Technical Conservation Guidance and Research

November 2020
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 on our website, HistoricEngland.org.uk. If you are viewing this brochure 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 Advice Finder: HistoricEngland.org.uk/advice/find/

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

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Front cover: Historic England’s engineers were involved in the improvement of the external lighting scheme of The Iron Bridge in Shropshire. The project won the Outdoor Lighting Project of the Year at the 2020 Lux Awards. A geometric model was created to undertake stress analysis and strength assessment work of the bridge. © English Heritage

This document has been prepared by the Technical Conservation Team, Historic England, November 2020 (v4). All images © Historic England unless otherwise stated.
Contents

What’s New ................................................................. 1

Energy efficiency ....................................................... 3
Technical guidance..................................................... 3
Research reports ....................................................... 8

Flooding ................................................................. 11
Technical guidance..................................................... 11
Research reports ....................................................... 11

Emergency planning and fire ................................. 12
Technical guidance..................................................... 12
Research reports ....................................................... 13

Building services engineering ............................... 14
Technical guidance..................................................... 14

Geospatial survey ................................................... 15
Technical guidance..................................................... 15
Research reports ....................................................... 17

Building conservation ........................................... 18
Technical guidance..................................................... 18
Research reports ....................................................... 22

War memorials ....................................................... 24
Technical guidance..................................................... 24
Case studies ............................................................ 25
Videos ................................................................. 27

Strategic Stone Study ............................................. 28

Parks, gardens and landscapes ................................ 29
Technical guidance..................................................... 29
Research reports ....................................................... 30

Improving accessibility ......................................... 32
Technical guidance..................................................... 32

Practical Building Conservation ............................ 33
What’s New

- Technical Tuesdays: Conservation webinars (see below)
- COVID-19: Cleaning and disinfecting historic surfaces advice (page 2)
- New advice on the conservation and repair of Purbeck Marble (page 2)
- New stained glass windows guidance (page 18)
- Updated emergency planning advice (page 13)
- Review of existing and future research needed to better understand the performance of traditional buildings and inform retrofit (page 8)
- BIM for Heritage – Developing the Asset Information Model (page 15)
- Flood emergency webinars (page 11)
- Report on the variability in resistance moisture meter readings obtained from medieval roofs (page 23)

Technical Tuesdays

Following the cancellation of physical events due to the COVID-19 pandemic, in spring 2020 Historic England began Technical Tuesdays – a series of free webinars focusing on a range of technical conservation topics including graffiti, damp, and geospatial survey.

Recordings of previous webinars are available to view online. See the Technical Tuesday webpage for details of forthcoming webinars.
COVID-19: Cleaning and disinfecting historic surfaces

Cleaning is essential to remove dust and dirt from historic surfaces and is primarily a ‘dry’ process through dusting and vacuuming. Yet after the outbreak of COVID-19 in 2020, disinfecting surfaces may now be needed in routine cleaning to prevent the spread of harmful microorganisms such as viruses and bacteria.

Some cleaning and disinfecting products can permanently damage historic surfaces, so we have published new guidance online on how to safely clean and disinfect historic fabric and fittings. Our advice provides examples of historic surfaces, the persistence of the COVID-19 virus (where known), and the suitability of selected disinfectant chemicals.

Advice concerning COVID-19 is updated frequently. This guidance is based on information available as of July 2020 and is subject to change.

Conservation and repair of Purbeck Marble

The unique shelly appearance and subtle colour variations of Purbeck Marble made it the foremost decorative stone of the English medieval period. It was used extensively for architectural features, including columns and pillars, string courses and sculpture in high-status buildings such as cathedrals, abbeys and palaces.

Unfortunately, the composition of Purbeck Marble makes it especially vulnerable to deterioration caused by moisture. In the past, attempts at treatment have tended to be piecemeal and inconsistent, but recently there has been an increased understanding of Purbeck Marble and progress has been made in developing methods to combat its decay.

This new guidance publication provides best practice advice for the care and repair of this important stone (page 18).

BIM for Heritage – The Asset Information Model

This guidance is the second in a series of documents on Building Information Modelling (BIM) for heritage. It focuses on heritage asset management, in particular conservation repair and maintenance, and suggests that the first task when adopting a BIM information management approach is to develop an Asset Information Model (AIM).

See more technical guidance on building information modelling and specialist survey techniques for heritage on page 15.
Energy efficiency
Technical guidance

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 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

Webinar

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

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.

Energy efficiency and older houses

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


Low and zero carbon technologies

Guidance on installing solar arrays on roofs (2018)

Guidance on installing heat pumps in historic buildings (2017)

HistoricEngland.org.uk/energyefficiency
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)
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)
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.

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.

