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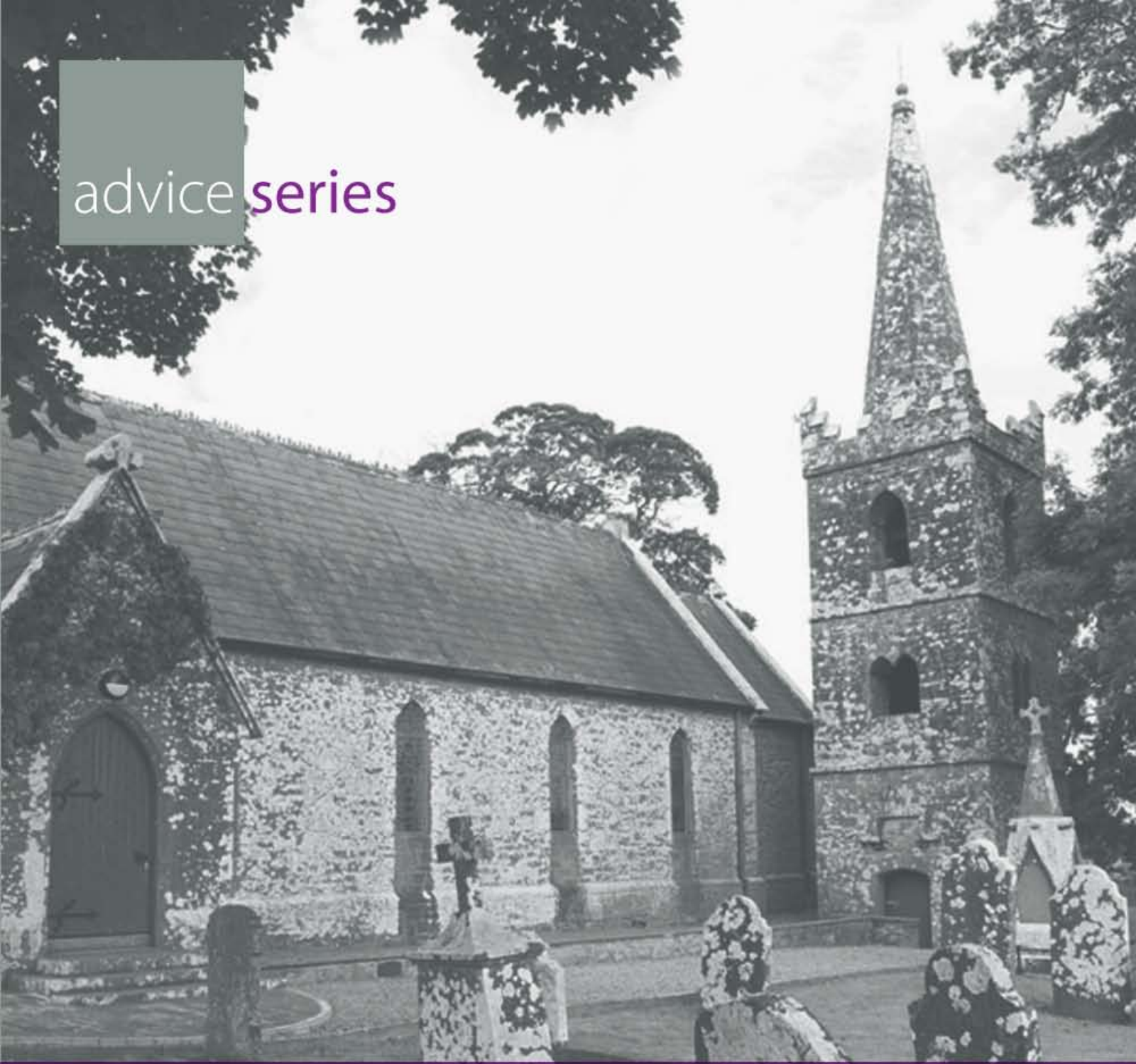

places of worship

THE CONSERVATION OF PLACES OF WORSHIP

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An Roinn
Ealaíon, Oidhreachta agus Gaeltachta
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Text by: Howley Hayes Architects
Contributors: David Lawrence, Lisa Edden and Edith Blennerhassett
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Editor: Nessa Roche
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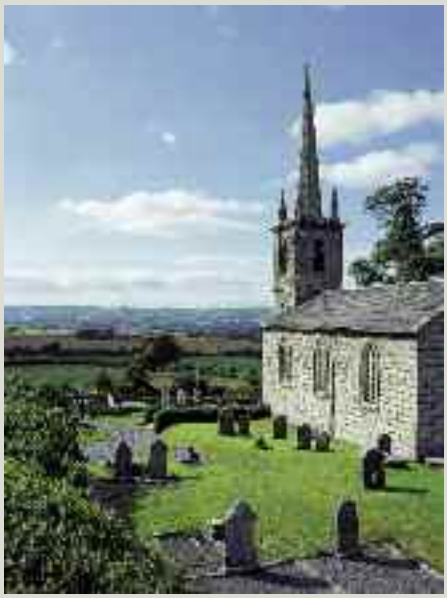


Introduction

The nature and essence of Irish ecclesiastical architecture is dominated by variety; variety of scale, type and style, all brought about by an equally wide diversity of wealth, situation and denomination. Wherever they occur, whether in formal town plans, sprawling villages, on the fringes of designed landscapes in country demesnes, or simply in splendid rural isolation away from any centre of population, churches are an ever-present spirit of Irish architecture.

Christian church buildings constitute a substantial part of this country's architectural heritage. Often the finest and most prominent buildings in their locality, possessing architectural, historical and social significance, churches were designed to express the meaning of heaven in the language and symbols of architecture and art. In providing a spiritual focus within a community, usually over many generations, churches retain considerable social significance. As guardians of this inheritance, the faith communities have maintained their church buildings through good times and bad. It is through their efforts that historic churches have survived to become a major part of the cultural landscape of Ireland.

The arrival of Christianity to Ireland in the fifth century led to the construction of timber-and-wattle or drystone church buildings. The use of mortared stonework came to Ireland much later than to many other European countries, possibly as late as the eighth century AD, and was most likely introduced by Irish monks and clerics returning from the continent. The earliest surviving masonry church buildings are small and relatively plain. Most are now roofless and survive only as picturesque ruins, scattered across the Irish countryside; although a small number of these early medieval churches continue in use to this day. The arrival of the monastic orders from mainland Europe in the High Medieval period saw an increase in the scale of church building as the focus of large monastic settlements, such as at Glendalough, County Wicklow.

The Reformation and the dissolution of the monasteries in the sixteenth century, the emergence of a Protestant ascendancy after the Williamite wars in the following century, together with Penal Laws imposed until the late-eighteenth century, led to an unusual pattern of church ownership in Ireland. The Anglican church became the owner and guardian of all of the ancient Irish churches still in use. This stock was supplemented by extensive building programmes for the construction of new churches from the late-eighteenth century to the mid-nineteenth century. Throughout much of this period, Roman Catholics in Ireland, who made up by far the largest portion of the population, were either prohibited from, or at best grudgingly permitted, to practise their religion. Mass rocks in the countryside provided altars for clandestine services during the bleakest years of the Penal Laws. When the construction of Roman Catholic churches recommenced in the eighteenth and early-nineteenth centuries, they tended to be modest in scale and often located in the back streets of towns. A noteworthy exception is architect John Roberts's magnificent Cathedral of the Most Holy Trinity in Waterford, built during the 1790s. The building of larger and more ambitious churches began tentatively during the first half of the nineteenth century and grew exponentially in the decades following Catholic emancipation in 1829 as the levels of tolerance for, and the economic prospects of, the Catholic population increased. Early Catholic churches ranged from simple barn chapels such as Holy Trinity Church, Bawnboy, County Cavan (completed in 1796) to more elaborate T-plan and cruciform chapels. There were also some early compositions fully expressed with nave, side aisles and transepts. Many were subsequently enlarged, remodelled or replaced by larger buildings. Many early Catholic churches, particularly in Ulster, were similar in form to those of their Presbyterian neighbours, though with an internal focus on the altar rather than the pulpit.

Despite its much smaller congregations, the established Anglican church was actively promoted through public funding that assisted the construction of many churches during the eighteenth and nineteenth centuries. In addition to grants from the Irish parliament, funding for the building and repair of ecclesiastical buildings and glebe houses of the Anglican church was also made available through the Board of First Fruits. This was a body established in 1711 whose income derived from dues paid from the first year's income of a cure plus an annual payment of a percentage of that income. The functions and income of the Board of First Fruits were transferred to the Ecclesiastical Commissioners in 1833 following the enactment of the Church Temporalities (Ireland) Act. The Commissioners employed many leading architects in both the design and repair of churches until disbanded in 1870.

In Inistioge, County Kilkenny, two churches occupy the site of the early thirteenth-century Augustinian priory of Saints Mary and Columba. The priory, Saint Mary's Church of Ireland church (largely altered by the Board of First Fruits in 1824), and Saint Columcille's Roman Catholic church, 1836 (also known as Saint Michael's and as the Church of the Assumption) together form an ecclesiastical quarter within the village

Within the Anglican tradition, a new approach to church building took place in the mid-nineteenth century in the wake of the writings of the Gothic Revival architect Augustus Welby Northmore Pugin and the formation of the Oxford Movement and the Ecclesiological Society. The Oxford Movement which, in its early days, counted John Henry Newman amongst its members, wished to reinstate the medieval catholic tradition within the Church of England. It was opposed to the preaching boxes of the eighteenth and early-nineteenth centuries, with their galleries, box pews and emphasis on the pulpit. New churches were to be axially arranged; with the congregation sitting on east-facing benches, focused on the altar, which was to be placed in a distinct and substantial chancel, reached by a series of steps. The preferred architectural style was thirteenth-century Gothic, the windows were to have coloured leaded or stained glass, and other forms of enrichment to the exterior and interior were encouraged.

These ideas crossed the sea to the church in Ireland. In the early decades of the nineteenth century, there had been a revival of the 'high church' tradition of the Church of Ireland, which had its roots in the seventeenth century. This revival in many ways anticipated the doctrines and practices of the Tractarian movement in England. However, it was not until the 1860s that its influence, and that of the Ecclesiological Society, were to have widespread consequences on the approach to church buildings and their furnishings. This coincided with the second wave of nineteenth-century church building in the years leading up to, and immediately following the disestablishment of the Church of Ireland. The Irish Church Act, separating the church from the state, was passed in 1869. One outcome of the Act was that many ancient church sites, not in use for worship, passed out of Church of Ireland ownership and into the realm of protected monuments owned by the state.

Architects engaged by the Church of Ireland in the first half of the nineteenth century included John Semple, James Pain, William Farrell and Frederick Darley, who mostly worked in late-Georgian Gothic styles. In the mid-nineteenth century, no fewer than five Anglican cathedrals were built from new, or comprehensively rebuilt, in rapid succession, starting with Kilmore Cathedral, County Cavan, designed by William Slater and completed in 1860. As well as building new churches and cathedrals, numerous humble Anglican so-called 'tower-and-hall' churches were radically reordered by the addition of chancels, the removal of box-pews, the moving of pulpits to one side and fonts to the west end, and the installation of stained-glass windows and encaustic-tiled floors. The High Victorian

era saw the employment of figures such as William Atkins, James F Fuller, and Welland and Gillespie (the latter partnership working directly for the Ecclesiastical Commissioners between 1860 and 1870) as well as noted English architects including William Burges and George Edmund Street.

In the Roman Catholic Church, early nineteenth-century churches were mostly designed in either the Neoclassical or the Gothic Revival styles, architects such as John B Keane and Patrick Byrne working competently in both idioms, although the churches and cathedrals of Dominick Madden and William Deane Butler were ubiquitously Gothic. From the 1830s acclaimed architects of the High Victorian Gothic Revival were employed to build churches throughout Ireland, facilitating ecclesiological principles, as liturgical emphasis shifted from the word to the sacraments. The earliest of these was A W N Pugin, who designed Killarney and Enniscorthy cathedrals, together with several fine churches in County Wexford. In the 1860s his son, Edward Welby Pugin built up a considerable, if short-lived Irish practice, run by his partner George Coppinger Ashlin. This practice was continued by Ashlin alone after 1869, and in partnership with Thomas A Coleman after 1903. Their main rival was James Joseph McCarthy, who designed the chapel at Saint Patrick's College, Maynooth and the cathedrals at Thurles (unusually Romanesque in style) and Monaghan, as well as completing that at Armagh. Leading figures of the late-nineteenth century included William Hague and William H Byrne, the latter joined by his son Ralph in partnership in 1902.

The nineteenth century was also a productive period for the construction of many churches and meeting houses for the nonconformist Protestant denominations such as the Presbyterians, Methodists and Religious Society of Friends (or Quakers). In the early part of the century these were mostly classical in style, sometimes fronted by a portico in the case of the first two denominations. During the Victorian era, the Gothic Revival was increasingly adopted by both the Methodists and the Presbyterians, though usually of a more restrained type than that being used by the Anglicans and Roman Catholics and ordered internally for a different type of service. Noted stylistic exceptions were the three large Presbyterian churches, complete with spires, built in the Dublin area in the 1860s by Scottish architect, Andrew Heiton. The building of churches by the Church of Ireland and other Protestant denominations reduced dramatically from the latter part of that century.

The growth of the Roman Catholic Church represented the most expansive building programme of any denomination in Ireland, one which continued long into the twentieth century. The most important figure of the early part of the twentieth century was William A Scott, who favoured a modern Romanesque style incorporating decorative art by the best Irish craftsmen and women of the period. Despite a preference for conservative architectural styles for much of the century, several landmark modern churches were built, such as Christ the King, Turner's Cross, Cork (1927-31, designed by F Barry Byrne, construction superintended by J R Boyd Barrett) and Saint Aengus, Burt, County Donegal (1965-67, by Liam McCormick).

The demographic changes that took place in Ireland during the first decade of the twenty-first century saw a widening of the spiritual base within the country in tandem with declining church attendance.

Saint Colman's Cathedral, Cobh, County Cork, designed in French-Gothic style by Edward Welby Pugin and George Coppinger Ashlin in 1868, exemplifies the confidence of the Irish Roman Catholic Church in the second half of the nineteenth century

The Society of Friends built this elegant Neoclassical meeting house in Cahir, County Tipperary in 1833. In 1881, it became a Presbyterian church and remains so today

The Church of Christ the King was designed by American architect F Barry Byrne who had trained with Frank Lloyd Wright in Chicago. Constructed in reinforced concrete using strong geometric forms, the church was built to cater for the growing Catholic population in the expanding suburbs of Cork City

Immigration increased memberships of many protestant and nonconforming churches and introduced many new sects into Ireland. To the small, but long-established Jewish community, were added other non-Christians from some of the great world religions such as Islam, Hinduism and Sikhism, but these still represent less than 3% of the population according to the latest census data (Central Statistics Office 2006). The building programmes of these non-Christian religions have, to date, been modest. With the notable exception of the new Mosque and Islamic Cultural Centre of Ireland, in Clonskeagh, County Dublin, most places of worship used by non-Christian religions are former churches or other simple or adapted buildings. A valuable contribution to the conservation of the built heritage has been made by this adaptation of ecclesiastical buildings, which might otherwise have fallen into disuse.

A comparison of the numbers of places of worship owned by each denomination or religion is revealing. Not surprisingly, the largest number of churches within Ireland are in the ownership of the Roman Catholic Church which represents some 87% of the population (CSO 2006). The smallest numbers are in the care of the non-Christian population, while disproportionably high numbers of churches and meeting houses remain in the care of the Church of Ireland and the Religious Society of Friends, which make up 3% and 0.03% of the population respectively. This places a heavy burden of guardianship on those two religious groups, both of which have played an important part in the history of this country. Another significant change in Ireland during recent years has been the drift away from organised religion with some 4.4% of the population now taking no part in any recognised religious group (CSO 2006). Population shifts from the countryside to the cities and towns have brought about an increase in the number of redundant rural churches, particularly those of the smaller religious denominations. It has led to a number of radical changes of use, sometimes accompanied by equally radical intervention, some of which have been more successful than others. As commercial viability and sustainable use are often of fundamental importance to good conservation practice, the challenge of finding suitable new uses for redundant historic places of worship is pressing.

For simplicity, throughout the rest of this booklet the generic term 'church' will be used to mean churches and all other places of worship.

Conservation principles

The primary aim of conservation is to prolong the life of something of value, and to do so in a way that protects what is valuable about it. The built heritage enriches our lives and provides a connection with, and a means of understanding our shared past. Historic places of worship have incalculable value as tangible records of those who have gone before us, of the lives they lived and of their aspirations and achievements. Each church provides unique and irreplaceable evidence of the past and should be passed on to future generations with that evidence intact.

As each historic building is unique, each requires an individual assessment of its significance, its condition and a solution to the particular conservation issues that have arisen. The conservation of a place of worship requires highly specialised skills in all aspects of the works. Expert advice is needed for assessing the extent of works required, designing and specifying those works and overseeing the project on site. Skills are also required of the craftworkers, stonemasons and others who carry out the works.

An aim of good conservation is that there should be minimal intervention into the historic fabric of a structure. Conservation works should do as much as necessary, yet as little as possible to the building to ensure its future. This means that elements should be repaired rather than replaced. Conjectural reconstruction of any part of the building should be avoided and only undertaken where there is good reason and where the works can be based on reliable documentary or other evidence. Appreciation is needed of all the various phases of construction. Later additions or alterations may be of equal or, in some cases, more interest than the original built fabric.

CARRYING OUT MAINTENANCE OR REPAIR WORKS

- Do use the experts – get independent advice from the right people
- Do repair the parts of the building that need it - do not replace them unless they can no longer do the job they were designed to do
- Do make sure the right materials and repair techniques are used and that even the smallest changes made to the building are done well
- Do use techniques that can be easily reversed or undone. This allows for any unforeseen problems to be corrected in future without damage to the special qualities of the building
- Do establish and understand the reasons for failure before undertaking repairs
- Do record all repair works

- Don't overdo it – only do as much work to the building as is necessary, and as little as possible
- Don't look at problems in isolation – consider them in the context of the building as a whole
- Don't use architectural salvage from elsewhere unless certain that the taking of the materials has not caused the destruction of other old buildings or been the result of theft

1. Conservation Issues and Challenges

Churches are a source of great pride not only for the congregation but also for the wider local community. Within this sense of guardianship there may sometimes be an emphasis on wanting the buildings to be as good as new. This can create a tendency to over-restore or modernise, rather than retain genuine historic fabric that is beginning to show its age. Recognised international good practice in conservation places great importance on the beauty that can result from the aging processes of different building materials and the evidence of a building's use over time. Some refer to this as the patina, while others describe it as the aesthetics of age. The implication of this is that old buildings should be allowed to look old as this provides much of their beauty and sense of depth in time. It is important not to confuse something that is worn with something that is damaged.

Understanding the significance of the place of worship

The starting point for the conservation of any historic building or place is the assessment and understanding of its cultural significance. The criteria used to assess the significance of a building or place are: architectural; historical; archaeological; artistic; cultural; scientific; technical and social interest. Almost all places of worship include more than one of these important attributes and many include several. Architectural and historical qualities are generally assumed to be paramount amongst these criteria, as many churches are prominent landmarks and focal points in urban townscapes and rural landscapes. Cultural, artistic and social factors are also highly relevant, as places of worship play a central part in the spiritual and family lives of many people and have done so for generations.

When assessing the significance of a church, it is necessary to consider the individual building within a national context in order to judge its importance as a particular example of its type. Its significance should also be assessed and understood within a local context, where a building considered modest by national standards might contribute greatly to the townscape as the principal landmark in a small rural village. An understanding of cultural significance will be reached through careful observation during fieldwork and through historical research and is essential to guide the care, repair or alteration of any significant historic building. The process can be formalised into a conservation statement or conservation plan, which is a useful document for stating all aspects of significance, where there are multiple dimensions to the heritage. Together with a statement of significance, the conservation plan will identify threats and set out conservation strategies that will address the threats and preserve the significance of the site.

Saint Patrick's Purgatory, Station Island, County Donegal, has been a place of pilgrimage for many hundreds of years. The collection of nineteenth- and early twentieth-century buildings, including the basilica designed by Professor William A Scott, is of architectural heritage interest. The buildings and archaeological remains embody a religious and cultural ensemble of major importance

Before commencing work on any historic building, a full understanding of its history and significance is essential. Most of the Christian denominations have some form of central archive in which records and historic documents are stored. In Dublin, the Roman Catholic Archdiocese and the Representative Church Body of the Church of Ireland are two valuable starting points, each containing a wealth of material. The Irish Architectural Archive in Merrion Square is also an excellent source of architectural history. When preparing a statement of significance for a historic building, it is necessary to have sufficient general knowledge of ecclesiastical architectural history to place the church under consideration within a regional and national context. The *Buildings of Ireland* series currently covers eight of the thirty-two counties in Ireland, plus the centre of Dublin, and other volumes are currently in preparation. A more comprehensive, if less detailed, survey is the National Inventory of Architectural Heritage, which has a very useful and accessible website www.buildingsofireland.ie. There is also an invaluable online database named *Gloine* which contains extensive details of stained glass within most Church of Ireland churches.

Protection of historic places of worship

It is important to establish at an early stage whether a building or site is protected by legislation and what types of notifications, permissions and/or consents it may be necessary to obtain before undertaking any works. This section is intended as guidance only and is not a legal interpretation of the legislation referred to below.

NATIONAL MONUMENTS ACTS

Although there is a general exemption under these Acts for buildings in ecclesiastical use, for some older churches and their graveyards, the provisions of the National Monuments Acts 1930-2004 may apply and notice should be given of any proposed works, or consent obtained where applicable from the Department of Arts, Heritage and the Gaeltacht.

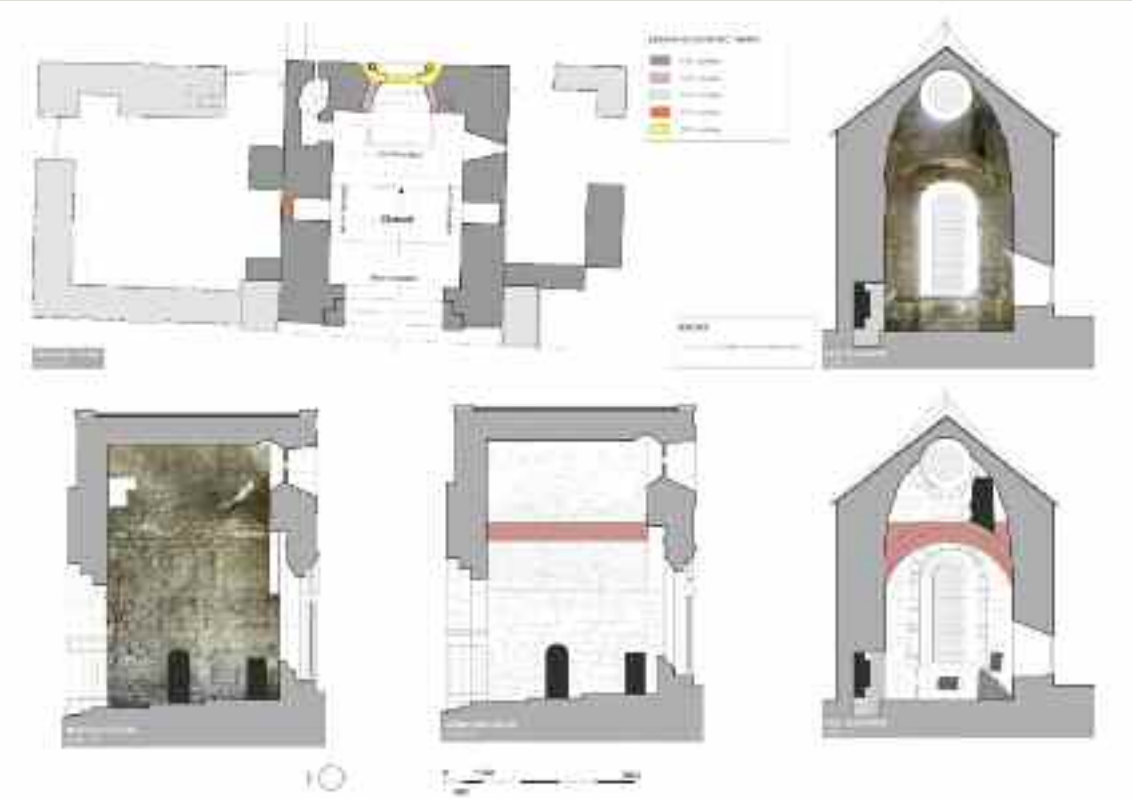
PLANNING AND DEVELOPMENT ACTS

Many churches are included in the records of protected structures held by planning authorities, and their care, repair and alteration are governed by Part IV of the Planning and Development Act 2000. This legislation was drawn up to protect the heritage from both intentional and unintentional actions that may result in the removal or alteration of historic fabric. Planning authorities manage this legislation through the planning process and planning guidelines, and through the advice provided by their architectural conservation officers. The laws are not intended to prevent change, but simply to ensure that any actions taken are appropriate and are carried out within the principles of what is recognised to be good conservation practice. In some instances planning permission might be required; in others, a declaration might be obtained from the planning authority, which would define areas or works exempted from the need to obtain permission. For works to be considered exempted development, they must not materially affect the character of the protected structure. The definition of the term 'works' within the Planning and Development Acts is wide reaching and may include what seem to be relatively straightforward tasks. If any doubts exist, clarification should be sought from the architectural conservation officer in the planning authority.

