Technical Conservation
Guidance and Research

November 2019
Summary

This brochure lists our technical conservation guidance and research reports on all aspects of the repair and maintenance of the historic built environment.

All our advice and reports are free to download from the relevant sections of our website HistoricEngland.org.uk. If you are online, each publication can be opened by clicking on the thumbnail image, or the weblink at the foot of the page will take you to the relevant web site section.

We’re adding to our technical conservation guidance and research reports throughout the year. To find out about the latest guidance go to our new Advice Finder HistoricEngland.org.uk/advice/find/

For more information about our technical advice and research please contact conservation@HistoricEngland.org.uk

Front cover: Fibrous plasterwork in the Daily Express Building, London (Herbert Owen Ellis and William Lee Clarke with Sir Owen Williams, 1932)

This document has been prepared by the Technical Conservation Team, Historic England, November 2019 (v3). All images © Historic England unless otherwise stated.

HistoricEngland.org.uk/advice/technical-advice/
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What’s New

- Guidance on lightning protection for historic buildings (page 13)
- Guide to fire fighting in thatched buildings (page 13)
- Church roof replacement using terne-coated stainless steel (page 18)
- Advice on the conservation of fibrous plaster (page 18)
- Research on environmental deterioration of stained glass (page 22)
- Report on our nine-year research project into the role of soft capping for ruins (page 22)
- Report on a pilot study on mapping pests and disease to trees in historic parks and gardens (page 28)
- A catalogue of Capability Brown’s architectural drawings and sketches (page 28)

Lightning protection

We recommend that lightning protection is considered for all churches, and tall or prominent historic buildings. However there is no system that will give absolute protection, and the significance of a building needs to be balanced against providing an acceptable level of protection.

Our guidance provides advice on the design, installation and maintenance of lightning protection systems for architects, surveyors, engineers and others involved in the care of historic buildings.

Photo © Stuart Lilley Photography
Fibrous plaster

This is our interim guidance on the care and management of historic fibrous plaster. It is supported by the other UK home countries heritage bodies and professional associations. The guidance emphasises the importance of accurate survey of the material by competent professionals. Research into the deterioration, assessment and conservation of fibrous plaster is on-going, and more detailed advice will be published in due course.

Out soon

Environmental protection for stained glass

Stained glass windows form a highly sensitive interface between the exterior and the interior, making them vulnerable to problems including rain penetration and condensation. This guidance shows why evaluating environmental problems and finding solutions requires collaboration between stained-glass conservators, architects/surveyors, and potentially other specialists such as stone conservators, metal conservators, building performance specialists, and building services engineers. For intractable problems or very fragile and important glass, Environmental Protective Glazing (EPG) can greatly reduce deterioration, though not without some impact on the appearance of the window and of the building. This guidance includes details of optimal configurations for the design of EPG, based on our research report (page 22).

Soft capping to protect ruins

The impetus for this research was to assess the effectiveness of soft capping (turfs and soil) as an alternative to the use of stone and mortar (hard capping) for protecting vulnerable wall tops on historic, usually ruined, masonry. Hard capping had been used on English Heritage sites over the past century, but these were costly, ineffective and appeared to exacerbate the decay of stonework below the wall heads. Following successful pilot tests, a full research programme began in 2004 comparing the performance of hard and soft capping. Our peer reviewed report describes all the work and documents the results which show how effective and economical soft capping is at protecting historic masonry. Guidance on the use of soft capping will be available in spring 2020.
Practical Building Conservation

Practical Building Conservation is a comprehensive and practical series of reference books for professionals.

The series builds on the research and field experience of Historic England, and is aimed at those who work on or look after historic buildings: primarily architects, surveyors, engineers, conservators, contractors and conservation officers, but also owners, curators, students and researchers.

Published by Routledge on our behalf, the books are available to purchase from their website. The revised and expanded ten-volume series includes:

- **Conservation Basics** (2013)
  The history and evolution of building conservation in England, and current best practice for planning conservation projects

- **Concrete** (2013)
  The history of concrete, and best-practice conservation

- **Building Environment** (2014)
  How buildings systems and materials interact with their surroundings, and the ways they are used (including energy reduction)

- **Earth, Brick & Terracotta** (2015)
  The history and conservation of fired and unfired clay materials, including earth, brick, terracotta, and tiles

HistoricEngland.org.uk/pbc
Practical Building Conservation

Glass & Glazing (2012)
The history of architectural glass, and best-practice conservation of plain and stained-glass windows, glass roofing, and modern facades

