Choice of Restoration Methods: 
Modern Versus Traditional Methods

by
Judith A. Grice, Head of Environmental Design and Planning, 
Waterway Environment Services, British Waterways
(Revised 2006 by Nigel Crowe, Head of Heritage, British Waterways)
INTRODUCTION

1. The waterways restoration movement in the United Kingdom has a long and distinguished pedigree. However, the rationale for restoration in the past was often a reaction to the prospect of loss or wholesale demolition of waterways rather than seen as a way of carefully conserving the historical fabric of navigations and their associated heritage, social and literary associations.

2. Much energy and effort was expended in bringing the waterways back into water and use for navigation as quickly and as cheaply as possible. Undoubtedly, in the process features of historical interest were lost, traditional techniques and methods of construction ignored or built across, local character and distinctiveness swept away by an often unskilled yet hugely enthusiastic and dedicated workforce.

3. Yet without this important volunteer effort and the motivation of a few waterway enthusiasts many canals would have been lost and the richness of our waterway heritage diminished as a result. Waterways like the Montgomery Canal, the Kennet and Avon Canal, the Pocklington Canal and the Ashton Canal would simply not be there now for people to enjoy for a wide range of leisure and recreational activities.

4. The importance of the inland waterway system as a recreational and heritage resource is now well recognised and the public campaigns of the past to save the waterways from demolition consequently becoming fewer.

5. With the passage of time has come a growing recognition that there are other issues to consider alongside the wish to simply restore navigation. The heritage value of the waterways is increasingly protected through designation of waterways and their associated structures and buildings as Conservation Areas, Listed Buildings and Scheduled Monuments. Many waterway corridors pass through Areas of Special Landscape character and the ecology and nature conservation value of such waterways and their corridors is recognised through designation as Sites of Special Scientific Interest (SSSI's) and Local Nature Reserves.

6. Such designations highlight the requirement for special care and attention, promoting a change in approach to restoration that is now becoming widespread whether sections of waterway or features to be restored are statutorily protected or not.

7. With the benefit of hindsight too it has been possible to review the early restoration works and assess their effectiveness. Many early schemes simply rebuilt at a most basic level with materials that came to hand, begged or borrowed. Little consideration could be given at that time to the appearance of the end result or indeed the longevity of the repair. Consequently many works executed in the
1970’s and 1980’s now need re-doing and at worst may be actually damaging the original fabric of the waterways they were designed to save. There is now a growing understanding and respect for traditional materials, methods and techniques of construction that comprise part of our industrial heritage and have proved their value over the last 200 years which with modern adaptation can be used again to great effect.

8. However, restoration is not just about putting things back as they were. The waterways were robust features that have stood the test of time and seen many changes. The evidence of those changes is a fascinating part of our industrial and social history and it is not always appropriate to remove more modern additions and features. Further destruction and deterioration of the original fabric can occur if done badly.

9. The spectrum of potential use of the waterways has also widened. While undoubtedly important for leisure and recreation they also perform other functions such as land drainage, flood defense. Constraints relating to such activities have strengthened over the years and the restoration and repair of traditional mechanisms and control structures, for example, may no longer meet stringent health and safety requirements.

10. We must also look to the future and anticipate the value of such waterway networks to a growing population, whether for transporting water and telecommunications, acting as an outdoor classroom or as a catalyst for widespread urban regeneration. All of these issues affect the choice of restoration methods and the extent and type of renewal.

11. A restoration project in the 21st century is just as likely to be about building new waterways and water bodies to link, strengthen and make viable the current network as about restoring redundant arms and basins. The debate over the last 5 years has become much more strategic and considered in defining where the priorities for restoration lie to ensure that the national network is made secure.

12. We now know an awful lot more about our waterway heritage than in the past. British Waterways has a thematic Architectural Heritage Survey of the 2,000 miles of waterways it manages and it has a heritage policy and a set of standards for heritage conservation works. More importantly, BW now employs local heritage advisers whose expertise informs judgments as to what elements of its heritage are special and worth retaining and what are not. Other navigation organisations need to make similar assessments, balancing operational and heritage criteria, in order to be clear what choices to make.

13. The sections that follow do not offer a prescription for certain types of restoration work. Rather they serve to offer guidance on the overlying principles, culture and thought processes that should influence the planning and execution of any
restoration project. It really is the case that each project must be judged on its merits.

