ENGLISH HERITAGE
PRACTICAL BUILDING CONSERVATION

CONSERVATION BASICS

ENGLISH HERITAGE

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To the memory of John Ashurst (1937–2008), an inspiration and friend to all the editors, whose encouragement and support was a great motivation for this new series of Practical Building Conservation.

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CONSERVATION BASICS

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The volume editor would like to take this opportunity to thank all the contributors for their help and support with this book, as well as the information and images they have so generously provided.

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CONTENTS

THE PRACTICAL BUILDING CONSERVATION SERIES

This series of *Practical Building Conservation* technical handbooks supersedes the original five volumes written by John and Nicola Ashurst, and published in 1988.

The series is aimed primarily at those who look after historic buildings, or who work on them. The ten volumes should be useful to architects, surveyors, engineers, conservators, contractors and conservation officers, but also of interest to owners, curators, students and researchers.

The contents reflect the work of the Building Conservation and Research Team, their colleagues at English Heritage, and their consultants and researchers, who together have many decades of accumulated experience in dealing with deteriorating building materials and systems of all types. The aim has been to provide practical advice by advocating a common approach of firstly understanding the material or building element and why it is deteriorating, and then dealing with the causes. The books do not include detailed specifications for remedial work, neither do they include a comprehensive coverage of each subject. They concentrate on those aspects which are significant in conservation terms and reflect the requests for information received by English Heritage.

Building conservation draws on evidence and lessons from the past to help understand the building, its deterioration and potential remedies; this encourages a cautious approach. New techniques, materials and treatments often seem promising, but can prove disappointing and sometimes disastrous. It takes many years before there is sufficient experience of their use to be able to promote them confidently. Nonetheless, understanding increases with experience and building conservation is a progressive discipline, to which these books aim to contribute.

The volumes also establish continual care and maintenance as an integral part of any conservation programme. Maintenance of all buildings, even of those that have deteriorated, must be a priority: it is a means of maximising preservation and minimising costs.

Most of the examples shown in the books are from England: however, English Heritage maintains good relations with conservation bodies around the world, and even where materials and techniques differ, the approach is usually consistent. We therefore hope the series will have a wider appeal.

Dr Simon Thurley

Chief Executive, English Heritage

ABOUT THIS BOOK

"The past is never dead. In fact, it's not even past" (William Faulkner 1879–1962). The past, in other words, lives in the present. Historic buildings and places are an integral part of our collective heritage or patrimony. As Sir Bernard Feilden once observed: *"they bring us messages from the past"*; they tell stories of how and why we came to the places we are now. But they are also very much a part of the present and are, for the most part, adaptable to current expectations of commodity, firmness and delight. The choices we make about what, and how, to conserve – and our changing opinions about conservation – reflect current attitudes to the past and the values we ascribe to its material remains. These choices, in their turn, become part of the story that we pass on to future generations who will reinterpret it from their perspective, as we have done in our time, and add further chapters of their own.

In recent years there have been developments in building conservation theory and principles that have led to the adoption of a 'values-based' approach. This is based on the idea that heritage values are ascribed to places by people, rather than being inherent or intrinsic characteristics. Understanding the reasons why people value a place is therefore fundamental to the process of conservation. There have also been some changes in the language used to express these ideas, with terms such as heritage assets, significance and conservation planning entering the lexicon.

This book is about managing the maintenance and repair of historic buildings and places: what we may now refer to as 'heritage assets'. It explains the theories and principles that underpin building conservation in the 21st century, and shows how they may be applied in practical terms.

The book begins with a chapter tracing **The Evolving Concept of Building Conservation** in England from its origins up to the present day, and examines the ways in which attitudes to conservation have changed – and will continue to change – under the influence of developing ideas, beliefs, and wider political, social, economic and cultural factors. **Current Law, Policy & Guidance** reviews planning legislation, guidance, codes and standards concerning building conservation in England. **Conservation Planning for Maintenance & Repair** explains how a values-based method for safeguarding and sustaining the significance of heritage assets translates into practice. The wide range of **Survey & Investigation Methods** for understanding the history and evolution of a building, its construction and condition, are reviewed. **Ecological Considerations** examines the relationship between the natural and historic environments, and emphasises the importance of understanding the ecological interest of historic places, and how to reconcile conflicts between fauna and flora and historic buildings. **Managing Maintenance & Repair** describes the processes involved in devising, planning and managing programmes of maintenance and repairs for buildings of all types and sizes. Finally, the chapter **Planning for Emergencies** deals with risk assessment, risk management and preparing for unforeseen events such as fire and flood. Practical advice is given on management and measures to mitigate threats to significance.

USING THESE BOOKS

For accessibility and ease of use, the information given in the text has not been footnoted, and rather than references, short lists of further reading are given at the end of the appropriate chapters. References to other sections within the text are given in **bold**, and references to other publications in ***bold italics***.

Links to other books in the *Practical Building Conservation* series are indicated throughout the text by the relevant volume symbol, showing that more information on the topic will be found in that volume.

The other volumes in the series are:

- Building Environment 
- Concrete 
- Earth, Brick & Terracotta 
- Glass & Glazing 
- Metals 
- Mortars, Renders & Plasters 
- Roofing 
- Stone 
- Timber 

Although every attempt has been made to explain terms as they first occur in the text, a glossary has also been included, and will be found just before the index.

