

Case Study

REDCOR® weathering steel
October 2025



Weathering the storm

The rebuilding of the Fitzroy River Bridge with BlueScope Welded Beams made from REDCOR® weathering steel



RedCor®

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Project Background

It's late December 2022 when Ex-Tropical Cyclone Ellie crosses the NT border headed for the Kimberley coast in Northern WA. This massive storm event would result in a once-in-a-100-year flood that would see surging waters rise an unprecedented 15.8 metres, the ferocity of which would be felt across the entire Kimberley region, significantly impacting local communities, industry and commerce. As flood waters subsided, the irreparable damage to the Fitzroy River Bridge and 500 metres of the Great Northern Highway would become apparent.

This vital piece of infrastructure is a key commercial transit route for the East Kimberley and the Northern Territory, and a crucial link for local, regional and remote Indigenous communities, so its reconstruction was an economic and social imperative, unconditionally prioritised by the State and Federal Governments with funds provided through the Disaster Recovery Funding Arrangements.

With funding secured, Main Roads WA was laser-focused on expediting the tender and selection process, which saw contracts awarded in record time. This process would typically take many months, but given the project's urgency, a progressive design approach with a collaborative construction methodology enabled the New Fitzroy Bridge to be officially opened six months ahead of its scheduled completion date. This was an outstanding achievement given the complexity of the build, challenging weather conditions, and the logistics of building in a remote location.

The contract to design and construct the new bridge was awarded to the Fitzroy Bridge Alliance, a collaboration comprising Main Roads WA, Georgiou Group Pty Ltd, BMD Constructions Pty Ltd, and engineering company BG&E Group Ltd.

Early planning

With the construction team formed, it was with a sense of alacrity that the first of many site visits and meetings occurred in late January 2023. According to Emir Muhlisic, Associate Director, BG&E, "This initial visit provided us with a real-world perspective and a clear understanding of the site topography, the strength of the river flow and the aftermath of the event

itself; these learnings and insights would influence the design of the new bridge". Additionally, Marcus Toleman, Senior Bridge Engineer at BG&E, explained, "When assessing the width of the river, the impact of potential flooding events during construction and the duration of the construction program, it became apparent to the design and construction team that a superstructure utilising an incremental launch method would provide the best design solution for the new bridge".

An incremental launch approach enables construction of the superstructure and substructure to occur concurrently, and was a significant contributing factor to the bridge's early completion.

Bridge Design – Concrete vs Steel

Typically in Australia, the sub and superstructures of a road bridge are constructed using concrete. In the case of the New Fitzroy River Bridge, the design and construction teams realised early on that, given the region's climatic conditions and isolation, there were a range of impediments to using concrete in terms of timely access and availability of prestressed beams, and the high cost of freighting heavy concrete beams over thousands of kilometres. The alternative of fabricating post-tensioned beams on-site, was far too complicated and added timing risk to the project.

The team concluded a composite steel superstructure was the best option moving forward. Luke Kelly, Associate Structural Engineer, BG&E, explained, "The Kimberley region is a semi-tropical area with a dry and wet season. The construction methodology we adopted had to ensure we could build the substructure during the dry season and allow us to continue working on the superstructure through the wet season. We believed an incremental launch method using steel would make building the continuous road bridge easier and more time efficient than a conventional, prestressed concrete option".

To further support the decision, the supply chain, which included BlueScope Steel Port Kembla, BlueScope Welded Products Unanderra, Infrabuild, and Cimec, were readily available and, given the project's importance, were able to adapt manufacturing and fabrication processes and schedules to ensure the tight project timeline would be achieved.

Progressive design approach and a collaborative construction methodology helped ensure the new Fitzroy River Bridge would officially open six months ahead of its scheduled completion date.



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Luke Kelly,
Associate Structural Engineer, BG&E





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The right choice – BlueScope's REDCOR® weathering steel

Alliance partner and client Main Roads WA, although highly supportive of the construction and design strategy, did raise a concern regarding ongoing maintenance of the steel superstructure, which was particularly pertinent given the remoteness of the location. Options using galvanised or painted standard carbon steel were structurally appropriate but would require painting on a semi-regular basis. To resolve this issue, Rob Danis, BlueScope's National Engineering Manager – Infrastructure, recommended REDCOR® weathering steel.

REDCOR® weathering steel is a high-strength structural steel that develops a stable oxide layer on the surface known as the 'patina'. When used in the appropriate environment, the patina enhances the corrosion resistance and does not require any protective coating during the bridge's expected 100-year lifespan. REDCOR® weathering steel is also known for its distinctive evolving appearance brought about by the patina that develops over time when exposed to alternating, climatic wet and dry weather cycles. Once fully formed and weathered, the protective layer's appearance takes on a hue ranging from deep orange to dark brown to rich purple. In the case of the Fitzroy River Bridge, these hues would coincidentally work seamlessly with the natural colours of the surrounding Kimberley environment.

Luke Kelly added, "The benefits to the building program by using REDCOR® weathering steel allowed the design and construction team to take advantage of the inherent attributes of steel that helped us with the incremental launch construction methodology while satisfying Main Roads by ensuring they

weren't burdened with future maintenance costs. We also believed it would give us program advantages versus alternate materials."

The Fitzroy River Bridge was the longest road bridge ever to be designed and built in Australia, incorporating welded 'I' girder beams made from REDCOR® weathering steel. The REDCOR® weathering steel road bridge design for Main Roads WA would give the engineering team at BG&E the enviable status as an industry leader but would also present some technical challenges associated with the use of 'weathering steel' in the design.