Making a planning application

Early consultation with the planning authority is recommended when considering works to a church, especially works or changes that would affect its character. Every applicant is entitled to obtain a pre-planning meeting with the planning authority. Where proposals may be complex or contentious it is recommended that this opportunity to explain the project be taken. The advice or recommendations of the planning authority and its architectural conservation officer should be taken into account by the architect and the Historic Churches Advisory Committee or other consultative body prior to finalising the application (see also 'Reordering and liturgical change' below).

If there is a query as to whether or not the proposed works would be considered exempted development or would require planning permission, a declaration should be sought from the planning authority, using Section 57 (7) of the Planning and Development Act. Such a declaration is the planning authority's opinion on whether the proposed work would, or would not, materially affect the character of the protected structure and therefore would or would not require planning permission.



A high standard of presentation will greatly assist the passage of a proposal from initial discussion right through to the formal planning application. Drawings, reports and illustrations should all clearly show the present (and perhaps a known former) state of the church and the changes that are intended in this and perhaps subsequent projects

STANDARD OF DRAWINGS AND REPORT

The planning authority will make its decision on the basis of the quality of the proposals and these may need to be presented at a higher level of detail than would be required for a planning application for a building that is not a protected structure. It can be expensive to produce drawings for large and often complex structures, but these are often of critical importance. Old survey drawings or original design drawings may survive that can provide a base for the general arrangement of the church with more detailed drawings restricted to those places where material changes are proposed. Historical reports do not need to be over-long, but they should be sufficiently detailed to show a clear understanding of the building's history and significance within a wider context. Historical photographs, maps and documentary information should be included where they support the overall proposals and conservation strategy. Where liturgical requirements may be the inspiration for particular works the application should describe the liturgical reasons behind the proposal, as this aids the planning authority in making its decision.

Building types and scales

Churches comprise a remarkable range of styles and scales from small, simple structures consisting of a single space to vast cathedrals and cathedral-like parish churches containing a complex arrangement of internal rooms and spaces. Similarly, the range of conservation needs of different churches will differ. The underlying principles of care, repair and ongoing maintenance, however, are largely the same. Most Irish churches have a masonry superstructure, mainly of rubble stone but occasionally of brick. External finishes vary, ranging from well dressed ashlar, perhaps with elaborately carved enrichments, to lime rendered finishes, either applied smooth and scored to mimic dressed stonework, or hand-thrown to create a porridge-like texture known as a wet dash or roughcast. Internal decoration and furnishing also vary considerably in their degree of sophistication and craftsmanship.

The small Romanesque Anglican cathedral of Saint Brendan at Clonfert, County Galway, is used irregularly due to the size of its congregation. Interest in its future within and outside the Anglican community is helping to sustain it as a place of worship

Patterns of use

A large urban church might be used several times a day for divine worship with additional services for christenings, weddings, removals and funerals, whereas a rural church (within a group or union of parishes), a chapel or meeting house belonging to a minority denomination might enjoy only infrequent use. In some cases there might be only one service a week, or one a month; in others a church may only be used whenever there is a fifth Sunday in the month. With such scant use, the implications for the fabric of the building can be serious unless it is regularly heated and ventilated. Even in a well-attended place of worship the size of the congregation can vary considerably from service to service, with a small number attending an early morning service, while a funeral or a mid-morning Sunday service might result in a large attendance. This places different demands on the building interior particularly in the need for heating and ventilation. For a church with a small congregation, there are fewer resources to provide adequate heating and fewer people to recognise and identify problems and undertake necessary action.

Consultants and contractors

The conservation of historic buildings is a specialised area of expertise within the practice of architecture. The care, repair and conservation of churches require yet a further level of expertise. For all churches, regardless of their size, scale or complexity, it is prudent to seek guidance from an advisor experienced in this type of work. Conservation architects or engineers, with experience in the care and repair of ecclesiastical buildings, can provide an invaluable service in the resolution of existing problems and defects. In some instances they may be able to help in the procurement of grant funding to assist with these works. Of even more importance is the help they can give in preventing new problems from arising in the future.

Finding successful and cost-effective solutions to building defects is one valuable skill; preventing them from occurring in the first place is considerably more valuable. Within this process, co-ordination with other church bodies or church authorities can be productive to share experiences, knowledge, and cautionary tales, and to help direct congregations to the appropriate levels of specialist professional advice and to recommend suitably qualified contractors to undertake the work.

Church committees

Church authorities, at central or diocesan level, have special advisory groups to help guide and finance projects planned for the churches within their area. Usually the client body for a church consists of the priest or minister, with the support of a finance committee, or a select vestry in the case of the Church of Ireland. Sometimes these groups need to enlist the necessary conservation expertise and experience, perhaps from within their congregations, to identify and commission suitably qualified consultants, who will assist in determining and overseeing necessary works. Church authorities should not implement works directly without proper documentation; the necessary skills to assess whether or not the project will be diagnosed, specified and implemented correctly; and also a clear understanding of the church's responsibilities under current health and safety and planning legislation. Historic Churches Advisory Committees operate at a central or diocesan level to assist on matters relating to changes, including liturgy-inspired proposals, in protected churches. There are a

number of useful organisations, which can give general direction about the conservation of the built heritage. A list is given at the end of this booklet. These different bodies can provide general guidance on finding suitably qualified advisors, on applying for grants and on the responsibilities of a building owner under relevant legislation.

Training and volunteer carers

The specialist knowledge of a building professional can be greatly enhanced by the support of a group of volunteers drawn from the congregation who, with training, can keep a watchful eye on those elements of the church fabric that need the greatest degree of vigilance. Some churches already have established finance committees but there is also a need for a fabric committee, the remit of which concentrates fully on care, repair, damage prevention and alteration. In some churches, volunteers fill this role and give generously of their time by cleaning, carrying out simple day-to-day maintenance tasks, repainting and providing floral decoration. High standards of internal cleanliness and the smell of fresh polish, often found in a cherished ecclesiastical building, can sometimes create a deceptive sense that the external fabric is equally well tended. It is, however, unreasonable to expect volunteers from the congregation to take on the more challenging and potentially hazardous tasks of clearing gutters, repairing roofs or making regular inspections in towers and roof spaces. Indeed health and safety legislation may preclude some works being carried out by anyone other than suitably skilled and experienced operatives (see Chapter 3).

Funding

Raising the money to implement large-scale repair programmes presents a challenge for most congregations. The starting point is to determine the correct scope of work required, together with accurate cost estimates. This will often require a considerable amount of work by the design team to survey, open up and identify problems and diagnose their likely causes. Fund-raising will only be effective when a realistic financial target has been established and the nature of the defects shared with the congregation. Illustrated information panels can be helpful for this, showing close-up detail of damaged fabric that may otherwise be out of sight from the ground. There are a number of state and private bodies that provide funding for conservation works. When applying for grant aid, it is advisable to have a conservation report or plan that outlines the cultural significance of the church, identifies defects and sets out a conservation strategy for repair, including budget cost estimates. Where fund-raising is likely to take a considerable time, minimal programmes of short-term emergency works may slow down the advance of decay and deterioration, helping to prevent an escalation of the long-term repair costs.

The Roman Catholic church of Saint Peter's, Phibsborough, Dublin has a lofty, cruciform roof and tall steeple, which make roof maintenance a specialised task. Repairs to the roof and guttering were grant-aided in 2009 by the Heritage Council's Significant Places of Public Worship grant scheme

High standards of workmanship are achievable, with both formal and on-the-job training. This pool of skill is growing steadily and helps to increase standards countrywide. The quality of workmanship, as well as of research, design and project management, are vital to achieving the best outcome for the architectural heritage

Getting the right advice

When it comes to repairing a church building, regardless of its age or size, it is important to know when specialist advice is needed and where to find the right help. It is a false economy not to get the best advice before having work carried out. Bad repair works can be difficult and expensive to undo and can damage a building in the long-term.

The conservation of historic buildings calls for specialised skills to meet the particular demands and potential conflicts of structural stability, conservation and alteration. Churches can be amongst the most complex of historic building types and the nature of their conservation often requires greater attendance on site than usual by the professional advisor overseeing the works. Numerous decisions are usually required as the work progresses in which a judicious balance should be made between conservation, renewal and cost. Work carried out inexpertly, either without professional advisors or under the guidance of inexpert advisors, is of little value and may result in removal or damage of historic fabric, requiring remedial measures of significantly greater cost than the original repair programme. For these reasons, the care and conservation of churches is rightly acknowledged to be a specialty within a specialist area of work.

Equally important to the selection of professional advisors, is the selection of those who will be entrusted with carrying out the repair works. Those who physically work on historic buildings should have an understanding of and a respect for the original workmanship, traditional materials, working practices and techniques of those craftsmen who have gone before them. In conservation, successful work depends much more on the skill of the workforce than in a new building. There are also the added demands of having to create a building site within and around what might be valuable and delicate historic fabric, where careless actions can result in irreparable damage. Protection of existing surfaces, together with extreme care throughout the execution of a building contract and the foresight to anticipate and avert difficulties, are essential qualities for contractors and craftspeople working in historic churches.

If a church is likely to need ongoing works over a number of years, the relationship with the advisor and builder will be important both to the client and the building, and continuity will be a great advantage. They will be able to become familiar with the property, and to understand how it acts, and will build up expertise based on that particular building.

The Royal Institute of the Architects of Ireland (RIAI) has an accreditation system for architects trained in building conservation and can provide a list of those architects that are accredited. Similarly, the Society of Chartered Surveyors Ireland has a register of conservation surveyors. The Construction Industry Federation also has a register of Heritage Contractors working in the field of building conservation. The architectural conservation officer in your local authority can provide general advice and may be able to give advice on suitable professionals, craft workers and suppliers in your area.

2. Inspection and Maintenance

Most churches were built with the expectation that they would remain standing and continue in use for a long time. The current generation may be the latest of many generations who have worshipped in the building, and each hopes that the place will continue to play a central part in the future of their descendants for years to come. It is therefore essential that those currently entrusted with the guardianship of these buildings pass them on in a reasonable state of repair.

The maintenance of a church can be difficult and expensive due to the size of the building, its height and architectural complexity; however, regular programmes of preventive maintenance works are essential to keep the building in good repair and avoid costly and unexpected defects emerging

Prevention is the ultimate goal. Almost every major defect that occurs in a building started out as a minor defect, and many could have been avoided by regular ongoing maintenance. Identifying necessary tasks as urgent, short term, medium term or long term, allows the church finance or fabric committee and its professional advisors to prepare a practical strategy that will be most cost effective whether dealing with matters on a large or small scale. The greatest efforts should be focused on preventive maintenance to avoid unnecessary decay and a possible need for more extensive repairs. Notwithstanding this ideal, there will occasionally be larger programmes of work to undertake, such as the refurbishment of gutters, or the re-covering of roofs or structural repair. Identifying these larger programmes of work well in advance allows for temporary repair, careful monitoring, and strategic planning to implement a wider scope of associated works that might benefit from the use of a single scaffold or site set-up. Long- and medium-term planning also allows for fund-raising campaigns to be instigated for work programmes of higher cost.

Good housekeeping, maintenance plans and manuals

Ecclesiastical buildings are often distinguished by vast internal spaces, by high and complex roofs, and by the durable quality of the materials used in their construction. Stone walls, facings and window dressings, slate roofs, metal-framed and leaded windows, lime and sand plasters, oak or pine joinery and furnishings, and tiled or woodblock floors are all materials of the highest quality that will last for a long time. But like all building materials, they need regular care and maintenance. A large church is no different from any other building in that there is a need to keep the roof in good repair, the gutters clear and free flowing, the painted surfaces clean and re-painted regularly; and the interior heated and ventilated to avoid condensation and mildew. With generous levels of volunteer help, it is not uncommon to find floors, pews, doors and wall surfaces up to a height of about two metres in an excellent state of preservation and repair; while high-level windows, upper walls and ceilings, gutters, downpipes and roofs in the same church might be found to be in a much less satisfactory condition. This contrast highlights the need for maintenance to extend to all parts of a building regardless of the difficulties encountered in gaining access either for inspection or for work.

Maintenance plans and manuals are invaluable tools to help identify, organise and fund maintenance and repair programmes. The first step in compiling a plan is to document to the best possible extent all knowledge of past maintenance and repair works. Plans generally contain three categories of works: routine or day-to-day maintenance tasks, cyclical tasks and occasional tasks. Controlled maintenance minimises the spread and seriousness of defects in almost all cases. For more information on maintenance plans, see *Maintenance – a guide to the care of older buildings* in this Advice Series.

The inspection of a church requires that close attention be given to roof coverings and rainwater goods, the elements that are hardest to reach. Neglect of the roof will, however, manifest itself in a myriad of problems throughout the fabric, starting, as seen here, with blockage of the rainwater goods

Quinquennial inspections

A process of quinquennial, or five-yearly, inspections involves a regular, expert overview of all aspects of church conservation that encompasses everything from the condition of the external fabric to the internal decorations and building services. The idea for quinquennial inspection of church buildings was introduced by the Church of England and has been a legal requirement in England since 1955. There is no similar requirement for quinquennial inspections in this country. However, experience has shown that five-yearly inspections followed by a programme of repair works are an excellent method to keep a historic building in good condition and reduce the risk of distressing, and expensive, defects appearing without warning. Best practice for all churches and places of worship would be to commission a suitably qualified person, normally an architect or surveyor with particular experience of church conservation, to undertake five-yearly inspections of the church and its site.

The main purpose of these inspections is to ensure that expert advice is obtained at regular intervals and that a long-term maintenance and management plan is prepared and then carried out. To facilitate the inspection it may be necessary to arrange for the attendance of a building contractor to erect ladders, or operate mechanical access equipment. While the contractor is on site providing this support function, he or she can also take the opportunity to clear gutters and carry out simple routine maintenance to roofs and high level parts of the building.

A quinquennial inspection report will highlight urgent short-term actions and less pressing but equally significant medium-term actions, while also identifying the long-term actions that will be necessary. This method of planning makes financing and fund-raising easier and also allows hidden problems to be identified and monitored.

The greatest cost benefit to the congregation of any church is prevention, and this is brought about by expert guidance, regular inspection and continuous active maintenance.

A quinquennial inspection is a detailed examination of the whole of the structure, including areas that are hard to reach such as roof spaces. Fitting electric lighting makes inspection of these areas easier and safer, thereby reducing the risk of damage from unnoticed water ingress. Note that a safety harness is being used because of the fragile nature of the ceiling construction

Other types of survey

From time to time other specialist surveys may be necessary, such as structural or services surveys, or surveys of stained glass or decorative plasterwork. The need for these will generally be identified by the quinquennial inspector. Many churches have old heating and electrical systems that present a considerable risk to health and safety and are inefficient. A specialist report might point out that the cost of an efficient modern system would be soon recouped through lower fuel bills.

Several service elements such as boilers, smoke detectors, fire alarms, fire-fighting equipment, electrical installations and lightning protection, require annual checks to make sure they are functioning correctly. These are easily overlooked unless brought within a systematic programme of inspection and surveying.

Keeping good records

Some religious groups and denominations maintain valuable central archives with historical documentation and records of their properties. The records kept of more recent works may be less complete. Many churches have been the subject of regular and often extensive programmes of work carried out without any records being kept. The importance of good record-keeping cannot be stressed too strongly, even if only as a chronological checklist of when certain works were implemented. Where work is of sufficient scale and complexity to justify the preparation of drawings and specifications, these records are even more valuable to those who may be responsible for conservation works in the future. At the very least, a full chronological account should be kept in a separate building-fabric file, noting every individual item of work completed, who was responsible for it, who carried out the work, the costs and the date. To supplement this file, the creation of an archive is recommended to include every report, condition survey, drawing, specification, health and safety plan and safety file that has been prepared for the job. This archive should be stored locally (in the church or parish), with a back-up copy in an alternative, preferably centralised, location. If properly maintained, such an archive will help to ensure a thorough, logical and well-planned strategy for the care and repair of a church that will be successful and cost effective. Where such records do not exist, it is nonetheless valuable to collect whatever documentation does come to hand, to make a start. The more information that survives, the greater the understanding and the clearer the task ahead will become. Maintaining good records over time also reminds church guardians of the importance of continuity and regular, ongoing action if they are to achieve a pattern of prevention rather than cure.

Prioritising work programmes within limited budgets

Regular inspections of the building fabric and reports are invaluable when they not only identify necessary works, but also present them according to their priority; that is, listing the works required in order of urgent, medium-term and long-term needs. A rigorous regime of inspection and ongoing maintenance can certainly result in successful prevention, but will not remove the need for action. Every part of a building requires some maintenance, regardless of its quality and durability, even if it is simply a matter of cleaning.

For the majority of churches, the routine maintenance of gutters, roofs, windows, towers and steeples is not straightforward, as it requires scaffolding or a cherry picker to provide safe access. Considerable expense might be incurred just to get up to these high-level areas to undertake simple tasks such as fixing back a loose slate, or clearing debris and organic growth from a gutter. It is, however, short-sighted to neglect these matters, as access costs (such as scaffolding) rise considerably when more extensive works are required to repair deterioration caused by neglect. If funds are not available for all of the most urgent works, difficult choices are required as regards priorities and the temporary measures that might limit the extent of long-term damage. The expense of creating safe, high-level access can also influence the programming of works. Economies can be found when less urgent works are brought forward to take advantage of a scaffold erected for the purpose of repairing an adjoining, and equally inaccessible, part of the building. For these reasons it is invaluable to retain an experienced advisor, particularly one with ongoing involvement and knowledge of the building.

3. Health and Safety

Note: this chapter is intended as guidance only and is not a legal interpretation of current health and safety legislation.

Responsibilities of employers

Safety, Health and Welfare at Work legislation was first enacted in 2000 and amended in 2005. The aim was, inter alia, to make construction sites safer as places of work. Under the legislation, construction is now deemed to include not only alteration, but also the repair and maintenance of existing buildings. Buildings under construction are subject to rigorous health and safety reviews for those who work on them and also for those who will be expected to maintain them in the future. Many church authorities have yet to put in place the necessary safety measures to provide safe access for the purpose of routine maintenance. As a result, even greater diligence is needed to make sure the church can be made as safe as is reasonably possible as a place of work; for those who use, maintain or repair it. To reduce these risks, hazards should be identified and safety measures put in place, through a process of risk assessment and mitigation.

When commissioning works to a historic church, the owner or custodian should be aware of the requirements of the Safety, Health and Welfare at Work Acts and the Safety, Health and Welfare at Work (Construction) Regulations. The duties of owners/clients, contractors and relevant professionals are mandatory under these Acts and accompanying Regulations. Helpful guidance is provided on the website of the Health and Safety Authority, www.hsa.ie.

Safety planning

When implementing specific programmes over a certain scale, the building owner is now obliged to appoint a competent person as Project Supervisor for the Design Process (PSDP) and also as Project Supervisor for the Construction Stage (PSCS). One of the responsibilities of the PSDP is to produce a Preliminary Health and Safety Plan. Contractors appointed to carry out the works must produce Health and Safety Method Statements, and at the end of the project a Safety File is produced. These documents are important for those responsible for ongoing maintenance or future repair works of the church. Where work is not planned, it is nonetheless valuable to prepare a general Safety Statement addressing any risks that might be faced by those asked to carry out regular maintenance.

Working at heights

Probably the most serious hazards encountered in the care and repair of ecclesiastical buildings result from having to work at heights. Tall buildings with high roofs and even higher towers present obvious risks. This can be further complicated by the presence of lower adjacent roofs, for example those covering aisles or side chapels. Some roof designs incorporate parapets and gutters that can be accessed with some degree of safety. Where these exist, the means of getting onto the roof must be safe and particular care should be taken where parapets are low and offer little guarding. Tall buildings are likely to have high internal spaces and these too can create hazards where high-level access is needed to repair windows, replace lamps, carry out ceiling repairs or redecorate. Mobile access towers can be used, but may require the temporary relocation of pews. Light-weight electronic lifts and hoists may provide a practical solution in some situations.

The erection of scaffolding may be necessary to allow safe access to high roofs, turrets and other features and can be an expensive undertaking. Advantage can be taken when scaffolding is in place to co-ordinate a series of maintenance and repair works at high level, designed in compliance with the health and safety method statement

Towers and roof spaces

Towers and roof spaces present hazards where stairs, ladders and walkways are inadequately protected. In belfries, it may be difficult to install a safe staircase in the restricted space available around the bell and bell-cage. Roof spaces can also present risks unless proper walkways with guardrails and lighting are provided. Plaster ceilings in churches were traditionally supported by closely spaced timber laths fixed to roof joists. While these traditional lath-and-plaster ceilings would be unlikely to support the weight of a person, the risk of falling through them is somewhat reduced by the spacing of the rafters. Rafters may, however, in some cases be weakened by insect or fungal attack and unable to support any significant weight, thus presenting a hazard to those working over a fragile ceiling high above the floor of the church. The ceilings of some later nineteenth-century or early twentieth-century churches are constructed of large fibrous plaster panels supported on widely spaced ceiling joists. Fibrous plaster is reinforced only with hessian and offers little resistance if walked on. This fragility, combined with the wider joist spacing, make ceilings of this type a serious risk to safety, and appropriate measures such as the use of safety harnesses should be put in place when working above them.

During inspections or repair works carried out within roof spaces, care is necessary to avoid stepping onto the delicate areas of plaster that span between the ceiling supports. Appropriately specified temporary or permanent plywood sheeting should be fixed to give safe access where necessary, to distribute loads across a number of joists, and to reduce the risk of accidentally stepping onto an area of vulnerable plaster.

It is necessary to provide safe access to the upper parts of towers in order to check and maintain the condition of the tower roof and parapets, to inspect the nave roof from above, and to check the condition of bells, the bell support and louvres. Access to the roof-spaces and towers of churches can be precarious, with old ladders or gangways that rise to considerable heights without handrails or are inadequately fixed. For reasons of health and safety it is the responsibility of the building owners to ensure that these are made safe to use.

Installing a walkway with handrails secured to the joists allows for adequate and safe access for inspection and maintenance of the internal fabric of the roof space

Toxic materials and animal infestation

Toxic materials ranging from asbestos to bat or pigeon droppings might be present in churches. Lagging to boilers and heating pipes containing asbestos is probably the most serious of these and where found, specialist analysis should be undertaken and the material removed by a suitably qualified contractor. Many painted surfaces contain lead-based paints which give rise to serious health risks where the paint is unsound or is disturbed. The fumes created when applying lead paint or burning it off and the dust resulting from sanding it down are particularly hazardous. An excessive build-up of dust can be a health hazard, particularly in roof spaces, and dust masks should always be used when working in these areas.

