

Pretty Point Bridge Replacement

Executive Summary

Bega Valley Shire Council has recently commenced the replacement of Pretty Point Bridge over Mataganah Creek on New Buildings Road, Wyndham. The repair/replacement strategy will remove the load and speed limit restriction to return the bridge to full service. The current structure requires a very high level of maintenance and is difficult to source replacement members of the hardwood structure. The road bridge is a 3 span, 48m long, 4m wide timber structure. The central span is supported by a 27.5 metre Allan truss. The new bridge will result in significantly lower maintenance costs to council.

A local consulting engineer has analysed the truss bridge in an effort to develop a program of renewal works to preserve it. It was determined that the Pretty Point Bridge is in such poor condition that the critical components of the bridge have deteriorated significantly and is considered beyond repair. These components are the support butting blocks at the base of the trusses, cross girders and the bottom chords.

The cost to restore and maintain an Allan truss bridge was discounted due to the significant ongoing expense of maintaining truss bridges. A design was prepared to replace the existing truss bridge with a concrete bridge. After considering associated road realignment and connection works this option was also too costly.

The Allan Truss road bridge is in the process of being replaced by using in-house council bridge carpenters and utilising the Unibridge steel bridge system. The timber girders will be replaced with modular box girders supplied by Unibridge Australasia Pty Ltd. Unibridge, manufactured by Matiere in France is a modular steel permanent and rapid assembly bridge system, which provides the ability to build clear spans of 11.4 to 45.6 metres without the need for intermediate piers.

This option provided the best balance of low cost and ease of construction. With the box girders used initially as a 'bailey' bridge, the bridge can be supported as various components are replaced as the load can be distributed and shared, providing minimal interruption to traffic flow as the bridge remains in service. It is a staged project and expected to cost \$1.3 million, suiting our budgetary constraints.

The timber bridge truss members will be restored and replaced to maintain existing character. The imported modern materials support the structure with the truss having no load bearing significance, purely a façade for heritage values.

Council officers were unsuccessful in sourcing a "bailey" bridge as an emergency support for the existing bridge. Council investigated other ways to rehabilitate or replace the structure. Council officers approached Unibridge as an alternative to the "bailey" bridge system. The initial approach to Unibridge was to hire their steel bridge girders as emergency support for the existing bridge truss. While Unibridge had not used their system for this application previously, their Australian representative was interested in the concept. A site inspection was arranged to explore the idea of using their girders as temporary support, then use their bridge modules to replace the bridge in stages.

A staged detailed design was developed using the 1 metre high bridge girders initially as an emergency support for the existing bridge and then lowered on the reconstructed piers and abutments as a permanent bridge replacement.

The Unibrige system offers a cost effective method of replacing the Pretty Point Bridge with the work being able to be carried out by Council's bridge team. The use of Unibrige components as a temporary support as well as a permanent bridge replacement has significant world wide applications with Unibrige and the Roads and Maritime Services (RMS) closely monitoring the works.

With an extensive bridge replacement and maintenance program, limitations of existing bridges within a modern road network needs to consider both operational and heritage value providing long term value for money and longevity within the road network.

Introduction

The Bega Valley Shire extends from Bermagui in the north to the Victorian border in the south. There is a population of approximately 33,000 people spread over 6,279 square kilometres. The shire is predominately (75%) national park and state forest. Bega is the rural centre of the shire and the area is best known for Bega Cheese. Land is primarily used for agricultural purposes particularly dairy farming, fishing, oyster production, tourism and retail are the other major industries.

There is a transport infrastructure network comprising over 1,400 km's of sealed and unsealed roads. This road network includes 227 timber and concrete bridges.

Wyndham, a village with 368 people is approximately 46 km's south west of Bega. New Buildings Road is a rural road linking the villages of New Buildings, Rocky Hall and Burragate. Pretty Point Bridge over Mataganah Creek is on New Buildings Road, 3.6km's west of Wyndham. Work on Pretty Point Bridge commenced in July 2013 with the initial investigation and inspections.

Pretty Point Bridge is a 3 span, 47.5 metre long and 4 metre wide road bridge. The central span is 27.5 metre long Allan truss span and 2 x 10m approach spans. It will be a staged project and is expected to last for approximately 5 years. The expected cost is approximately \$1.3 million dollars.

Truss bridges were constructed throughout South Eastern Australia between 1890 and 1920 with spans up to 27.5 metres. This was reliant on suitable and readily available materials. The main features of Allan truss bridges is the minimisation of maintenance and replacement of elements can be completed without supporting the whole bridge, provided all other components are in good condition. This design proved to be cost effective.