The *Town and Country Planning Act 1947* (developing its 1944 precursor) introduced a comprehensive national system for regulating the use of land in the public interest. It also allowed for Preservation Orders to be made on historic buildings in use, and required the relevant minister to produce a national list of buildings of 'special architectural or historic interest', the start of statutory listing. The emerging list owed much to pre-war unofficial local surveys, which had helped to inform lists of buildings compiled in 1940–44 as priorities for first aid repair in the event of bomb damage.

Protection inevitably demanded selection. The initiative was now with architectural historians in the Ministry of Housing, rather than archaeologists in the Ministry of Works. Age was, and remains, key to selection for protection, with inclusion in the statutory lists becoming progressively more selective through time. The lists soon included a small number of Victorian buildings as the principal works of the leading architects of the time, so that, albeit very selectively, the potential interval between construction and recognition of cultural significance narrowed to half a century.

As the listing criteria gradually embraced first 'Edwardian', then inter-war, and finally post-war, buildings, all initially with very restrictive selection criteria, so the gap closed further. A '30-year rule' was set, and soon was reduced to 10 years for buildings deemed to be of 'outstanding' importance and under threat. Architects have had to come to terms not only with their buildings being listed during their lifetime – an honour – but also to working on them for a second time, like Norman Foster at the Willis (originally Willis Faber & Dumas) Building in Ipswich, under the constraints of listing .

Facing page: When this glass-clad building designed by Foster Associates for the Willis Faber & Dumas Company in 1973—75 was given Grade I status in 1991, it became the first structure less than 30 years old to be listed.

In 1992, it was also the subject of the first Listed Building Management Agreement, a formal agreement between the owner and the local planning authority providing "*clarification as to what proposals for the building may not require Listed Building Consent and/or planning permission.*"

1950

1950

The Gowers Report recommends that owners of outstanding country houses should be eligible for tax and death duty relief (although this does not happen until 1980).

1951

Founding of the International Institute for Conservation of Historic and Artistic Works [IIC].

Creation of the first National Park (in the Peak District).

1951

Publication of the first volume of Nikolaus Pevsner's ***Buildings of England*** series, covering Cornwall.

1953

Historic Buildings and Ancient Monuments Act introduces national grant schemes for the repair of historic buildings and ancient monuments, and creates the Historic Buildings Council to advise government.

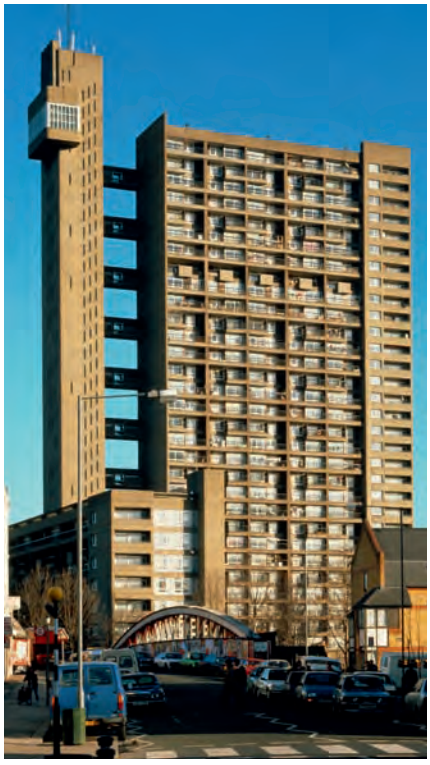
1954

Howard Colvin's ***Biographical Dictionary of British Architects 1600–1840*** first published.

The wide range of listed buildings

The term 'building' is defined broadly in the legislation and may include such things as lamp posts, telephone kiosks, lime kilns, bridges, cranes, railings, garden walls, statues, milestones, and man-made landscape features such as ha-has and grottos. Listing formalises a structure's special architectural and historic interest, and brings decisions about its future under the consideration of the planning system. All buildings built before 1700 that survive in anything like their original condition are listed, as are most of those built between 1700 and 1840. The criteria become tighter with time, so that post-1945 buildings have to be exceptionally important to be eligible for listing; normally, a building must be over 30 years old.

Since the 1990s, English Heritage has undertaken thematic assessments for listing that are focused on particular types and locations of 'heritage assets' (for example, railway buildings, military structures, post-Second World War buildings, cinemas, schools, agricultural buildings, letter boxes and many others). It has also published a series of selection guides setting out the assessment criteria for a wide range of buildings and structures (see Current Law, Policy & Guidance: Further Reading).



Clockwise from top left: Trellick Tower, Royal Borough of Kensington and Chelsea, London (Grade II*); Second World War tank obstacles, Isle of Grain, Kent (Grade II); hand-operated dockside crane, Bristol (Grade II); E. Pellicci café, East London (Grade II); K2 telephone kiosk (Grade II).

Many local authorities produce guidance tailored to local building types and traditions. Interpretation can vary between authorities, especially concerning the need for consent for repair which follows such good practice. Routine maintenance and minor repairs are unlikely to require Listed Building Consent if they do not affect the significance of the heritage asset. Proposals for substantial intervention and the introduction of new materials are much more likely to require consent than those which minimise replacement of historic fabric, and use materials and techniques which match the originals (***Mynors 2006***).