Pigeon infestation within roofs and towers presents a hazard as an accumulation of guano, dead birds and addled eggs can be a source of disease. It is advisable for measures to be taken to prevent pigeons from entering roofs and towers. Bats, which also create toxic guano but generally less detritus than pigeons, are a protected species and it is illegal under the Wildlife Acts to remove or harm bat roosts. Where there is evidence for bats, the first step should be to have a bat survey carried out by an appropriately qualified expert.

Where bats are found in the roof space, boarding or sheeting can be laid under their main roosting sites. This allows the guano they produce to be cleaned more easily, using protective clothing and a mask, than if it is allowed to fall on the insulation or timber laths of the plaster ceilings below. The openings through which bats gain access should not be closed off. Pigeon infestation is a more serious problem and can be prevented by blocking all possible entry points with good quality stainless steel mesh.

Clothing and equipment

Health and safety considerations during inspections are always improved by using appropriate protective clothing and equipment including: an overall, goggles, a dust mask, rubber gloves, stout, non-slip footwear and, in some instances, a safety helmet and a high-visibility jacket. Adequate lighting is essential, particularly in crypts and roof spaces that may have no daylighting. A head torch is a practical and safer option than a hand-held torch; however, they are not acceptable as a long-term solution and where artificial lighting is defective or has not been installed, the lack should be remedied as a matter of urgency. When ladders are required to carry out an inspection they should only be used with someone else in attendance, ideally an operative who can secure the top of the ladder or stabilise the base.

Inspecting a crypt presents risks such as trip hazards, toxic fumes, asbestos and rodent or fungal infestation. Personal protective equipment and adequate lighting are essential to reduce the risk of accident to the inspector or damage to the structure

Risk assessment

It is always prudent to carry out a risk assessment before engaging in any form of survey inspection or maintenance programme. This focuses the mind and ensures that the right level of precaution is taken. It also ensures that any necessary health and safety requirements are complied with in advance. Photographs and notes should be taken only from a stationary position and never when walking. If there is the slightest concern or doubt about the safety of any activity involved with the inspection or maintenance of an ecclesiastical building, the work should stop immediately. Working in dark, dusty, dirty and claustrophobic spaces can be disorientating for some people, as can be working at heights. The principle here is very simple: when in doubt – stop!

Disaster planning

Disasters by definition have devastating consequences: for historic buildings, their interiors, archives and artefacts. In the worst instances, disasters may cause injury or death. Drawing up a disaster management plan is highly advisable to ensure that all who manage or work in the church are aware of the possible risks. They should be familiar with procedures to immediately inform the emergency services, and to evacuate the building safely. It is also important to have a strategy in place for rescuing valuable artefacts and archives that are readily removable. Establishing standing arrangements with the fire and water services in the local authority will help to determine how best to approach the building in the first, vital hours after a flood or fire occurs. It is equally important to have contact details for conservation professionals and conservators who may be needed at short notice to carry out emergency repairs and to handle and store salvaged items. Electronic early-warning systems within the church should be checked regularly and all personnel involved in the care of the church should do periodic fire drills and mock evacuations. The adequacy of the water supply should be checked and verified by the fire service. Where a church is vulnerable to flooding, the possibility of installing demountable flood barriers should be considered, while bearing in mind that this may have architectural and archaeological implications which must be taken into account.

Buildings are more vulnerable to fire during construction or repair works and careful specifications and good site practice can help to reduce this risk. It is essential that the church authority checks that the contractor's insurance policy adequately covers the costs of repair or reinstatement and not just the value of the contracted works. In most building contracts for works to existing structures, the responsibility for insuring the building remains with the building owner throughout the work. Owners should inform their insurer of the proposed work and seek written confirmation that their existing cover will be extended throughout the period of the building contract. Policies restricting 'hot working' should be considered. Churches that are unused or underused, and therefore not often visited, are particularly vulnerable to damage should disaster strike, as it is less likely that alarm systems will be operational or early warning signs heeded in time.

The Heritage Council's *Museum Standards Programme for Ireland* provides guidelines on disaster plans and disaster response procedures, which may be of assistance. These guidelines are available to download from www.heritagecouncil.ie.

If disaster strikes a church it is advisable to provide prompt protection from the additional damage caused by the elements by fitting a temporary roof and securing the openings

4. External Envelope

The structural form of churches

In Ireland, the majority of churches were constructed of massive, load-bearing masonry walls with a timber roof structure. Thick walls, sometimes reinforced with buttresses or piers, support heavy timber roof frames or trusses, which in turn support purlins and rafters and the roof covering. The plan may include a tower and a separately roofed chancel. In a larger church, there may be side aisles running along one or both sides of the nave separated from it by arcades of columns and arches. A more elaborate plan might include transepts, side chapels and a complex chancel with an ambulatory. Churches in the Neoclassical style may have a portico with a pediment and columns. These variations on the theme of the simple nave-and-chancel church are nonetheless relatively straightforward in their structural systems. While failure of a component or particular architectural element is not uncommon, the large-scale failure or collapse of the overall structural system is rare in modern times.

Towers and spires

Towers and spires are often the crowning glory of a church, providing imposing landmarks that enrich both townscapes and landscapes. Many are delicate masonry structures that are daring in their design and construction. Lightning protection is vital for such structures, as they are particularly vulnerable to lightning strike. Regular inspection of steeples and pinnacles is essential. Binoculars can be used in the first instance and, if any problems are suspected, then cherry pickers or steeplejacks should be employed for closer inspection. Towers and spires are generally constructed of neatly squared stone with fine joints known as ashlar. These are usually held together with iron cramps that over time become susceptible to rusting. Where driving rain becomes trapped within the masonry, or where original lime pointing has been replaced with Portland cement, the masonry can become saturated. Rust may then occur causing the ferrous metal to expand, dislodging or cracking individual stones; making them unstable, weakening the structure, and creating a risk to public safety. The removal of rusted cramps requires complex stone repairs to cut out the rusting cramp and insert a non-ferrous replacement. This is then concealed behind a new piece of stone known as a graft. Many towers have flat roofs concealed behind castellated parapets that are reached only after a difficult climb up a series of ladders and through belfries. As a result, these roofs tend to be maintained infrequently and failure is common.

Difficulty of access no doubt contributed to lack of maintenance of this church tower, resulting in ingress of water to saturation level in the masonry. This will lead inevitably to serious damage unless it is remedied

Roofs

Levels of rainfall in Ireland are high and the rain is often driven by strong winds. The roof is the building's main protection from rainfall. It endures the greatest exposure to the weather and church roofs, being large, are particularly vulnerable. The roofs of Irish churches are generally steeply pitched and covered with natural slates, supported on timber battens fixed to rafters. Sarking boards were sometimes fixed to the rafters underneath the slates. The slates were secured using iron nails or wooden pegs and were often partially bedded with their undersides plastered with lime and sand mortar, known as parging. The parging regulates unevenness and prevents individual slates from rattling and becoming loose in high winds. It also prevents driving rain and snow from blowing through gaps. Where parging survives, it should be retained and repaired as it plays an important part in weathering the roof.

Roofs may fail for a number of reasons: slates may become loose and slip during storms; nails may corrode due to rusting; and damage can occur as a result of falling objects, or through inappropriate and ineffective repairs. Historic roofs are sometimes stripped and re-laid unnecessarily and long before they should be, leading to unnecessary breakage of sound slates and a resultant loss of parging.

If careful repairs are carried out regularly and in the correct manner, a typical timber slated roof can last for 150 to 200 years. To achieve this, only qualified roofing contractors with experience of repairing historic roofs should be employed, and repairs implemented promptly after any damage occurs. Regular inspection should be undertaken when gutters are being cleaned; it is also advisable after severe storms. It is better to discover a leak by noticing damage or disturbance to the roof covering, rather than by seeing water stains inside the building. Where a roof has to be re-covered, the replacement material should closely match the original. For example, natural slates should be used where slate was the original roof covering. Concrete or fibre-cement tiles (sometimes marketed as 'blue-black' or artificial slate) are sometimes used as a cheaper alternative to natural slate; however, these have a shorter lifespan and are inappropriate for use on a historic building.

A previously repaired slate slipped off this chancel roof (the clip or tingle remains), revealing a hole in the covering and leaving some of the copper flashing vulnerable to uplift

Flat roofs, covered with lead or copper sheeting, are common on towers and porches and sometimes occur in small projecting bays as an extension to a sloping roof or as a ridge capping. If properly detailed, constructed and maintained regularly, these roofs will last for a long time. They generally need only to be cleaned regularly. Where the lead or copper sheet has failed and cracks have started to appear it is important to replace like with like. Bituminous membranes, whilst cheaper to install, have a short lifespan and do not result in long-term savings when compared to the more expensive traditional materials, which will long outlast them.

In some churches, dating from the first half of the twentieth century, there may be flat roofs made of structural concrete and weathered with asphalt. These tend to be the roofs of small, enclosing porches or side chapels, with the roof concealed behind a parapet. It is quite appropriate to renew these coverings with the same material, taking the opportunity where appropriate to incorporate a layer of insulation laid to a fall, which will cut down heat loss and reduce the risk of ponding.

Rainwater disposal

While the roof serves the all-important role of keeping the rain out of a building, it also plays a critical role as the starting point of the rainwater disposal system.

It is a mistake to view the different elements of the fabric of a building in isolation rather than as part of an integrated whole. Roofs are sometimes given a higher priority for repairs than gutters or downpipes, despite failure in the latter being much more critical and potentially damaging. Consider a small hole resulting from a couple of missing slates high up on a roof close to the ridge. This will let in a small amount of water, possibly no more than may fall through the openings in the top of a chimneystack of a house. A similar-sized hole in a gutter or downpipe will have the effect of a hose being turned on the building every time it rains. Clearly small holes in roofs become more serious when they occur closer to the eaves and the level of rainwater run-off is greater, but even these may be less serious than a defect in the rainwater disposal system. When considered as an integrated system, the roof sheds rainwater into the gutters and downpipes; these channel the water off the building and into the drains, which in turn direct it away from the base of the walls as quickly and efficiently as possible. Any blockages or breaks in this system are likely to cause serious problems.

Walls will quickly become saturated if rainwater cannot be shed effectively from the roof. Staining, discolouration and plant growth behind and beside downpipes are signs of problems at eaves or parapet level that require immediate attention

The most common design of gutter consists of cast-iron sections fixed to the wall head or to the ends of the overhanging rafters. Failures to this system are easy to identify through staining or drips. Gutters of this type, usually with downpipes and hoppers to match, come in a wide range of profiles and decorative patterns. Cast-iron gutters are robust and long lasting, but they need regular maintenance to keep them clean and painted, and to replace seals where the different sections join. Where the gutter supports have become weakened by corrosion there is a risk to public safety. If the gutters are well maintained and redecorated regularly, any repairs can usually be done on site. Where severe corrosion has occurred, it may be necessary to take down the gutters to have them shot-blasted in a workshop. This process removes all the old paint and rust, exposing evidence of any structural damage, after which they can be repaired and repainted prior to their replacement.

Cast-iron rainwater systems play a part in the architectural decoration of a church. Many have been removed unnecessarily, and this is a significant loss of original fabric. Rainwater goods made of uPVC or extruded aluminium are not appropriate on a historic building and their short life-span represents poor value for money. Cast aluminium is both solid and durable and can be an acceptable alternative to cast iron. A common failing when replacing original rainwater goods with contemporary systems is to fit undersized gutters and downpipes, which fail to cope with the large volumes of water running off and can clog easily. Most of the original patterns for cast-iron rainwater goods are still manufactured today and can be readily obtained from specialists to replace any sections that are damaged beyond repair.

An entirely different type of gutter is to be found in behind the parapets of churches where the external walls rise up above the outer edges of a roof. A parapet gutter is constructed of timber and lined with sheet lead or copper. Originally they were drained by lead downpipes but most have been replaced by cast-iron pipes. Parapet gutters can be used with care to gain access to the roof for cleaning, inspection and maintenance.

The failed copper guttering and parapet flashings on this church (left) were replaced with new copper guttering and flashing and the stone cleared of growth (right). The snow, or access, boards were not replaced as these can constitute a significant trip or fall hazard at roof level, particularly when they are in poor condition

Flashings

The junctions between roofs and walls are vulnerable to water ingress and are usually weathered by using flashings made from lead or copper sheet. Where failures occur, repairs should be carried out using these traditional materials rather than modern sealants such as mastic or cement. Sometimes a lime mortar fillet may have been used in preference to lead or copper flashings. This traditional detail is much cheaper and easier to install in the abutment between a sloping roof and a rubble stone wall. If the correct mix is produced, the pitch of the roof sufficiently steep, and the workmanship of high standard there is no reason why this traditional technique cannot be maintained. Using hard cement-rich mortars for this purpose will fail however, as they are more likely to crack and let water drive through the fillet.

Where walls are carried up beyond rooflines in the form of parapets or raised gables, they are more vulnerable, as both sides of the wall are exposed to the weather. Plants and weeds are more likely to grow in these vulnerable and less accessible areas. These should be removed promptly in order to prevent the damage which they can cause once fully established. Good coping and flashing details are paramount if parapets and raised gables are to resist the greater severity of weathering that affects these more exposed parts of the building.

For further information on roofs, rainwater goods, flashings and dealing with bats see *Roofs - a guide to the repair of historic roofs* in this Advice Series.

External walls

The walls of most historic churches were constructed of masonry, usually rubble stone, or in relatively few instances, brick. Coarse rubble masonry requires either a dressed or ashlar stone facing, or a lime plaster outer coating to keep out driving rain. The vast majority of early churches had rendered external walls, as did those later churches constructed on a modest budget. Churches of more ambitious design and some of the larger cathedral churches were partially or wholly faced in ashlar. During the second half of the nineteenth century a form of exposed, neatly squared rubble was often used which incorporated regular, narrow joints. The walls of most churches are thick and solid and are generally found to be structurally stable when roofed and still in use.

Until the early to mid-twentieth century, the masonry in most churches was constructed using lime mortar. Later, Portland cement became increasingly popular for both new construction and the repair of historic buildings. Lime mortars and coatings in traditionally built buildings have many advantages, being softer, more flexible, porous and vapour-permeable. This allows the walls to settle, breathe and, most importantly, to absorb moisture and dry out quickly. By contrast, cement mortars and coatings are hard, brittle, impermeable and prone to cracking, particularly when used on an older building. When water is driven into the small cracks that invariably occur in cement pointing and coatings it becomes trapped within the heart of the walls and is unable to escape by evaporation. The result is a damp wall that will be much colder than a dry wall during times of low temperature. This will encourage greater heat loss from the building and will increase the likelihood of condensation and mould growth on the internal wall surfaces.

The damaging effects of using hard cement mortars and coatings to repair old buildings may only became clear after decades of using cement and many of the most serious building defects faced by churches today can be attributed to this. There is no place in the care, repair and conservation of historic churches for the use of Portland cement, other than in underpinning and in subterranean repairs to foundations. Cement repointing and coatings are not only technically damaging but also visually intrusive. Where possible, later cement pointing and plastering should be removed and replaced with an appropriate lime-based mix. Because cement mortar is so strong the misconception has arisen that the main purpose of the mortar is to glue or bind the stones or bricks together, whereas its true purpose is to fill the gaps between the individual masonry units and keep them apart and to facilitate the evaporation of any water absorbed by the wall. Equally, an external coating should provide a soft, sacrificial layer that weathers back slowly rather than creating a hard, impermeable and inflexible outer shell.

As damaging as the removal of lime coatings from rubble walls, is the grit-blasting of ashlar or coursed rubble, particularly so when this is followed by the application of cement pointing. The use of abrasive systems to clean historic stonework has the potential to cause irreparable damage. Harsh and aggressive abrasive treatments damage the surface of the stonework, removing tool marks and years of aesthetically enhancing patination, while also increasing water-penetration into the stone. In certain circumstances, the use of small air abrasive tools and finer abrasives in the hands of a highly skilled and careful operative may be appropriate, but the hazards are significant.

This wall has become overly rigid due to the use of cement mortars, which resulted in the mortar becoming harder than the stone. Structural movement in the church is seen in the vertical cracking through the ashlar stones rather than the mortar

The rubble walls on this medieval parish church were stripped of roughcast cement render and re-rendered using a soft lime mortar. This helped the interior of the building to dry out, assisting to preserve the significant Romanesque stone carving

Climbing plants such as ivy sometimes colonise the external walls of churches. While these might appear to be visually attractive, their roots are damaging to the underlying masonry and lime coatings, and they should be removed and the roots treated to prevent regrowth.

Sub-floor ventilation

Many churches have solid floors with a finish of woodblock, tile, stone or mosaic. For those with suspended timber floors supported on joists, the space beneath the floor boarding was designed to be ventilated to avoid the risk of dampness that might lead to fungal or insect attack. Vents are usually found along the sides of the nave at low level in the form of decorative cast-iron grilles or holes formed through the stone facings. These sometimes become obstructed where external ground levels have risen over the years, due to burials, to the lack of maintenance, or to the laying of paths or hard standings. In some cases, the vents may have been deliberately blocked in the mistaken idea that they caused draughts. Where this has occurred, consideration should be given to lowering the external ground level, or excavating locally to make sure the vent outlet can function properly. On sites that are included on the Record of Monuments and Places, this process may have archaeological implications and may require on-site monitoring by a licensed archaeologist. The National Monuments Service of the Department of Arts, Heritage and the Gaeltacht should be contacted for advice. Where outlets have been deliberately removed or blocked to reduce draughts, they should be reinstated. Vents should always be fitted with insect mesh to prevent flies and beetles from entering the building. Sub-floor ventilation should not be confused with interior ventilation systems that are sometimes built into external walls; this is discussed in more detail below.

Drains and external ground levels

Ground levels around buildings tend to rise over the years as organic matter and waste building materials accumulate or path is laid upon path. In long-established graveyards located beside churches, the ground level might have risen substantially. Where external ground levels are higher than the internal floor levels, there is a risk of damp penetration of the building. Reducing ground levels or making excavations in burial grounds is difficult as individual grave sites might be disturbed and human remains disinterred. The National Monuments Service should be contacted for advice before any works are undertaken.

The grounds of this extended and altered medieval church have served as a graveyard for about six centuries, leading to a build-up of levels next to the church walls. Due to the archaeological sensitivity of a site such as this one, any proposals to lower the ground near the walls should be approached with caution, and expert advice followed

Where burials do not exist beside the external walls of a church, a simple, low-cost means of reducing dampness in the walls and floors of stone buildings may be the provision of a trench around the perimeter of the walls, back-filled with drainage-grade stones. This system, which is known as a French drain (named after its inventor, a Mr Henry French) should only be installed under the supervision of the building professional, such as an architect or structural engineer, who will inspect the foundations and decide on the exact positioning, profile and size of the trench.

External doors and windows

External doors and windows generally make a significant contribution to the overall architectural composition of a building. In churches of modest design, they might be the only memorable ornamentation and detail to the exterior. The following observations apply to timber windows frames with clear glass (metal windows, leaded lights and stained glass are dealt with in Chapter 6). Old timber windows are extremely robust, because they were usually made from slow-growing pine often imported from the Baltic region, which is close-grained, resinous and resistant to rot. These windows and doors can usually be repaired, even when a significant level of decay has set in. It is always desirable to retain and repair an original window rather than replace it with a new window regardless of the quality of the replacement. Further information is available in *Windows – a guide to the repair of historic windows* in this Advice Series.

Original external doors are typically well-proportioned, attractively detailed and well-made using robust timber. They should be retained wherever possible and repaired, and only replaced as a last resort. Where a replacement is unavoidable, an exact copy should be made using good quality well-seasoned pine, or Douglas fir, with accurately profiled mouldings. The use of standard doors from catalogues is unlikely to be appropriate in a historic building and should be avoided. Original doors and windows should be repainted periodically and, where new replacements are required, these should be given a painted, rather than a stained finish, except where there is evidence of staining or graining being the original historic finish. Where a door has deteriorated beyond the point of reasonable repair, its original door furniture and fixings may well be perfectly salvageable and should be reused on the replacement door.

The replacement of existing doors or windows is likely to require planning permission where the church is a protected structure and it is advisable to contact the architectural conservation officer before undertaking any works.

Historic doors and door furniture should be maintained and repaired as necessary in line with best conservation practice

Lightning protection

Lightning protection is essential for all churches, not only for those with towers and steeples. Many churches rise well above their surrounding buildings in small towns or cities, and many are on elevated rural sites. Many insurance companies now require lightning protection as a condition of their policies. The cost of an installation relative to the potential damage caused by a lightning strike is minimal. Existing installations should be tested annually to ensure they are functioning properly. The installation of lightning protection requires specialised expertise. Careful planning is needed to ensure that the route of the electric conductor and the location of fixings do not have a damaging impact on the historic building.

5. Structural Considerations

Structural movement in masonry

Masonry is strong in compression and will generally crack only when subjected to tension or shear forces. Excessive lateral forces from arch thrusts and the bursting forces from the buckling of ashlar, or expansion of rubble-filled walls can also create movement in walls, although this is more likely in ruinous buildings.

Differential settlement, the unequal downward movement of adjoining sections of walls, can cause shear in masonry and examples can sometimes be seen in the unevenness of string courses or cracking of walls between different parts of the building, particularly under and over window and door openings. Most churches have extensions in the form of side chapels, vestries, sacristies and the like, perhaps added some time after the main building works were completed. The foundation levels, compression of the ground, and settlement of the materials of later additions can vary significantly from the main construction, which may have settled many years previously. This can result in cracks where the extension joins the original building.

Significant changes in ground water on the site due to water-table changes, flooding, leaking drainage or faulty rainwater disposal, can impact on the ground-bearing capacity resulting in differential settlement. Graveyards are particularly vulnerable to this type of soil erosion and sudden changes in ground bearing capacities. Churches founded on older burial sites or upon the remains of a previous church are most susceptible. Burials may be found close to, and even under, the walls of a church. If the differential movement has stopped, it may simply be a matter of filling any cracks with an appropriate material. However, in the case of all but the smallest of cracks, a structural engineer with expertise in the repair of traditional masonry structures should be consulted to properly assess the movement, diagnose its cause, and design and specify an appropriate remedy.

Cracking at window heads, particularly square heads, is most frequently associated with water ingress to internal timber lintels leading to deterioration caused by wet or dry rots. Cracking over windows and doors should be explored by the removal of plasterwork or render locally, where this can be done without damage to decorative finishes and schemes, so that the concealed structural member can be inspected and checked for decay. Outward movement of walls can occur where tall walls are not properly restrained at their tops. Frequently there are no structural ties to the wall tops in high-roofed ecclesiastical buildings, which are subjected to the push-and-pull of roof movements together with thermal and moisture changes within the walls. It is almost always the case

This Bath stone turret, which is also a bell-tower, is in a highly exposed location. Several stones cracked due to rusted cramps and the poor condition was exacerbated by previous misguided cementitious repair. New stainless steel collars and ties were fitted and the turret was repointed

that the direction of least restraint is outwards and hence the top of these walls will tend to move in this way. Excessive wall movements are less likely if the roof and the external walls are kept in good order. However, on occasion the problems found are the result of an original design defect and, in such cases, more significant investigative and repair works may be required.

Corroding ironwork

Ironwork embedded into masonry can cause untold damage if subjected to dampness. Stonework, particularly to intricate turrets and elaborate parapets, is often held together with wrought-iron cramps. In their original condition, with the protection of alkaline mortar or lead caulking around them, there is little corrosion; however, as the original lime mortar erodes, or water becomes trapped by later cement pointing, the combination of air and moisture reaches the iron and corrosion commences. When ferrous metals (such as cast iron, wrought iron and steel) corrode, they form rust which has a volume between six to ten times that of the iron before corrosion occurred. If rusting occurs within the confined space of a mortar joint, or within a rebate in stonework, it either jacks up the upper stonework or cracks the masonry, causing pieces of stone to spall away. As the stonework deteriorates, further moisture can penetrate the wall, exposing the ironwork to increased rusting.

