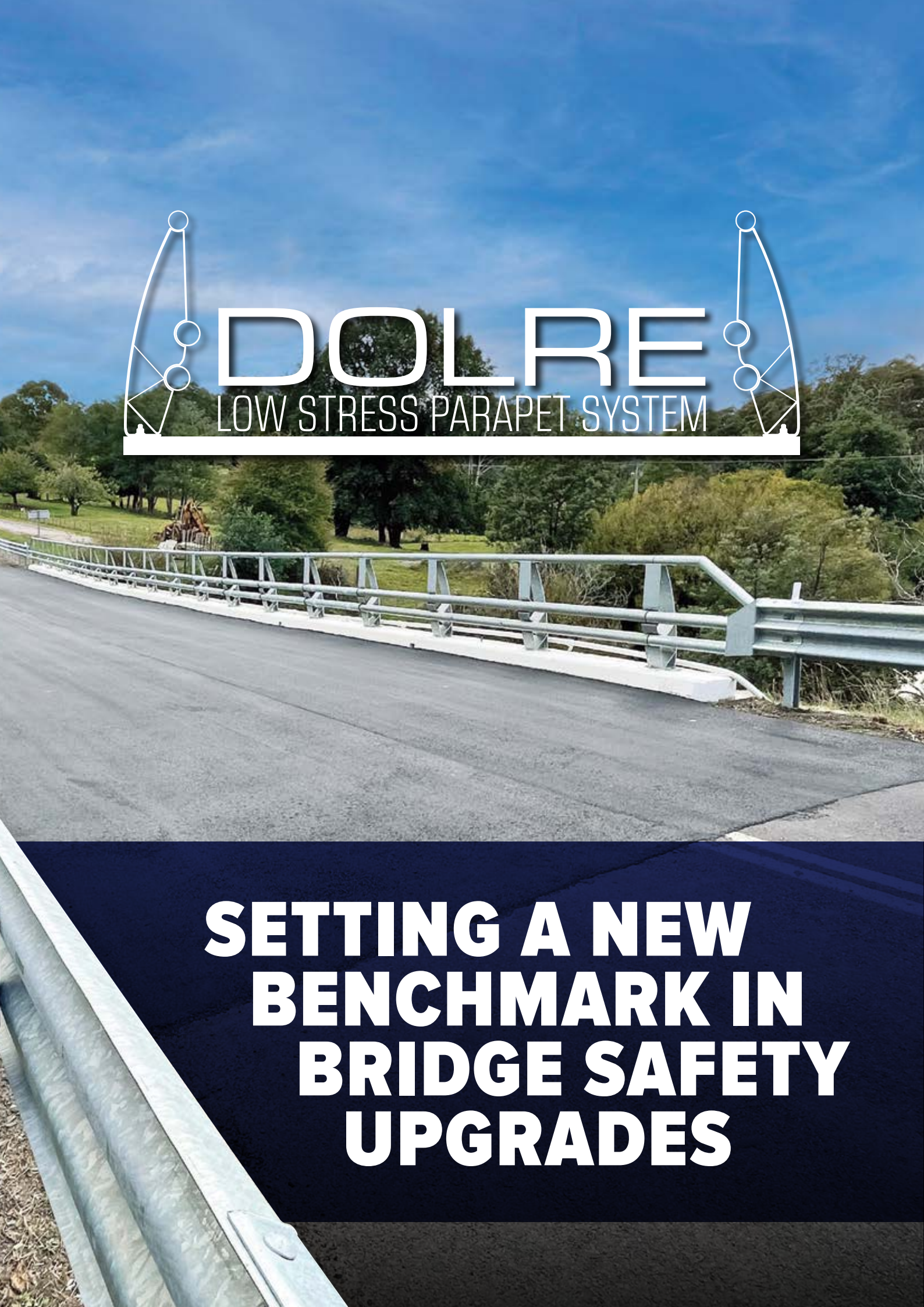


SETTING A NEW BENCHMARK IN BRIDGE SAFETY UPGRADES

To the untrained eye, the Ringarooma Bridge on the Tasman Highway near Moorina in Tasmania's north-east may appear to be no different from literally thousands of relatively 'non-descript' road and highway bridges located across Australia. Closer inspection reveals that it is far from 'ordinary'. Indeed, this rather unsuspecting looking bridge has recently secured its place in Australian road and bridge safety history as the first bridge in Australia to feature the innovative new DOLRE Low Stress Parapet System.

