

# UNDERSTANDING MATERIALS



**St Brigid's Convent (1898), Northbridge, Perth, Western Australia, in 1997.**  
Gable crucifix details destroyed by corroding metal fixing rods, gutter and rain goods not maintained - allowing water ingress, roof sheeting corroded - requiring reconstruction, and inappropriate cement rendered repair work.



**St Brigid's Convent (1898), Northbridge, Perth, Western Australia, in 2000.**  
After *repair* (by *restoration* and *reconstruction*) based on documentary evidence and using *appropriate* materials to retain *authenticity*.

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## UNDERSTANDING MATERIALS

Question: ‘*What is your understanding of the relationship between the practical issues of using appropriate materials - e.g. lime, stone, timber, metals, brick, earth, concrete, - in the repair of historic or landmark buildings and the philosophical issues of authenticity?*

*Is there an irreconcilable gulf between the concerns of the craftsman and the concerns of the conservator?*

*You will be expected to show a wide and accurate knowledge of at least two of the building materials discussed, and of the varying needs of historic buildings of different periods and values.*

### 1. Introduction and Definitions:

At the beginning of this essay, it is considered valuable to reflect upon the terminology used in the question, so that the words may be analysed, and clarified further. The concept of using *appropriate* (right or suitable, fitting) materials in conservation will be elaborated in much greater detail in relation to examples of materials usage in following text.

The words *places of cultural significance* can perhaps be used to supplement the term *historic or landmark buildings* in this work. *Places of cultural significance* are defined in articles 1.1 and 1.2 of the revised Burra Charter of 1999.<sup>1</sup> ‘**Place** means site, area, land, landscape, building or other work, group of buildings or other works, and may include components, contents, spaces and views.’

‘**Cultural significance** means aesthetic, historic, scientific, social or spiritual value for past, present or future generations. Cultural significance is embodied in the place itself, its fabric, setting, use, associations, meanings, records, related places and related objects. Places may have a range of values for different individuals or groups.’

In adopting this slightly broader range of consideration, discussion can also incorporate examples of material use and authenticity in places that may not be considered as historic or landmark buildings, but are worthy of discussion as *places of cultural significance* for other reasons.

It is important that the word *repair* in conservation terminology is also examined with the assistance of the Burra Charter (Burra). The concept of *repair* is first discussed with regard to *maintenance* in Burra article 1.5, which notes that: ‘*Maintenance means the continuous protective care of the fabric and setting of a place, and is to be distinguished from repair. Repair involves restoration or reconstruction.*’

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<sup>1</sup> The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance 1999.

**Restoration and reconstruction** are then defined:

*‘Restoration means returning the existing fabric of a place to a known earlier state by removing accretions or by reassembling existing components without the introduction of new material.’*

*‘Reconstruction means returning a place to a known earlier state and is distinguished from restoration by the introduction of new material into the fabric.’<sup>2</sup>*

In both the definitions of restoration and reconstruction (repair) the words ‘to a known earlier state’ are common, and this wording is significant.

Leading into the issues of **authenticity** in conservation work, Burra article 4.2 notes that the use of traditional techniques and materials are preferred, but includes a provision for modern usage if conservation benefits are forthcoming: *‘Traditional techniques and materials are preferred for the conservation of significant fabric. In some circumstances modern techniques and materials which offer substantial conservation benefits may be appropriate.’* In this area Burra appears to provide some flexibility in guidance, with the explanatory note attached to article 4.2 placing a restraining hand on the shoulder of a less than cautious conservator: *‘The use of modern materials and techniques must be supported by firm scientific evidence or by a body of experience.’*

The Burra Charter provides for the possibility of **change** to a place, again with a wisely placed cautionary note referring to the prime principle in conservation of retaining cultural significance:

*‘Change may be necessary to retain cultural significance, but is undesirable where it reduces cultural significance. The amount of change to a place should be guided by the cultural significance of the place and its appropriate interpretation;’* and *‘Changes which reduce cultural significance should be reversible, and be reversed when circumstances permit’<sup>3</sup>*