Embedded metal tie bars in this bell tower corroded and expanded, causing fractures in adjacent granite and slate louvres. Part of the repair solution involved installing a cathodic protection system to reduce the corrosion rate of the embedded ironwork

Steel bell supports built into the sides of high, exposed towers, cast-iron crosses, weathervanes and other ornamentation built into gables or ridges are amongst the other vulnerable metal details frequently found in church buildings.

If the existence of corroding ironwork is suspected within masonry, a more detailed examination is required to understand the extent of the problem and to formulate a solution. Where corrosion damage is extensive, the first step would normally be to compile a set of stone-accurate drawings on which to record evidence of movement and damage. A good mason or professional advisor, with an understanding of the repair of historic masonry, can then identify and mark up all probable locations of cramps, opening up a small section of wall to confirm the cramp detail and the extent of damage. Alternatively, certain types of metal detectors can be used to locate the ferrous cramps. It should be noted however that some types of stone and brick can contain significant quantities of iron and this can confuse the results. In such cases, a trial area of opening up will be required to calibrate the metal detector. Opening up historic masonry may require planning permission in some cases and the architectural conservation officer in the local authority should be consulted before any works are undertaken.

Further information on dealing with iron is available in *Iron – the repair of wrought and cast ironwork* in this Advice Series.

Neglect of upper levels

The floors to upper levels in towers, particularly those at the belfry level, should be considered as external fabric as they are often open to the elements and protected only with louvres. Towers and turrets can become popular pigeon roosts if left unprotected. The build-up of guano and dead birds along with dampness from driven rain can have a detrimental effect on the structural elements, causing early erosion of bell-support steelwork and accelerated timber decay from both insect infestations and timber rots. The detritus caused by a bird infestation also presents a health hazard to anyone entering the area. These less accessible, and very exposed, upper levels require regular maintenance and inspection to make sure all bird guards are in place and that louvres and other timber elements remain in good repair. As the cost of providing safe access and working platforms for these high places is considerable, it is important that only

good quality materials and specifications are used to withstand extreme exposure and prolong the time between major repair programmes.

Attic spaces and small rooms within bell towers have often become repositories for a range of useful, or not so useful, objects. These might range from redundant furnishings (or parts of the building fabric that may have been replaced at some point) to Christmas decorations and temporary displays. For ease of access, to improve safety and reduce fire risk, it is best to keep these areas clean and clear of all redundant materials and objects. Where there are redundant items found stored within the building, their significance should be expertly assessed before a decision can be made on disposing of them. It is possible that their storage was a condition of a previous grant of planning permission.

Bell-cages and supports

Many church towers contain one or more bells. Originally operated by a rope bell-pull, which swung the bell in its supporting cradle, most are now sounded using electronically powered strikers that have the benefit of creating less vibration. Belfries have large openings to let the sound out. These openings were traditionally weathered with stone or, more commonly, timber louvres. Bell-cages and supports are probably some of the most vulnerable and neglected aspects of churches, usually because there is no safe access. If a place is dangerous and difficult to get to, it is unlikely to be visited and maintained. Bell towers should be provided with safe internal access up to the base of a spire where a closer inspection of the spire masonry can be made than from the ground.

Bell supports and belfry louvres require regular inspection and maintenance. Of paramount importance is restricting the ingress of driving rain to the bell support structure, which is assisted by maintaining the louvres in a good condition. As belfries are particularly vulnerable to pigeon colonisation, the backs of the louvres should be fitted with concealed stainless steel mesh to prevent birds entering.

Bells are heavy objects frequently weighing many tonnes. They require a robust and well-designed support structure of timber or steel capable of carrying the swing of a heavy bell or collection of bells. The sound of the bells resonates through timber louvres set within openings in the bell tower.

This belfry was photographed prior to work commencing on the steeple (but after the louvres were removed to provide more light for the duration of the project). In common with all such areas, the signs of pigeon infestation are everywhere, however the structure and bell mechanism are in a reasonable condition

The extent to which driving rain and lack of a protective coating can damage bell supports is shown by this badly corroded steel beam

Consequently the bell supports frequently suffer from driving rain that lodges on horizontal surfaces and runs into crevices in the steelwork. The ends of the steel, or in some cases timber, supports are set into masonry that is frequently wet due to the severe exposure experienced at high level. The steelwork is frequently designed primarily with the support of the bell and its movement in mind and its protective coating may be insufficient, leaving it vulnerable to rusting and structural deterioration. The condition of the paint should be inspected annually as part of a general maintenance inspection and repainted on a regular basis, preferably every three to five years. Paint systems are becoming more robust and existing bell support structures, if not badly corroded, can be well-prepared and painted with a good modern paint system on site. When designing new bell supports, brackets of a non-corrosive material should be used, or failing that, the steelwork should be galvanised and the bearing ends coated in bitumen, or isolated from wet masonry.

HISTORIC CLOCK MECHANISMS

Historic turret clocks, long abandoned and replaced by electronic motors, survive in many old church towers as they are heavy and hard to move. Their flat-bed mechanisms are important artefacts of considerable beauty and historical significance. Where they survive they should be preserved and protected from damage by covering or encasement in plywood boxing. Maintaining a historic mechanical clock mechanism is demanding, but it might be feasible to restore the mechanism and place it on display in a more accessible part of the church.

Timber decay

Most churches contain a range of structural timbers from the roof and ceiling structures to suspended floors, galleries and the internal lintels of doors and windows. Once timber reaches a critical moisture content, it becomes susceptible to decay caused either by fungal or insect attack. Of these, the fungus known as serpula lacrymans, commonly referred to as 'dry rot', is probably the most damaging if it becomes established, as it can spread rapidly with serious consequences. Insect attack from a range of species can also be destructive if not identified and controlled promptly. The conditions that encourage fungal and insect infestation are moisture and lack of air movement. If the external envelope of a church is weather-tight and well-maintained, and there is adequate ventilation of roof and floor voids, the risk of timber decay is reduced significantly.

Where structural timbers have been damaged by insect or fungal attack, they may need to be strengthened by the addition of steel or timber sections. These repairs should be designed by a structural engineer with an expertise in the care and repair of historic structures. It is imperative that all infected parts of the timber be cut out and disposed of off-site and the surrounding areas treated locally with fungicides and insecticides before the repairs are commenced. There is no need for the wholesale removal of sound timber in an area of a dry rot outbreak. Similarly, extensive chemical irrigation of masonry adjoining the outbreak is not always advisable, due to the toxic nature of some products and the need to avoid introducing more moisture into the fabric of the building. The most extensive

Regular inspections and scheduled maintenance work should prevent rot from taking hold to the degree that it causes structural damage, as has happened to this beam which supports an organ gallery

outbreaks of timber decay almost always correspond to serious defects in the building fabric through which water can enter and which, combined with poor ventilation, nurtures the spread of the fungus. Therefore, the first task in treating all forms of timber decay is to identify and repair all leaks that penetrate the external envelope of the building. This should be followed up by improving levels of ventilation to the roof space.

There are many timber treatments on the market, and these are constantly evolving as new products are developed. Timber treatments should be specified only by independent, skilled practitioners capable of taking an overview of the condition and significance of the infected fabric. This will ensure a holistic repair solution that encompasses several conservation measures to resolve simultaneously the problem of water ingress, treatment of the infestation and the repair of any physical damage. For further information see *Roofs - a guide to the repair of historic roofs* in this Advice Series.

6. Stained-glass Windows

Stained-glass windows have a unique role within the building fabric of many churches. They fulfil a dual function: as elements of the external building fabric that must withstand the weather; and as remarkable works of art that enrich the iconic and aesthetic qualities of a church interior. Irish churches contain a vast collection of stained glass, much of it of international significance, that is vulnerable to damage, neglect or inexpert restoration. It is for this reason that the subject of its conservation and repair is given particular attention here.

Stained glass in churches in Ireland

Irish stained-glass windows largely belong to the latter half of the nineteenth century. However, it has taken until the present century for the astonishing achievements of the nineteenth-century stained-glass studios to be fully appreciated. The majority of windows commissioned by the Church of Ireland came from English studios, while the Roman Catholic Church generally bought from studios in France, Germany and Ireland, although there were a few studios that supplied windows to churches of both denominations. By the end of the nineteenth century, there was some prejudice amongst critics against large firms such as Mayer & Company of Munich but now the quality of that studio's work is justly acclaimed. This former prejudice, however, gave rise to the creation, in 1903, of a Dublin school of stained-glass artists, An Túr Gloine. The original ideas and bold and enchanting works of the members of this Arts-and-Crafts co-operative transformed not only the status of Irish stained glass but were part of an artistic movement of international cultural significance. Separately, the artist Harry Clarke pursued a career of single-minded excellence and unequalled originality. For a period of some thirty years in the early twentieth century, windows by the artists of An Túr Gloine and from the Clarke studio appeared in large numbers in churches of all denominations throughout Ireland.

Harry Clarke (1889-1931) was a stained-glass artist of international standing, whose glass panels are jewel-like works of art that contribute enormously to the artistic character of the churches to which they belong

Within the Roman Catholic Church, there was no bar to the use of religious images in stained glass throughout the massive programme of building new churches and cathedrals in the late-nineteenth and early-twentieth centuries. The position was more complex in the Church of Ireland where such images were often considered contrary to doctrine. However, the tenets of the High Church movements in Ireland and England gradually filtered through and objections to the presence of stained-glass windows gradually diminished from around the time of Disestablishment. The designs made in 1869 for the new Saint Fin Barre's Church of Ireland cathedral in Cork, for example, included more than seventy stained-glass windows, based on Old and New Testament iconography.

There is very little stained glass in Ireland pre-dating the nineteenth century and no surviving, in-situ medieval glass. Particular sophisticated techniques are employed by the senior European cathedral workshops for the conservation of early glass and church authorities should retain the services of an accredited stained-glass conservator for works to such glass.

What is 'stained' glass?

There is considerable confusion about the nature of this art-form. The question is frequently asked, 'Is this stained glass or is it a painted window?'. The answer, in all but a handful of instances, is both. At least some of the confusion stems from the name for this art-form in English. Often both staining and painting are carried out in the same window. The staining technique involves firing a silver stain (silver nitrate) into clear glass in order to produce a range of yellow and amber colours. The technique is used, for example, on the piece of glass on which a head is painted, in order to produce a fair hair-colour, or to add yellow details to areas of formalised architectural borders and canopy work. This technique was used extensively in windows of the fifteenth century and, indeed, right up to the time of the rediscovery (in the mid-nineteenth century) of the medieval technique of producing intrinsically coloured glass. It is still employed today.

The glass used is hand blown, with the characteristic rich reds, blues, greens and so on produced by the addition of powdered metals at the time of melting the batch of glass. 'Pot' colour is composed entirely of coloured glass, while 'flashed' colour has a narrow depth of colour to one side of a sheet of clear glass. Having selected sheets of the chosen colours and having had the pieces cut to shape, the glass-painter, working from the full-sized cartoon prepared by himself or another artist, paints and kiln-fires opaque black/brown enamels in order to add details of line, shading and texture, thereby creating the figures, drapery, foliage, backgrounds and so on, which make up the picture. The artist can acid-etch the coloured side of flashed glass and add line or shading in silver stain to increase the variation of colours obtainable in a single piece of glass.

In the simplest form of leaded glazing, namely leaded-light windows, the glass consists of rectangular, diamond-shaped, or more complex geometric-shaped panes of plain glass, known as quarries. The glass can be clear, tinted or coloured and can be decorated with simple motifs. In many eighteenth and nineteenth-century churches, the original clear glass has survived in either leaded lights or metal-framed lights. This glass predates the era of modern and regular float glass and has a delightful rippled quality, producing subtle distortions. Every effort should be made to protect such glass.

The simple iron glazing in the lancet windows of this rural Board of First Fruits church is enhanced greatly by the survival of crown and cylinder glass. The windows, and the church, are clearly well cared for

Components of leaded windows

The components of a stained-glass window are glass, lead, glazing-cement and supporting metalwork. The glazing is also intimately related to its stone or wooden window opening. Strips of H-section lead, known as cames, are used to join together the pieces of shaped glass, both for leaded lights and for stained glass. The other main component is a form of putty, known as cement, or glazing-cement: its function is to seal each piece of glass to its surrounding lead cames, thereby making the window weatherproof and providing rigidity. Each window is made up of a number of independent segments, of perhaps one metre or so in length, referred to as panels or sections.

Since stained glass cannot support itself in an architectural context, there are various forms of associated metalwork, most of which are designed to

provide structural security to the leaded panels. These include saddle-bars, stanchions, T-bars and armatures. Some window openings may also have transom-bars, which support the stonework, rather than the glazing. Some medieval window openings have a grid of external ironwork, known as ferramenta, which serves no structural purpose. It is decorative and possibly was fitted to prevent illegal entry.

Substantial iron bars are required to support large stained-glass windows. Often the ironwork is shaped to mirror the borders of panels, especially where continuing a horizontal or vertical line would be visually disruptive of the design. This conserved panel has been refitted and a copper band is visible that will secure the panel to a saddle-bar

A saddle-bar is a bar, in iron or bronze, set horizontally into the stone, to which the sections are tied with copper wires, known as bands. A saddle-bar extends only across a lancet and is set into recesses in the mullions and/or jambs. It is installed when the glazing is fixed and can be removed with the glazing. In nearly all cases, saddle-bars are placed internally, but one or two nineteenth-century studios, notably Kempe & Company, placed them externally with unfortunate consequences. Wide window openings require vertical supports, known as stanchions, in addition to the usual horizontal bars.

To assemble the window, the lower section is first put into place; the next section rests directly on it and so on. However a system is sometimes used, based on that common in French medieval windows, whereby each section is independently supported on a T-section bar. Where these T-bars are used, it is common to alternate them with saddle-bars. Large window openings, including circular and rose windows can be set in a grid of horizontal and vertical T-bars and this is known as an armature.

A transom-bar is a metal bar which crosses all the lancets of a multi-light window and passes through the stone mullions. The bar is installed at the time of construction of the building and is an integral part of the structure.

Function of a stained-glass window

A stained-glass window is an odd hybrid. No other work of art must also keep the weather out of a large public building. The best windows are indeed works of art entirely equal to oil paintings, yet extraordinary structural demands are made upon them. They might be as much as eight metres tall; they have to resist wind and rain; they are prone to accidental and deliberate attack and the medium on which they are painted is of course breakable. Their aesthetic functions are not only artistic, but also architectural. Their design has to be seen in its architectural context; conversely they have an effect upon the character of the interior and they change the quality and colour of light in the building. From the technical point of view, they are required to admit not only light but also air, and more critically, to regulate humidity. The dilemma is that some of these roles are contradictory, so that, for example, too much emphasis on the richness of colour and detail will prevent the admission of light; whilst too many stained-glass windows will lead to interiors so dark that electric lighting is required at all times, with consequent implications for costs and for the environment.

Mosaics, murals and stained glass by Mayer & Company, Munich, and Earley & Powell, Dublin, richly decorate the apse of the Roman Catholic Church of the Sacred Heart, Templemore, County Tipperary designed by George Ashlin

Common defects

BUCKLING

Under some circumstances, both stained glass and leaded lights can move away from the vertical plane, leading to buckling, or distortion. There are several possible contributing causes. South-facing and west-facing windows are more prone to distortion than those facing north or east. Windows fitted with exterior secondary glazing are more likely to distort. A window with an inadequate system of supporting metalwork and wires will buckle; for example if there are no stanchions in a wide opening of the type that might be found in a Neoclassical building. Despite the alarming appearance of a badly distorted window, the condition is often stable and does not lead to any problems. Distortion is not necessarily an indication of the need for re-leading. It is only when the glazing is weak, or if there are signs that it is progressively causing breakages to glass, that remedial steps should be taken.

RUSTING

Unlike much of the iron smelted in medieval times, the iron produced in the nineteenth century can be prone to disintegration through rust. If this reaches the point where the rusted metal expands, then the saddle-bars, transom-bars, and so on can be the source of serious damage to the stained glass and to the stone (or timber) window openings. Damage caused by expanding transom-bars in particular can have serious structural consequences for a multi-light window. The rusting of window-guards made of ferrous metal is dealt with below.

LEAKAGE

Evidence of water on the inside surfaces of stained glass, or on the sills or walls beneath, cannot necessarily be put down to leakage in the stained glass. In buildings where there are wide temperature swings due to irregular use and heating and perhaps insufficient ventilation, the extent of condensation forming on the glass can appear to be a leak. If there is genuine ingress of water, it should not be assumed that it has entered through the main structure of the leaded glazing. In some cases, the stone of the window opening is permeable. Possibly the leakage is taking place around the edge, where lead adjoins stone. Maybe there are small holes in the stained glass or at a section where one panel engages with the next panel. Only if all of these possibilities have been ruled out, should the costly step of undertaking major work to the stained glass itself be considered. The decision about the level of intervention indicated is a complex matter, which requires advice from a stained-glass conservator. Broadly, the options are re-weathering on site; re-weathering on the bench whilst retaining the existing leadwork; or re-leading part or all of the glazing.

INTRUSIONS

Glass is breakable! Damage to stained glass can be caused by accident or by vandalism. However, some of the most insidious damage is that caused by unskilled restorers who, at some time in the past, have replaced original pieces of glass with poorly matching replicas, known as intrusions. Unfortunately there are few glass-painters nowadays with the skills required for drawing the cartoon, selecting the glass and matching the style of glass painting. It is all too easy to compromise the integrity of a window by the introduction of poor quality intrusions.

In this example, the face of Saint Brendan and some other intrusions do not match the quality of the original glass-painting

LOSS OF GLASS-PAINT

If the glass-paint is correctly formulated and the kiln-firing technique is sound, details painted by the stained-glass artist become permanently fused to the glass and the glass-paint is stable. If not, there can be partial or total loss of intensity of detail and the window takes on a washed-out or faded appearance. It is not the colour of the glass which has faded. Poor kiln-firing is known to have occurred in all eras. However, there was a period in the 1870s in which many of the English studios routinely used an incorrectly formulated glass-paint which virtually disappeared through contact with moisture. Condensation is the worst enemy of imperfectly fired glass-paint.

INCORRECT POINTING MATERIAL

The purpose of the pointing material around the perimeter of a window is to cushion the leaded glazing and to fill the space between it and the masonry opening and not to glue or to fix. This is similar to the purpose of mortar in a stone wall, to cushion and to fill. The correct material, in the case of a stone window opening, is lime mortar. Moreover, the addition of the pointing material should be reversible so that, if necessary, the stained glass can be readily removed without causing any damage to the stonework. Two incorrect materials are commonly used for pointing, linseed-oil putty and cement mortar, both of which make removal difficult.

Conservation principles and standards in stained-glass repair

Good conservation practice is based on a respect for the existing fabric and should involve the least possible physical intervention. There are two fundamental consequences of this when applied to the conservation of stained glass. Firstly, work should be carried out only where there is no alternative. Secondly, if work is done, as much as possible of the original fabric should be retained.

Thus, the fact that a piece of glass is broken is not necessarily a trigger for remedial steps to be taken. Similarly, despite the distortion of a leaded window, there is, in most cases, no need to do anything. Where there is doubt, the condition of a window should be monitored by a stained-glass conservator and eventually some intervention may be needed. The options are discussed below. Fears that the window is about to fall out during a service are usually unfounded. In only a few instances, perhaps where stone mullions are broken, do windows require urgent attention. In most cases, a period of five years or so will not contribute significantly to the deterioration although it is advisable to monitor the defect during this period. This allows time to raise funds, appoint suitable conservators and draw up clear specifications on precisely what they should be aiming to achieve. The professional advisor should be able to assist with, and oversee, all of these tasks.

Stained glass is a particularly delicate medium and its repair should only be entrusted to craftworkers who have mastered the specialist conservation skills required to carry out any necessary intervention. Through inexpert treatment, a window may suffer serious irreversible damage that diminishes its significance as a work of art. International guidelines have been published by the International Stained Glass Committee of ICOMOS / Corpus Vitrearum Committee for Conservation and Technology to set standards of best conservation practice. Several international accreditation systems exist which have established levels of skill and technical expertise necessary for work on the conservation and restoration of stained glass. For windows of high quality, conservation works should only be undertaken by those suitably qualified to carry out the work.

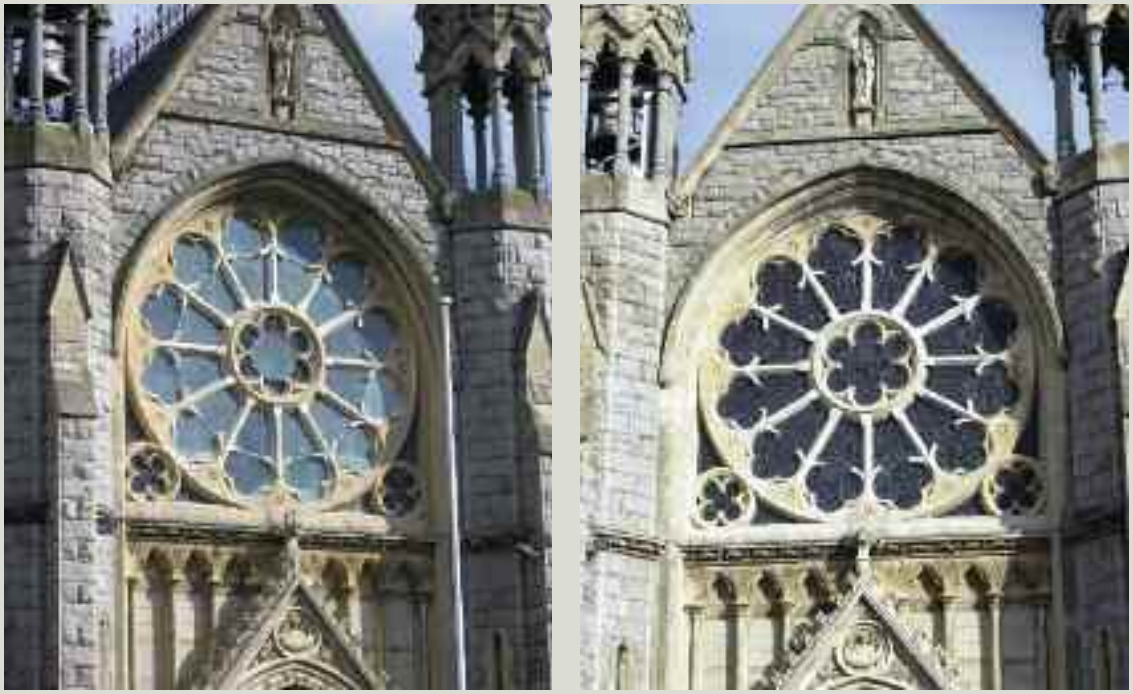
An expert conservator will examine the condition of the window, identify causes of damage, present repair options and carry out the works, at all times guided by internationally recognised principles of best practice

Fitting new wire guards

Where there is a risk of vandalism, it is strongly recommended that stained-glass windows be fitted with correctly specified, well-made and neatly fitted wire window-guards. Vandalism is not a new social phenomenon. Stained-glass companies routinely fitted wire-guards when they installed new windows, in their thousands, in the second half of the nineteenth century. This simple approach to protecting stained-glass windows is well-established and remarkably effective. However, the principal drawback of galvanised wire-guards is that, unless they are regularly maintained, they rust and cause serious, possibly irreversible, staining to the sills and wall below. Cases are known where rust has penetrated 30mm into stone. Similarly, copper guards eventually produce bleaching of the stonework and green staining.