The advice of the local authority conservation officer should therefore always be sought before embarking on any significant repair or periodic renewal of the fabric of a listed building, since undertaking works requiring, but not having, consent is a criminal offence. If work is undertaken without consent, the local planning authority can issue a listed building enforcement notice, as well as prosecuting those responsible. Where a Listed Building Consent application is necessary, every effort should be made to respond to the local planning authority's pre-application advice and to provide the information required to support the application.

Listing for group value

New Bolsover Model Village (Grade II). Buildings may be listed for 'group value' where they are part of an important architectural or historic group, or are fine examples of planning, such as terraces, squares or model villages. Bolsover Castle, visible in the background, is a listed building (Grade I), a Scheduled Ancient Monument, and a Registered Park and Garden (Grade I).

The granting of Listed Building Consent does not obviate the need for planning permission if the proposals involve a material change to the external appearance of a listed building. Few conservation repair projects that follow the good practice necessary to achieve consent (or agreement that consent is not required) are likely to do so. Where it is required, however, Listed Building Consent and planning permission should normally be sought at the same time. Whilst applications for Listed Building Consent should be determined against national policy and guidance, applications for planning permission for the same works must also comply with local planning policies. Obtaining Listed Building Consent does not imply that planning permission will be granted for the same works, or vice versa.

Ladders may be used for simple tasks of short duration (such as inspections and cleaning debris from gutters). A risk assessment is required to justify the suitability of a ladder as opposed to other access equipment options.

HEALTH & SAFETY AT WORK

A range of health-and-safety legislation exists that may affect the conservation of historic buildings. This includes the ***Workplace (Health, Safety and Welfare) Regulations 1992*** and amendments, which cover a wide range of basic health, safety and welfare issues, and apply to most workplaces. The regulations include requirements for workplaces to be maintained in efficient working order (for health, safety and welfare), and that safe routes are provided for circulation in and around the building. In practical terms, there are seldom major conflicts between this legislation and building conservation. However, there may be instances where problems arise, for example, when there is the need to eliminate trip hazards on historic floors or paved areas. Other requirements concerning windows (including cleaning), doors and stairways may affect the conservation of these elements, particularly when a building is brought within the scope of this legislation due to a change of use to a workplace.

Other relevant health-and-safety legislation covers contact with hazardous materials, such as asbestos, and working at heights. The ***Construction (Design and Management) Regulations 2007*** (***CDM Regulations***) makes health, safety and welfare requirements in respect of building operations. The implications of this legislation are discussed in the **Survey & Investigation Methods** and **Managing Maintenance & Repair** chapters of this book. The Health and Safety Executive [HSE] publishes a wide range of detailed guidance (see **Further Reading**).

EUROPEAN UNION DIRECTIVES & STANDARDS

As a member state of the European Union [EU], the UK is obliged to abide by its rules, conform to all ***European Commission*** [EC] ***Regulations***, and incorporate the requirements of any EC Directives into its own legislation. Building conservation is affected by EU Directives, mainly in areas such as general building regulations, procurement, materials standards and restrictions on the availability or use of some traditional building materials, like paint containing white lead, and these do not always take account of heritage impacts. In 2003, a Working Group on EU Directives and Cultural Heritage was set up to research, document, monitor and communicate the consequences of Directives for cultural heritage, with the hope that any adverse effects could be mitigated either at the drafting stage, or when implemented in national law.

By 2007, some 25 directives had been identified and reviewed by the Working Group, in subject areas ranging from restrictions on biocidal and hazardous products, fire safety regulations, and energy efficiency and performance in buildings, including work relating to ***Directive 99/13*** on the limitation of emissions of volatile organic compounds in paints [VOCs], and ***Directive 98/8/EC*** on biocidal products. Member states, including the UK, have also been able to enact derogations within their own legislation that specifically address cultural heritage assets and permit use of restricted materials. The Working Group has pressed for a standard 'clause of special consideration' for cultural heritage, which would support similar inclusions by member states in developing national laws.

THE EUROPEAN COMMITTEE FOR STANDARDISATION

Acknowledging the lack of broad standards for European practice, in 2004 the European Committee for Standardisation (*Comité Européen de Normalisation*) [CEN] began a project to formulate pan-European standards for the conservation of cultural property (***CEN/TC 346 Conservation of cultural property*** (11 parts; standards under development)). The aim is "*to acquire a common unified scientific approach to the problems relevant to the preservation/ conservation of the Cultural Heritage. Moreover, this common approach and the use of standardised methodologies and procedures would promote the exchange of information, would avoid the risk of duplication and foster synergy between the European experts and specialists involved in the preservation activity*."

The CEN project aims to draft standards in eight areas, including terminology, materials characterisation, and the evaluation of conservation product performance and environmental conditions. Within the UK, input is being coordinated through the BSI Technical Committee for Conservation. Unsurprisingly, given the vast array of subject areas, and the need for significant volunteer input from specialists in participating countries, development has been slow and sporadic. Current progress can be tracked at the BSI website.

