIMBER DOOR-SET AT

THIS LETTER IS TO CERTIFY THAT WE SUPPLIED THE FIRE RATED GLAZED TIMBER DOOR-SET FOR THE ABOVE SITE LOCATION CONFORM TO THE BS 476 : PART 22 : 1987.

PRODUCT : "THERMOSAFE" FIRE RATED GLAZED TIMBER DOOR-SET
GLASS THICKNESS : 22MM
OVERALL SIZE & QTY. : W1540 x H2140MM 1 SET DOUBLE DOOR
GLASS SIZE & QTY. : W665 x H1715MM x 2 NOS.
FRP : ONE HOUR INTEGRITY AND INSULATION
REPORT NO. : IA11-055

YOURS FAITHFULLY,

AUTHORIZED SIGNATURE

Gaelish Crown Fire Engineering & Consultancy

CERTIFICATE OF FIRE RATED DOORS

REF NO: ENGAFC160805.3
ISSUE DATE: 27-Aug-16
PROJECT:
ADDRESS:
TYPE OF DOOR: TIMBER
ORIGIN COUNTRY: CHINA

DETAILS OF DOORS

ITEM	LOCATION	DOOR SIZE (FRAME SIZE)	Integrity / Insulation	FRAME	Smoke seal	QTY	SERIAL NO.	RELEVANT REPORT
1	L/F	1140(720)x2140(2100)mm (800 x 850 x 2110mm)	60 / 60 Minutes	Yes	Yes	1	EN/FC7512	Fire Report no.JF 12-125 & Smoke Report no.JF 12-127
2	L/F	1140 x 790 x 2010mm (1132 x 840 x 2110mm)	60 / 60 Minutes	Yes	Nil	2	EN/FC7533-EN/FC7534	Fire Report no.JF 12-125 & Smoke Report no.JF 12-133
3	L/F	1140 x 790 x 2010mm (1132 x 840 x 2110mm)	60 / 60 Minutes	Yes	Nil	1	EN/FC7535	Fire Report no.JF 12-125 & Smoke Report no.JF 12-135
4	L/F	1140 x 680 x 2040mm (800 x 740 x 2110mm)	60 / 60 Minutes	Yes	Nil	1	EN/FC7536	Fire Report no.JF 12-125 & Smoke Report no.JF 12-135
5	L/F	1140 x 670 x 2040mm (800 x 930 x 2110mm)	60 / 60 Minutes	Yes	Yes	2	EN/FC7537-EN/FC7538	Fire Report no.JF 12-125 & Smoke Report no.JF 12-138
6	L/F	1140 x 735 x 2040mm (830 x 790 x 2110mm)	60 / 60 Minutes	Yes	Yes	1	EN/FC7539-EN/FC7540	Fire Report no.JF 12-125 & Smoke Report no.JF 12-140

TOTAL NO. OF DOORS : 8 Sets

Fig. 3.15 Fire certificates issued by a door supplier for a few installed fire rated doors for a project, which contains such information as all the test results and associated drawings

Fig. 3.16 Fire Doors under test (Source: http://www.firepros.hk/en/Service.aspx)

In addition to fire rated materials being used to form fire barriers, brick or concrete walls can also be used to construct a fire rated wall as stipulated under the Code.

Fig. 3.17 Fire damper (Source: https://www.goldjet.com.hk/products-tc/)

TABLE E2

WALLS CONSTRUCTED WHOLLY OF NON-COMBUSTIBLE MATERIALS

Construction and Materials	Minimum thickness in mm (excluding plaster) for FRR of		
	240 mins	120 mins	60 mins
SOLID CONSTRUCTION			
Solid bricks of clay, concrete or sand lime without plaster	225	225*	100
Reinforced concrete -			
(a) containing not less than 1 per cent of vertical reinforcement	180	100	75
Concrete cover to main reinforcement	25	25	15
(b) containing less than 1 per cent of vertical reinforcement	240	160	120
Concrete cover to main reinforcement	25	25	25
HOLLOW BLOCK CONSTRUCTION			
Clay blocks (outer web not less than 13mm thick) of 2 cells not less than 50 per cent solid finished with 13mm gypsum plaster on each side		100	100
Concrete blocks of one cell in wall thickness not less than 50 per cent solid finished with 13mm gypsum plaster on each side			190

* Where finished with 13mm gypsum plaster on each side, the thickness may be reduced to 100mm.

A 100mm thick brick/concrete wall can be considered to be a fire barrier with FRR

Table E2 as extracted from Section E of the Code

Fire may go into a protected area through an air duct passing through a fire rated wall (if the air duct in an area is damaged by fire), so there is a need to install an item called fire damper within an air duct. When there is a fire, the closing action of the damper will be activated (by heat breaking a fuse/link or a signal from a central fire alarm system), blocking the inside of the air duct and preventing fire & smoke from running into the protected area.

If there is need for air ducts, cables and the like to pass through the walls with FRR, they may damage the integrity of the walls, and so these services have to be specially protected/covered by fire rated materials like Promatect boards and fire proof gypsum boards, while the junction of the opening on the wall and the services need to be sealed with special certified fire resistant sealants. If there is a ceiling with FRR in the Protected Exits, services passing through above the ceiling with FRR need not be separately protected.

Spreading of fire between floors of building

An interesting feature one may notice when visiting shopping centres with atriums is a down stand (can be glass panes) installed along the adjoining side of a ceiling with the atrium or just around a staircase area:

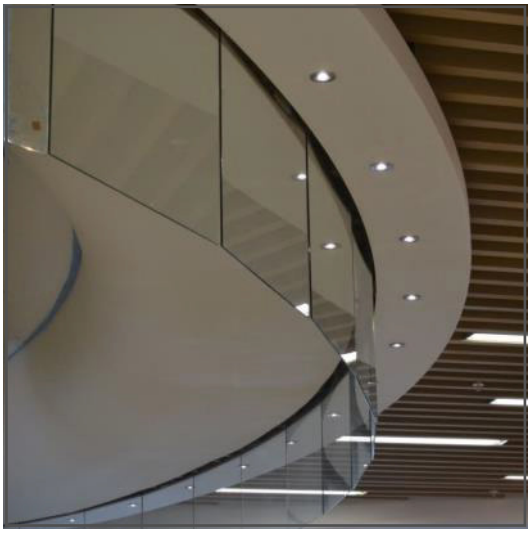


Fig. 3.18 A down stand made of glass panes

This 450mm long down stand (which has a FRR not less than -/30/-) is not to prevent the spread of smoke (there are gaps between each piece of the down stand) but to ensure the formation of a hot layer to activate the fire protection system like the fire alarm and the sprinkler system.

If there is **a pipe passing through a slab between two floors** (such as a drain pipe of a water closet with S-trap drainage arrangement), the pipe should be made of metal since other materials like plastic may melt or be burnt easily, allowing fire to quickly reach the upper floors. In the same way, **duct wells** in high rise buildings that allow the passage of M&E services between floors are also required to be fire rated so as to lengthen the time of their damage by fire.

To sum up, this chapter covers the following topics:

- MOE related to the routing for people to escape during fire;
- Fire Barrier so the route of fire escape can be protected from fire spread as well as damages caused from fire;
- Some features and items in an interior space that help to prevent the spread of fire.

To round up this chapter, it is perhaps helpful to briefly mention a few common fire-fighting devices within a premises to stop the occurrence of fire:

- **Fire Extinguishers:** different types of fire extinguishers are distinguished by their different color labels used for different fire situations.
- **Hose Reels (H.R.)/Fire Hydrant:** If interior designers are involved in the design of a new building or the renovation of the common areas of a building, they may need to design the appearance of the HR doors. HRs are normally situated at the common area of a building and are usually permanently installed. Interior designers may not need to make any changes if access to hose reels are not blocked. If, for some reason, the interior partitions are designed in such a way that the hose cannot reach some areas of the premises (the allowed maximum distance of a HR hose is 30 meters), additional HR may need to be added.
- **Smoke detector:** Smoke detector: this can be a stand-alone alarming device
- **Fire sprinkler system:** there are rules guiding the design of the system regarding the total required quantity of sprinkler heads and the distances between each sprinkler head. The following simple rules should help interior designers gain a basic understanding of sprinkler systems:

1. The distance between two sprinkler heads should not be more than 2 meters;
2. A normal area coverage for a sprinkler head is considered to be $12m^2$
3. If a ceiling void or floor void (under raised floor system, for example) is over 800mm in clearance, an additional layer of sprinkler system must be installed within the voids

- **Fire Shutter:** Roller shutters can be seen in many large buildings such as shopping centres. Often permanently rolled up with 2 sets of fire alarm and a smoke detector placed on either side, fire shutters are used to compartmentalize the building in the event of a fire to stop fire/smoke spreading, allowing more time for occupants to evacuate.

  A fire shutter will only be lowered (some can be closed horizontally too) when triggered by the fire alarm system, or by their own heat or smoke detector.

- **Pre-action system and FM-200 System:** Pre-Action System is also a kind of fire sprinkler system but the water pipes are NOT filled with water but pressurized gas like nitrogen until the occurrence of fire, which would initiate the process of filling the pipes with water, then performing as if a normal fire sprinkler system. The FM200 system is a literal DRY fire-fighting system by using a fire suppression chemical gas instead of water. These two types of fire-fighting system are employed for water sensitive environments like data centres, rooms with sensitive medical/public service facilities, etc., with FM200 being a more complete dry fire-fighting system.

Any building works related to the modification of fire-fighting systems has to be carried out by a licensed FS contractor, also known as RFSIC (registered fire service installation contractor) with a Certificate of Fire Service Installations and Equipment (eg F.S. 251) issued by it to the Director of Fire Services after work completion. Even though **the design of fire-fighting system is not the responsibility of an interior designer,** if designers are equipped with some knowledge of the Fire Services Code of Practice, they can better incorporate its requirements into their designs. Lastly, it is worth mentioning that, under the Fire Safety (Commercial Premises) Ordinance (Cap.502) implemented since 2 May 1997, The Buildings Department can take the initiative to issue directions, namely The Fire Safety Direction or Fire Safety Improvement Direction, to the owners of some specific commercial premises (which can be partly commercial and partly domestic) to improve the buildings' dated fire services installations. The purpose is to enhance the protection from the risk of fire for some older commercial premises or buildings. To understand the Ordinance better, please visit: https://www.bd.gov.hk/en/safety-inspection/firesafety/

CHAPTER 4

Barrier Free Access
by Simon Leung, Edwin Leung & Isaac Tam

With the enactment of the Disability Discrimination Ordinance in Hong Kong in 1995, discrimination against persons with a disability by failing to provide means of access to any premises that the public is entitled or allowed to enter or use, or by refusing to provide appropriate facilities, is now prohibited. For a new building or the alterations or additions to an existing building, the Disability Discrimination Ordinance stipulates that building plans must include satisfactory access for people with disabilities.

In view of this, the Buildings Department published the Design Manual: Barrier Free Access 2008. It provides detailed design requirements for various barrier-free facilities. In this chapter1, we will outline as well as describe the obligatory and recommended design requirements for several facilities as required by the Design Manual, including:

A) Access Route
B) Handrails
C) Corridors, lobbies and paths
D) Doors
E) Toilets and W.C. Cubicles
F) Signs

A) Acess Route

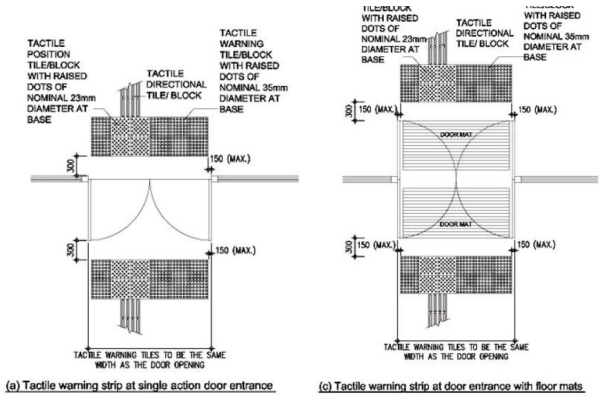
Access routes should ensure proper access for everyone to enter or leave a building independently as well as use its facilities, such as foyers, lifts, toilets, shops, restaurants, cinemas, etc. without undue difficulty.

An easily recognizable continuous and relatively level path free from obstruction or any kind of threats should be provided for persons with a disability to enter, move within and leave a building to reach the accessible facilities.

The width of an access route should not be less than 1050 mm, and should be free from barriers such as steps, kerbs other than dropped kerbs, steep ramps, doors or doorways which will prevent access by persons with a disability. The surface of an access route should be secure.

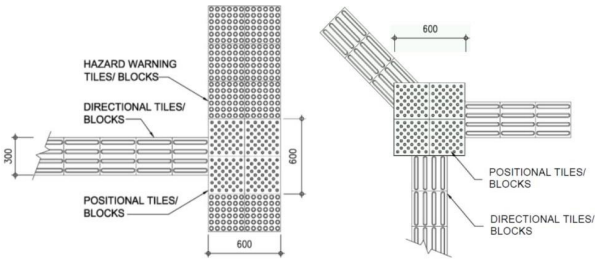
Tactile Guide Path

For categories of buildings as required in Appendix A, access routes shall be provided with a tactile guide path which illustrated in Figures 4.1 and 4.2, which should offer warning on different types of door entrances.



