Modification of a Pratt Truss Bridge for double-stacked freight trains

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ABSTRACT

The Inland Rail Upgrade project is a transformative initiative aimed at enhancing freight efficiency across Australia's eastern seaboard heavy rail network. A critical component of this upgrade is the Albury to Parkes (A2P) segment, which involves the modification and strengthening of the Lachlan River Bridge to accommodate double-stacked freight trains. This paper details the approach and methodologies employed to extend the usable life of this existing asset.

The Lachlan River Bridge, a local heritage-listed structure located on the outskirts of Forbes, was built in 1912, consisting of a 48m steel Pratt truss carrying a single transom top track and 10 approach spans. The primary objective is to raise the minimum clearance from 4.57m to 7.1m, the necessary clearance for double-height freight traffic. This is done by replacing the internal lattice bracing between the vertical and principal members with external lateral and knee bracings.

The approach involved site inspections and condition assessments, including constructing a 3D analysis model to analyse the structural responses. The project has had to ensure that the replacement of the internal bracings will not reduce or negatively impact the structural capacity of the bridge. The proposed design needed to consider how to maintain the structural integrity and minimise impacts to the bridge during construction.

A fatigue assessment revealed that the stringer members are nearing the end of their fatigue life and require strengthening. However, the remainder of the bridge elements have proven the bridge’s robustness despite its age and will achieve a minimum of 25 years fatigue life from the completion date of the project. This project exemplifies the blend of historical preservation and modern engineering innovation, ensuring that the bridge meets contemporary freight requirements while honouring its heritage.

This paper will provide detailed insights into the methodologies, challenges, and solutions, offering valuable lessons for similar projects.