Keeping Up-to-Date with Changes in Legislation & Regulations

Changes in legislation and regulations are inevitable, and it is important that conservation practitioners keep up-to-date with current statutory requirements. There are several ways of doing this, including subscribing to automatically updated reference publications or to online information-handling services. Information may also be obtained from the websites of the relevant government departments, and agencies such as The Health and Safety Executive. The 'Planning Portal' provides online access to information and guidance about planning legislation and building regulations, including ***Building Regulation Approved Documents.*** Official guidance publications are generally available as online downloads, free of charge. Other sources of information include professional and trade journals, and professional conferences or courses organised by professional institutions, universities and other training organisations.

A list of useful sources of information about legislation is given in **Further Reading** at the end of this chapter.

However, the buildings and places that are now valued are far more diverse than in the past and no longer simply ancient. Many of these heritage assets require different approaches to conservation and more negotiation in order for their particular values to be sustained. It is as one moves from the more ancient to the more recent that a values-based approach becomes essential, particularly as design values make a greater contribution to the significance of a building listed as part of the 'national collection'. Retaining their design values (and, on occasions, recovering them from crude interventions) can conflict with sustaining other values.

The challenges of modern buildings

Top: Radar Training Station, Fleetwood, Lancashire, 1961–62 (Grade II), designed by Eric Morris Hart, and described by Sir Nikolaus Pevsner as 'a cute little piece'. The significance of a modern building is usually attributable more to its design value than any other heritage values. In such cases an approach to maintenance and repair that retains the building's intended appearance will be needed, although this may conflict with sustaining other values.

Bottom: Park Hill, Sheffield (Grade II*), built by Sheffield Corporation City Architect's Department and opened in 1961, was the first major scheme of slum clearance to be completed in England after the Second World War. It was also the first housing development to utilise external deck access ('streets in the sky'), which was conceived as a way of recreating the community spirit of traditional streets. Although Park Hill was initially successful and well-liked by residents, by the 1980s it had become dilapidated and unpopular.

The building was listed in 1998 amid controversy: many people were strongly in favour of its demolition. Park Hill is currently undergoing repair and rehabilitation to provide a mix of private and social housing. As part of this work the original brick façade panels are being replaced with storey-height glass and brightly-coloured aluminium cladding panels. While this alteration has an impact on heritage values, the justification is that it improves the environment of the dwellings and enhances the 'image' of the development, which is perceived to be an economic necessity.

Preservation and use

The Severn Bridge (which carries the M48 motorway over the River Severn) is listed at Grade I. It was opened in 1966, and was the first bridge in the world to use a streamlined, welded steel deck and inclined hangers.

It is interesting to consider the ways in which the approach to the maintenance and repair of the Severn Bridge must differ from that for another Grade-I listed bridge: the Iron Bridge in Shropshire, erected in 1779 and now preserved as a museum object.

English Heritage Guidance on Maintenance & Repair

English Heritage's ***Conservation Principles (2008)*** includes specific guidance on particular types of intervention and criteria against which proposals should be evaluated, both at the level of the historic environment as a whole and within the high-level ***Conservation Principles***. The sections on *Maintenance*, *Periodic Renewal* and *Repair*, reproduced below, are particularly relevant. But there will be occasions where policies concerned with *Restoration* and *New Work and Alteration* will also be relevant, where reversion to earlier arrangements (for example, to an earlier type of roof covering) or new interventions (for example, the insertion of roof hatches to make valley gutters accessible for cleaning) arise as options for works primarily of repair.

Routine Maintenance & Management

The conservation of significant places is founded on an appropriate routine of maintenance and management.

Periodic Renewal

Periodic renewal of elements of a significant place, intended or inherent in the design, is normally desirable unless any harm caused to heritage values would not be recovered over time.

Repair

Repair necessary to sustain the heritage values of a significant place is normally desirable if:

- there is sufficient information to understand the impacts of the proposals on the significance of the place
- the long-term consequences of the proposals can, from experience, be demonstrated to be benign, or the proposals are designed not to prejudice alternative solutions in the future
- the proposals are designed to avoid or minimise harm if actions necessary to sustain particular heritage values tend to conflict.

THE AMOUNT & DURABILITY OF REPAIR WORK

All buildings inevitably deteriorate with exposure to the environment and wear-and-tear from building users. It is important, therefore, to consider whether building fabric will benefit from repair, or whether repair itself will adversely affect or limit long-term durability. There are clearly instances where repair is essential; for example, refilling open mortar joints. The case for repair becomes less clear, however, when mortar joints are evenly, but not deeply, eroded. The decision whether or not to repoint must be based on a clear understanding of the durability of the existing mortar, the ongoing rate or erosion, and how erosion of the mortar joint or the physical properties of the mortar affect condition of surrounding building fabric.

For example, in brickwork where the original lime mortar joint has eroded back from the brick face by 5 or 6 mm over 230 years, the rate of erosion is approximately 2.6 mm every century. If the brick condition is good, with only minimal surface decay, and erosion limited to minor rounding of the brick arrises, it is reasonable to assume that the brickwork and mortar joints are still working together effectively. Assuming a reasonably consistent decay rate, repointing might not be required for at least 50 years, or when the joint erosion reaches 8–10 mm. At this point the increased exposure of the brick surface would be likely to reduce future durability of the brick. Periodic inspections enable the rate of decay to be monitored, and allow informed judgements to be made about the optimal time for repair to be carried out to maximise the life expectancy of the brickwork.

