

Foreword

This series of booklets has been produced by the Department of the Environment to increase awareness of the value of our architectural heritage and to provide information on the basic principles and methods of conservation and restoration. The titles in the series are listed on the back of each booklet.

These texts are not intended to be comprehensive technical or legal guides. The main aim is to assist architects, builders, owners and others, in understanding the guiding principles of conservation and restoration. They will facilitate the identification of the most common problems encountered in heritage buildings, and indicate the best solutions. It should be appreciated that specialised aspects of conservation and restoration will require professional expertise and more detailed information.

The Department acknowledges, with appreciation, the efforts of the authors of the individual booklets, the Irish Georgian Society who coordinated their production, the Conservation Advisory Panel established under the Operational Programme for Local Urban and Rural Development and all others involved.

Summary of Conservation Principles

- Research prior to planning work
- Minimum intervention - repair rather than replace
- Respect the setting.

Summary of Conservation Procedure

- Research and analyse history of building
- Survey building and identify original material
- Plan work according to conservation principles
- Use experts where necessary
- Record all work
- Install maintenance procedures.

FIRE SAFETY

Introduction

Fires can be generated by a vast range of causes from a faulty electrical connection to lightning. The earlier an outbreak is detected the better, and the more planning and procedures that have been put in place, the better chance there is of limiting the eventual loss and damage.

The purpose of this section of the booklet is to discuss briefly the issue of fire safety in heritage buildings. The booklet is one of a series produced by the Conservation Advisory Panel, to enhance awareness of conservation issues. It provides relevant information on fire safety legislation and policy as it affects heritage buildings. It advocates a fire safety audit for all such buildings, and outlines the procedures involved.

Objectives of Fire Safety

Concerns about fire safety provisions in heritage buildings arise from a number of objectives:

- Life safety of resident family and employees, and any visitors or guests who may be on the property.
- Rescue of building contents which are frequently very valuable and in the 'irreplaceable' category if consumed in a fire.
- Saving of building fabric and structures of architectural/historic merit which, if damaged or destroyed, are lost forever.

If you are the owner, trustee, curator, director or manager of a Heritage Property, the prime responsibility falls to you to ensure that the building, its contents and persons on the premises are protected from the disastrous consequences of fire.

The Fire Safety Legislative Framework

Fire safety legislation is primarily concerned with protection of persons from injury or death. However, steps taken to protect life will also enhance protection of a building and its contents.

If the public have access to a property, responsibility for their safety, in accordance with Section 18 (2) of the Fire Services Act, 1981, falls on the premises proprietor or 'person in control'. The Department of the Environment has published a series of Guides which give advice to persons in control of different categories of premises, such as places of assembly, hotels, flats and nursing homes.

If alteration works or a change of use, e.g. from a private residence to an hotel, is contemplated, then the provisions of the Building Control Act, 1990, and associated Regulations will apply. Details of these Regulations are available in a DoE leaflet entitled *A Guide to the Building Regulations*. One of the principal requirements of the Building Control Regulations is the need to obtain a Fire Safety Certificate, in respect of proposed works, before work is commenced.

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A fire safety certificate may be granted by the relevant building control authority with or without conditions, or may be refused. If an applicant is unhappy with the outcome, she/he may appeal to An Bord Pleanála within a period of one month beginning on the day of the decision.

Applicants for a certificate must show how they propose to meet five functional requirements of fire safety in the Building Regulations. This compliance can be demonstrated by preparing a fire safety proposal based on a published guidance document - *Technical Guidance Document B - FIRE*, or by using alternative solutions appropriate to the particular building, provided an equivalent level of safety is achieved.

Fire Safety Policy

In Ireland fire safety requirements are framed as simple Functional Statements and are not detailed prescriptive regulations. This policy allows a flexible approach for meeting fire safety requirements in individual buildings, and recognises that a large proportion of projects relate to existing buildings. While an appropriate level of fire safety to satisfy the functional statement has to be achieved, in heritage buildings normal fire protection measures could be damaging if implemented insensitively. For instance, the following common measures would generally require alternative approaches in heritage buildings

- upgrading fire resistance of existing floors which threatens decorative ceilings

- lobby protection of staircases which damages the architectural integrity of rooms
- sub-dividing ornate halls/staircases to prevent smoke movement
- removal of wooden panelling in rooms or halls
- replacing original panel doors with formally rated fire-doors.