Thus when attempting to elucidate an understanding of the usage of materials with *repair* work in conservation practice, there exists a clearly defined set of conservation terms, principles, processes and practices to guide a discussion of appropriate materials and authenticity. Where **new work** is considered to a *place of cultural significance*, other Burra articles are helpful, however that consideration is beyond the scope of this essay.<sup>4</sup>

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<sup>2</sup> *ibid* Articles 1.7, 1.8

<sup>3</sup> *ibid* Articles 15.1, 15.2

<sup>4</sup> New work is discussed at *ibid* Articles 22.1, 22.2

## 2. The Philosophical Issues of Authenticity:

Authenticity (of undisputed origin, genuine) in relation to conservation work has been the subject of passionate discussion and debate in the past. Architectural historian Peter Burman, writing on ‘Conservation Ethics and Philosophy’, notes that:

Our intellectual background includes the whole vast tapestry of intellectual and spiritual exploration, which, for Europeans, means that we need to recognise the importance of the texts of the Italian Renaissance; ...<sup>5</sup>

Burman records the importance of the *De re aedificatoria* of Leon Battista Alberti (1404-72) and of its English translation by Giacomo Leoni in 1726. Further to Alberti’s work, Leoni published the ‘The Ten Books of Architecture’ (after Vitruvius), and the tenth book is described as ‘*nothing less than a treatise on architectural conservation ...*’. The work of Christopher Wren is discussed in relation to the (pre Great Fire) St Paul’s Cathedral in London, and how Wren used a careful recording and analysis approach to examination of this building before recommending any further work. Burman’s point is clearly made. By careful study, Wren gained a clear understanding of the building - its construction and the nature of its materials - before discussing any intervention with the fabric of the building, and of course this method is still appropriate in current times.

The nineteenth century writing of John Ruskin in particular, lead to a further and wider philosophical analysis of conservation work in his own time. Other scholars and practitioners followed up Ruskin’s efforts, notably those involved in the arts and crafts movement of architecture, and also others concerned more directly both with the nature of materials usage and conservation in general. These further activities of the late nineteenth and early twentieth centuries were a precursor to further twentieth century documentation of conservation philosophy, embodied in charters such as the Athens Charter of 1931 and Venice Charter of 1964. The Venice Charter records in relation to restoration, and thus materials usage and authenticity:

ARTICLE 9. The process of restoration is a highly specialised operation. Its aim is to preserve and reveal the aesthetic and historic value of the monument and is based on respect for original material and authentic documents. ...

As a basis for the first Burra Charter produced by Australia ICOMOS in 1979, Venice Charter articles (such as that listed above) were closely analysed, and the charter layout and terminology refined to reflect developed understanding of conservation process and practice. The vigorous discussion of authenticity has continued. In 1994 *the Nara Document on Authenticity* (produced at the Nara Conference on Authenticity in Relation to the World Heritage Convention, Nara, Japan, 1-6 November 1994), was set down. This document set out some clear parameters for further intellectual and philosophical discussion of the issue.

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<sup>5</sup> Burman, Peter ‘*Conservation Ethics and Philosophy*’, website [www.york.ac.uk/depts/arch/gsp/conservation/buildings/prog98.htm](http://www.york.ac.uk/depts/arch/gsp/conservation/buildings/prog98.htm), consulted 12 March 2001.

The Nara Document relates in regard to ‘Values and authenticity’:

9. Conservation of cultural heritage in all its forms and historical periods is rooted in the values attributed to the heritage. ... Knowledge and understanding of these sources of information, in relation to original and subsequent characteristics of the cultural heritage, and their meaning, is a requisite basis for assessing all aspects of authenticity.

10. Authenticity, considered in this way and affirmed in the Charter of Venice, appears as the essential qualifying factor concerning values. The understanding of authenticity plays a fundamental role in all scientific studies of the cultural heritage, in conservation and restoration planning...