Metals (2012)
The history and conservation of both ferrous and non-ferrous architectural metalwork, including railings, fittings, and statuary

Mortars, Renders & Plasters (2012)
The history and conservation of mortars, including the design and preparation of new mortars for repair and construction

Roofing (2013)
The history and conservation of traditional roof coverings, including thatch, stone slates, tiles, lead and other metals

Stone (2012)
The history and conservation of architectural stonework, including masonry, carved decoration, and ruins

Timber (2012)
The history and conservation of timber in historic buildings, from timber frames through to joinery and fixings
Historic England has produced a wide range of practical guidance to help owners and managers as well as building professionals involved with energy efficiency improvements to historic buildings.

Improving the energy efficiency of historic buildings, whether listed, in a conservation area or built before 1919, can be done sympathetically and without compromising their character. Our guidance explains how to go about it, and includes guidance on draughtproofing, insulation and even ways of generating energy.

We advocate the whole house approach to energy efficiency. Our guidance explains how to plan energy efficiency improvements in older buildings and how to comply with regulations.

Energy efficiency and older houses

Guidance on energy planning for historic buildings - the ‘whole house approach’ (2018)

Energy efficiency
Technical guidance

Practical advice on energy performance


Guidance for advisors on assessing energy in historic buildings (2015)

Energy generation options available to owners of older buildings

Guidance on installing solar arrays on roofs (2018)

Guidance on installing heat pumps in historic buildings (2017)
Energy efficiency
Technical guidance

This series of guidance provides advice on the principles, risks, materials and methods for making changes to the building fabric to improve energy efficiency.

Roofs

- Insulating pitched roofs at rafter level (known as ‘warm roofs’) (2015)
- Insulating pitched roofs at ceiling level (known as ‘cold roofs’) (2016)
- Adding or upgrading flat roof insulation (2016)
- Insulating thatched buildings: the risks, materials and methods (2016)

HistoricEngland.org.uk/energyefficiency
Energy efficiency
Technical guidance

This series of guidance provides advice on the principles, risks, materials and methods for making changes to the building fabric to improve energy efficiency.

Chimneys and walls

Preventing draughts from unused or intermittently used chimneys and flues (2016)

Insulating timber-framed walls (2015)

Insulating traditional solid walls (2016)

Insulating pre-Second World War masonry cavity walls (2016)
This series of guidance provides advice on the principles, risks, materials and methods for making changes to the building fabric to improve energy efficiency.

Windows, doors and floors

Draughtproofing windows and doors to reduce energy use (2016)

Upgrading the thermal performance of windows using secondary glazing (2016)

Insulating dormer windows (2016)

Insulating suspended timber ground floors and timber upper floors (2016)

Insulating solid ground floors (2016)
Energy efficiency
Research reports

Research underpinning Historic England’s technical guidance on energy efficiency.

Building analysis

- **Reducing Energy Use in Traditional Dwellings**
  Prepared for Historic England by Chris Newman, Parity Projects Ltd
  Research Report Series no. 9-2017

- **The Sustainable Use of Energy in Traditional Dwellings: Using legislation and policy to guide decision-making**
  Prepared for Historic England by the Centre for Sustainable Energy
  Research Report Series 46-2017

- **EPCs and the Whole House Approach**
  A Scoping Study
  Report prepared by the Sustainable Traditional Buildings Alliance (STBA) on behalf of Historic England and the National Trust
  May 2018

- **A Retrofit of a Victorian Terrace House in New Bolsover: A Whole House Thermal Performance Assessment**
  Research Report

- **Correlating Maintenance, Energy Efficiency and Fuel Poverty for Traditional Buildings in the UK**
  A scoping study funded by Cadw, Historic Environment Scotland and Historic England
  Christopher Whitman, Dr Oriel Prizeman, Max Lacey Barnacle
  Welsh School of Architecture, Cardiff University
  May 2016

- **A series of interim reports looking at building performance before and after refurbishment (2011–2017)**

- **SPAB Building Performance Survey 2017**
  Interim Report
  December 2017

- **Scoping study on increasing energy efficiency through better maintenance (2016)**


- **Advice on the convergence and conflict of housing legislation, policy, standards, fuel poverty, and carbon reduction (2017)**

- **Thermal performance analysis of a Victorian brick terrace house before and after retrofitting (2015)**

- **Research by the Sustainable Buildings Alliance (STBA) on EPCs and the ‘whole house approach’ (2018)**

HistoricEngland.org.uk/researchreports/
Energy efficiency
Research reports

Research underpinning Historic England’s technical guidance on energy efficiency.