It is important that the flexibility is recognised, and that persons responsible for formulating fire safety measures ensure that advantage is taken of this flexibility. Otherwise insensitive, expensive and damaging works may be undertaken needlessly.

Fire Safety Engineering

The development of fire safety engineering, based on a 'systems' approach, has greatly facilitated the type of functional approach referred to above.

Fire Safety engineering allows fire safety in a particular building to be considered from first principles, predicting fire growth and spread, and calculating the time for critical life safety conditions to be reached. This enables a tailored package of fire safety measures to be proposed to meet the life safety requirements of the regulations. Frequently these will be based on early fire detection and alarm systems. Fire safety engineering can be particularly useful in showing how safety proposals in heritage buildings are equivalent to solutions in more conventional buildings.

This discipline has emerged in recent years and will continue to develop. As is the case for other professional services, if seeking advice, reputable practitioners with appropriate experience should be engaged.

General Approach to Fire Protection

Fire safety is generally recognised as being a function of three integrated components, and it is important that the inter-action is recognised:

- passive fire protection, which is the protection afforded by the buildings construction features such as subdivisions afforded by walls and floors.
- active fire protection, being specific facilities, such as fire detection and alarm systems.
- building management, which includes staff training, emergency procedures, maintenance of the building and its services, as well as steps taken to prevent fires occurring.

The Fire Safety Audit

Conservation/restoration projects in heritage buildings will generally incorporate fire safety work as an integral part of the project. However, it is also essential to undertake fire safety audits of heritage buildings where works are not necessarily planned. Specialist advice may be necessary to ensure that the *Fire Safety Objectives* of adequate life safety, protected contents, and minimal damage to building are achieved. Consideration of building and safety management is critical in

all cases, as the benefits of expensive fire safety works may be negated if, for instance, staff are untrained to respond to early warning of fire.

Fire Safety Audit Procedures

Fire safety should be an integral and permanent part of heritage property operations. The following steps should be undertaken by owners or heritage property managers, in association with conservation and other specialist advisers.

1 Fire Safety Objectives for the Property

The uses to which a building is put will determine the fire safety objectives which need to be elaborated. For instance, the fire safety risks are different if the public are admitted, or if sleeping accommodation is provided. Likewise a survey of the contents of the building (generally undertaken for security purposes) will determine the status to be placed on protecting these from destruction by fire. Similarly a conservation study and survey will identify original building fabric and structure, which can again be assessed for priority in terms of protection from fire. The decisions taken at this stage will in effect determine the nature and level of fire protection which will be appropriate in a heritage building.

2 Building Survey

If not already available, building plans should be prepared which can be used in a survey of the building with fire hazard and fire

protection in mind. Such surveys are generally best entrusted to competent and experienced fire protection engineers. The survey will highlight the areas in need of attention, and form the basis for the Fire Safety Plan for the building.

3 The Fire Safety Plan

The Fire Safety Plan will become the heritage property manager's policy statement on fire safety. It should build from the previous two steps, and form the basis for the remaining action points. The Fire Safety Plan should therefore generally contain the following:

- Building name, description, uses, Fire Safety Objectives, as well as the person responsible for fire safety
- Fire Protection facilities, including building Plans, illustrating escape routes and location of fire protection facilities, with specifications if appropriate
- Emergency Action procedures to be taken by staff in the event of fire
- Control sheets to ensure that required actions are taken and overseen at an appropriate level.

4 Implementation of Physical Fire Protection Measures

The following are the common fire protection features which would be used in heritage properties.

4.1 Fire detection systems

Fire has much less chance of doing great damage if it is detected and intervention starts at an early stage, and buildings can be

safely evacuated if early warning is given to staff. Automatic detectors can detect a fire condition from smoke, heat rise or infra-red/ultraviolet radiation from a fire. The technology in Fire Detection and Alarm systems is developing rapidly, and specific features such as radio-based (wireless) systems, and air-sampling tubes may be particularly appropriate to avoid damage to building fabric or unsightly intrusion to ceilings. The specification of fire detection and alarm systems should be entrusted to competent fire protection engineers.

Unless appropriate monitoring and response procedures are put in place, expensive detection systems will not function adequately. Buildings which are unoccupied for part of the day should be linked to alarm monitoring stations.

It is essential that routine testing and maintenance of fire detection and alarm systems is carried out in accordance with suppliers recommendations, as a high degree of reliance for life safety may be placed on them.

