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REVOLUTIONISING BRIDGE SAFETY UPGRADES

DOLRE DELIVERS THE IDEAL
BRIDGE BARRIER SAFETY SOLUTION
ALONG A MAJOR SUBURBAN
SYDNEY ARTERIAL ROAD



For many of Australia's aging bridge assets, bridge remediation is not so much a matter of upgrading structural capacity, but rather one of upgrading safety. This is especially true when it comes to the safety barriers and fencing on many of the smaller bridges along Australia's suburban streets and roads.

While the fencing along many of these bridges may provide delineation along the outer edge of the bridge to prevent pedestrians and cyclists from falling from the structure, when it comes to vehicular protection and meeting the safety requirements of Australian Standard AS 5100 (Bridge design), they are woefully inadequate. Indeed, in terms of vehicular impact, many existing bridge fences offer little more protection than one might reasonably expect from a pool safety fence.

These issues surrounding a lack of vehicular impact protection on bridges were brought sharply into the spotlight during a serious incident on the Fifth Avenue bridge over the Cooks River in the Sydney suburb of Campsie, in late 2020.

In that incident, the vehicle, a Honda Jazz 5-door compact hatchback with three occupants, crashed through a bridge fence, plunging several metres into the Cooks River below. According to reports, the vehicle was travelling along Burwood Road when it crossed into the southbound lane before crashing through the barrier and landing in the water just before 3:30am.

Fortunately, the driver and two occupants, all men aged in their 20s, were able to get themselves out of the car and to the riverbank before emergency services arrived. A photo

from the crash scene (see below) shows how lucky the three men were to escape the crash with their lives, let alone with only relatively minor injuries. With the vehicle coming to rest on the riverbed - upside-down and with the doors and windows submerged - it is surely only a matter of extraordinary luck that this incident did not result in far more serious consequences for those involved.

While this is only one of many such incidents to have occurred over the years, the circumstances, location and coverage it received on the major national news bulletins did serve to highlight the wider issue of safety along Australia's ageing traffic bridge network.

Dane Hansen, Engineer with road and bridge safety specialists LB Australia, commented:

"With the majority of Australia's suburban bridge stock now well in excess of 30 years of age, councils, authorities and other asset owners face a number of significant challenges, particularly when it comes to ensuring that the bridge barriers meet the requirements of AS 5100."

"That's not to say that the bridges or barriers were poorly constructed or are poorly maintained," Dane added, "it's simply a matter of aging bridge assets in a changing world."

"Vehicle numbers have increased, the vehicle mix has evolved, and the Australian Standards have been updated, and in many instances, those changes have rendered a lot of older bridge barrier and fence designs no longer fit-for-purpose."

UPGRADING SAFETY ALONG THE FIFTH AVENUE BRIDGE

Located in Campsie in Sydney's inner-western suburbs, the bridge on Fifth Avenue/Burwood Road is one of a number of critical road connections over the Cooks River, which forms the boundary between the City of Canterbury Bankstown and the Municipality of Burwood. As part of a key suburban arterial route, the bridge carries thousands of vehicles each day, including a significant amount of local delivery trucks and buses servicing a number of public transport routes.

Importantly, as is the case with many older bridges around the country, despite the fact that it now carries vehicle numbers well in excess of its original intended design, the bridge is structurally sound and not at the end of its useful design life. However, the incident in late 2020 provided a clear catalyst for a deeper investigation and review of what could be done to upgrade safety along the bridge for vehicles and pedestrians.



The Fifth Avenue bridge prior to the installation of DOLRE bridge traffic barriers.

The investigation and the subsequent tender process resulted in the installation of DOLRE 'Regular' bridge traffic safety barriers along both sides of the bridge. As the first DOLRE installation in suburban Sydney, the Campsie installation marks another milestone for this innovative bridge traffic barrier system, building on the success of a number of other DOLRE installations around the country, including three

rural highway installations in Tasmania.

The Fifth Avenue bridge installation was carried out as part of a package of bridge rehabilitation works for the City of Canterbury Bankstown, with support from Burwood Council and Transport for NSW (TfNSW) and included a total of 48 metres of DOLRE 'Regular' (AS 5100 Regular/MASH TL4) barrier.



The three occupants in the vehicle involved in the Fifth Avenue bridge incident were lucky to escape with their lives - let alone with only relatively minor injuries - after the vehicle came to rest upside-down on the riverbed with the doors and windows submerged.