- **Performance and Energy Efficiency of Traditional Buildings: Gap Analysis Update 2020**
  - Prepared for Historic England by Sustainable Traditional Buildings Alliance
  - Discovery, Innovation and Science in the Historic Environment
  - Research Report Series no. 210/2020
  - Review of existing and future research needed to better understand the performance of traditional buildings and inform retrofit (2020)

- **EPCs and the Whole House Approach: A Scoping Study**
  - A report prepared by the Sustainable Traditional Buildings Alliance (STBA) on behalf of Historic England and the National Trust
  - May 2018
  - Research by the Sustainable Traditional Buildings Alliance (STBA) on EPCs and the ‘whole house approach’ (2018)

- **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
  - Discovery, Innovation and Science in the Historic Environment
  - Research Report Series no. 46-2017
  - Advice on the convergence and conflict of housing legislation, policy, standards, fuel poverty, and carbon reduction (2017)

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

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

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

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

SPAB Building Performance Survey 2017
Interim Report December 2017

Dr Caroline Rye and Cameron Scott
Research conducted on behalf of the SPAB by ArchiMetrics Ltd
Supported by Historic England
December 2017

- 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

- Hygrothermal Modelling of Shrewsbury Flaxmill Maltings
  Dr Paul Baker, Glasgow Caledonian University
  Research, Innovation and Advice in the Historic Environment

- An overview of three large-scale external wall insulation projects (2014)
  External Wall Insulation in Traditional Buildings

  A Retrofit of a Victorian Terrace House in New Bolsover
  A Whole House Thermal Performance Assessment

- Hygrothermal modelling to predict impacts of wall insulation systems (2015)
  Hygrothermal Modelling of Shrewsbury Flaxmill Maltings

- Report on U-value measurements of 18 solid-wall brick properties and laboratory tests (2013)
  Research into the Thermal Performance of Traditional Brick Walls

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

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

Heat loss tests comparing proprietary retrofit systems for traditional timber windows (2017)

Results on thermal performance of metal windows and methods of reducing heat loss (2017)

Research results on heat loss through timber sash windows and methods of improving thermal performance (2009)
Historic England’s advice on managing buildings that are threatened by flooding, and research on flood impacts.

**Webinars**

- **Flooding: Preparation, resistance and resilience**
- **Flooding: Salvage, drying and preparing for restoration**

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

**Research reports**

- **A Preliminary Study of Flood Remediation in Hebden Bridge and Appleby**
  - Dr Brian Ridout, Chris Wood and Iain McCaig
  - Initial findings from site visits to properties ten months after severe flooding (2017)

- **The Health Risks from Contaminated Flood Water in the UK**
  - Dr Brian Ridout, Ridout Associates Ltd

- **An Analysis of Drying Data from a Medieval Hall after Flooding**
  - Dr Brian Ridout and Iain McCaig
  - Report on the accuracy of moisture monitoring measures during the drying out of a flooded building (2017)
Historic England provides expertise and support on emergency planning and fire advice.

- **Lightning Protection**
  Design and Installation for Historic Buildings.
  - Advice on the design, installation and maintenance of lightning protection systems for historic buildings (2019)

- **Guide to Fire Fighting in Thatched Buildings**
  - Guide to fire fighting in thatched buildings (2019)

- **Fire Safety for Traditional Church Buildings of Small and Medium Size**
  - Guidance for churches on deciding if fire safety improvements are needed, and making improvements (2017)

- **Arson Risk Reduction**
  - Guidance on identifying threats and taking steps to reduce the risk of arson (2017)
Emergency planning and fire
Technical guidance

Historic England provides expertise and support on emergency planning and fire advice.

Online advice

- Online advice on emergency planning, emergency response plans, preparedness training and fire safety
- Hot Work and Historic Buildings: Online advice on managing the risk of fire (2018)

Research reports

- Research findings on fire risk from wood-burning stoves in thatched buildings (2018)

Webinars

- Fire in thatched buildings
- Lightning Protection
Historic England provides expertise and support on building services engineering.

**Online advice**

Online advice on building services engineering

**Webinars**

- Installation
- Inspection and Maintenance
- Emergency Lighting and Exit Signage
- External Lighting
- Internal Lighting
- Principles and Decision Making
Technical guidance on building information modelling; and specialist survey techniques for heritage projects.

This guidance will help users successfully implement BIM in heritage projects (2017)

Advice on heritage asset management and developing an Asset Information Model (AIM) (2020)

Third edition providing updated guidance on the use of three-dimensional (3D) laser scanning across the heritage sector (2018)

Guidance on the practical application of photogrammetry in recording cultural heritage (2017)
Technical guidance on building information modelling and specialist survey techniques for heritage projects.