**BASIC RESTORATION PRINCIPLES**

14. **Principle 1**: When working with historic environments a conservation led approach and culture needs to be adopted. The underlying history and heritage of the waterway is part of its value and this can be explained and used to great effect in the development of the waterway for leisure and recreation as well as provide an important archive. Research into the structure, its use, its historic setting and development and records of past repair can help in determining future methods and techniques for restoration.

15. **Principle 2**: Problems and defects should be identified and monitored before proposing remedies: this may save money and effort in the long run and avoid the unnecessary destruction of waterway fabric. Experienced staff and contractors are needed to inspect and undertake this task. There is no substitute for informed analysis.

16. **Principle 3**: Where waterway features are to be restored a process of minimal intervention should be adopted in order to conserve as much of the sound original fabric as is practicable. All sorts of issues affect this judgement which must be made by an expert in this field, balanced by wider business objectives. Opportunities may arise to remove past inappropriate repairs taking into account the desire to achieve a uniform appearance against the loss of historical integrity.

17. **Principle 4**: When preparing cost information for the restoration and repair of waterways, the maintenance and repair cycle of such features must be taken into account as part of the 'whole life costs' of the project. Some conservation materials, methods and techniques may seem costly at the outset but can be cheaper in the long run requiring less maintenance.

18. **Principle 5**: Traditional restoration projects have been led by technical experts, often engineers, concentrating on the built fabric of the waterways alone. Large scale restoration projects require a multi-disciplinary professional team including key personnel in heritage, planning and landscape design, architecture, ecology and environmental science, community use and involvement, PR, market research, water resources and development as well as engineering.

19. More often the restoration project is about the regeneration of a waterway corridor, of which the navigation is just one part involving the planning and design of land and water, services and facilities and new income earning opportunities that can enhance the local economy.
OPTIONS AND CHOICES

20. It is not possible to be specific about the options and choices of techniques to deploy on a restoration project. Each situation comes with its own unique history, making research and investigation important even for works that have already been 'restored' and where further work is planned. The following issues have an important bearing on decisions.

STATUS

21. Whether the structure or section of waterway to be restored is statutorily designated under the UK heritage protection system or not, its significance should be checked. Many waterway structures are located within Conservation Areas or are Listed Buildings or Scheduled Monuments. The former designations are controlled by the Local Planning Authority and the latter by English Heritage, CADW or Historic Scotland. Works to designated structures may well require statutory consent and The Local Planning Authority Conservation Officer should be contacted in the first instance. Consent will only be given if it can be demonstrated that the works are to be implemented to best conservation practice. Clearly, evidence of research, surveys, detail drawings and method of construction need to be described, together with proposals for future care. It is worth remembering that any works 'that affect the setting' of a listed building will also need consent. Any unauthorised work is a criminal offence and could lead to enforcement action and prosecution. Planning permission may also have to be negotiated, applied for and granted before any works begin.

22. In addition, a wide range of other statutory and non-statutory designations can affect the choice of restoration method. Waterways may lie within Areas of Special Landscape, over archaeological remains and within Sites of Special Scientific Interest or Local Nature reserves. They may bisect World Heritage Sites, Registered Historic Battlefields or Historic Parks and Gardens. The nature conservation interest of redundant waterways can be a difficult constraint to overcome without destroying the ecology of the waterway. Special techniques may be required to protect and conserve species, with new areas of conservation value developed in advance of the removal of any current interest. This applies to creation of new habitats for plants and animals e.g. bats, voles, wetland etc.

23. Government guidance (PPG 16) makes it clear that archaeological evaluation and possibly recording may be required of restoration/alteration works in the historic environment. It is important to select a properly qualified archaeologist who is above all experienced in assessment of industrial archaeological remains.
CHARACTER AND DISTINCTIVENESS

24. The amount of the original fabric of the waterway that has survived intact, including frequently overlooked features such as paddle gear and bollards, gives the waterway its individual character and provides direction to the nature of the restoration and choice for reconstruction.

If much of the original fabric has been destroyed and little remains then the opportunity may be taken to re-build in a modern idiom and create a new waterway character. Retention of the few original relics may be important however, as evidence of early historical waterway development. More usually, the waterway displays many original features. In such situations it is important to look at the whole waterway strategically and make a judgment, with the support of the Local Authority Conservation Officer (and perhaps the relevant statutory heritage agency), as to which sections should be restored in a traditional manner and which could be reconstructed using modern techniques, methods and design. It is not always the case that reconstruction should be to a 'roughly traditional' design.