These challenges were collaboratively worked through with the help of BlueScope's Rob Danis. Rob worked with Luke and the broader BG&E team to provide technical advice and guidance on material selection, environmental suitability, beam sizing, including specific details on flange and web gauge, corrosion allowance and advice on span length and bolted connections, all resulting in a bridge that was more robust, longer, wider and stronger than the original.

Rob also recommended the use of REDCOR® weathering steel as sacrificial formwork for the bridge's road deck. This suggestion would benefit the project in two ways; firstly, it would provide a stable platform for workers to lay rebar in preparation for the deck's concrete pour, and secondly, it would help reduce the project's overall timeline because the majority of the 'formwork plates' would be incorporated into the prefabricated girder assemblies which were being manufactured off-site.

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Prefabrication – delivering project efficiency

Whilst construction of the concrete casting bed and substructure at the Fitzroy Crossing site progressed at pace to ensure its completion before the start of the coming wet season, BlueScope's Welded Products facility in Unanderra NSW simultaneously commenced processing the 1,200 tonnes of REDCOR® weathering steel plate that would form the structural core of the prefabricated superstructure.

The steel superstructure would consist of a hundred welded I-beams made from WR350B-graded weathering steel plate cut into flanges with a base metal thickness (BMT) of 40mm and a web with a BMT of 25mm. Each assembled beam would be a massive 18 metres long, 1.2 metres deep, 0.5 metres wide, and weigh approximately 9 tonnes.

Assembling these components to create the finished I-beams would require over 6,400 lineal metres of sub-arc welding and take just over 2 months to complete, a process which would also include a stringent testing regime to ensure the welded beams were code compliant to the appropriate Australian Standards.

Joe Ciccone, BlueScope Welded Products Plant Manager, explains, "These tests include a metallographic weld test, which is a visual assessment of the weld quality to ensure they are free from visual and mechanical defects, and a destructive weld test, which effectively attempts to tear the web and flanges apart to assess overall joint strength".

The next phase in the supply chain's critical path would see the weathering steel I-beams produced by BlueScope Welded Products shipped by rail to specialist steel fabrication company Civmec in Henderson, Western Australia.

Civmec is a tier 1 fabricator commissioned to transform the individual girders into prefabricated modules. Their scope of work included pairing the 18-metre-long I-beams with a complex series of support and intermediate braces, fabricating the hundreds of connecting plates, predrilling precision aligned holes to accommodate site assembly, and welding web brackets for additional lateral, shear, and transverse restraint. These modules were then capped with a 10mm REDCOR® weathering steel plate to provide the sacrificial formwork. Once completed, 50 modules were trucked to the remote Fitzroy Crossing site and craned onto the concrete casting bed to enable the final stages of the superstructure's assembly.



Summary

The official opening of the New Fitzroy River Bridge occurred on the 10th of December 2023, more than 6 months ahead of schedule and only 11 months after the catastrophic January flood. This was a phenomenal achievement and a testament to the unprecedented level of collaboration between the local indigenous community, local workers, alliance partners, suppliers, manufacturers, fabricators and, crucially, the decision by the construction and design teams to adopt a progressive construction methodology incorporating a prefabricated composite REDCOR® weathering steel girder superstructure coupled with an incremental launch method.

As a further endorsement of the success of this project, Main Roads WA, as part of its objective to build a more resilient Great Northern Highway, commissioned the rebuilding of the nearby Brooking Channel Bridge, replicating the basic design and construction methodology used on the New Fitzroy River Bridge.

Industry Award
Infrastructure Partnerships Australia:

2024 Industry Choice & Contractor Excellence Award Winner

“The Panel recognised the rapid delivery of the project in a remote area, employment of over 250 local residents, collaboration with local suppliers, and contribution to the safety and resilience of the Kimberley region's road network. By achieving an early project completion, the project restored a vital transport link before the onset of the wet season. The environmental and social benefits of the accelerated delivery, minimised on-site time and use of prefabricated and modular materials were all noted by the Panel.”

Source: New Fitzroy River Bridge – Infrastructure Partnerships Australia





Project Details

Project: New Fitzroy River Bridge

Location: Fitzroy Crossing, Kimberley Region, Western Australia

Builder: Fitzroy Bridge Alliance (In partnership with Main Roads WA)

- Georgiou Group: Will Telfer – Alliance Director | Greg Mengel – Construction Manager | Chee Seng Gan – Civil Section Manager
- BMD Constructions: Rowan Dillon – Construction Manager | Slobodan Savic – Structures Section Manager
- BG&E Group: Emir Muhlisic – Associate Director | Luke Kelly – Associate Structural Engineer | Marcus Toleman – Senior Bridge Engineer

Client: Main Roads Western Australia

Fabricator: Cvmec

Steel Distributor: Infrabuild: Craig Hunter – Manager Steel Centre, Perth

Manufacturer: BlueScope Welded Products

Product/Application: 1,500 tonnes of REDCOR® weathering steel in grade WR350B

BlueScope: Rob Danis – National Engineering Manager – Infrastructure | Elly Pilkadaris – State Manager WA, SA & NT Australian Steel Markets – Distribution
Stuart Gibson – Hot Roll Product Owner | Joe Ciccone – Welded Products Factory Manager | Keith Hampton – Welded Products Team Leader

Project Value: \$245M

Photography: Fitzroy Bridge Alliance, Craig Nealon – BlueScope

[steel.com.au/products/
redcor-steel](https://steel.com.au/products/redcor-steel)

1800 800 789
For more information



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