These guidelines focus on the equipment required and the method to produce Highlight-Reflectance Transformation Imaging (H-RTI) (2018)

These guidelines cover the electronic Total Station Theodolite (TST) and its use in landscape archaeology (2016)

Webinar

HistoricEngland.org.uk/advice/technical-advice/recording-heritage/
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 crosses 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)

A comparison of different techniques to record inscriptions on a stone (2019)
Advice on how to maintain and repair historic buildings, including the types of materials and treatment methods to use.

Guidance on the environmental deterioration of stained glass and options for remedial action (2020).

A checklist and flowchart providing guidance on undertaking a basic survey is also available online.


Advice on the history, survey and management of historic fibrous plaster (2019).

Current best practice advice for new fully supported stainless steel roofing to replace stolen lead (2019).

Advice on obtaining insurance and extent of cover required (2018).
Building conservation
Technical guidance

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 on reducing risks of damage and decay in vacant buildings (2018)

**Wall Paintings**
Anticipating and Responding to their Discovery

Guidance on the potential survival of wall paintings and what to do if you discover painted decoration (2018)

**Traditional Windows**
Their Care, Repair and Upgrading

Guidance on maintaining, repairing and upgrading timber and metal windows (2017)

**Nanolime**
A Practical Guide to its Use for Consolidating Weathered Limestone

Research-based guidelines on using nanolimes to conserve decayed stone (2017)

**Repointing Brick and Stone Walls**
Guidelines for Best Practice

The key issues to consider when repointing stone and brick walls of traditional buildings (2017)

**Sourcing Stone for Historic Building Repair**

Step-by-step guidance on how to source matching stone for building repairs (2016)
Advice on how to maintain and repair historic buildings, including the types of materials and treatment methods to use.

Books

- Practical advice on the maintenance and repair of traditional farm buildings (2017)
- Guidance on how to adapt traditional farm buildings to new uses whilst retaining their significance (2017)
- Advice on how to protect bats and their roosts in building maintenance, adaptation or repair works (2009)
- Advice on the insects and fungi that cause problems in building timbers and how to treat them (2019)
Building conservation
Technical guidance

Advice on how to maintain and repair historic buildings, including the types of materials and treatment methods to use.

Online advice

**Guidance** on cleaning and disinfecting historic surfaces in light of the COVID-19 pandemic (July 2020)
Image © English Heritage

**Guidance** on responding to graffiti attacks on historic buildings and structures following a number of instances during the COVID-19 pandemic (2020)

A new **statement** on modifying historic windows as part of retrofitting energy-saving measures (2020)

Webinars

- **Concealed decoration**
- **Graffiti**
- **Damp**
- **Glazing and the environment**
- **Purbeck Marble**
- **Earthen mortar**
- **Fibrous plaster**
- **Dealing with environmental deterioration of stained glass**
Historic England carries out and commissions research on a range of topics relating to the conservation of historic buildings and structures.

Research on dealing with the environmental deterioration of stained glass (2019)

Research on the role of soft wall cappings to conserve ruins (2019)

Experiments suggest removing lime plaster does not speed up drying (2018)

Final report from a 10-year project on whether ivy on walls is harmful or beneficial to building fabric (2017)
Historic England carries out and commissions research on a range of topics relating to the conservation of historic buildings and structures.

- Findings from on-going research looking at measuring moisture (2016)
- Research into factors affecting resistance moisture meter readings obtained from timbers in three medieval roofs (2020)
Historic England provides advice on conserving, protecting and maintaining these unique monuments that stand at the heart of almost every community.

The Conservation, Repair and Management of War Memorials

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

Conservation and Management of War Memorial Landscapes

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

Conserving War Memorials: Structural Problems and Repairs

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

Conserving War Memorials: Cleaning

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: 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)

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)
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)

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

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

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

Videos

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

Conserving inscriptions

- Legibility and condition
- Gilding
- Inpainting
- Recutting inscriptions
- Replacing stonework

Cleaning

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

Webinars

- Introduction to war memorials
- Cleaning, repairing and maintaining war memorials

Search for ‘Historic England War Memorials’ on www.youtube.com
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.

43 stone guides are currently available:

Historic England carries out and commissions research on a range of topics relating to the conservation of historic landscapes.

**Online advice**

Online advice on how to care for and manage historic parks, gardens and landscapes.

A new section on landscape management of monuments and sites has been added.

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)**
Parks, gardens and landscapes
Research reports

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 tercentenary of Lancelot ‘Capability’ Brown’s birth 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

Guidance on improving physical access (2015)
HistoricEngland.org.uk/advice/technical-advice/easy-access-to-historic-buildings-and-landscapes/

Guidance on an inclusive approach to improving access (2015)

Engagement

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/
Practical Building Conservation

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

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
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’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/

Watch Historic England’s Technical Tuesday webinars here:

HistoricEngland.org.uk/services-skills/training-skills/online-training/webinars/technical-tuesdays/

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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Tel: 0370 333 0607
Email: customers@HistoricEngland.org.uk

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