In recent years, a welded stainless-steel, wire-mesh has been used. While generally the technical suitability of modern products supplied and fixed to historic buildings should be verified over the long term, this type of mesh is currently considered to be acceptable. It is visually unobtrusive, especially if finished in black powder-coating. It should give long service and will not cause rust damage. The welded mesh gives the guard an integral strength, which cannot be matched by a woven mesh. In most cases, the lower grade of stainless-steel AISI 304 will be sufficient, but the high-grade AISI 316 is preferable for town-centre and seaside locations. A 12-gauge, 75mm x 13mm grid should be used, welded onto 6mm diameter stainless-steel rod frames.

For wire-guards to be successful there are two fundamental requirements: the product itself needs to be of high quality and correct specification, and the work on site needs to be carefully undertaken. Accurate templates should be taken of each lancet and each tracery-light. Guards should never be fitted over stone mullions or tracery. Each template should be identified by a label before sending it to the manufacturer and the vertical alignment should be clearly marked, so that the mesh of the wire will be truly horizontal and vertical. It should not be assumed that a template taken of one opening will necessarily fit neighbouring openings. The correct size for a guard is precisely the sight-size of the glazing. The spacing between the stained glass and the guard is also crucial for both technical and visual reasons. The guards should be fixed to the building with black-finished stainless-steel brackets and screws and grey nylon masonry plugs. If there are any remains of ferrous fittings or screws from earlier guards, these should be removed and the holes repaired with lime mortar.



The storm glazing of this rose window was removed and powder-coated stainless-steel wire guards were fixed to the masonry. As a result the window is less likely to suffer from the effects of humidity and heat on the glass and leadwork. There is no loss of clarity to the stained glass and the stone tracery reads more clearly from the exterior

Exterior secondary glazing

Stained glass fitted with exterior secondary glazing creates a damp microclimate between the panes, subject to wide temperature swings, especially on south-facing windows. This is potentially damaging to the leaded glazing and to the fabric of the building in general. By fixing secondary glazing, the number of surfaces is increased to four, namely the inner and outer surfaces of both the stained glass and the plain glass. Of these, two are clearly inaccessible for cleaning and organic substances can quickly accumulate. These are harmful not only to the painted surfaces, but disfiguring to the visual imagery in the window. Typically, ventilation is provided at the top and bottom, but this is often insufficient to achieve effective air circulation.

The unsightly appearance of secondary glazing compromises the external character of a church. If textured glass is used, this can be seen when viewing the stained glass from the interior on a bright day. It causes, by refraction, a dappled pattern of bright spots. Those who champion secondary glazing have confused objectives, referring to it as storm glazing but seeing it as a protection against vandalism. Although some secondary glazing is made in plastic, much is in glass. The fact that this is breakable and therefore offers no protection against vandalism to the stained glass is one of the indisputable arguments against it. Secondary glazing looks bad on a church, but broken secondary glazing looks even worse. Plastic glazing is prone to scratching and discolouration and, if distorted, produces unsightly reflections.

The most convincing argument against the use of external secondary glazing is to look at windows which do not have it. There are many examples in Ireland of stained-glass windows, at least one hundred years old, which have never been fitted with secondary glazing and which are still in perfect condition, not buckled, not leaking, not damaged and set in stonework in a healthy state of preservation.

REMOVAL OF SECONDARY GLAZING

As a general principle, secondary glazing that is causing damage should be removed, but there can sometimes be a real dilemma. The underlying technical problem is that, although the presence of the secondary glazing may be contributing to the deterioration of the stained glass or the stonework, the condition of the stained glass may have reached the point where it is no longer weatherproof and has become dependent on the very thing that is harming it. Thus, there could be leakage if the secondary glazing were to be removed. It is advisable to take a cautious approach. First, a small test area of the exterior secondary glazing should be removed and a water-test carefully carried out using a garden-spray as long as there are no badly broken pieces of glass as any leakage will be through the holes and this will not be helpful in establishing the structural condition of the glazing.

Sealed, or inadequately ventilated, storm glazing provides an opportunity for the growth of vegetation, which damages the stained glass as well as being unsightly

Secondary glazing should never be removed by deliberately breaking it. This can result in serious damage to the stained glass. The technique of removal should be to take away the pointing around the perimeter, using a small chisel and hammer. The chisel should only be directed sideways, towards to the mullions and jambs and not inwards towards the stained glass. The technique should be considered akin to dentistry. It is delicate work and should only be carried out by skilled workers with proper supervision. The sheets of secondary glazing can then be taken out whole. As the exterior secondary glazing is removed, the pointing around the stained glass should be checked and possibly renewed, using a lime mortar in the case of stone and linseed oil putty in the case of timber frames. The condition of the stonework or timberwork, which had been enclosed in the humid microclimate within the cavities, should be assessed. The exterior surfaces of the stained glass should then be cleaned by light brushing with soft brushes.

ISOTHERMAL GLAZING

The system known as isothermal glazing, which is designed to protect historic glass against environmental damage, rather than vandalism, is complex and is not discussed in detail here. It may be considered acceptable in certain circumstances, such as the conservation of early or chemically unstable glass. The stained glass is moved to the interior and set in a bronze framework, ventilated to the interior. Plain glazing is fitted into the original glazing grooves. There are several conservation studios overseas, particularly those attached to medieval cathedrals, which are experienced in advising on, and carrying out, this technique. The design of isothermal glazing systems requires an in-depth knowledge of the scientific factors involved, including the careful calibration of the airflow between the stained-glass panel and the protective glazing.

Cleaning

The interior surfaces of many windows are dirty and their appearance would be greatly improved simply by expert cleaning. Exterior surfaces of stained glass, where the window is not storm-glazed to the exterior, are normally kept clean by the action of rainfall. The problems associated with the inaccessible cavities created by secondary glazing have been discussed above. Cleaning of stained glass is a specialised job and should be done only by experienced stained-glass conservators who first check the stability of the fired glass-paint. Amongst the methods which conservators might propose are careful use of a vacuum cleaner with a soft brush attachment to remove cobwebs and flies; using de-ionised water and cotton-wool swabs, possibly with a conservation-grade non-ionic detergent mixed with the water; or using a mild, conservation-grade biocide.

Repair or re-creation of damaged glass

If, and when, a window is eventually re-leaded, damaged glass can be repaired by one of a number of modern techniques of conservation. The most satisfactory method is to remove the fragments from the lead cames, repair them using a conservation-grade resin and laminate the repaired piece with 1mm thick clear glass. This work should be undertaken only by an experienced conservation studio and a method statement should be prepared in advance. Where there are isolated pieces of badly damaged glass, it is sometimes feasible to repair them while the leaded windows remain in place, attending to the pieces of glass in situ.

The alternative to repair is re-creation but, once an intrusion has been introduced, the process is irreversible and the original information has been lost. It is often considered good conservation practice and more acceptable visually, to leave cracked pieces of glass unrepaired rather than replace them with intrusions, as long as they are not loose within the cames. Without a repository for the safe storage of the original damaged glass, pieces stored in good faith often end up broken or lost. However, when there is absolutely no alternative, a skilled and experienced artist can recreate new work in the correct style, based on the surviving fragments of the original piece.

Priests, churchwardens and other parishioners should be aware that, following the discovery of damage to a window, the pieces of glass should be carefully collected and stored, ideally labelled with the location at which they were found. They should be put in the care of the stained-glass conservator once he or she has been appointed.

Traditional techniques of painting faces, drapery and other detail must be studied by the stained-glass conservator, each used for painting missing pieces as his or her experience judges them to be appropriate

The damage to this window (left) was extensive. Repair (right) consisted of lamination of fractured panes, introduction of carefully chosen and painted intrusions, and re-leading the panels using all surviving pieces

Conjectural re-creations are to be discouraged. If there are no extant fragments, original cartoons or historic photographs can be used to assist the glass-painter. The re-created piece of glass should be openly declared, for example by the inclusion of initials and date within the fired glass-paint. If a repair is indicated, this should be done as part of the re-leading and the extent of such work and the methodology should be included in the schedule and method statement from the conservation studio.

Where the church is a protected structure, the re-creation of all or part of a stained-glass window may require planning permission and the architectural conservation officer in the local authority should be consulted prior to any works taking place.

Reinstating lost glass paint

In a window which has lost painted details, provided there is evidence for what has been lost, some of the drawing lines (but seldom the shading) can be re-created onto thin clear glass, which is laminated with the original, sealed and placed within the leads.

Although there have recently been some outstandingly good examples of this highly skilled task, it is only to be considered in rare cases and to be undertaken only by the most skilled conservators with previous experience of the technique and following consultation with the appropriate authorities.

Re-leading of windows

The condition of some, but relatively few, windows is such that the need for re-leading is inevitable in the short or medium term. This is a major undertaking requiring much careful work and the use of correct materials. It should not be seen as a routine procedure. Any studio commissioned to carry out this work should first be asked to prepare a detailed method statement. The principle of minimal intervention should guide the decision-making process, as there is the risk of damage to both the building and the stained-glass window by such work. Except in the most straightforward cases, the process of removing and re-fixing a stained-glass window should be overseen by an expert such as an architect, who may

or may not also wish to consult with stonemasons. The conservator should consult the architect and keep up-to-date on current thinking on stonework-repairs, lime mortars, ferramenta and condensation-outlet systems. If correct stone-working tools and techniques are used, similar to those described above for the removal of secondary glazing, no glass need be damaged during the process of removing the stained glass from the window opening and there should be no damage to the stonework. The practice of deliberately breaking the outer glass borders, as a method of removal, is destructive and should be avoided.

Unless there is no alternative, all original damaged glass should be repaired and put back, rather than replaced with replicas. Extreme care is needed where the glass-paint is not stable.

Replacement of rusted ironwork

Ferrous metal saddle-bars should be replaced wherever possible by new non-ferrous bars. The most suitable replacement material is the brass alloy CZ114, also called manganese bronze. This should be done as a routine task when leaded glazing is returned to the church, following repair in a workshop.

Replacement of rusted bars whilst the glazing remains in place is often proposed, but seldom thought through. The process is problematic because the existing copper bands can normally not be reused to tie the leaded panels to the bars. Re-soldering of new bands in situ is unsatisfactory. Insecure bands are of no use and there is a risk that the stained glass will buckle. However, there is a proven technique for fixing new wires, involving passing a loop through tiny holes drilled through the core of the lead-cames: this should be undertaken with extreme care by a stained-glass conservator.

MASONRY DAMAGE FROM RUSTED IRONWORK

Rust expansion of transom-bars can damage window stonework. It is not always easy to see damaged stone in a general inspection of a window. The damage may be located at some height and difficult to discern due to the relative brightness of the transmitted light through the glass. Inspection-lighting should be used internally, and externally the masonry should be scrutinised for cracks, which may be indicative of more serious internal damage. If stonework is at risk of falling, the public should be excluded from the area around the window. In the worst cases, damage can reach the point where the whole window assembly is in danger of collapse. The services of an architect, structural engineer, stonemason, and stained-glass conservator, as appropriate, should be engaged as a matter of urgency.

Metal-framed windows

A common form of glazing in Irish churches, particularly of the early nineteenth century, resembles leaded-light windows but the structure is made of iron, or sometimes copper, rather than lead. Thus it consists of a metal frame containing a metal grid, normally of small, diamond-shaped openings, each glazed with clear glass set in putty. In more elaborate windows, simple diamonds can give way to geometric patterns with flowing curves in the lancet heads. The crown glass with which these are glazed has been discussed above. If quarries are smashed or missing, then glass of an equivalent quality should be used: such glasses are available, including a mouth-blown, so-called restoration glass. Any maintenance to the metalwork can normally be carried out in situ, but where this is done, each glass quarry should be individually protected. For further information, see other publications in the Advice Series: *Windows – a guide to the repair of historic windows* and *Iron – the repair of wrought and cast ironwork*.

Hopper lights and casements

Buildings require regular ventilation, on a weekly basis at least. Independently of window openings, some churches have sophisticated ventilation systems designed by the original architect and constructed as an integral part of the building. However, most churches are dependent on opening sections in their windows to provide essential ventilation. Some take the form of side-hinged casements, but most are bottom-hinged hopper lights. In recent years, the desire of churchgoers for increased comfort and warmth in their churches, has led in some cases to these casements and hopper lights being made inoperable. This may have been done in various ways: by fixing secondary glazing; by removing the operating strings or mechanisms; by securing them in a shut position and sealing around the perimeter; or simply by the mechanism seizing through lack of regular maintenance, cleaning and oiling of the hinges.

The relatively small outlay involved in overhauling casements and hopper lights and the effort involved in arranging for them to be opened regularly is more than repaid by the immediate benefits to be gained to the health of the building. In a small single-cell church it may be that only two working hopper lights, at diagonally opposite corners of the building, are needed. More will be required in a larger church. A good routine is to open these regularly, for example immediately after churchgoers leave following a service, when the internal atmosphere is warm and the moist air can readily escape.

Where there is delicate glass in the window care should be taken when attempting to open a hopper light. Where windows have not been opened in a long time, general maintenance or repair may need to be carried out first

Indirect impacts on stained glass

Stained glass is both an architectural and a liturgical art form and a stained-glass window is best appreciated in its original context. However, a variety of circumstances may lead to a window being separated from its context. There are four principal ways in which this separation may occur:

Firstly, context can be lost when the church has been subjected to redecoration: for example the painting of walls in strong, competing colours; or the stripping of plaster so that the exquisite qualities of stained glass are seen in juxtaposition with raw stonework. Stained-glass windows can also be affected by changes in internal lighting schemes; they may be subject to strong front-lighting and become difficult to read. Where these types of change have occurred, the opportunity should be taken to re-establish an appropriate context for the windows.

Secondly, changes in liturgical practice or other alterations can remove the original context of the window; for example when a baptistry is moved, so that the iconography of a window relevant to baptism is now located in a shrine of Saint Anthony and the font is placed before a panel depicting the Last Supper; or when mosaics and wall-decorations, conceived as part of a unified scheme with the stained glass, are painted over. However, in such cases, the windows should be left in their original locations where they provide an important record of the original disposition of functions within the place of worship. It also leaves open the possibility that, over time, it may be possible to reverse the alterations.

Thirdly, proposals may be made to salvage a window from one church and adapt it for use in another. Whilst this may be proposed with the best of intentions, it is a process fraught with difficulties and is seldom appropriate. The new opening is rarely the exact shape. In such cases the stained glass should not be cut down, split into meaningless parts or completed using new glasswork. Windows that have been repositioned may be inadequately lit by daylight if they were made for sites which had a different orientation. The subject matter may not be relevant in the new location.

The final type of dislocation occurs when a church ceases to be a place of worship and is given a new use, leaving sacred images in secular surroundings. However, as with other fixtures of a historic building, the windows should remain in the original architectural context for which they were designed. If the building is a protected structure, the removal of such fixtures would require planning permission.

7. Interiors

The interior contributes much to the overall character and atmosphere of a church. Where changes are proposed to internal fittings, furnishings or finishes the local diocesan committee, the Historic Churches Advisory Committee or central office of the denomination should be consulted. These bodies advise on prospective changes within each denomination. Where the church is a protected structure, the planning authority should be kept informed of any proposed alterations and early consultation is highly recommended.

Roof spaces

Roof spaces are a valuable asset as they facilitate close inspection of the roof and ceiling structures, the underside of the roof coverings and the concealed side of ceiling finishes. They are also used to accommodate cable runs and pipework for building services and may provide easy access for the changing of light bulbs. They often provide safer access for the maintenance of parapet gutters than can be gained using ladders. For a roof space to be used for these purposes, it should be safe to enter, with adequate walkways and handrails and good levels of artificial lighting. They should be fitted with smoke detectors linked into the fire detection and alarm system. See also Chapter 3.

Naves are often ventilated through grilles in the ceiling that open into roof spaces. Where this form of ventilation exists, it is important that the moist stale air is ducted through the space to external grilles or ventilators discharging to the open air; otherwise the moisture may build up and have a damaging effect on roof timbers. A roof space also makes it easier to install thermal insulation which, if properly specified and installed, can reduce heating bills. However, given that most churches are only heated at weekends, there may be a long payback period on the investment in insulation. Each church will need to make its own cost-benefit analysis in this regard.

When insulating a roof space, care should be taken with regard to any electrical cabling, particularly older installations within roof spaces. In general, insulation should be fitted beneath electric cables to prevent them from overheating which could create a fire hazard. It should also be borne in mind that any

Ceiling grilles should be checked to ensure that the warm, humid air rising into the roof space is ducted through and discharges to the exterior to avoid raising the moisture content of the roof timbers to a level that might make them vulnerable to insect or fungal attack

insulating materials placed above the ceiling will conceal the structural elements from view and also from inspection. Future access requirements to roof timbers should therefore be taken into consideration when choosing an insulation product. For more information see *Energy Efficiency in Traditional Buildings* in this Advice Series.

Ceilings

In many churches ceilings are an important decorative element. They may be found in the form of a suspended structure with a lime plaster finish, or as a decorative, timber-boarded finish to an open-roof structure. The majority of flat ceilings are constructed of lime plaster, reinforced with animal hair, laid flat onto timber laths or modelled or cast into ornate decorative forms. Decorative plasterwork represents one of the high points of eighteenth and nineteenth-

century craftsmanship, with churches providing many splendid examples. In a modest church, the plaster decoration may be the most important, or indeed the only artistic enrichment to be found, and should be protected and maintained.

The greatest threat to plaster ceilings is water ingress, which can lead to rot in the supporting laths and ceiling joists. Decorative plasterwork is equally vulnerable to moisture, which leads to deterioration of the metal or timber armatures onto which it is fixed. Even small areas of flat plaster are heavy, while sections of much thicker plaster mouldings or decoration can be extremely heavy. If they are allowed to reach a state of collapse, they present a risk to public safety and a loss of historic fabric. Dry rot infestation in a ceiling can be particularly damaging as it can spread at an alarming and highly destructive rate. Another possible cause of damage to a ceiling located under an accessible roof space is accidental damage due to carelessness.

Neglect of the roof of this church led to moisture ingress and timber decay, resulting in serious damage to decorative plasterwork. Investigations determined the extent of the problem, which was remedied using traditional plaster repair methods and the removal of as little structural timber as necessary

Where a flat plaster finish has started to become detached from the timber laths that provide its support, there is a risk of falling lumps of plaster. Loose areas of plaster can be detected through crack lines that appear in the ceiling and these unstable areas can be consolidated using countersunk screws and washers from below, or by the application of a layer of hessian and plaster of Paris from above. Consolidation is always preferable to replacement but, where plaster has fallen and replacement is necessary, only suitably matching lime plasters should be used. When modern gypsum-based plasters, or sand and cement are used to repair or replace the original lime plaster, greater damage will almost always follow. Consolidating loose plaster mouldings or figurative detail is more difficult than repairing flat plaster and should only be carried out by a specialist plaster conservator.

Damage to plaster that becomes obvious on the finished side may represent only the tip of the iceberg as in most cases it means that greater damage has already occurred to the supporting carpentry above.

Wall finishes

The internal wall faces of many historic churches were finished in flat lime plaster, sometimes with decorative mouldings extending down from the ceiling and cornices. Marble was sometimes used for columns, while in many churches marble, Portland stone and other natural stones were used as facings to significant areas such as the chancel, sanctuary or baptistry. The same principles of repair apply to walls internally as externally. Soft lime-based materials that flex and breathe are preferable to modern substitutes such as gypsum or sand and cement. Flat lime plaster is a durable and robust material that will last for a long time if it is kept dry and well ventilated. Where damage has occurred to lime coatings through neglect or accident, it is easy to patch in repairs with a lime plaster of similar mix and strength. Lime plaster provides a decorative finish to rubble stonework, while also creating a thin insulating layer that reduces the risk of condensation.

In many churches, off-white and light stone colours were used for ceilings and walls, while the timber fittings and furniture were stained, polished or grained. By the mid-nineteenth century, inspired by architectural writers such as A W N Pugin and John Ruskin and by the Gothic Revival movement, polychromatic colour schemes became more common, with the use of strong colours and bold enrichments. In these interiors, colour was an important part of the overall architectural concept and was carefully co-ordinated with other decorative features and furnishings. Pale walls were often bordered with stencilled decoration, a regular and striking feature of many nineteenth-century church interiors. These patterns can add great richness to walls, ceilings and, in some cases, exposed carpentry elements and joinery. In many churches, these important decorative schemes were later painted over; some may survive under later coats of paint.

This richly decorated Neoclassical baptistry is separated from the body of the church by Connemara marble columns, which have polished black limestone plinths. The Carrara marble-clad niche houses an Italian gold-leaf mosaic panel

The lower levels of internal walls may be lined with timber wainscotting. These add visual richness while also helping to reduce wear and tear on the paintwork, particularly when they line circulation routes.

In the past, church interiors were sometimes deliberately stripped of their internal wall plaster to expose the underlying rubble stonework, in the mistaken assumption that it was the original finish. Stripping buildings of their internal finishes is damaging both to their architectural character and their environmental performance. Fortunately this practice has largely died out, mainly due to increasing awareness of its inappropriateness. Where the church is a protected structure, such works usually require planning permission, which is unlikely to be granted. Where internal wall finishes have previously been inappropriately stripped off, lime plaster should be reinstated and appropriate finishes applied during conservation works. The damage to the character of a historic building by the removal of its internal wall finishes to expose rubble stone or soft brick is serious and, where the stripping has been followed by cement pointing, the technical consequences are potentially detrimental. The problems caused by impervious, cement-rich pointing and coatings to external wall faces have been noted in Chapter 4, and these can also cause damage to internal decoration. Condensation and mould growth occur when seals or barriers are created in or on the surface of a wall, preventing evaporation and trapping moisture.

Equally damaging can be the application of a hard cementitious tanking plaster to the lower levels of internal wall faces, intended to address problems of damp penetration. The lower levels of solid masonry walls are prone to dampness for a variety of reasons. One is the simple effect of splash-back from rain falling on the ground adjacent to the wall, another is due to raised ground levels on the exterior, another might be that the external ground is not sufficiently drained and may fall towards, rather than away from, the base of the wall. The moisture in a permanently saturated wall is rarely restrained effectively by modern impervious coatings. In fact, these coatings may have the effect of simply forcing the moisture further up the wall. It is always preferable to remove the cause, whether by lowering external ground levels, improving drainage, clearing gullies or repairing rainwater goods. In older churches where the graveyard levels may have risen significantly, these remedies will not be possible as the disturbance of graves is unacceptable. At the twelfth-century Church of Saint Carthage in Rahan, County Offaly, the 1912 restoration works installed internal brick linings with a cavity behind, to the height of approximately one metre, which were then encased in a timber wainscotting. The internal brick lining, which was isolated from the damp inner face of the external wall, therefore prevented dampness reaching and damaging the decorative timber linings. A good intervention for its time, it would be appropriate now only in certain circumstances.

DECORATIVE FINISHES AND REDECORATION

The variety of architectural styles and decoration fashions over the centuries makes it difficult to recommend a single approach to the redecoration of a church. The general principles, however, are clear. Every redecoration project should be approached with knowledge and sensitivity, guided by an appropriately qualified professional with an overall aesthetic vision and backed by knowledge of internationally accepted criteria for materials and techniques suitable for historic places of worship. The simple matter of scale

makes the redecoration of many churches an expensive exercise, where the cost of a scaffold to provide access will be substantial, even before the costs of preparation and painting are considered.

Limewash and distemper were the traditional choices for decorative coatings. Most modern paints are impermeable and inhibit the free movement of water vapour, often causing the paint to flake shortly after application. The majority of churches that have been redecorated during the past sixty to seventy years have used impervious paints. When redecoration is next being proposed, consideration should be given to the removal of such coatings. In recent years several ranges of microporous, or vapour-permeable, paints have become available. These are better suited to the soft, breathable, lime-based materials historically used as the wall and ceiling finishes of most churches.

Where stencilled decoration survives it should be protected, preserved and maintained through any redecoration of the building interior. It should always be borne in mind that important decorative schemes may survive beneath modern over-painting. Historical evidence may come to light to support restoration or reinstatement of stencil work.