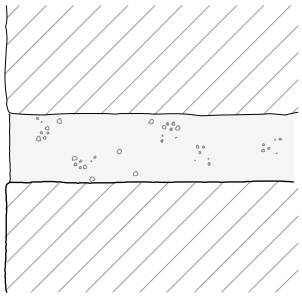
The following table compares the life-expectancy of various types of stonework repairs and illustrates the influence that workmanship has on durability.

DURABILITY OF REPAIR WORK

REPAIR TYPE	DURABILITY OF WELL-EXECUTED REPAIRS	DURABILITY COMMONLY SEEN IN SUB-STANDARD REPAIRS
Stone indent or piecing-in repair	60 to 120 years	10 to 20 years
Mortar repairs in sheltered locations	30 to 60 years	5 to 15 years
Mortar repairs in exposed locations	<20 years (not recommended)	<10 years
Mortar joint repointing	60 to 120 years	5 to 15 years
Shelter coating	<20 years	<10 years
Stone replacement	100+ years	<30 years
Brick replacement	100+ years	<30 years

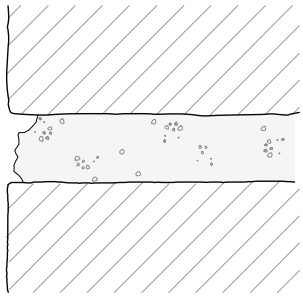
TYPICAL LIFE HISTORY OF LIME MORTAR JOINTS

1: AS BUILT (1650)



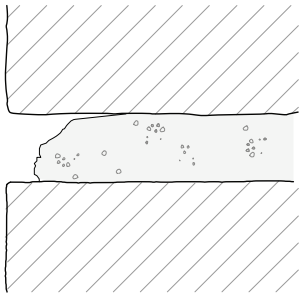
Mortar: One part non-hydraulic lime with kiln slag: two parts sand. Joints finished flush with face of masonry.

2: AFTER 1 YEAR



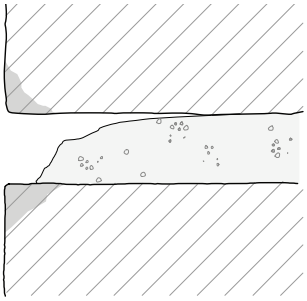
First winter attacks weak, non-hydraulic lime before it has time to stiffen.

3: AFTER 2 YEARS



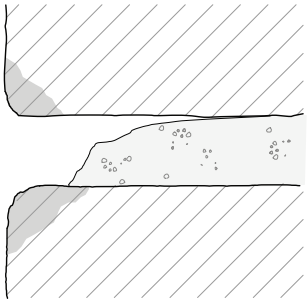
Early frost attack has weakened all joints, allowing rain penetration to core filling.

4: AFTER 2–10 YEARS



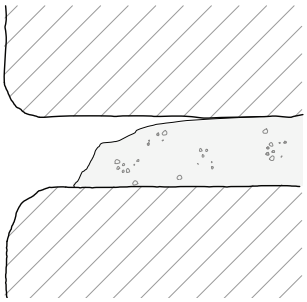
Masonry arrises, exposed by disintegration of mortar, become saturated during rain.

5: AFTER 10–50 YEARS



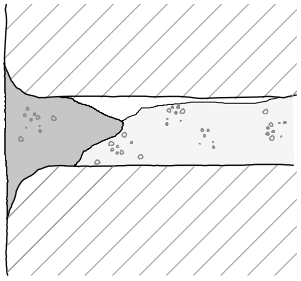
Frost causes further damage to exposed, saturated arrises, which are further weakened by acidic rain and stresses caused by crystallisation of soluble salts within the pores of the masonry.

6: AFTER 50–200 YEARS



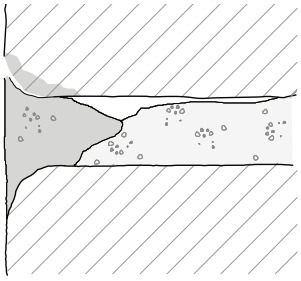
Further weathering rounds off damaged arrises. By now the lime mortar has hardened sufficiently to resist further rain attack.

7: 1890



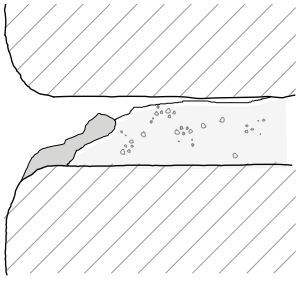
Repointing carried out in Portland cement mortar finished flush with the face of the weathered masonry. The apparent width of the joint is doubled, changing the visual character of the masonry. Voids are left due to inadequate joint preparation.

8: AFTER 20 YEARS



High strength, good adhesion and impermeability of cement mortar accelerate decay of vulnerable masonry. Rain penetrates hairline cracks between mortar and masonry.

9: AS FOUND



Further saturation and freezing loosens and then detaches most of the dense pointing, increasing vulnerability of masonry to further damage.

Diagram after John Ashurst

RESTORATION

An issue that often arises when devising a programme of repair is whether, or where, to include an element of restoration, and if this can be justified. English Heritage's ***Conservation Principles*** defines restoration as returning a heritage asset "*to a known earlier state, on the basis of compelling evidence, without conjecture*". The document sets out a number of criteria which, if met, would normally make restoration acceptable. Indeed, the distinction between restoration and repair may well become blurred when architectural details and/or decorative elements that are important to the character and appearance of a historic building become eroded or damaged. Understanding the values of these elements, particularly evidential and aesthetic values, and their relative contribution to overall significance, should guide decisions, so far as resources permit.