*All dimensions are in mm

Fig. 4.1-2 Tactile Guide Paths at Building Entrances Linking up with Initial Access on the Lot boundary and Interior Facilities



*All dimensions are in mm

Fig. 4.3-4 Typical Tactile Guide Path Junction

Design Conisderations

For an access to the building, it should be recognized that changes in levels are hard for peoples to access, including wheelchair users, people who use walking aids as well as those with visual impairment. Entry routes from the main entrance of a building should be wide enough to allow diverse users (wheelchair users and other users) to pass simultaneously. Easily identifiable access route (e.g. tactile leads path for persons with visual impairment) should be provided from the lot boundary to the entrance of a building. Indication signage for accessible entrances should be provided where more than one entrance exist in a complex building.

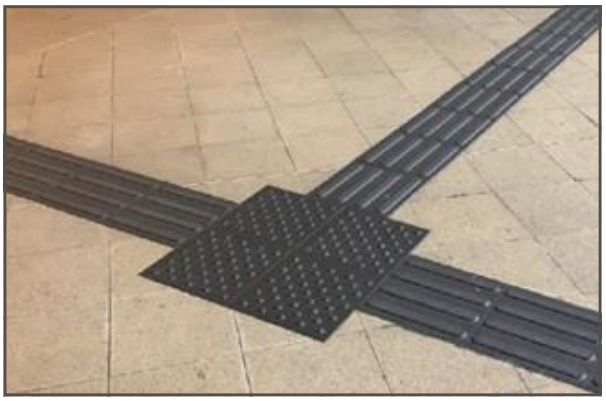
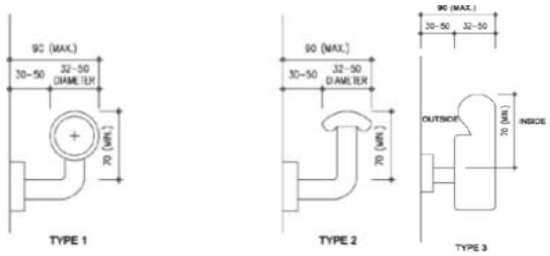


Fig. 4.5 Guide path

B) Handrails

Handrails support are especially helpful for the disabled and the elderly to utilize staircases, to pull themselves up inclines, check themselves on declines and to assist them in moving within the building. Handrails need to be in correct sizes, strengths and shapes so that can be conveniently located as well as provide secure hand-grips, and be capable of taking the entire weight of the persons who are using them.

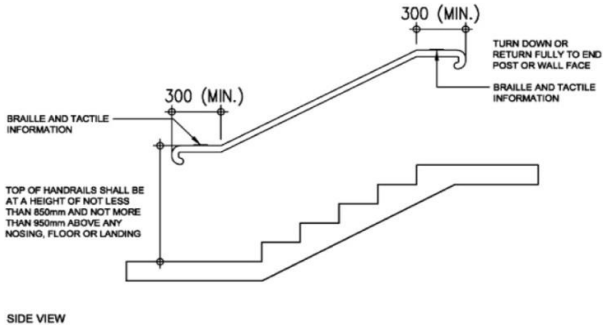
Typical handrail sections are shown in Figure 4.6.



*All dimensions are in mm
Fig. 4.6 Handrails

Braille and Tactile Information

Braille and tactile information on directional arrow and floor number should be provided on handrail on every floor at a labeled location as illustrated in Figure 1.5 to ease persons with visual impairment.



*All dimensions are in mm
Fig. 4.7 Handrails of Staircase

Design Conisderations

Handrail should be designed to provide stress-free, firm and comfortable grip to all users without any obstruction when people slide their hands along the handrail. The installation level of the handrail and also clearance dimensions should facilitate a safer grip in order to prevent hand injuries especially for the elderly and persons with visual impairment. The materials and shapes of handrail should be tailored to suit the elderly. Handrail should be set with suitable height for all users as well as extend safely beyond the top and bottom of a flight of steps or a ramp.

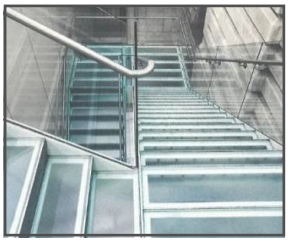


Fig. 4.8 This barrier-free handrail runs around the corner

Fig. 4.9 LED-lit handrail

Fig. 4.10 Tactile information at the end of a handrail

Fig. 4.11 Barrier-free, allround grip handrail

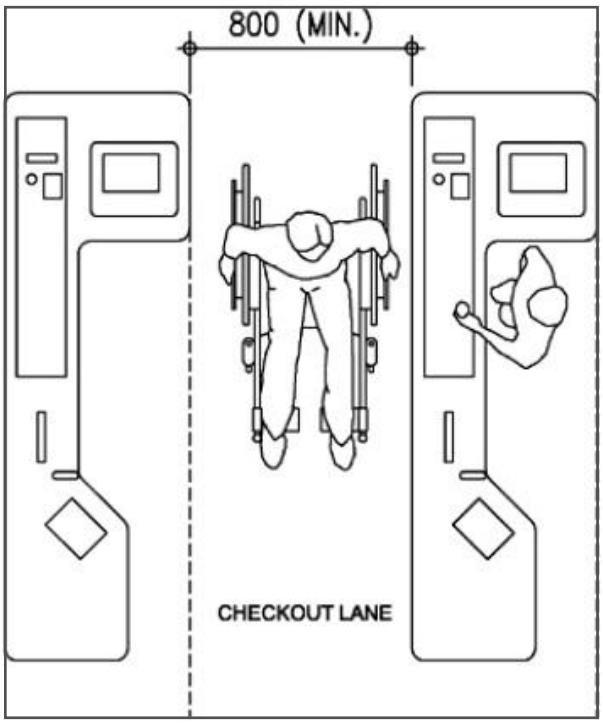
C) Corridors, lobbies and paths

Corridors provide for internal movement within a building. Lobbies provide interceptions at as well as interceptions at entries to staircases or lifts. Corridors, lobbies and also paths shall be designed to an appropriate standard in order to allow everyone to travel within a building safely and independently.

Space should be allowed for maneuvering wheelchairs in corridor, lobby, path and similar areas, and the law specifies the minimum width and length of corridors so as to allow wheelchairs to pass through.

Controlled Passage

For cashier counter, security device connected at shop entrance or turnstile controlled passage reachable to the public, each shall have at least one path of minimum 800 mm in width for the use by wheelchair users and clearly marked with international symbol of accessibility, unless an alternative passage adjacent to the controlled passage is provided. (see Figure 2.5)



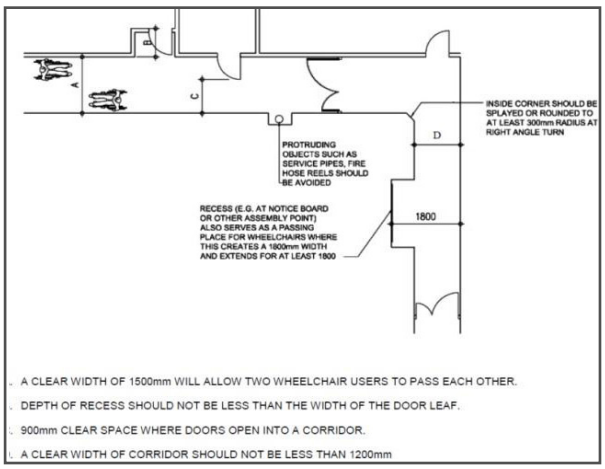
*All dimensions are in mm

Fig. 4.12 Width of Controlled Passages

Design Considerations

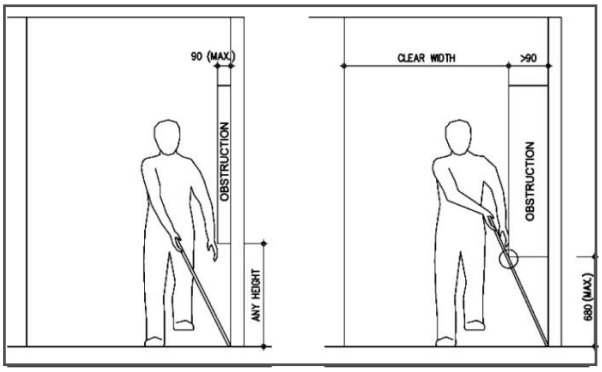
a) Corridors, lobbies as well as paths should be designed to have appropriate dimensions to permit people using wheelchair or other forms of mobility aids to pass on the access route.
b) In order to facilitate the way finding for persons with visual impairment, surfaces and finishes with luminous contrast between the wall and the ceiling, as well as between the wall and the floor should be adopted. Appropriate lighting design with adequate illumination should also be considered.
c) Adequate maneuvering space for wheelchair mainly in lobby and corridor of domestic building should be provided in order to facilitate the wheelchair users in passing through corridor especially when turning through 180° is required.

a) Protruding object can be hazardous to the persons with visual impairment as well as the general public. Examples of protruding obstruction are sign, drinking fountain, fire extinguisher, telephone enclosure, and underside of stairway or escalator, etc.



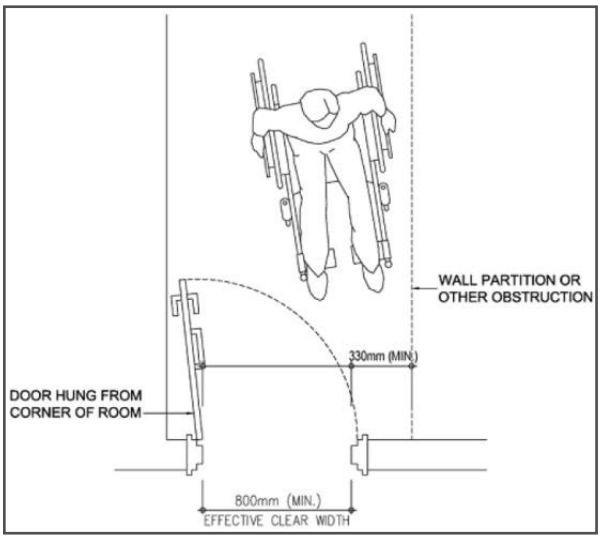
*All dimensions are in mm

Fig. 4.13 Dimension and Space Allowance for Corridor in Building



*All dimensions are in mm

Fig. 4.14 Examples of Design to Cater for Protusion Hazards



*All dimensions are in mm

Fig. 4.15 Plan of Door Suitablefor Wheelchair

Design Conisderations

Handles

Door handle shall not be less than 950 mm as well as not more than 1050 mm above the finished floor level, measured from the top surface of the grip.

Door Thresholds

Door threshold shall not surpass 20 mm in height and should be slanting to facilitate passage of wheelchairs.

Door closing devices

Door closing devices should be intended to allow exterior and interior doors to be opened with horizontal force of not more than 30 N and 22 N respectively. Door closing devices include door closer, spring hinge and floor hinge.

Frameless Glass Doors

If frameless glass door is used, it shall be clearly marked so as to make it visible. The marking shall be placed across on the glass door such that at least a portion of the marking is placed between 900 mm and 1500 mm above the finished floor.

Automatic Main Entrance Doors

Automatic doors should be provided to one of the main entrances, which is commonly used by the public, such as sports stadium, town hall, civic centre, theatre, museum, public library, shopping complex, sports complex, public swimming pool, office building, hotel and hospital.

Fig. 4.16 Transparent vision-panel

Fig. 4.17 Automatic main entrance doors

Fig. 4.18 Kick-plates

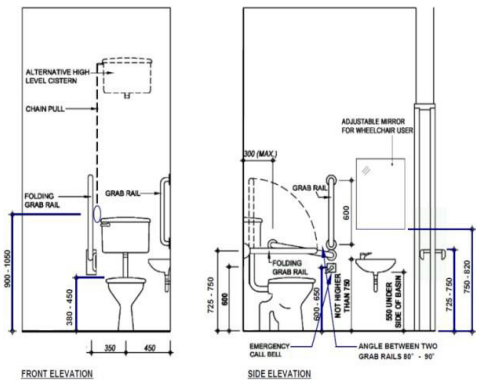
E) Toilets and W.C. Cubicles

The Design Manual states that sufficient properly designed and located toilet and W.C. cubicles shall be available for use to permit the elderly and disabled people, including wheelchair users to use the facilities provided in a toilet independently without assistance as far as possible. A typical disabled toilet is shown in Figure 2.16. Space requirements are set to enable a wheelchair user to maneuver into location for forward, side or diagonal transfer to and from the W.C. seat.

There should be at least one accessible W.C. cubicle on a floor, which should be designated as an accessible unisex facility for use by persons of both sexes.

