Appendix 3

Other jurisdictional approaches to selecting heritage bridges for conservation

Queensland

The Queensland Department of Main Roads is presently (2009) undertaking an assessment of its timber beam bridges, which are subject to the similar capacity constraints and maintenance issues as timber bridges in NSW. Queensland differs from NSW in that its Roads Department only built timber beam bridges in two slightly different configurations (referred to as ‘A Class’ and ‘B Class’) between 1925 and 1976. As a result, the bridge portfolio is very homogeneous, with little variation other than in length and number of spans. While timber trusses were constructed in the state, none now remain, with the last example having been replaced in 19831. The remaining timber truss border bridges are managed by NSW. Of an original construction population of around 1300, about 450 timber beam bridges are still in use2. As a part of the assessment, it has been determined that due to the similarity and ubiquity of the timber beam design, no individual bridge is particularly significant. However, collectively, the bridges do have significance in terms of the history of transport development in the state. The purpose of the study is to identify a representative sample of timber beam bridges to be retained and conserved, subject to operational constraints3.

The Queensland process relies on the Queensland Heritage Register criteria and also will consider the following criteria:

- Bridge condition.
- Ability to be safely operated.
- Suitability for diversion or duplication.
- Visibility in the landscape.
- Potential for public appreciation.

The key principles underpinning the Queensland timber bridge review are:

- Bridges should be chosen where a replacement bridge can be built on a different alignment.
- Only bridges that are not currently included in a replacement program should be considered.
- Only bridges that are in a good enough condition to be able to be repaired and maintained should be considered.
- Geographical consideration should be given to include bridges in different regions of Queensland.
- The sample should include examples of use of different materials (such as an all-timber bridge, a bridge using some concrete components, a bridge with steel decking and a bridge with plywood decking).
- Both A Class and B Class bridges should be included to demonstrate the variety in bridge design.
- Any bridge known to have particular community significance should be included.
- Bridges with particular aesthetic appeal or landmark qualities should be included.
- Bridges should be selected on well-travelled roads or in areas where people often visit to ensure that they are accessible to the public.
- Bridges that are located in a situation where they are easily viewed by the public should be chosen to maximise the education potential of the places through the installment of interpretative signage4.

USA - New York

The New York State Department of Transportation (NYDOT) undertook a process of strategic heritage assessment of its bridges over the course of 1999-20025. This involved the examination of an initial portfolio of

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3 Pers. comm. Catherine Westcott, Queensland Department of Main Roads. 30 July 2008.
10,600 bridges, eventually reduced to a list of 1700 potential heritage bridges which were subjected to further assessment. This included all types of bridges within the agency’s control. However, it should be noted that their portfolio only included three timber beam bridges and no timber truss bridges. All other bridges were iron, steel, masonry or concrete. Some 481 bridges were ultimately identified as meeting the relevant criteria for heritage significance and the specific criteria of the study, or slightly less than five per cent of the total bridge portfolio of the agency. This included bridges of all types, with a bias in favour of listing older, less common or unique bridges and, for later common or standardised bridge types, retention of selected examples with high integrity.

The NYDOT assessment process relied upon the US National Register criteria for the assessment of heritage values, as well as the following specific criteria developed to further differentiate the bridges within the assessment group:

- Design.
- Workmanship.
- Materials.
- Special features.
- Regional Representation.
- Integrity.
- Location within an historic precinct.

Where a bridge was one of a common type (built to a standard design), the study focused on identifying the best representative examples of that type for long-term conservation.

**United States - Indiana**

In 2008, the Indiana State Department of Transport commissioned the development of a methodology to identify bridges of historic significance which were suitable for preservation. That study was based on stated prior preservation goals determined by the agency, with the intention of basing preservation decisions on a normal distribution curve analysis of the state’s bridge population.