4.2 Compartments to restrict fire spread

The survey of the building will have identified the points where the building construction such as masonry walls, will provide a barrier to fire spread. However, all forms of construction are only as good as their weakest link in terms of resisting fire spread, and heritage properties are particularly prone to having hidden voids, which facilitate

rapid fire and smoke spread. It is necessary to identify such points of weakness, and to provide appropriate fire stopping materials.

It is also necessary to identify both horizontal and vertical fire compartments, to be provided by floors and walls/doors respectively. These compartments should be chosen carefully to fit to the existing building form and construction. Enhancement of construction may be appropriate to achieve compartmentation in some circumstances.

4.3 Escape routes

Adequacy of escape routes from the building is crucial to ensuring life safety. The building survey, combined with the uses to which the building is put, will determine if escape routes are adequate in terms of distance to be travelled to safety, times taken to evacuate the occupants, and protection of escape routes from ingress of smoke. The provision of early detection and alarm systems enhances the safe use of escape routes. Where provision of additional escape routes would conflict with the conservation objectives in a building, it may be necessary to limit the number of persons in the building at one time who can be safely evacuated with the existing escape routes.

The needs of security can sometimes conflict with fire safety, in that escape routes and exit doors will be locked to prevent unauthorised and uncontrolled access, and to protect very valuable contents. Electromechanical and electromagnetic locking devices on exit doors

can provide solutions to this dilemma, provided they are designed into fire safety and security systems, in accordance with appropriate codes of practice. Monitoring and staffing arrangements are also crucial to resolving the competing demands of security and safety.

4.4 First-aid fire fighting

Appropriate first-aid fire-fighting equipment, such as hose reels and fire extinguishers should generally be provided to enable trained staff to intervene in the early stages of fire. Fire detection and alarm systems provide a good possibility for early and successful intervention while the fire is still in the early stages of growth.

5 Operational Practices

Operational practices which avoid the common causes of fire should be put in place as part of the routine building operation.

5.1 Building services

The building services, electrical, heating, and ventilation should be designed and installed to appropriate standards. Routine maintenance programmes should be put in place to ensure that they are operating safely and not posing risk of fire. Likewise, electrical fittings and appliances should be checked regularly.

5.2 Housekeeping

House-keeping, including the collection and removal of rubbish and combustible materials, especially in non-public areas, is essential to avoid build up of potential initial sites for fires.

5.3 Security

It is also important that appropriate consideration be given to building security. Arson by intruders poses a threat to heritage properties.

5.4 Smoking

Smoking also poses a threat to heritage property. Adopting and enforcing a 'No Smoking' policy is the simplest way of eliminating this risk.

5.5 Kitchens

Kitchens and cooking always pose a threat of fire, and it is important that equipment is appropriate and safe, and that staff use it correctly. Appropriate first aid fire-fighting equipment should be provided in kitchens, which should be enclosed by fire-resisting construction, and monitored by appropriate (rate of rise) heat detectors.

5.6 Renovations

Renovation work poses one of the greatest fire dangers to heritage buildings. It is essential that renovation contracts provide for safe work systems, particularly hot-work such as cutting, welding and gas-burners, and that fire extinguishing equipment is available. Appropriate supervision procedures should be put in place while work is on-going. Where possible fire resisting construction should be used to separate construction areas from the remainder of the building. It is essential that exit routes are not interfered with, or that alternative routes are provided. Flammable liquids, such as paint thinners or

solvents, and petrol-engined plant pose particular dangers in a building. Materials not immediately required for work should be stored away from the building, and debris and rubbish should be removed, and not burned in the vicinity of the building.

5.7 Lightning

Lightning strikes also pose a danger to buildings which are prominent in the surrounding landscape, and, where appropriate, buildings should be protected with earthed lightning conductors.

6. Preparation for Emergencies

An Emergency Action Plan should be prepared and promulgated, aimed at ensuring that staff will react in a proper way when a crisis does occur. Preplanning for emergencies and holding exercises helps minimise the confusion that will occur, and significantly improves the probability for safe evacuation and of minimising property losses.

Cooperation with local fire brigades, resulting in pre-fire planning visits to heritage properties, is also most helpful. This enables fire brigades to familiarise themselves with building layout, location of water supplies, priority actions to take in the event of an incident, and the persons they will be dealing with in the event of a real fire situation, all of which enhance the probability of effective intervention. Such visits should be arranged through the Chief Fire Officer of the local Fire Authority.