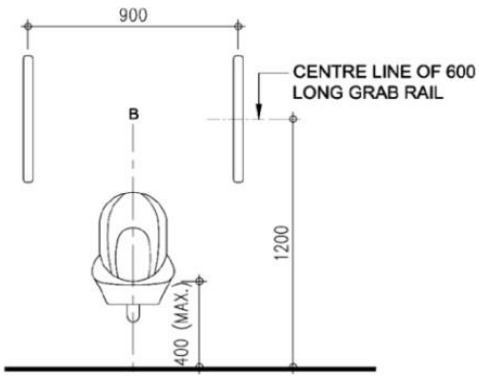
Design of Accesible W.C. Cubicle

The accessible W.C. cubicle shall not be less than 1500 mm x 1750 mm in area and the clear maneuvering space within the cubicle shall not be less than 1500 mm x 1500 mm. Water closets should be equipped with a back support such as a seat lid. Wash basins should also be of appropriate height for use by wheelchair users. Grab rail and emergency call bells are also required for the safety of users.



*All Dimensions arein mm

Fig. 4.19 Accessible Toilet



*All Dimensions arein mm

Fig. 4.20 Accessible Urinal

F) Signs

It is essential that suitable signs are erected at prominent and conspicuous positions inside and outside a building to indicate clearly the exact locations of facilities that are available for use by people with disabilities. To design an effective signage system, the needs of different types of users in a building and the complexity of the building layout must be considered.

Signs should give clear directions, information as well as instructions for the users of the building, and they should be erected to indicate clearly the exact locations of facilities. The international sign of accessibility is the wheelchair figure in white on a blue, as shown Figure 2.12. Directional arrows and visual information should be provided at conspicuous places in conjunction with the international character for accessibility.

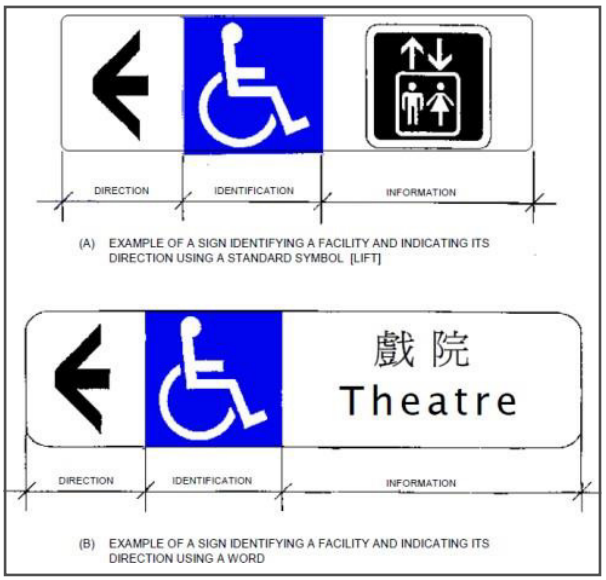


Fig. 4.21 DIrectional Signs

Sign for Persons with Hearing Impairment

International symbol of access for hearing loss should be provided if there is an assistive listening system provided for individuals with hearing loss.

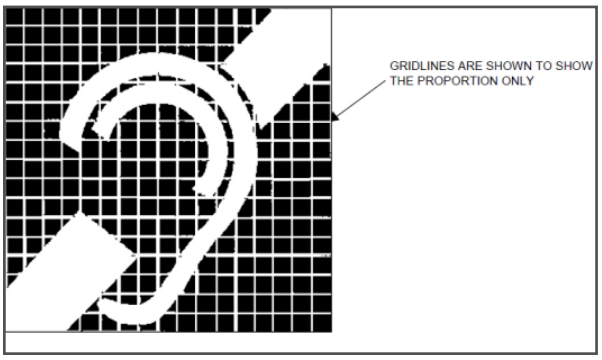


Fig. 4.22 Proportional Layout for International Symbol of Access for Hearing Loss

Braille and Tactile Sign

Braille and tactile sign should be indicated for toilets as well as fire exits, as well as for potential hazards such as stairs or escalators.

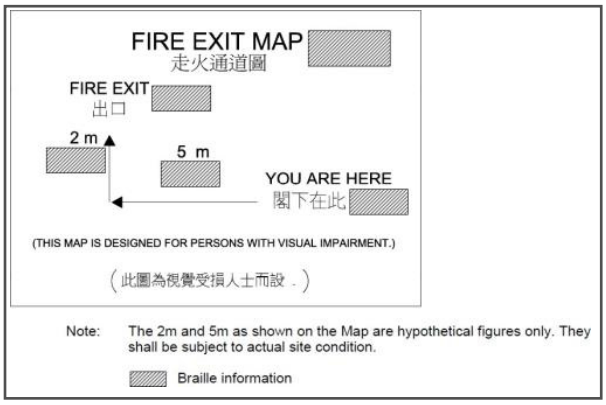


Fig. 4.23 Braille and Tactile Fire Exit Map

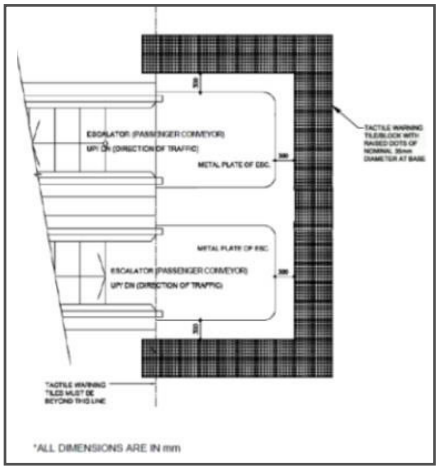


Fig. 4.24 Tactile Warning Strip to Escalator or Passenger Conveyor

Design Considerations

a) Signs should be clear and easy to read and understand in order to assist persons with intellectual, cognitive and sensory disabilities.
b) International symbols are to be used for purpose of standardization and apprehension by people of all nationalities.
c) Prominent signs with high color and luminous contrasts as well as special shapes should be used.
d) Information such as distance to the destination, name of building etc. should be conveyed to the persons with visual impairment. The recommended provisions are voice message and Braille and signs with high luminous contrast.

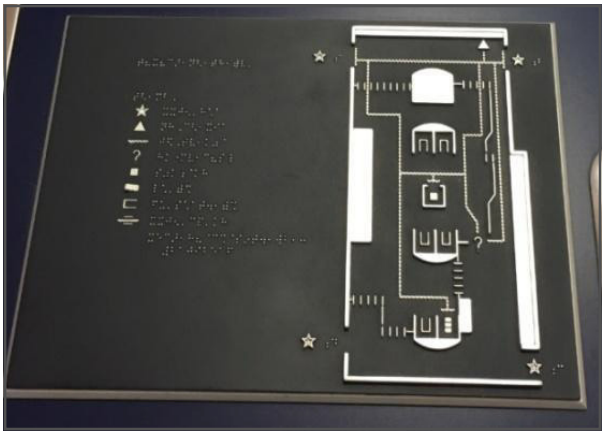


Fig. 4.25 Braille signage

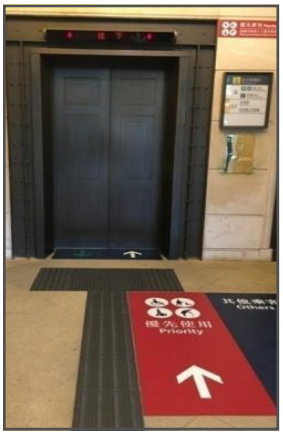


Fig. 4.26 Tactile Warning Strip to elevator

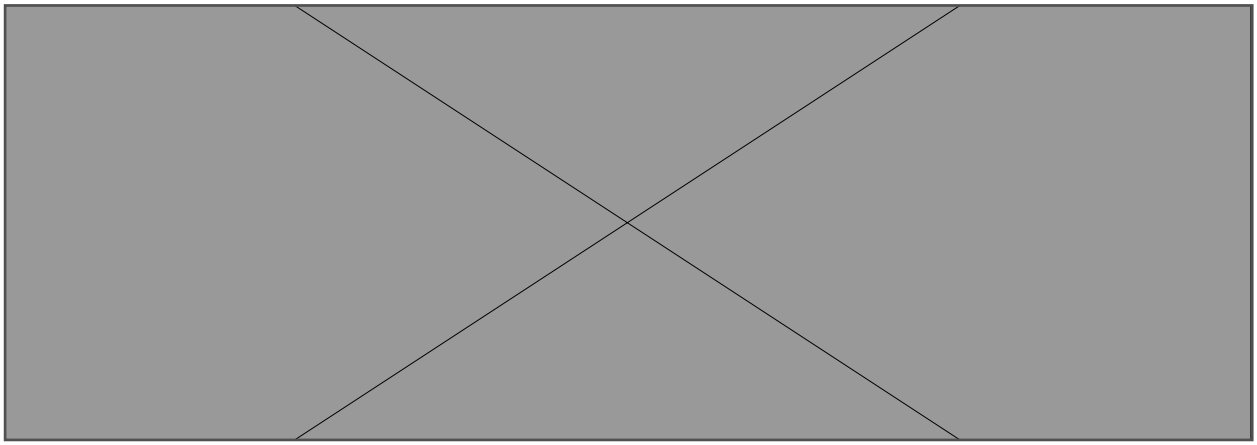


Fig. 4.27 Hong Kong Velodrome

Automatic door system

Automatic doors are used at the main entrances for each public building. The system works with motion sensor for automatic opening and safety sensor to stop the door from closing when people are entering the building. All the doors for bicycle races athletes going from velodrome to the racing track outdoors are designed with automatic doors to allow athletes to pass through with their bicycles.

Fig. 4.28 Automatic doors

Cam action door

The door closers, both concealed and surface overhead slide arm closers use cam action technology, which fulfill the barrier free requirement of closing force less than 22N for interior door and 30N for fire door and external doors. Moreover, the closers satisfy with its standard of BS EN1154 and fire requirement of BS EN 1634.

Built-in door selector

The floor hinges around the entrances of the velodrome are designed with built-in door selector to allow rebated double doors to close in sequence, which not only fulfill floor hinge standard BS EN1154 and door selector standard BS EN1158, but are also aesthetically pleasing.

Fig. 4.29 Door selector

Fig. 4.30 Cam action door closer

Accessible toilet

Grab rail, lever handle and lockset are installed to suit needs of wheelchair users. Grab rail at both sides of doors are new requirement under BFA2008. The door closer of the accessible toilet has delay action to provide sufficient time for users to pass through the door.

Fig. 4.31

Fig. 4.32

Fire rated door with electromagnetic hold open door closer

Fire doors should normally be kept closed. However, the fire doors located at the main corridor must be kept open to let users pass through. The use of electromagnet allows the door to be kept open but also fulfill FSD requirements. The closer will close the door if fire signal is received.

Emergency escape door

Emergency escape doors of the auditorium can be kept open to avoid panic situation and fulfill smoke vent requirements. An automatic door system with back up battery allows the doors to be held open in case of electricity failure.

Fig.4.33 Emergency escape door

Fig.4.34 Emergency escape door

Fig. 4.35

Fig. 4.36

The YMCA learning institute focuses on children, and therefore hardware in the door is concealed as much as possible. Hinges and door closers are also concealed. Lever handles are round-shaped to avoid injury to children. The doors have finger guards to prevent painful and serious finger entrapment accidents.

Fig. 4.37

Fig. 4.38

Fig. 4.39

The Tanner Hill, a housing development for the elderly commissioned by Hong Kong Housing Society, was designed to address Hong Kong's urgent demand for senior care facilities. It is not simply a residential development but also a place that provides a comprehensive range of health care and amenity facilities to encourage active social life and a healthy lifestyle to its ageing residents.

This project goes beyond the basic legal requirements outlined in the Building Department's *Design Manual: Barrier Free Access 2008* by providing innovative features that improve accessibility for users. "Ageing-in-place" is the design concept of **The Tanner Hill** development, which aims to provide senior residents with a range of thoughtful home and lifestyle amenities that effectively enhance both their health and well-being.

Driven by the "ageing-in-place" concept, universal accessibility is therefore one of the important design principles of the special architectural and interior design features geared towards senior residents, coupled with homey interiors and smart technologies. Higher degree of accessibility can empower and motivate senior residents, enabling them to live with freedom and self-sufficiency while enhancing their social connection and quality of life at the same time.

Target Residents:
The design and planning of The Tanner Hill take into account of the characteristics of elderly people, their daily routines and the operating requirements of senior dwelling facilities. The design is adaptable in a way that it caters for different health or mobility conditions of senior residents.

A) Access Route

Universal design is thoughtfully applied along the access route, from the main entrance of the development to the interior of individual units. A smooth emergency passage is particularly important, considering the health conditions and special health care needs of the senior residents. Not only is the route free from obstruction, supporting facilities and services have been planned as well to encourage senior residents to perform day-to-day activities independently.

a1) Main Entrance

The main entrance of **The Tanner Hill** is designed to be wide and spacious so that the loading and unloading bays allow ambulance access. The drop-off area with covers also provides weather protection for convenient access. Furthermore, a range of ancillary facilities and services are provided at the main entrance to strengthen the support that the senior residents may need. For instance, sofa seats in the well-lit lobby serve as buffer space for senior residents to take rest; a lavatory with accessible design is provided for their biological needs.