In that study, where a bridge type population was less than 100 members (and, generally, considerably less than 100 members), the preservation goal was set at preserving all bridges which fell up to one standard deviation below the mean of the assessment criteria [of up to 84 per cent of the population]. For bridge type populations with greater than 100 members, preservation goals were set at preserving only those bridges which were at least one standard deviation above the mean [or 16 per cent of the population]. The initial assessment which placed the bridges into the standard deviation curve was based on a range of US Federal operational and funding criteria which are not detailed in the study. This initial process ranked bridges into nine categories which were then filtered through a range of operational and heritage criteria.

With these goals in mind, the ranking of bridges was applied to a suite of considerations in a decision-making matrix including:

- Condition and suitability for rehabilitation.
- Load capacity.
- Traffic volume.
- Physical configuration (eg clearances, lane width).
- Special features.

7  Ibid page 10. This type of analysis will, however, only generally be useful where the asset populations under assessment have very large initial populations. Applying this methodology to the NSW timber truss bridges, for example, would set a preservation goal of 40 of the 48 extant timber truss bridges (84 per cent of the population).
• Length of detours (threshold of more than 10 miles/16 km).
• Suitability for non-vehicular usage.
• Future estimated average daily traffic.

**United States - Virginia**

Virginia undertook a detailed study of 55 bridges to determine their potential heritage values and suitability for conservation. The study was designed to respond to federal guidelines to retain historic bridges in service but to respect changes to structures over time. Key considerations in this study included:

• Liability and safety issues.
• Operational issues.
• Disaster factors.
• Relation to design standards.

Each bridge was rated against a US federal government’s ‘sufficiency rating’ to determine the operational suitability of an individual bridge.

• Bridges which meet the standard to 100 per cent were to be conserved as is.
• Bridges which meet the standard to 80 per cent were considered for rehabilitation (upgrade).
• Bridges which meet the standard to 50 per cent or less were considered for replacement.

As a part of this analysis, the study considered the option to vary the relevant engineering standards with the approval of sufficiently senior technical staff. Sub-issues considered in that circumstance included the degree of standard reduction, the flow-on affect to other standards and the effect the reduction would have on the adjacent roadway.

**United States - Kentucky**

The Kentucky Transportation Cabinet commenced a project in late 2008 to review the future of many of its pre-1960 bridges. Segments of the state’s bridge population had been assessed in previous studies, with 250 bridges assessed in 1997, of which 139 were recommended to receive heritage status, 57 of which were no longer in service.

The 2008 study reviewed these 57 out-of-service bridges as well as an additional 206 bridges which have not been previously surveyed.

The assessment criteria specified in the project brief included:

• The number of bridges state-wide within each bridge type.
• The criteria under which bridges have been recommended as eligible for the national register.
• Historic integrity.
• Compelling historic qualities.
• Reasonable preservation options.
• Structural integrity.
• Preservation/restoration/rehabilitation needs.
• Estimated costs.
• Existing and future transportation needs along the route.

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10 Kentucky Transportation Cabinet (2008) ‘Request for Proposal To Develop Historic Bridge Survey and Management Plan’. Thanks to Rebecca Horn Turner, Historic Preservation Coordinator, Kentucky Transportation Cabinet who provided this information.
11 The author would like to thank Rebecca Horn Turner, Historic Preservation Coordinator, Kentucky Transportation Cabinet for providing a copy of the brief for this study. (Pers. Comm. Rebecca Horn Turner 4 August 2008).
The consultant is to develop other criteria as relevant. This project is still in progress.

**United States - federal approach to historic timber bridge management**

In 2005, the United States Department of Transport, Federal Highways Administration, released the ‘Covered Bridge Manual’[^12], a detailed technical guide to maintaining historic covered timber bridges in the USA. This was based on a federal program of historic covered-bridge preservation where a bridge was listed, or eligible for listing, on the National Register of Historic Places. Covered bridges are essentially timber truss bridges with an external structure to protect the bridge from weather. Unlike Australian bridges, American covered bridges tend to be built from softwood timber.