Installed in March by Tasmanian civil infrastructure specialists BridgePro Engineering Pty Ltd as part of a comprehensive bridge strengthening and refurbishment project, the new 'DOLRE Regular' parapets are not only an aesthetically pleasing barrier solution that complies with Australian Standards and has been ASBAP approved, they also provide life-saving MASH TL4 rated protection for road users, while at the same time delivering unmatched protection from damage to the bridge deck and structure during an impact.

Speaking about the Ringarooma Bridge installation, Paul Hansen, Managing Director with DOLRE's exclusive ANZ distributor LB Australia Pty Ltd, commented: "We're extremely proud to see the first Australian DOLRE barrier installation on the Ringarooma Bridge in Tasmania."

"We've been involved with the DOLRE system for a number of years, through the development, testing and approvals process, and while we've seen numerous installations of the DOLRE barriers completed across Europe in recent years, it's always a major milestone to see the first product installed on an Australian bridge," Paul said.

"We believe that this installation not only represents a major watershed moment in bridge barrier safety but also in the way in which bridge remediation projects and bridge safety upgrades are approached in Australia," he added.

PROJECT BACKGROUND

While many of the early European and Chinese settlers were attracted to areas around Derby, Pioneer and Moorina in north-east Tasmania as part of the 'Tin Mining Rush' of the mid-1870s, the highly fertile ground and heavily-treed landscape also saw the rapid development of a major forestry and timber milling industry across the region. Even though the region's tin mining operations have long since subsided, timber and forestry still play a significant role in north-east Tasmania's economy, together with agriculture and a burgeoning tourism sector. Indeed, Derby and the surrounding areas are now widely regarded as one of Australia's premier mountain biking, adventure tourism and eco-tourism destinations, attracting thousands of visitors each year.

Not surprisingly, this strong growth in tourism (and the resultant increase in vehicular traffic), combined with the heavy vehicle traffic associated with the region's timber, forestry and agricultural sectors, is placing a significant strain on the region's ageing bridge infrastructure.

This is particularly true for the bridges along the Tasman (A3) Highway, which provides critical road access across north-east Tasmania for locals and tourists alike.

With that in mind, remediation works have been carried out on a number of key bridges across the region to increase load-carrying capacity and safety.

Remediation works on the Ringarooma River bridge near Moorina - including bridge strengthening works, application of a new wearing course, and in an Australian first, installation of the DOLRE Regular (TL4) Low Stress Parapet System - were carried out by Tasmanian civil infrastructure specialists BridgePro Engineering Pty Ltd.

AUSTRALIA'S FIRST DOLRE INSTALLATION

Located on the Tasman (A3) Highway some 11 km east of Derby, the Ringarooma River bridge near Moorina is one of three bridges over the river between Launceston and St Helens on Tasmania's north-east coast. Despite its remote location, the bridge carries an annual average of 335 vehicles per day, including a significant percentage of heavy vehicles such as logging trucks and freight carriers.

Measuring some 35 metres in length, the 2-lane bridge previously featured an old-style concrete post and rail barrier with direct connections to the bridge kerbs along the outer edges of the deck.

Phase One of the remediation project incorporated the bridge strengthening works, which included carbon fibre strengthening of the beams using a combination of fabric, laminates and rods, and stainless steel strengthening of the bridge beam diaphragms. With the bridge strengthening works completed, the existing concrete post and beam barriers along the bridge were removed, and minor concrete repairs were completed along the bridge kerbs in readiness for the DOLRE installation.

Importantly, thanks to DOLRE's ground-breaking design – which restricts the energy from a vehicular impact to a fraction of the capacity of the bridge deck, resulting in a low load in the bridge deck – the new barrier could be installed along the bridge kerbs without the need for and additional reinforcement or strengthening works. The Ringarooma River bridge project included the installation of some 35 metres of 'DOLRE Regular' (TL4) barrier along each side of the bridge, together with the installation of off-structure barriers on both sides of the bridge.

The off-structure barriers include DOLRE's purpose-designed TL4 rated transitions, which connect the DOLRE barrier to a section of TL4 Thrie-Beam barrier. These TL4 Thrie-Beam barriers subsequently transition to TL3 W-beams with TL3 end terminals.

Taken during construction, this Image shows the new DOLRE barrier on the left, and the old concrete post and rail barrier on the right-hand side of the bridge deck prior to its removal and replacement.

Remediation works on the Ringarooma River bridge near Moorina in north-east Tasmania included bridge strengthening works, application of a new wearing course, and installation of Australia's first DOLRE Regular (TL4) Low Stress Parapet System.

Together with the obvious benefit of improved safety for road users and reduced risk of damage to the bridge deck during an impact, another major benefit of the DOLRE design is the speed and ease with which it can be installed. This was highlighted during the Ringarooma River bridge installation, which was completed in a little over a week, including removing the original concrete barriers and old 'W-Beam' barriers and the installation of the new DOLRE barriers, transitions and new off-structure barriers.