By 1996 the Nara Document had achieved greater consideration in a global forum, and the *Declaration of San Antonio* was made (at the InterAmerican Symposium on Authenticity in the Conservation and Management of the Cultural Heritage) during that year. At San Antonio the issues of authenticity were examined in close relation to American examples, and it was pointed out by San Antonio delegates that the Nara work was produced with a focus towards the World Heritage Convention. Both of these particular considerations were valid, and the commitment to consideration of the principle of authenticity remained the focus for discussion.

How does one determine the time when materials should be replaced? Certainly if a *place* is in danger of losing *cultural significance*, then material replacement is consistent with good conservation practice. With *repair*, usage of the original type of materials and fixings again will ensure compatibility of detailing and appearance in new work. Recording of change can then be made, and this recording becomes part of *Interpretation* – defined as ‘*all the ways of presenting the cultural significance of a place.*’ The Burra Charter affirms the concept of *Interpretation* in conservation philosophy: *The cultural significance of many places is not readily apparent, and should be explained by interpretation. Interpretation should enhance understanding and enjoyment, and be culturally appropriate.*<sup>6</sup> If it becomes necessary to make change to a *place*, this change can be recorded and explained.

With knowledge of this preceding information, the philosophical issues of using appropriate materials can be examined in a contemporary fashion, with discussion of the use of various materials.

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<sup>6</sup> The Burra Charter *op cit* Articles 1.17, 25

### 3. Appropriate Materials and Authenticity:

Using the term *appropriate* in relation to materials implies that materials used are sympathetic to the nature of the existing construction. Historically, the selection of appropriate materials has often evolved with continued use of material over a long period of time. Through usage comes a tradition of understanding. Both the craftsman and the conservator must observe this tradition, and understand the physical properties of materials, to successfully use them in building repair. The following examples of material usage are selected to give a simple overview of some of the parameters that may be of concern to a craftsman and conservator in using *appropriate* materials, in an authentic manner, in the *repair (restoration and reconstruction) of places of cultural significance*.

#### 3.1 The tradition of lime mortar and render usage in masonry and plasterwork:

An almost universal and ‘classic’ example of discussion for appropriate materials in recent times has concerned the tradition of lime mortar and render usage in masonry. This is a very important and common area of concern for current conservation practitioners. We know that masonry is a general term that describes a bonded construction using bricks or blocks, stone units, terracotta, or other structural units, all laid manually unit by unit and set in a mortar. What is often not understood by well-meaning repairers of such work is that the masonry units provide the necessary continuance of the construction, and that the mortar is required to act as a ‘softer’ permeable medium for absorbing both movement of the structure and of releasing moisture through the system. Maintenance by replacement of the mortar (which has carried the burden of cracking, and moisture/salt release from the structure) will ensure that the structural units are preserved, and that the masonry itself is conserved for the longest possible period of time.

Traditional buildings, and particularly lime-based buildings, were conceived on the principle that few materials or elements of construction were impervious to moisture. Reliance was placed on a high rate of ventilation, and of moisture loss to the atmosphere when possible. Attempting to modify the construction of these places of cultural significance risks disrupting the equilibrium achieved by the original builders.

With the benefit of many years of practical experience in a number of countries, Irish stonemason and conservation consultant Patrick McAfee provides a good summary of essential considerations for good pointing and replacement mortars for masonry. The major factors are (others are listed):<sup>7</sup>

- Sacrificial mortars - they will fail sooner than their host material, brick and/or stone.
- Pervious mortars - they do not prevent wet walls from drying out.
- Non-permanency - capable of being removed without damage to the surrounding stone or brick.

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<sup>7</sup> McAfee 1998, p.156

McAfee's summary is based on an understanding of the lime cycle and lime itself, which is necessary to effectively use the material. Also of value with the use of lime is the consideration of sustainability. Non-hydraulic lime eventually reverts to the same chemical as when it was quarried, though in a different location. In the long term, elements of a traditional building can reproduce themselves, whereas cement, gypsum and the stronger hydraulic limes are generally one-way materials.<sup>8</sup>

Tim Ratcliffe and Jeff Orton emphasise the need for knowledge in lime based plaster work.<sup>9</sup> Traditional materials such as the type of timber lath (has 'suction' which aids the drying and carbonation of plasters), sand (coarse sharp sand for scratch and float coats and fine sharp sand for setting coats), hair (goat, cow, or ox for flexibility), and 'fat' lime ('fat' because of the consistency after maturing) were historically and critically developed for good results. The fact that lime plasters can be left to mature is a comparative advantage, as the process breaks down any particles of under and over burnt material.