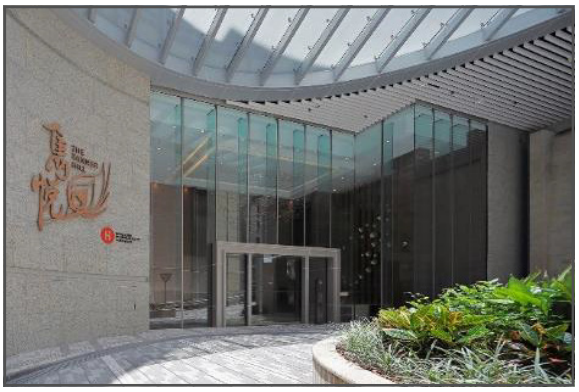


Fig.4.40 Smooth emergency passage provides sufficient loading space for ambulances

The lobby is equipped with various facilities catering to physical and biological needs:

- seating for physical needs and social gathering
- lavatory
- spacious design well-lit by natural lighting
- homely and well-lit lobby
- universal accessibility

Fig. 4.41 Lobby

Fig. 4.42 Lobby

a2) Lifts

Lifts are the most common vertical transportation and also provide accessible routes. At **The Tanner Hill**, the design of lifts accommodates the needs of elderly with different physical conditions and provides a comfortable and safe experience for users. Some of the lifts are designed to accommodate wheelchairs, mobile beds or stretchers, and are also equipped with built-in foldable seats for resting.

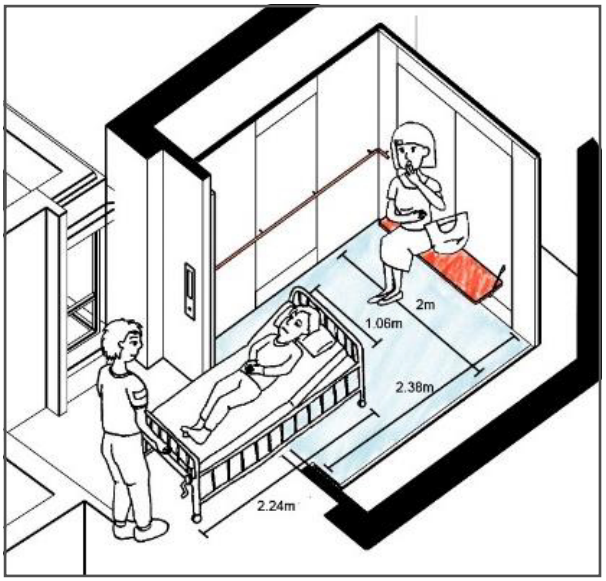


Fig.4.43 Smooth emergency passage provides sufficient loading space for ambulances

a4) Covered walkways

Walkways and terraces which link up the two towers are designed with covers. Shading allows protection from harsh weather and functions as a transition from indoor to outdoor environment.

Fig.4.46 Covered walkways provide weather protection

a3) Podium Gardens

A more active lifestyle driven by physical activities or exercises is crucial to elderly people so as to improve their physical conditions and strengthen their cognitive capability. At The Tanner Hill, there is a special Therapy Garden which was designed as barrier-free access at the podium level, where senior residents are encouraged to spend their leisure time or exercise. Some of the design features of the podium include:

- barrier-free accessibility
- wide walkways for wheelchair accessibility
- planters with knee space for seniors and wheelchair users
- walkways that are looped instead of dead-end
- benches are provided for resting
- spaces for outdoor activities
- plants with a variety of contrasting colours, texture, fragrance, butterfly attracting species to stimulate the senses

Fig.4.44

Fig.4.45 Podium: barrier-free accessibility

B) Handrails

Being able to move around provides autonomy and self-sufficiency for elderly people. At **The Tanner Hill**, handrails are designed throughout public spaces, including corridors, to support seniors as they get around.

Fig.4.47 Universal accessible public spaces: public spaces installed with supporting railings

C) Corridors

A corridor should not simply be a long boring passage in a confined indoor space; instead, it can be an interesting break-out space which brings in outdoor natural elements such as sound and light. Corridors at **The Tanner Hill** are not only wide and equipped with timber support railings for accessibility, the space is also designed for the wellness of senior residents. Timber grilles screened openings are installed to facilitate natural cross-ventilation while interiors with simple and decent pattern design integrate accessibility features such as LED lights on both sides, slip-resistance floor tiles and braille signs.

Fig.4.48 Corridors are bright and airy

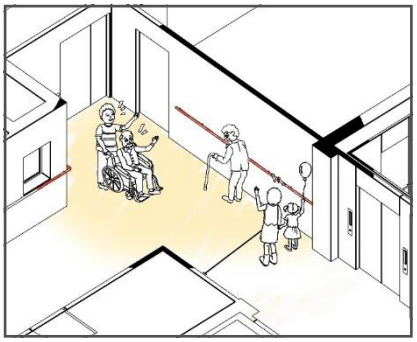


Fig. 4.49 Universal accessible public spaces: wide and spacious corridors installed with supporting railings

D) Doors

At **The Tanner Hill**, doorways of residential units are wider for wheelchair accessibility. Two-level viewers are adopted on doors to facilitate the needs of both of ordinary residents and wheelchair users.

Fig.4.50 Peep-holes on doors are installed at both of the standing and wheelchair levels

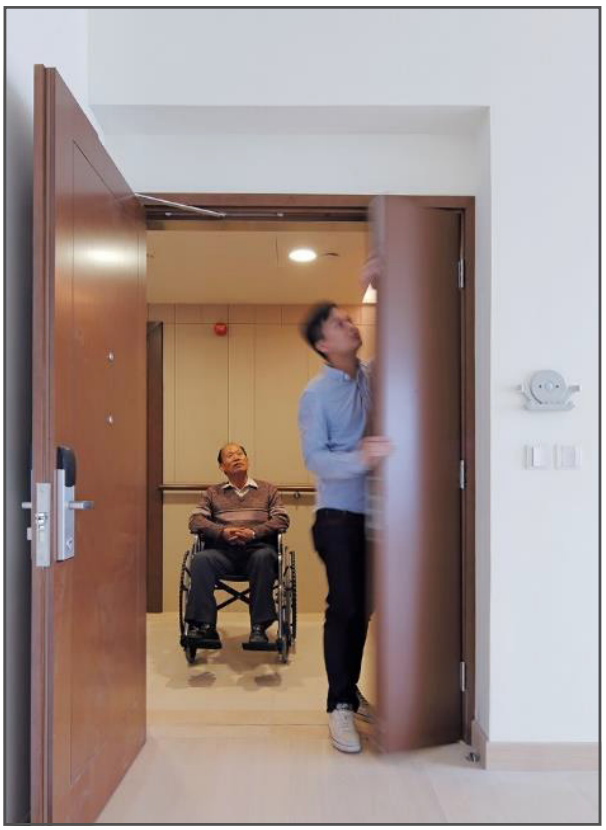


Fig. 4.51 Wide doorway

E) Toilets and W.C.

Cubicles Accidents and sudden illness could seriously impact on the elderly. **The Tanner Hill** is designed to assist elders in their daily lives so that they can still conveniently accomplish a majority of household tasks free of accidents. In private spaces like bathrooms or toilets, sliding doors instead of swing doors are installed to allow accessibility by wheelchair users. These sliding doors can be opened in emergencies to facilitate entry without hitting the senior residents who may have fallen or fainted. Other thoughtful design includes adaptable shower cubicles, foldable chairs in bathrooms and removable cabinets for additional knee-space of wheelchair users.

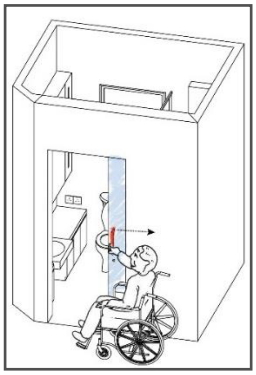


Fig. 4.53

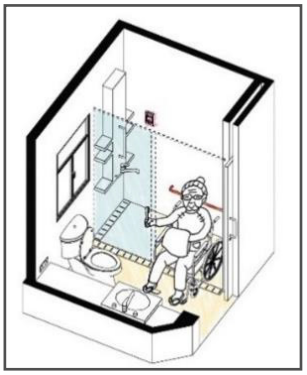


Fig. 4.54 Bathroom and toilets are installed with sliding doors that can be opened in case of emergency.

Fig. 4.52

Fig. 4.55

Fig. 4.56 Convenience and safety considerations: moveable / dismountable cabinets under wash basin allow knee space for wheelchair users

F) Signs

Elderly people, especially those with dementia, may have way-finding problems due to cognitive and perceptual impairments, particularly if the built environment lacks sufficient support to stimulate route learning, way-finding and topographical memory. Effective way-finding can support the safety of the elderly, stimulate long-term and temporary memory and increase independence.

At **The Tanner Hill**, contrasting warm-colour feature portal or wall with special lighting at entrances, lifts or exit doors are designed to assist senior residents to become familiar with the space and orientate their paths. Each floor level and emergency exits are marked in big fonts and strong colours so that even those with poor eyesight can read them easily.

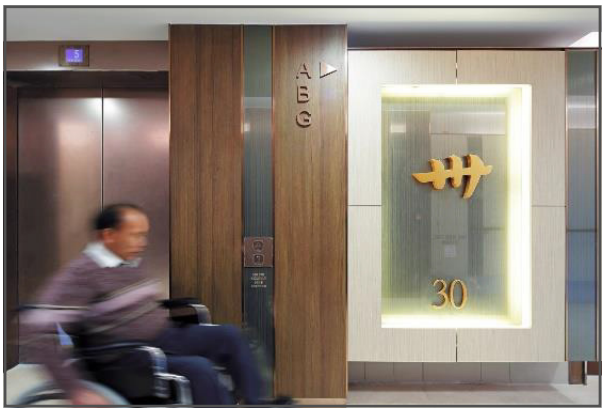


Fig. 4.57 Prominent signage: signage in bigger fonts and stronger colours is more readable by seniors

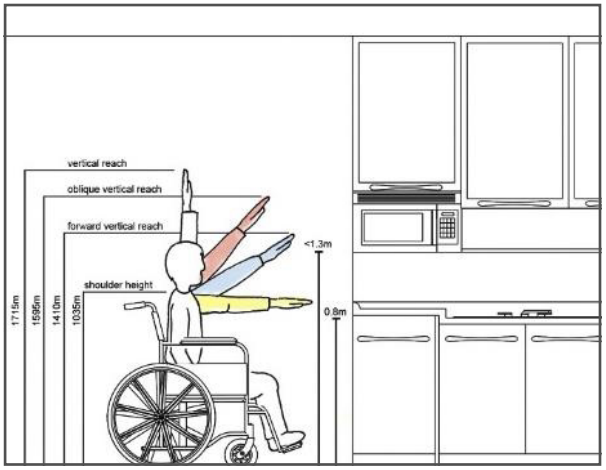


Fig. 4.61 Convenience and safety considerations: household designs that cater to wheelchair users

G) Other Safety and Convenient Design

To minimize the risk of accidents, waist-level (0.95m height) switches are installed to allow senior residents to reach the sockets safely without bending and risk losing their balance.

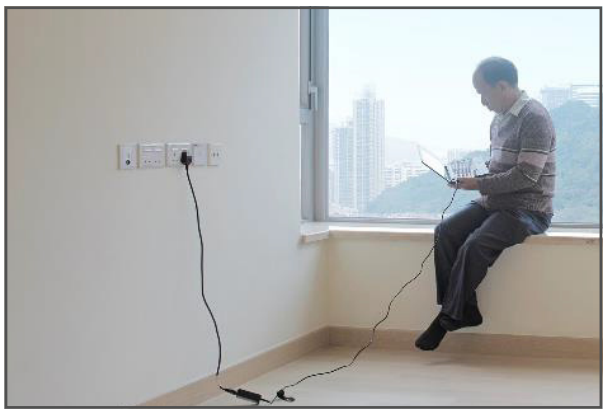


Fig. 4.58

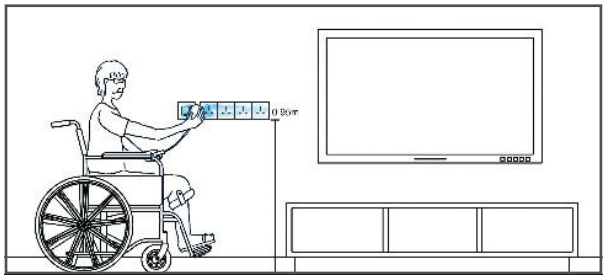


Fig. 4.59 Convenience and safety considerations: socket at 0.95m height

Fig. 4.60 Kitchen benchtops are lowered to 0.8m, and micro-wave cupboards are installed below 1.3m.

