



Practice Guidebook for Adaptive Re-use of and Alteration and Addition Works to Heritage Buildings 2012

**Practice Guidebook
on
Compliance with
Building Safety and Health Requirements
under the Buildings Ordinance
for Adaptive Re-use of and
Alteration and Addition Works to
Heritage Buildings**

2012

**Buildings Department
Hong Kong**

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Preamble

According to leaders and experts in heritage building conservation, adaptive re-use of buildings is often the only way that the historic and aesthetic values can be saved economically and heritage buildings can be brought up to contemporary standards.

Generally speaking, as most of the heritage buildings were built long time ago, their design and facilities provided usually do not comply with current building safety and health standards and statutory requirements. Certain degree of alterations and additions is usually required if new facilities are to be installed or if the buildings are to be adapted for re-use other than their original use. Structural strengthening may be required if the new use demands a greater loading requirement. Hence, for most cases of adaptive re-use of heritage buildings in private ownership, submission of proposal for alteration and addition (A&A) works to the Buildings Department (BD) for approval under the Buildings Ordinance (BO) is invariably required if the proposed works are not exempted from approval by virtue of section 41(3), (3B) & (3C) of the BO.

However, if it is not intended to alter or change the use of an existing heritage building, then there is no provision under the BO requiring the existing building to be brought up to the current standards.

In facilitating private sector's participation in heritage conservation, a dedicated Heritage Unit (HU) has been set up in the BD since 2008 to process all building and structural plan submissions involving adaptive re-use of and A&A works to heritage buildings for approval under the BO.

This Practice Guidebook mainly provides design guidelines on the compliance with building safety and health requirements under the BO for adaptive re-use of and A&A works to heritage buildings. It is prepared by the BD in consultation with the Antiquities and Monuments Office of Leisure and Cultural Services Department (AMO), the Fire Services Department (FSD) and the Architectural Services Department (ArchSD), taking into account experience gained in the past and making reference to some successful heritage conservation projects in Hong Kong and overseas. The interim edition of this Practice Guidebook was published in June 2009 and this edition is now revised by incorporating the recommendations from the Consultancy Study commissioned on this subject in 2009/10.

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1. INTRODUCTION

- 1.1 This Practice Guidebook aims to provide design guidelines in terms of straight-forward practical solutions and alternative approach that may be adopted for compliance with building safety and health requirements under the BO so as to facilitate the planning and design of adaptive re-use of and A&A works to heritage buildings.
- 1.2 This Practice Guidebook serves as a reference not only for persons or organizations intending to propose adaptive re-use of or A&A works to a heritage building but also for architects, engineers, surveyors, heritage conservationists and designers who are engaged for this type of projects.
- 1.3 The main focus of this Practice Guidebook is on the building safety and health requirements under the BO and its allied regulations for the adaptive re-use of and A&A works to heritage buildings. The principles of heritage conservation are under the jurisdiction of the AMO. When the Building Authority (BA) makes a decision on a submission involving a heritage building, comments made by the AMO will be duly considered. The designer should carefully consider requirements set out in the Conservation Guidelines agreed by the AMO on a project basis.
- 1.4 Under section 4 of the BO, an authorized person (AP) shall be appointed as the coordinator of the building works to be carried out and a registered structural engineer (RSE) shall be appointed for the structural elements of such building works. To facilitate the design process, the AP and the RSE concerned with the planning and design of projects involving adaptive re-use of or A&A works to a heritage building are encouraged to approach the relevant government departments including the AMO, the BD and the FSD, with adequate information, to identify critical requirements at an early stage. Such early contact may help to identify key design constraints and potential problems before the detailed design stage. The contact points of these departments are provided at the end of this Practice Guidebook. AP and RSE are also encouraged to refer their enquiries to the HU for advice through the pre-submission enquiry service as provided for in the Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers (PNAP) ADM-19.

- 1.5 This Practice Guidebook contains successful case studies in Appendix I, lists of contemporary design standards in Appendix II, a sample Management Plan in Appendix III and useful information for reference in Appendix IV.

2. INTERPRETATION

Heritage building

- 2.1 For the purpose of this Practice Guidebook, a heritage building is taken as either a *declared monument* or a *proposed monument* defined under the Antiquities and Monuments Ordinance, Cap. 53 (A&MO), a *graded historic building* accorded by the Antiquities Advisory Board (AAB), a proposed graded historic building identified by the AMO¹. Where a building has not been declared under the A&MO nor graded by the AAB and yet possesses a cultural significance² in terms of aesthetic, historic, scientific, social or spiritual value, etc, the project designer should consult the AMO on whether or not the building is a heritage building.

Monument

- 2.2 Under section 3 of the A&MO, a monument means a place, building, site or structure declared to be a monument, historic building or archaeological or paleontological site or structure. Declaration of a proposed monument or a monument under section 2A or 3 of the A&MO shall be made by the Authority³, by notice in the Gazette. Once a building has been declared as a monument or a proposed monument, the building is legally protected and no person shall undertake building or other works on it without a permit granted by the Authority under section 6 of the A&MO. For the list of declared monuments and their respective location plans and monument boundaries, please visit the Heritage Discovery Centre Reference Library or the AMO's website <http://www.amo.gov.hk/en/monuments.php>. For the exact boundary of the declared monuments, please consult the AMO.

Graded historic building

- 2.3 Other than the formal declaration of monument, the AMO has adopted a three-tier grading system which is an administrative arrangement, to provide an objective basis for determining the heritage values and the conservation needs of the historic buildings. They are:

¹ The information and updated lists of declared / proposed monuments and graded / proposed graded buildings can be obtained from the website of AMO at <http://www.amo.gov.hk>

² According to the Burra Charter, cultural significance means aesthetic, historic, scientific, social or spiritual value for the past, present or future generations.

³ Under the A&MO, the Authority means the Secretary for Development.

Grade 1: Buildings of outstanding merit, which every effort should be made to preserve if possible.

Grade 2: Buildings of special merit, efforts should be made to selectively preserve.

Grade 3: Buildings of some merit, preservation in some form would be desirable and alternative means could be considered if preservation is not practicable.

Grade 1 buildings will be accepted as providing a pool of highly valuable historic buildings for consideration by the AAB under the A&MO as to whether some of these may have reached the high threshold of monuments to be put under statutory protection. As such, unlike the declared monuments, a graded building does not enjoy the protection under the A&MO. The list of graded historic buildings and proposed graded historic buildings is available at the AMO's website: <http://www.amo.gov.hk/en/built3.php>. The owner and/or his agent is advised to identify the status of the building before any works are carried out.

Adaptive re-use

- 2.4 For the purpose of this Practice Guidebook, adaptive re-use of a heritage building may be defined as modifying a building for use other than its original use, such as from a residential home to an exhibition hall or a tea house for public access.⁴ In other words, adaptive re-use will involve a material change in use. Through adaptive re-use, a heritage building may be rejuvenated in terms of both physical and economic values. Some local remarkable examples include the Western Market (a declared monument) and the Kom Tong Hall (a declared monument).

⁴ It differs slightly from Burra Charter's definition of 'Adaptation' which includes 'modifying a place to suit the existing use or a proposed use'.



Photo 1 Western Market, traditional trades, arts and crafts centre converted from a market building



Photo 2 Kom Tong Hall, once the residence of Mr. Ho Kom-tong, a wealthy Hong Kong merchant in the early 20th century, has been adapted into the Dr Sun Yat-sen Museum

3. LEGISLATION ON BUILDING CONTROL

Background

- 3.1 The BO, Cap. 123 and its allied regulations together with other related enactments, constitute the legal framework of the building control system for all private buildings and building works in Hong Kong. All buildings in Hong Kong are subject to the control under the BO unless exempted under section 41(1) thereof. For example, government buildings or public housing under the control and management of the Housing Authority are exempted from the provisions of the BO.
- 3.2 The objective of the BO is to provide for the planning, design and construction of buildings and associated building works to ensure public safety and health in buildings by setting therein the minimum safety and health standards.
- 3.3 Apart from the BO, the following legislations also contain fire safety requirements concerning the building fabric and the fire service installations that may be applicable to certain existing buildings :-
- (a) Fire Services Ordinance, Cap 95 and its subsidiary regulations;
 - (b) Fire Safety (Commercial Premises) Ordinance, Cap 502; and
 - (c) Fire Safety (Buildings) Ordinance, Cap 572
- 3.4 The two Ordinances mentioned in paragraph 3.3 (b) and (c) above may require the upgrading of fire safety measures in certain existing commercial, domestic and composite buildings to the current standards as specified in the two Ordinances. For information on the types of buildings that are affected and the fire safety measures required to be upgraded under the said Ordinances, reference may be made to the guides jointly issued by the BD and the FSD⁵. When only part of the said buildings undergoes A&A works or involves change in use, the AP of the project is strongly advised to take the opportunity to upgrade the fire safety measures of the whole building to comply with the

⁵ An Introduction to the Fire Safety (Commercial Premises) Ordinance Cap.502 and An introduction to the Fire Safety (Buildings) Ordinance Cap. 572 jointly issued by the Buildings Department and Fire Services Department.

requirements of both the BO and the said two Ordinances at the same time.

Submission of proposals to the Buildings Department

- 3.5 As provided for in section 14(1) and 41(1) of the BO, except for buildings belonging to the government, buildings upon any land vested in the Housing Authority or over which the Housing Authority has control and management or buildings upon any unleased government land, proposals for A&A works with or without a material change in use of a heritage building are normally required to be submitted to the BD for obtaining approval and consent prior to commencement of the works. An AP registered under the BO shall be engaged to prepare the necessary submissions. An RSE should normally be required in view of the need to conduct structural appraisal and structural integrity assessment of the heritage building, taking into consideration the age of the building.

Compliance with the requirements of the Buildings Ordinance

- 3.6 In principle, buildings constructed before any new standards come into force are not required to be upgraded to the new standards (except for certain commercial, domestic or composite buildings to which the two Ordinances mentioned in paragraph 3.3(b) and (c) above apply) which only come into force after the buildings are constructed. However, when such buildings undergo change in use or A&A works, those parts of the buildings so affected will normally be required to be upgraded to comply with the current standards.
- 3.7 From the perspective of heritage conservation, the major building safety and health requirements which may affect the design and construction of buildings for the adaptive re-use or A&A works may be categorized as follows:-

(a) Structural Considerations

Structural Design for Alteration and Addition Works

- (i) The adaptive re-use of or A&A works to a heritage building may involve the design of new structural works and/or the checking of structural adequacy and structural strengthening of an existing building. All new structural elements in the A&A works should be designed in accordance with the current building

regulations and relevant codes of practice. In principle, the building regulations and codes of practice prevailing at the time of construction of the building may be used for checking the structural adequacy of the existing portion of the building affected by the proposed A&A works, provided that the design assumptions on which the building was originally based still apply. A list of contemporary design standards in Hong Kong is given in Appendix II.

Structural Appraisal

- (ii) As heritage buildings are often constructed long time ago, it is necessary to appraise their current conditions and identify the extent of defects, deterioration and any damage. The RSE should re-assess the validity of the design parameters. When structural documentation record is not available, site measurement, non-destructive investigation and, where appropriate, destructive tests such as taking material samples from existing structure for strength tests, and opening up for structural investigation are effective methods for assessing the design parameters. As to the locations of any destructive tests and opening up, prior approval from the AMO should be obtained for proposals involving declared monuments, whereas advice from the AMO should also be sought for proposals involving heritage buildings other than declared monuments.
- (iii) Although current design codes of practice containing advanced limit state design methods are usually more comprehensive and contain more accurate findings and well-proven concepts for structural design, specific partial material factors are incorporated which may not be applicable to heritage buildings. In conducting a structural appraisal to substantiate the stability of heritage buildings, the RSE may use either the method in the then prevailing code of practice to which the buildings were designed or advanced limit state design methods in the current codes of practice if the partial material factors could be substantiated, and they should not overlook alternative load paths or over-simplify the structural model. It is an essential step to understand how the structure stands and its load paths before embarking on any A&A works.

- (iv) Structural appraisal for heritage buildings should be carried out in a scientific and rational way, taking into consideration the deterioration in material properties over time and the validity of design parameters. Hence, all structural appraisals should start with a desktop study on the history of the building, since part or the entire floor of the building could have been re-built. Appendix IV contains some useful information about structural appraisal.

Design Imposed Loads

- (v) Many heritage buildings were constructed with timber floors resting on masonry or brick walls. These constructions were often based on traditional practice, craftsmanship and relevant prescriptive requirements that were prevalent at the time of construction. A complete set of approved plans and structural calculations for this type of construction in many heritage buildings may not be available. When carrying out A&A works, taking into account the possible material deterioration of these buildings, it would be prudent to carry out a structural assessment with site measurements of dimensions and tests for the material properties of structural elements respectively, to substantiate the structural capacity of these elements for adaptive re-use.
- (vi) Buildings constructed in different periods, even if they are of the same use, may have been designed with different design imposed floor loads as the relevant statutory requirements have changed over time. For instance, the minimum design imposed load for buildings of domestic use was changed from an equivalent load of 3.35 kPa in the 1915 version of the London County Council By-laws (LCC 1915) to 2.35 kPa in the LCC 1938, 1.90 kPa in the LCC 1952, 2.50 kPa in the Building (Construction) Regulations (B(C)R) 1976 and to 2.0 kPa in the Building (Construction) (Amendment) Regulation 2011.
- (vii) In essence, direct comparison of the design imposed load of the proposed adaptive re-use against that of the existing use is not recommended for heritage building as the existing use may not tally with the

original design imposed load.