Obtaining agreement for colour schemes for a church interior can be an emotive and contentious matter. Individual colour preference is highly subjective and it is always wise to have expert guidance to assist the church committee in making its decision. For example, historical research may unearth photographic

The cement plaster on this Romanesque church, which was damaging the stonework and associated timbers, was carefully removed and replaced with a soft lime plaster

The vaulted ceiling of this late nineteenth-century cathedral is claimed to have been painted by an Italian artist. The black background contributes to the dark atmosphere of the interior, but as an original feature of the design it forms part of the character of the protected structure and should not be altered in any redecoration of the interior. Cleaning and conservation of paintwork and gilding of this quality requires specialist skills

evidence of original or early decorative schemes, and this information can be augmented by carrying out scientific paint analysis to achieve authentic colours for a new scheme.

For most church interiors subdued shades may be the most effective. These emphasise architectural detail and the enrichment provided by decorative plaster, carved wood and carved stone, while helping to create an appropriate and contemplative mood.

Strong colours should generally be avoided unless they are known, through a process of expert paint analysis, to have been part of an original or important decorative scheme. Strong colours tend to subdue contrast and diminish the visual expression of fine architectural detail. Dark colour schemes reduce internal light levels, which might already be low if the windows are glazed with coloured glass. The beautiful effect of sunlight passing through coloured glass can be completely lost if the refracted light falls on a surface painted with a strong colour.

Due to the high costs involved in the redecoration of most churches it is advisable to produce coloured drawings or computer-generated simulations to consider the aesthetic impact of any proposed redecoration scheme. Once a scheme is selected, sample panels can be prepared to assess the impact of the preferred colours in their actual setting. Where the proposed redecoration scheme would have a material effect on the character of a protected structure, planning permission will be required. The architectural conservation officer in the local authority should be consulted before any works commence.

As with all good quality decorating, the starting point is careful and thorough cleaning and preparation of the surfaces to be decorated. Painting over a dirty, or poorly prepared, surface is as futile as painting over a recurrent damp patch.

There is a current fashion for painting the interior surfaces of stone window openings with white emulsion or oil-based paint. This is technically harmful and, especially in the case of stained-glass windows, it can detract from the impact of the glass. Where it is adjudged acceptable to paint stonework, traditional limewash should be used, since stonework should be allowed to breathe. By applying impervious paint coverings, water will be retained within the stone, causing a migration and build-up of salts that will eventually lead to deterioration.

MOSAICS AND MURALS

The tradition of decorating walls of Christian churches with paintings or mosaics dates back to ancient times and evidence survives in many early medieval churches throughout Europe. It is thought that many early churches in Ireland were enriched with painted decoration and although little evidence of this remains, some significant survivals can be seen in Cormac's Chapel in Cashel, County Tipperary. During more recent times, murals and mosaics were created during the Gothic Revival and Arts and Crafts periods, the latter of which was heavily influenced by the art and architecture of the Hiberno-Romanesque style. Mosaics are more commonly found than painted murals, and can be seen particularly in chancels, side chapels or baptistries. Like mosaic floor coverings, wall mosaics are durable and need little maintenance where the substrate is dry and intact and where they are not subject to impact or other damage.

Murals are more delicate and vulnerable, being painted directly onto the wall finish, which is normally plastered, or onto canvas that is then fixed directly onto the wall. Dampness in the wall may lead to crystallization of salts on the surface and a subsequent loss or damage of the painting. Where this has occurred, the advice of a specialist plaster and paint conservator should be sought to devise a strategy for stabilising the paintwork after the leaks have been repaired and the wall has dried out.

Leading figurative artists were, and are, often commissioned to paint murals. The resulting artwork is usually of great beauty as well as iconographic and art-historical importance

Floor finishes

Decorative encaustic tiles, stone, timber boarding and woodblock flooring are the most common flooring materials to be found in historic churches. Mosaics were also used as floor finishes, but to a lesser extent. All of these materials are highly durable and bring richness and quality to the interior finish of a church. Hard, durable materials such as tile and stone were commonly used in the aisles, while warmer materials such as timber boarding were used beneath the pews.

The fitting of carpets, often of commercial design and strong colour, is a recent fashion stemming from the wish to modernise churches and provide home comforts. Aisles, in particular, are frequently covered with a strip of carpet or a rug, which may not only conceal interesting floor decoration but can act like a sponge, absorbing moisture and holding it against the historic floor. Where this occurs, mould and damp smells occur and there is also a risk of damage to the floor finish below. When damage occurs to floor finishes that consist of small unitary elements such as mosaics, encaustic tiles or woodblocks, these should be repaired promptly to avoid further deterioration by the loss of additional units. Most can be replaced with new finishes fabricated to match, but it is always best to fix back the original material immediately it becomes loose.

Worn-looking, historic floor finishes are sometimes covered with thin vinyl or linoleum in the form of sheeting or tiles. This practice is damaging as these materials are usually impervious and can lead to a build-up of moisture on their concealed side that can cause the original finish to deteriorate further. Worn flooring is a sign of the use of the building over a long period and in many instances adds to a building's character. Intervention should only be considered if the flooring presents a trip hazard, in which case, sensitive repairs of uneven units can be made using carefully matched replacements.

Floor surfaces may be of significance for historic or social reasons. The paving of this cathedral floor contains cut down and reused grave slabs

Crypts and vaults

Damp-penetration and inadequate air circulation are the main challenges encountered in crypts. In most churches, the only form of crypt or basement is the heating chamber that would originally have contained a boiler. Most of these old solid-fuel boilers have been replaced by oil or gas-fired ones. As with roof spaces, safe access and good artificial lighting are essential for reasons of safety. Where proposals are put forward to introduce new uses into a crypt, they should be suited to the spaces involved, for example they should not require unrealistic levels of dryness. Burials should not be removed from a crypt just to create usable space.

Galleries and staircases

Galleries within a nave or transept can bring architectural and aesthetic richness to the interior of a place of worship. Some eighteenth-century churches have galleries running around three full sides of the nave, which are particularly significant for their spatial qualities and for their historic and social significance. A practical benefit of having a gallery in a church is that it allows for a closer inspection of the condition of ceilings and high level windows.

Galleries are usually constructed with timber beams, supported on timber or cast-iron columns. It is important that the floor joists in galleries are not notched to take building services as this reduces the strength of the structural members and may lead to excessive deflection. The staircases leading up to galleries may contain fine historic joinery and should be preserved accordingly. Steps are usually timber but some are of stone, and may have worn nosings from long use. Often old staircases are felt to be unsafe due to the low heights of handrails, wear on the treads or the steep pitch of their flights. Each case should be assessed individually and the patterns and frequency of use taken into consideration before deciding whether or not an intervention is necessary to make the staircase safer or more accessible. Where pews run right up to the front edge of a balcony the height of the effective guarding might be dangerously low requiring a simple rail to improve safety (possibly set back behind the gallery front).

The gallery of this church is finely detailed and contributes significantly to the spatial quality of the nave

Organs

Within many churches a pipe organ might be the largest and most valuable item of internal furnishing. It frequently serves a dual purpose by providing a large musical instrument capable of filling the church with sound while being an important visual presence within the church. Organs are delicate and sophisticated instruments that require stable and dry environmental conditions together with regular, expert maintenance. They often become redundant due to malfunction, or the lack of an organist, to be replaced with a small electronic organ. Where this has occurred, or is considered necessary, the electronic organ should be seen as a second instrument. It is preferable that the original pipe organ should not be removed but left for future generations to restore when the electronic instrument has reached the end of its relatively short life. When undertaking decoration or repair works in the vicinity of a pipe organ, particularly where adjoining windows are being temporarily removed for repair, the highest standards of protection are required to avoid damage through dust, moisture or physical impact.

Organs are often immense fixtures, but their very size masks a vulnerability towards environmental changes. They require dry, stable conditions and expert care

Organs require specific temperature and humidity conditions to be maintained to prevent them going out of tune. Usually a specific heating system local to the organ is employed for this purpose. If an existing system is being altered in a church with an organ the impact of the new heating output needs to be considered.

Memorials and wall plaques

Memorials and wall plaques are often exemplars of fine craftsmanship, design and historic record. They range from large architectural compositions, complete with life-size figure sculpture, to plain stone tablets with hand-cut lettering. Stained-glass windows and plaques were also commonly commissioned for commemoration. Memorials can add artistic and historic richness and visual interest to the interior of a church as they record the lives of patrons and benefactors; young lives cut short by war or civil strife; or popular clergy who made significant contributions to the life of the parish. Like other church artefacts, memorials and wall plaques are generally finely made from durable and robust materials, which survive well with basic maintenance and cleaning. They should be protected as important and integral parts of the overall architectural composition.

Wall memorials bring to mind the social importance of the church building and institution. They honour the families who have worshipped there and who have contributed to the church over generations

Maintenance plans should allow for periodic inspection of memorials. Wall-mounted panels can be damaged by dampness in the wall or by accidental damage by churchgoers, cleaners or decorators. Where salts from a damp wall have migrated to a stone panel, or breakages have happened, a stone conservator should be consulted to determine the most appropriate methods of repair.

Church fixtures and furnishings

Church fixtures and furnishings include a wide range of fittings, fixtures and artworks that serve a variety of liturgical, functional and aesthetic purposes within a church interior. These may be fixed or loose objects, designed specifically for the church, or obtained from a workshop that specialised in the production of ecclesiastical art and artefacts from one of the many studios that specialised in the supply of church furnishings during the nineteenth and twentieth centuries. Like the decoration, church furnishings were usually part of an overall, unified vision for the interior of a church and should be protected and respected accordingly. There is a growing tendency towards a more secularised, domestic treatment of church interiors, which should be resisted where it dilutes the architectural character or detracts from the reflective and ceremonial ambience appropriate to a place of worship. In the Roman Catholic tradition, the liturgical changes that followed Vatican II resulted in the removal of historic fabric; in more recent times there have been disagreements about proposed reordering of important church interiors. The principles that underline best conservation practice do not prohibit change; they simply provide guidance as to how changes can best be accommodated sensitively and without loss of significant character or fabric. Similarly, the introduction of new artworks or artefacts into a church interior should be considered within the overall interior design intention, and carried out to the highest standards of artistic skill and design.

INTERNAL JOINERY

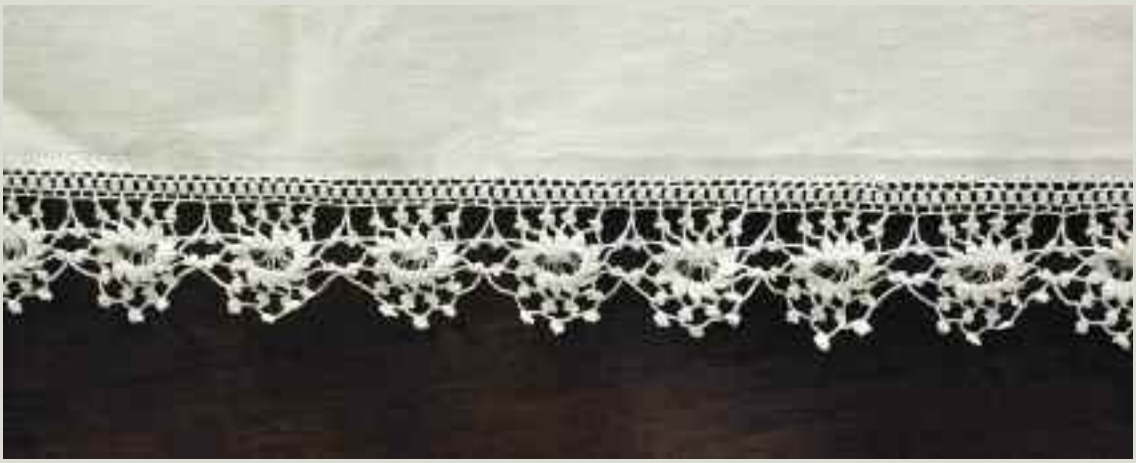
The quality of the internal joinery in most churches is high; with robust boarded or panelled doors and screens, fabricated from good quality timber, with well-made ironmongery and door furniture. The glazed screens to lobbies often contain decorative leaded-glass panels that add quality to the interior. Many items of church furniture and furnishing, such as altars, pews, pulpits, choir-stalls and lecterns and smaller objects such as chairs, communion rails, book rests and hymn boards may be fine examples of stone-carving, joinery and cabinetmaking, sometimes with elaborate carved detail. Such features may be particularly characteristic of the date of construction or alteration. From archival drawings that survive it is clear that loose furniture and fittings in churches were often designed by the original architects of the building and, as such, are an important part of the overall composition and ordering of a church. Others may have been designed especially for the building by a subsequent architect, or purchased ready-made.

In some early churches the seating takes the form of box pews that are an intrinsic part of the architectural fabric of the church. The walls of Quaker and Methodist meeting houses were traditionally lined with panelled wainscotting that was sometimes integrated into a raised dais containing benches and seats for elders or ministers. In churches of the Roman Catholic and Anglican traditions, altars and communion rails may define the area of the sanctuary or chancel. There may be a reredos, which is an ornamental screen designed as a backdrop to an altar. Altars and reredoses, together with pulpits, may be richly carved in stone or wood and are frequently the artistic high points of an ecclesiastical interior.

All historic joinery and furniture of quality found within a church, whether original to the building and designed by its architect, or added at a later date, should be protected and cared for equally, as much for their design or material qualities as for their associations with past generations of worshippers who may have donated, made and used them. Generally, fixed or loose-fitted elements were fabricated or crafted from high quality and durable materials that survive well with basic cleaning and maintenance. Over-zealous cleaning, or stripping and recoating, should be avoided.

The noted church architect J J McCarthy most likely designed this Gothic Revival reredos in 1860 when he is recorded as having been commissioned to design the high altar for SS Peter and Paul, Ennis. It was executed in carved stone by noted church decorators John Hardman and Company of Birmingham, a firm closely associated with A W N Pugin. The post-Vatican II granite altar table is an unobtrusive introduction

Reformed churches are often simply furnished, with fitted furniture such as box pews contributing much to the character of the interior



The care, storage and presentation of fabrics of artistic or historical significance within a church should follow the advice of a textile conservator, to avoid loss or damage

TEXTILES AND MOVEABLE FURNISHINGS

Amongst the most delicate elements of church furnishings are textiles and light, easily movable cloth artefacts. Textiles may be found in altar cloths and dressings; vestments; rugs and carpets; or flags and banners. Older flags and banners may have a historic importance, in their commemoration of military history and war-dead, that outweighs any artistic significance. Flags and banners of more recent date may represent societies or youth organisations that contribute to the secular life of the parish or religious community. It is, however, in embroidered altar cloths and woven rugs that the greatest artistry is usually found. The work of the Dun Emer Guild established by Evelyn Gleeson and Elizabeth and Susan Yeats, sisters of the poet William Butler Yeats, are of particular note. The Guild manufactured beautifully crafted embroidered altar cloths and vestments, together with hand-tufted rugs, which are considered to be amongst the highest achievements of the Arts and Crafts movement of the early twentieth century. These delicate fabrics are appreciated for their beauty, often without the church guardians having a full understanding of their artistic and historic significance. They are susceptible to damage and deterioration where they are kept in areas of dampness or high relative humidity. Where delicate textiles exist in churches, their concealed surfaces should be inspected on a regular basis to check for mould and mildew. Where there is any concern about their condition, specialist advice should be obtained from an appropriately qualified textile conservator.

Textiles subject to wear and tear, such as this fine drugget, designed and manufactured by the Dun Emer Guild, should be regularly monitored for any evidence of damage or deterioration and specialist advice sought if concerns arise

One of the risks presented by smaller objects, such as textiles, is that they can be moved easily, or set aside temporarily and lost or forgotten. It is therefore, important that churches keep an inventory of all objects of value, large and small, that fall within their guardianship and make arrangements for their conservation and protection.

Secure storage

Most churches have a safe or strong box in which the sacred vessels, the communion plate and other items of value can be secured when the church is unattended. Many churches also retain archives containing parish records, drawings, old photographs, paintings, books and ancient bibles that may be extremely valuable and require secure storage places. There may even be artefacts or small artworks, the value of which may not be fully appreciated, that are currently housed in insecure locations. Like textiles and other small easily moveable objects that might be located in the public parts of the place of worship, these should be assessed and included in an inventory, for both security and insurance purposes. Where objects are found to be of particular value, they should be stored within secure and, where necessary, environmentally controlled conditions. Where a church building is used to store valuable records or artefacts, or houses a diocesan archive or a museum, structural compartmentation to achieve adequate fire separation is strongly recommended. In some instances, after appropriate consultation, it may be decided to transfer a valuable item to a central or diocesan storage place that might better comply with international standards for the safe conservation of archive and museum collections. Further information on museum standards in Ireland is available at www.heritagecouncil.ie.

Loose collections of medieval carved stone are commonly found in and around some older churches and these merit careful recording and secure storage. Such ex-situ monuments are protected by legislation. Both the National Museum of Ireland and the National Monuments Service of the Department of Arts, Heritage and the Gaeltacht should be informed of any proposal to move or carry out any works to these artefacts.

It is advisable to compile an inventory of moveable items within a place of worship and to have policies in place to ensure they are kept safe from accidental damage, theft or vandalism

8. Building Services

Churches built prior to the late-eighteenth century were generally unheated. Glazing set into the walls provided light and sometimes ventilation. Openings at high level into a roof void allowed hot air and moisture to migrate from the church by natural buoyancy. This air left the building through openings in the eaves and ridge and new fresh air was drawn in through doors and windows at lower level.

Some old churches are a rich repository of historic building services. Where old services installations survive it is always preferable to reuse them if this can be done safely. If they are no longer effective, there may be a case for their retention for study or as an interesting historical record. Specialist advice should be sought on the significance of such historic heating, ventilation, early lighting (gas and electrical) or power installations. Planning permission may be required before historic installations such as cast-iron radiators are removed or altered.

Heating and ventilation are key issues in relation to protecting the fabric of the building. Fire detection, alarm, security and lightning protection systems are also vital to the long-term conservation and preservation of churches together with their fixtures and fittings.

Heating

HISTORIC HEATING SYSTEMS

There are many examples of open fireplaces, in particular in Board of First Fruits churches. However from the late-eighteenth and early-nineteenth centuries, often through donations from wealthy individuals, many churches were fitted with warm-air heating systems. These generally consisted of a simple solid-fuel boiler, freestanding within the church or located in a recess beneath the floor, with the flue being routed through the floor and walls to provide the heat. Air and surfaces in contact with the main body of the boiler and the flue were heated and the heat dissipated throughout the volume of the church. In the earliest installations, flue gases were routed through perforated ducts so that they escaped into the space and contributed to the heating but also to poor air quality and pollution within the space. In later systems, the exhaust flue was ducted directly to the outside air while separate air ducts were passed over the boiler collecting heat and distributing it through the church, generally via grilles in the aisle floors.

By the 1850s, warm air systems had largely been replaced with water-borne heating systems with pipes circulating from the boiler and usually running around the external walls of the church or in underground ducts with perforated covers releasing heat directly into the space. Later systems incorporated radiators to focus heat emission on specific locations.

Several elements of a historic heating system often survive, as at this church where both boiler and perforated floor grilles remain

Often due to a lack of funding for new heating installations, many older churches still contain remnants of antique heating systems which may be of considerable historic value. These may contain asbestos lagging and specialist advice should be sought about its removal. In some instances it may be desirable to retain parts of a redundant system for historical interest. The removal of elements of historic significance from a church may require planning permission. The advice of the architectural conservation officer in the local authority should be sought when considering any works of this type.

HISTORIC RADIATORS

Historic cast-iron radiators may sometimes survive in sufficiently good condition to warrant reuse. However, a careful evaluation of the risk of leaking or flooding should be made. While modern hot-water-based central heating systems employ pumps and contain comparatively small amounts of water, there is no technical reason not to employ sound old radiators.

MODERN HEATING SYSTEMS

Modern heating systems are often introduced into churches with the sole aim of satisfying the thermal comfort requirements of the users of the building. These systems try to heat the large internal volume of the church within a short period of time, such as when a service is due to begin. Often acceptable levels of comfort are only reached as the service concludes and the congregation is ready to leave. A more effective strategy is for a heating system to be designed to provide a low, constant temperature of approximately 15°C which helps to dispel damp, reduce the risk of condensation and keep internal conditions within acceptable levels of thermal comfort. This approach ensures optimal conditions for the conservation of the built fabric and the contents of the church; it can also achieve significant energy savings.

Once in place, a congregation will often generate sufficient heat to raise the temperature locally or the heating system can be designed to boost the temperature if required. It is, however, unrealistic to expect the internal temperature of a church to reach what is considered an acceptable domestic room temperature of 21°C. Most people come to church in their outdoor clothing and retain it during the service.

Water-borne heating systems are generally the most effective, being economical to run and easy to control. It is important to have good thermostatic control on boilers and heat emitters (such as radiators, underfloor heating, or trench heaters). Most churches comprise large internal volumes. In such large spaces, perimeter radiators are least effective in terms of delivering heat to the congregation as the warm air tends to rise from the radiator only to be lost in the upper levels of the space. Underfloor heating can maintain good background temperatures and the heat is evenly distributed and rises over the congregation providing local heat. With underfloor heating it is only necessary to heat the occupied zone to provide comfortable conditions. Trench heaters, if well-located, can provide good distribution and good comfort. However, providing underfloor heating or trench heaters in a historic church can be invasive and destructive of existing floors and other features and requires careful consideration for a number of reasons. There is a potential to undermine walls which have very shallow, or perhaps no, foundations or footings. Vibrations arising from the works also can potentially cause structural damage. Care should be taken in churches built over a high water table or with existing rising damp problems. It is possible that, as a new insulated sub-floor would seal the floor, moisture which previously evaporated through the floor joints will now be trapped and may be forced to make its way over to the walls, thus increasing the risk of damage to fabric from rising damp.

Intermittent heating is common in churches that are used irregularly but this is not always appropriate to the proper conservation of the building and its

Church lighting and heating systems may evolve on an ad-hoc basis as funds become available. In this case, strip lights and electric bar heaters were fitted to some of the aisles. Conservation works to the church will include the removal of these fittings and repairs to the roof above to eradicate the damp in the wall

contents. The resultant abrupt changes in temperature and relative humidity can be damaging to delicate contents and finishes particularly those of organic materials such as timber, leather or cloth. Electric radiant systems provide instantaneous local heating for the congregation with no need for a warm-up period. This type of heating comes at low capital cost and is easy to install compared to plumbed heating systems, which usually require considerable intervention into the historic fabric of the church. However, the overall effects on the conservation of the building and its contents must be carefully evaluated. Electricity is also a more expensive fuel than gas or oil and would not be economical as a means of providing a low level of continuous background heat. Economies can be achieved through the use of storage heaters, using lower cost night-rate electricity, and in some instances this may be the only viable option.

WOOD-BURNING BOILERS

Biomass boilers burn wood pellets or wood chips to generate heat and can be effectively carbon neutral, providing the fuel has been sourced locally and has not been treated, such as pre-dried timber or wood pellets. Fuel cost is relatively low but a robust space for fuel storage is necessary and can be large and unsightly. The construction of a new storage structure within the curtilage of a protected structure or within an architectural conservation area may require planning permission.

Ventilation

All heating should be accompanied by adequate levels of ventilation. With an emphasis on energy efficiency it has become common to try to seal buildings to prevent the ingress of cold air and draughts. This can be detrimental to a traditionally built building as, by sealing up openings, moisture is trapped and can result in degradation of fabric over time, not to mention poor air quality. The Irish climate is moist; often a cold crisp day is followed by a warm moist day with warm air depositing its moisture by way of condensation when it meets a cold surface. This effect is exacerbated by the intermittent occupancy experienced by most places of worship. During services, a large congregation will deliver significant moisture to the air. It is critical that this moisture can be vented to outside air to prevent it building up inside the church.

Early church architects were aware of this issue and many churches were designed with windows with opening sections at the lower levels and ventilators in the ceiling at high level. These create what is known as a stack effect, which creates effective natural ventilation that can be used by the church caretakers to reduce the build-up of moisture internally.