Speaking about the DOLRE installation, John Nel, Project Manager with BridgePro Engineering, said they were very pleased with the installation process and the finished barriers.

"For the most part, the DOLRE barrier system was relatively easy to install, simply by following the instruction manuals provided by the supplier," he said.

"As with anything new, it initially took time for everyone to get acquainted with the design and components, but once the crew had gained some experience in the assembly process, the barrier installation proceeded more efficiently, and everything went smoothly," John Nel added.

Installation of the DOLRE barriers, transitions and off-structure barriers was followed by the application of a new asphalt wearing course (PSV value 54) across the bridge deck. The completed bridge was opened fully to traffic in late March.

COST-EFFECTIVE SOLUTION FOR BRIDGE SAFETY UPGRADES

While the combination of increased traffic flows, increased vehicle loadings, and the rapidly-changing vehicle mix undoubtedly present some significant challenges for Australia's aging bridge assets, bridge remediation is not only about load-carrying capacity. Other critical considerations include safety for road users and compliance with the current Australian Bridge Standards and safety guidelines.

In short, even though many road bridges - particularly those in rural, remote and urban interface areas - are now carrying vehicle numbers well in excess of their original intended design and, as a consequence, are often in urgent need of refurbishment and/or strengthening works to enable them to cater for these increased loads, not all are at the end of their useful design life. Indeed, for many bridges across Australia, it's not so much a question of upgrading capacity but rather one of upgrading safety. DOLRE provides the ideal solution for both situations.

TL4 TRANSITIONS

Another unique feature of the DOLRE Regular performance traffic barrier is the ability to transition to MASH TL4 Thrie-Beam. The DOLRE barrier, DOLRE transitions and the Thrie-Beams create a continuum of MASH TL4 protection for road users onto and across the bridge structure. Thus, there is an engineered continuity of MASH TL4 protection on either side of the DOLRE Regular traffic barrier.

Even though the Ringarooma Bridge DOLRE installation was carried out at the same time as the bridge strengthening and remediation works, another significant benefit of the DOLRE design is that, unlike some traditional safety barrier designs, it is not always necessary to complete strengthening works along the bridge deck simply to meet the needs of the new barrier.

Paul Hansen explained: "The DOLRE Low Stress Parapet System offers councils, road authorities and other bridge asset owners an extremely cost-effective and efficient method of upgrading bridge safety barriers to meet the requirements of the current Australian bridge Standards, without necessarily needing to perform strengthening or remedial works on the bridge deck."

"Put simply, DOLRE provides the ideal safety upgrade for bridges that still have residual life in the Bridge Deck but need upgrading to meet the current Australian Bridge Standards."

The key to this unique capability lies within DOLRE's patented 'low stress' design which absorbs and redirects the greater majority of the energy generated during a vehicular impact along the length of the barrier – including the transitions and adjacent off-structure barriers - rather than transmitting it directly to the bridge deck. In fact, with the DOLRE barrier, the stresses transferred to the bridge deck during an impact are less than one-third of the stresses created by a conventional barrier.

Developed by Belgian bridge engineer David De Saedeleer, a director of Belgian manufacturer DESAMI, working in conjunction with world-renowned FEA (Finite Element Analysis) specialists GDTech Engineering, the DOLRE Low Stress Parapet System has been crash tested to European Standard EN1317-2 H2 and simulated to USA Standard MASH TL4. DOLRE complies with Australian Standards AS/NZS3845-2015 and AS5100-2017 and has been approved by ASBAP for use throughout Australia.

Ideal for bridge refurbishment projects, the DOLRE Low Stress Parapet System offers a cost-effective and easy to install method of upgrading existing bridges to meet current Standards without the need for expensive deck strengthening or deck replacement works. DOLRE also provides the added advantage of being easy to dismantle and remove in times of flood, thereby helping to significantly reduce the risk of damage to valuable bridge assets.

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 BELOW.

SCAN ME

ABOUT LB AUSTRALIA

Part of the HFH Group, LB Australia Pty Ltd has been at the forefront of road safety for over 30 years.

Over the past three decades, we have built a proud history of providing innovative, high performance, life-saving road safety products and solutions for clients across Australia, New Zealand and beyond.

From the largest road infrastructure projects to small regional construction and upgrade projects, our team of specialist engineers and technicians work with our clients to deliver bespoke solutions that focus on saving lives and reducing the severity and cost of road trauma.

ABOUT BRIDGEPRO ENGINEERING

Founded in 2010, BridgePro Engineering Pty Ltd has been operating in the civil infrastructure industry in Tasmania as both a head contractor and a sub-contractor.