In relation to missing elements, Christopher Brereton's comment still holds good: "*Some elements of a building or monument which are important to its design, for example, balustrades, pinnacles, cornices, hood-moulds, window tracery and members of a timber frame or roof truss, may have been lost in the past. ...a programme of repair may also offer the opportunity for the reinstatement of missing non-structural elements, provided that sufficient evidence exists for an accurate replacement, no loss of historic fabric occurs, and the necessary statutory consents are obtained in advance. Speculative reconstruction is hardly ever justified.*" There will, of course, be exceptions, for example, where the form in which the fabric has survived is due to, or provides evidence of, some historically important event.

Challenges of restoration

The façades of these 16th-century timber-framed town houses were modernised in the 18th century by inserting sash windows and rendering the walls to conceal the 'unfashionable' timber framing. The render was removed from the house on the left in the 20th century, as the appearance of timber framing had become desirable again. However, the 18th-century windows were retained; at no time in its history was the building intended to look as it does now.

Hill Hall, Essex

Hill Hall came into the care of the Ministry of Works after being largely gutted by fire in 1969 *(top)*. English Heritage, the successor to the Ministry of Works, decided to re-roof it and return it to use as the only long-term means of sustaining the fabric (the brick walls have cores bedded in loam rather than mortar), preserving the remains of 16th-century wall paintings that had survived the fire, and revealing the significance of Sir Thomas Smith's design (1569–77) (*bottom*).

REMOVAL OF EARLY ALTERATIONS

THE GUILDHALL
FINCHINGFIELD, ESSEX

The Guildhall, at Finchingfield in Essex, comprises a range of 15th-century almshouses, remodelled in the 17th century. Recently, as part of a major scheme of refurbishment, it was proposed to remove the rendering from the Guildhall's principal elevation to reveal its framing. The proponents of this course of action suggested that this would bring out the historic interest of the 15th-century frame. The implication was that it would both reveal and reinforce the building's significance.

In English Heritage's ***Conservation Principles***, the definition of 'conservation' acknowledges the existence of "*opportunities to reveal or reinforce (heritage) values*"; for example, by restoring a building to a previous form by removing later accretions: in the case of the Guildhall, its render. ***Conservation Principles*** sets out a number of criteria for assessing restoration proposals. The primary test is whether "*the heritage values of the elements that would be restored decisively outweigh the values of those that would be lost*".

The Guildhall, Finchingfield.

Restoring a building to a previous form may be acceptable where *"the form in which a place exists is not the result of a historically significant event"*. In the case of the Guildhall this raises an important question: is not the change in local building tradition that resulted in the general rendering of East Anglian buildings (many of which had frames that were originally exposed) a historically significant event or process?

Conservation Principles provides a further test: whether *"the work proposed respects previous forms of the place"*. Analysis of the Guildhall suggests that it had been rendered in the 17th century when the original 15th-century building was altered and enlarged. Removal of the render would reveal an altered, multi-period framed structure, including later parts which had been rendered to begin with. Therefore, the result would not respect the *"previous forms of the place"* because at no time in its history did the Guildhall exist in the form proposed. It would also be incongruous in its village setting, where the timber-framed buildings remain for the most part rendered.

To return to the primary test – that of the balance of heritage values – it might be thought that this has been settled by what has been written so far. The Guildhall's present form embodies considerable evidential and historical value. The removal of the render would diminish both. The rendered finish is aesthetically satisfactory when compared with the incoherent appearance that would result from its removal. This conclusion may also be framed with reference to authenticity, a quality dependent on *"Those characteristics that most truthfully reflect and embody the cultural heritage values of a place"*. The authenticity of the Guildhall resides in its development, and that of the Essex vernacular building tradition, over time, and this would be gravely harmed were the render to be removed.

The Guildhall in Thaxted, Essex.

It must be acknowledged, however, that heritage values may be keenly debated. Past restoration of timber-framed buildings by the removal of later renders continues to shape many people's appreciation of this tradition. Few people would pause to question the exposed and limewashed framing of the very fine Guildhall at Thaxted, a few miles from Finchingfield, although its restoration in 1911 was itself controversial.

Orthophotography

Top: A standard photograph of the south doorway of Kilpeck Church, Herefordshire, showing scale distortion.

Bottom: An orthophotograph of the south doorway of Kilpeck Church. The orthoprojection makes it possible to view the entire doorway at the same scale. Topographic detail can be combined with orthophotographs if required, with the line drawing appearing on top of the photographic image.

ORTHOPHOTOGRAPHY

An orthophotograph is a photograph that has been corrected for scaling variations arising out of the relief of the subject, as well as tilts of the camera relative to it. Orthophotographs are useful when an image-based output is required, but the subject is not sufficiently flat for rectified photography to be used. Using the digital photogrammetric process, it is possible to produce a digital terrain model [DTM] that is an accurate representation of the surface of the land or elevation of a building. The DTM can then be used to adjust the scale of an image, pixel by pixel, and thereby convert it from a photograph with perspective projection to one with orthographic projection: an orthophotograph.

