



KEN ERICKSON ACHIEVEMENT AWARD - ENTRIES

PROJECT: LEEVILLE VIADUCT
ENTRANT: ARTC, TEJV and Maunsell

SUMMARY:

The Australian Rail Track Corporation Ltd (ARTC) opened the new \$7.73 million Leeville rail viaduct, a 505 metre long construction that spans the flood plain at Leeville near Casino on the North Coast Line in July.

The new structure will reduce transit times by up to four minutes on the Brisbane-Sydney rail journey and allows the lifting of a 10-year-old 40 kph speed restriction, enabling a full mainline speed of up to 120 kph for all trains travelling across the viaduct.

It replaces the old viaduct on the same alignment that was built in 1925.

DESIGN/INNOVATION:

As all partnership members – ARTC, TEJV and Maunsell, were involved from the very beginning, what resulted was a very innovative and collaborative design process.

The design successfully fulfilled ARTC's key objectives, which included:

- Developing a construction sequence that could be executed during existing occupancy windows;
- Offering a solution with minimum future maintenance costs;
- Maintaining the cross sectional area through the viaduct to avoid negative impacts to the floodplain hydrology.

The unique construction method replaced the steel girder viaduct with a concrete ballast-top structure. This was achieved by the placement and sequential jacking of pre-cast concrete culvert units.

The viaduct's innovative design enabled these operations to take place during existing time windows between trains on the line, with zero impact on train schedules and train operators.

The team overcame a number of obstacles to bring the project to fruition. Some examples include:

- Managing the logistics, storage and installation of more than 1,200 pre-cast concrete elements, ranging from 0.5 tonnes to 8.9 tonnes, with a combined total weight of approximately 3,500 tonnes. A heavy duty access road was constructed adjacent to the viaduct which enabled units to be pre-positioned adjacent to their installation site. This reduced double handling and unit damage.
- Recovering four weeks which had been lost in large part due to bad weather early in the project. This was achieved by taking advantage of the flexible design methodology and through refined construction and jacking techniques. The site team improved efficiencies replacing from four spans per possession (equivalent to 15 linear metres) up to eight spans (30 linear metres) by the end of the project.

This fantastic outcome took seven months and was delivered by a team of just 14 people – an Engineer, Supervisor, Protection Officer and 11 Site staff.

The new viaduct will require minimal maintenance and has a design life of 100 years.

The project came in well under budget, and the client was so impressed by the design and construction methodology, that it is investigating using the same technique on other structures throughout its network.

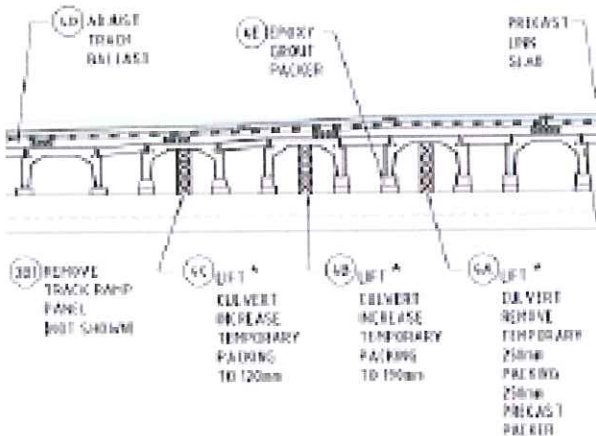
SAFETY:

Two operations were identified as carrying a risk of potential safety incidents – moving the large concrete culvert units and then jacking them into position.

Firstly, the large pre-cast concrete box culvert units had to be placed in position with great accuracy using cranes. Through the use of a set sequence, no incidents occurred during the handling and placement of the units.

It was identified early in the project that a purpose-built jacking system should be created and applied. TEJV and Maunsell developed a jacking frame system that could safely and efficiently raise the culverts into their final position during the process of removing the existing steel girders. The process was refined during the construction process and not only made the project safer, but resulted in a doubling of the productivity.

In summary, the project was executed without rail safety incidents, LTI or MTI, no impacts to the existing train services, and only one incident relating to an external hired crane.



The above diagram showcases one day's scheduled work

The new structure was constructed with zero impact on scheduling



The original structure slowed traffic to just 40km



The unique purpose-built jacking system in action