Clifford Price highlights the problems in masonry resultant from salt and sulphate movement through a porous, permeable medium.<sup>10</sup> The crystallisation of salts and resultant expansion at a drying plane can literally 'blow apart' masonry, with fretting and fracture of the surfaces. Control of the moisture movement by correct detailing is the initial consideration, and then the use of weaker, more porous mortars can ensure that the majority of salt movement can be dealt with in the *maintenance* of the mortar itself.

### **3.2 The common problem of cement rich mortar and render replacement to lime based traditional buildings, attempting to prevent damp but resulting in further deterioration due to a lack of understanding of the materials:**

It has been historically understood that lime mortars allow the release of moisture from within a system, and the phenomenon of cement rich replacement of previously softer mortar, demonstrates a lack of understanding of the physical characteristics of the materials. Cement is a rigid, low-permeability medium. The same requirements of moisture permeability apply where renders are used. Enrico Fodde, discussing traditional finishes on mud brick construction, illustrates the necessity of successive coats of lime render being 'softer' (having greater permeability) to the outside of the render. This ensures that moisture can be 'lost' from the construction rather than being trapped in the masonry under harder layers of render.<sup>11</sup> With repair work, the use of a consultant building materials chemist can aid the formulation of a mortar and render mix that recognises the inherent characteristics of the initial mix used. This added technical advice supplements, and often confirms traditional usage (and 'gut' feelings) developed from previous observations and experience.

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<sup>8</sup> Schofield, 1994, p.2

<sup>9</sup> Ratcliffe and Orton, 1 March 2001

<sup>10</sup> Price, 24 January 2001.

Scotland's Ingvál Maxwell maintains a focus on the importance of understanding materials within traditional and regional variations of usage in his own country.<sup>12</sup> Maxwell points out how the appearance characteristics of a wall can be changed by an insensitive repair approach, and how regularly replaced clay and earth mortars were seen as useful adjuncts to the longevity of masonry. In many instances the work of replacement of sacrificial materials in building maintenance was tied to seasonal activity. Referring to intuitive constructional methods, Maxwell suggests a reason that has contributed to a movement away from traditional materials:

Without these time-honoured systems, the quality of our built heritage would not have been as unique as it has turned out to be. Impossible to 'calculate' for, and to fully understand in a truly scientific manner due to the many variables involved, this can be disconcerting in the present world where pre-determined codes and standards prevail. Not surprising then the effect has been to move away from traditional building systems to one that can be 'proven' to work.

It is important that a conservator can produce a body of evidence that demonstrates that traditional materials and methods do work, if this is required by regulatory authorities.

### **3.3 Timber has optimal usage when used correctly to suit an application:**

Timber requires protection to prevent the decay process that follows from continued wetting and drying (causing expansion and shrinkage of timber cells as they gain and lose moisture). Proper detailing of timber, proper weather coverage with more durable materials, and proper maintenance with a sealer will assist longevity. It must be accepted that timber is perishable. However, there is never any need for advanced decay of timber used in building if simple design precautions (in historical building forms usually with a clear precedent) are incorporated, and maintenance of other materials is continued to exclude the possibility of the timber becoming sufficiently damp to support insects, fungi, or wetting and drying problems. Brian Ridout gives many examples of situations where simply ensuring that timber was dry would eliminate the further activity of insects and fungi.<sup>13</sup> Indeed experience in termite prone countries reveals that with proper detailing, local timbers (with natural resistance to local insect attack) can be used effectively in structural work, as long as the material remains dry.