The Emergency Action Plan should contain the following parts:

6.1 Emergency Organisation

Everybody associated with a heritage building has a part to play in ensuring it is protected from fire. The emergency organisation chart should set out the responsibilities of each person and position. Appropriate provision is needed to ensure that different levels of responsibility are catered for, and that supervision arrangements are in place. Each person should have a check-sheet which sets out their individual responsibility, and action points in the event of emergency. It is important that new and temporary staff are properly inducted into their role in safety management.

6.2 Staff Training

When responsibility has been assigned to staff, it is vital that they are then trained to carry out the assigned roles. Such training will depend on the level of responsibility, and may include training for pre-emergency functions, such as maintenance and testing, as well as actions to take in the event of an emergency.

6.3 Emergency Operations

If a fire occurs, it is vital that preparations have been made for the following steps:

- raising the alarm
- calling the fire brigade
- evacuating the premises, and accounting for all persons

- taking other pre-planned action, such as first-aid fire-fighting if appropriate, or priority salvage work
- briefing fire brigades of situation on arrival.

6.4 Salvage Operations

An inventory of contents and special features should be created as a record of the building, and stored in a separate location. Successful salvage operations require immediate action. The Emergency Action Plan should include appropriate salvage procedures. Care is needed to ensure that salvage does not pose an unacceptable risk of injury to persons involved, or interfere with fire containment and suppression. The salvage plan should

- identify priority salvage objectives
- indicate persons to be involved
- state temporary, safe stores for salvaged goods
- explain use of protective coverings
- identify contractors for temporary repairs
- aim at getting security and safety back in place as soon as possible.

Dos and Don'ts

- Do*
- appreciate that fires happen and endanger people, heritage buildings and their contents
 - undertake a fire safety audit and make a Fire Safety Plan
 - get good specialist advice
 - prepare for the emergency
- Don't*
- assume it could never happen

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SECURITY Introduction

The problem of security in heritage buildings is becoming more and more difficult. The theft of antiques whether in the Fine Art, architectural or archaeological category is escalating at a frightening rate.

Fine Arts theft

In the area of works of art, furniture and paintings, historic houses and collections are being targeted regularly. Robbery to satisfy a particular demand is common, with a market lined up and ready prior to the theft of a particular object. It is known that separate gangs are operating in Ireland, one laying claim to say, the dining table 'trade', while another deals exclusively in drawing room furniture!

Security for the historic home owner is difficult. In order to claim any of the tax reliefs currently on offer, public access is a requirement. This means, of course, that would-be thieves can gain entry to earmark what might be stolen at a later date. Owners may view this as an unacceptable risk and close their doors, thus losing some income vital for their upkeep of the property. When this happens the tourist industry suffers as well, as heritage properties draw great numbers of visitors.

Architectural theft

The market for architectural salvage has become so buoyant in recent years that supply is falling far behind demand. This has

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resulted in thefts of architectural fixtures and fittings reaching epidemic proportions. Buildings have always been vulnerable to vandalism - lead thieves were at work in the 18th century.

Today marble chimneypieces and grates are at the top of the list, followed by doors, doorcases, staircase balusters, carved brackets, shutters and even whole panelled rooms! External features such as doorcases, fanlights, gate piers, stone urns, gates and railings are at risk. In the case of ruined or derelict buildings, steps, window sills, floorboards, paving slabs and garden seats quickly disappear.

Prevention and Protection

- (i) Have photographs taken of any object of high risk, such as furniture, paintings, chimneypieces and items of decorative art. Store negatives away from building.
- (ii) take basic measurements of high risk objects and record any individual markings, colour, wood grain, cracks or stains. Store information away from building.
- (iii) take advice from security experts in conjunction with the local gardai, and install a burglar alarm system tailored to the requirements of the house and occupants.
- (iv) switch on alarm at all times of risk. Architectural items are most at risk if the building is empty after a sale, so a caretaker should be employed during this period.
- (v) put in place procedures for regular checks of fire safety and security systems and updating of emergency plans.

Action

- (i) Inform local Gardai Station
- (ii) contact Art Loss Register. Some stolen pieces are recovered, some lost forever. The Arts Loss Register is a major resource in terms of identifying and recovering stolen pieces. At their headquarters in London, details and photographs of stolen objects are kept on a computer data base. The main auction rooms regularly use this facility to check the credentials of pieces put up for sale, and owners use it in an effort to track down stolen goods.