Thermal performance of walls

- Hygrothermal modelling to predict impacts of wall insulation systems (2015)
- An overview of three large-scale retrofit projects (2014)
- Report on U-value measurements of 18 solid-wall brick properties and laboratory tests (2013)

Thermal performance of windows

- Research results on heat loss through timber sash windows and methods of improving thermal performance (2009)
- Heat loss tests comparing proprietary retrofit systems for traditional timber windows (2017)
- Research results on the thermal performance of metal windows and methods of reducing heat loss (2017)
Historic England’s advice on managing buildings that are threatened by flooding, and research on flood impacts.

Guidance on preventative measures, and what to do after flooding (2015)

Research reports

Initial findings from site visits to properties ten months after severe flooding (2017)

A review of potential health risks related to conserving contaminated historic building fabric (2017)

Report on the accuracy of moisture monitoring measures during the drying out of a flooded building (2017)
Historic England provides expertise and support on building services engineering, emergency planning and fire advice.

Technical guidance

Advice on the design, installation and maintenance of lightning protection systems for historic buildings (2019)

Guide to fire fighting in thatched buildings (2019)

Guidance for churches on deciding if fire safety improvements are needed, and making improvements (2017)

Guidance on identifying threats and taking steps to reduce the risk of arson (2017)
Building services engineering, emergency planning and fire advice

Online advice

Historic England provides expertise and support on building services engineering, emergency planning and fire safety.

HistoricEngland.org.uk/advice/technical-advice/building-services-engineering/

Online advice on building services engineering

Online advice on emergency planning, emergency response plans, preparedness training and fire safety

Hot Work and Historic Buildings: Advice note on managing the risk of fire (2018)
Building services engineering, emergency planning and fire advice

Research reports

Research findings on fire risk from wood-burning stoves in thatched buildings (2018)
Technical guidance on building information modelling; and specialist survey techniques for heritage projects.

- **BIM for Heritage**
  - Developing a Historic Building Information Model
  - This guidance will help users successfully implement BIM in heritage projects (2017)

- **Photogrammetric Applications for Cultural Heritage**
  - Guidance on the practical application of photogrammetry in recording cultural heritage (2017)

- **3D Laser Scanning for Heritage**
  - Advice and Guidance on the Use of Laser Scanning in Archaeology and Architecture
  - Third edition providing updated guidance on the use of three-dimensional (3D) laser scanning across the heritage sector (2018)

- **Metric Survey Specifications for Cultural Heritage**

- **Multi-light Imaging**
  - Highlight-Reflectance Transformation Imaging (H-RTI) for Cultural Heritage
  - These guidelines focus on the equipment required and the method to produce Highlight-Reflectance Transformation Imaging (H-RTI) (2018)

- **Traversing the Past**
  - The Total Station Theodolite (TST) in Archaeological Landscape Survey
  - These guidelines cover the electronic Total Station Theodolite (TST) and its use in landscape archaeology (2016)
Geospatial survey
Research reports

Research reports on surveys involving photogrammetry, laser scanning and other techniques.

A survey of the historic carvings at Carlisle Castle, Cumbria, using Structure-from-Motion photogrammetry and terrestrial laser scans (2016)

Geospatial survey of the standing medieval crosse at the Church of St Edward and the Market Place, Leek, Staffordshire (2016)

Recording of artefacts from Helmsley Archaeological Store (English Heritage) using Structure-from-Motion (2016)

Report looking at different techniques to record inscriptions on a stone (2019)

Coming soon

BIM for Heritage: Developing an Asset Information Model

Measured and Drawn: Techniques and practice for the metric survey of historic buildings (3rd edition)

HistoricEngland.org.uk/advice/technical-advice/recording-heritage/
Advice on how to maintain and repair historic buildings, including the types of materials and treatment methods to use.

Stained Glass Windows
Dealing with Environmental Deterioration

Guidance on the environmental deterioration of stained glass and options for remedial action

Out soon

Church Roof Replacement Using Termo-coated Stainless Steel

Current best advice for construction of new fully supported stainless steel roofing to replace stolen lead on historic churches (2019)

Historic Fibrous Plaster in the UK
Guidance on its Care and Management

Advice on the history, conservation and maintenance of historic fibrous plaster (2019)

Insuring Historic Buildings and other Heritage Assets

Advice on obtaining insurance and extent of cover required (2018)
Advice on how to maintain and repair historic buildings, including the types of materials and treatment methods to use.