There are elements of construction, notably external timber joinery, where sufficient weather cover or surface treatment of the timber itself will assist with preservation. The repair of timber elements using an appropriate durable wood is certainly possible, and authenticity can be maintained. As before, knowledge is important. An understanding of how quickly the timber is grown, how it is converted, an awareness of the nature of the material (e.g. fast or slow grown softwood or hardwood; location of pith, heartwood, sapwood, bark etc) and how it has been dried, is critical.

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<sup>11</sup> Fodde, 28 February 2001.

<sup>12</sup> Maxwell, 24 January 2001.

Some timber structures of cultural significance have been designed that require regular replacement of materials. This type of design is shown in two examples of jetties in Western Australia (WA), different in scale, but both subject to constant weathering in a ‘hostile’ marine environment, to attack from marine borers, and to cyclonic loading from storms in the Indian Ocean. The humble Streeter’s Jetty at Broome, WA, is a comparatively short (~70 metres long) timber structure built in the 1890s to facilitate the loading and unloading of pearling luggers. The Jetty is built amongst mangroves, is subject to 10 metre tidal movements, and is located in a monsoon climatic area. The Jetty thus has extremely wide variations of moisture content in the timber. The local eucalypt Cadjebut timber (an extremely durable hardwood) has been found over perhaps four separate reconstructions to have the maximum resistance to the decay resultant from the wide thermal and moisture movements in the area. The ‘paperbark’ type covering of the timber is left on the timber piles driven into the seabed, and gradually ‘flakes’ as a sacrificial covering. A special stand of trees has been set aside for the ongoing renewal of the ‘bush-cut’ piles, a process that is necessary perhaps every thirty to forty years.

**Figure 1: Streeter’s Jetty (c.1897) at Broome, Western Australia, in 1998.**



A structure that periodically requires complete reconstruction.

The characteristic appearance and the longevity of the jetty is resultant from use of authentic, traditional materials.

The West Australian hardwood Jarrah (*eucalyptus marginata*) has long been known for its durability and hardness. The ‘One-Mile Jetty’ at Carnarvon, WA, has Jarrah piles, stringers, bearers, and decking; and has had a continuous program of replacement of this material since 1896. At times as many as 16 men have been involved in full-time repair work. The structure has withstood Category 5 cyclones with success due to the flexibility embodied in the timber structure. Engineers and architects alike have come to recognise that if the galvanised metal fixings are maintained and replaced as required, and the marine borers are discouraged from activity in the pile footings by ‘wrapping’, then the materials replacement program is sustainable. Weathered timber is cut back to the useful cores when structural section is lost, and the material then reused elsewhere. The workmen employed to do this replacement work in the past have passed on traditional skills to new generations, and this allows the timber to continue to be used in an authentic manner.

**Figure 2: ‘One Mile Jetty’ (1896) at Carnarvon, Western Australia, c.1922.**



A structure with a continuous program of restoration and reconstruction. The ongoing use of traditional materials and skills is maintaining authenticity.

### **3.4 The characteristics of metal reinforcing (primarily steel) in reinforced concrete, properly cured concrete, and sufficient cover to properly placed steel:**

It must be recognised that the use of mild steel reinforced, Portland cement based concrete is an immature tradition. Conservators working with this material may be concerned with the repair of concrete construction that is of poor quality, due to the fact that the materials have not been fully understood. It is possible that with an evolution of usage, construction characteristics such as curing of the material will be improved, to ensure that the reinforcing medium (correctly placed to suit the imposed loading) may be better protected from the possibility of moisture entry and the corrosion/oxidation resultant. Conservators who for good reasons may consider concrete to be a ‘bad’ material; will recognise that mild steel reinforced concrete has its place in certain types of construction, and will be a continuing source of consideration in the immediate future. Reinforced concrete, again as a relatively new material, will on occasion not be used or detailed well; and conservators should see concrete as a material to be understood and used appropriately - as with any other material. The sustainability (or lack thereof) of this material is an issue outside the scope of this essay.