25. Similar judgments have to be made for individual features requiring restoration. For example, an accommodation bridge which has lost one parapet but is otherwise soundly constructed of early 19th century bricks will require the rebuilding of one parapet in an appropriately matching brick with a lime based mortar. A completely derelict bridge will need reconstruction to an approximately traditional design, probably using modern materials: a semi-engineering brick, a reinforced concrete deck, with possibly a cement or hydraulic lime based mortar.
Similar assessment of, for example, a lock will need to be made and every structure must be judged on its merits, defects and circumstances. It is important that the design and materials of any new structure is of a high quality.

26. On balance, there should be a presumption in favour of the retention of historic fabric wherever possible. Health and safety issues are always important considerations but must not become the excuse to damage or remove historic fabric.

CONDITION OF STRUCTURE

27. A full assessment of the physical condition of a structure will need to be made before any works are planned. An understanding of how the structure was constructed and used is important in diagnosing defects. Periodic repair and piecemeal re-building may have taken place and this should be noted. The following criteria should be considered:

- What is the extent and historical value of the existing structure?
- What are the problems and defects?
- What kind of interventions are necessary?
- Will temporary works be necessary?
- Does the structure stand on or contain contaminated matter?
- What kinds of repair/maintenance have previously been performed?
- What kind of demountable equipment (e.g. lock gates, paddle gear) survives and what will need to be returned to or replaced on the structure?

LOCATION

28. The location of the restoration project and its accessibility will have a bearing on the choices of techniques and methods used. For example, in an urban location vandalism and damage will influence the phasing of works and choices of mortars. In an urban location also, issues relating to safety become more critical with potentially greater numbers of people to consider. The need for handrails is a common consideration. In an urban location a structure or site intended for restoration may stand upon or contain contaminants (e.g. a buried lock chamber). Due consideration must be given to this and site investigations may be necessary before works begin.

29. Costs may increase due to the need for double handling of materials if a site is remote from good vehicular access. Inaccessibility to large equipment may justify the need for hand work which could favour traditional restoration techniques. Some of these costs may be offset by the use of volunteer labour.
30. Removal of material from site can be expensive and difficult at remote sites. Legislation may require special disposal of contaminated material.

31. Sites which have been remote and undisturbed for many years may be rich in conservation value and their alteration may be greatly resisted by the local community and the Local Authority. Archaeological investigation may be required and the County Archaeologist should be consulted at the earliest opportunity.

**USE AND PROSPECT OF USE**

32. The best use for an historic structure is the use for which it was originally built. Where only partial restoration of a structure is carried out (e.g. a pumping station) regular maintenance and monitoring will be required. Where complete restoration is contemplated it should be remembered that the hidden parts of an historic structure are as important as its visible parts. Listed Building protection covers the whole structure and its historical cartilage and setting, alterations or even 'opening up' of the structure. Scheduled Monument designation has similar controls. In restoration work the following criteria should be considered:

- What has the structure had to do in the past and how well has it survived?
- Are unnecessary changes of use being considered?
- Will proposed works involve removing historic fabric?
- Will restored elements or alterations alter load paths?
- Will new strengthening elements be necessary and how will these alter the appearance of the structure?
- Can major changes be avoided?
- Will the original form, character and appearance be maintained?

33. In addition, it should be noted that the waterways were not generally built for powered craft and that restoration will inevitably attract increasing numbers of such craft. While boating is not now considered to be the sole reason for restoration, the impact of increased numbers of boats on traditional bank protection, canal bank profiles, vegetation and other structures (requiring fendering and safety barriers etc.) needs to be borne in mind.

34. Health and safety requirements can have a great impact on the form and character of original structures. For example, bridge parapets for pedestrian use may have to be raised and made solid to meet current standards, and bridge decks may have to be strengthened, altering the mass and appearance of a bridge. In the case of designated structures these changes will always require statutory consent.

35. Decisions have to be made as to how much access the public will be allowed to historic structures both during re-construction and after the work has been completed. A risk assessment should be part of the research and early survey work on the project.
36. Restoration of a structure often involves adaptation in order to gain satisfactory use and benefit. But alterations should always be in sympathy with historic fabric. Wherever possible, new elements should not replace originals and if they must, then they should follow the original pattern and design. Good practice requires alterations to be in character yet identifiable as part of the historical development of the structure.

