Preservation in New Buildings

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In the United Kingdom (as in many other countries) increasing attention is being paid to the importance of each library and archive having a written preservation strategy endorsed by its governing body. So increasingly we are asking: where does "preservation" begin and what are its top priorities?

Some would say preservation begins with the definition of collecting policies to ensure that only relevant items are acquired in the first place, and therefore that no unnecessary costs are incurred on the long-term care of unwanted and unconsulted items. Others might argue that the first priority must be the careful appraisal of existing holdings to determine their preservation and conservation requirements and to prioritise their treatment. Or should preservation begin with damage-limitation: restricting the physical handling of books and documents, on the one hand by providing whenever possible surrogate copies in digital formats or microform, and on the other hand by offering at least basic protection through appropriate boxing and packaging? This, surely, goes hand-in-hand with the education of staff and readers about the importance of treating rare or unique materials with proper respect.

But I want to suggest for discussion today that preservation should really begin at an earlier stage: with the concept of the library or archive building itself. It seems to me that if we do not have the right kind of building, and building services, all the rest of our preservation strategy can be undermined. So in designing a new library or archive building we have to look at all the factors that will contribute to the long-term well-being of the books and documents, and to ensure that every feature of the building and its services fits into the overall preservation strategy we wish to achieve rather than working against it. In the case of older buildings, and particularly those converted from other uses, we may not be able to achieve all our preservation objectives, on account of the constraints of the existing structure and design of the building, but the objectives remain the same and we must do all we can.

I want to develop this theme first with reference to the new edition of a British Standard in this field, and then by looking briefly in turn at the buildings of our three national libraries: the British Library in London (a "new" building which took some thirty years to complete); the National Library of Scotland in Edinburgh (where I shall mainly be speaking not about its newest building at Causewayside but about its original headquarters building beside George IV Bridge in Edinburgh, which was extensively refurbished during the 1990s); and finally the National Library of Wales (which had a third building added to the Library's existing hill-top site in Aberystwyth in the mid 1990s). I have chosen these three examples because each in its own way is a "flagship" building to which other libraries and archives look as an example of good practice, because all three hold both books and archives, and because, as they were under development concurrently, one was able to learn from the experiences of another.

It is 23 years since the British Standards Institution first published *Recommendations for the storage and exhibition of archival documents (BS 5454)* in 1977. The Standard was lightly revised for a second edition in 1989, but most of its basic principles and recommendations remained the same. Now a committee under my chairmanship has just completed a much more extensive revision to create the third edition, BS 5454:2000 which was published in April this year. On the basis of the advice given in the earlier editions of this Standard many fine buildings have been constructed or converted in the United Kingdom: by national bodies, local authorities, the universities and to a some extent by business and private enterprise. All three of the national library buildings I shall be describing in this paper paid careful attention to BS 5454.

British Standards do not have the force of law, so the adoption of BS 5454 by those who have responsibility for the care of archives and special collections is entirely voluntary. And yet this Standard has become essential reading for professional archivists and librarians. Such emphasis is now placed on it in our postgraduate training schools, that it is unthinkable that any reputable librarian, archivist, or (I hope) architect, would seek to construct or convert an academic or research library or an archive building without reference to it. Compliance with the Standard in all essential respects is required by the Public Record Office (the United Kingdom's National Archives) for any building in which Public Records are to be stored. It is also the main yardstick for my own Commission when it inspects repositories with a view to giving them official recognition. Increasingly also, the national and private funding bodies that offer grants for the acquisition and conservation of library and archive material want to know whether the applicant's buildings are of a high

standard. So, statutory or not, BS 5454 is a very useful weapon in our armoury.

Although it is true that the Standard was first formulated with archives rather than books in mind, we are of course dealing with essentially the same kind of materials in both cases: still predominantly ink on paper or parchment. Even as we move forward into the new electronic age archivists and librarians will still be facing the same, or very similar, problems. It may be unrealistic for open-access libraries to provide cool and stable storage temperatures (because the books and their readers have to share the same ambient environment), and there is no corresponding British Standard to cover them. But there is really no good reason for a national library or any other research library not to apply BS 5454. So the new edition of the Standard explicitly recognises in its Foreword that it applies just as much to books as to archives.