Cracking to allow moisture penetration in reinforced concrete may result from a range and combination of many factors including inadequate design, poor laying, movement of foundations/footings, movement/failure of other construction elements etc. Conservation Architect John Allan referred to his recent work on architect Patrick Gwynne’s 1938 English house ‘The Homewood’, and related the necessity of modification of design details to properly conserve this place.<sup>14</sup> Gwynne was a relatively young and inexperienced architect when he designed this house. Details that are considered essential to modern concrete work - such as a drip groove to a suspended slab edge, and overflow outlets to concealed ‘flat’ roof gutters, were omitted in the first work. Insertion of such details can now be made in the interests of good conservation practice, with appropriate records made, and the significance of the place is not compromised.

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<sup>14</sup> Allan, 5 March 2001.

### 3.5 Health and safety issues in replacement of materials:

Not all issues of authenticity can be resolved without significant discussion and research. With due consideration of the life-cycle of a material shown in previous examples, for the contemporary conservator there are occasionally health and safety issues in repair work that also fall within the realm of authenticity considerations. An example of this is shown with the St Francis Xavier Cathedral at Geraldton, Western Australia. The dome of the cathedral was hurriedly roofed in 1938 using corrugated asbestos fibre cement sheeting, at that time a relatively new and inexpensive material. With the economic effects of the 1930s depression still current, this use of this material was seen to provide an expedient method to both complete the dome, and to re-roof the nave and sanctuary, previously covered in timber shingles some 20 years before.



**Figure 3: St Francis Xavier Cathedral at Geraldton, Western Australia (1918-38):** Corrugated asbestos fibre cement roof sheeting to the dome in 1938. Timber shingles to the nave and sanctuary roofs from 1918, soon to be replaced with asbestos sheeting. Can the cathedral now be roofed in accord with the architect's original design intent? Would a green copper dome to the cathedral, as originally envisaged by the architect, similar to the George Street, Edinburgh bank example shown below, meet with approval? Is this authenticity?



The roof sheeting has now decayed in the very abrasive semi-marine environment, and poses health and safety issues. Research has revealed that the architect's original design preferred the use of clay tiles for nave and sanctuary roofs, and of copper for the dome to the crossing. For financial reasons these materials were not originally placed, and may be the correct material to place now. However many other factors need to be taken into account. Is the existing structure capable of taking the new loadings without significant modification, and are social factors (local people have come to admire the old roof appearance) of cultural importance?

Also of consideration is the fact that encapsulation of the asbestos fibres in the sheeting by a coating may be possible, and the issue of appropriate materials and authenticity in this case is not clearly resolved. The St Francis Xavier Cathedral at Geraldton is from a relatively recent period, and some would ascribe a lesser value to this structure, than say a medieval Gothic cathedral. However, the principles of materials usage and authenticity remain the same. **A conservator must determine and document work with the aid of clear conservation policy, policy that ensures the retention of cultural significance.**

#### 4. The Craftsman and the Conservator:

The question was posed: Is there an irreconcilable gulf between the concerns of the craftsman and the concerns of the conservator? A **craftsman** is by definition *a member of a skilled trade*, and to some extent this also implies is a person who uses ‘authentic’ materials. The craftsman is traditionally a person who is prepared to provide for a prolonged period of care in the execution of his trade skill, so as to achieve a result held high in the tenets of his own training and in the esteem of both his clients and his peers. **The Conservator**, *a person who conserves or keeps safe - a custodian*, has the same concerns with appropriate materials and authenticity in the quality of his/her work. A person who conserves items of cultural significance, is also a custodian of the skills of the craftsman. There is a commonality in the aims of the craftsman and the conservator. With the previous materials examples, it can be seen that knowledge of materials is the key to appropriate usage. With equal knowledge of the materials and of their usage, there is a meeting of minds and aims. This knowledge may be gained either traditionally, intuitively, by scientific study, or by a combination of these methods, depending upon the circumstances of an individual or group. Craftsmen and conservators must be prepared to share knowledge and skills for an effective conservation process to occur.

