PRESERVATION OF BUILDINGS

The conservation of heritage interiors: preprints of a conference symposium 2000, Ottawa, Canada May 17 to 20, 2000. Canadian Conservation Institute, Ottawa (2000), 214 pp.

Bratasz, Lukasz. Response of historic materials – a key issue in making cultural heritage policy. *6th European Commission Conference on Sustaining Europe's Cultural Heritage: from Research to Policy. London, 1-3 September 2004.* (2004) http://www.ucl.ac.uk/sustainableheritage/conference-proceedings/pdf/3C.9_bratasz.pdf

Building Research Establishment *Damage to structures from ground-borne vibration.* BRE Digest; n. 403. Building Research Establishment, Garston, United Kingdom (1995), 8 p.

Ground-borne vibrations from civil engineering, blasting or traffic often cause noticeable vibrations in buildings. Householders are occasionally worried that vibrations might damage their property and this can be a significant cause of distress. Guidance levels for damage from ground-borne vibration were introduced in two British Standards in 1992 and 1993. This Digest gives information on the current UK position concerning damage to buildings. A guide to evaluation of human exposure to vibration is given in BS 6472 but is not considered here. (BCIN)

Dann, Nigel; Worthing, Derek and Bond, Stephen Conservation maintenance management – establishing a research agenda. (1999) www.maintainourheritage.co.uk/structures_nd.htm

This paper examines some of the key aspects of the process of maintenance management of the built cultural heritage. It is primarily based on responses to a questionnaire from a number of maintenance managers all of whom are responsible for significant stocks of historic buildings within their portfolios. The research identifies two types of organisation; 'heritage focused' and 'non-heritage focused'. It examines differences in approach between them in the following key areas, aims and objectives of the organisation, the use of external consultants and condition surveys, prioritisation and costs. The paper identifies areas for further research, it also suggests that the identification of cultural significance embodied in the fabric of historic buildings and consideration of its vulnerabilities should be a prerequisite for determining approaches to maintenance management. (abstract from article)

Demaus, Robert Non-destructive investigations. (1996)
http://www.buildingconservation.com/articles/nondestr/nondestr.htm

Where decay or structural problems are suspected but are hidden by fine decorative finishes or buried within structural elements, the use of conventional investigation techniques can result in extensive and unnecessary damage. This paper introduces the principal non-destructive alternatives available today. (author's abstract)

Ellis, Patricia. Effects of traffic vibrations on historic buildings. *The science of the total environment* 59, 1 (1987), pp. 37-45.

The paper describes work carried out by the London Scientific Services in conjunction with the Historic Buildings and Historic Monuments Commission on three heritage buildings: Greenwich Hospital Estate, Vauxhall Cross and Hampton (2-storey cottages) subject to traffic-induced vibrations. Buildings exposed to higher levels of traffic vibration were generally in worse state of "well-being" than their controls, despite vibrations being lower than those normally associated with onset of structural damage. For storeys at or above ground level, vibration in the horizontal plane, perpendicular to the facade, dominates. It is likely that this is air-induced vibration rather than ground induced and it is thought possible that it is the vertical component which is important. It is clear that much more information must be obtained to provide a sound statistical base of data. (AATA)

Feilden, Bernard M. *Conservation of historic buildings.* Architectural, Oxford (2003), 388 pp.

Hume, Ian. The effects of road traffic vibration on historic buildings. *Context* 47 (1995), pp. 28.
http://www.ihbc.org.uk/context_archive/47/ian_dir/ian_s.htm

The effects of vibration on buildings and their occupants is a complex subject. Vibrations can be caused by road traffic, railways, users of buildings, and numerous other sources, including blasting and building works, particularly piling. Investigations have taken place but it is far from clear how much damage is being caused to the fabric of historic buildings from vibration. (AATA)

Hume, Ian. Floor loadings in historic buildings. *Context* 70, (2001), pp. issue insert.