(b) Fire safety provisions

- (i) Building (Planning) Regulations (B(P)R) 41, 41A, 41B, 41C and 41D and B(C)R 90 stipulate the statutory requirements pertaining to fire safety of buildings. The codes of practice issued by the BD⁶ (the 'fire safety codes') provide guidance on compliance with such requirements. The fire safety codes provide technical standards for the passive fire protection measures including the provision of means of escape, means of access for fire fighting and rescue and fire resisting construction in a building. For A&A works without involving change in use, only the areas affected by the proposed A&A works (e.g. shared exits) will need to comply with the current standards prescribed in the fire safety codes.
- (ii) Technical standards for the active fire protection measures such as the fire alarm, detection and suppression systems are provided for in the Code of Practice for Minimum Fire Service Installations and Equipment (FSI Code) issued by the FSD.
- (iii) The primary objectives of the fire safety standards prescribed in the fire safety codes are to ensure that occupants are able to escape from the building safely, fire fighters can enter the building safely to fight the fire and for rescue, and to prevent the spread of fire within the building and to adjacent properties. Protection of the properties themselves against damage by fire is not the primary concern. As such, owners and designers may wish to enhance the fire safety provisions in their heritage buildings to protect such properties of high heritage value against damage by fire.

⁶ The new Code of Practice for Fire Safety in Buildings 2011 comes into operation on 1.4.2012. This code replaces the 'Code of Practice for the Provision of Means of Escape in Case of Fire 1996', the 'Code of Practice for Fire Resisting Construction 1996' and the 'Code of Practice for the Provision of Means of Access for Firefighting and Rescue 2004'. Reference should be made to the Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers APP-153 issued by the BD.

(c) Protective Barriers

The requirement for the provision of protective barriers between adjoining floor space at different levels was first introduced in 1956 when the B(P)R and B(C)R were first enacted. These early requirements were subsequently found to be inadequate. Incidents of people or objects falling over or through gaps in the barriers causing injury and litigation against the building owners have led to tighter controls on the design of the barriers. Current statutory requirements on the design and construction of protective barriers are set out in B(P)R 3A and B(C)R 8 and 17(3).

(d) Barrier Free Access

The Disability Discrimination Ordinance (DDO), Cap 487⁷, has made it unlawful to discriminate against a person on the basis of a disability. The requirements for the provision of barrier free access for persons with a disability are prescribed in section 84 of the DDO. B(P)R 72 and the Design Manual for Barrier Free Access 2008 issued by the BD specify the design requirements and standard for such barrier free access.

- 3.8 Apart from the building safety and health requirements identified in paragraph 3.7 above, there are also building requirements of a planning nature such as site coverage, plot ratio, lighting and ventilation, etc. Application for exemption from or modification of such requirements will be considered on individual merits of each case.
- 3.9 The adaptive re-use of and A&A works to heritage buildings could have safety implications on geotechnical features associated with the buildings, e.g. slopes and earth retaining structures adjoining or adjacent to the buildings, basement or screen walls, foundations, etc. Since the adaptive re-use of and A&A works to heritage buildings are subject to the control under the BO, Registered Geotechnical Engineer (RGE) should be engaged where appropriate for geotechnical tasks in accordance with PNAP APP-141.

⁷ Section 84(1) of the DDO stipulates that any new building or alterations or additions to an existing building must be provided with such access as is reasonable in the circumstances to the building or premises for persons with a disability.

4. APPROACHES IN DEALING WITH ADAPTIVE RE-USE OF HERITAGE BUILDINGS

Balanced Approach

- 4.1 The successful conservation of heritage buildings requires an optimal balance between the degree of conservation⁸ and the type of adaptive re-use and/or the extent of A&A works proposed. Not all heritage buildings can be adapted into any other uses and the selection of an appropriate use is most crucial to minimize the possible conflict between preserving the heritage value and upgrading the building to current standards to make it suitable for the new use.⁹
- 4.2 Every heritage building has its unique historical and cultural significance. Its character-defining elements that account for its heritage values may vary from case to case. In order to identify the character-defining elements and to comply with the building safety, health as well as conservation requirements, the AP/RSE responsible for the project are advised to conduct a comprehensive appraisal of the building and to consult a heritage conservationist at an early stage to prepare a conservation study or a set of conservation guidelines for the heritage building to address the scope of proposed works, the assessment of impact on heritage and the corresponding mitigation measures. Such study/ guidelines should be agreed by the AMO prior to the commencement of the proposed works. Seeking comments from or agreement by the AMO on the requirements of heritage conservation at an early stage is also advisable. Building owners and future operators, if already identified, also play a pivotal role in the design process. They should understand the limitations of the existing building and their responsibility in proper management and maintenance of the building. An understanding of what should be retained, and what can be altered as how the building will be used and managed in the future will significantly help the AP/RSE in coming up with a holistic plan before embarking on the adaptive re-use project.
- 4.3 In this connection, the AP/RSE are advised to make reference to some international principles in conservation, including the Venice Charter (by ICOMOS), the Burra Charter (by ICOMOS Australia) and the Principles for the Conservation of Heritage

⁸ According to Burra Charter, conservation means all the processes of looking after a place so as to retain its cultural significance.

⁹ The Burra Charter points out that 'compatible use means a use which respects the cultural significance of a place. Such a use involves no, or minimal, impact on cultural significance'.

Sites in China (by China ICOMOS) in dealing with an adaptive re-use project. In general, reusing the heritage buildings with compatible use, introducing minimal intervention to the character-defining elements, carrying out A&A works in a reversible manner, upholding both integrity and authenticity when carrying out A&A works to the heritage buildings and not attempting to falsify history (i.e., the new should be distinguishable from but also compatible with the old, and the new should not be made to look like the old) will be the key principles for the AMO to assess the suitability of the adaptive re-use/ A & A proposals. Since every building has its unique cultural significance and its character-defining elements that account for its heritage values vary case by case, timely engagement of a conservation expert may be necessary.

- 4.4 In certain heritage buildings, incorporation of facilities that are necessary to fulfill modern needs may have adverse effects on their architectural value. Careful treatment and sensible design in preserving the heritage value of the building may reconcile the two distinctive needs. To name but a few, an access ramp for persons with a disability has been added inside the Forbidden City in Beijing to take care of the needs of these persons. It may not be possible to summarize what ought and what ought not to be done.



Photo 3 An access ramp for persons with a disability in the Forbidden City, Beijing.



Photo 4 A circular access ramp to a church in Cambridge, UK

- 4.5 Owing to the age of heritage buildings, the intended change in the use of such building will invariably create difficulties for the AP/RSE to tackle, which in turn would make compliance with the statutory building safety and health requirements a challenge. Another balance to be considered by the AP/RSE is the need for preservation of character-defining elements of the heritage buildings and the need to comply with the minimum building safety and health standards stipulated under the BO and other relevant legislations. In many cases, the AP/RSE has to consider what requirements can be met by the prescribed methods and what requirements need to be met by alternative methods to achieve the equivalent safety standards in performance or function. For instance, the design of protective barriers may vary to suit the heritage conservation needs in each individual case. Some successful examples of these are provided in Appendix I. AP/RSE may consider merits of each of these examples when devising their solutions.



Photo 5 A protective barrier on the parapet wall of a building at the Tombs of the Thirteen Ming Emperors



Photo 6 A glazed panel added behind the existing balustrade to meet the current safety requirement in Oxford Castle, UK

Alternative Approach

- 4.6 As stated in paragraph 3.2 above, the objective of the BO is to ensure public safety and health by setting the minimum safety and health standards in the design and construction of private buildings. It should be noted that the BA is not empowered to grant modifications prejudicing the standard of structural stability and public health established from time to time by regulations by virtue of section 42(4) of the BO.
- 4.7 In recognition of the needs for preservation of the whole or part of a heritage building, the BD takes a pragmatic and flexible stance to consider the proposals for adaptive re-use of or A&A works to heritage buildings. An alternative design, though deviating from

the prescriptive requirements, may be accepted if equivalent level of safety and health standards of its performance or function can be explicitly demonstrated to be achieved on a case-by-case basis.

Principles of accepting alternative design

- 4.8 In vetting an alternative design that meets an equivalent level of standards of the relevant prescriptive building safety and health requirements, the BD may consider if such design can achieve an equivalent performance to ensure the safety of the users and occupants of a heritage building. When determining the merits of each design option, the views of the AMO towards the preservation of specific character-defining elements are important, which in many cases would dictate how specific features or areas in the heritage building could be used, upgraded or strengthened. Hence, the AP/RSE should liaise with the BD and the AMO to arrive at an alternative design that can satisfy both needs. From conservation point of view, the AMO may consider the compatibility of the proposed use, the reversibility of the proposed A&A works, the safeguard of authenticity and the degree of disturbance.
- 4.9 Very often, to achieve fire safety in a heritage building, a fire engineering approach may be adopted to work out an alternative design which may achieve equivalent performance as laid down in the fire safety codes. In general, a variety of compensatory measures may be taken to achieve fire safety in a building. These measures may include, but not limited to, early warning by an automatic detection and warning system, facilities for control of smoke and rate of spread of fire such as sprinkler systems, and a capacity for fire containment through compartmentation, etc. A guideline on adoption of this approach for the fire safety design of new buildings or A&A works in existing buildings is provided in Part F and Part G of the Code of Practice for Fire Safety in Buildings 2011.
- 4.10 In the event that no other alternative design of equivalent standards is found to be feasible and practicable, building safety and health achieved by adopting a management approach may be critically considered. The acceptance of this alternative is based on the merits of each individual case. In this connection, it is imperative that the AP should formulate a feasible and enforceable management plan in collaboration with the building owner and future operator, if already identified. Application adopting this approach should be accompanied with suitable

justifications and undertaking to demonstrate that there is a reliable and effective management system during the life of the building and that a monitoring system could be effectively and reasonably implemented to avoid abuse. If the proposal adopting a management approach is considered acceptable, the BA may impose conditions requiring compliance with the management plan upon granting modification of or exemption from the relevant regulations, under section 42 of the BO. In all cases, the responsibility for the provision, management and maintenance of the alternative measures will rest with the owners. An undertaking letter from the owner is required to be provided in the management plan. A management plan is outlined in Appendix III for reference. The management approach would be subject to the approval of the BA and should therefore be considered as a last resort.

4.11 To assist the AMO in formulating their views on the proposed alternative design, the AP/RSE, when applying for a modification of and/or exemption from the prescriptive requirements of the building regulations, should also provide the following information : -

- (a) Statement to describe the heritage values of the subject building element(s) proposed for modification;
- (b) Threats to the heritage values if modification is not granted, with substantiation by an appraisal of design options;
- (c) Recommendations on the design options;
- (d) Mitigation measures for minimizing the adverse impact on the heritage values if modification is not granted; and
- (e) Proper photographic records and plans of the subject building element(s).

The AMO will consider the case by assessing the impacts caused by each design option and whether such impacts have been minimised as far as possible.

5 PRACTICAL ADVICE

- 5.1 Practical advice given in this section aims to provide guidance to resolve some common problems that may be encountered in complying with the current building safety and health requirements while taking due care of the objectives of heritage conservation. As every case has to be considered on its own merits and the heritage value of a building feature varies from case to case, the examples of the alternative design described in this section are by no means suitable for universal application. The AP/ RSE are advised to fully understand the conservation requirements as agreed with the AMO before adopting any one of these examples.

Structural safety

- 5.2 Structural works involving in any change in use and structural strengthening in buildings should proceed in accordance with the requirements stipulated in PNAP APP-117.

There are innovative methods and techniques for structural investigation and structural strengthening that can be devised to minimize the impact on the aesthetic and heritage values of a particular project.

In certain circumstances where it is impracticable to carry out structural strengthening works, alternative approach as specified in paragraph 5.8 may be adopted.

Some practical solutions for strengthening and alternative designs are further elaborated below.

- 5.3 The lack of approved plans and structural records

One of the common problems for heritage buildings is the lack of approved plans and structural records. The uncertainty in the load carrying capacity of the existing buildings makes it difficult to assess accurately the extent of structural strengthening required. For buildings without approved plans and structural records, a detailed structural appraisal should be adopted. The following measures are practical solutions to some typical structural issues:

(a) The use of archaic records

The BD maintains an archive of approved plans and structural records including calculations and material test reports of private buildings whilst the ArchSD may have

archaic records of some government-owned buildings. However, the records for pre-war (i.e. pre-1946) buildings were lost in the Second World War. The AP/RSE should first check for A&A records after 1946 in the BD archive. Then, attempt should be made to trace the archaic records of the building from other sources such as the current and previous owners or tenants, or other Government departments. Old photographs may reveal valuable information on the probable period when the building was built, an annex was added or a roof was replaced, etc. Other useful sources of reference include the Public Records Office, university libraries, the ArchSD, the AMO, the Lands Department, the Hong Kong Museum of History, etc.

