

# Fire and Heritage

## Guidelines on Fire Safety in Heritage Buildings

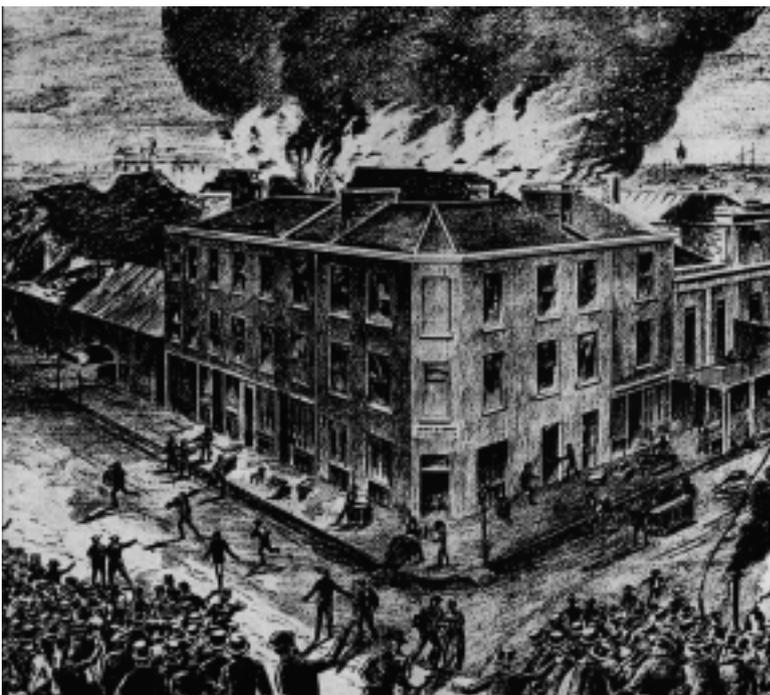
Fires in buildings are life threatening and often occur without warning. This gives building occupants little time to react – to fight the fire or evacuate the building. Prevention of fires is the most effective method of dealing with this threat and is the responsibility of both building owners and statutory authorities.

Current building regulations are encompassed in the Building Code of Australia (BCA). Most of our heritage buildings were built prior to the adoption of these regulations. In fact some of our very old buildings

predate the existence of any formal building regulations in Australia. Many heritage buildings do not meet the full requirements of current building regulations and may need upgrading for fire safety.

A challenge exists to find fire safety solutions which do not require substantial changes to significant historic building fabric. This guideline has been developed to provide building owners with information and advice on fire prevention in heritage buildings. Included is background information regarding the fire safety objectives of building regulations and the assessment of a building's heritage significance. Advice on the means of achieving an adequate level of fire safety without making substantial changes to the building is presented.

*Destruction of the Prince of Wales Theatre by fire on 3 October 1860. It was situated at the corner of King and Castlereagh Streets, Sydney.*



Courtesy of Mitchell Library, State Library of NSW



Courtesy of Mitchell Library,  
State Library of NSW

*Juniper Hall in Paddington has two stories plus an attic and basement connected by one stair. The attic is used as a caretaker's residence. A sprinkler system was carefully installed which allowed residential use while retaining the significant stair, doors, walls, floors and ceilings.*

## FIRE SAFETY

### What are the fire safety objectives of building regulations?

The fire safety objectives of building regulations are firstly to ensure occupants are able to safely escape from the building. Secondly, the building must be constructed in a manner which allows fire fighters to safely enter the building to attack the blaze. The third objective of the regulations is to prevent the spread of fire from the burning building to adjacent properties.

Current regulations meet these objectives by requiring the following:

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#### Access and Egress

The internal layout of a building must allow adequate means of escape from the building during an emergency. Staircases, ramps and passageways must be available and distributed in a manner to minimise travel distances to required exits. There are further specific requirements regarding the construction of exits.

### What is significant about my building?

Buildings and sites may be considered heritage items for a variety of reasons not immediately apparent to the general public. A building may have value due to its appearance and context in relation to others in the vicinity. It may be a rare example of a particular architectural style or may have been constructed in an unusual manner using special materials. Historic significance could be attached to the building due to its builder, owner or past occupant being a noteworthy figure. A building may have scientific value if it is representative of a particularly rare style or of a quality which may contribute to further knowledge. Social value can be established where a building or site has become a focus for community, spiritual or other cultural pursuits.