Upgrading the floor loadings in historic buildings when converting them to new uses can lead to major, sometimes unnecessary, changes to important historic fabric. Attempts to upgrade a historic building to high load-carrying capacity will almost always result in expensive intervention, or in extreme cases, to the complete loss of the building. These costs and potential losses may not be justified by the perceived need for high floor loadings, and unrealistic design loads should not be used when it is possible to avoid them. (AATA)

Hume, Ian. Floors in historic buildings 1015 BC to AD 1994. *Context* 43, (1994), pp. 25-27.

A brief summary of the history of floor joists and beams is presented, largely from AD 1726 to the present day. Sizes and loadings are discussed and the implications for conservation of historic buildings are examined. (AATA)

Hume, Ian. I think it's still moved. *Context* 51, (1996), pp. 18-19.

Basic procedures for structural monitoring in historic buildings include comparison of photographs taken over a period of time, inspection of cracks, and examination of the relationship of interior fittings with masonry structures. The importance of keeping complete and accurate records of monitoring is stressed. (AATA)

Hume, Ian. Installing services into historic buildings. *Context* 90, (2005). http://www.ihbc.org.uk/context_archive/90/hume/Context90.htm

Careful planning and supervision are needed if we are to provide modern services in historic buildings while minimising damage and maintaining their historic character.

Hume, Ian. Load testing and historic structures. *Context* 57 (1998). http://www.ihbc.org.uk/context_archive/57/loadtest/ian.html

Load testing is a powerful weapon that the Structural Engineer can use as a means of justifying the structural adequacy of historic structures. It is particularly useful when structures or individual elements of structures cannot be justified by calculation when the primary evidence presented by the building itself shows that there are adequate reserves of strength. (Author's introduction).

Lloyd, Helen. Monitoring vibration in building structures. *Views* 30, Summer (1999), [English]. 2. The National Trust

Maintain our Heritage Historic building maintenance. A Pilot inspection service. The Bath Area Pilot mounted by Maintain our Heritage in 2002-03. Supplement to the printed report. (2004) http://www.maintainourheritage.co.uk/pdf/samplereport.pdf

Maintain our Heritage undertook the Bath Area Pilot, the first maintenance inspection service for historic buildings in the UK, in 2002-03. The report, Historic building maintenance - A pilot inspection service, giving a summary of the Pilot and what was learned, was published in November 2003. This supplement gives more detailed information than the report. Because the service still operating as the report was being written some data did not cover the entire scheme. This supplement therefore also up-dates the data in the report. (Author's introduction).

Maintain Our Heritage Historic building maintenance – a pilot inspection service. A report on the bath area pilot mounted by Maintain our Heritage 2002-2003. http://www.maintainourheritage.co.uk/pdf/pilot.pdf

Maintain our Heritage undertook the Bath Area Pilot, the first maintenance inspection service for historic buildings in the UK, in 2002-03. The Pilot achieved its aim of demonstrating that it is practically, technically and legally possible to establish and operate such a service. A wide range of historic buildings was inspected and owners were provided with illustrated reports setting out maintenance action priorities. The target number of buildings, 72, was passed. Take up, however, was not on a scale to make the service immediately attractive commercially. MoH had anticipated at the outset that the service was unlikely to be economically viable, especially in a limited geographical area for a limited period. Customers in fact mostly welcomed the service. The conversion rate from enquiries to inspections was 59%. Typical comments after fulfillment were 'excellent service', 'practical', 'helpful' and 're-assuring'. Nevertheless, for a similar service to cover its costs would require at least greater economies of scale and more marketing. Most importantly, it would require a climate of official help and support and fiscal policies more favourable to maintenance. The Pilot was pioneering. Valuable lessons have been learnt that are already informing similar emerging initiatives in the UK and should be central to the development of a national maintenance strategy. (Author's abstract).

Michalski, Stefan. Quantified risk reduction in the humidity dilemma. *APT Bulletin* 27, 3 (1996), pp. 25-29.