(b) Full survey and structural appraisal

When the design information of an existing building is not available, the structural system of the building may be ascertained by conducting full survey and structural appraisal of the existing building in order to re-establish the structural framing information, the load path, the construction details of the structural elements, the robustness of the structure, the material strengths and the current condition of the existing structures including the foundations. Coring and opening-up or other destructive tests may be employed to obtain the construction details and material strengths. For heritage buildings, however, the AP/RSE should adopt the use of non-destructive tests as far as practicable. Opening-up and destructive tests should be kept to a reasonable minimum. The AP/RSE should note that destructive tests or full scale load test carried out on the existing structure may constitute building works requiring prior approval and consent from the BA. Significant breaking up of structure can cause danger and persons instructing or carrying out such building works without prior approval and consent from the BA may be liable to prosecution under the BO. Moreover, as destructive tests or load test may incur irreversible damage to the specific feature of a heritage building, the AMO should be consulted for agreement in advance. Information should include the sampling/test locations, reinstatement proposals after the sampling/opening up works and photographic record before and after the carrying out of the sampling/ test. With respect to the information required for structural appraisal and safety issues, the AP/RSE should liaise with the BD to arrive at a reasonable number of destructive tests and an

appropriate structural investigation plan.

5.4 Addition of new structural elements

The addition of new structural elements such as lateral ties, shear walls, braced frames or concrete lining to the existing building is often found necessary to improve structural performance. The addition of these new structural elements should be identified at an early stage of the design and their design should be agreed with the AMO. Elements for strengthening such as tie rods to the gable walls and masonry arches may either be concealed in the roof, in the floor screed or under the floor. In some cases, these elements can be exposed as these provisions were often found in old timber structures. The AMO should be consulted to obtain the desired architectural and heritage treatment of them.

5.5 Re-distribution of design loads

The re-distribution of design loads that may act on the existing building may be considered to reduce the extent of the required strengthening works and hence minimizing the impact to the heritage value of the heritage building. For example, the lateral stiffness of an old building may be significantly improved by adding shear walls inside concealed rooms instead of strengthening every structural frame in the building. To consider the redistribution of loads, the RSE must have a thorough understanding of the load paths of the structure. This relies on the full survey and structural appraisal. The cracks identified in the full survey may reveal how the loads have been redistributed within the structure in the past history of the building.

5.6 Additional supports to reduce the span

The deficiency of the load carrying capacity of floors or beams may be resolved by putting in additional supports in specified locations. Often, large rooms need to be sub-divided through re-planning by constructing new partitions. These partition walls can be designed as structural supports to reduce the floor span. It is also possible to put in additional columns and beams constructed of material that are distinguishable from the existing structure to reduce the stresses in the existing structures.

5.7 Insertions to strengthen timber elements

To increase the flexural strength of timber beams or joists against bending moment, it is possible to insert a steel plate at the bottom

or the centre of the timber beam/ joist to form a composite section with the timber or constructing a new steel beam underneath the existing timber beam/ joist to increase its carrying capacity. The steel plate, which may form a composite section with the timber, must be fixed to the timber section with connectors at suitable spacing capable of transmitting the horizontal shear forces. The steel plate should be adequately protected to achieve the required fire resistance period.

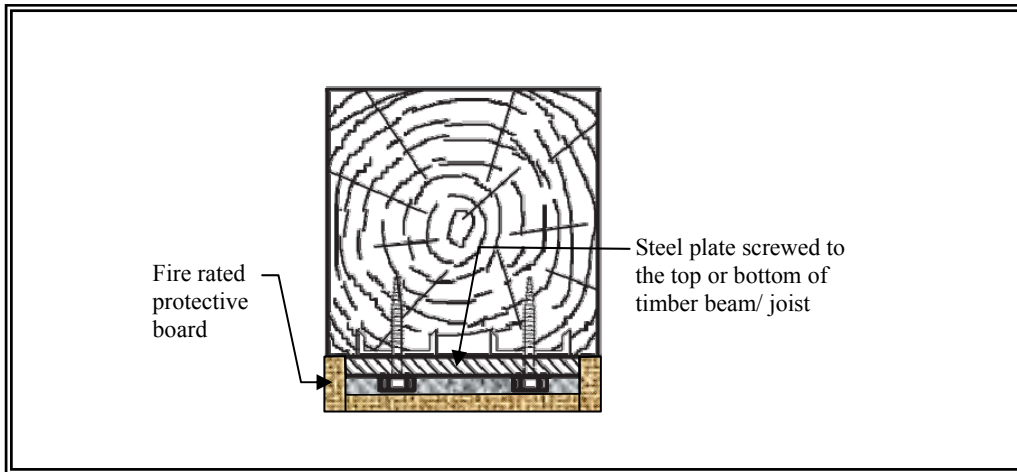


Figure 1 Steel plate for strengthening a timber beam/ joist (with composite action)

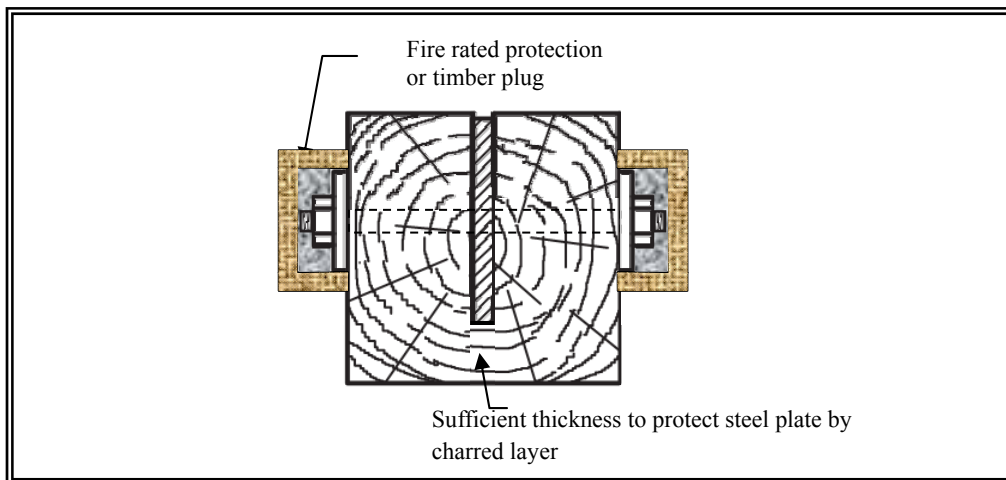


Figure 2 Steel strengthening plate in vertical sawn slot



Photo 7 New beams and columns underneath the timber Joists

It is also possible to add timber joists or steel plates bolted alongside the joists. Where the inserted steel plate is used (as in Fig. 2), the plate and associated connections should be protected with timber plugs against fire in accordance with BS5268 Part 4.1.



Photos 8 and 9 Three timber joists bolted together

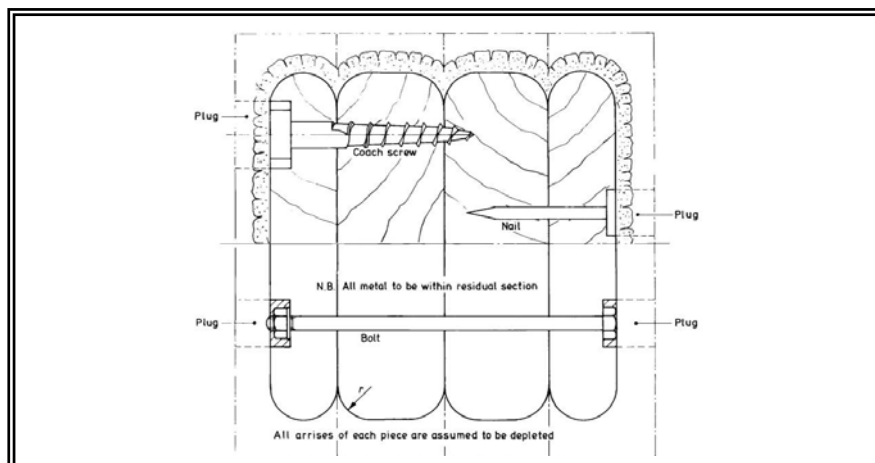


Figure 3 Charred timber section with steel connections to BS 5268 Part 4.1

5.8 Minimum imposed loads for floor

B(C)R 17 specifies the requirements of minimum imposed loads for various uses as set out in Table 1 thereof.

However, the adaptive re-use of a heritage building raises the concern that the existing structure may not be capable of supporting the minimum imposed load for the adaptive re-use as stipulated in the current regulations. Whilst strengthening of the existing structure may be feasible, significant A&A works may affect the heritage fabric. To avoid such damaging intervention, it may be reasonable to determine a minimum imposed load based on the nature or specific function of the adaptive re-use. The Code of Practice for Dead and Imposed Loads 2011 provides guidelines on determining the magnitude of imposed loads for specific use not prescribed in the B(C)R17.

Full justification should be provided on the methodology, source of reliable data and calculations in determining the magnitude of the imposed load taking into consideration the actual floor area, influence area of the occupants' lumped mass, configuration and framing of the structural elements, load transfer path and effects of concentrated load, etc. The reliability of the above design parameters should also be justified. Reference should be made to the Code of Practice for Dead and Imposed Loads 2011.

The BA may consider this approach on a case-by-case basis together with the following information :-

- (a) Assembly of people. For example, floor layout indicating the location of fixed setting, such as partitions, furniture, railing, equipment and plant, etc, that controls the movement of occupants and hence the imposed load intensity;
- (b) Accumulation of equipment, display items and furnishing;
and
- (c) Storage of materials.

5.9 Wind load on roof

The restoration works of a roof structure not involving the total removal or change in any of the following aspects: geometry,

material and load paths may be considered as repair works in nature. In this respect, the repair works of the roof structure would not be required to be designed to meet the current Code of Practice on Wind Effects in Hong Kong (the Wind Code).

If the existing roof structure needs repair works that involve the replacement/strengthening of some of the existing structural elements, they may be designed without the need of complying with the current Wind Code.

If the condition of the existing roof has dilapidated to a state beyond repair, the demolition and re-construction of the roof structure is regarded as A&A works, which should be designed to comply with the current Wind Code.

Occasionally, the roof structure may be so dilapidated that it may have already been replaced with other construction materials. When the roof structure is to be restored to its original form, such works are regarded as A&A works which should be designed to comply with the current Wind Code.

The above sets out the general guideline for the use of the Wind Code in design. Each individual project will be considered on a case-by-case basis.

- 5.10 Since heritage buildings were built a long time ago, some of the building fabrics are likely to have suffered deterioration to various degrees. Selection of appropriate repair methods for these building fabrics without damaging the heritage value of a building is of great importance. Recommendations in this Practice Guidebook may also be applied to the repair and strengthening of these heritage buildings.

Fire Safety

- 5.11 When a heritage building undergoes adaptive re-use, improvement to the fire safety provisions is necessary to cater for the possible increase in occupancy load and fire risk in association with the new use. As such, the existing fire safety provisions, both active and passive, may need to be upgraded to provide the adequate means of escape, means of access for fire fighting and rescue, fire resisting construction, and fire service installations and equipment.
- 5.12 The solutions to address the inadequacy of the fire safety measures cannot be considered in isolation, as a solution for one

particular situation may not be valid for another. It is imperative that a comprehensive fire safety package is developed for the building which takes into consideration the level of risk, the overall fire safety strategy and the specific building conservation needs. The compensatory measures provided in this section aims to provide guidance to the AP in compliance with the building safety and health requirements under the BO. The AP shall consider carefully whether such compensatory measures are adequate to ensure the safety of the occupiers or a fire engineering study shall be carried out to achieve a holistic design to resolve the various fire safety issues in one go. Where structural matters are involved, an RSE should be appointed to provide structural advice. The BA will consider acceptance of such compensatory measures on a case basis having considered the characteristics of the building, its proposed use and the associated risk.

Means of Escape

5.13 Inadequate width and number of exit routes

In cases where additional means of escape in terms of the number and the width of exit routes, staircases and doors are required, the following practical measures may be considered.

- (a) Installation of new exit doors and exit staircases at inconspicuous location

Where the existing width of a staircase or the number of staircases available is not adequate, new staircases may be erected in areas of less heritage value, e.g. areas which are not identified as character-defining elements and where there is minimal visual impact to the building, or a room inside the building where the room carries less heritage value than the exterior of the building. However, since each heritage building has its unique character-defining elements, the acceptable location of new staircases from conservation point of view varies from case to case. As the location of new staircases may affect the fundamental planning of the building layouts, early consultation with the AMO is highly recommended.

In view of the adverse impact on the existing structures by adding new exits and staircases, existing exits and staircases should be re-used as far as possible from conservation point of view. As such, the possibility of reusing, modifying and adopting (with management

approach if considered appropriate) the existing exits and staircases should be explored before new exits and staircases are introduced.