SKILLED CRAFTSMAN AND PROFESSIONALS

37. Restoration work demands extensive planning and project management skills, given the unpredictable nature of works which are frequently below ground. Good preparation and investigative work helps in this respect. Experience and understanding of historic structures and the way in which they perform is essential. Expertise is needed to decide whether distortion or cracking represents a current problem or not. Expertise is also needed to design and carry out sympathetic repairs to historic fabric. An ability with modern materials and boundless enthusiasm is not enough. In addition to a full heritage assessment the following may be required:

- survey and monitoring of structural movement
- geophysical survey of local ground conditions
- archaeological and environmental investigation

38. Equally important is the availability of craftsmen and contractors with proven skills in conservation techniques and methods of construction. Such skills should be verified and past experience and evidence of practice sought before they are deployed on sensitive tasks.

39. There is scope for running heritage training workshops as part and parcel of restoration projects; the development of such skills can be a very rewarding output from the scheme, an investment that can benefit future projects. British Waterways is developing such an approach on the Cotswold Canals restoration project.

AVAILABILITY OF MATERIALS

40. Careful survey and investigation should reveal a substantial amount of masonry material and original copings etc. in the bed of the waterways or buried beneath old fill material and dredgings. Such finds should be recovered and cleaned for reuse and only then new or second hand materials sought to effect the restoration. Volunteer labour can be a cost-effective way of recovering such valuable materials. For remote sites the transport of new materials into the working area can be very disruptive to the wider environment (haul roads and site compounds may require archaeological investigation) and cause almost as much damage as
the works themselves. It makes sense to re-use materials recovered from the site itself.

41. Once such options have been explored, then careful selection of new materials is the next consideration. Where specials and other unique features are required these should be well researched and sourced where possible. While it is not the intention to replicate original materials (it is considered good practice to be able to recognise the original from the new in a repair or reconstruction), the quality of the new materials, and the construction must be to a high standard. Frequently the higher cost of quality materials can be justified on the greater longevity and performance of the work into the future, keeping maintenance costs to a minimum.

42. Compatibility of materials is extremely important, for example, incorrect mortar specification can result in accelerated decay of historic fabric, whilst some metals may cause chemical reactions upon adjoining materials. Any new detailing will need careful consideration so as to avoid unsightly staining or erosion of surrounding areas.

43. Researching suitable materials takes time with special or rare materials frequently having long lead in times for production and delivery.

FUNDING

44. Many early restoration projects were constrained by the limited money available to do the works and decisions often revolved around whether to spread the cash thinly and achieve as much as possible so that the work could be used as a visible model to attract further funding or concentrate on repairing the work substantially. Inevitably the former prevailed but the danger always existed that the work would deteriorate quickly and again fall into disrepair and long term damage could be the result.

45. With the advent of Heritage Lottery funding and other UK and European grant funds, it is now possible to include the cost of essential surveys and investigations within the overall budget for the works, appoint the necessary specialists, undertake training and properly plan for good conservation repair and restoration.

46. Such funding has necessitated the broadening of restoration projects beyond simply repair and restoration; to qualify for funds other social, community, leisure, recreational, economic and employment factors have to be considered as part of the scheme of things. While more complex to implement, such multifaceted projects have the advantage of also being attractive to other funding sources.

47. A perennial issue, however, is the availability of funding for on-going maintenance of a restored waterway with many grants geared to the provision of
capital funds only. Finding revenue for future care is difficult for many organisations to commit to, despite the overwhelming support for the project. Without such funding, however, it is questionable if the project should proceed except in very small ways. Phasing and timing of works and the scope and design of works has to reflect this problem balanced against the prospect of continuing decay of structures that are left unrepaired.

48. Sustainability of the project is important and a multi-faceted scheme that looks at economic regeneration and income earning development has to be part of the long term equation.

CASE STUDIES

49. The three case studies that follow each demonstrate an approach to restoration and repair and serve to illustrate the points raised above. They should not be seen as a model for future works as every site and circumstance is unique but they can offer pointers to the degree of thought, consideration and care that needs to be built into the restoration process.

A. Brynich Aqueduct- Monmouthshire and Brecon Canal

50. Brynich Aqueduct is a Scheduled Monument in Wales. It is a c.1800, four-spans, 50 metres long masonry arch structure that had been repaired extensively over the years with rebuilt spandrel walls and arch barrels and the construction of supporting brick arches beneath two spans over the River Usk. Most elements of the structure showed signs of movement and deformation with leakage an ongoing problem.

51. Loss of mortar from joints and the weakening of clay fill, associated with leakage and ground water, was contributing to an overall weakening of the aqueduct. The decision was taken in 1996 to carry out a £500,000 repair to the structure over a 6 month period, in 1996/7.