When people humidify buildings in winter, or air condition buildings in summer, wall cavities get damp. This article summarizes current theoretical knowledge about the wall-cavity problem. The science of deterioration has advanced for artifacts, as well as buildings. A continuum of fracture risk due to low humidity emerges for the mixed collections typically housed in a historic building. This article summarizes current recommendations, especially those relevant to furniture. (Author introduction).

Richardson, Clive Structural movement: is it really a problem? http://www.buildingconservation.com/articles/movement/movement.htm

The last 50 years have seen the extremes of people's reaction to movement in buildings. In the immediate post-war years, when we were grateful for any accommodation which had survived the Blitz, attitudes to odd cracks were relaxed. Whilst redecorating my father would summon us children with glee to see finger-wide cracks discovered beneath the wallpaper, before ceremoniously plugging them with newspaper and Polyfilla. No panic attacks for him, whereas nowadays structural engineers are increasingly called out to pronounce upon hairline plaster cracks dramatised by white emulsion paint.

People's expectations of building performance have become unreasonably high and everything is too precious nowadays. It is time for reactions to be tempered by considering the issues.
The forces of nature are capable of breaking down mountains, so we must assume that a building will also not last indefinitely. Regular maintenance and occasional structural intervention is essential to slow the process of deterioration and to extend the life of its structure. Intervention may be aimed at preserving the building indefinitely, but a more realistic view may also be taken with finite expectations for both original fabric and repairs. (Author's introduction from website)

Rose, William B. *Water in buildings: an architect's guide to moisture and mold* John Wiley & Sons, (2005). 288 pp.

The definitive guide to understanding and managing the effects of water on buildings. Water in Buildings: An Architect's Guide to Moisture and Mold is a detailed and highly useful reference to help architects and other design professionals create dry, healthy environments, without jeopardizing a project with poor liability management. Much more than a book of "quick fixes," this practical guide illuminates an essential understanding of the "whys" of moisture problems, including valuable information on how water behaves and how its performance can be anticipated and managed in building design.
With a special emphasis on water's role in creating mold, an issue of growing concern and liability, Water in Buildings offers the most up-to-date information on rainwater management, below-grade water management, foundations, wall and roof construction, mechanical systems, moisture, and much more! Providing authoritative guidance to designers and builders, this definitive guide features:
* Clear explanations of how water interacts with building materials and equipment
* An in-depth exploration of the paths of leaks
* Numerous case studies on such well-known structures as Mount Vernon, Independence Hall, and Wingspan (Frank Lloyd Wright)
* Numerous descriptive drawings and photographs
(Summary from publisher's website)

Ross, Robert J.; Hunt, Michael O.; Wang, Xiping and Soltis, Lawrence A. Floor vibration: a possible assessment method for historic buildings. *APT bulletin* 32, 2-3 (2001), pp. 23-25.

Examines the use of vibration to detect the condition of wooden floors. Building on work done previously on individual timbers, the authors used a forced-vibration system to evaluate wooden floors in a two-story building built ca. 1900. Seven areas of flooring on both stories were examined using a motor with an eccentric rotating mass attached to the floor. A digital storage oscilloscope was attached to a linear variable differential transducer to monitor the vibrations. The elasticity of the wood relates to the frequency of

oscillation, and a formula is given to determine the modulus of elasticity. Stiffness of the floor was assessed by placing a static load on the floor at the mid-span of the joists and measuring the bending of the floor. An equation is given for measuring the floor stiffness. Initial results indicate that the extent of deterioration of a floor can be detected by measuring the damped natural frequency using a forced-vibration technique. Future work will examine the effectiveness of the technique with flooring exhibiting greater deterioration and a wider range of floor spans and joist sizes.