ADDED SAFETY FOR PEDESTRIANS

As well as providing AS 5100 Regular/MASH TL4-rated impact protection for vehicles crossing the bridge, the Fifth Avenue bridge DOLRE installation has also been designed to provide a significant increase in protection for pedestrians using the bridge.

To that end, the DOLRE bridge traffic barriers have been installed along the kerb between the outer edge of each carriageway and the footpath. The outer ‘footpath-facing’ facia of the DOLRE barrier has also been fitted with pedestrian mesh, which discourages climbing by preventing access to the lower beams of the barrier.

Pedestrians are protected against falling from the bridge by the existing fence along the outer edges of the bridge deck.

Importantly, DOLRE’s ground-breaking design (which restricts the transfer of energy from a vehicular impact to a fraction of the capacity of the bridge deck, resulting in a low load in the bridge deck) and lightweight construction (76 kg per linear metre), meant that the new bridge traffic barriers could be installed along the existing bridge deck without the need for additional reinforcement or strengthening works – significantly reducing both the cost and complexity of the project.



All DOLRE systems feature three rails - two rails for the initial vehicle impact and one rail to resist roll-over.

CRITICAL CONSIDERATIONS IN SAFETY BARRIER SELECTION

Providing upgraded AS 5100-compliant bridge traffic barrier protection along an ageing bridge deck is far more complex than simply ‘swapping out’ an existing barrier for a newer model with greater structural capacity to cater for faster, larger and/or heavier vehicles.

Indeed, when it comes to providing AS 5100-compliant traffic barrier protection along older bridge assets, one of the most common challenges is that the bridge deck lacks the structural capacity to accommodate the transfer of impact energy from many higher-capacity

traffic barriers.

When a bridge traffic barrier is impacted, the energy transfer is not limited to the barrier alone - it also flows through to the bridge deck and the overall bridge structure. If the amount of impact energy transferred exceeds the capacity of the bridge deck, it not only increases the risk of the barrier failing, it can also pose a significant risk to the structural integrity of both the deck and the bridge as a whole.

Then there is the matter of weight. As a general rule of thumb, the higher the level of impact protection, the heavier the barrier. In some instances, this can add well in excess of

250 kg of load per linear metre to each side of the bridge deck.

Weighing in at only 76 kg per linear metre, DOLRE’s patented lightweight design provides proven AS 5100 Regular/MASH TL4 impact protection at a fraction of the weight of more traditional barrier designs without compromising performance or safety. What’s more, its open structure and modular design makes it extremely easy to repair, even following a major impact. DOLRE bridge traffic barriers can even be temporarily removed during major flooding events to help minimise the risk of damage to bridges caused by flood-borne debris.



AS 5100-COMPLIANT SAFETY WITHOUT THE NEED FOR BRIDGE DECK STRENGTHENING

Specifically engineered to minimise the risk of damage to the bridge deck and structure during a vehicular impact, DOLRE bridge traffic barriers can play a significant role in extending the serviceable life of many existing bridges - delivering AS 5100 and AS 3845 (Road safety barrier systems) compliant protection without the requirement for bridge deck strengthening works. DOLRE has been crash tested and certified to EU EN1317 (with additional digital model validation and verification to EN16303-2020) and simulated to US MASH-2016 and AS 5100-2017 requirements using validated FEA (Finite Element Analysis) modelling. The DOLRE Low Stress Parapet system has been assessed, approved and recommended for acceptance throughout Australia by ASBAP (Austroads Safety Barrier Assessment Panel).

DOLRE is available in 'Low', 'Regular' and 'Medium' performance levels in accordance with the requirements of Australian Bridge Design Standard AS 5100:2017.

Together with life-saving impact protection and attractive aesthetics, another major factor in the success of the DOLRE bridge barrier both in Australia and internationally is its ground-breaking 'low stress' design, which restricts the outward transverse force transmitted to the bridge deck during a vehicular impact to a fraction of the bridge deck's capacity. In fact, the combination of DOLRE's patented post 'fuse' system, and innovative post and rail design enables DOLRE Regular bridge traffic barriers to deliver AS 5100 Regular/MASH TL4 protection, while at the same time, limiting the maximum outward transverse force to only 43 kN/post (22 kN/metre), which equates to only 14% of the allowable ultimate load under AS 5100-2017.

What this means in practical terms, is that DOLRE bridge traffic barriers can be installed along most bridges without the need for expensive deck strengthening works or additional reinforcement.

As well as providing AS 5100 Regular/MASH TL4-rated impact protection for vehicles crossing the bridge, the Fifth Avenue bridge DOLRE installation also minimises the risk of pedestrians being struck by an errant vehicle.