Construction Methodology

The current structure as it was required a very high level of maintenance and proved difficult to source replacement hardwood timbers. A local consulting engineer analysed the truss bridge in an effort to develop a program of renewal works to preserve it. It was determined that the Pretty Point Bridge was in such poor condition overall that the critical components of the bridge had deteriorated significantly and were considered beyond repair. These components included the support butting blocks at the base of the trusses, the bottom cords and cross girders. The cost to restore and maintain an Allan truss bridge was discounted due to the significant ongoing expense of maintaining truss

bridges. The RMS is the recognised authority on the maintenance of timber truss bridges and they estimated that the cost to restore an Allan truss with a span of 27.5 metres would be in the order of \$2.95 million. Any work on the supporting piers would be additional cost.

A design was prepared back in 1988 to replace the existing truss bridge with a concrete bridge. After considering associated road realignment and connection works, this option was also too costly. The Pretty Point Bridge is listed as having heritage value in Schedule 5 of the Bega Valley Local Environmental Plan 2013.

The Allan Truss road bridge is in the process of being replaced by using in-house council bridge carpenters and fabrication workshop teams, utilising the Unibridge steel bridge system. This will be replaced with modular box girders supplied by Unibridge Australasia Pty Ltd. In France, it is a modular steel permanent and rapid assembly bridge system, which provides the ability to build clear spans from 11.4 to 45.6 metres without the need for intermediate piers. This option provided the best balance of low cost and ease of construction.

With the box girders from unibridge used initially as a 'bailey' bridge, the bridge deck is supported so the truss sections can be removed and the load can be distributed and shared. It also provides minimal interruption to traffic flow as the bridge remains in service. Prior to the work, the speed on the bridge was limited to 10kp/h and a weight restriction of 5 tonne applied.

A concept design was drawn up by local structural engineers, Andrew Marshman & Associates Pty Ltd and sent to Unibridge in France for their consideration. This looked at replacing the truss span and approach spans with a Unibridge system and placing the timber trusses back as a non-structural feature to maintain the heritage look of the bridge. The proposal was to purchase 4 x 11.4 metre and 2 x 6.0 metre long by 1.00 metre high Unibridge bridge girders and these would be used as a bailey bridge to support the existing truss span until Council is in a position to replace the truss span with the Unibridge modular system supported by new concrete piers.

Council's bridge team could then carry out the work of placing extra piles to support the new Unibridge girders as a temporary measure. Once the girders were installed as temporary support, the load limit could be upgraded and the permanent bridge replacement could be staged to fit with Council's Long Term Financial Plan (LTFP). This work could also be carried out by Council's Bridge Team, who were involved in a lot of the preplanning stages to understand the concept of the project and also provide input into the design.

The works, staged over a number of years will ensure that the replacement of the bridge can be carried out with minimal disruption to the existing LTFP. This will also allow Council's Bridge Team to continue to carry out necessary maintenance work on other Council bridges within the shire. The replacement of Pretty Point Bridge will give Council's Bridge and Civil Construction Teams an excellent opportunity to gain skills for the future. The steel fabrication work is also being carried out by Council's Workshop Team.

The first three stages of work were undertaken in the 2013 / 2014 financial year. The first stage involved:

- The inspection and repair to the existing pier, cross girders, bottom cords and approach spans

- The removal of the upstream kerb and rail
- The installation of extra piles to the existing piers to support the temporary girder 1 to clear the deck.
- The installation of the temporary girder 1 and brackets to support the upstream edge of the deck
- The removal of the upstream truss to allow for the installation of temporary girder 2

Stage 2 involved:

- Installation of extra piles to existing piers to support temporary girder 2 and extra cross girders to support the deck
- The installation of temporary girder 2 to support the upstream edge of the deck to allow the
- Transfer of temporary girder 1 to the downstream side which will become temporary girder 1A.

Stage 3 involved:

- Removing the downstream kerb and rail to allow for the installation of temporary girder 1A
- Installation of extra piles to existing piers to support temporary girder 1A and to clear the deck
- Installation of temporary girder 1A and brackets to support the downstream edge of the deck
- The downstream truss was removed with the deck now supported by the Unibridge girders

Currently, the load limit is 20 tonne with a 10 km speed limit and a 3.5 m traffic lane.

The 2015 / 2016 financial year will see stages 4 and 5 being completed. These included:

- The construction of the new pier 2 (western) adjacent to the original pier
- Concrete encase existing pier 1 (eastern)
- The closure of the bridge to remove the original timber deck on the truss span
- Supporting of the existing timber approach spans on pier 1 and new pier 2
- Removal of original pier 2
- The installation of Unibridge girders and decking in permanent position on pier 1 and 2 with a span of 28.8m.

The 2016 / 2017 financial year will see the completion of stages 6, 7, 8 and 9. These include:

- The reconstruction of abutment A and bank protection
- Construction of abutment B and bank protection in preparation of replacing the approach spans
- The closure of the bridge to remove the existing approach spans
- The installation of the 11.4 m Unibridge girders and deck units
- The restoration and re-installation of the timber trusses

This will bring the total length of Pretty Point Bridge to 51.6 m when finalised whilst maintaining the heritage look and feel of the bridge and the original road alignment and levels.