(b) Compensatory measures for a narrow staircase

An existing staircase of width not less than 860mm may be accepted for the purpose of means of escape and/or means of access if:-

- (i) the building is provided with the following fire service installations:-
 - (1) automatic sprinkler system of fast response type; and
 - (2) fire detection system with early warning components to alert the occupiers the outbreak of fire and to notify the FSD within the shortest time;
- (ii) either the access to such staircase is via a protected lobby or the staircase is naturally ventilated with sufficient openings to the external air in accordance with the fire safety codes;
- (iii) for the purpose of demonstrating compliance with the fire safety codes , the discharge value (DV) of the narrow staircase shall be computed with a reduction in its capacity as follows: -

$$\text{DV of staircase} = 56 + 17 (n-1),$$

where n is the no. of storey above ground level of building
- (iv) handrails are provided on each side of the staircase in accordance with the fire safety codes;
- (v) the staircase is free from any combustible materials and unprotected services other than emergency services in accordance with the fire safety codes;
- (vi) clear signs with an illustrated diagram showing the single-row users design are posted at the entrance to the staircase and along the stair;
- (vii) where the heritage building is of such use or of such design and capacity that requires more than one exit staircase, at least one of these staircases is code compliant; and

(viii) a management plan is provided in accordance with Appendix III.

(c) Management approach

Management approach may be adopted to limit the number of occupants in licensed premises. Reference should be made to paragraph 4.10 above.

5.14 Non-compliant risers and treads of staircase and staircase with winder

If a staircase is with winder and its risers and treads deviate from the requirements in the fire safety codes and such staircase has to be preserved for conservation needs, the following options may be considered : -

(a) Addition of a new staircase

A new staircase may be added at suitable locations for the purpose of means of escape and/or means of access, and the existing substandard staircase may be retained for circulation purpose.

(b) Compensatory measures for non-compliant staircase

In case it is impractical to provide a new staircase, depending on the number of people using such non-compliant staircase, the occupiers' level of familiarity with the building and the number of storey the staircase serves, an existing non-compliant staircase may be accepted as a means of escape and/or means of access if : -

- (i) handrails of height not less than 850mm and not more than 960mm are provided on each side of the staircase;
- (ii) tread surface is firm and slip-resistant;
- (iii) adequate warning signs are posted at the entrance to the staircase to alert occupants the geometry of the staircase;
- (iv) the tread is not less than 220mm wide along a straight flight; and

- (v) a management plan is provided in accordance with Appendix III.

For the avoidance of doubt, a non-compliant staircase that serves primarily children, elderly and persons with low mobility, such as in a kindergarten, nursery, learning centre, child care centre, elderly care centre, etc will not be accepted as a means of escape and/or means of access.

5.15 Excessive number of risers in a flight of staircase

An existing staircase having not more than 18 risers may be accepted as a means of escape and /or means of access if the following compensatory measures are provided: -

- (a) handrails of height not less than 850mm and not more than 960mm are provided on each side of the staircase;
- (b) adequate warning signs are posted at entrance to the staircase to warn the users of a long stair flight; and
- (c) a management plan is provided in accordance with Appendix III.

For the avoidance of doubt, a non-compliant staircase that serves primarily children, elderly and persons with low mobility, such as in a kindergarten, nursery, learning centre, child care centre, elderly care centre, etc will not be accepted as a means of escape and/or means of access.

5.16 Exit door not opening in the direction of exit

According to the current fire safety codes, every exit door from a room or a storey shall open in the direction of exit where the capacity of the room exceeds 30 persons. If it is impractical to have an existing inward opening door altered to swing in the direction of exit, then the following options may be considered:-

- (a) Door kept open

If the door is not required to perform a fire or smoke separation function, such door may be kept fully opened permanently using a door holder, to remove the impediment to egress.

(b) Subdivision of room

A room may be subdivided into smaller compartments so as to accommodate not more than 30 people in each sub-divided room.

(c) Addition of new door

New doors that open in the direction of exit may be added at suitable locations of the room for exit.

(d) Compensatory measures

If there are operational needs to have the door kept normally closed, such a non-compliant door may be accepted for the purpose of exit if : -

- (i) the door is fitted with a device that will open the door automatically upon activation of the fire alarm. Such device is required to be included in the Schedule of Building Materials and Products under PNAP APP-13 when applying for occupation permit or certifying the completion of the respective A&A works; and
- (ii) a management plan is provided in accordance with Appendix III.

(e) Management approach

Management approach may be adopted to limit the number of occupants in licensed premises. Reference should be made to paragraph 4.10 above.

5.17 Basement connected with upper floors by a common staircase

The fire safety codes stipulate that an escape staircase serving the floors above ground should not be continued directly to the basement. If it is impractical to erect a new staircase to serve the basement, the following options may be considered: -

(a) Provision of dividing wall

If the landing of the staircase at the ground level of exit is wide enough, a wall having the same fire resistance performance required under the fire safety codes as the staircase may be erected to separate the staircase serving

the floors above ground from the staircase serving the basement.

(b) Compensatory measures

If it is not feasible to construct a dividing wall as described in item (a) above, a staircase that serves both storeys above and below ground may be accepted for the purpose of means of escape and/or means of access if: -

- (i) the building is provided with the following fire service installations:-
 - (1) automatic sprinkler system of fast response type; and
 - (2) fire detection system with early warning components to alert the occupiers the outbreak of fire and to notify the FSD within the shortest time;
- (ii) the staircase is provided with protected lobby at each floor to inhibit the spread of smoke and heat into the staircase;
- (iii) adequate directional and exit signs are provided within the staircase;
- (iv) the exit door leading to a street or an open area at ground level/ ultimate place of safety as described in the fire safety codes is fitted with a device that will open the door automatically upon activation of the fire alarm. Such device is required to be included in the Schedule of Building Materials and Products under PNAP APP-13 when applying for occupation permit or certifying the completion of the respective A&A works;
- (v) an audio and visual advisory system is provided inside the staircase at the level of exit to show the direction of safe egress; and
- (vi) a management plan is provided in accordance with Appendix III.

For the avoidance of doubt, a non-compliant staircase that serves primarily children, elderly, persons with low mobility or a large crowd who may be unfamiliar with the building, such as in a kindergarten, nursery, learning

centre, child care centre, elderly care centre, places of public entertainment, etc will not be accepted as a means of escape and/or means of access.

Fire Resisting Construction

5.18 Timber construction

Timber is a combustible material but charred timber is also a good insulator. In the event of fire, the charred layer protects the inner part of the timber section from being consumed by the fire while the strength properties of the uncharred timber are virtually unaffected. The charring rate of timber in mm/min is predictable for various timber species and is well documented by many international timber design codes of practice such as BS5268 to calculate the strength of the residual section in the event of fire. Guidelines on fire resisting construction for individual timber elements are provided in the paragraphs below.

5.19 Timber floor

A floor is an element of construction and in some circumstances may also be required to act as a compartment floor as stipulated in the fire safety codes. In heritage buildings, the timber joists are typically 8" deep by 4" wide (i.e. 203mm deep x 101mm wide) spaced at 1'6" (450 mm) centre to centre. When fully exposed to fire, they are unable to provide the required fire resistance performance in terms of stability for 1 hour. Furthermore, the fire safety codes prohibit the use of combustible material. Hence, some form of modification or A&A works on a floor constructed of timber may be inevitable. However, methods (e.g. by fire engineering approach) of full retention of a timber floor as element of construction and to expose both sides of the floor should be sought as far as possible when the floor is identified as an element of high heritage value. In other situations, the following options may be considered to suit specific needs:-

- (a) Installation of fire rated floor board underneath the existing timber floor board

When the existing timber floor board is required to achieve certain fire resistance performance under the fire safety codes, additional fire rated floor board can be installed beneath the existing timber floor planking (Fig. 4 refers). If the top surface of the existing timber floor board is exposed to fire, the additional fire rated floor board installed underneath can still provide structural support to the imposed

floor loads. Details of the upgraded timber floor should also be included in the Schedule of Building Materials and Products under PNAP APP-13 when applying for occupation permit or certifying completion of the respective A&A works.

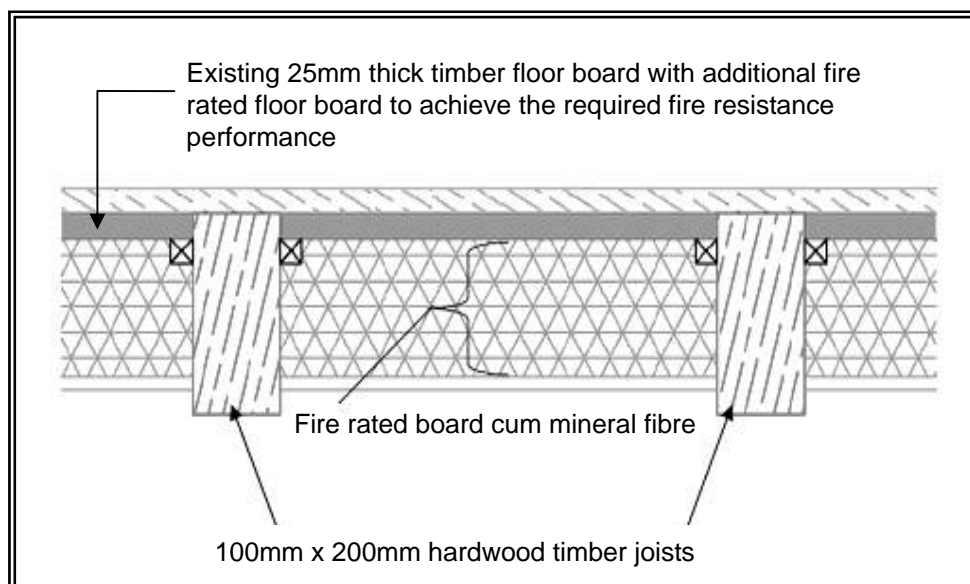


Figure 4 Additional fire rated protective board fixed at underside of floor board with additional fire rated board installed underneath the top timber planking

(b) Installation of structural deck with adequate fire resistance

If it is required to expose one side of a timber floor, an additional structural steel deck with adequate fire resistance can be erected on the other side of the floor. The timber floor is then preserved in-situ. Stability of the timber floor in case of fire should be considered and justified.

(c) Sandwich approach

In cases where it is decided to retain a timber floor, it may be upgraded to achieve the requisite fire resistance rating by using a “sandwich approach”. Fire-resisting materials could be installed on the top and soffit of the floor to achieve the required fire protection. However, the heritage value of the floor would be grossly affected by adopting this approach. It should be noted that the actual improvement in fire resistance performance depends on the details of the construction and condition of the existing floor. A technical assessment should be conducted to ensure that appropriate decisions and choices could be made to suit the specific situation. Details of the upgraded timber floor should also be included in the Schedule of Building Materials and

Products under PNAP APP-13 when applying for occupation permit or certifying completion of the respective A&A works.

(d) Erection of new reinforced concrete floor slab

A new reinforced concrete floor slab may be constructed to replace the existing timber floor not meeting the FRP requirements. This approach is subject to the agreement with the AMO and should be considered as a last resort.

5.20 Timber staircase

A required staircase including the landings and supports thereto being an element of construction is required to be fire rated, unless it is enclosed within walls having the required fire resistance performance, and should be constructed of non-combustible materials.

- (a) In order to fulfill this safety requirement, a new staircase may be added so that an existing timber staircase, being one having significant heritage values, may be maintained to serve as a circulation staircase or left intact. In this case, paragraph 5.13(a) above should be noted while considering the choice of location to erect a new staircase. The condition of the existing timber staircase should also be assessed and upgraded where necessary to ensure structural safety if it is to serve as a circulation staircase.
- (b) An existing timber staircase may be accepted as a means of escape and/or means of access if: -
 - (i) the staircase is separated from the rest of the building by fire resisting walls as required under the fire safety codes;
 - (ii) all timber elements are protected with fire retardant treatment¹⁰ applicable to foot traffic to achieve a Class 1 surface spread of flame when tested in accordance with BS476 Pt. 7 or other equivalent standard in accordance with the manufacturer's recommendations, and such fire retardant treatment is to be included in the Schedule of Building Materials and Products under PNAP APP-13 when applying for occupation permit or certifying

¹⁰ The main function of fire retardant treatment is to reduce the heat supplied to the substrate of timber for sustaining flaming in timber. Such treatment includes impregnation treatment or application of fire retardant paint to the timber elements.

completion of the respective A&A works;

- (iii) if the staircase is the main staircase of the building with frequent foot traffic, a single layer of 13mm thick gypsum board or equivalent proprietary fire protective lining is required to be fixed to the underside of the stair flight and landing. Details of the upgraded timber floor should also be included in the Schedule of Building Materials and Products under PNAP APP-13 when applying for occupation permit or certifying completion of the respective A&A works;
- (iv) the staircase is provided with automatic sprinkler system of fast response type and fast detection alarm system; and
- (v) a management plan is provided in accordance with Appendix III.

5.21 Timber column

Timber columns should be covered by proprietary fire protective lining system to achieve the required fire resistance performance. Subject to the satisfactory demonstration of the overall stability performance of the building based on the residual strength and stiffness of the columns in case of fire, existing timber columns may be accepted with or without additional fire resisting protection. Details of the upgraded timber floor should also be included in the Schedule of Building Materials and Products under PNAP APP-13 when applying for occupation permit or certifying completion of the respective A&A works.