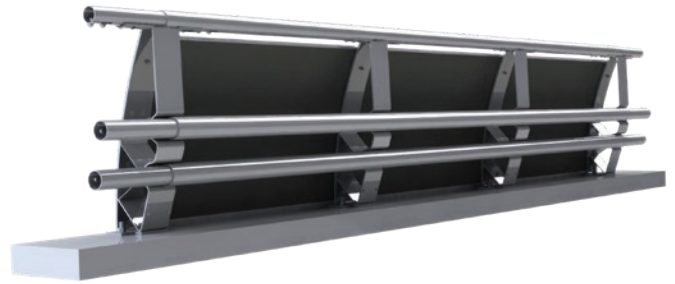
SAFETY, PERFORMANCE & AESTHETICS

DOLRE traffic barriers deliver the ideal combination of life-saving performance, versatility and aesthetics, and are ideal for use with:

- Concrete bridge decks
- Engineered structures such as high retaining walls
- Existing road safety barriers with a suitable transition

Its patented 'low stress' fuse and post design means that DOLRE can be installed to an existing concrete kerb, directly onto the bridge deck, or independently using a non-anchored kerb.

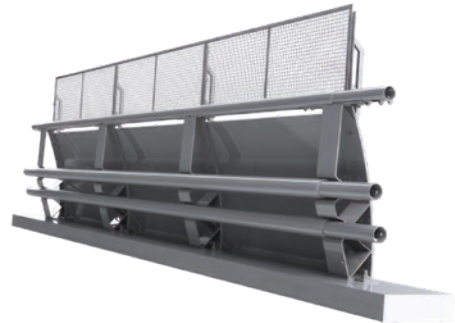
DOLRE is available with a range of options including motorcycle rail protection, pedestrian safety mesh and panels, decorative facias and integrated LED lighting systems, and can be supplied in a variety of colours and architectural finishes.



Solid pedestrian protection panels
(these can be supplied with one or both sides coloured or with a printed pattern)



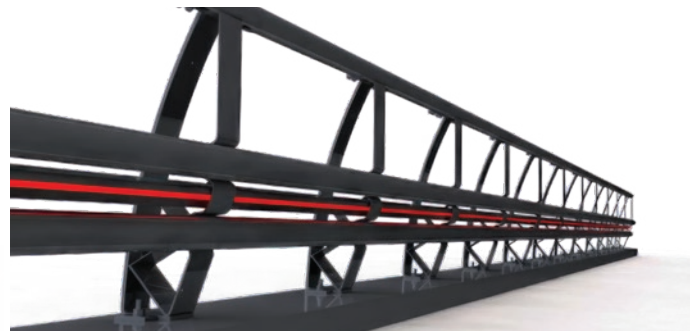
Pedestrian protection mesh fascia panels



Railway and motorway overpass protection panels with mesh extension



Custom-designed pedestrian protection fascia panels



Integrated LED lighting

FEATURES & BENEFITS

- Available in a range of containment levels, from AS 5100 'Low' (MASH TL2 | EN1317 N2) through to 'Medium' (MASH TL5+ | EN1317 H4b)
- Compliant with Australian Standards AS/NZS 3845-2015 and AS 5100-2017
- DOLRE barriers are suitable for both bridge and roadside traffic barrier applications
- Design allows for rapid installation, as well as rapid repair and reinstatement of the barrier following an impact
- Easy to dismantle and remove in times of flood - significantly reducing the risk of damage to bridge assets caused by flood-borne debris.
- Transitions at each end of a DOLRE barrier are engineered to provide a continuity of protection level and full longitudinal load transfer between the bridge traffic barrier and connecting roadside barriers
- Aesthetically pleasing design
- DOLRE is also available with an extensive range of optional fascia designs and integrated lighting options
- The post design (including the patented 'fuse') allows the post to yield in an outward transverse direction and fully deform - minimising load transfer to the deck while ensuring that maximum energy is absorbed or transferred along the rails
- Posts are designed to yield in multiple characteristic steps
- All DOLRE systems feature three rails - two rails for the initial vehicle impact and one rail to resist roll-over
- All rails are cylindrical sections with wall thicknesses and diameters to suit the specified design loads
- All rails manufactured in Europe in standard lengths of 6, 2 or 1.5 metres and carry CE Mark quality certification.

For further information, please contact DOLRE's exclusive ANZ distributor, LB Australia Pty Ltd, on 1300 522 878, visit the website: www.dolre.com.au or SCAN THE QR CODE.