With the introduction or upgrading of heating systems, other measures are sometimes put in place to reduce heat loss and improve thermal efficiency. To achieve this, attic spaces might be insulated and ventilators blocked. The latter practice should be avoided at all times. To reduce permanent heat loss through ventilators it is possible to add a motorised damper to the ventilator which can be controlled by temperature and humidity sensors so that the ventilator responds to moisture and temperature build-up but can be closed to retain heat when the church is in use.

Original ventilators in the glazing should be repaired where necessary and opened after church services. Care should be taken in operating the mechanism to avoid damaging historic glass

To avoid excessive levels of relative humidity, ventilation is equally important as heating and all churches should be aired regularly by opening windows and doors after services to allow moist air to escape.

Relative humidity

All air contains some moisture and warm air is capable of holding more moisture than cold air. Single glazing tends to follow the temperature of the external air. Thus, where the inside of the building is being heated and this warm air meets the cold surface of the glass, the air cools and releases the moisture in the form of condensation. The presence of a congregation increases relative humidity by adding moisture to the air. This, in turn, can increase condensation. If spaces are well ventilated, this moist air is removed by the air movement before it has the opportunity to condense. If the air movement is warm any moisture in the building can be re-absorbed by the air and vented away.

The impact of high relative humidity on stained glass should be noted. Imperfectly fired glass-paint can be damaged by condensation. Where a church has suffered from condensation, the stained glass should be inspected for loss of paint by a stained-glass conservator. Large fluctuations in relative humidity can have a detrimental effect on elements of the building and on furnishings and fittings in particular those made of organic materials such as timber and leather, causing cracking and distortion.

Fire safety and security

FIRE SAFETY MEASURES

To protect the fabric of a church and its contents, a fire detection and alarm system should be installed. Large volumes can be dealt with using beam detectors where a sender and receiver are fixed on opposing walls and a beam is transmitted between the two. When the beam is cut by smoke particles a fire alarm sounds. This avoids the need for standard smoke detectors to be placed at high points where they are difficult to maintain.

Air aspiration systems are also viable. These systems use a fan to suck air through small tubes and the air is then analysed for smoke particles. The suction heads and tubes are static requiring only occasional maintenance, and the fan and analysis equipment can be placed at low level for ease of maintenance.

Local hand-held fire-extinguishers should be provided close to exits or beside areas where votive candles are used to allow a small fire to be tackled locally. Advice on the best type of extinguisher for a given purpose should be sought. Fire alarms should also be connected to remote bases, such as a caretaker's house or the local garda station, to ensure that the fire risk does not increase when the building is empty.

SECURITY SYSTEMS

If a church has valuable contents, consideration should be given to a security system including closed circuit television. This is not ideal in a place of worship but discreet cameras targeted at relevant areas could, in some instances, provide a useful deterrent.

Lighting

Types of light fittings vary widely from spotlights to pendants and from concealed indirect sources to highly visual ornamental fittings. Ideally fittings should be fitted with lamps such as long-life fluorescent or LED (light emitting diode) lamps to reduce maintenance. Regular maintenance can be difficult due to the heights at which many light fittings are installed. Long-life lamps also reduce running costs and carbon-dioxide emissions.

Emergency lighting to direct people to exits in the event of a power failure is a legislative requirement. Exit signage at exit doors should also be provided. Emergency lighting can be incorporated into the general church lighting system with some advance planning. Alternatively, stand-alone systems can be provided. Many of these can be unattractive and inappropriate in a historic location and it is important to spend time finding a solution which is unobtrusive and appropriate for the particular church.

Many churches were constructed before the advent of electricity and were originally illuminated with candles and oil lamps and later by gasoliers. Where original or early light fittings survive, these should be retained where possible and wired to accommodate modern lamp holders. Removing or modifying historic fittings in a protected structure may require planning permission. New light fittings do not need to imitate historical designs to be considered appropriate. Interior lighting is both a functional and an aesthetic

consideration and, if well designed, can enrich the quality and atmosphere within a church. Artificial lighting design within historic interiors is a highly specialised skill. Designers should seek every opportunity to conceal light sources and select visible fittings that will be unobtrusive so as not to distract from the internal detail. Highlighting of paintings, fabrics and artefacts should be designed so as to avoid using lamps of high heat and ultra-violet content, which can degrade the objects they illuminate. The location of cable runs requires careful planning to avoid negative impacts.

Historic light fittings should preferably continue in use and their light output augmented if necessary. Where new light fittings are required, it is recommended that the church authority obtains specialist advice in order that the scheme adequately addresses both the needs of the church users and the character of the interior

Floodlighting

The design of floodlighting, like that of interior lighting, is a specialised skill. When well-designed, floodlighting can make a church appear equally impressive by night as it does by day. Recent developments in lamp technology have seen the production of more efficient light fittings using low energy fluorescent or LED sources, which can reduce running costs significantly. However, the benefits of any proposal to floodlight a structure should be balanced against national policies to conserve energy and reduce carbon-dioxide emissions. In addition, consideration should be given to the effects of light pollution, particularly in rural locations. A proposed lighting scheme should be carefully planned to minimise the impact of cabling and light fittings sited on or near the structure and to ensure that the floodlighting enhances rather than detracts from the appearance of the building. Floodlighting schemes require ongoing maintenance, including regular inspections, cleaning of fittings and replacement of lamps and faulty luminaires. This should be taken into consideration and planned for in any proposal. In all cases where floodlighting is proposed to a protected structure or within an architectural conservation area, the architectural conservation officer in the local authority should be consulted as planning permission is likely to be required.

Where a floodlighting scheme involves a monument included in the Record of Monuments and Places, the National Monuments Service should be consulted. Floodlighting installations have the potential to impact on archaeological heritage through additional electricity poles, underground cabling and light installations requiring excavation, and on natural heritage by affecting the activity rhythms of both plants and animals. In principle, lighting should not be used on a structure where a bat colony is in occupation. If a church is suspected of having a bat roost, a specialist survey of the structure will be required and advice should be sought from the National Parks and Wildlife Service.

The number of lights should be kept to a minimum and lighting should never be left on all night. Dusk to midnight is a generally suggested timeframe. If there is a bat roost, lighting times should be subject to the recommendations of the National Parks and Wildlife Service as relevant. Cross-lighting and back-lighting should also be considered as an alternative to up-lighting to avoid light pollution of the night sky.

Amplification systems

Amplification systems are often little more than a simple microphone with a number of high level speakers located throughout the church. There are many types of speakers; a larger number of small discrete units may have the least visual impact and provide good sound coverage compared with fewer larger units. The location and fixing methods of speakers should be carefully chosen to cause the least impact on the fabric and visual appearance of the interior. Zoning should be provided for larger churches to allow for selection of specific areas if required. Also, separate choir stalls may need separate microphones and so on. Flexibility should be built in to any new system. Induction loops should be considered to aid the hard of hearing. These are generally in the form of a cable loop running around the church and are easy to conceal on features such as coving details.

Renewable energy technologies

Where new heating systems are being introduced, the use of renewable energy sources could be considered for small-scale generation of electricity. So-called 'micro-renewables' include devices for exploiting sun and wind power and heat within the ground, as well as equipment for using renewable fuels such as timber, biomass or wood pellets. At present, the economic case for installing micro-renewables is not strong in terms of payback through cost savings. High capital costs result in lengthy payback periods which often exceed the lifespan of the installations. However, in the medium term, market forces are expected to drive down the costs of installing renewable energy technologies, thus making the installations more cost effective. For more information, see *Energy Efficiency in Traditional Buildings* in this Advice Series.

SOLAR PANELS AND PHOTOVOLTAIC PANELS

Using simple solar-powered water heaters to generate hot water is probably the most effective way to actively exploit solar power. Solar thermal panels can be used to generate hot water for hand-washing or cooking needs and could be beneficial if a church has ancillary facilities which are used regularly such as a hall or parochial meeting room. Solar panels mounted on the roof of a place of worship can be visually intrusive; a roof slope with a southerly orientation, not visible in important views of the building, such as within the valley of a roof, is ideal. Such an installation may be suitable for use on protected structures and within architectural conservation areas, subject to planning permission. For many church roofs it may prove difficult to conceal such panels. Some disturbance of the historic fabric is also inevitable, so careful consideration and attention to detail are essential. Where there are ancillary buildings these might be used successfully to accommodate panels, or alternatively, appropriate ground-level sites might be feasible.

The decision to install solar, or photovoltaic, panels should be based on a thorough analysis of the needs of the building as well as of the site itself. The panels are sited in an unobtrusive part of the graveyard and all services are run on the surface. The panels are easily demountable

There may be an opportunity to install solar panels on the less visible slopes of a roof. In this case the heat generated by the panels is taken to an underfloor system providing a certain amount of background heating which keeps the building fabric in good condition (Image courtesy of Margaret Quinlan Architects)

Photovoltaic panels have the advantage in that they convert solar power directly into electricity and do not require the plumbing and enlarged hot-water cylinder associated with solar panels which may be difficult to accommodate in some architecturally sensitive buildings.

HEAT PUMPS

Heat pumps work by drawing heat from a source, such as the air, ground water or the soil, and putting it into water or, less commonly, air. Such heat pumps work best serving as a source of heat for underfloor heating, where the water temperature required is lower than for radiators. Normally they are driven by electricity and are often claimed by their manufacturers to have the ability to convert one unit of power into three units of heat, thereby making the use of electricity for space heating more economic. If properly designed and installed, heat pumps may represent a carbon-efficient form of space heating. Systems should be designed for appropriate applications for all weather conditions.

As heat pumps are usually only appropriate for use with underfloor heating the retrofitting of this type of system is difficult. Installation should usually be considered only in the context of large-scale refurbishment works. Where the installation would involve loss of historic fabric it may not be suitable in a protected structure and planning permission would most likely be required. It is also worth noting that the appearance of air-source heat pumps, which are large and fitted in industrial-looking cabinets, may not be appropriate sited adjacent to a historic church and their location will therefore require careful consideration.

Where the place of worship is surrounded by a burial ground there will be significant archaeological constraints to the installation of a ground water heat pump and it is unlikely to be considered acceptable. The National Monuments Service should be consulted at an early stage if such works are being considered.

WIND POWER

Small-scale wind-turbines are unlikely to offer any benefit in an urban environment although well-located installations, with a good exposure to wind, may be worthwhile in a rural situation. If there is some open space available to the church it may be possible to introduce a small wind turbine to generate electricity. Power from such an installation could be used for water heating or background space heating. Wind turbines generate a large amount of vibration in use and are subject to high wind loadings. This would preclude attaching one to an older, possibly fragile, church, but there may be a suitable ancillary building within the grounds. Also, the visual impact of a wind turbine on a historic building may be unacceptable. It is recommended that the building be checked for structural stability by an appropriately qualified professional before a wind turbine is attached. Where the church is a protected structure or is located within an architectural conservation area, planning permission may be required to erect a wind turbine. If the grounds of the church are protected under the National Monuments Acts, the National Monuments Service should be contacted when considering erecting a turbine within the site.

9. Around the Building

Churchyards and burial grounds

The original setting of a historic church contributes to its significance, by improving the appreciation and understanding of the building. Rather than considering buildings as historic structures and their settings as cultural landscapes, it is useful to consider the two as a single historic place, wherein each element contributes to the overall significance. The immediate surroundings of churches can become characterless through over-zealous tidying, or excessive resurfacing to create car parking or low maintenance hard standings. Graveyards within churchyards usually enhance the atmosphere and setting of a church with collections of headstones, funerary sculpture and mausolea adding visual, historical, social and archaeological interest. In more ancient graveyards, the memorials may date back for several centuries providing a great source of local, social history. Graveyards that continue in use for burials are particularly significant for those commemorating departed loved ones and deserve additional respect for visitors seeking contemplation and quiet reflection.

Maintaining churchyards, and in particular burial grounds, can be a challenging task that requires considerable human resources. Where the scale is not too daunting, the work of volunteer groups within the congregation can be very effective. It is, however, necessary to strike a balance between neglect and excessive tidiness both of which can threaten the special character and atmosphere often found within historic churchyards.

MAUSOLEA AND TOMBS

Some of the more elaborate tombs and mausolea found in churchyards are significant architectural compositions in their own right and, like any other structure, require maintenance. With the demands that may be necessary for the maintenance of the main church building, it is easy to overlook the significance of a nearby mausoleum in the churchyard. Like the memorials found within a church, these may have social, historic, artistic or architectural significance and should be protected accordingly.

Some mausolea are shaped like miniature churches, containing high quality architectural details and materials. Mausolea require sufficient maintenance to prevent them slipping into a state of neglect, damaging the remains within and endangering visitors to the graveyard

BOUNDARY TREATMENTS

Boundary walls, either of stone or metal railings, are often neglected. Stone walls are robust structures but they do require some degree of regular ongoing maintenance to keep them pointed, capped and free of damaging plant growth. Metal railings, of wrought or cast iron, contain fine examples of workmanship in their original design and hand-forged detail. Like all ferrous metals these need regular care and maintenance. For more information see *Iron – the repair of wrought and cast ironwork* in this Advice Series.

Archaeological considerations

Church sites of ancient origin, with many centuries of burials and perhaps the ruins of earlier church buildings, may be as important for their archaeological significance as their standing buildings. In some instances, the archaeology may record a thousand years or more of Christian worship on a site. Antiquities may be found in standing structures or grave markers,

or hidden beneath the present ground level. For this reason, many churchyard sites are recorded monuments protected under the National Monuments Acts. Some church grounds may also contain significant upstanding monuments such as high crosses, early churches or round towers. Any proposed works within, or in proximity to, a recorded monument that might disturb and cause damage to the archaeology of the site should be notified to the National Monuments Service. Archaeological testing may be requested ahead of the proposed works to assess the potential for any impacts.

For sites that contain national or recorded monuments, even the relatively simple task of running a new drain or water supply through a churchyard generally requires consent from, or notification to, the Minister for Arts, Heritage and the Gaeltacht in accordance with the requirements of the National Monuments Acts.

A consequence of a long accumulation of burials in an ancient graveyard is the steady build-up of the ground level. This can sometimes rise to well above the internal floor level of the church, interrupting drainage runs and effectively making the external walls of the church into retaining walls. Both situations can lead to serious damp penetration through the base of the walls into the building and may require some form of internal treatment to diminish the impact of the dampness on the fabric and finishes of the church interior.

Ecological and wildlife considerations

Larger churchyards containing trees, shrubs and areas of long grass are likely to have a rich biodiversity, particularly in overgrown or rural locations. These habitats, which may contain rare or protected plant or animal species, should be maintained whether in the town or the countryside, and any maintenance regimes should be planned to avoid excessive disturbance or damage to any flora or fauna that may be present. Wild flowers, birds, insects and small mammals all contribute to the attraction and atmosphere of a churchyard. Various species of trees such as laurel, holly and yew were planted traditionally for both symbolic and aesthetic reasons. All should be respected, whether or not they are legally protected.

The headstones in old graveyards can often harbour important lichen species. Lichens can be used by experts to help date stonework and, therefore, the need to clean and remove lichens should be very carefully assessed for each individual piece, and other non-invasive techniques for reading and recording the stonework should be tried before embarking on lichen removal.

Lichens should only be removed in extreme cases, since most are benign and their removal will damage the surface of the masonry, particularly in the case of lettered, worked or sculpted stone. Re-colonisation will result in a deeper level of damage. However, some types of lichens are damaging to stonework and expert advice should be sought on their removal.

Many ancient ecclesiastical sites of all sizes are still in use. After the Reformation, parish churches then in use were often reused and later incorporated into Board of First Fruits churches, sometimes so thoroughly that few early features remain visible. The illustrated site shows a Roman Catholic graveyard attached to the Church of Ireland graveyard, on a Romanesque site

The great nineteenth-century Roman Catholic cathedrals are often the focus of an ecclesiastical quarter, with bishop's palace, convent schools and, in some cases, a seminary, as at Thurles, County Tipperary

Building ensembles

Many churches are part of a larger complex of buildings that might include parochial houses, rectories, schools or parochial halls. These dependent buildings contribute to the greater significance of a historic place by representing the wider social activities of the parish or church community. They remain important even when no longer within the same ownership or type of use. Where they survive but have become redundant it is essential that viable and sympathetic new uses be found for them that will not diminish the original relationships and meaning. Proposals for such buildings should be considered in the light of the effect on the character of the ensemble.

Intensification of use

The grounds surrounding most churches contain paved approaches and grassed areas. There are often sculptures or gravestones and, in many instances, car-parking and a burial ground. The area of protection afforded to a protected structure often extends to the boundary wall of the site. Intensification of the use of the church will, depending on the proposal, affect the curtilage of the protected structure and so require planning permission.

Most churches provide limited car-parking facilities within the historic boundary of the site. Priority is usually given to the elderly or people with disabilities, but more space may be sought, for example, where a church provides facilities for other users throughout the week. It is always preferable to site new car-parking spaces outside the walls of a historic churchyard. Where this is difficult, the impact of the change on the grounds of the church should be assessed and incorporated into any planning application submitted.

The construction of new buildings for parochial use will usually have a significant effect on the setting of the church and may compromise the character of the building. In creating or adding to an individual or group of ecclesiastical buildings it is important not to overlook the implications of altering the appearance of the church in its setting. Churches stand out due to their height, size, materials and individuality of design, often occupying a pivotal and dominant place in their surroundings which should always be respected. Church grounds may contain archaeological remains; archaeological advice should be sought at the earliest stage when contemplating any works. There may be cases where little or no new development is acceptable within the church grounds.

10. Interventions

Designing for change

Design changes and interventions are not uncommon in churches and some of the most interesting churches display numerous phases of work and physical evidence for forms of worship that have evolved over centuries. Changes may have taken place over long periods of time during which the church congregation or its importance grew or shrank; such changes may represent new architectural ideas, new liturgy, or rising expectations of comfort and convenience. Evidence that a church has changed does not necessarily dilute its importance. The ability to absorb change can demonstrate flexibility and adaptability, combined with the ongoing viability and usefulness of a place of worship. Some churches are more capable than others of absorbing change without significant impact. Retaining the sacredness of the space – the intangible, spiritual significance of the place of worship to believers – should be an important consideration in planning for change.

Chapter 1 introduced the idea of managing change using a conservation statement or plan drawn up by experts in the relevant disciplines in consultation with the church authorities and other stakeholders. Consultation with all those who have an interest in the future conservation and use of the site is important. The method provides a framework for ongoing management and planning for all those involved in the church, its setting and any ancillary buildings on the site. The conservation plan or statement should be the first point of reference when seeking to know what impacts are likely to affect the character of the church or its surroundings.

QUALITY OF DESIGN AND MATERIALS IN NEW INTERVENTIONS

Introducing change into the historic built environment requires sensitivity and high standards of design, coupled with a philosophy that ensures that the new intervention will sit comfortably within, or beside the older fabric. When altering or extending an old building, there is sometimes the temptation to copy and try to fit in with the prevailing style. This approach is generally to be avoided as it can cause confusion and conflict between the intervention and the historic fabric, though it may be warranted in certain circumstances. Designing within a historic context is a challenge that demands good manners and a carefully considered approach. Any proposed additions or alterations should be rigorously scrutinised, from their general appearance down to the fine details. The choice of materials is also important when altering or extending a church. Most churches were built to last using durable, high quality, natural materials that weather slowly but beautifully over time. A similar ambition is necessary with contemporary

The medieval chapel of Saint Anne at Saint Audoen's Church of Ireland, Dublin was converted to a visitor centre in 2000. The work included re-roofing the chapel and the construction of a new east gable wall. The wall is a spare, modern intervention in a highly sensitive location facing onto the former Portlester Chapel and chancel of the medieval church

interventions. New elements and materials should wear and function well. Over time these should not stand out, but should sit comfortably beside the traditionally durable and patinated surfaces of the older materials and finishes.

Improving accessibility

Some of the changes now considered necessary for churches and other old buildings might simply involve improving access for all users or providing sanitary facilities. Successfully incorporating wheelchair ramps and sanitary facilities into a historic church requires skill. Like any other intervention into an old building, good design, detailing and the careful choice of suitable materials are essential if a sensitive and appropriate solution is to be found and implemented.

For further information, see *Access: improving the accessibility of historic buildings and places* in this Advice Series.

Reordering and liturgical change

Just as many churches have been enlarged and altered over time, so too have they seen liturgical change, most recently in the Roman Catholic Church since the Second Vatican Council. In retrospect, the manner in which some liturgically inspired changes were implemented since the 1960s and 70s might now be questioned as many of these changes involved the removal of fabric and artefacts and, in some cases, loss of character from historic churches. There is, however, no doubt that in many cases the objective of bringing the clergy and the congregation closer together in more direct communion achieved its aim. The wish to reorder churches for liturgical reasons continues.

While under Section 57 (5) of the Planning and Development Act 2000, a planning authority is required to respect liturgical requirements when issuing declarations for a place of public worship that is a protected structure, all proposals which would materially affect the architectural heritage require

Improving access where there are several changes of floor level within a church requires careful consideration. Where the church is a medieval structure, there is the possibility of burials beneath the nave which preclude lowering of the floor level. Ideally, the improvement of access should be an integrated part of an overall conservation strategy

planning permission. Reordering has the potential to affect the character of a protected structure. In order to ensure that the appropriate balance is struck between the protection of the architectural heritage and the need for continued use of the protected structure as a place of public worship, early consultation between the planning authority and the relevant church authority is advisable. There may also be requirements for diocesan and/or central church consent to be obtained; in the case of the Church of Ireland, both diocesan and central church consent is required.

In 2003, the four main Christian denominations agreed to establish bodies to provide advice to local church authorities on matters relating to liturgically-inspired change. The Roman Catholic Church agreed to establish Historic Churches Advisory Committees at diocesan or inter-diocesan level; the Church of Ireland set up a Historic Churches Advisory Committee within the Representative Church Body (which has since been absorbed into its Property Committee); the Presbyterian Church in Ireland has a Historic Churches Advisory Committee based at the Board of Mission in Belfast, and the Methodist Church in Ireland deals with these matters through its Annual Conference.

When plans for reordering are under consideration, it is prudent to talk to all interested parties and stakeholders, including the architectural conservation officer of the local authority, to discuss possibilities, obtain feedback and hopefully to reach a consensus. Reordering can, at times, be controversial and divisive at a local, and even national, level. Sometimes the changes sought might conflict with the character of a protected interior. The building works that are most frequently included in reordering proposals today are the removal of confessional boxes, altar rails or pews; enlargement of the dais or predella towards the congregation; the lowering of altar floors; and the removal of altar furniture and furnishings from the main sanctuary, chancel or a side chapel. A degree of compromise to the historic fabric may be justifiable in some cases where it brings about an overall improvement in the way a church functions.

The A W N Pugin-designed Saint Aidan's Cathedral, Enniscorthy, County Wexford, underwent a programme of restoration in the 1990s, during which the cathedra and pulpit were reinstated. The altar table was placed on a dais under the tower and the altar rails have been removed. The magnificent marble reredos and choir screens survive

Where reordering is being considered, a concise report should be prepared by a suitably qualified expert on the character, importance and condition of the fabric, furniture and artefacts to be moved or removed to allow the full impact to be considered. The proposals should show that the design has been carefully developed to respond sensitively to the existing interior and to minimise any adverse effects on the historic fabric. Alterations which impact on significant elements of the building should be capable of being reversed, wherever possible. The report should illustrate the mitigation measures that are to be taken to reduce the impact on the character of the interior. An appropriate location for the storage or reuse of redundant elements should be identified, preferably within the church building. At planning application stage, the supporting documentation should include copies of correspondence or evidence of support from the relevant Historic Churches Advisory Committee or similar body.

Parochial and pastoral facilities

The informal meeting of a congregation for tea and coffee after church services is an important social consideration that is growing in popularity across many different denominations. Traditionally, these activities took place in adjoining Sunday school rooms or parochial halls that were also used for other parish groups and societies throughout the week. In more recent times, purpose-built parish centres have been constructed close to large churches in which a wide range of church and outside activities are able to function effectively. These may include crèches; drop-in groups for parents and toddlers, or the elderly; fitness and yoga groups; whist or bridge clubs, meetings of parish committees, local groups such as gardening clubs or historical societies, or committees dealing with general matters of church maintenance and administration.