Vacant Historic Buildings
Guidelines on Managing Risks
Guidance for owners about how to reduce risks of damage and decay (2018)

Wall Paintings
Anticipating and Responding to their Discovery
Guidance on assessing whether wall paintings have survived and what to do (2018)

Nanolime
A Practical Guide to its Use for Consolidating Weathered Limestone
Research-based guidelines on using nanolimes to repair decayed stone (2017)
Advice on how to maintain and repair historic buildings, including the types of materials and treatment methods to use.

Repointing Brick and Stone Walls
Guidelines for Best Practice

A brief guide on mortar joints, their appearance and what to do when repointing (2017)

Traditional Windows
Their Care, Repair and Upgrading

Guidance on altering or replacing timber and metal windows (2017)

Sourcing Stone for Historic Building Repair
Step-by-step guidance on how to match stone in building repairs (2016)

Bats in Traditional Buildings
Guidance on how to protect bats and their roosts in building maintenance, adaptation or repair works (2009)
Building conservation
Technical guidance

Farm buildings

The Maintenance and Repair of Traditional Farm Buildings
A Guide to Good Practice

Practical advice on the maintenance and repair of traditional farm buildings (2017)

Adapting Traditional Farm Buildings
Best Practice Guidelines for Adaptive Reuse

Guidance on how to adapt traditional farm buildings to new uses whilst retaining their significance (2017)
Historic England carries out and commissions research on a range of topics relating to the conservation of historic buildings and structures.

- **Conserving Stained Glass using Environmental Protective Glazing**
  - Tobit Curteis and Léonie Seliger
  - Research on dealing with the environmental deterioration of stained glass (March 2019)

- **Soft Capping on Ruined Masonry Walls**
  - Chris Wood, Alan Cathersides, Prof Heather Viles
  - Research on the role of soft wall cappings to conserve ruins (March 2019)

- **Does Plaster Retard the Drying of Walls After Flooding?**
  - Dr Brian Ridout, Ridout Associates
  - Experiments suggest removing lime plaster does not speed up drying (2018)

- **Ivy on Walls**
  - Prepared for Historic England by Dr Martin Coombes and Prof Heather Viles, Oxford Rock Breakdown Lab (OxRBL), University of Oxford; and Alan Cathersides, Historic England
  - Final report from a 10-year project on whether ivy on walls is harmful or beneficial to building fabric (2017)

- **Ventilation and Conservation**
  - Prepared for Historic England by Dr Brian Ridout, Ridout Associates Ltd

- **Measuring Moisture Content in Historic Building Materials**
  - Prepared by Dr Brian Ridout and Iain McCaig
  - Findings from on-going research looking at measuring moisture (2016)
The Strategic Stone Study addresses the problem of finding suitable replacement stone for conservation repairs by identifying the most important building stones in England and their sources.

The Strategic Stone Study is available through the British Geological Survey website and includes a searchable map, data spreadsheets, and county guides or ‘atlases’ showing representative buildings for each building stone type.

42 stone guides are currently available:

- Avon
- Bedfordshire
- Berkshire
- Buckinghamshire
- Cambridgeshire
- Cheshire
- Cleveland
- Cornwall
- Cumbria
- Derbyshire
- Devon
- Dorset
- Durham
- East Sussex
- E Yorkshire & N/NE Lincolnshire
- Gloucestershire
- Greater Manchester
- Hampshire
- Herefordshire
- Hertfordshire
- Isle of Wight
- Kent
- Lancashire
- Leicestershire
- Lincolnshire
- Merseyside
- North Yorkshire
- Northamptonshire
- Northumberland
- Nottinghamshire
- Oxfordshire
- Rutland
- Shropshire
- Somerset
- South Yorkshire
- Staffordshire
- Tyne and Wear
- Warwickshire
- West Sussex
- West Yorkshire
- Wiltshire
- Worcestershire
Historic England provides advice on conserving, protecting and maintaining these unique monuments that stand at the heart of almost every community.

One of a pair of publications looking at planning work and protection of war memorials (2015)

One of a pair of publications looking at the settings of memorials and other dedicated parks, avenues and sites (2016)

Guidance on diagnosing structural problems, monitoring, emergency works and repair options (2017)

Step-by-step guidance on making decisions about cleaning memorials (2017)
War memorials
Case studies

Historic England’s case studies look at specific conservation challenges of memorials.