An outsider to a conservation process may consider that a situation where contention is to be found between craftsman and conservator is shown in the ongoing development of contemporary skill as applied to the conservation of historic monuments. Evolution of change examples in England such as the stone mason’s sculptural work to the west front of both the York Minster and of the Lincoln Cathedral, have highlighted the debate in relation to this issue. In these cases sufficient fabric of the decorative stone carving to the buildings has been lost to make full reconstruction of some portions of previous work impossible. Confirming documentary evidence does not always exist to assist in any reconstruction. The skilled stonemasons employed to work continuously on these cathedrals have become familiar with the work of previous masons. Contemporary masons have the ability to produce new work that continues a tradition of replacement of decayed sculpture, a procedure that has occurred in some cases over many, many centuries.

**Figure 4: Detail around the arch over the central doors of the west front of York Minster, England c.1998.**



Illustrates loss of detail with weathering. As a philosophical question in relation to authenticity in conservation:  
‘Should the stone work be replaced with new work, if the old cannot be accurately reconstructed?’

Examination of conservation principles and practices embodied in charters such as the Burra Charter reveals that in a place of cultural significance the type of new work shown at York and Lincoln does not cause a philosophical conflict. In fact the craftsman (in this case - the masons) are continuing a tradition of authenticity, and the Burra Charter recognises this work of conservation of cultural heritage particularly well with some concepts (e.g. Article 27 - *Managing Change*) that are incorporated in the 1999 revisions.

Eventually buildings such as the great medieval Gothic cathedrals will lose cultural significance if some of their features are lost with material decay that is natural over a long passage of time. Thus authentic, appropriate materials used with the aid of *interpretation* allow an even greater understanding of the place, and facilitate the possibility of material replacement. Cultural significance can be maintained.

## **5. Conclusions:**

Most historic buildings that survive were soundly built in the light of accepted practice, but it is clear that poorly detailed building is not an invention of the twentieth century. Where a deterioration problem in a place exists, the conservator has a duty to examine the detailing initially placed - to see if it requires modification to assist in the retention of fabric, and thus the retention of cultural significance.

The appropriate use of appropriate materials requires understanding of the material itself in physical terms, understanding of the history of the usage of the material, and understanding of the adequacy of the detailing used in the design. Change is possible in conservation, but only within the parameters of clear conservation policy, and by the use of authentic, traditional materials and skills. Any changes must be reversible, to allow modification should an analysis suggest a better method to retain cultural significance.

Conservators can approach the usage of materials in buildings with recognition that conservation is an ongoing process. Armed with correct knowledge (records/skills/materials) authenticity is possible, and materials can be used without conflict between conservator and craftsman.

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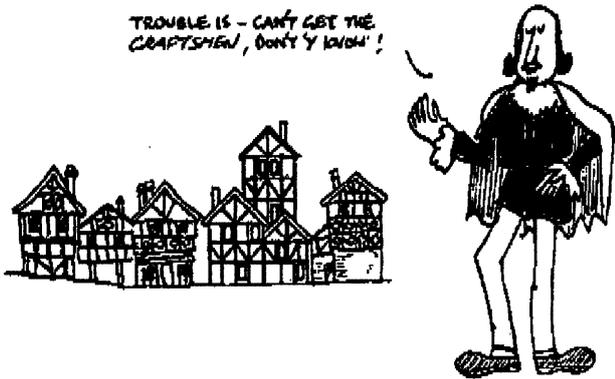
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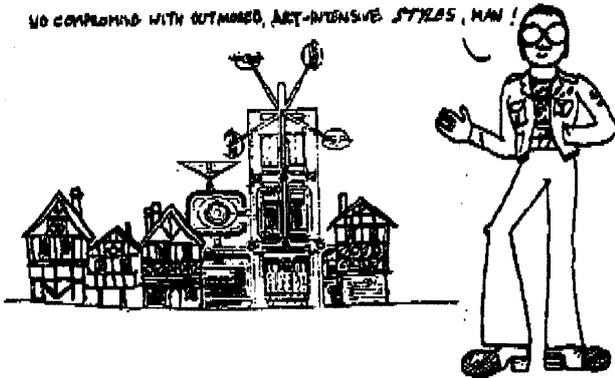
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COMPROMISE



REPRODUCTION



MODERN



KEEPING-IN-KEEPING

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