One of the most crucial factors in the long-term preservation of archival materials is the provision of a controlled and stable environment. We have deliberately retained in the new edition a statement made in the 1977 edition of BS 5454, that "unsuitable environments damage documents more extensively than any other single factor". The Standard makes no judgement about whether air conditioning is necessary. Some modern archive buildings in the United Kingdom have been successfully designed to use passive environmental control and natural ventilation without air-conditioning, but this is more difficult to achieve in a very large building such as a national library. Nevertheless, it really does not matter how large the structure is, an essential principle should be that the design and the materials chosen, and their mass, should perform much of the work of providing a stable environment and (by implication) keeping down the running costs. In the choice of the site and at the design stage, careful attention has to be paid to the building's orientation. Materials and construction methods chosen should promote "high thermal inertia" so that the storage environment is very little affected by external conditions. BS 5454:2000 recommends very stable temperatures (16-19°C and within this range a variation of only \pm 1 °C). It also recommends somewhat lower relative humidities than in the past (45-60% and within this range \pm 5%). The Standard recommends that the air should be kept in motion, by natural or mechanical means, to prevent stagnation and to remove off-gassing from the materials. Any fresh air taken in should be reasonably free from pollutants such as sulphur dioxide and the oxides of nitrogen.

As you would expect, considerable attention is also paid to fire prevention and the importance of having not just a construction that is itself substantially fire-resistant, but also a sophisticated and rapid detection and alarm system, and wherever possible an automatic fire-extinguishing system. As a result of national and international experience and experimentation, water sprinklers can now be regarded as both safe and reliable for fire fighting in libraries and archives, so these now have their place in the Standard alongside gaseous fire-extinguishing agents. Whether sprinklers are used or not, a major fire would be likely to result in the discharge of a very large quantity of smoke and water. So provision has to be made for the extraction of both of these from every level of the building. (How often these factors still seem to be overlooked in building design or in the conversion of existing buildings. In many cases too much trust is still placed in the belief that there could never be a serious fire).

Many other issues are covered by the Standard, but in the time available this afternoon these can only be briefly summarised. It covers, for example, the hazards to be avoided in the choice of a site; security issues; the dangers of excessive exposure of materials to light; packaging; display for exhibition; and the storage of what we have called "modern media" (i.e. media of more recent origin than parchment or paper). The Standard also stresses the importance of regular monitoring: of environmental conditions of course, but also of other defence mechanisms and machinery, so that nothing is left to chance. It should never be a good enough excuse to say that we did not know the environment had become unstable, or that we did not realise that the fire alarm system was temporarily disconnected.

All three national library buildings that I have chosen to examine in this paper were of course completed well before the new edition of BS 5454 was published, so it would in a sense be unfair to measure them against the most recent recommendations, except for the fact that the practical lessons learnt during the construction of these buildings fed directly into the thinking behind the new Standard. The project managers also drew on each other's experience: the National Library of Wales, for example, was able to learn directly from some of the highly publicised difficulties encountered by the British Library in the course of its fitting-out, particularly with regard to its mobile shelving, whilst the British Library was able to draw on some of the experience of the National Library of Scotland, particularly with regard to fire prevention.

One of the central lessons learnt for management was the importance of the library itelf being the principal client in the project and not having this role filled by a middle-man. The British Library's management lacked that degree of "ownership" of their project until very late in the day as a result of central government rules which have now been changed. Other national organisations including the Public Record Office when building its new extension at Kew in the 1990s were able to avoid these birth-pangs. A direct relationship

between the library's staff and the builders and architects is essential if the closest attention is to be paid to preservation issues, which are often best grasped by the curators and conservators, and which can come with an apparently high price tag that needs properly argued defence if costs are under tight restraint. The voice of preservation needs to be directly heard by the planning team.