5.22 Timber roof

According to the fire safety codes, if a roof does not form part of an exit route or perform the function of a floor and is not within 1.8m and 0.9m from the adjoining building and common boundary respectively, all roofs, together with the members forming the roof structure, are not required to have fire resistance performance, but shall be constructed of non-combustible materials. A timber roof may be retained to meet conservation needs if :-

- (a) the rafters and battens supporting the roof have been proven to be structurally safe;
- (b) all timber elements are protected with fire retardant treatment

to achieve a Class 1 surface spread of flame when tested in accordance with BS 476 Pt. 7 or other equivalent standard in accordance with the manufacturer's recommendations, and such fire retardant treatment is to be included in the Schedule of Building Materials and Products under PNAP APP-13 when applying for occupation permit or certifying completion of the respective A&A works;

- (c) the roof is covered by non-combustible roof covering including roof tiles such as natural slates, clay tiles, concrete tiles, etc; and
- (d) a management plan is provided in accordance with Appendix III.

5.23 Timber door

When a heritage building undergoes adaptive re-use, some of the existing doors may need to be upgraded to provide the requisite fire resistance. If it is necessary to retain the original door fabric, the following options may be considered :-

- (a) Installation of new fire rated door

An additional fire rated door may be provided in the vicinity to take up the role of fire protection, leaving the existing door intact as a decorative feature. The appearance of the additional door shall be compatible with but distinguishable from the existing building fabric from conservation point of view.

- (b) Upgrading of existing door

There are available techniques to upgrade the fire resistance rating of a timber panelled door without altering the external appearance (at the front) of the door. The AP is strongly advised to check and submit test evidence for the proposed upgrading methods with the submission of building plans to BD. Implementation of the upgrading should be carried out by experienced personnel of the trade in accordance with the manufacturer's recommendations. Such upgraded fire door is required to be included in the Schedule of Building Materials and Products under PNAP APP-13 when applying for occupation permit or certifying completion of the respective A&A works. Depending on the type of upgrading methods, some may cause irreversible changes to the

components of a door to be preserved. Thus, this approach would be subject to the agreement with the AMO and should be considered as a last resort.

(c) Assessment of existing door

If an existing door to be preserved is of solid construction, of adequate thickness and with a suitable rebate provided by the door frame, an assessment may be carried out by a HOKLAS accredited laboratory or equivalent to determine whether the door and its associated door frame could meet the requisite fire resistance rating. Fire test on a door of similar construction may need to be carried out to provide further evidence on the fire resistance property of the existing door.

5.24 Reinforced concrete structure of inadequate fire resistance

Where the existing concrete cover to reinforcement in the reinforced concrete structure is found inadequate for the required FRP, a new layer of gypsum plaster on metal lathing or proprietary fire protective lining can be applied to the face of the reinforced concrete element to enhance its fire resistance.

5.25 Inadequate protection to adjoining building

Existing openings in the external walls of a heritage building that are within 900 mm of an adjoining building can be protected by fire resisting glass panels, having the same fire resistance performance required under the fire safety codes as the element of construction of the building, installed at the inner side of the openings.

Emergency Vehicular Access and Access for Fire Fighting and Rescue

5.26 Emergency vehicular access

An emergency vehicular access (EVA) is required for new buildings. The AP can make reference to the current fire safety codes on the typical enhanced fire safety measures to compensate for the non-provision or deficiency of EVA. Besides, reference can also be made to PNAP APP-136 on the guidelines on the exemption/ modification in special circumstances. Early consultation with FSD on the upgrading works and compensatory measures required is recommended.

5.27 Structural and spatial constraints for the provision of major fire service installations or means of access for fire fighting and rescue

(a) Fireman's lift and fire-fighting and rescue stairway

Subject to full justifications on the hardship encountered, e.g. due to site constraint, the BA and the Director of Fire Services may accept a smaller lift to serve as a fireman's lift and relaxation on the provision of firefighting and rescue stairway on a case by case basis.

Street Fire Hydrant and Fire Service Installations and Equipment

5.28 The provision of street fire hydrant(s) may be required with due consideration of water supplies at the vicinity by the FSD.

5.29 In case where major fire service installations are required in accordance with the FSI Code, the following practical measures may be considered. Advice from the FSD shall be sought at an early stage.

(a) Emergency generator

Secondary power supply before the incoming main switch from the electricity company or provision of back up power from main supply may be considered as a substitute on a case by case basis.

(b) Water tank for automatic sprinkler system

Improvised sprinkler system with water supplied from the fire hydrant/hose reel water tank may be acceptable. When additional space is not available to construct a new water tank outside a heritage building, it may be possible to obtain direct feed from the town main water supplies. Alternatively, a smaller water tank may be built on top of a new lift or within a floor with new supporting beams.

Protective Barrier

5.30 Many existing protective barriers in the form of parapet walls or balustrades to stair-wells, balconies or verandahs are of insufficient height or have excessive gaps to prevent falling of persons or objects, or have not been designed to prevent persons from climbing over the barrier. To improve safety, the following options may be considered:

(a) Secondary protective barrier

To preserve the existing barrier, a secondary protective barrier, such as a glass panel or steel balustrade that complies with the current safety requirement, may be installed behind the existing one. Care should be taken to minimize intervention to the floor of heritage value.

(b) Adding height to existing protective barrier

To achieve the required height, a glass panel or additional railings which are compatible with the existing may be added on top of the existing barrier. The existing barrier, the fixing and the structural strength of the additional members together with their effects at the support should meet the current structural requirements. In this case, the fixing details should be agreed with the AMO for compatibility with and preservation of the existing heritage elements.

(c) Adding mesh or grille to reduce the opening dimensions

Wires, wire mesh or metal grille may be added behind the existing protective barrier to reduce the size of its openings. These additions should be securely fixed to the existing barrier or adjacent structures to meet the current structural requirements. In this case, the fixing details should be agreed with the AMO for compatibility with and preservation of the existing heritage elements.

(d) Compensatory measures for protective barrier with wider gaps and/or with lower solid curb

Depending on the use of the premises, the location and function of the protective barrier and the difference in adjacent levels, an existing protective barrier with gap marginally wider than 100mm and/or with solid curb less than 150mm may be accepted if: -

- (i) access to the passage or area under the protective barrier is restricted;
- (ii) adequate warning signs are posted at conspicuous locations close to the protective barrier to alert occupiers of the non-compliance;
- (iii) an effective management control system is in place with measures that will prohibit children access to such protective barriers; and
- (iv) a management plan is provided in accordance with Appendix III.

For the avoidance of doubt, the above compensatory measures will not be acceptable if the premises are used primarily by children, such as a kindergarten, nursery, learning centre, child care centre, primary school, etc.

- (e) Compensatory measures for protective barrier of height less than 1100mm but not less than 900mm at balconies and verandahs

An existing protective barrier of height less than 1100mm may be accepted if: -

- (i) the height of the protective barrier is not less than 900mm;
- (ii) the sum of the width of the top surface measured from centreline of the barrier being not less than 300mm and the height of protective barrier being not less than 900mm, is not less than 1 220mm. Figure 5 refers;
- (iii) such top surface is so constructed to prevent persons sitting or placing articles which are liable to fall to any area below;
- (iv) the fixing and structural strength of the top surface meets the requirements on the minimum horizontal imposed load;
- (v) adequate warning signs are posted at conspicuous location to alert occupiers of the lower parapet height and not to sit on the parapet;
- (vi) floor surface in front of the protective barrier is non-slip;
- (vii) an effective management control system is in place with measures that will prohibit children access to such protective barriers; and
- (viii) a management plan is provided in accordance with Appendix III.

For the avoidance of doubt, the above compensatory measures will not be acceptable if the premises are used primarily by children, such as a kindergarten, nursery, learning centre, child care centre, primary school, etc.

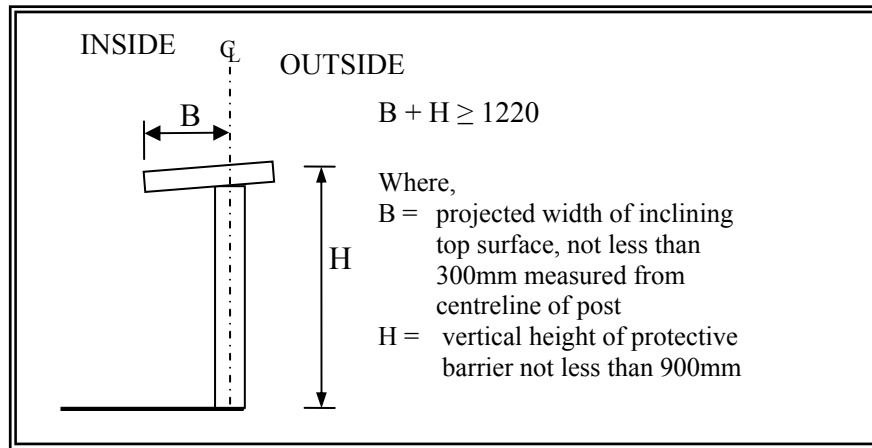


Figure 5 Relationship between the height of protective barrier (H) and minimum width of top surface (B)

- (f) Compensatory measures for protective barrier of lesser height and/or with wider gaps, along flight of staircase

Depending on the use of the premises, the location and function of the staircase and the difference in adjacent levels, an existing protective barrier of height not less than 900mm and/or with gaps marginally wider than 100mm along the flight of a staircase may be accepted if : -

- (i) the staircase is not of open well design;
- (ii) adequate warning signs are posted at conspicuous location close to the barrier to alert occupiers of the non-compliance;
- (iii) an effective management control system is in place with measures that will prohibit children access to such protective barriers; and
- (iv) a management plan is provided in accordance with Appendix III.

For the avoidance of doubt, the above compensatory measures will not be acceptable if the premises are used primarily by children, such as a kindergarten, nursery, learning centre, child care centre, primary school, etc.

- (g) Minimum horizontal imposed load for protective barrier

The horizontal imposed loads on any protective barrier is stipulated in table 3 of the B(C)R17(1). To demonstrate the structural adequacy of an existing protective barrier in a heritage building, the project RSE may discuss and agree with the BA the appropriate level at which the minimum horizontal imposed loads apply.

- (h) Management approach

For existing balustrades around voids, it may be possible to prevent access to the balustrade by providing a distance barrier on the inside of the balustrade such as a fixed display cabinet of a suitable depth. Reference should be made to paragraph 4.10 above.

Barrier Free Access

5.31 Most heritage buildings are not designed to cater for access for persons with a disability. Improving access to these buildings may benefit many people, not only to persons with a disability, but also the elderly and families with children. It is therefore essential that all reasonable steps should be taken to ensure proper access to heritage buildings. In order to minimize any adverse effect on character-defining elements that give heritage values to the building, the following options may be considered: -

- (a) New ramp, lifting platform and lift at areas of less heritage value

An accessible lift or lifting platform should be conveniently located. It should also be placed at a location which is not identified as a character-defining element. If placed externally, it should impose minimal visual impact to the building. Alternatively, it may be placed inside the building, within a space that carries less heritage value than the exterior of the building. Where a ramp is required for entry into the building, elegant solutions that compliment the architecture of the building may be explored. Where there is an unjustifiable hardship to provide a fixed ramp, a removable ramp may be considered based on case merits.

Since each heritage building has its unique character-defining elements, the acceptable location of a new lift, lifting platform or ramp from conservation point of

view varies from case to case. As the location of the new lift, lifting platform or ramp may affect the fundamental planning of the building layouts, early consultation with the AMO is highly recommended.

(b) New entrance at lower level

To overcome the initial flight of entry steps which have been identified as a character-defining element of a heritage building, an alternative access via a lower ground floor that matches with the external floor level may be explored. Appropriate and sensible solutions such as incorporating a new lower ground floor and subtly modifying the external floor level at the entrance may also be considered. This alternative main entrance should be prominently located and designed to be commonly used by the public.

(c) New entrance via an alternative access route

It may be possible to change the way in which a building is managed by opening up an alternative main entrance that is accessible to all. Altering an existing window to form a doorway for creating a side entrance may be possible subject to the AMO's agreement. While the original main entrance with its entry steps is retained, the alternative main entrance should be prominently located and designed to be commonly used by the public.

5.32 Minor alteration for adequate manoeuvring space inside a lobby in a corridor

It may be possible to either change the direction of door swing or to replace the door hinges by those allowing double action such that the full length of the lobby being not less than 1200mm can be allowed for manoeuvring wheelchairs (Figure 6 refers). If the latter one is to be adopted, a check mechanism shall be provided to prevent the door swinging beyond the closed position and a transparent vision-panel with a bottom edge not more than 1000mm and the top edge not less than 1500mm above the finished floor level shall be provided.

Alternatively, where there is enough space, it may also be possible to extend the walls of the lobby to achieve the minimum length requirement subject to the AMO's agreement. Figure 7 refers.