The stated purpose of the program is:

“…to find means and methods to restore and rehabilitate historic covered bridges to preserve our heritage using advanced technologies, and to assist in rehabilitating and restoring these bridges. The specific objectives of this research project are to provide comprehensive support to those readers involved with maintaining, assessing, strengthening or rehabilitating any covered bridge[^13].”

This manual focused on technical solutions to common issues and modes of failure of historic timber bridges, and recommended a series of generic approaches to repairing and strengthening this type of bridge which is considered iconic within the American landscape. Around 900 timber-covered bridges are still in existence across the United States, out of an estimated initial population of 16,000. The study noted that there is an ongoing disagreement within the historic preservation discipline as to what makes a bridge ‘historic’. Is it its form or its function (fabric versus design). This issue was not resolved by the study team, who observed:

“There is controversy as to what makes a… bridge historic. Some believe a bridge is important because it is a physical relic and the material is historic. Some believe that a… bridge is historic because it embodies a special idea or concept. As noted elsewhere in this manual, various components of an historic… bridge have probably been replaced at least once during its life (eg roofing, siding, flooring); hence, some believe that replacing those items in subsequent repair projects is acceptable. Others place more emphasis on replacement in-kind and only when necessary[^14].”

The manual noted that covered bridges are primarily located on secondary roads and that most are load rated at less than the HS20-44 standard (32.7-metric-tonnes). Access has been managed through a combination of restricted weight postings, as well as the inherent physical height limits of this type of bridge (most have portals less than 2.4 metres high)[^15]. Covered bridges are, however, vulnerable to wind and snow load, which are not generally relevant to Australian circumstances. The manual recommends that load levels, as a general rule, be kept as low as possible[^16].

The manual noted that it was desirable to use traditional techniques to facilitate repairs wherever possible. However, a variety of new techniques have been accepted, including:

- Replacement of timber elements, sometimes with stronger timber[^17].
- Modifications to improve deck drainage[^18].
- Use of sacrificial timber elements, particular at the interface areas between different materials (for example between timber trusses and stone/concrete abutments)[^19].

[^13]: Ibid. Forward.
[^16]: Ibid pg 204.
[^18]: Ibid pg 208.
[^19]: Ibid pg 211.
United States - federal approach to heritage management for the interstate highway system

With regards to federal road infrastructure, there was general concern that, as the federal interstate highway system approached its 50th anniversary, it would fall within the purview of the federal heritage legislation, creating significant operational and compliance burdens for road agencies for some 46,700 miles (75,156 kilometres) of road and road infrastructure.

To alleviate these concerns, an exemption was negotiated under the US National Historic Preservation Act to exclude the vast bulk of road infrastructure from the heritage requirements. However, specific engineering features such as tunnels, bridges and other distinctive elements remain subject to the federal heritage assessment process where an element is:

- At least 50 years old and meets the National Register criteria for national significance.
- Less than 50 years old and meets the National Register criteria for exceptional significance.
- Listed in the National Register or has been determined eligible by the Keeper of the Register.
- Was constructed prior to 1956, was incorporated into the Interstate System, and meets the National Register criteria for state or local significance.

The purpose of the exemption is to ensure that certain 'character-defining' elements of the interstate highway system are recognised, assessed and conserved while not placing a heavy administrative burden on transport agencies with respect to the commonplace elements of the road network.

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20 Federal Highway Administration (May 2005) ‘The Interstate Highway System Section 106 Exemption: Maintaining a Unique Resource’ (www.environment.fhwa.dot.gov/strmlng/newsletters/may05nl.asp). It is further worth noting that Presidential Executive Order 13274 (18 September 2002) directs that, for specified federally-funded road projects, consent agencies are directed to expedite environmental reviews and consents (including heritage considerations). However, this does not exempt the need for environmental protection and due diligence for these projects. See: www.whitehouse.gov/news/releases/2002/09/20020918-14.html for the full text of the Order.
