

Case Study



QUARTERBAC

BRIDGE PORTFOLIO CONDITION ASSESSMENT FRAMEWORK & LIFECYCLE MODELLING ANALYTICS

The Challenge

One of the major rail operators in Australia manages a network that has more than one thousand bridges. The bridge fleet comprises overbridges, underbridges, subways, and footbridges among other bridge types.

Bridge renewal and refurbishment funding requirements were identified as areas of significantly high value that would benefit from deeper analysis. Asset investment forecasts were conservative and modern analysis was needed to provide a granular forecast of bridge lifecycle funding requirements.

The client engaged Quarterbac to help to review the current renewal and refurbishment policies and to identify, collect and utilise the relevant data to build lifecycle funding models. The lifecycle models provide an excellent tool for investigating funding options, experimenting with various policy settings, and performing sensitivity analyses on multiple parameters.

First Steps

The first step was to understand the current strategies and funding estimation approach. The Quarterbac team facilitated workshops with different stakeholders to understand the current state and capture the internal knowledge and improvement ideas.

An extensive data collection exercise followed whereby asset condition data was sought for 200 bridges at a component level to inform the revised modelling approach.

Detailed investigation of the previous modelling revealed renewal and refurbishment unit costs to be very basic, not taking into account variations in the bridge types, component configuration and the options for partial treatments of the bridges.

»»» Benefits of Modelling

Granular lifecycle cost modelling provides a defendable basis for funding estimates. Moreover, models are a platform that enable continual improvement upon a repeatable process. They can be used to:

Predict

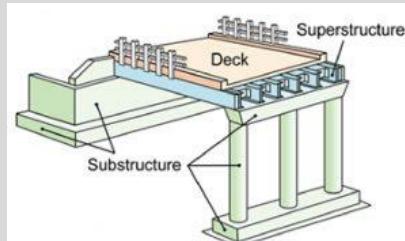
Apply condition-based lifecycle degradation profiles to model every asset and components' future condition and service levels.

Compare

Create scenarios to demonstrate the impact of increased, steady or decreased funding to make more informed decisions.

Optimise

Allocate available funding in the optimal way to extend asset lives and improve service levels.



Based on the initial findings and recommendations the following activities were prioritised:

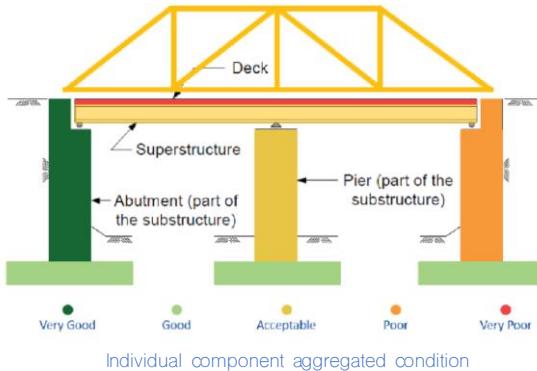
- Establishment of a more robust and granular view of the bridge lifecycle intervention requirements.
- Collection of detailed condition data for a prioritised sample of bridge fleet.
- Compilation of component-based treatments, unit rates and useful life estimates.
- Pre-processing analytics to be built to transform the condition data from raw element assessments into the primary bridge components.

Solution

A detailed life cycle funding model was built for the bridge asset class with more reliable data and refocused strategy settings. Workshops with the client's subject matter experts yielded refined:

- Modelling logic and degradation profiles.
- Asset component hierarchy.
- Analytics to transform the data from raw element assessments into the primary bridge components
- Cost unit rates for dozens of component and maintenance intervention scenarios.

The individual component conditions were utilised to build more realistic funding requirements.



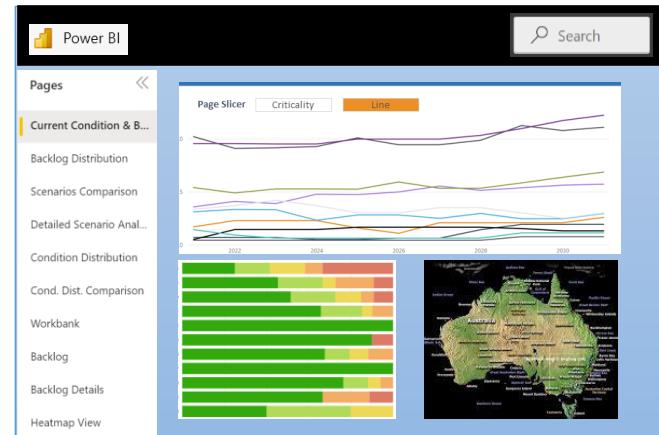
Individual component aggregated condition

The revised funding scenarios generated outcomes that enabled more efficient lifecycle delivery which led to a 50% reduction in funding need compared to previous strategies, the equivalent of 10's of millions in benefits from the process.

The client was able to visualise the impact of changes and select the most appropriate actions.

Some of the key outcomes included:

- A reduction in wasted capital expenditure caused by the unnecessary refurbishment of components in order to avoid revisiting the bridge for an extended period. Modelling demonstrated that it was more efficient to bundle component treatments based on condition and revisit the bridge on a more frequent basis.
- Improved reliability and defendability of funding requirements based on improved field inspection reporting that fed the condition assessment.
- Improved visualisation of present and future asset conditions and funding scenarios through Business Intelligence (BI) dashboards.



Dashboards for conditions and scenario comparison

Results

Quarterbac delivered the engagement over a 20-week period with the input from 4 client SMEs. The process generated 10's of millions of dollars in savings through the following changes:

BEFORE

Conservative

Assumptions lead to high funding forecasts

Manual

Decisions based on spreadsheet calculations

Status Quo

Budgets reflected dated inefficient practices

AFTER

Realistic

Results based on defendable granular data

Repeatable

The model can be used to generate scenarios

Visual

Dashboards provide visual business intelligence