

Queensland Rail Cabbage Tree Creek & Redbank Road Rail Bridge



Client: Queensland Rail
Completion: July 2016
Value: \$3.18M

AS PART OF QUEENSLAND RAIL'S QUEST TO REPLACE NUMEROUS TIMBER RAIL BRIDGES ON THE NORTH COAST LINE BETWEEN BRISBANE AND TOWNSVILLE, CABBAGE TREE CREEK NEAR LOWMEAD AND REDBANK ROAD BRIDGE NEAR TIARO WERE TO BE REPLACED WITH CONCRETE RAIL BRIDGES. IN LATE 2015, VEC WERE AWARDED THE CONTRACT TO REPLACE BOTH BRIDGES. AS THE NORTH COAST LINE IS A CRITICAL RAIL LINE FOR FREIGHT, LIVESTOCK AND PASSENGER TRAINS, THE REPLACEMENTS WERE TO TAKE PLACE IN A SHORT 48 HOUR SHUT-DOWN – ONE OF VEC'S KEY CAPABILITIES.

CABBAGE TREE CREEK

HEAVY RAIN HAD HIT THE EAST COAST OF AUSTRALIA THE DAY AND HOURS BEFORE THE SHUT-DOWN WAS SCHEDULED. THE VEC TEAM WERE PREPARED AND HAD ENSURED THAT THE CONSTRUCTION SITES WERE METICULOUSLY PREPARED TO MANAGE THE EXPECTED EXTREME WET WEATHER. WITH FLOODS OCCURRING IN NUMEROUS STATES, THE GROUNDS ON-SITE WERE EXTREMELY WET AND ALTHOUGH ALL OF THE CREWS WERE ON-SITE, AND ALL THE EQUIPMENT WAS READY TO START, IT WAS THE WEATHER THAT DICTATED IF THE PROJECT COULD START AS PER THE PROGRAM. WITH THE SKIES CLEARING IN THE EARLY MORNING OF THE FIRST CONSTRUCTION DAY, WORKS COULD COMMENCE.

HEIGHT & OVERHEAD ELECTRICAL LINES
The biggest challenge of this project was the height of the bridge, standing approximately 9.0m high. With overhead electrified power lines hanging above the bridge, extreme caution was exercised during the demolition of the old rail bridge, and the installation of the new pre-cast concrete structure.

INNOVATION
In the original design incorporated driven piles, insitu concrete pile caps and insitu piers. However, it soon became obvious that with the limited track closure, combined with the dangers of the overhead

**APPROXIMATELY 80M LONG
6 SPANS
48-HOUR SHUT-DOWN TO REPLACE THE BRIDGE
BRIDGE CONSTRUCTION AND DEMOLISH COMPLETED IN 37 HOURS
2 CREWS
12 PEOPLE IN EACH CREW**

electrified power line, a pre-cast solution would be more favourable. The process to pour each pier insitu would have required multiple stages, which would require inconvenient and costly train shut-downs. Furthermore, cranes, concrete pumps and other plant and equipment would be required to work in the vicinity of the overhead electrified power lines, performing multiple stints of work. Pouring insitu would therefore be more time consuming, inefficient and potentially dangerous.

The team chose a pre-cast solution. Pre-casting the elements off-site would mean that they would need to be pre-manufactured and transported to site. Keeping true to our culture of **Innovation & Excellence**, the team devised a practical solution which meant that the piers could be pre-cast on-site, outside the rail corridor. This meant that while the team were working on completing preparation construction works, they could also work on the pre-cast elements. Approximately ten trains pass over the bridge on a daily basis. During this time, the team were unable to perform any works within the vicinity of the bridge which allowed them to use the time efficiently and work on the pre-cast elements.

TEAM
The VEC crew was meticulously chosen to ensure that all areas of expertise were covered. Professional in-house steel workers were available to perform the welding tasks, combined with experienced carpenters and labourers who were able to perform the demolition and construction works. This combination of an experienced and professional team ensured the safety and quality of the construction works.



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REDBANK ROAD

INNOVATION & EXCELLENCE

Although a significantly smaller structure, this project was the more complex of the two. The construction of the Redbank Bridge presented many constraints, such as the rail alignment that could not be lifted, and the clear height between the soffit of the bridge deck and the road that was required to be 5.0m, while originally only 4.2m. Lowering the road significantly would present complications with drainage, as the site underneath was in a flood plain area. Our solution to overcome this challenge involved decreasing the structural depth of the bridge deck. The beam design comprised of a smaller depth than standard rail deck beams, measuring in at just 700mm (instead of the standard 1200mm). This required additional safety in design checks to be performed to safeguard the safety of the construction. VEC's design included a thru girder, comprising of two sizeable girders on either side, with smaller shallow depth planks spanning in-between.

As the rail line is heavily trafficked, the bridge was to be replaced during a 48-hour shut-down – the exact same weekend as the Cabbage Tree Creek replacement. Although construction works on the Redbank Bridge were slightly delayed due to inclement weather conditions, our team were able to complete the construction within the nominated time-frame.

Here too, overhead electrified powerlines were present and needed to be safeguarded throughout the construction. Furthermore, the alignment was on a severe skew in relation to the road, adding to the challenges faced throughout the design and construction of the project.

With the site locations being over three hours' drive away from each other, the four VEC crews (two shifts; two locations) were briefed and prepared for the construction delivery.

THERE NO SAFETY INCIDENTS ON EITHER SITE. THE ENTIRE PROJECT WAS FINALISED WITHIN THE NOMINATED BUDGET. THIS PROJECT SHOWS THAT VEC CAN COMPLETE LIMITED CLOSURE RAIL BRIDGE REPLACEMENTS WITHIN THE ENVIRONMENT OF OVERHEAD ELECTRIFIED LINES. IT IS A CREDIT TO THE TEAM, INNOVATIVE DESIGN AND OVERALL MANAGEMENT FOR THE SUCCESSFUL DELIVERY OF BOTH PROJECTS.



**17M LONG
48 HOUR SHUT-DOWN TO
REPLACE THE BRIDGE
BRIDGE CONSTRUCTION AND
DEMOLISH COMPLETED IN
32 HOURS
2 CREWS**



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