I thought it might be interesting to search the published literature on these buildings, and the memories of some of those involved in their development, to discover how explicitly the needs of preservation were articulated by the architects and project managers. A national library building is going to make some kind of a "statement" to the world, but where (if at all) does preservation feature in it? The British Library's architect, Colin Wilson, in his book about the Library, outlined his theology as follows: "[A] library and what it houses embodies and protects the freedom and diversity of the human spirit in a way that borders on the sacred". He also speaks of "an institution that embodies and celebrates the collective memory of the nation".²

So we might say that the challenge is to give all the right outward signals about what a library is whilst at the same time providing all the safeguards that will protect its treasures in perpetuity. The British Library was on the drawing board before even the first edition of BS 5454 was published, and before the attention of the library community in the United Kingdom was sharply focussed on preservation issues by the Ratcliffe Report.³ Nevertheless the Library's experts themselves had a hand in formulating BS 5454, so it is not surprising that a lot of what we would now endorse as "right thinking", well in line with the Standard as eventually published, and as revised in 1989, went into its planning.

Wilson emphasises that environmental standards for the different sectors of the building were among the first issues to be addressed. Almost all the storage areas are below ground, in 4 levels of basements holding 340 kilometres of shelving. The intention was to create a storage environment of 17° C \pm 1 C and relative humidity of 50% \pm 5% (actually well in line with BS 5454:2000). It was recognised from the start that locating the storage areas underground would in principle assist environmental control. Given the sheer scale of the building contemplated, this also presented some formidable construction challenges. It was not possible simply to dig a pit deep enough and wide enough to contain the basements. Surrounding buildings would surely have collapsed into it. So instead one level at a time was excavated, a concrete raft floor laid, the next level below that excavated, and so on until the bottom was reached. Until the basements were in place, therefore, this

building was in effect being constructed from the top down! The concrete surroundings of the basement, together with the solid mass of the rest of its structure and of the stored books themselves, would virtually guarantee a stable environment. An air-conditioning system was necessary, but for the most part not to counteract external environmental conditions but simply to maintain an appropriate degree of stability. Above ground it was a different matter, and in these areas, including those for the storage of archives and manuscripts, the environment is still proving much more difficult to control.

The sheer scale of the building is impressive by any standards. The exterior above ground is clad in about 10 million red bricks⁷, which should mellow to blend in with the surroundings. The vast roofs required about 50,000 Welsh slate tiles.⁸ Direct sunlight is excluded from the public areas and reading rooms by the way the roofs are angled and the windows baffled. Careful attention has been paid to lighting levels for storage, access and especially for exhibition,⁹ where good use has been made of fibre optic lighting to minimise exposure of documents and books to both heat and light.

An automatic water sprinkler system has been installed for fire fighting. In the initial plans this was to be a dry-pipe system, but in the course of building it was decided, after consultation with colleagues at the National Library of Scotland, which was being refurbished at the same time (as we shall see in a moment), to change this to a wet-pipe system. Special plans had to be made, right down to the lowest basement level, for the effective drainage of any discharged water.¹⁰

Turning now to my second example, the buildings of the National Library of Scotland, like those of the British Library and most other government buildings until 1988, used to be managed by a government body called the Property Services Agency (PSA). Under PSA the building was exempt from the requirement to have a certificate of its fire-worthiness from the local fire authority. When the Library passed into the management of a Board of Trustees in 1988 and a risk assessment was conducted, it was clear that the headquarters building, constructed beside George IV Bridge in Edinburgh in the 1950s (but to plans conceived in the 1930s and postponed for two decades) was extremely vulnerable to fire, and possibly even to total collapse in the event of a fire. Throughout much of its seven basements, each concrete floor of the storage areas was held up substantially by the metal shelving uprights from the floor below. It was estimated that in the event of a fire these could have buckled in as little as 10 minutes, causing the collapse of the whole structure. After a detailed appraisal of options including that of removing the entire library to another, less central, site it became clear that the best course was going to be to retain the existing building but to protect it so

rigorously against fire that the risk of collapse – with all that that would entail both for human life and for the books and special collections – became infinitesimal. To paraphrase the words of Bill Jackson, the Buildings Manager, the heart-stopping question that had to be asked, and that really influenced all the subsequent decisions, was "How much of your collection do you want to have left after the fire?"

