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Queensland's first State Infrastructure Plan will see a \$300 million investment in critical road and rail upgrades.

That plan includes the replacement of some of the state's old, maintenance-intensive timber bridges with more sustainable solutions – durable concrete bridges.

Concrete has been long proven to be a long-lasting and low maintenance structurally-suitable material for both civil and building construction applications. It has a proven performance record over hundreds, and even thousands, of years. Take the Colosseum as an example, or the Pantheon, or any of the ancient Roman theatres.

The University of Rochester in New York's Renato Perucchio explains that while Roman concrete is approximately 10 times weaker than modern concrete, the fact that the buildings in Rome are still standing is a testament to its "phenomenal resistance over time."

So when it comes to the construction of structures in Australia in more modern times, one wonders why timber was used in the first instance. Surely if design teams had the option in then, they would have chosen concrete. Did they fully understand the inherent benefits of concrete and limitations of timber?

Most likely, the answer has more to do with location, available resources and of course, cost. We have to assume that the teams involved with those earlier projects chose the best materials they could at the time of construction, and that while they weren't building iconic buildings, they must have known that these bridges would have a shorter life span and would eventually need replacing.

A brief research exercise helps us to understand the reason why timber bridges are being replaced with concrete ones by the Queensland government. What benefits are these new projects giving to the community and why are we not replacing timber with timber?

Here are some statements from a few state organisations offering a quick snapshot:

Queensland Rail: "As part of this project, ageing timber bridges will be replaced with steel and concrete structures to improve reliability, operational safety and efficiency of services on the rail corridor."

Department of Transport and Main Roads, Queensland: "Four existing timber bridges at Fiery Creek, Lonely Creek, Boundary Creek and Cut Creek will be replaced with new concrete structures as part of the Peak Downs Highway timber bridges replacement project. The new bridges will improve the safety, capacity and reliability of the Peak Downs Highway particularly for the heavy vehicle and freight industries. Replacing the old timber bridges is the most cost effective long term solution considering ongoing maintenance costs for the timber bridges and the benefits provided by the new concrete structures."

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residents will enjoy better and more reliable road access. Freight from farms and local factories will be able to pass safely along quicker routes with greatly improved productivity.”

“We’ll see significant reductions in road closures due to flooding when this project is complete. This means improved year-round freight access to inland communities and the Townsville Port, as well as safer and better driving conditions for locals.”

VEC Civil Engineering: “(a selected design using concrete) allowed a crew of just 7 workers using 2 excavators to remove the old timber rail bridge and replace it with the new bridge or culvert in just 48 hours.”

There are some key themes to take away from this.

Firstly, future generations of Australians, as well as visitors, will be able to use the infrastructure for a significantly longer period of time. The low maintenance, 100-year plus lifespans of the new bridges give precast concrete a big tick for sustainability.



Secondly, by using longer spanning and more durable precast, the local communities will enjoy a more reliable infrastructure system, with fewer delays leading to increased productivity (another tick for sustainability) and in some cases, during the wet season, an evacuation route during a flood.

It is safe to assume that anyone would agree that the use of concrete over timber can be justified as a step in the right direction. It’s reminiscent perhaps of the story of *The Three Little Pigs*, and isn’t the moral of that story to use the strongest material possible to build houses?

It goes without saying that the standards of today demand more than for a structure to simply not blow over. When we plan, design, construct and commission a structure, we want to ensure both workers and users are safe. As well, we demand that:

- in the case of a fire, we won’t be exposed to any harmful chemicals and that the fire rating of the build is as high as possible
- as payers of rates, strata fees and taxes, our authorities should not purchase high maintenance structures – structures that not only cost an exponential amount as they get older, but that may be decommissioned after a short period of time, or eaten by termites on the off chance a maintenance inspection wasn’t carried out correctly
- structures will withstand our unpredictable environment. We want our structures to withstand floods, as recently seen in Brisbane. Would a timber building have survived?
- our buildings are as thermally and therefore energy efficient, as possible
- they perform well acoustically
- their manufacture and construction supports local economies





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