Dos and Don'ts

- Do*
- put together identification information on high risk objects
 - store such information away from building.
- Don't*
- switch off alarm systems unnecessarily, even for short periods
 - neglect to run regular maintenance checks on all alarm systems.

Sources of Information

The Council for the Protection of Irish Heritage Objects
Tel. 044 66344 Fax. 044 66245

Art Loss Register
13, Grosvenor Place, London SW1X 7HH
Tel. 0044 171 235 3303
Fax. 0044 171 235 1652

MAINTENANCE

Introduction

Maintenance can be taken to mean the ongoing care and conservation of an historic building. Once the conservation or restoration work is complete, and the appropriate fire prevention and security systems have been put in place, maintenance takes over the lead role in the conservation of the fabric of the building.

In the forgoing sections on Fire Safety and Security the importance of monitoring fire detection and burglar alarm systems has been stressed, together with the need for routine testing, and the identification and briefing of specific personnel to carry out these tasks. This section deals briefly with the maintenance of the actual fabric.

Most problems which occur in the fabric of a building stem from the ingress of water or damp, and lack of ventilation.

Damp

The basic rule is to avoid damp getting into the building. It weakens timber and causes rot, rusts metal and can damage brickwork.

Roofs and gutters

Roof timbers are vulnerable as the roof is the most likely place where water penetration may occur, so great vigilance is necessary both externally and in the roof space. Any damage to roof coverings should be repaired immediately. Slates are very resistant to water but can be damaged. All cracked, slipped or broken slates should be repaired or put back into position immediately. Flashing around chimneys, gutters and

parapet walls should be checked regularly.

Care should be taken that gutters and pipes are not blocked thus causing a build-up or overflow of water. They should be carefully maintained and checked on a regular basis. Pipes may fracture due to weather conditions, or get damaged by ladders or scaffolding.

Paintwork should be examined for signs of rust. It can be difficult to paint between downpipes and the wall but this is the most vulnerable area and must be protected. See booklet *No. 10 Roofs and Rainwater Goods*.

A twice yearly inspection of the roof, internally and externally, for cracks, holes, damp timbers and clogged gutters and pipes should suffice to avoid any major problems. These inspections should ideally take place in the spring after the wet winter, and autumn after the leaves have fallen. Interim inspections are recommended after severe gales or frost.

Brickwork and stonework

Damaged stones or spalled bricks, where the surface has disintegrated, should be repaired, if possible, or replaced, if necessary.

Otherwise water will find easy access into the building. Mortar decays and may need repairing or repointing. Repair of brickwork or stonework without pinpointing the cause of the deterioration is a useless exercise. The use of lime instead of cement in the repair of pointing or rendering will usually add greatly to the health and wellbeing of the house. See booklets *No. 4 Mortars, Pointing & Renders* and *No. 8 Brickwork & Stonework*.

Ironwork

Conservatories, iron railings and gates should be subject to regular inspection, cleaning and painting. Paintwork should be examined for signs of rust, which indicate that moisture is entering with resultant damage. See booklet *No.13 Ironwork*

Ventilation

Good ventilation is of vital importance, as it encourages evaporation and lessens the likelihood of condensation, which can cause decay and damage. Gaps in the eaves, and airbricks, will ensure adequate ventilation of the roof space. Rooms need ventilation, as well, and chimney flues and air bricks provide it naturally. Check all air bricks regularly for blockage and, if there have been later additions to the house, it is wise to check that the new construction has not sealed off any airbricks. Blocking off flues may cause ventilation problems. Abrupt changes of temperature can also cause condensation. A low constant temperature is preferable to bursts of excessive heat.

Prevention

- Provide easy access into roof space and on to roof. Inspect regularly and provide duckboards and roof ladders to prevent damage.
- check gutters and downpipes particularly after storms.
- provide adequate ventilation and constant low temperature to avoid condensation.
- check danger points for signs of damp, cracks, rust or warping.

Action

- Act promptly if a problem occurs - the sooner the job is done the less damage to the historic fabric and the less expense incurred.
- make sure the origin of the problem has been located and dealt with in appropriate fashion.
- employ professional help, as virtually all repair jobs require such assistance. An experienced professional who is sympathetic to both the owner and the house is of vital importance if work has to be carried out. This cannot be stressed strongly enough.

Dos and Don'ts

- Do*
- check roofs, gutters and pipes regularly
 - act promptly, if a problem occurs.
- Don't*
- seal a building, by the use of hermetically sealed windows, blocked-off flues, etc., as this may cause severe condensation problems.

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