The stereo photography for an orthophotograph of a building must be taken as square-on to the façade as possible, to minimise any gaps in the image that might be caused by, for example, a projecting feature that occludes the detail behind it. An orthophotograph can be printed out at the required scale, or imported into a CAD package. Within the CAD package, it can be combined with line data from conventional photogrammetry to produce a composite product. It should be remembered that an orthophotograph is two-dimensional, and so contains no depth information. However, an orthophotographic image can be 'draped' over a DTM using three-dimensional modelling or visualisation software.

INDIRECT METRIC SURVEY TECHNIQUES

TYPE		USES	SCALE	RANGE	REQUIREMENTS
RECTIFIED PHOTOGRAPHY					
2D	SCALED IMAGES	Condition recording and assessment Works scheduling	1:20 to 1:50	2 m to 50 m	Metric or non-metric camera Precise control data or scaling information Rectification software
PHOTOGRAMMETRY					
3D	STEREO PAIRS	Recording Condition monitoring	1:20 to 1:200	2 m to 100 m	Calibrated camera Scaling or precise 3D control data
	LINE DRAWINGS, CAD	Architectural 'stone by stone' drawings Topographic surveys Landscape surveys Condition recording Works scheduling	1:20 to 1:200	2 m to 100 m	Photogrammetric plotting machine/software: analytical or digital
	ORTHOPHOTOGRAPHS	Conservation plans, landscape survey, condition recording, condition assessments, works scheduling	1:20 to 1:200	2 m to 100 m	Operator experienced in stereo-viewing and image interpretation
	DIGITAL ELEVATION MODELS [DEM]	Condition monitoring Surface and 3D modelling Reverse engineering Visualisations	1:5 to 1:50	2 m to 100 m	Image processing CAD and 3D-modelling software
LASER SCANNING					
3D	TERRESTRIAL SCANNER Point clouds, meshed surface models	Surface and 3D modelling Record drawings Visualisations Reverse engineering	1:20 to 1:100	5 m to 500 m	Scanner, post-processing and 3D-modelling software
	CLOSE-RANGE 'ARTEFACT' SCANNER Point clouds, meshed surface models	Condition monitoring	Actual size to 1:10	0 m to 5 m	Scanner Post-processing and 3D-modelling software

BUILDING CONDITION SURVEYS

There is no single 'standard' approach for each survey type; the level of detail and method of presentation will depend, to a large extent, on the experience of the building professionals and the brief they are given. Before commissioning a condition survey, it is advisable to ask a potential surveyor to provide examples of past survey work and a detailed summary of experience. It should always be remembered that surveys can be tailored to meet the specific needs of a particular case. It is essential to be clear about the purpose of a survey and what information is needed, as this will have a bearing on the level of detail and accuracy required. As with measured surveys, it can be helpful to include a short statement in the brief about the purpose of the survey, to make sure that the objectives are clear and that all the necessary information is obtained. Where site conditions or available resources (including access) limit the closeness of inspection, there will be a greater degree of uncertainty in the conclusions that can be drawn. Survey accuracy is discussed later in this chapter.

It is important that any past condition survey reports and maintenance records are made available wherever new condition surveys are commissioned. Past data can provide valuable information about decay rates, and the success and durability of past treatments and repairs. Commissioning surveys without reference to past work may result in inappropriate recommendations and unnecessary intervention. The main types of building condition survey are described here.

6.0 ROOF COVERINGS

NOTES: See key plan

PRESENT CONDITION	WORKS REQUIRED	PRIORITY
6.1 Porch - E Slope (1)		
6.1.1 Random slate in fair condition with some moss colonisation; crested clayware ridge in good condition.	Remove moss; minor repairs to replace/refix 15 no cracked/ displaced slates.	A
6.1.2 Lead valley in fair condition.		
6.1.3 Metal (not cast iron) OG eaves gutter in good condition but requires clearing.	Clear out gutter.	A
6.1.4 Plastic RWP in poor condition.	Replace defective RWP.	A
6.2 Porch - W Slope (2)		
6.2.1 Random slate in fair condition; some displaced slates next to valley gutter and 7 no on lead tingles.	Minor repairs to refix displaced slates.	A
6.2.2 Lead valley in fair condition.	Renew lead lining to parapet gutter in accordance with current Lead Sheet Association (LSA) recommendations.	C
6.2.3 Lead parapet gutter (E side of Tower); no evidence of present leakage but lead lining in poor condition; length of bay exceeds current recommendations and is ridged; numerous "Flashband" patches.		
Gutter discharges to concealed internal (probably lead) RWP. Plastic grating fitted to outlet. NB: Outlet from internal gutter in Tower discharges into this gutter	Investigate condition of internal rainwater pipe, and replace if required.	C

Quinquennial survey

Example of a survey schedule produced for the quinquennial inspection of a church. The location, material and condition of each element is recorded, along with a description of the nature and extent of any necessary remedial action. Each action is assigned a priority rating, in this case:
A = Within 12 months
B = Within 12–24 months
C = Within the quinqennium.