Appendix A

"Y" denotes "Applicable"

"-" denotes "Not Applicable"

EXTENT OF APPLICATION OF ADDITIONAL ASSISTIVE PROVISIONS TO VARIOUS USES OF BUILDINGS						
Uses of buildings	Required Additional Assistive Provisions listed below: -					
	Braille & tactile floor plan [para. 69(2) in Division 14]	Tactile guide path [para. 13 in Division 4 and para. 69(3) in Division 14]	Visual Display Board [para. 69(4) in Division 14]	Accessible Public Information / Service Counter [para. 70 in Division 15]	Visual Fire Alarm System [para. 5.2 in Chapter 5]	Assistive Listening System [para. 77 in Division 18]
1. Domestic use	-	-	-	-	-	-
2. Common areas of Office	-	-	-	-	Y	-
3. Department store and shopping complex	Y	Y	-	Y	Y	-
4. Hotel, guesthouse, hostel and bank	Y	-	-	Y	Y	-
5. Place for worship	Y	-	-	Y	Y	-
6. Cinema, theatre, concert hall, stadium, museum, theme park and purpose-built family amusement centre	Y	Y	Y	Y	Y	Y
7. School, college, university and public library	Y	Y	-	Y	Y	-
8. Factory, workshop and place for industrial use	-	-	-	-	Y	-
9. Sports complex and public swimming pool complex	Y	Y	-	Y	Y	-
10. Restaurant and food court	Y	-	-	-	Y	-
11. Indoor market and supermarket	Y	-	-	-	Y	-

EXTENT OF APPLICATION OF ADDITIONAL ASSISTIVE PROVISIONS TO VARIOUS USES OF BUILDINGS						
Uses of buildings	Required Additional Assistive Provisions listed below: -					
	Braille & tactile floor plan [para. 69(2) in Division 14]	Tactile guide path [para. 13 in Division 4 and para. 69(3) in Division 14]	Visual Display Board [para. 69(4) in Division 14]	Accessible Public Information / Service Counter [para. 70 in Division 15]	Visual Fire Alarm System [para. 5.2 in Chapter 5]	Assistive Listening System [para. 77 in Division 18]
12. Hospital, purpose-built clinic	Y	Y	Y	Y	Y	Y
13. Residential home for the elderly and welfare centre	Y	Y	-	Y	Y	-
14. Club house	Y	-	-	Y	Y	-
15. Transport station, interchange, passenger terminal	Y	Y	Y	Y	Y	Y
16. Carpark	Y	-	-	-	Y	-

CHAPTER 5

Sustainable Interior Construction
by Jimmy Law Ching-Hin and Eagle Mo

The construction industry in Hong Kong is one of its most environmentally impactful industries. According to the World Wildlife Fund's (WWF) Hong Kong Ecological Footprint Report 2010, the construction sector is the second largest contributor of the carbon footprint in Hong Kong. The construction sector influences the environment in two main ways. Firstly, the heavy machinery used in construction consumes fuel, water and electricity. Secondly, the construction of building facilities requires building materials such as cement, concrete, steel, wood, plastics, and many others, which consume energy and produce greenhouse gases during manufacturing process.

The International Federation of Interior Architects/Designers (IFI) recognizes "the role of interior design professionals to "design green" to maximize the positive impact of design in the development of buildings, products and spaces that minimize environmental harm, as well as enhance the quality of life and protect the health, safety, and welfare of the public." It encourages interior designers to use safe products and services; protect the atmosphere, use environmentally safe energy sources and use sustainable materials and resources.

Some of the ways in which interior designers can minimize the environment impact associated with construction are to incorporate sustainable building methods such as modular design, using pre- fabricated materials, and to consider designing for maximum adaptability.

Structural Elements	Structural Beams System
	Concrete Slab
	Concrete Flooring
Facade Elements	External Wall
	Bay-Window Unit
	Cladding Unit
	Utility Platform
Architectural/Internal Building Elements	Internal Partition/Wall Panels
	Door Sets
	Staircases
Building Services Elements	Fire Services
	Sanitary Fittings
	Luminaries
	Air-Conditioning Components

Modular Design

BEAM plus is a set of assessment criteria developed by the Hong Kong Green Building Council Limited (HKGBC), a non-profit, members-led organization which strives to promote the standards and developments of sustainable buildings in Hong Kong. BEAM Plus encourages the increased use of modular and standardized design to enhance buildability and reduce waste. Building components and materials produced in standard ranges of sizes can be interchanged. Materials should be dimensioned carefully to use standardsized modules to the greatest extent to minimize construction waste.

The benefits of adopting modular design are:

1. Minimize cost by reducing the diversity of parts in a product range.
2. Save design time as modules are simply selected are their reliability, cost and quality are easier to access.
3. Enable a fast, efficient customization of standard products for unique user needs.
4. Enable quick and easy upgrades for unique user needs.
5. Prevent obsolescence and shortens the redesign cycle.
6. Increase flexibility in use.
7. Easy and quick installation of products.
8. Shortens the learning curves for users to become familiar with products.

Modular design can be applied to many different parts of buildings. The checklist below includes some of the applicable aspects:

Pre-fabricated Materials

The idea of modular and standardized design from BEAM Plus aims to encourage prefabrication building elements in order to reduce wastage of materials and quantities of on-site waste.

Prefabrication of material is the manufacture of sections of a building at the factory so they can be easily and rapidly assembled at the building site, thus improving the buildability of the building. Since the factory fabrication of building elements is conducted under controlled conditions, it allows for more efficient disposal of debris and waste. Noise, dust, site traffic and other environmental nuisances can also be reduced. Interior millwork and custom metalwork should be detailed to be shop-finished and installed to the highest degree to limit the need for on-site painting and finishing work.

The benefits of adopting pre-fabricated materials are:

1 Speed up construction time, lower labor cost.
2 Ensure precise conformity to building code standards.
3 Protect materials from exposure to the elements during construction.
4 Higher safety and comfort levels than in site-built construction.
5 Ensure higher energy efficiency by quality control and factory sealing

Pre-cast concrete can be used in various building parts, including:

i Facades
ii Staircases
iii Slabs
iv Balcony/Utility Platform
v Parapet
vi Partition Walls

Fig. 5.1 Pre-fabricated housing materials

Design for Adaptability

The idea of design for adaptability from BEAM Plus aims to encourage the design of building interior elements and building services components that allow modifications to space layout, and to reduce waste during refurbishment and deconstruction.

Adaptability refers to the capacity of buildings to accommodate substantial changes. The advantages of achieving design adaptability is to increase the flexibility of the building, enable minor shifts in space planning; increase convertibility, allow changes in use within the building, facilitate additions to the quantity of space in a building; increase the longevity of buildings; improve operating performance, and allow more efficient use of space and yield more economic benefits.

Design for adaptability can be divided into two aspects: 1) Spatial Adaptability and 2) Flexible Engineering Services.

Fig. 5.2 Demountable partition walls

1) Spatial Adaptability

The ASTM (American Society for Testing Materials) International, a globally recognized leader in the development and delivery of voluntary consensus standards, provides guidelines for achieving spatial adaptability, which includes the following key points:

I. Use of adaptabe floor plans, including large grids that can be subdivided
II. Spaces designed for a loose fit rather than a tight fit.
III. Inclusion of multifunctional spaces.
IV. Design that allows interior fitting-out to use modular and pre-fabricated components.
V. Designed spaces to minimize the physical change that occupants may need to bring
VI. Easy relocation of partition walls that cause minimum damage to flooring or ceiling systems.
VII. Fully salvageable partition walls
VIII. Separate long-lived components from shortlived components to facilitate the collection process for recycling.
IX. Use of interior partitions that are demountable, reusable and recyclable.

2) Flexible Engineering Services

Pointers for increasing the adaptability of engineering services include the following:

I. Design that allows interior fitting-out to use modular and prefabricated components.
II. Use hybrid HVAC systems with a balance between centralized components and distributed components.
III. Use luminaries that easily relocated within ceiling grid or uplighters.
IV. Use air diffusers on flexible duct.
V. Use exhaust air ducts for special exhaust.
VI. Use sprinkler heads that are easily relocated within ceiling grid.
VII. Apply pre-wired horizontal distribution systems in ceilings or floors.
VIII. Reduce the use of embedded infrastructure for power, data and HVAC systems.

Fig. 5.3 Air duct

Sustainable Construction Methodology

During construction, air quality may be downgraded and noise pollution may also be generated, not only affecting the environment but also affecting the occupants. Therefore, control and mitigations should be conducted to minimize the potential risks.

(a) Construction IAQ Control

IAQ (Indoor Air Quality) control measurement can be conducted according to guidelines provided by BEAM Plus. Hong Kong's Air Pollution Control Ordinance (APCO) is the main legislative framework governing the control of air pollution activities. Regulations in five sub-areas are further made under APCO: Construction Dust Regulations; Specified Processes Regulations; Smoke Regulations; Fuel Restriction Regulations; and Open Burning Regulations.

To be specific, the followings are examples of mitigation.

HVAC System

I. Sealing of ductwork and air handling equipment installation with plastic sheeting.
II. Protection of HVAC system to avoid cutting off a room from its outdoor air supply.
III. Use mechanical system during construction, shut down HVAC system during construction.
IV. Duct cleaning and filter replacement after construction.

Contaminant Source Control

I. Specify low emitting and non-toxic products or materials to be used, such as zero or low VOC content materials; formaldehyde-free composite wood products; phthalate- free compounds; chairs free of PBDE flame retardants; mercury-free paints.
II. Keep building materials that have moisture absorbing properties dry to prevent the growth of mold and bacteria.
III. Minimize exhaust fumes from idling vehicles, gasoline and diesel fueled tools.

Pathway Interruption

I. Ventilation using 100% outside air should be used to exhaust contaminated air directly to outside area during installation of VOC emitting materials.
II. Isolate areas of work to prevent contamination of clean or occupied spaces by creating pressure difference.
III. Recover, isolate and ventilate containers housing toxic materials by designated storage excluding heating, ventilation and air conditioning equipment rooms or by plastic sheeting for volatile, loose or adsorptive materials.

Fig. 5.4 Provision of fresh air during construction.

(b) Construction Noise Control

Noise problems during construction may affect the neighborhood and there is a need to minimize such nuisance. In Hong Kong, noise related to construction activities is controlled under the Noise Control Ordinance (NCO), which aims to enhance the environmental awareness of the construction industry and to provide steps and practical solutions to identify and mitigate environmental problems which may be encountered on construction sites.

Examples of 'good practices' with respect to further reducing noise nuisance from construction activities include erection of barriers and use of enclosures, and the use of appropriate equipment, such as:

i. Hydraulic piling hammers.
ii. Hydraulic crushers instead of conventional excavator mounted breakers.
iii. Wire saw for concrete cutting rather than excavator mounted breakers.
iv. Acoustic enclosures for hand-held breakers and generators.
v. Acoustic barriers for large equipment.
vi. Disposal of rubble through plastic chutes.

Sustainable Building Materials

(a) Reused Materials

Rapidly renewable materials in appropriate applications should be used whenever possible. Rapidly renewable materials are materials that substantially replenish themselves faster than traditional extraction demands, and do not result in significant biodiversity loss, increased erosion, or air quality impacts.

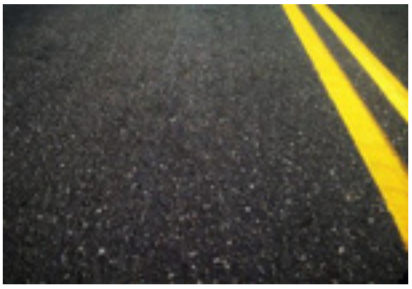
Below is a list of rapidly renewable materials and suggested applications. Designers should not specify materials that present fire hazard when installed.

Flooring	Bamboo
	Natural Linoleum
	Cork
	Other rapidly renewable materials
Panels/ Partitions	Sunflower Seed
	Bamboo
	Wheatboard
	Other rapidly renewable materials
Cabinetry/Fittings	Wheatboard
	Strawboard
	Soy bean composite
	Bamboo
	Other rapidly renewable materials
Insulation	Cotton
	Strawbale
	Soy-based foam
	Other rapidly renewable materials

(b) Recycled / Up-cycling Materials

The use of recycled materials can help reduce the consumption of virgin resources. Waste materials and industrial by-products can be employed in building construction in an unprocessed form, such as fill material, or processed to a limited degree for use as aggregate in concrete, or used as raw material for manufacturing building products.

Below are some examples of recycled materials for construction industry, as suggested by the Hong Kong Environmental Protection Department (EPD).

Recycled Materials	Uses	Local examples	Photo examples
Aggregate	Sub-base material for road construction, hardcore for foundation works, base/fill for drainage, aggregate for concrete manufacture and general bulk fill	Pilot studies carried out by the Works Departments	
Asphalt	Aggregate fill and sub-base fill	Pilot studies carried out by the Works Departments	
Excavated Materials	Filling materials	Housing Department's building projects	
Land Fill	Land reclamation	Land formation at Public Filling Areas	
Pulvurized fuel ash	Manufacture of concerete products, uses in fill and reclamation, highway construction and reinforced soil structures	Construction of Chek Lap Kok Airport, structural concerete for foundation works in the Housing Department's building projects	

Recycled Materials	Uses	Local examples	Photo examples
Metals	Manufacture of new metals	Widely practied in local construction industry	
Glass	Manufacture of eco-pavers, eco-partition blocks and glassphalt, substitute for sand and aggregates as motar, backfilling and reclamation materials	Use of eco-pavers by the Works Departments for road paving. Studies and trial uses are being carried out by the Works Departments for other applications	
Plastic	Synthetic materials in form of plastic lumber for landscaping, horticulture and hydraulic engineering	Used at some public recreational facilities as garden furniture	
Rubber	Manufacture of rubber slate tile use in roofing and sport/playground surface mat	Used at some public recreational facilities as playground surface mat	
Expanded polystyrene	Manufacture of lightweight concrete for non-structural works	Used in manufacturing lightweight concrete in Housing Department's building projcets	

(c) FSC Wood

FSC (Forest Stewardship Council) is a certification system that provides internationally recognized standard-setting, trademark assurance and accreditation services to companies, organizations, and communities interested in responsible forestry. It sets standards for responsible forest management. A voluntary program, FSC uses the power of the marketplace to protect forests for future generations.