**Statutory orders can be served on owners of buildings which do not meet the fire safety provisions of building regulations.**

It is important that any fire safety upgrading takes the building's significance into consideration. In NSW buildings are listed on the State Heritage Register if they are assessed as being of state significance. The Heritage Council of NSW has developed criteria to help establish significance.

To be assessed for listing on the State Heritage Register an item must meet one or more of the following criteria:

- (a) an item is important in the course, or pattern, of NSW's cultural or natural history;
- (b) an item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history;
- (c) an item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW;
- (d) an item has strong or special association with a particular community or cultural group in NSW for social, cultural or spiritual reasons;
- (e) an item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history;
- (f) an item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history;
- (g) an item is important in demonstrating the principal characteristics of a class of NSW's cultural or natural places, or cultural or natural environments.

## How could the significance of my building be affected by upgrading for fire safety?

Obviously, it is desirable for all buildings to fully meet the requirements of contemporary building regulations, but this may not be possible without compromising the building's significance. Loss of original doors, floors, ceilings and furnishing may be required to fully meet contemporary building regulations. Oversheeting of old fabric, installation of services and alterations for new stairs and partitions can also adversely affect the cultural significance of the building.

Authority for ensuring the safety of existing buildings is vested in local councils. Statutory orders can be served on owners of buildings which do not meet the fire safety provisions of building regulations.

These orders require upgrading for fire safety to a level acceptable to the council.

In upgrading heritage buildings, consideration should be given to the need to preserve significant fabric. This may require solutions which meet the objectives of the fire provisions of building regulations but may not fully meet the prescriptive regulations, i.e. the "deemed to satisfy" provisions of the Building Code of Australia. Discretionary powers exist which allow the council to accept such fire safety solutions.

*A siren and an exit sign could have been designed and located to be sympathetic to the elements of this significant interior.*



*Courtesy of Mitchell Library, State Library of NSW*

## How can I achieve fire safety while minimising the impact on significance?

Rather than meeting prescriptive present-day fire regulations for each building element, an overall fire safety package is preferable. This must meet the objectives of the regulations and minimise the disturbance of significant building fabric.

Fire safety issues often encountered when upgrading heritage buildings are detailed below. Suggested solutions cannot be considered in isolation, as a solution for one particular situation may not be valid for another where different building characteristics are present. It is therefore imperative that an overall fire safety package is developed for the building based on the level of risk and the significance of the building.

### Electrical Fire Safety Services

Installation of electrical services for fire safety often requires penetration of significant building fabric. These services include smoke detectors, alarms, emergency lighting and exit signs.

#### *Detectors, alarms and emergency lighting*

Detectors, alarms and emergency lighting should be placed unobtrusively or camouflaged within elements of wall and ceiling patterns. Smaller colour co-ordinated detectors and emergency lighting could be incorporated. Where electrical cabling is required, its layout should ensure minimal impact on significant building fabric. For example, concealment behind cornices and within floor and wall cavities should be pursued. This requires careful planning to ensure minimal cutting and drilling of the building fabric.

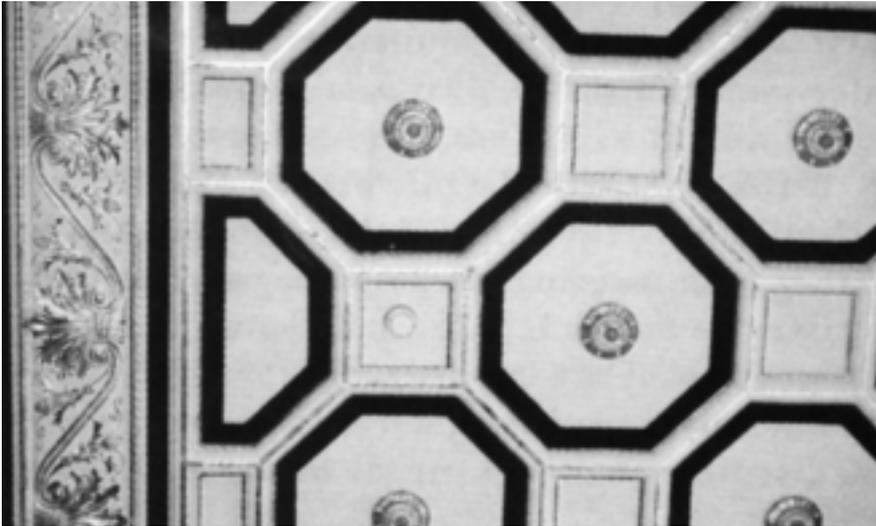
#### *Exit Signs*

Exit signs are by their very nature anything but unobtrusive. However, exit signs consistent with the décor of your building can be designed to minimise their visual impact by varying the casing, lettering style and colour. In extreme cases, use of approved photo luminescent exit signs and safety labels may be possible, avoiding the need for electrical cabling. All signs should be sensitively located and any cabling required should be installed so as to minimise disturbance.