52. Particular issues considered were:

- its Scheduled Monument status (requiring consent for the works from CADW),
- the location of the structure in the Brecon Beacons National Park and its potential landscape impact,
- the presence of protected bat species in the soffits of the arches (Daubenton's and Pipistrelle),
- impacts on the operation of the navigation,
- impacts on water quality of the canal and the River Usk below,
- impacts on fish and other wildlife, including dippers,
- variable river levels,
Fill material had to be replaced within the aqueduct in order to relieve internal pressures on the spandrels and side walls. However, the masonry structure was not strong enough to allow this without structural support. Temporary support from below was ruled out due to difficulties of timing and risk of flooding. A system of grouting and anchoring was adopted to strengthen the arches and piers which then allowed concrete fill to be placed working from 'within the structure'. Excavation of fill material and replacement with concrete was undertaken in carefully controlled stages.

Great care was taken with the choice of mortar. A hydraulic lime based mortar was used to allow the structure to breath and allow limited movement, with particular care taken over the pointing detail. This was an important issue for CADW. They inspected the method of raking out and removal of the old mortar and required test panels of the proposed materials to be used.

A full archaeological photographic record was taken of the structure pre-works, this being a requirement of CADW.

Artificial bat roosts were designed and provided on the completed structure. The design suggested by the Countryside Commission for Wales was modified to suit the requirements of CADW to offer greater concealment within the arch barrels. It is understood that they have been used in their first season following completion. Consultations and advice was sought from the Brecknock Bat Group. A further 4 roosts were provided for the dippers.

All the necessary consultations and research were carried out well in advance of the need to obtain formal consents for the works and the contract works proceeding, which undoubtedly smoothed the way of the project.

The Grade II Listed timber framed transhipment warehouse at Rednal had been decaying for many years. The objective was to arrest the decline and carry out sufficient work to rescue and repair without prejudicing any future use of the building. There was a very real danger of the building falling into the canal.

Particular issues faced were:

- a limited budget (£40,000),
- major settlement, some attributed to adjacent engineering restoration works on the channel,
- a confined working space, restricted by the proximity of the road and canal and a steep embankment to each side,
- risk of total collapse if the scaffolding was moved indiscriminately,
- how to maintain the structural stability of the building while removing sections of the lower fabric for repair.

**Options**

60. The building was not what it seemed! Research and investigation revealed a different structural form to that originally thought. As such a decision was taken to adopt a method that removed the more recent slate roof allowing easier access to the timbers and brickwork for repair.

61. An innovative technique of 'racking' the building and pulling it back to plumb with winches was adopted, thus propping the building and allowing repair 'in situ'. Mini piles were used to underpin the building within the confined spaces next to the canal.

**Restoration Issues**

62. A sympathetic repair strategy based on site and structural investigations was created early on in the project. In conjunction with the Local Authority Conservation Officer English Heritage were invited to agree the method and approach at this stage.
63. It was decided to use proven traditional techniques for the structural timber repairs, scissor scarf joints to the posts etc.

64. Reclaimed bricks and timbers were used, with a lot of effort given to sourcing of suitable materials.

65. A contractor with proven conservation and historic building skills was employed to undertake the works. A clear brief was created for the specialist consultants to supervise the works, involving the client fully in the process. Any problems arising on site were referred back to the client project team for decisions.

66. Close liaison was maintained with the Local Authority Conservation Officer throughout the life of the project.

C. Relining and Edge Treatments - Kennet and Avon Canal

67. While the Kennet and Avon Canal was restored to navigation in the 1980's further works were still required to safeguard the future of the waterway and ensure public safety. In 1996, the Kennet and Avon partnership was awarded £25 million from the Heritage Lottery Fund to restore the canal as an historic working waterway.

68. The canal embankments present a major instability problem caused by poor drainage and leakage from the canal. Elsewhere, the base and walls of the canal have undergone a general deterioration due to erosion by boat traffic. As a result extensive relining of the canal is necessary.

69. (Removed)

70. The Kennet & Avon Canal is characterised by soft waterway edges, often fringed by marginal plants or overhanging vegetation. The sinuous river-like character of the canal forms a distinctive waterway landscape and valuable ecological resource. The challenge has been to conserve the special character and biological diversity, whilst safeguarding its future by undertaking engineering and dredging works.

Two very different sites and solutions are described below:
**Bath Valley**

71. Three methods of lining were considered: Bentonite, PVC/concrete and Puddle Clay and the environmental pros and cons considered.