Singh, Jagjit Timber decay. (1996)
http://www.buildingconservation.com/articles/envmon/envmon.htm

Building materials are decayed by the effects of adverse environmental conditions and the extent of damage depends on both the materials and the conditions. Among the most vulnerable materials are timber, paint, textiles and paper. Timber remains one of the most useful in a world of diminishing resources and is a major component in most historic buildings. It has many positive structural and aesthetic properties as well as being an energy-efficient and renewable resource. However, timber provides specialised ecological niches and many organisms have evolved to use it as a food. The most common and destructive to timber are dry rot, wet rot, common furniture beetle, and death watch beetle. (author's introduction from website)

Stott, Jeff Assessing timber-framed structures. (2004)
http://www.buildingconservation.com/articles/timberstruc/timberstruc.htm

Swallow, Peter; **Watt, David and Ashton, Robert** *Measurement and recording of historic buildings* Donhead Publishing Ltd., Shaftesbury (1993).

Provides a practical guide to measured building surveys with a special emphasis on recording the fabric of historic buildings. It will be of interest to all practitioners working in the field of conservation who need accurate surveys of buildings. (A.A.)

Taylor, Jonathan The appointment of professionals for quinquennial inspections an introduction to accreditation and approval systems. (1999)
http://www.buildingconservation.com/articles/quinap/quinap.htm

It is widely recognised that the inspection of historic churches requires specialist skills, but it is not always easy for non-specialists to determine which professionals have the skills required. Some professionals seem to qualify solely because they have always qualified, and it is likely that many continue to practice methods which are now known to damage historic buildings, simply because they have not been required to keep abreast of current developments. (From article)

Wang, Xiping; Ross, Robert J.; Hunt, Michael O.; Erickson, John R. and Forsman, John W. Low frequency vibration approach for assessing performance of wood floor systems. *Wood and fiber science: journal of the Society of Wood Science and Technology* 37, 3 (2005), pp. 371-378.

The objective of this study was to determine whether wood floor systems could be inspected in situ to evaluate their structural performance. Twelve laboratory floor systems were constructed using joists of three species and different sizes, using lumber decking and cross bracing. The floor systems were tested with several end conditions. Forced vibration was used to determine the natural frequency of the floors, and static load tests were made to evaluate their flexural rigidity. An analytical model was developed that has the potential to predict the flexural rigidity from the natural frequency of vibration. In order to use this for floor inspections, the model would need to be calibrated with field data from actual floor systems in structures. (AATA)

Watt, David; Colston, Belinda. The application of science in the conservation of historic buildings and monuments. *Conservation Science 2002: papers from the conference held in Edinburgh, Scotland, 22-24 May 2002.* Townsend, Joyce H.; Eremin, Katherine and Adriaens, Annemie, Archetype Publications Ltd., London (2003), pp. 127-134. [English]. 5 figs., 1 table, refs. [ISBN 1-873132-88-3].

The role of science in the conservation of historic buildings and monuments is increasing as conservators seek to understand heritage in ways that require greater levels of analysis and investigation. Much of this scientific work has concentrated previously on the archaeological evidence provided by materials and methods of construction, which has increased knowledge of social and technological development. Both simple and sophisticated methods that have been employed in the diagnosis of complex mechanisms of deterioration and decay affecting historic buildings and monuments are described. The results of this work have provided the basis for appropriate methods of remediation, informed planned maintenance, and aftercare and show how preventive conservation is relevant within the context of the historic built environment. (A.A.

Watt, David; Swallow, Peter *Surveying historic buildings* Donhead Publishing, Dorset, UK (1996).

Yeomans, David Strength grading historic timbers. (2003) http://www.buildingconservation.com/articles/gradingtimbers/gradingtimbers.htm

The strength of a timber, whether new or historic, depends on its species and the effects of certain growth characteristics. In particular, knots and shakes (splits along the grain which occur as the timber dries) and the slope of its grain reduce its strength - the ideal timber has straight grain with no knots or drying shakes. Strength grading involves assessing the effect of these features. (Author's introduction from website)