### Hydraulic Fire Safety Services

Provision of hydraulic fire services such as sprinkler systems, fire hose reels, hydrants and hand-held fire extinguishers can adversely affect heritage buildings. A philosophy of minimising visual impact and disturbance of significant building fabric should be pursued which may involve alternatives to hydraulic services.

***Rather than meeting prescriptive present-day fire regulations for each building element, an overall fire safety package is preferable.***



*Smoke detector placed unobtrusively within the elements of the ceiling pattern.*

*Courtesy of Mitchell Library,  
State Library of NSW*

### ***Sprinkler Outlets***

Sprinkler outlets (heads) should be installed to follow the geometric form of ornate ceilings. Flush mounted sprinkler heads are available in a range of colours which minimise the visual impact. Alternatively, wall mounted sprinkler heads could be installed. Careful planning of associated plumbing is required to minimise the disturbance of building fabric. Pipework should be concealed within wall and floor cavities and installed in a manner which minimises the removal of existing ceiling and floor materials.

### ***Fire Fighting Equipment***

As with exit signs, hydraulic fire fighting equipment such as fire hose reels, hydrants and hand-held fire extinguishers must be sympathetically placed while remaining easily found in an emergency.

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### **Provision for Escape**

#### ***Fire Emergency Exits***

Occupants of a building must be provided with a safe path of travel to leave a building in case of fire. Current regulations require certain numbers of fire emergency exits and specify maximum distances to these exits dependant upon the building type, size and its use. Some older buildings exceed minimum travel distances to exits or may have fewer exits than required on each floor. Further, doors and stairs of these exits may not comply with current standards.

Where an additional exit is required, its placement should be such that the significance of the building is not compromised. Any external fire escape should be designed in a manner which is sympathetic to the building.

The dimensions of exits and stairs can sometimes be inconsistent with the requirements of modern standards. A rational approach to acceptance or modification of the dimensions of doorways and stairs is required based on an assessment of the risk posed and the effect of such modification.



Courtesy of Mitchell Library,  
State Library of NSW

*Nesca House at Newcastle.  
Careful consideration needs to be  
given to fire isolating a significant  
staircase.*

**Many traditional materials, structural elements and building features such as windows, doors, stairwells and lift shafts do not meet the requirements of contemporary fire safety standards.**

### **Doors**

Doors leading to a fire exit should open out so that people can push their way through. If it is impractical to have an existing inward-opening door altered to swing in the direction of egress, then the use of a door holder could be considered. This would permanently keep the door fully opened, removing the impediment to egress. This should be considered for doors which do not perform a fire or smoke separation function.

### **Door Hardware**

Door hardware including closers, latches, knobs and handles should be visually sympathetic to the existing interior. A range of heritage hardware is available which reproduces the style of many building periods. Where required, modern magnetic door holders, electrical door strike releases and security escape latches can be incorporated into the building's existing doors.

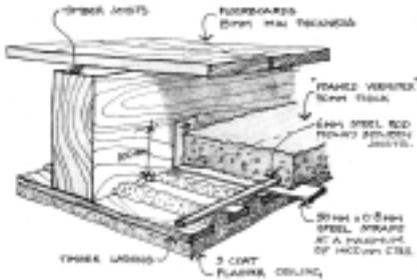
### **Other options**

Provision of additional exits is invariably expensive and often detracts from the appearance of the building. Also, modification of existing doors and stairways which are required for escape from a building is often impractical. Therefore, options such as the installation of a sprinkler system, detectors and alarms should be pursued as a trade-off for exit requirements.