72. Bentonite avoided the potential risk of introducing chemicals into the environment and offered a more natural edge to the canal. However, it required extensive excavation and heavy plant with corresponding adverse traffic generation.

73. PVC and Concrete need less excavation and fewer lorry movements and imposed lower loads on (unstable) slopes. The edge details and bed conditions are very harsh, preventing colonisation of vegetation. PVC could leach into the environment.

74. Puddle clay offered a traditional solution that would have allowed colonisation by voles and vegetation but was very expensive, required large amounts of material to be excavated and was vulnerable to future erosion and leakage.

75. It was finally agreed that the PVC and concrete lining solution was the best option, considering that slope stability is the main problem along this length and that softer edge details could be designed.
76. Particular issues addressed for the canal edge treatment were:

- impact on emergent aquatic vegetation and shallow margins which provide habitat for invertebrates, fish, birds, mammals,
- impact on known water vole habitat; need to maintain suitable burrowing conditions and food supply,
- need to maintain crossing points for local badgers and provision of escape points along restored towing path wall for animals in the water,
- re-use of towing path bank topsoil in towing path bank restoration to encourage recolonisation by local species,
- protection of trees and hedges along the line of works,
- use of appropriate materials,
- use and recycling of existing materials.

77. The proposals included for 3 different offside shelves for marginal aquatic habitats. A towing path shelf is to be included where width of channel allows. This will address issues of boating and pedestrian safety and encourage an attractive visual appearance following engineering works.

78. Existing emergent aquatic vegetation was removed and stored to be replanted along the shelves as part of the restoration.

79. Part of the design included for artificial vole banks. Voles were removed before works took place, kept at facilities in Slimbridge and released after habitat reinstatement. Monitoring is taking place.

80. Coir rolls were used along some wider shelves to assess how they can withstand increased boat traffic, acting as a pilot for future restoration.

81. Badger paths across the canal will be maintained with temporary crossing points created for the duration of the works and permanent animal escape ramps were built into the restored towing path.

82. Contract documents contained specific requirements relating to the built and natural environment.
Martinslade Embankment

83. Three options have been considered to arrest the leaking embankment:

- Steel sheet piling cut-offs,
- PVC and concrete,
- Bentonite geotextile.

84. Steel sheet piling was chosen as it allows most of the canal to be in water during construction, soft banks and their vegetation remain undisturbed and the structure is hidden from view. Where moorings are planned the piling is capped with timber. Silencers are to be used on all construction plant.

85. Underlying geology has proved suitable for this option which has significant environmental advantages over lining options.

86. The chosen method using piling in the towing path and the centre of the offside embankment is unlikely to directly affect either the water vole burrows or the animals' food supply. The action of piling may cause some disturbance when adjacent to burrows. As at Bath Embankment, the water vole experts, Wildlife and Countryside Recreation Unit, are being engaged to make a pre-works population assessment and to monitor the voles after the works are complete. Radio-tracking of animals during works is being considered. This project provides the opportunity to gather data on the impacts of the technique which may prove generally useful.

87. A small area of adjacent land between the canal and the disused railway land forms a valuable wetland. It is thought to be largely dependent on canal leakage and the project allows some provision of water to this marsh.

THE IMPORTANCE OF DESIGN AND INNOVATION

88. Most restoration projects now employ a wide range of professionals with an extensive range of skills. With so many issues to consider, a balanced approach can only be achieved if all interests are taken into account.

89. Important to this process is the role of the heritage adviser. If restoration schemes are to appeal to and benefit the public then a proper understanding of the historic environment is required. Working with engineers the heritage adviser can help to look beyond the obvious and introduce features that will create a new heritage for the waterways, while still respecting the past. It may be possible to introduce methods or materials that are unconventional and innovative. Such moves should
be carefully evaluated, particularly if the methods suggested are structural, untested or untried.

90. Design influences too can be felt in many small ways: the care taken in the re-design of a replacement hinge on a gate, using modern materials in an environmentally sensitive way, or the introduction of incidental public art in the landscape. The aim is to enrich and develop the waterway experience, while constantly safeguarding the heritage.

91. Artists, architects, landscape architects and heritage trained craftsmen have much to offer a restoration project team.

CONCLUSION

92. The most interesting developments in recent years have been not necessarily to seek modern materials and methods of working for restoration work per se, but to understand fully the reasons why and on what basis traditional canal structures and buildings have survived until the present day and use such research to guide future repair and restoration. With the recognition of the value of historical research comes the realisation that strategic and contextual issues are just as important as structural ones to the restoration movement.

Rev - December 2006