TYPES OF BUILDING CONDITION SURVEY

DESCRIPTION	ADVANTAGES	DISADVANTAGES
PRELIMINARY, BASIC OR RECONNAISSANCE SURVEY		
At the project inception stage, carried out as part of a feasibility study to establish and review options for repair, conservation, adaptation and alteration. A basic site survey is required to find out, in broad terms, key information such as condition, construction, site access, size, and so on	Relatively low cost Useful fact-finding exercise Can avoid potential expense by eliminating unsuitable options at an early stage	Only intended to provide broad understanding; further surveys are required to provide greater detail
PERIODIC SURVEY		
Also known as property management surveys (for example, quadrennial and quinquennial surveys) The primary survey type for maintenance planning and management	Information is prioritised into years when repair work is required and includes budget costs An excellent way of planning for and implementing cyclical maintenance Can provide a valuable data base of information on condition, and past maintenance and repair	Computer-based systems which require minimal data input, particularly for defect analysis, frequently have limited value Not suitable for improvement work or 'project work', which involves detailed or extensive conservation and repair
BUILDING FABRIC SURVEY		
Also known as a 'full', 'comprehensive' or 'detailed condition survey' The principal survey type when a detailed condition analysis is required. Surveys can be tailored to establish the amount and scope of future conservation and repair project work. Variations on this survey can include: • Prioritised recommendations for maintenance and repair over specific time periods. For example, urgent, within two years, within five years, within 10 years, within 20 years • Prioritised cost budgets • Tabulated 'defect schedules' which list and describe all visible defects • Recommendations for conservation and repair	A comprehensive understanding of condition, and the requirement for conservation and repair Can be tailored to specific needs	Relatively high initial cost, but when correctly used are very cost-effective
STRUCTURAL SURVEY		
Structural surveys investigate the structural performance of a structure and are provided in addition to building fabric surveys	Specifically investigate and report on structural performance of buildings, structures or structural elements	Structural surveys generally do not assess condition unless it directly affects structural performance Recommendations can be limited to structural repair and may not address cosmetic issues Structural surveys are often confused with building fabric surveys, but do not look at the condition of the building fabric as a whole and each of its individual elements

PLANNING FOR SALVAGE

PREPARING A SALVAGE PLAN

Experience has shown that the losses and damage caused by emergencies to heritage assets can be mitigated by adequate pre-planning. In buildings where there are collections of works of art, books or furniture of high significance, a written emergency plan should be prepared that identifies:

- the personnel responsible for salvage operations, including the Salvage Officer and their deputy (contact list for management teams and service providers)
- site and building plans (with keys)
- salvage priorities
- salvage procedures for the removal of items
- specialist facilities for the temporary storage and emergency first-aid conservation of objects
- arrangements for the longer-term storage or treatment of salvaged material.

The plan should also prompt the procurement of response equipment, and identify a schedule for its maintenance. The fire and rescue service should be made aware of the existence and content of the plan.

Once a plan is written, it must remain fit for purpose, so it needs to be tested and maintained. Regular training exercises aid this process and ensure that the people using the plan are familiar with it. The steps for testing a plan are as follows:

- undertake a full-scale exercise
- update the plan
- full-scale exercise
- update the plan again.

The contact lists for the management teams, members of salvage teams and equipment suppliers are often difficult to keep up-to-date. Review contact lists regularly and ensure the escalation ('telephone tree') process works regardless of the time of day.

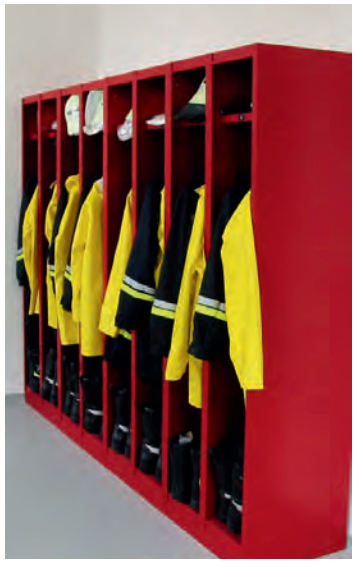
When a disaster occurs, contacting the staff may take a long time, and occupy the person who is first on the scene and has many other tasks to perform. An alternative solution is to contract-out the task to a third party, such as a call-receiving centre. The third party would be required to periodically check the lists and make test calls.

All incidents, even if they are relatively minor, should be reported to management, so that a record can be made of their nature, size and potential impact. These reports can then be used to take action before the incident is repeated, which could be more serious the second time around.

TRAINING OF SALVAGE TEAMS

Training should include how to undertake a risk assessment and working safely in adverse conditions. The most likely risks in order of magnitude are: manual handling, trips and slips, falling objects (tiles, overhead working), burns and scalds, electric shock, smoke inhalation, structural collapse, and drowning.

Practical aspects of training include reading plans, identifying objects on the salvage list, removing paintings from their fixings, handling objects and carrying out first-aid treatment of damaged items. All these should be practised in simulated conditions. These practices should periodically include joint exercises with the fire brigade. A log book should be provided so that a record of training can be kept.



Training of salvage teams

Top left: Participants on an emergency training course at a historic property discuss access issues with the fire service.

Top right: Check in/out procedure in operation to ensure everyone is accounted for in the event of an evacuation.

Bottom left: A 'human chain' is an effective method for moving a large number of objects quickly.

Bottom right: Personal protective clothing and equipment for the salvage team, stored ready for use in an accessible location.

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