

BRIDGES

UK BRIDGES BOARD

UK Bridges Board Media Briefing Sheet Conservation of Heritage Bridges

Introduction

Bridges, in their various guises, have been around for a long time on the human scale. They carry railways, highways, bridleways and footways and have made it possible for transport links to be established across the country. These links have made the relatively free movement of people and materials possible aiding the industrial revolution and the development of commerce leading to the society we live in today.

A significant proportion of bridges, still in service today, are centuries old and carry traffic that was never envisaged at the time of their construction. They are part of the nation's engineering heritage and public opinion tends towards the preservation of this heritage. In fact many bridges are listed and some are classed as Ancient Monuments. Bridge owners, trying to satisfy this public appetite for preservation, have difficulties in the management and maintenance of such structures on a number of levels.

Safety

One issue is safety. Older bridges usually fall short of modern standards on key elements such as the height of parapets and their ability to contain errant vehicles.. They are also often sub-standard in terms of the vertical and horizontal alignment of the roadway over them and the loading of vehicles that they can withstand.

Parapets can be raised or strengthened but these actions can so significantly change the appearance of a structure that its heritage value is lessened or lost. Compromise can be reached by risk assessment. Incidents arising because of a shortfall in the height or containment of a parapet may have high or low consequences. Should the consequence be low then parapets don't need to be modified. However, if the consequence is high, such as bridges crossing busy railways, then action should be taken.

The alignment of roads over bridges was usually of little significance for early highway structures. The traffic of the day was either foot or horse drawn and travelling at low speeds. Bridges tended to be built square to reduce their complexity. Where the route over was skewed to the obstacle crossed then horizontal alignments ended up as little more than chicanes. Vertical alignment was treated similarly and could result in the typical "hump backed" canal bridge. These are well outside current design standards.

The risk of accidents with modern traffic using these bridges is high and parapet impacts or vehicle to vehicle collisions at these locations are all too frequent. Traffic calming can help but major reconstruction of either bridge or highway is the only way

to minimise the risk. These measures are, of course, at odds with the preservation of the heritage value of the structure.

Changes over time

Over the time that these old structures have been in service, vehicles have not only increased in speed and volume but also in weight. In fact regulations are in place to limit the weight and size of vehicles that use the public highway. Loading on bridges from rail traffic has similarly increased. All bridges carrying public highways and railways have been assessed to determine their load capacity. If they are capable of carrying the loads that current legislation allows they can continue in service. If they are found to be “weak” then the options available are to restrict their use or to strengthen them. Restriction of highway traffic is by legally enforceable signing but this can be, and is, frequently abused. The other option is to strengthen and this is where conflict with heritage value is most likely to arise. Some types of structure can be strengthened and the external appearance preserved: for others this is not so easy.

Maintenance

Maintenance of our historic bridges is another area where conflict can arise. There are abundant examples of past repairs and reconstructions which are unsympathetic and even inappropriate. Repairing an arch bridge constructed in Bath stone with blue engineering brick may be an extreme example but it has happened. Materials and methods used are the main sources of concern but even intrusive structural investigations can leave permanent scars. Local planning authorities now have much more influence on the choice of materials, especially where structures are listed, but it is also up to owners to ensure that proposed works are appropriate to the appearance and characteristics of a bridge.

Matching stone and brick for masonry bridges helps maintain their appearance but original bricks were often hand made on site and of very poor quality. The question is whether to replace with a more modern, durable equivalent or take the purist line of exact like-for-like replacement knowing that the life of the repair will be limited. A similar argument may arise where painting with modern epoxy based systems can be at odds with original systems, especially in the case of iconic structures. Also, surface preparation of historic metallic structures can damage the substrate irreparably or remove important features if it is too aggressive.

In some instances the use of historic materials has proved to be more appropriate than their modern equivalent. This is particularly the case with mortar. Cement mortar repairs to masonry bridges, which were originally built with lime mortar, can increase the deterioration of the surrounding masonry and retain unwanted moisture within a bridge. Reverting to lime mortar is actually more suitable for these structure types.

Bridge management is all about keeping our structures in a serviceable condition so they can continue to perform their intended function. Some have historic significance and there is considerable public support for their preservation. The heritage of a bridge can introduce additional constraints to be managed by engineers but they can be dealt with if there is a willingness to accept that there may have to be compromise.