The programme of remedial building works at the National Library, undertaken in close consultation with the Preservation Division, included complete electrical rewiring; installation of a wet-pipe water sprinkler system for fire extinction, requiring in all 2,500 sprinkler heads; the provision of drainage and smoke extraction from every floor of the building; a wet and dry vacuum system both for regular cleaning and for use in emergencies; a new fire escape for readers (who also have to be preserved!); and new environmental controls aimed at achieving stability within the parameters recommended by BS 5454. After a phased programme of refurbishment, which spread the agony over almost a decade, including a short period of closure to the public, the Library now has a building that is better in terms of fire protection and environmental stability than its own newer building at Causewayside which was opened in two stages at the end of the 1980s and the beginning of the 1990s. The refurbished building is indeed of a higher standard than many another newly built library and archive building in the UK.

As in London, so too in Edinburgh the scale of this operation fills the observer with awe. So too in this case does the ingenuity of the Buildings Manager and his team in finding solutions to apparently intractable but absolutely fundamental problems, such as where to site the giant water tanks required to feed the sprinkler system, which together contain 99,000 litres of water. In the (fortunate) absence of any major cases of library fires in the UK up to that date, the Library benefited considerably from the latest American thinking on fire prevention. It also undertook its own research and experimentation, for example in using neoprene gaskets for the joints of the stainless steel piping in the sprinkler system to avoid hot welding, particularly since all the work had to be undertaken in situ without the contents of the stacks and strongrooms being moved (- they were rigorously protected by a double layer of fire-resistant polythene sheeting mounted on a wooden frame that surrounded each stack and was sealed at ceiling and floor level to exclude dust). There was another good example of lateral thinking: since the piping for the fire-suppression system contains water it can be warmed and circulated when the temperature of the storage areas needs to be increased in winter. All the new safety and good housekeeping features were extended to the public areas as well as the storage; and the sprinkler heads, which even emerge from the

open-shelf book stacks in the reading room, have been made as unobtrusive as possible.

Moving finally to Aberystwyth, the third building of the National Library of Wales was opened by the Queen in May 1996. In the commemorative booklet for the occasion the design team spoke of the project as "part of the [Library's] overall purpose to sustain archival activity and to continue to develop educational capability into the foreseeable future". Here again – almost, but not quite, explicit – are the twin themes of preservation and sustainability which should lie at the heart of all major library building development.

The new building is of reinforced concrete, faced with brick and reconstituted stone. In the words of the booklet, this is "massive construction to support and protect the contents and thermally stabilise its internal environment". The five floors above ground and the one semi-basement are entirely for storage, with books on the four upper levels, maps at ground floor level, and archives in the lowest level. The building is windowless apart from shallow strips of glazing running along the top of the exterior walls at each level, and larger windows lighting the main gangways. The environment is controlled to BS 5454:1989 standards or stricter, the specific requirements having been worked up by a Project Users' Group which included the Library's Conservation Officer.¹³ Once again it is a wet-pipe water-sprinkler system that covers the five upper floors including the map storage, and each of these floors is fitted with mobile shelving. The lower ground floor, reserved for the storage of such irreplaceable materials as archives (on all media), manuscripts, incunabula and microform masters, is quite different, being divided into a grid of twenty "cells", ten either side of a central gangway. Each cell has a steel fire door and environmental controls to suit the specific nature of the materials stored within, so it is possible to provide different storage environments for paper, photographs and film. Three of the cells are run together as a single room, a Faraday Cage, lined with copper to isolate electronic records from potential interference. This is still a very rare feature in the UK's library and archive scene. For added protection of the archives, the building has been so designed that the reinforced concrete immediately above the archive storage areas is in theory strong enough to withstand the collapse of the entire building above, whilst the plant room, on two storeys, is separately housed at the northern end of the building.