The 10 principles of FSC are: 1) compliance with laws and FSC principles; 2) tenure and use rights and responsibility; 3) indigenous peoples' rights; 4) community relations and worker's rights; 5) benefits from the forest; 6) environmental impact; 7) management plan; 8) monitoring and assessment; 9) maintenance of high conservation value forests; 10) plantations.

Fig. 5.5 FSC certified wood

(d) Finishes with Low VOC Content

VOCs includes hundreds of chemical compounds found in indoor environments, from trace levels to levels that can cause various symptoms, such as eye and throat irritations, respiratory problems or headache.

Application of low VOC content finishes reduces toxins which is beneficial to occupant's health; reduces landfill, groundwater and ozone depleting contaminations; performs well in terms of coverage, scrutability and hideability; easily cleans up with soap and warm water; low odor during application; no odor once cured, no off-gassing. Painted areas can be occupied sooner, and with no odor complaints.


Fig. 5.6 Low VOC content finishes

CHAPTER 6

Evaluation of a Built Environment by Jimmy Law Ching-Hin and Eagle Mo

Importance of Built Environment Evaluation

In general, built environment encloses the physical makeup of where we live, learn, work, and play, which also involves our homes, schools, businesses, streets and sidewalks, open spaces, and transportation options. The built environment can influence overall community health and individual behaviors, such as encouraging physical activity and healthy eating.

The evaluation of built environment brings the impact and feedbacks of settings on behavior from built environment, which is essential for bringing about positive changes and improvements, for otherwise it is very difficult for designers to judge the impact of their creations.

By conducting such evaluations, the built environment performance can be measured and clarified, communication between participants can be enhanced, alternatives can be developed, and professionalism can be advanced.

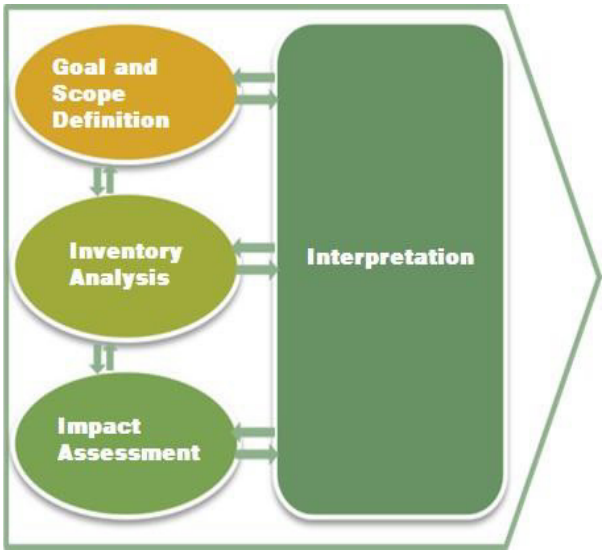


Fig. 6.1 The graph above shows the major phases for LCA:

Post – Occupancy Survey

There are several tools to evaluate the suitability of built environment, including (a) life cycle assessment, (b) indoor air quality assessment and (c) end-user evaluation.

(a) Life Cycle Assessment

According to The United Nations Environment Program (UNEP), Life Cycle Assessment (LCA) is a tool for the systematic evaluation of the environmental aspects of a product or service system through all stages of its life cycle, from raw material, processing, transportation to the construction and post-occupancy. It gives out an acceptable apparatus for environmental decision support, sustainability measurement and is vital for accessing a life-cycle economy.

The LCA compares the full range of environmental effects of products and services by quantifying all inputs and outputs of material flows and processing how these material flows impact the environment.

- Goal and Scope Definition: Define the product(s), service(s), and the required level of details, a functional basis for comparison is chosen.
- Inventory Analysis: Analyze the extractions, emissions, energy, raw material used and emissions to the atmosphere, water and land. Combine to the flow chart and relate to the functional basis.
- Impact Assessment: Group and quantify the effects of the resource use and emissions generated into a limited number of impact categories which may then be weighted for importance.
- Interpretation: Report the results in the most informative way as possible; evaluate the need and the opportunities to reduce the impact of the product(s) and service(s) on the environment systematically.

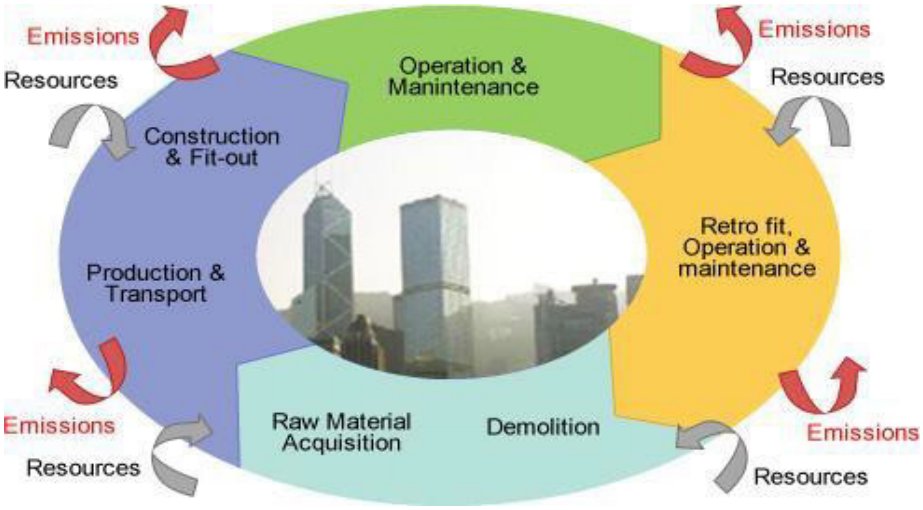
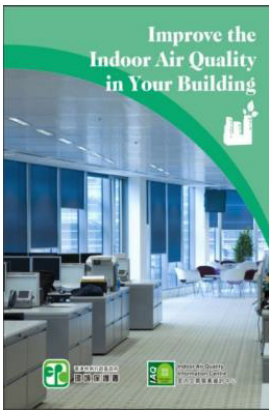


Fig. 6.2

The above graph shows the Life Cycle of Buildings from the Hong Kong Electrical and Mechanical Services Department (EMSD). Life Cycle Energy Assessment (LCEA) of building construction covers a range of the issues relevant to sustainable building development. LCEA includes the entire life cycle of the product, process or activity, encompassing extracting and processing materials; manufacturing, transportation and distribution; use, reuse, maintenance; recycling and final disposal.

(b) Indoor Air Quality Assessment



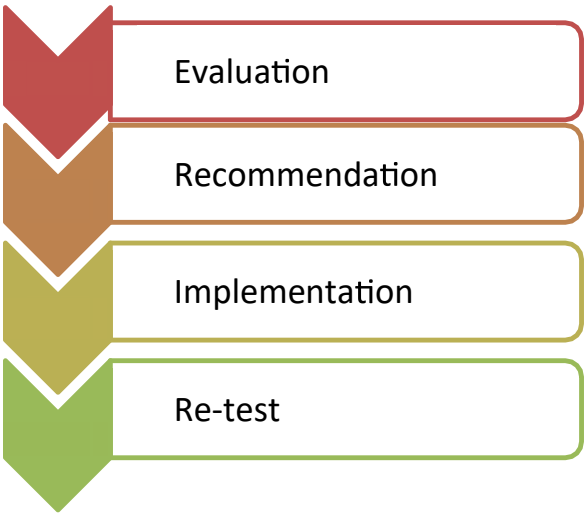
According to BEAM Plus, buildings, specifically those with extensive ventilation systems, can be plagued with indoor air pollution arising from residuals left in Heating Ventilation and Air-Conditioning (HVAC) and mechanical ventilation system. Therefore, it is very crucial to ensure that building ventilation systems are not contaminated by residuals left over from construction activities by implementing Indoor Air Quality (IAQ) Assessment.

IAQ Assessment aims to minimize the air pollution effects that may be by controlling pollutant sources, interrupting pathways for contamination, enforcing proper housekeeping and coordinating schedules to minimize disruption. To conduct the IAQ Assessment, a Construction IAQ Management should be included to demonstrate compliance; filter replacement and flush-out, the detailing of the technological information of filtration media used during construction should be completed immediately prior to occupancy.

(c) End-User Evaluation

Last but not least, End-User Evaluation focuses on how well actual users think the products are for achieving their goals. In this case, the evaluation should be about the users' feedback on the built environment. To gather their feedback, several methods can be used, such as surveying, interviewing, meeting.

It is necessary to obtain the feedback from users in order to create and modify a better user-friendly design. Procedures for conducting the End-User Evaluation can be as follows.



The four steps are: evaluate the collected data; recommend and analyze useful data; implement improvements; and re-test to measure the effectiveness of new implementation.

CHAPTER 7

Interior Design for the Food and Beverage Industry - Regulatory requirements by Kinney Chan

The food and beverage sector plays an important part in the interior design industry in Hong Kong. The city is world-renowned as a culinary hub and one can find authentic foods from all over the world here. The competition in the sector is fierce and many new restaurants open every year, but because of high rents, many also go out of business. As establishments come and go, it is rare for a restaurant that remains in business for over five years. Some restaurants in shopping malls may be forced to close down because the landlord wants a new image for the mall. That is why in the interior design business, firms that service the food and beverage sector are never short of new projects to do.

For interior designers, designing for the food and beverage sector is different from other commercial design projects, because in Hong Kong, premises must obtain proper licenses before being qualified to operate. Firms that design restaurants must adhere to Hong Kong laws because their designs will be scrutinized by the Food and Environmental Hygiene Department, which will determine whether to grant an operating license to the premises.

Consequently, interior designers must be familiar with the terms and regulations concerning the relevant licenses in order to produce satisfactory designs for their clients.

Fig. 7.1 A western-style restaurant in Hong Kong

There are several main types of restaurant licenses in Hong Kong: both General Restaurant License and Light Refreshment Restaurant License holders can serve food, but the former allows operators to prepare raw food on the premises, while holders of the latter can only reheat prepared foods. Other types of licenses include Food Factory, which gives licensee the right to prepare and manufacture food but not serve customers. Club houses can only serve food and drinks to members. Different types of licenses have different requirements for facilities.

Before embarking on the design process for restaurants, designers must first assess whether it is possible for the premises to obtain a restaurant license to operate. For example, some spaces may not be able to meet fire regulations. Premises exceeding a certain size must contain two means of access in case of fire, and the two must be spaced adequately apart instead of being in the same position. Many Hong Kong buildings contain attics, which may not offer sufficient means of escape and therefore would not be able to satisfy the licensing requirements. However, if the attic was simply used for storage rather than as seating area, then it is permitted.

Several governmental departments are involved in the application for restaurant licenses. They include the aforementioned Food and Environmental Hygiene Department (FEHD), which is concerned with food preparation and hygiene issues. First and foremost is that there should be adequate space for food rooms, which include kitchen, food preparation room and scullery accommodation. Depending on the overall size of the premises, a certain percentage of the floor area must be reserved for food rooms. In addition, hygiene is also an important consideration. FEHD has established guidelines regarding the wall and flooring material for the food preparation area, and requires that only non-absorbent materials be used, such as ceramic tiles, stone, metal and glass, while materials such as wood are absorbent and not allowed to be used in these areas.

In addition, FEHD also laid out strict requirements regarding waste water treatment. For example, there has to be floor drains to allow for waste water disposal. In addition, there should not be 90 degree straight angles between the wall and the floor in the kitchen area in order to avoid dirt accumulation. Unless a designer had experience with restaurant design, he or she may not be aware of these details.

FEHD also places great importance on toilet facilities, and stipulates that restaurants must provide adequate toilets. Restaurants located in shopping malls can have toilet facilities in the mall area, but must submit floor plans to the department stating the exact location of the facilities. The size of the toilets is also regulated. For example, cubicles must be at least 1.2m x 0.7m in size, wash basins must be at least 350mm in length, while there must be at least 500mm x 500mm of standing room in front of urinals. The number of toilet cubicles provided depends on the overall capacity of the restaurant.

There are also regulations regarding air exhaust system. If the smoke exhaust is near residential areas, there has to be emission control facilities in place. Waste water has to be discharged into grease traps or other treatment facilities, thus preventing waste water from clogging up the sewers and avoiding pollution.