When designing a new parish centre in the vicinity of a church, some people believe that the historic style of the church would be best respected by being copied. However, copying historic building styles successfully is problematic and the architectural style of a new building or extension does not need to imitate or replicate the original building in order to be considered acceptable. Building today in a style that was popular a hundred or more years ago may detract from the historic fabric and create confusion in the perception of both parts of the building. Contrasting but respectful additions to the ensemble are often more visually and aesthetically successful. Careful consideration of the palette of materials, the scale and the detailed design can ensure that the new work complements the original while reflecting the values of the present time.

The Methodist Church, Killarney, County Kerry was extended to provide pastoral facilities. The extension was designed in a contemporary style that complements the original historic fabric (Image courtesy of Mott MacDonald Ireland Ltd)

Flexibility and multi-purpose use

Where a church has neither parochial nor parish facilities, or lacks either the space or funds to build such facilities, they can sometimes be accommodated within or adjoining the existing church through discreet and careful intervention. This may also be an appropriate solution where a congregation has shrunk significantly in relation to the size of the place of worship. Flexibility may be created quite simply by adapting and possibly enclosing a side chapel, and inserting an altar to accommodate services for which the number of participants is likely to be small. This improves the sense of intimacy and communion, while also taking place in a space that is easier to heat. In more radical interventions, an entire collection of pews might be removed to make the nave of the church more flexible for a wider variety of sympathetic uses. Such proposals require careful consideration of the impacts on the architectural heritage, that is, they should balance the needs of the users with a respect for the character and special interest of the historic building. A strong, well-presented argument in favour of the proposal is recommended as part of any planning application for change of use.

Sensitively designed interventions subdividing the spaces within a nave, perhaps by glazing in the areas under a gallery, can help to accommodate a wider range of parochial facilities, which will enhance the usefulness and value of a church that might otherwise be facing redundancy. Proposals that include subdivision need careful assessment and a high quality, context-sensitive design to avoid creating a significant impact on the architectural composition and historic fabric of a church. They may, however, help to keep an old church in use for its original intended purpose, which is preferable to redundancy and abandonment, or alteration to a less suitable use. Changes that preserve or prolong viability are not unreasonable, particularly when the principle of reversibility is followed, whereby interventions can be readily reversed at a later date revealing the original historic fabric and arrangement. Any new design intervention should aim to preserve the spiritual character and ritual significance of the place for the benefit of the worshippers and visitors as well as the architectural heritage character of the building.

Saint Cronan's Church, Tuamgraney, County Clare, is one of the oldest continuously functioning churches in Ireland. It contains a local museum in the Early Medieval part of the building, with the adjoining Romanesque single-cell Church of Ireland church displaying some museum exhibits at the rear

Kitchen and sanitary facilities

Sanitary and drinking water facilities in churches were often installed piecemeal and may be unsatisfactory for the users and damaging to the fabric of the church. Where possible, the upgrading of facilities should be integrated into larger programmes of works, to minimise the disruption to the fabric and conceal service runs. Providing toilet and kitchen facilities within a church can be a challenge. Where possible these should be accommodated in secondary areas which contribute little to the character of the church. In some instances it might prove too difficult to fit kitchen or sanitary facilities within the church and separate structures will have to be considered. The physical and visual impacts on the church and its spiritual character of partitions, pipework, vents, and facilities in use, on the character of the church during services, should be considered carefully and expert advice obtained from the outset.

Treatment of redundant fittings and fixtures

Where changes are proposed to the spatial arrangement or use of specific fixtures or fittings within a church, efforts should be made to retain the redundant artefacts within the building and preferably in place, where this is feasible. These artefacts may be important works of art or craft and may retain a spiritual association with the past liturgy, and for these reasons may be significant to both the religious and lay adherents. Many churches have the capacity to store such artefacts but where space is inadequate, an alternative approach should be made first to the religious authority to find a home within a place of worship, or alternatively in a museum. In almost all cases it will compromise the presentation of a religious artefact to display it in a public house or some such inappropriate setting. Where it is proposed to remove plaques or memorials, each should be considered individually and the families of those who erected memorials should, where possible, be traced and consulted on an appropriate new location for the memorial. If it is not possible to retain plaques and memorials in situ they should be stored within the church until such time as a family member is located and the family's wishes determined.

Redundancy

With declining congregations across most of the Christian denominations and demographic changes in land ownership and population movement from rural to urban, and from inner-city to suburban, many church buildings are becoming redundant. In Dublin, some of the finest eighteenth-century churches are no

This impressive Gothic Revival Church of Ireland church of 1830 has been in use since 1986 as a cultural centre by Comhaltas Ceoltóirí Éireann. Externally it appears unchanged; internally it retains the pulpit, memorial plaques and other features

longer in ecclesiastical use, or survive today with only a small congregation to sustain them. Some of the country's most important urban landmarks, in the form of historic churches designed by leading architects, lie empty or have been converted to serve new purposes that are, in some instances, less than ideal. It is generally accepted that the best method of conserving a historic building is to keep it in active use. Churches, however, are not typical historic buildings as their scale, spatial arrangement, decorative features, fenestration and former consecrated use restrict many suitable options for reuse. Notwithstanding these reservations, an alternative use, particularly one with a minimal physical impact, will usually be preferable to the building being left vacant and disused.

VANDALISM

Vacant churches, like other highly visible vacant properties, require ongoing monitoring to prevent dilapidation and vandalism that might lead to the irreversible loss of important historic fabric. Neglect of the surrounds of a church can also increase its vulnerability with the possible increase of undesirable activity. Mature planting may hide broken windows or doors; falling tree branches can damage roofs and masonry; graveyards may render the site forbidding at night except to those intent on vandalism. It is advisable for parishes to organise active and passive supervision of sites and to pass on information immediately to the regulatory authorities where there are signs of illegal entry or vandalism. Owners of protected structures continue to have a legal responsibility to maintain the structure so as not to endanger its survival even when the building is no longer in use.

'MOTHBALLING'

The period of transformation from redundancy to dereliction, aided by vandalism and neglect, can be alarmingly brief. If a new use is not found quickly once a church becomes redundant, its viability reduces rapidly as the fabric deteriorates and repair and renovation costs soar. Potentially valuable buildings become uneconomic to redevelop and invaluable historic fabric is lost forever. In an attempt to buy time for an abandoned church, the Redundant Churches Trust in the United Kingdom devised a process known as 'mothballing' to maintain unused churches in a state of reasonable repair. 'Mothballing' includes a range of measures such as boarding up windows; encasing delicate internal features and details; securing doors from unauthorised entry; repairing roofs and rainwater courses; and maintaining internal ventilation. In this way the valuable historic fabric is protected and preserved at relatively low cost to await a sensitive and viable alternative use.

Reuse and change of use

Generally, the most suitable use for a church is as a place of worship, but increasing numbers of churches are becoming surplus to the needs of their denominations, and this trend is likely to continue. Suitable alternative uses should be actively pursued by the church authorities from the stage when redundancy is first anticipated. It is not sufficient to wait for market forces to determine a final use for a building, which might contain architecture and art of the highest quality and significance.

This redundant Church of Ireland church was 'mothballed' to prevent deterioration while decisions are made on its future

CHANGE OF USE BY OTHER RELIGIOUS DENOMINATIONS

A church may often be appropriate as a place of worship for another Christian denomination, or indeed the congregation of another religion. For example the former Presbyterian Church on the South Circular Road, Dublin is today an Islamic mosque. Where a new sect or religion wishes to reuse a church, any new functional or liturgical requirements should be considered at the earliest stages to avoid inappropriate intervention.

CHANGE OF USE TO NON-RELIGIOUS USE

While ongoing religious use is the ideal, any appropriate, viable and sustainable proposed use should be considered. Commonly, proposals for rural churches include to conversion to a dwelling. Given the large internal volumes typical of a church, subdivision into domestic-scale rooms requires careful consideration of the potential impact on the character of the church. To radically change the character of a former place of worship to suit the new needs of a subsequent owner is a short-term approach. Those considering purchasing a former church for conversion to other uses should first of all ensure that the building is appropriate to the intended use; make every effort in the conversion works to preserve its character and finally, be suitably motivated to keep the building intact and well maintained.

The presence of a graveyard around a church may restrict the provision of new underground services, such as septic tanks, and may make some types of redevelopment unfeasible. Any proposed interventions will be closely scrutinised by the planning authority, which will judge their impact on the character of the protected structure. It is advisable that a prospective owner should find out in advance the type of development constraints that exist on a particular site before proceeding.

Telecommunication transmitters

Church towers may offer the possibility of accommodating telecommunication transmitters to produce valuable income for the parish; however, there are a number of factors to be taken into consideration. Firstly, access for installation and maintenance of the transmitter should be safe, and secondly, the transmitter should be installed in such as way that it does not damage any of the building fabric and is not seen from the ground or in views of the tower. The replacement of timber louvres with inappropriate materials or visually different designs should be resisted. If, for technical reasons, timber louvred panels must be replaced with panels of an alternative material, the new panels should be designed to complement the architecture of the building. The original timber panels should be carefully stored within the church for possible future reinstatement.

Consideration should be given to the location and appearance of the necessary power and data cabling, switchboards and controls, all of which take up considerable space for installation and maintenance

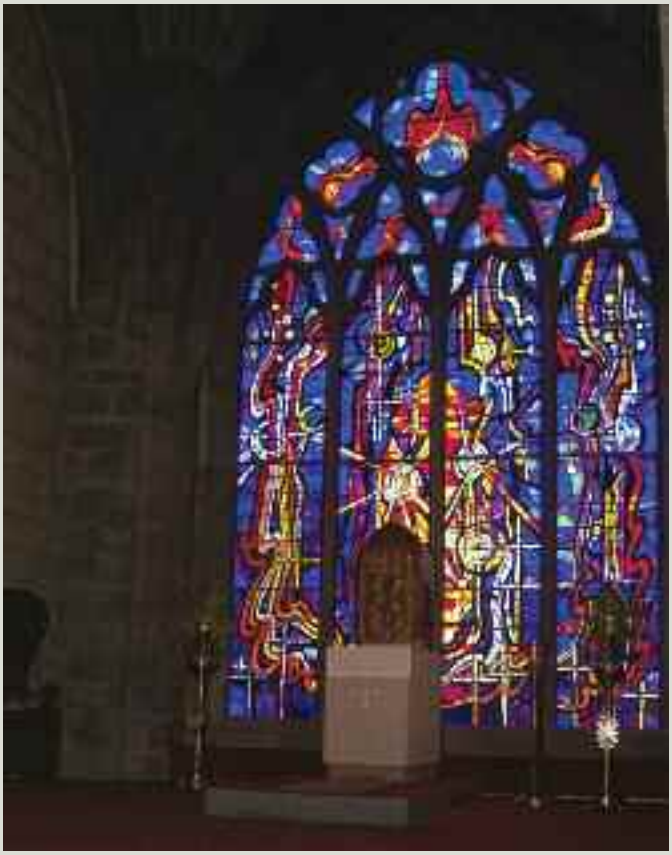
Occasionally, former churches are used as workshops for trades such as printing or joinery, which require large spaces such as are offered by a nave. This church was in use as an organ-building workshop from 1979 until 2008. The firm took great care to ensure that all the structures introduced into the building were freestanding. This church is once again in use as a place of worship.

and may have an adverse visual impact on the building fabric. Unless a tower is particularly spacious it may not fit the equipment of more than one service provider as well as allow for necessary access for building maintenance. Heavy equipment may have structural implications for old or delicate walls and floors. The advice of a suitably qualified structural engineer should be taken. Tall masts and surface-mounted transmitters affecting the appearance of the structure are unlikely to be acceptable to either the congregation or the planning authority.

Commissioning new art works

One of the defining characteristics of many religious denominations is the role they have played over centuries as patrons of the arts. Reference has already been made to the numerous artworks that might be found within a church, from stained glass to textiles, stone and wood carving to mosaics and paintings, often of the highest artistic merit. Sculptures, tombs and memorial plaques are other objects in which the skill of the stone or wood carver can be seen. When commissioning new works of art, the requirements of the existing diocesan or central committee structures that are currently in place within each denomination should be followed, and expert advice obtained to help prepare a brief and a panel of artists to be invited to submit designs. Like any major work to the interior of the church, such as reordering or redecorating, it is important to prepare a clear picture of what is proposed and the visual impact that this may have on the church. In some instances, a full-scale mock-up can be produced to review the visual impact of a sculpture or a piece of wall-hung art. Offers of gifts of new stained-glass windows are usually welcome, but the visual impact on the interior should be considered as part of the design process, for example to be careful not to darken an already dark interior. New stained-glass windows should not result in the loss of important plain glass windows.

Forming a subcommittee to liaise with the successful artist can be beneficial; however, the views of the wider church community and other relevant stakeholders should also be sought.



The east window of the multi-period Black Abbey Church, Kilkenny, founded in 1225, was fitted with stained-glass windows in the late-twentieth century, amongst many post-Vatican II changes. It provides a dramatic contrast to the nineteenth-century stained-glass windows elsewhere in the church designed by the studio of Earley and Powell

Further reading

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Useful contacts

If the place of worship is a protected structure, the architectural conservation officer in the local authority should be the first person to contact with queries regarding works to it. Other useful contacts include:

Department of Arts, Heritage and the Gaeltacht, Custom House, Dublin 1
- Architectural Heritage Advisory Unit
- National Monuments Service
- National Parks and Wildlife Service

Telephone: 01 888 2000
Web: www.ahg.gov.ie
www.buildingsofireland.ie
www.archaeology.ie
www.npws.ie

Building Limes Forum Ireland
Web: www.buildinglimesforumireland.com

Church of England Churchcare
Web: www.churchcare.co.uk

Corpus Vitrearum International
Web: www.corpusvitrearum.org
www.cvma.ac.uk

Diocesan Archives, Archdiocese of Dublin, Holy Cross College, Clonliffe Road, Dublin 3
Telephone: 01 837 9253
Web: www.dublindiocese.ie

Engineers Ireland, 22 Clyde Road, Ballsbridge, Dublin 4
Telephone: 01 665 1300
Web: www.engineersireland.ie

Heritage Council, Áras na hOidhreachta, Church Lane, Kilkenny, Co. Kilkenny
Telephone: (056) 777 0777
Web: www.heritagecouncil.ie

Irish Architectural Archive, 45 Merrion Square, Dublin 2
Telephone: (01) 663 3040
Web: www.iarc.ie
www.dia.ie (Dictionary of Irish Architects)

Register of Heritage Contractors, Construction Industry Federation, Construction House, Canal Road, Dublin 6
Telephone: 01 406 6000
Web: www.heritageregistration.ie

Representative Church Body of the Church of Ireland, Braemor Park, Churchtown, Dublin 14
Telephone: 01 492 3979
Web: www.ireland.anglican.org (general)
www.gloine.ie (stained-glass database)

Royal Institute of the Architects of Ireland, 8 Merrion Square, Dublin 2
Telephone: (01) 676 1703
Web: www.riai.ie

Society of Chartered Surveyors Ireland, 38 Merrion Square, Dublin 2
Telephone: 01 644 5500
Web: www.scsi.ie

Society for the Protection of Ancient Buildings: Faith in Maintenance initiative
Web: www.spabfim.org.uk

Glossary

AISLE

A passage, or wing, to one or both sides of the nave of a church and separated from it by arcades

AMBULATORY

A passageway, or walkway, connecting the eastern ends of the aisles, passing behind the sanctuary

APSE

A semi-circular or polygonal recess at the east end of a church, usually with a domed or vaulted roof

ARMATURE

A concealed light reinforcement cage generally for slender elements such as columns or tracery

ARTS AND CRAFTS

A style of architecture and design of the late-nineteenth and early-twentieth centuries that was based on a desire to revive the use of medieval craft-working methods and materials

ASHLAR

Cut stone worked to even faces and right-angled edges and laid in a regular pattern with fine joints

BUTTRESS

An element of masonry built against or projecting from a wall to provide it with support

CAME

A grooved metal strip, often of lead, used to hold glass in a stained-glass panel

CARTOON

A preparatory sketch for a mural, mosaic, stained-glass panel, etc. that is traced over or copied for the final work

CASEMENT

A window panel hinged on one side or at either the top or bottom edges

CASTELLATED

Built with battlements

CEMENT

A binding material mixed with aggregate and water to form a mortar or concrete. The term is usually taken to mean an artificial cement such as Ordinary Portland Cement

CHANCEL

The part of the church, usually at the east end of the nave, where the altar or table is placed

CONSERVATION

All the processes of looking after a place so as to retain its cultural significance (from the 'Burra Charter')

COPING

A capping or covering to the top of a wall to prevent water entering the core of the wall

CRAMP

A metal strap or pin built into a wall to hold together elements such as adjacent blocks of stone

EAVES

The lower edge of a sloping roof which overhangs the wall head

ENCAUSTIC TILES

Terracotta wall or floor tiles decorated with coloured clays inlaid and fired

FLASHING

A flat sheet of impervious material, usually lead, zinc or copper, covering the junction between materials or elements of a building to prevent water penetration

FRENCH DRAIN

A trench filled with gravel or other loose material to collect ground water and deflect it away from a building

GASOLIERS

A branched light fitting similar to a chandelier but fitted with gaslights

GOTHIC / GOTHIC REVIVAL

A style of architecture characterised by pointed arches, ribbed vaults and lancet or tracery windows, which prevailed in Europe from the twelfth to the early-sixteenth centuries. The style was revived in the nineteenth century and was particularly popular in church architecture

HOPPER HEAD

A receptacle for collecting rainwater from gutters and channelling it into downpipes

HOPPER LIGHT

An inward-opening, bottom-hung casement window

JOIST

One of a series of horizontal timbers supporting a floor or carrying a ceiling

LANCET

A slender pointed-arch window found in Gothic and Gothic Revival architecture

LIME MORTAR

A mortar made from lime, aggregate and water that, on exposure to air, carbonises and hardens

LIMEWASH

A form of thin lime putty used as a paint or protective coating. It differs from whitewash which is a mixture of chalk and water that does not carbonate

LINTEL

A small beam made of timber, stone or concrete which spans the top of an opening such as a door, window or fireplace and supports the wall above

LOUVRE

A panel consisting of parallel horizontal timber slats that slope outwards to throw off rain and allow air in

MAINTENANCE

The continuous protective care of the fabric and setting of a place, and is to be distinguished from repair. Repair involves restoration or reconstruction (from the 'Burra Charter')

MORTAR

The mixture of a binder (such as lime or cement), aggregate and water to form a substance used to bind bricks together in a masonry wall

MOSAIC

A decorative, patterned finish to a wall or floor composed of small individual pieces, or tesserae, of stone or glass

MULLION

A vertical dividing element of a window

MURAL

A wall painting

NAVE

The part of the church where the congregation sits, usually the western part of the church

NEOCLASSICAL

Styles of architecture that derive from ancient Greece and Rome. In Ireland, the style was popularised in the period 1775-1850

PARAPET

The part of a wall that rises above a roof or terrace

PARGING

The application of lime mortar to the inner faces of flues to create a smooth flue and to seal any gaps and also to the underside of roof slates or tiles

PATINA

The weathering effect on an exposed surface

PORTICO

In classical architecture, a porch formed with columns

POINTING

The application of a separate facing mortar applied onto the bedding mortar

PORTLAND CEMENT

Artificial cement invented by Joseph Aspdin in 1824 and so called because of its perceived resemblance to Portland stone. It sets rapidly and is very hard when set

QUARRIES

Small panes of glass, often square or diamond-shaped, set in lead cames

RAFTER

A sloping timber roof beam running from eaves to ridge and supporting the roof covering

REREDOS

A decorative screen to the rear of the altar

RESTORATION

Returning the existing fabric of a place to a known earlier state by removing accretions or by reassembling existing components without the introduction of new material (from the 'Burra Charter')

SACRISTY

A robing room attached to a church where sacred vessels and vestments are kept

SADDLE-BARS

Horizontal metal bars set between the mullions of a window to reinforce leaded glazing such as stained-glass panels

SARKING

Roofing boards to which slates are fixed

SIGHT-SIZE

The actual size of a window (or door) opening through which light may travel

SPIRE

The upper part of a steeple, a structure that tapers upwards to a point

STANCHION

A vertical supporting member or prop

STEEPLE

The tower and spire of a church

STRING COURSE

Decorative horizontal band of moulding found on an external wall, often at first floor level

TRACERY

Ornamental intersecting timber or stone mullions and transoms in a window, panel or vault. Typical of buildings built in the Gothic or Gothic Revival styles

TRANSEPT

In a cruciform plan church, the wings that extend at right angles to north and west of the crossing

TRANSOM

A horizontal dividing element of a window

TRUSS

An arrangement of principal rafters, posts and ties to support the purlins of a roof

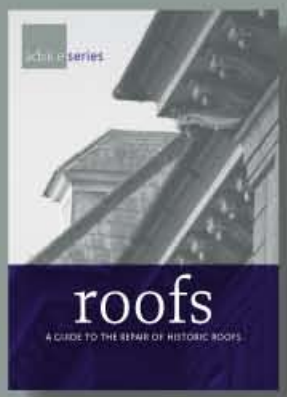
VESTRY

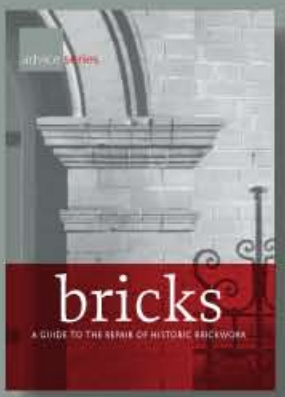
A robing room attached to a church where sacred vessels and vestments are kept. A vestry may also be used as a meeting room

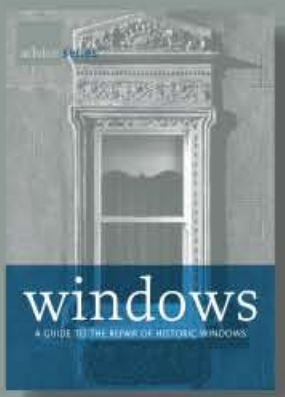
WAINSCOTTING

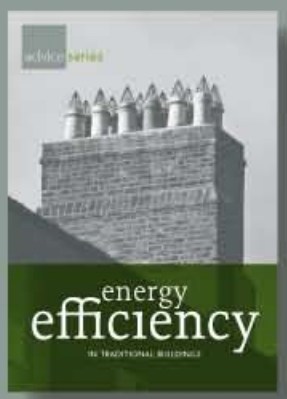
Timber lining to the lower portion of a wall

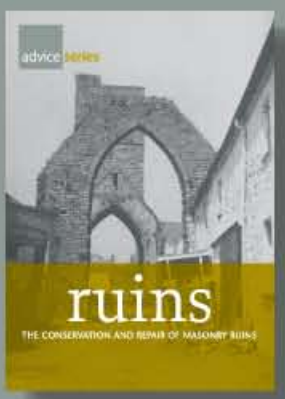
The Advice Series is a series of illustrated booklets published by the Architectural Heritage Advisory Unit of the Department of Arts, Heritage and the Gaeltacht. The booklets are designed to guide those responsible for historic buildings on how best to repair and maintain their properties.

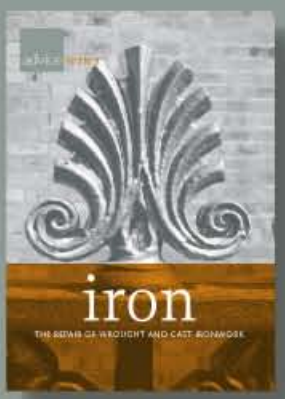












This guide gives advice to those responsible for the care and conservation of a historic place of worship on:

- Maintaining the fabric of the building
- Caring for a range of high quality finishes and furnishings
- Repairing important features of the building
- Altering the building to accommodate changing needs

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