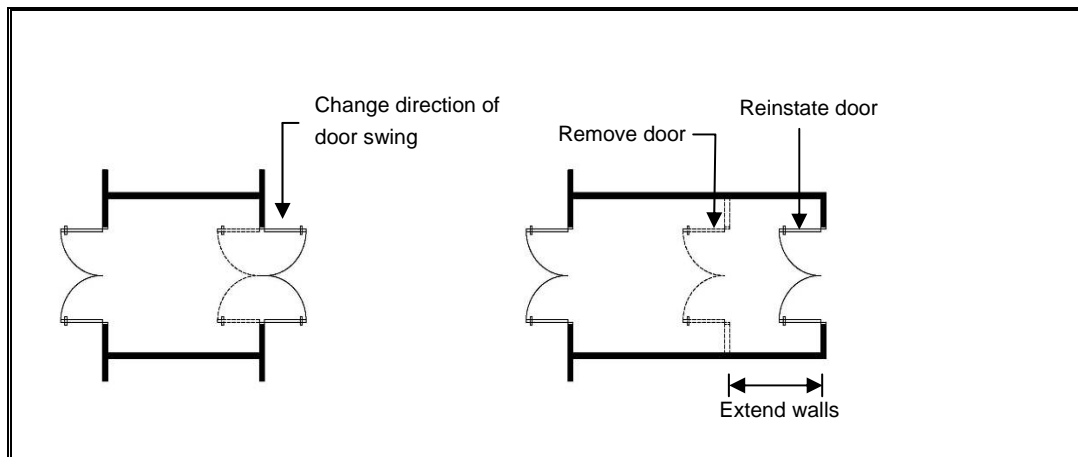


Figure 6 Change door swing direction

Figure 7 Lobby extension

5.33 Leveling the minor level difference along a path

It may be possible to fasten a wedge-shaped solid piece having gradient of not less than 1:8 or 1:10 to bridge a level difference of not more than 75mm or 150mm respectively if its maximum length is not more than 600mm and 1500mm respectively. Figure 8 refers.

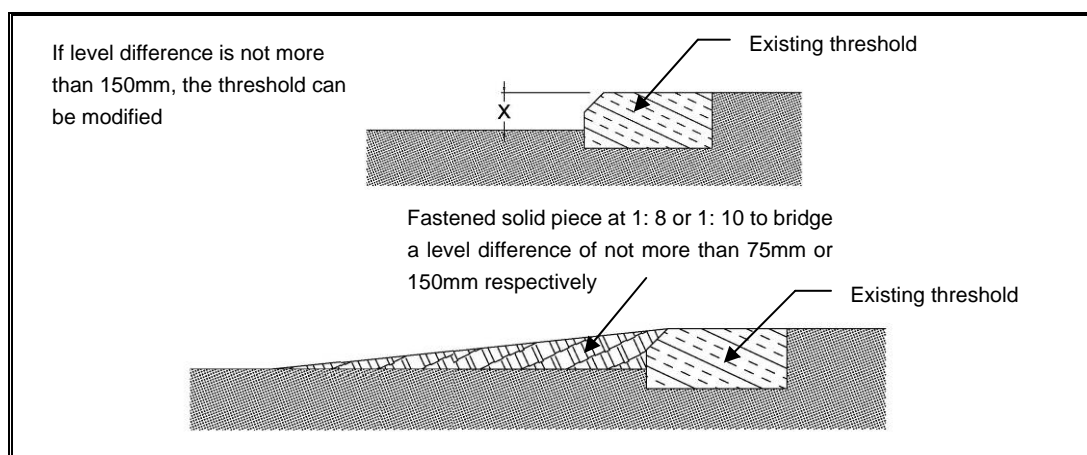


Figure 8 Installation of solid piece

5.34 Adding width to existing doorway

If the width between an open door and the opposite jamb or the other leaf is marginally less than the requirement, it may be possible to replace the hinges of the existing door by the 'swing-away' or 'offset' type such that the door will be open out of the door opening and this in turn increases such width by about 50mm depending on the performance of such hinge. Such hinge forming the doorset is required to be included in the Schedule of Building Materials and Products under PNAP APP-13 when applying for occupation permit or certifying the completion of the

respective A&A works.

Unjustifiable hardship

- 5.35 It is normally possible to plan adequate access and facilities for persons with a disability without compromising the significance of a heritage building. Where it is impracticable to provide reasonable access within the building, bearing in mind the physical location and immediate environs of the building, and where providing such access would impose unjustifiable hardship on the person seeking approval in relation to plans submitted for A&A works or change in use of an existing building, the BA may accept applications to vary the provisions required under B(P)R 72 and the Design Manual-Barrier Free Access 2008.
- 5.36 In considering such applications to vary the required provisions, the BA will consider the special circumstances of the case and may seek advice from the Advisory Committee on Barrier Free Access (ACBFA). The terms of reference and membership of ACBFA are set out in PNAP APP-41. In this respect, the applicants should demonstrate the nature of the “unjustifiable hardship” and any practicable alternatives for consideration of the BA.
- 5.37 For A&A works to existing buildings where initial access for persons with a disability is not provided, applications may be acceptable if the BA would be satisfied with the design of the building in respect of the non-provision of facilities for persons with locomotory disabilities in cases where the provision of a ramp access would involve alteration works to the common parts of a building and where the applicant can demonstrate that: -
- (a) the applicant has no control over the area;
 - (b) consent from co-owners or owners' corporation to permit the carrying out of the A&A works to the common parts of the building is declined or cannot be obtained; and
 - (c) where ground beam is involved, there is spatial or structural constraint.

Provision of Sanitary Fitment

5.38 It is common that more sanitary fitments are required to be provided to cater for the new use of a heritage building. In order to minimize any adverse effect on the character-defining elements that give heritage value to the building, the following options may be considered: -

(a) Alteration of existing rooms for new toilets

Existing rooms may be altered for accommodating new toilets to meet the current sanitary fitments standard. In this case, the proposal shall be agreed with the AMO for compatibility with the existing policy to preserve the character-defining elements as far as possible.

(b) New toilets in another building at the same site

For a heritage site comprising a group of buildings which are under the same ownership and management, new toilets required for one building may be provided in another building within the same site if: -

- (i) the buildings are in close proximity with each other;
- (ii) the total number of sanitary fitments provided is not less than the sum required for the buildings to be served;
- (iii) unrestricted access to such toilets is maintained during the operation of the buildings;
- (iv) adequate directional signs showing the location of such toilets are posted at conspicuous part of the buildings concerned; and
- (v) a management plan is provided in accordance with Appendix III.

Case studies

The purpose of this Appendix is to illustrate, through case studies, how the approaches mentioned in section 4 of this Practice Guidebook could be adopted to meet the needs for preservation of those building fabrics of significant heritage value and compliance with building safety and health requirements when planning the adaptive re-use of and alteration and addition works to a heritage building. The examples illustrated are for general reference only. The appropriate solution for a particular case should be worked out on its own merit by adopting the approaches as mentioned in section 4 of the Practice Guidebook.

Local cases

Case 1 - Kom Tong Hall at 7 Castle Road, HK

This case involves adapting an old residential building known as Kom Tong Hall built in 1914 into the Dr Sun Yat Sen Museum. This building was accorded as a Grade 2 Historic Building by the AAB, i.e., a building with special merit, when conversion took place. It has been declared as a monument under the A&MO in 2010. The 4-storey building is of classical Edwardian style and is one of the first steel-frame mansions in the territory. According to the AMO's advice, the façade comprising Greek style granite columns and the curved balconies behind them at the front elevation and main timber staircase are of significant values and hence should be preserved.



Photo 10 Front elevation of Kom Tong Hall (from Caine Road)

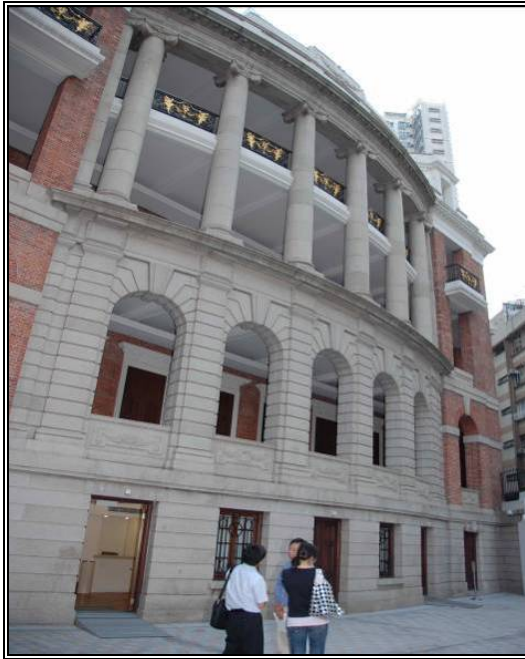


Photo 11 Front elevation of Kom Tong Hall



Photos 12 and 13 The grand timber staircase preserved by using management approach

(a) Structural safety

Due to the lack of information on the structural design of the building, a comprehensive structural survey and appraisal was necessary to ascertain the framing plan, construction details and structural capacities. Moreover, to verify the load carrying capacity of the existing reinforced concrete slab, a full-scale static loading test for a few selected slab panels were carried out with a test load of 1.25 times the designed live load. Partial replacement of a timber joist at the landing of the timber stair which was deteriorated seriously by termite attack was necessary.

(b) Fire safety

The existing means of escape provisions in terms of number and width of staircases, width of corridors, existence of winders in a staircase and travel distance were inadequate to accommodate the increase in occupancy load upon adaptive re-use.



Photo 14 Existing staircase with winders

With a view to minimizing the visual impact on the heritage value of the building, fire engineering approach was adopted to work out an alternative fire safety design demonstrating that the performance standards of the prescriptive requirements could be achieved with little alteration works. In essence, a

management approach was adopted to restrict the occupancy of the venue to 300 people at any one time. A new staircase was added (similar to paragraph 5.13(a) of the Practice Guidebook). An automatic sprinkler system is provided in the office and back of house areas. Air aspirating detection system is provided to all areas not protected with sprinklers i.e. all public areas. The provision of adequate attendants and reliable management team were taken into account in accepting the alternative design.



Photo 15 Air aspirating detection system provided at areas not protected with sprinklers

(c) Protective barrier to the grand staircase

In order to preserve the architectural value of the grand staircase which forms a major circulation staircase for the building, a management approach has been adopted to ensure the safety function of the stair balustrade can be achieved. Decorative planters are placed along the balustrade to prevent people from approaching the balustrade so as to eliminate danger of falling from height. The situation is closely monitored by CCTV.



Photo 16 Decorative planters provided along staircase to keep users away from balustrades

(d) Barrier free access

Due to the spatial constraint within the building and the visual impact on exterior elevation, a lift for persons with a disability has been carefully placed in the rear courtyard where the effect on external elevation is acceptable and to the satisfaction of the AMO.



Photo 17 Accessible lift placed at the rear part of the building

Case 2 - Hong Kong Heritage Discovery Centre in Kowloon Park

This project involves adapting two blocks of 2-storey barracks (S61 and S62) into a heritage centre for research, public education and promotion of heritage conservation in Hong Kong. Built in 1910, the buildings were designed in accordance with the discipline and rules of the European colonial architecture with true brick arches, timber flooring and pitched roof. They were accorded with a Grade 3 status when the conversion work was carried out under the guidelines set out by the AAB assuring their heritage values. The buildings have been graded as a Grade 1 status since 2009. The major issues relating to building safety encountered are summarized below.

(a) Structural safety

The “masonry slab”, the suspended slab constructed of steel channels with infill masonry, at the verandah at 1/F was found deteriorating and hence had to be replaced with a new reinforced concrete slab.

(b) Fire safety

The timber floor at 1/F, which has to be upgraded to 2 hr fire resistance period, has to be preserved. Accordingly, fire resisting boards were added on the top and bottom of the timber floor to provide the requisite fire resistance period.

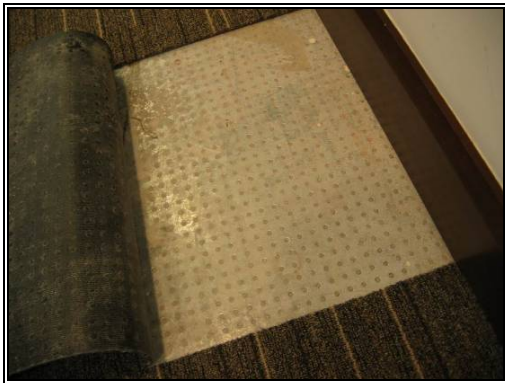


Photo 18 Durasteel boards added on top of the existing timber floor



Photo 19 Fire-rated boards provided to the soffit of timber floor

Automatic sprinkler provision is provided in accordance with the FSI code requirement. The sprinkler water tank is housed on the roof of the new extension block connecting the two blocks. Moreover, an EVA is provided along the front entrance façade.



Photo 20 Automatic sprinkler system provided in the whole building



Photo 21 EVA of the Heritage Discovery Centre

(c) Protective barrier

The old barriers at the arch openings along the verandah at G/F have been replaced to ensure safety of the visitors and occupants of the buildings. Effort has been made to design the new barriers in such a way that it can blend in with the existing architectural details of the building façade without compromising the building safety.

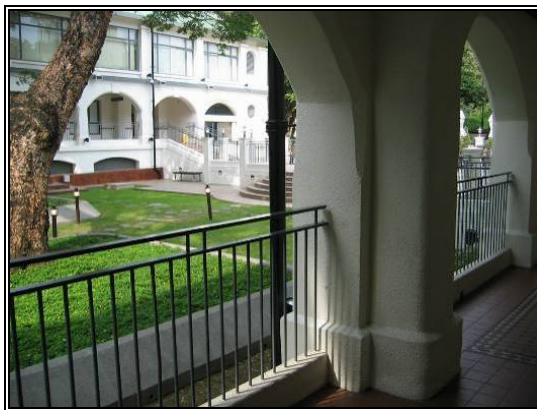


Photo 22 New protective barriers matching the original style and complying with current safety standards



Photo 23 New window frames blended in with the existing architectural details

(d) Barrier free access

Access and facilities for persons with a disability such as ramp, lifting platform, lift, tactile warning strips and guide paths and toilets are provided.