Fig. 7.3 Floor drain

Fig. 7.4 Smoke exhaust

Fig. 7.2 A kitchen in a restaurant operating under General Restaurant License

Aside from FEHD, two other governmental departments are also involved in restaurant licensing. The first is the Buildings Department, which is responsible for inspecting whether there are any illegal structures. If so, licenses cannot be issued. Officers from the Buildings Department will make on-site inspection, which involves comparing the floor plans they have on file with the actual premise to see if there are structural alterations. The Buildings Department will then issue a report to FEHD.

Also, some older buildings may not be able to provide facilities for the disabled, and may have to obtain exemption from such requirements. New buildings, on the other hand, are required to provide disabled facilities. The Buildings Department must also ensure that such facilities as ramps and toilets for the disabled are up to standard.

Another important party is the Fire Services Department. They are chiefly concerned with whether the premises contain adequate means of escape in case of fire. For example, exit routes have to be at least 1050mm in width and must not be obstructed. In addition, there should be adequate and suitable fire extinguishing devices such as hose reels or sprinklers. Fire resistant facilities in the kitchen are also important. For instance, the kitchen should be enclosed by walls and floors having a fire resistance period of not less than one hour, and there has to be dry powder type fire extinguishers present in case of fire.

Electrical and Mechanical Services Department (EMSD) is another relevant government department. They are responsible for inspecting the electric supply of the premises. In addition, if the restaurant uses electricity, town gas, liquefied petroleum gas (LPG) or natural gas as fuel, electrical or gas contractors registered with the EMSD must certify that the electrical or gas installation in the restaurant complies with relevant legislative requirements and codes of practice.

Fig. 7.5 Fire hose reel

When designing food and beverage establishments, interior designers ought to take into account these facilities. Restaurants must fulfill legal regulations, and designers should not ignore them in favor of aesthetics concerns, for failure to satisfy these requirements means the restaurant cannot obtain a license to operate. Aesthetics, style, spatial arrangement and marketing represent another level of consideration. Good interior designers should also be familiar with restaurant operations, target clients' preferences and habits.

Fig. 7.6 Restaurant exterior

CHAPTER 8

Design for Residential Care Homes
by Patrick Lau Sau-Shing

In Hong Kong, there are various ordinances governing the operations of public institutions such as schools and old age homes, and operators have to obtain proper licenses before these facilities can open their doors. There are regulations underlying such ordinances which state the legal requirements regarding various aspects of those institutions, such as the size and dimension of rooms, number of toilet facilities, etc. Interior designers should adhere to relevant requirements so as to enable their clients to obtain operating licenses.

For some building types, the requirements for means of escape is different from that stated in the Buildings Ordinance. For the design of school buildings, for example, the regulations under the Education Ordinance stipulate a certain number of toilet facilities for male and female students, depending on the gender distribution of that school. If the school is equipped with a science laboratory, the walls and doors must satisfy certain fire resistant requirements.

Laws are constantly evolving, so designers must keep up with the times. For instance, there had been news reports in the past that over 300 old age homes in Hong Kong did not meet licensing requirements, and as a result were only granted temporary exemptions. This was because many such homes did not satisfy the requirements under the Residential Care Homes (Persons with Disabilities) Ordinance, passed in 2011, which, for example, requires that the passageways and exits in such homes be wide enough for access by people on wheelchairs. Yet, many existing homes are located in cramped buildings and are thus unable to fulfill such requirements.

The old age population in Hong Kong is constantly increasing. In 2015, the percentage of people over the age of 65 is 5.3%, but by 2064, that percentage will rise to 36%. Taking care of the needs of older people will become an important future trend, and interior designers must be prepared to meet this challenge.

The current regulations often represent the minimum requirements, but designers can often consider user needs and go the extra mile. In 1986, Design Consultants Ltd., a firm headed by the present writer, was commissioned to design a centre for the blind in Shum Shui Po for the Hong Kong Society for the Blind, which contained a home for the aged blind. Each room had six beds, with bathrooms located outside the room. Despite the fact that the Residential Care Homes (Persons with Disabilities) Ordinance was not yet in effect, the design included such forward-looking features as handrails along the corridors, signs with Braille signage and elevators with voice announcements. It was the first building in Hong Kong with such facilities, and the project won the Design Award for the Most Accessible Building in Hong Kong in 1989.

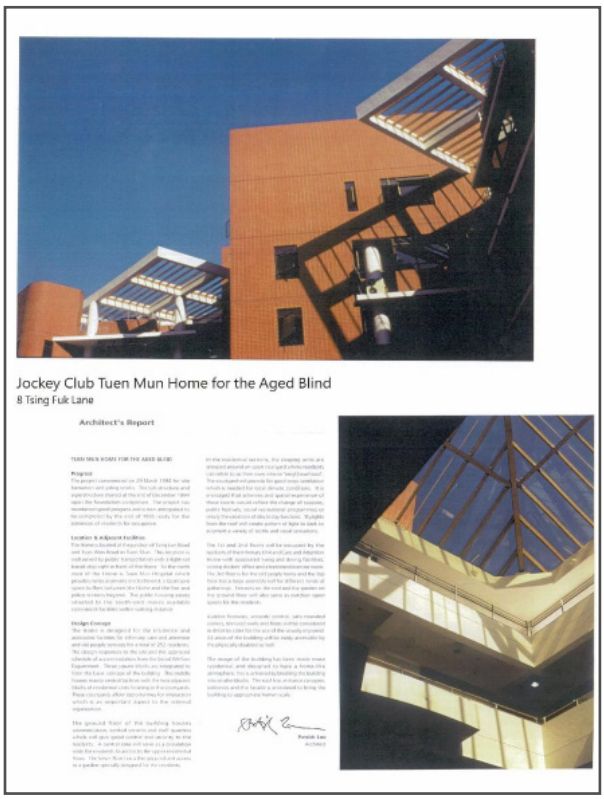


Fig. 8.1 Jockey Club Tuen Mun Home for the Aged Blind

In 1997, the firm was again commissioned by the same organization to design a home for the aged blind in Tuen Mun. For this home, the rooms were made more spacious. and toilets were placed inside the rooms. There is a garden with an area of more than 10000 square feet for residents' recreation and relaxation, which has strolling paths, fish ponds, a gazebo and sports facilities. Other facilities include a multi-purpose activity room, a physiotherapy room and a spa pool. Spatial planning is only one part of interior design. Providing adequate care to elderly people is the most important function of the home, which the design also incorporates.

The firm designed a third old age home for the blind for the organization located in Yuen Long, which was completed in 2015. This facility has seven-stories (fire regulations stipulates that such buildings can only be up to seven stories tall, because the maximum reach of fire services extension ladders is 24 meters), with four people per room, and the toilets are more conveniently located inside the room. The elevator is also designed with enough room to accommodate stretchers. The nurses' station is positioned so that they have direct line of sight to all the rooms. Together with the aid of closed-circuit television, they can monitor the residents and offer timely assistance. In addition, a rooftop farm helps nurture residents' interest in gardening.

Fig. 8.2 Yuen Long Home for the Aged Blind

These three homes for the aged blind, built in the 1980s, 1990s and 2010s respectively, testify to the ever-improving standards for such facilities. Regulations may seem dry and rigid, but designers can use their creativity to adhere to the requirements of regulations while catering to the needs of users at the same time.

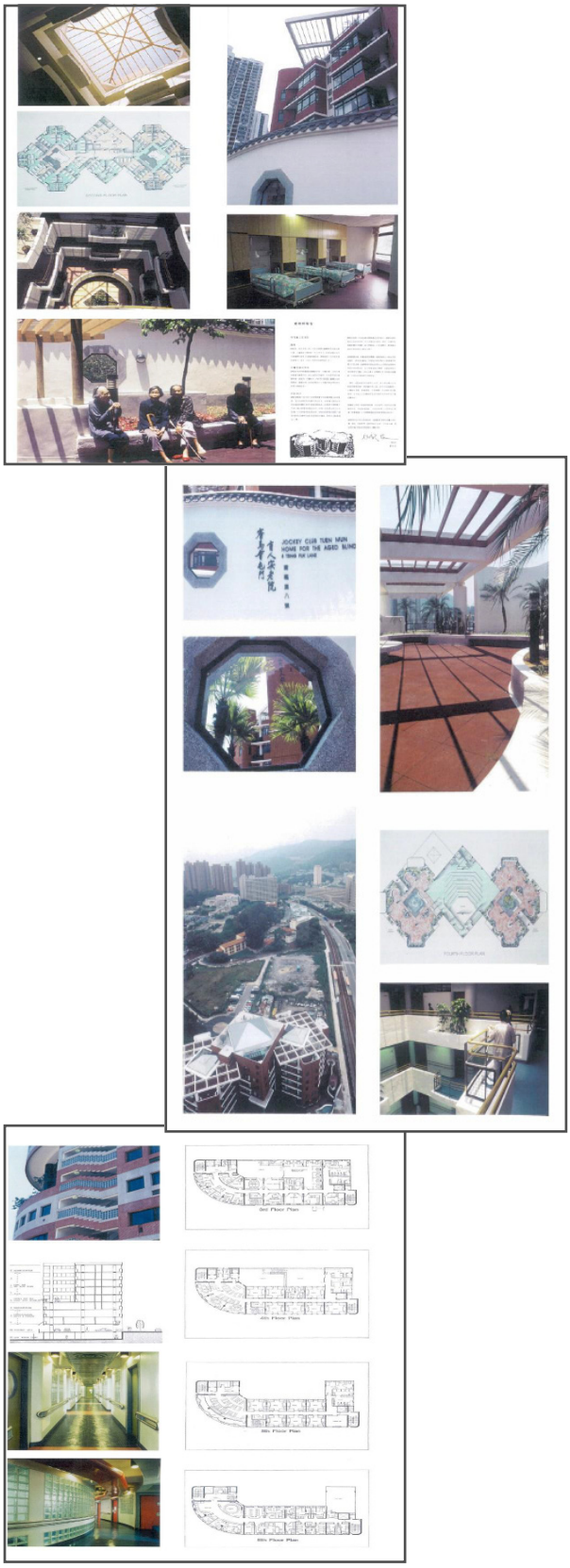


Fig. 8.3-5 Jockey Club Tuen Mun Home for the Aged Blind

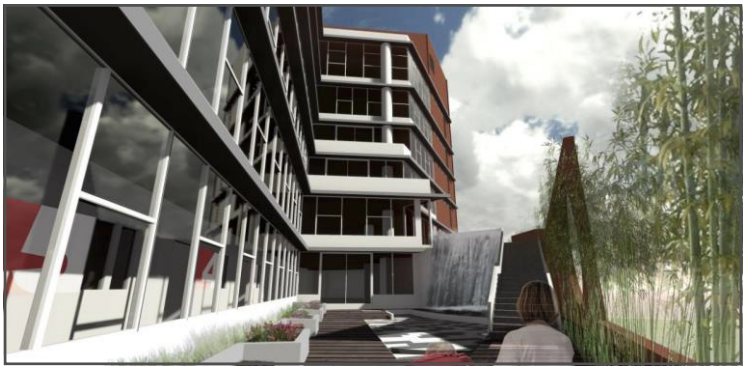


Fig. 8.6 Yuen Long Home for the Aged Blind (Jockey Club Yan Hong Building)

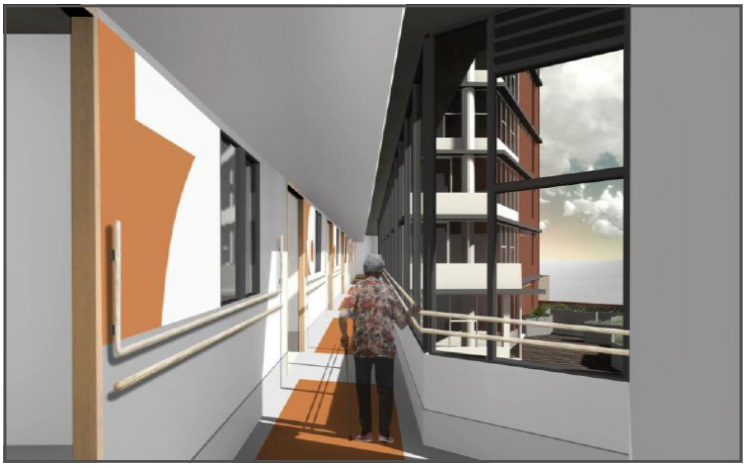


Fig. 8.7 Yuen Long Home for the Aged Blind (Jockey Club Yan Hong Building)

Fig. 8.10 Rooftop farm allows residents a chance to enjoy outdoor activities.

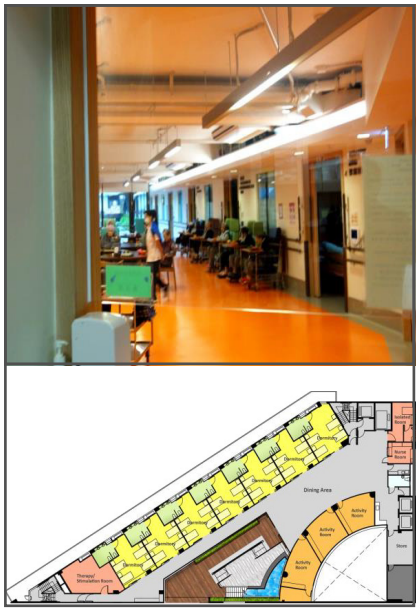


Fig. 8.8-9 Layout allows nurses' station to observe all rooms along the corridor

CHAPTER 9

Case Study in Adaptive Reuse and Building Regulations - Tai O Heritage Hotel by Simon Chung

Fig. 9.1 Tai O Village

In recent years, adaptive reuse of old buildings has gained traction globally, and Hong Kong is no exception. Restoring old buildings and converting them into new uses is a more environmentally-friendly option than demolishment and rebuilding, and also serves to preserve the architectural legacies of the past for the enjoyment of future generations.