Conserving War Memorials
Case Study: Surface Treatment of Bronze
First and Second World Wars Memorial, Tottenham, Haringey, London

A case study looking at assessing condition, cleaning and repatination of bronzes (2017)

Conserving War Memorials
Case Study: Differential Movement of Foundations
Civilian Second World War Memorial, Abney Park Cemetery, Stoke Newington, London

A case study looking at repairing unstable foundations (2017)

Conserving War Memorials
Case Study: Deterioration of Metal Fixings
Waterloo War Memorial, Bispham Hall, Wigan, Greater Manchester

A case study looking at damage caused by corroded iron cramps, and repair options (2017)

Conserving War Memorials
Case Study: The Surface Treatment of Bronze Statuary
First and Second World Wars Memorial, Bootle, Merseyside

A case study looking at the failure of original protective wax coatings (2017)
Historic England’s case studies look at specific conservation challenges of memorials.

**Conserving War Memorials**

**Case Study: The Replacement of Missing Bronze Elements**
First and Second World Wars Memorial, Bootle, Merseyside
A case study looking at how bronze parts are fixed and problems when these fail (2017)

**Case Study: Cleaning**
First World War Memorial, Cheltenham, Gloucestershire
A case study looking at cleaning damaged inscriptions and long-term care (2017)

**Case Study: The Conservation of Mortar-Filled Inscriptions**
First World War Memorial, Cheltenham, Gloucestershire
A case study looking at conserving mortar-filled inscriptions (2017)

**Videos**

Watch our videos about the treatment and repair of stone war memorials:

**Conserving inscriptions**

- Condition and legibility
- Gilding
- Inpainting
- Recutting inscriptions
- Replacing stonework

**Cleaning**

- Reasons for cleaning
- Water washing
- Chemical cleaning
- Biocides

Search for ‘Historic England War Memorials’ on [www.youtube.com](http://www.youtube.com)
Historic England carries out and commissions research on a range of topics relating to the conservation of historic landscapes.

Case studies on planting at three late Georgian gardens (2018)
HistoricEngland.org.uk/research/current/conservation-research/designed-landscapes/humphry-repton-landscapes/
Historic England carries out and commissions research on a range of topics relating to the conservation of historic landscapes.

- **Report on a pilot study to understand risks and threats to trees**
- **Catalogue of Capability Brown’s architectural drawings and sketches (2019)**
- **List of Registered Cemeteries**
  - Dates, architects and designers of registered cemeteries to help assess significance (2018)
- **Thematic study on golf course design (2017)**
- **Overview of past public park funding models to inform current debate (2016)**
Historic England carries out and commissions research on a range of topics relating to the conservation of historic landscapes.

A review carried out ahead of the 2016 Festival to map research knowledge (2013)

A plant list for researchers and those restoring late Georgian gardens (2018)

Review of research needs and priorities for academia and the public park sector (2014)

A study identifying conservation issues and priorities for future study and funding (2014)

A report looking at the history of cobbled churchyard paths in Devon, accessibility and maintenance issues (2016)
Improving accessibility

Technical guidance

Historic England’s advice on improving access, and engaging people in conservation.

Easy access

- Easy Access to Historic Buildings
- Easy Access to Historic Landscapes

Guidance on improving physical access (2015)

Guidance on an inclusive approach to improving access (2015)

HistoricEngland.org.uk/advice/technical-advice/easy-access-to-historic-buildings-and-landscapes/

Engagement

- Delivering Public Engagement, Skills and Training

A case study looking at how to include public engagement, skills and training activities in building projects (2017)

HistoricEngland.org.uk/services-skills/training-skills/heritageskills-cpd/building-skills-and-training-into-conservation-projects/
Historic England’s expert advice helps people care for and protect historic places. All our advice is free online. You can also buy printed versions of our advice publications.

Our Advice Finder will help you search our extensive range of advice and guidance publications.

HistoricEngland.org.uk/advice/find/

Look out for Historic England’s technical conservation training and skills development courses at:

HistoricEngland.org.uk/services-skills/training-skills/

We are the public body that helps people care for, enjoy and celebrate England’s spectacular historic environment.

Please contact guidance@HistoricEngland.org.uk with any questions about this document.

HistoricEngland.org.uk

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