BridgePro provides the Local Tasmanian market with a highly competent, high-quality infrastructure provider delivering solutions from pre-construction through to completion. We focus on projects involving foundations, bridges, wharves, jetties and other areas where our engineering skills, highly trained workforce and specialist equipment can be brought together to provide excellent outcomes for our clients.

Since its inception, BridgePro has grown to be one of the largest Tasmanian contracting businesses, employing over 100 Tasmanians, including many trainees and apprentices.

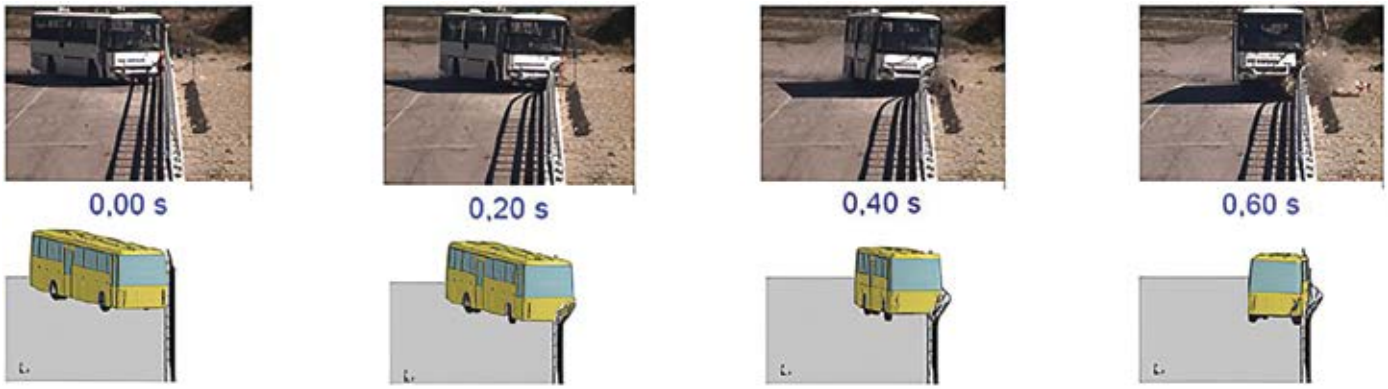
DOLRE
LOW STRESS PARAPET SYSTEM

FEATURES AND BENEFITS

DOLRE Regular Barrier

KEY SAFETY BENEFITS:

- Meets the requirements of AS5100-2017 for a 'regular' traffic barrier
- Crash tested in Europe in accordance with European Standard EN1317-2010 for an H2 class barrier (equivalent to MASH TL4)
- Finite Element modelling, verification and validation of the simulations to both European and US MASH Standards by GDTech (Belgium)
- Approved by Austroads Safety Barrier Assessment Panel (ASBAP) in 2020 for use in Australia as a MASH TL4 traffic barrier



KEY STRUCTURAL BENEFITS:

- Thanks to DOLRE's unique post and 'fuse' design, the maximum outward transverse force is limited to only 43 kN/post (22 kN/metre)
- DOLRE's maximum outward transverse force is only 14% of the allowable ultimate load under AS5100-2017
  - **NOTE:** *Regular bridge traffic barriers designed prior to 2017 and using the AS5100-2004 Standard used an ultimate transverse outward load of 250 kN. The AS5100-2017 Standard increased the required resistance in the deck by 20% (to 300 kN) for the modern traffic barrier.*
- The DOLRE traffic barrier and the DOLRE transition to Thrie-Beam are tested to both US and European Standards to MASH TL4 or equivalent
- The DOLRE transition simulation testing has been assessed and approved by ASBAP
- The DOLRE barrier, DOLRE transitions and the Thrie-Beams create a continuum of MASH TL4 protection for road users onto and across the bridge structure
- DOLRE can deliver substantial savings in both time and cost for the majority of bridge refurbishment projects, by eliminating the need for carbon fibre or other reinforcing of the deck specifically for the safety barriers
  - **NOTE:** *All installations are subject to inspection and certification by a qualified bridge engineer*

AS5100 - 2017 Barrier Performance Level	MASH Test Level	DOLRE System	AS5100 - 2017 Ultimate Transverse Outward Load	DOLRE Maximum Transverse Load per Post	DOLRE Load as % of Ultimate Load	DOLRE Transverse Load per metre
Regular	TL4	DOLRE MASH TL4	300kN	43kN	14%	22 kN/m
Medium	TL5	DOLRE MASH TL5	600kN	83kN	14%	55 kN/m

find out more at **www.dolre.com.au**