For architects and interior designers, adaptive reuse projects present many challenges. Not only must the layouts of the original buildings be re-designed to suit new uses, the modifications must comply with current building regulations as well as legal requirements for the adaptive usage. For buildings with historical value, special care must also be taken to ensure that the architecture and other features are protected according to internationally recognised guidelines.

Tai O Heritage Hotel, located in the quiet fishing village of Tai O on Lantau Island, offers an excellent case study for adaptive reuse that adequately satisfies all the above requirements. Built in 1902, the site functioned as a police station until 1996, when it was officially closed due to low crime rate. Even though the old Tai O Police Station was rated a Grade II Historical Building by the Antiques and Monuments Office, the site was in poor condition when work to convert it into a boutique hotel began in 2009. Since it opened its doors in 2012, Tai O Heritage Hotel has already welcomed over 1 million visitors and has become a must-see destination for tourists visiting Tai O.

This adaptive reuse project was carried out by Hong Kong Heritage Conservation Foundation Limited, a local NGO, which won the tender to revitalise and convert the Old Tai O Police Station into a small hotel under Batch I of the HKSAR Government's 'Revitalising Historic Buildings Through Partnership Scheme' in 2008. Named Tai O Heritage Hotel, it is now home to nine colonial-style rooms and suites and commenced operation in March 2012.

The project has already received multiple international awards, including the Award of Merit given by UNESCO Asia-Pacific Awards for Cultural Heritage Conservation and the American Institute of Architects Hong Kong Chapter Citation Honour, and represents a success story in the adaptive reuse of historic buildings in Hong Kong.

Fig. 9.2 The former Tai O Police Station before revitalization. (All photos courtesy of Hong Kong Heritage Conservation Foundation Limited.)

The facilities and spatial arrangements of the historical Tai O Police Station were obviously very different from that of a modern hotel. Restoring and revitalising the building and adapting it to fit current regulatory requirements for a hotel presented a special challenge for architect Philip Liao, whose team was responsible for the architecture and interior design of Tai O Heritage Hotel.

“Regulations under the buildings ordinance are constantly evolving and changing,” said Liao. ‘For example, current regulations stipulate that railings along the corridor have to be at least 1100cm in height, whereas the old requirement was only 900cm. We gave the railing extra height by adding clear glass panels to the top. Other facilities that had to adhere to modern governmental regulations include handrails along the stairwell, additional means of escape for the restaurant and a number of toilets for restaurant patrons.”

Fig. 9.3 Exterior of Tai O Heritage Hotel

Liao further explained, “In addition to guest rooms, a hotel also requires F&B service so that guests can dine there. The biggest addition we made to the site was the restaurant, which did not exist before. The architect decided that the rooftop of the annex building was the most suitable location for the restaurant because it was the largest open space on the site. The restaurant represents an added value to the site. In addition to serving hotel guests, the restaurant provides a place where visitors can sit down, savour refreshments and enjoy the hotel.”

An important guiding principle for conducting historical revitalisation projects is reversibility. This means that any new additions should be reversible and should not affect the essential form and integrity of the historic place, and that the building fabric should not be impaired if the new work is to be removed in the future. Philip Liao’s team encased the rooftop in a wooden frame that is not attached to the original building so that the structure can be easily removed at a later date. Moreover, additional walls were created to allow for modern fittings to be installed in the rooms, leaving the original walls and ceilings undisturbed.

Fig. 9.4 Glass panels were installed on the railings along the corridor for extra height.

"The building was in quite a derelict state when we took over. The walls and floorboards were crumbling and there were holes on the floor. The building had just a couple of window air-conditioning units and there were no elevators," Liao recalled. "First, we had to make an assessment concerning the relative historical importance of various parts of the building. We found that the police station was constructed in two phases, with the main building erected at an earlier date, while annex was added much later to house Indian officers, with the latter part being of much lesser heritage value. With this knowledge in hand, we put additional structures such as the rooms containing building services with the annex and left the main building largely untouched. We also removed many later additions in the main building, such as aluminium windows along the verandah that was at odds with the original style of the building."

Fig. 9.5 The former Tai O Police Station was in poor condition before revitalisation work began

Fig. 9.6 The reception at the Tai O Heritage Hotel

Fig. 9.7 Before and after revitalisation work on the corridor

Melanie Kwok, Group Sustainability Manager at the Hong Kong Heritage Conservation Foundation added, "Restoring this building was not just about maintaining the architectural style, but also required preserving certain objects of historical value, like the window with nine bullet holes, relics of a tragic confrontation between an Indian police officer and the station master. The former temporary holding cell is also kept in its former condition to enable people to appreciate the historical ambience and the story behind it. Other features restored included the fireplace (which many of our guests, especially children, appreciate) as well as the French windows with their original butterfly hinges and cannons." Another structure of the old police station that has been preserved is the former watch tower, now located inside the restaurant, which has been fashioned into a semi-private dining space. The restaurant itself is furnished with wood-carved furniture that previously belonged to the China Tee Club in Central, which matches with its classical décor.

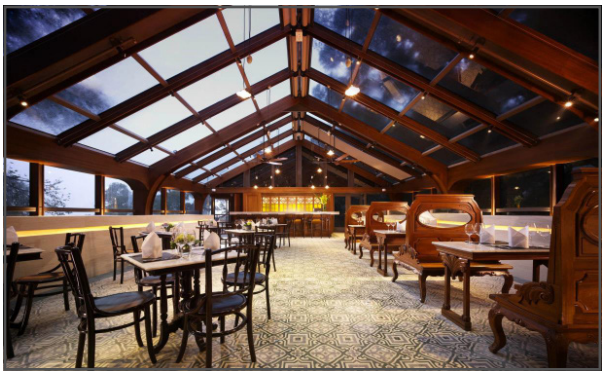


Fig. 9.8 Restaurant at Tai O Heritage Hotel

“We take into account the fact that the building is of colonial style, and so the interior design is also in keeping with this. For example, the lighting fixtures and ceiling fan at the restaurant are of a period style, while the colour palette we chose for the guest rooms is bright and naturalistic,” said Liao.

Fig. 9.9 The color palette of the guest rooms at the Tai O Heritage Hotel is bright and naturalistic

The hotel is situated on a small hill with a steep walkway leading up to the main entrance, which can be difficult to navigate for people in wheelchairs. Liao and his team decided to install an elevator to access the hotel, but finding the right type that suits the site proved a daunting task. “We thought that a conventional elevator with a vertical shaft and a bridge going across is unsightly,” Liao explained. “After considering several other options, we settled upon an elevator that goes up the slope. This kind of elevator allows for access by people with disabilities and does not obstruct the view of the hotel. However, because it is not very common in Hong Kong, EMSD was at first hesitant to grant approval, and it took a long time before they did so. We had to specifically order the elevator from Germany, and spare parts have to be procured from overseas.”

Fig. 9.10 The hotel features a specially-designed elevator

“Part of the regulatory requirements for modern hotels is barrier-free access and facilities,” Kwok further elaborated. “Tai O Heritage Hotel is equipped with a map for the blind, toilets for the disabled in the restaurant, and the furnishing and cabinets in the guest rooms are designed according to universal design principles. The government conducts annual checks on these facilities to ensure compliance with current regulations.” Indeed, despite many challenges, this project satisfies modern requirements for fire safety, means of escape and barrier free access while staying true to the original character of the site.

By adapting the century-old former police station for use as a boutique hotel, Liao and his team had given new life to the building and had succeeded in reconnecting it to the Tai O community. As Kwok pointed out, “We are fortunate to witness that Tai O residents had built a sense of identity through Tai O Heritage Hotel, and heritage conservation is only meaningful when it engages the community; Tai O Heritage Hotel is an epitome of this philosophy. Tai O Heritage Hotel represents a continuation of the deep and abiding relationship that this building has built up with local residents since it was completed in 1902.”

Fig. 9.11 A lily pond built by a policeman at the old police station is preserved

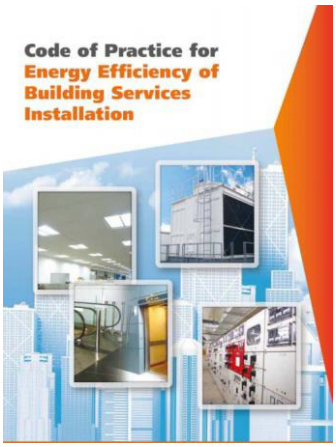
Appendix

Key Codes / Regulations / Standards in Hong Kong

Mandatory

- Buildings Department (BD)
  Buildings Ordinance
- Electrical and Mechanical Services Department (EMSD):
  Building Energy Code
  The "Code of Practice for Energy Efficiency of Building Services Installation", hereinafter "Building Energy Code" or "BEC" is issued under Part 9 of the Building Energy Efficiency Ordinance, Chapter 610.

  The BEC lists out the technical guidance and details of the minimum energy efficiency requirements governing the building services installations defined in the Ordinance. Building services installations designed, installed and maintained to a design standard in accordance with this BEC are also required to have satisfied the relevant requirements of the Ordinance in the technical aspects.



- Fire Service Department
  The Fire Service Department (FSD) provides "Code of Practice" for minimum fire service installations and equipment and inspection, testing and maintenance of installations and equipment. FSD has also provided codes and regulations for: Fire & Rescue, Fire Safety, Fire Safety (Buildings) Ordinance & Fire Safety (Commercial Premises) Ordinance etc. for guidelines and references.

- Water Supplies Department
  The Water Supplies Department (WSD) provides "Manual for Structural Design of Waterworks Structures" for the adaptation for the structural design of typical reinforced concrete waterworks structures. Other guidelines or regulations provided by WSD include "WSD Mechanical & Electrical Standard Specifications", Installation Requirements in Inside Service and Fire Service for further information.

- Environmental Protection Department
  The Environmental Protection Department (EPD) provides resources like Environmental Legislation, Ordinance & Regulation, and Compliance Guidelines for the purpose of monitoring the impact that might bring to the environment and acknowledge users should follow the rules and legislation.

Recommended / Voluntary / Valued-added regulations

- Indoor Air Quality Certification Scheme
  The Indoor Air Quality (IAQ) Certification Scheme sets to improve the IAQ and promote public awareness of the importance of IAQ. This voluntary and self-regulatory approach provides two-levels of IAQ objectives (Excellent Class and Good Class) to suit the needs of different premises and buildings.

  IAQ Certification Scheme sets different parameters for monitoring, such as room temperature, relative humidity, air movement, CO2, CO, PM10, NO2, O3, HCHO, TVOC, radon and airborne bacteria.

- BEAM Plus / LEED
  BEAM (Building Environmental Assessment Method) is a Hong Kong based scheme which aims to achieve a sustainable community and green livable built environment in harmony with nature. The scheme is administered by BEAM Society, which serves to administer and develop the BEAM Plus assessment tools, and build capacity in the community through education and training to advance health and well- being.

  BEAM Plus provides users with a single performance label that demonstrates the overall quality of a building. BEAM Plus New Buildings and BEAM Plus Interiors enclose a large variety of parameters that have to be assessed.

- LEED (Leadership in Energy and Environmental Design) is a US green label for all kinds of building to assess. LEED-certified buildings are resource efficient, provide a competitive differentiator, make for happier employees and occupants, attract tenants, save energy and resources, lower operating costs, provide public relations community benefits, increase rental rates and optimize health.

- WELL Building Standard
  The WELL Building Standard is administered by the International WELL Building Institute (IWBI), launched in 2013, a public benefit corporation whose mission is to improve human health and well-being through the built environment. The WELL standard features seven performance-based standards to optimize the building quality to humans. Unlike other standards for creating a better building to the environment, WELL focuses on the connection between buildings and the health and wellness impacts on occupants.

- ASHRAE, CIBSE

  ASHRAE (American Society of Heating, Refrigerating, and Air-Conditioning Engineers) aims to advance the arts and sciences of heating, ventilation, air conditioning and refrigeration to serve humanity and promote a sustainable world. ASHRAE writes standards for the purpose of establishing consensus for methods of testing for use in commerce and performance criteria to serve as guidance for the industry.

  CIBSE (Chartered Institution of Building Services Engineers) is a UK-based society that promotes the art, science and practice of building services engineering for the benefit of all and the advancement of education and research in building services engineering. The Hong Kong branch of CIBSE organizes appropriate activities for and provides membership or training advice to CIBSE members in Hong Kong, and also advises, assists and monitors the learned society functions with other society like ASHRAE.

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2. Textual and pictorial information courtesy of Ronald Lu & Partners

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Further reading

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