Photo 24 Access ramp, tactile warning strips and guide paths provided at the main entrance



Photo 25 Accessible toilet provided

Case 3 - Bethanie at Pokfulam

The Bethanie was built by the Missions Étrangères de Paris in about 1875 and was used as a sanatorium for a century. It is a 3-storey building above a basement. It was graded as Grade 2 Historic Building in 1981 and has been accorded a Grade 1 status by the AAB since 2009. The building was occupied by the University of Hong Kong from 1978 – 1997, and then it has been left vacant as a Government building. In 2003, the Government funded the Hong Kong Academy for Performing Arts (HKAPA) to restore Bethanie and two adjacent cowsheds as its second campus and a new theatre. The conversion work, which was completed in 2006, has restored the building's original features, in particular, its external elevations and the neo-gothic chapel.



Photo 26 Front elevation of Bethanie

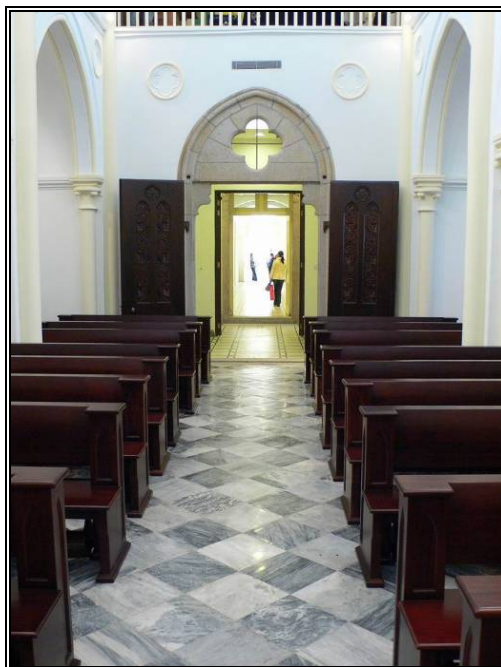


Photo 27 Original timber door with historical and architectural significance preserved

(a) Protective barrier

The existing balustrades along the verandah on the external walls are less than 1100 mm high, glazed panels have been installed to meet the current safety requirement.

(b) Barrier free access

Facilities for persons with a disability are generally provided. However, a lifting platform in lieu of a lift is provided in such a position so as not to affect the aesthetic value of the building.



Photo 28 Provision of tactile warning strips at the landing of the new staircase

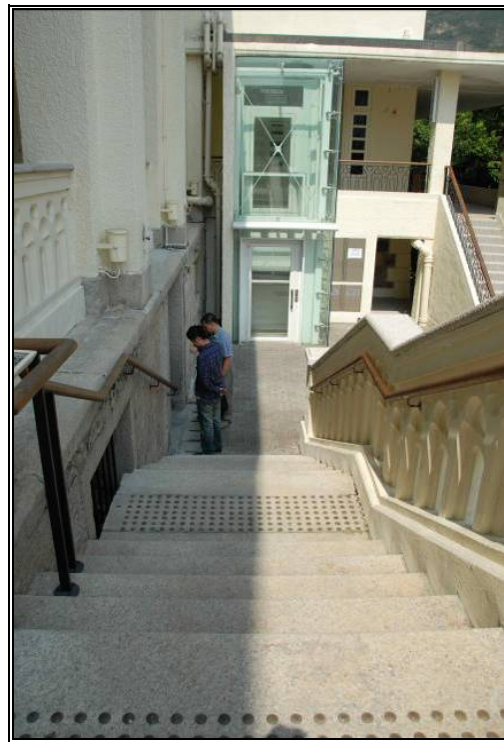


Photo 29 Provisions of wheelchair lifting platform and tactile warning strips along the existing staircase

Case 4 –URA Project (H16) at Johnston Road, Wanchai, H.K.

This case involves the adaptive re-use of the historic buildings at No.18 Ship Street and Nos. 60-66 Johnston Road. This is the first project in Hong Kong in which historic buildings are integrated with a new residential development. The location plan of the development is shown in Figure 1.

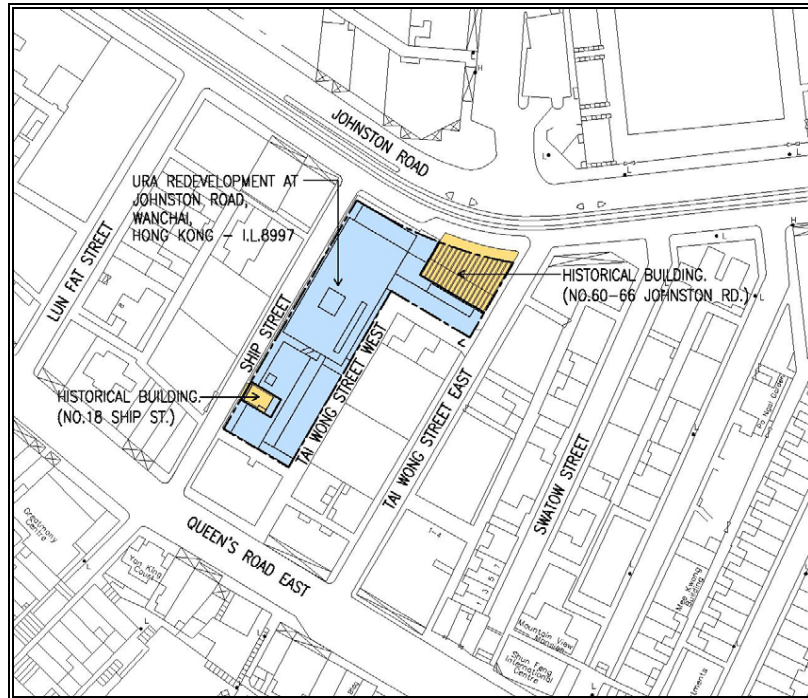


Figure 9 Site location plan

The pre-war buildings at Nos. 60-66 Johnston Road and No.18 Ship Street were identified by the AMO as Grade 2 Historic Buildings because of their significant townscape value. Both buildings are characterized by their unique façades and terrazzo decorative walls and floor finishes as well as many other rare features.

The buildings at No. 60-66 Johnston Road are a row of four typical verandah type buildings built in the 1920s. The building at No. 18 Ship Street was first constructed in the 1930's and later rebuilt shortly after World War II. The building at Ship Street was accorded with Grade 2 status by the AAB in 2009.

(a) Structural safety

Due to inadequacy of the load carrying capacity, the existing concrete floor may need to be rebuilt. However, the existing mosaic floor tiling has significant heritage value and temporary removal of these tiles is not possible. Instead of taking down and re-casting the whole floor slab, the lower layer of the concrete slab was carefully hacked off, added with new re-bars and then plastered with special concrete at the end as structural strengthening. Tests were carried out later to verify the design assumptions and structural strength intended to achieve.



Photo 30 Existing floor slab strengthened by adding reinforcement bars and then reinstated with special concrete (grey colour) at the slab soffit.

(b) Fire safety

The timber floor at No. 60-66 Johnston Road was substandard in terms of its adequacy in fire resistance and structural load carrying capacity. The non-destructive timber floor joists with heritage value were salvaged and re-installed at the ceiling after a new concrete floor slab was constructed at a higher level. Preservation of the original building elements should be done in-situ as far as practicable. However, the method of restoring the timber floor members to their original position after casting a new RC slab above may be acceptable in view of the difficulties encountered, subject to AMO's agreement. The solution was considered as a last resort and justifications on the need to temporarily dismantle a historic building element were required for AMO's consideration and acceptance.



Photo 31 The salvaged timber joists re-installed at the new concrete slab soffit.

(c) Protective barriers

The low parapet height and wide spacing of the bottle-shaped balustrades of the verandah at Nos. 60-66 Johnston Road were substandard. In order to avoid damage to the original fabric of the verandah, new glass panels as protective barriers were added in front of the balustrades.



Photo 32 New glass panels added at the back of existing balustrades

(d) Barrier free access

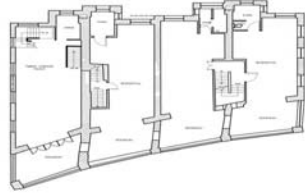
Provision of new barrier free access for persons with a disability in the historic buildings at Ship Street and Johnston Road was different due to spatial constraint. Integration with the new residential development provides a solution to make these heritage buildings accessible.

For example, a new annex with ancillary facilities had been constructed at the rear of Nos. 60-66 Johnston Road while No. 18 Ship Street shares the new accessible lift and exit staircases that serve the podium of the new development. As a result, some of the existing staircases of the heritage buildings can be preserved.



Photo 33 New annex building added to provide facilities for persons with a disability

No. 60-66 Johnston Road



ORIGINAL FIRST FLOOR PLAN



P1/F PLAN

No. 18 Ship Street



ORIGINAL FIRST FLOOR PLAN



P1/F PLAN

- > ESCAPE ROUTE
- > FIREMEN'S ACCESS
- > ACCESSIBLE ROUTE

- ORIGINAL BUILDING FABRIC
- NEW ANNEX BUILDING



PODIUM 1ST FLOOR PLAN

- LEGEND
- HISTORICAL BUILDING
- NEW BUILDING

Figure 10 Plans showing the integration of the heritage buildings with the new development at 1st floor

Case 5 - London Mission Building at 78-80 Robinson Road, HK

Built in 1893, the London Mission Building was originally the quarters for the missionaries of the London Missionary Society. In 1939, the building was used as the quarters for the nurses of Nethersole Hospital. Since the nurses moved out in 1950, it had been left vacant until 2001 when it was converted into a part of the clubhouse of the adjoining property development. The building has been accorded as Grade 2 Historic Building since 2009. As one of the town planning approval conditions for the property development, the conversion works to this historic building had to be carried out to the satisfaction of the then Secretary for Recreation and Culture. The following major building planning issues were encountered in this project.



Photo 34 Front elevation of the London Mission Building

(a) Fire safety

Before the conversion, the 3-storey building was only provided with a single timber staircase with winders serving both as the means of circulation and escape. After the conversion, a new staircase was added at the rear. The provision of this new staircase and the existing timber staircase is considered adequate for means of escape purpose for the 2/F floor in view of the following:

- (i) The accommodation in the building is relatively small. The total capacity is only 69 persons. The population of 2/F is 15 persons.
- (ii) The building is only three-storey high in which G/F and 1/F have direct exits discharging into the exterior;
- (iii) There is an open verandah on one entire frontage at 2/F;
- (iv) The timber staircase is separated from the remainder of the building by fire resisting walls and doors;
- (v) The timber staircase is of great architectural merit and should be retained as far as possible as advised by the AMO.

The existing double-leaf doors which are to be retained as exit doors are substandard in that the width of each leaf of these doors is only 540 mm instead of 600 mm. This deficiency is considered acceptable in view of:

- (i) The width of the door openings is restricted by the load-bearing pillars of the existing building and cannot be easily enlarged;
- (ii) The alteration works will cause drastic change to this small building totally defeating the purpose of its preservation and the AMO has a strong view to re-use all the existing doors; and
- (iii) A total of eight exits are available for the relatively small rooms. The total exit width is in excess of the prescribed requirement.



Photo 35 Automatic sprinkler system provided

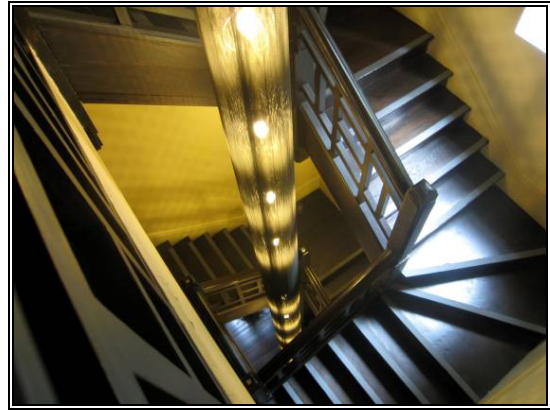


Photo 36 Existing timber staircase preserved

(b) Barrier free access

1/F and 2/F of the building are not provided with a lift for persons with a disability in view of the following considerations:

- (i) The provision of external lift was not acceptable to the AMO;
- (ii) It would be undesirable to make a lift shaft opening in the aged floor slab of the building;
- (iii) Access and toilet facilities for persons with a disability are provided on G/F;
- (iv) Only a limited number of rooms are accommodated on the upper floors; and
- (v) The activities provided on the upper floors are duplicated in the club areas with the main building of the adjoining development which is accessible to persons with a disability.



Photo 37 Access ramp compatible with architecture of the building added

(c) Protective barrier

The existing balustrades along the verandah on the external walls are with gaps wider than 100mm, plastic panels have been installed behind the existing balustrade to meet the current safety requirement.