### **Fire and Smoke Separation**

Building materials must be fire resistant to reduce the chances of a fire igniting and to contain the spread of flames. Smoke generated by a fire must also be controlled to allow occupants of a building time to escape and fire fighting personnel access to extinguish the blaze. Many traditional materials, structural elements and building features such as windows, doors, stairwells and lift shafts do not meet the requirements of contemporary fire safety standards.

Retention of lath and plaster ceilings is possible if upgraded to improve their fire resistance. Refer to the Heritage Office website for further details.



Courtesy of Mitchell Library, State Library of NSW

**In heritage buildings existing building materials and structure should be retained and incorporated into the fire compartment.**

### Fire isolated compartments

Fire safety is often pursued by dividing a building into fire isolated compartments. This restricts a fire to an area of a building until it can be extinguished. To be effective, the walls, floors and ceiling need to contain flames and smoke within the compartment. They also must provide sufficient insulation to prevent excessive heat radiating outside of the compartment. High levels of radiant heat passing to the outside can make escape routes unusable and may ignite materials in the vicinity.

To be effective, protection of openings in a fire compartment is required. Sealing of gaps around doors, glass panels and pipework and cabling which penetrates walls and floors will prevent the escape of fire and smoke. Intumescent materials can be used on existing building elements to seal these gaps. When subjected to the heat of the fire, these materials expand to fill any air void, effectively blocking the path of smoke and flames.

Installation of partitions and doors of **fire resisting glass** may also be preferable where enclosure of a compartment is required. This is particularly relevant where the alternative is to replace or enclose in solid construction a significant staircase or elevator.

To reduce the risk of fire, existing combustible materials such as curtains, carpets and upholstery can be impregnated with a **fire retarding agent** which provides resistance to ignition and spread of flame. Various retarding agents are available in liquid form which protect fabrics without damage or discolouration. Hard surfaces can be similarly protected. Such protection of existing significant materials should be pursued wherever possible rather than replacing with incompatible fire resistant materials.

In heritage buildings existing building materials and structure should be retained and incorporated into the fire compartment. The Heritage Office has published on its website acceptable methods of upgrading the fire resistance of existing **timber panelled doors** and **lath and plaster ceilings**. These methods should be pursued rather than installing incompatible fire doors and lining ornate ceilings and walls with fire resistant materials.



*Timber panelled doors can be upgraded. Refer to the Heritage Office website for further details.*

Courtesy of Mitchell Library, State Library of NSW

***Cluttered hallways and stairs hamper occupant evacuation and these must be kept free of clutter.***

*Storage of material on stairs is dangerous both as a source of fire and as an obstruction to evacuation.*



*Courtesy of Mitchell Library, State Library of NSW*

## **Building Management Solutions**

For some building uses it will be impractical to achieve an acceptable level of safety without destroying the building fabric. In such cases, it may be feasible to restrict the occupancy or type of use for the building. This should be pursued rather than destroying the building fabric and losing the very reason the building was originally considered a heritage item.

## **Good Housekeeping**

Owners are often tempted to use unoccupied rooms or floors as storage areas. If combustible materials are being stored, then a high risk fire source exists. Particular attention to flammable materials and those which produce toxic smoke and gases in fire is required.

Cluttered hallways and stairs hamper occupant evacuation and these must be kept free of clutter. All required smoke and fire doors must be closed or closable in the event of fire. This makes illegal the common practice of disengaging door closers or fixing doors open with chocks or locking or blocking exits.

## **Evacuation Plans**

The main objective of fire regulations is to ensure that the occupants are able to safely escape from the building. It is advisable to develop an evacuation plan and to train occupants of the building in fire emergency procedures. Formal plans exist in schools and larger buildings which may require regular fire drills and training in the use of fire hoses and hand held extinguishers. Further information on this important aspect of fire safety can be sought from your local fire brigade.

## **Be Prepared**

The fire regulations are designed for the rare occurrence of fire in a building. Being prepared for that event may save lives!

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### **Other Information**

Check the Fire, Access and Services page on the Heritage Office website: [www.heritage.nsw.gov.au](http://www.heritage.nsw.gov.au).

It includes information on:

- *Upgrading the Fire Resistance of Timber Panelled Doors;*
- *The Fire Resistance of Ceiling/Floor Systems Commonly Found in Heritage Buildings; and*
- *Frequently Asked Questions.*

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ISBN 1 876415 97 5

HO 05/05



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*Endorsed by the Heritage Council of NSW  
Fire, Access and Services Panel*