As I mentioned earlier, these three national libraries are by no means the only "flagship" library and archive buildings of recent years in the United Kingdom, and the standard of provision in buildings, whether new or converted, is rising all the time.

Construction to achieve high thermal inertia and reduce or even eliminate mechanical control of the environment is being widely practised. New refinements are being introduced in the methods of storing and handling documents, and increasingly these are being tailored to the specific needs of the individual media held. Specialised film and sound archives are being established where proper attention can be paid to the preservation and storage needs of these media; but where such items are held in general purpose repositories it is increasingly common to find specially controlled environments, as at the National Library of Wales.

Innovative technical features are also being incorporated, such as the National Library of Wales's Faraday Cage for electronic records already mentioned, or the acclimatisation chambers for photographs at English Heritage's repository in Swindon. Both the Public Record Office and the British Library have mechanical handling systems for transporting documents and books to the reading rooms, designed to minimise wear and tear.

Fire and security precautions are being enhanced, partly as a result of incidents such as the fire at Norwich Central Library in 1994. Automatic fire-suppression systems, whether based on water or inert gases, are becoming more common, although a big current issue for some repositories is the replacement of halon as a fire suppressant gas, as required by EU legislation. But physical defences are being strengthened too, as at Surrey History Centre in Woking, where steel roller blinds increase the fire resistance of the doors.

My Commission advises a number of grant-awarding bodies on applications for assistance towards the purchase and conservation of archives. It also suggests suitable repositories to private owners wishing to sell or donate their archives. And it advises the government on the most suitable resting place for archives accepted for the nation in lieu of tax. In all these situations, one important question is never far from our minds. Setting aside any short-term benefits of improved public access, what would be the long-term consequences of our recommendation? For example, does it make any sense to recommend a grant for extensive, and expensive, conservation work if you know that after treatment the materials will be returned immediately to a wholly unsatisfactory environment? It may be too hot and too dry; too humid, or (worse still) sometimes one and sometimes the other, with temperature and relative humidity subject to very little control. I think the strategic question I would like to leave with you is this: Is there any honourable argument in favour of recommending a private owner to place his or her papers, or a nation to store its stock of books, in a building which lacks a stable and controlled environment, or which lacks essential security provision, or which is structurally unsound, or where fire precautions are inadequate? And

doesn't the answer largely lie in the kind of building we are prepared to provide?

REFERENCES

- 1 Clause 7.1
- 2 Colin St John Wilson [hereafter cited as Wilson], *The design and construction of the British Library* (British Library, London, 1998), pp. 7,8. I am grateful to Professor Mirjam Foot and to Helen Shenton for additional information.
- 3 F. W. Ratcliffe and D. Patterson, *Preservation policies and conservation in British libraries: Report of the Cambridge University Library Conservation Project* (British Library, 1984).
- 4 Wilson, p. 18-20.
- 5 Wilson, p. 79.
- 6 Wilson, p. 89.
- 7 Wilson, p. 95.
- 8 Wilson, p. 95.
- 9 Wilson, pp. 67-8, 71, 95.
- 10 Wilson, 89.
- 11 Information obtained from the National Library of Scotland's leaflet, *In case of fire ... the major refurbishment at the National Library of Scotland's George IV Bridge Building*; ,National Library of Scotland protecting a nation's heritage', in *Fire Prevention* 249 (May 1992), pp. 22-26 and ,A novel approach to library fire safety', in *Fire Prevention* 267 (March 1994), pp. 28-30. I am grateful to the Buildings Manager, Bill Jackson, for these references and to him and John McIntyre, formerly Director of Preservation, for a detailed escorted tour of the building while this paper was in preparation.
- 12 The official opening of the Third Library Building at the National Library of Wales (1996), p.17.

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13 I am grateful to Iwan Jones, Preservation Officer, and Mark Mainwaring, Director of Administration and technical Services for much of this section of the paper.

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