Photos 38 and 39 Colorless plastic panels to cover wider gaps of balustrades

Case 6 - Lei Yue Mun Park and Holiday Village

Old Lei Yue Mun Barracks is one of the earliest British Army fortifications in Hong Kong. It was built at different times from 1890 to 1939, mainly served as offices and married quarters for the British Army. In 1985 the Army relinquished the site to the Hong Kong Government and the site was subsequently converted into Lei Yue Mun Park and Holiday Village.

The original balustrades at the verandahs are with height less than 1.1m and gaps wider than 100mm and the lowestmost 150mm was not built solid. Taking into account the architectural and heritage values of the balustrades, additional wire mesh and kicker plates are added to the balustrades to meet the current safety requirements.



Photo 40 Wire mesh and kicker plates are added at inner face of the original balustrades



Photo 41 Metal rods are added to the balustrades to improve safety

Overseas examples

Case 7 – The International Library of Children’s Literature, Ueno Park, Tokyo, Japan

It is a branch of the National Diet Library and is a renovation and expansion of the former Imperial Library built in 1906 and expanded in 1929.

The existing balustrades do not comply with the current safety standard in that the height is less than 1100 mm while the gaps are wider than 100 mm. In order to preserve the existing balustrades, a secondary glass panel of a height of 1100 mm was constructed behind the existing balustrade.



Photo 42 The existing balustrades with glass panels, The International Library of Children’s Literature, Ueno Park, Tokyo

***Case 8 – Asian Civilizations Museum (Court House to Museum),
Singapore***

The building was built in 1864 – 65 and declared as a monument in 1992. It was previously used as a court house, government office and art museum, and re-used as the Asian Civilizations Museum in 2002.

An access ramp with railings on both sides is provided for persons with a disability.



Photos 43 and 44 The existing façade is preserved (top) and an access ramp for persons with a disability is provided (below)

Case 9 – Somerset House at London, UK

The Somerset House was built in 1776. It was once the Naval quarter and the offices amongst other Government offices. In 1997, Somerset House Trust was established to conserve and develop the House. It is now a major cultural hub with galleries, restaurants, and other cultural spaces.

An access ramp with railings on both sides is provided at the main and rear entrances respectively of the House for persons with a disability.



Photo 45 The existing façade preserved



Photo 46 An elegant access ramp for persons with a disability provided at the building entrance

Appendix II

List of Contemporary Design Standards in Hong Kong

Design Standards for the Structural Use of Reinforced Concrete

Period	Design Standards
1903~1934	Public Health and Buildings Ordinance 1903 (R.C. building belonging to Exceptional Building which is subject to approval of Building Authority)
1935~1955	Buildings Ordinance 1935 London County Council By-laws 1915
1956~1968	Buildings Ordinance 1955; B(C)R 1956 London County Council By-laws 1938 or London County Council By-laws 1952 and subsequent amendments (for structural design prepared and signed by a person qualified as an engineer)
1969~1974	London County Council By-laws 1952 and subsequent amendments (for structural design prepared and signed by a person qualified as an engineer)
1975~1986	B(C)R 1975 (imperial version) and B(C)R 1976 (metric version)
1987~1989	Code of Practice for the Structural Use of Concrete 1987
1990~2003	B(C)R 1990; Code of Practice for the Structural Use of Concrete 1987 and BS 8110
2004~2008	B(C)R 1990 and Code of Practice for the Structural Use of Concrete 2004
2009~now	B(C)R 1990 and Code of Practice for the Structural Use of Concrete 2004 (2 nd edition)

Design Standards for the Structural Use of Steel

Period	Design Standards
1903~1934	Public Health and Buildings Ordinance 1903 (Steel framed building belonging to Exceptional Building which is subject to approval of Building Authority)
1935~1955	Buildings Ordinance 1935 London County Council By-laws 1915
1956~1968	Buildings Ordinance 1955; B(C)R 1956 London County Council By-laws 1938 or London County Council By-laws 1952 and subsequent amendments (for structural design prepared and signed by a person qualified as engineer); and BS 449
1969~1974	London County Council By-laws 1952 and subsequent amendments (for structural design prepared and signed by a person qualified as engineer); and BS 449
1975~1986	B(C)R 1975 (imperial version); B(C)R 1976 (metric version) and BS 449

Period	Design Standards
1987~1989	Code of Practice for the Structural Use of Steel 1987 and BS 449
1990~2004	B(C)R 1990, Code of Practice for the Structural Use of Steel 1987 and BS 5950
2005~2011	B(C)R 1990 and Code of Practice for the Structural Use of Steel 2005
2012~now	B(C)R 1990 and Code of Practice for the Structural Use of Steel 2011

Design Standards for the Structural Use of Timber

Period	Design Standards
1903~1934	Public Health and Buildings Ordinance 1903 – some prescriptive requirements on timber floors
1935~1955	Buildings Ordinance 1935 – some prescriptive requirements on timber floors
1956~1968	Buildings Ordinance 1955 – B(C)R 1956 London County Council By-laws 1938 or London County Council By-laws 1952 and subsequent amendments
1969~1974	London County Council By-laws 1952 and subsequent amendments
1975~1989	B(C)R 1975 (imperial version)
1990~now	B(C)R 1990; BS 5268 and Code of Practice on Fire Resisting Construction 1996. Reference can be made to B(C)R 1976.

Design Standards for the Structural Use of Masonry

Period	Design Standards
1903~1934	Public Health and Buildings Ordinance 1903
1935~1955	Buildings Ordinance 1935
1956~1974	Buildings Ordinance 1955 – B(C)R 1956
1975~1989	B(C)R 1975 (imperial version)
1990~now	B(C)R 1990 and BS 5628. Reference can also be made to B(C)R 1976.

Design Standards on Wind Effects in Hong Kong

Period	Design Standards
1956~1958	B(C)R 1956
1959~1967	Code of Practice (Wind Effects) 1959
1968~1975	Code of Practice on Wind Effects 1968
1976~1982	Code of Practice on Wind Effects 1976
1983~2003	Code of Practice on Wind Effects, Hong Kong 1983
2004~now	Code of Practice on Wind Effects in Hong Kong 2004

Design Standards for Foundations

Period	Design Standards
1903~1934	Public Health and Buildings Ordinance 1903
1935~1955	Buildings Ordinance 1935
1956~1974	Buildings Ordinance 1955 – B(C)R 1956
1975~1989	B(C)R 1975 (imperial version)
1990~2003	B(C)R 1990
2004~now	B(C)R 1990 and Code of Practice for Foundations

Design Standards for the Minimum Design Imposed Loads

Period	Design Standards
1915~1955	London County Council By-laws 1915
1956~1968	Buildings Ordinance 1955; B(C)R 1956 London County Council By-laws 1938 or London County Council By-laws 1952 and subsequent amendments (for structural design prepared and signed by a person qualified as an engineer)
1969~1974	London County Council By-laws 1952 and subsequent amendments (for structural design prepared and signed by a person qualified as an engineer)
1975~1989	B(C)R 1975 (imperial version)
1990~7/2011	B(C)R 1990
8/2011~now	Building (Construction) Amendment Regulation 2011 Code of Practice for Dead and Imposed Loads 2011

**Project Name –
Management plan to enhance safety/ health standard
for compliance with the Buildings Ordinance and its allied regulations**

The following information shall be included in the management plan : -

A. Project description

- project title,
- site address,
- details of the owner,
- existing use,
- proposed use and capacity,
- operation details of the premises,
- relevant approved building, drainage and structural plans and documents

B. Exemption(s) / modification(s) sought under the Buildings Ordinance and allied Regulations with justifications

- the relevant section of the Buildings Ordinance and the allied regulations that modification/exemption is sought
- description of the modification/ exemption sought
- special circumstances
- justification, proposed remedies and supporting documents including the information provided to AMO described in paragraph 4.11.

C. Details of the management measures

- List of compensatory measures
- Enforceable management strategy
- **Management plan**, e.g. monitoring mechanism with traceable records of evidence that can be retrieved; survey data of population, CCTV tape recordings, etc. as a proof of compliance with approval conditions/justifications
- **Maintenance plan** on testing and maintenance procedures and schedule of the long term implementation of the compensatory measures
- **Training plan** for key personnel who implement the compensatory measures
- **Other action plans** which may include contingency plan in the event that the compensatory measures become ineffective due to normal maintenance or any unforeseen events, etc or evacuation plan where appropriate

D. Owner's undertaking

BD file ref: _____ Date: _____

To the Building Authority

*I/We (name in full) _____ (Chinese) _____ of
(Address) _____ telephone no. _____, fax no. _____ holder of
*HKID No./Business Registration Certificate No. _____, being the
owner(s) / tenant(s) of (address of site, "the premises") _____ at (lot no.)
_____, undertake to observe the following :-

2. I/We fully understand that the approval of the general building plans under BD ref : _____ for the proposed change in use of and/or alteration and addition works to the above premises is subject to the conditions that all compensatory measures as stated in Part C of this Management Plan are complied with. I/We will comply with, and cause those employed to manage the premises to comply with, all compensatory measures as stated in the Management Plan.

3. The Management Plan will be incorporated into the conditions of sales in every assignment or as part of the tenancy agreement of the premises, if any. I/We will require subsequent owner / tenant to endorse a similar undertaking for incorporation into this Management Plan.

4. The Management Plan will be kept at both the management office and other areas easily accessible to occupants / visitors, e.g. the reception counter, for reference by both the occupants and visitors of the premises at all reasonable times.

5. I understand that contravention of any condition of a permit granted by the Building Authority under section 42 of the Buildings Ordinance is an offence under section 40(2)(b) thereof.

(Signature)

(Name and Capacity)

*Delete whichever is inapplicable

Useful information for reference

Legislations

1. Antiquities and Monuments Ordinance, Cap 53
2. Buildings Ordinance, Cap 123
3. Building (Construction) Regulations, Cap 123, Sub Leg B
4. Building (Planning) Regulations, Cap 123, Sub Leg F
5. Disability Discrimination Ordinance, Cap 487
6. Fire Services Ordinance, Cap 95
7. Fire Safety (Buildings) Ordinance, Cap 572
8. Fire Safety (Commercial Premises) Ordinance, Cap 502
9. Fire Service (Installations and Equipment) Regulations, Cap 95 Sub Leg B

Codes of Practice and Design Manual

10. Design Manual : Barrier Free Access 2008, Buildings Department
11. Code of Practice for Dead and Imposed Loads 2011, Buildings Department
12. Code of Practice for Foundations, Buildings Department
13. Code of Practice for Minimum Fire Service Installations and Equipment 2005, Fire Services Department
14. Code of Practice for Structural Use of Concrete 2004 (2nd edition), Buildings Department
15. Code of Practice for the Structural Use of Steel 2011, Buildings Department
16. Code of Practice on Wind Effects in Hong Kong 2004, Buildings Department
17. Code of Practice for Fire Safety in Buildings 2011, Buildings Department¹¹

Practice Notes

18. PNAP APP-69, Conservation of Historic Buildings
19. PNAP APP-117, Structural Requirements for Alteration and Addition Works in Existing Buildings
20. PNAP APP-153, Code of Practice for Fire Safety in Buildings 2011
21. PNAP ADM-19, Re-engineering the Building Approval Process

¹¹ This code replaces the 'Code of Practice for the Provision of Means of Escape in Case of Fire 1996', the 'Code of Practice for Fire Resisting Construction 1996' and the 'Code of Practice for the Provision of Means of Access for Firefighting and Rescue 2004'.

Relevant Design Standards

22. BS 7913: 1998, The Principles of the Conservation of Historic Buildings, British Standards Institute

Relevant Guidelines and Publications

23. An Introduction to the Fire Safety (Commercial Premises) Ordinance Cap. 502, jointly issued by the Buildings Department and Fire Services Department.
24. An introduction to the Fire Safety (Buildings) Ordinance Cap. 572, jointly issued by the Buildings Department and Fire Services Department.
25. Review of Built Heritage Conservation Policy 2.2004, Home Affairs Bureau
26. Appraisal of Existing Structures, The Institution of Structural Engineers, October 2010
27. Increasing the Fire Resistance of Existing Timber Floor, Building Research Establishment, BRE Digest 208
28. Timber Panelled Doors and Fire, Guidance Note, 1997, English Heritage
29. The Use of Intumescent Products in Historic Buildings, Guidance Note, 1997, English Heritage
30. Upgrading the Fire Resistance of Timber Panelled Doors, Technical Information Sheet 3, 1980, The Heritage Council of New South Wales

International Principles in Conservation

31. The Venice Charter (by ICOMOS)
32. The Burra Charter (by ICOMOS Australia)
33. The Principles for the Conservation of Heritage Sites in China (by China ICOMOS)

Enquiries

For enquiries on the Practice Guidebook, please contact the Heritage Unit of the Buildings Department:

Telephone : 2626 1354 / 2626 1576

Fax: 3157 1412

Email: enquiries@bd.gov.hk

For enquiries on fire service installations, please contact the New Projects Division of the Fire Services Department:

Telephone : 2733 7854

Fax : 2722 6234

Email : fschq@hkfsd.gov.hk

For enquiries on conservation guidelines, please contact the Antiquities and Monuments Office :

Telephone : 2208 4400

Fax: 2721 6216

Email: amo@lcsd.gov.hk

Buildings Department
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