

# URBAN DESIGN | ROAD PRINCIPLES | BRIDGES



SETTING



PARAPETS



COLOUR



 NZ TRANSPORT AGENCY  
WAKA KOTAHI

## UNDERSTANDING THE ISSUES

At their most pragmatic, bridges exist to connect transport networks. However, they can also support linkages between communities, offer new opportunities for viewing and appreciating the landscape, and be strong landscape features in their own right. Bridges can have a significant impact on the driving as well as the viewing experience and good bridge design will enhance both.

In the design process, a key issue is often the balance between cost and design quality. Design quality is more than aesthetics. It includes amenity, safety and security, accessibility, resource efficiency, landscape design, and appropriate form and scale. Costs should be considered over the life of the bridge and in relation to the environmental, social and cultural benefits offered.

Poor bridge design can miss opportunities to enable a well connected transport facility, to incorporate sensitive landscape design and enhance views. A well considered piece of highway infrastructure can do all of this and make a positive contribution to surrounding communities as well as to road users.

For more information and advice on bridge design contact: **Jacque Bell**, Urban Design Advisor, or **Rudolph Kotze**, Bridges and Structures Manager, NZTA National Office. Further material can also be sourced from the RTA Bridge Design Guidelines: [www.rta.nsw.gov.au](http://www.rta.nsw.gov.au)

## ROAD BRIDGE DESIGN

The following principles should guide the design of road bridges:

- // **LOCATION:** Bridge design starts with its location. Bridges that span waterways can dramatically change the landscape, and bridges within or next to residential areas can appear out of scale and out of character. The role of the bridge in the overall project must be established from the early stages of route selection as it can influence the alignment.
- // **CONTEXT:** Bridges should complement their context. This means considering the topography, the rural or urban setting, any existing structures, visibility of the bridge and the length of its span. Where bridges are part of a driving experience along a road, they should be consistent in form and recognisable as a 'family', with individual variations reflecting the requirements of their specific settings. Feature bridges are suitable for special places, where they can act as landmarks.
- // **VIEWS:** Bridges are both viewed objects and viewing platforms. The bridge can frame a new and unexpected vista, contributing to appreciation of the surrounding landscape. Optimising views to, through and from the bridge will also help with orientation on the journey. This can be achieved by making the bridge design as slender and open as possible, and the height of solid barriers as low as possible with the use of open rail or metal barrier systems. Bridges that are highly visible from roads and public spaces should be designed for these views.
- // **FORM AND PROPORTION:** The balance of structural elements should be carefully considered to minimise the bridge profile, achieve symmetry, and create a simple, elegant whole. Structural integrity, where each part of the bridge has a clear and obvious function, will result in a pleasing composition.

- // **LIGHT AND SHADOW:** A play of light and shadow on a bridge can reduce the apparent mass and bulk of the structure and balance its vertical and horizontal proportions. Sloping all or part of the outer face of the parapet outwards to catch the sunlight, and recessing beams to create a shadow line, will reinforce the horizontal lines of the bridge. Surface texture on barriers and retaining walls will create a finer level of detail.
- // **BARRIERS:** Barriers should be fully visible, with clean continuous lines that are not obscured or interrupted by non-structural elements. Their depth must be carefully proportioned in relation to the deck and superstructure. Barriers should be extended well past abutments to anchor the bridge in the landscape. Barriers must be designed to respond to the setting and to achieve a smooth transition between the bridge and the road. Sloping the top of the barrier inwards towards the deck will minimise water staining on the outer face of the barrier.
- // **ABUTMENTS:** Open abutments should be used to optimise views as well as to reduce the amount of structure in rural landscapes. They are less likely to attract graffiti than retaining wall abutments. Slopes should be designed to prevent erosion and to create an attractive, durable surface that complements the landscape treatment. In urban settings or when the corridor is constrained, the 'edges' of closed abutments must present a finished appearance to approaching traffic.
- // **HEADSTOCKS AND PIERS:** These substructure elements should not be designed in isolation. Their design is integral to the overall form of the bridge. Structures that eliminate the need for headstocks and enable simple, elegant column or pier design will better draw the eye to the horizontal lines of the bridge deck and barrier. These include wall type piers, haunched girders and piers with reverse tapers.

- // **TEXTURE:** Barriers should have minimum embellishments, with any surface patterning used only to reinforce the clean lines of the bridge. Any texture on retaining walls and barriers should relate to the size of bridge elements and the speed of travel, and can also be used to reference the area's cultural or historical significance. Abstract, repetitive patterns are suitable to add interest while not distracting drivers. Because road bridges are more likely to be seen from local roads by slower moving traffic, pedestrians and cyclists, it is important to pay particular attention to the quality of finishes and detailing in these areas.
- // **COLOUR:** Colour offers opportunities to provide consistency to a family of bridges and to reinforce the landmark quality of a standalone structure. When used to highlight particular elements it should form part of a coherent, ordered composition. Colour must be used carefully as it draws the eye, especially in a rural setting.
- // **LIGHTING AND DRAINAGE:** These bridge components must be considered early and integrated with the structure. The external surfaces of the bridge should be free of drainage pipes or services, and the draining system concealed from all views. Lighting at night, like colour during the day, can be used to highlight all or parts of a feature bridge. Lighting design and selection should incorporate protection against vandalism.
- // **MAINTENANCE:** It is important to select durable materials and finishes that do not significantly degrade in appearance over time. Where required, anti-graffiti coating should be applied as part of the bridge construction phase to the full extent of piers and barriers to prevent patchy application and appearance at later stages.

*A separate guidance leaflet on pedestrian and cycle bridges is available from the NZTA*

