Wellington's Ngauranga to Aotea Quay upgrade

RESOURCE EFFICIENCY CASE STUDY

August 2016

The SH1 Ngauranga to Aotea Quay upgrade, which is building New Zealand's first ever 'smart motorway' will improve safety and make journey times more reliable. It's a clever example of re-use, aligning with the NZ Transport Agency's objective to make resource efficiency an integral part of state highway functions.

The Transport Agency has undertaken a 3km, $55 million upgrade of the Ngauranga Gorge to Aotea Quay section of Wellington's urban motorway.

The project aims to reduce congestion along this stretch of the motorway, making journey times more reliable, and improve safety on the busiest section of road in the Wellington region.

This will partly be achieved by adding a fourth northbound lane. The space for the extra lane was gained by replacing the wide gravel-filled median barrier with a narrower concrete one and by widening part of the Thorndon Overbridge.

The project team employed an innovative solution by re-purposing the un-used Kaiwharawhara bridge structure rather than constructing a new clip-on bridge. This required the existing bridge stub to be lowered by 1 metre and pushed sideways by 1.5 metres.

Testing found the existing structure to be in good condition and therefore had considerable remaining life. As built drawings of the bridge stub were accessible which meant the strength of the structure was well understood.

The biggest obstacle encountered was the requirement to move two 300 tonne bridge decks without damaging the decks and bridge super-structure.

NZ TRANSPORT AGENCY WAKA KOTAHI

New Zealand Government

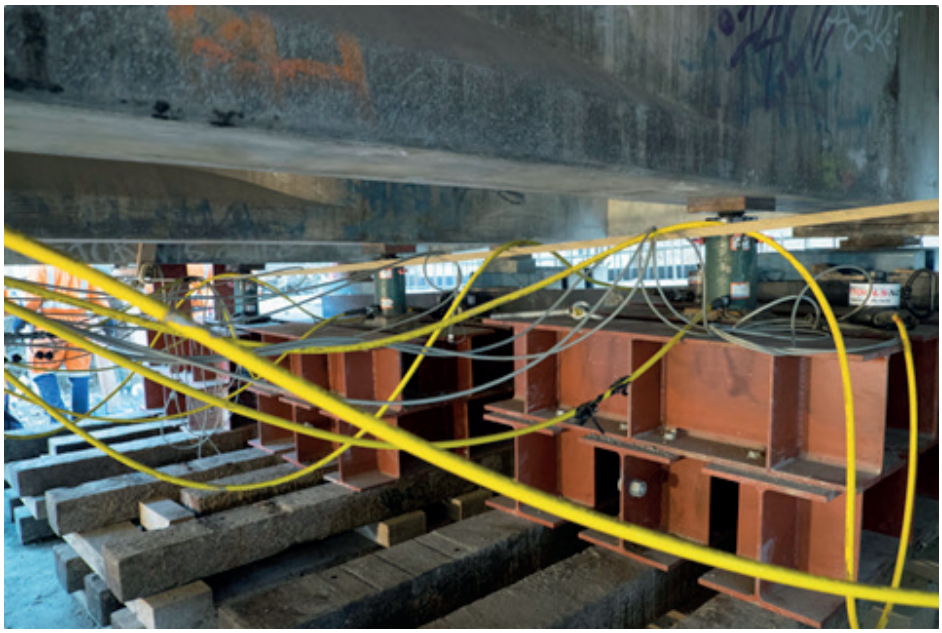
This was achieved by using a series of hydraulic jacks – each capable of lifting 100 tonnes. The jacks are computer-controlled and synchronised to within a 1mm tolerance so each span was lifted evenly and equally.

Once the the off-ramp was lifted from its old foundations it was held on temporary supports while the new foundations were built.

BENEFITS

The bridge widening works cost approximately $1.9 million. Reusing the existing bridge structure instead of demolishing the redundant Kaiwharawhara Bridge stub and reconstructing a new clip-on bridge resulted in overall cost savings of approximately $250,000. This approach also avoided construction emissions and resulted in considerable journey time savings, minimising disruption to motorists by not having numerous road closures for demolition work and re-construction.

Alternative options, such as a rebuild or partial rebuild, would have required substantial quantities of virgin concrete and reinforcement steel and a plant for construction.



WOULD WE DO IT AGAIN?

Reusing the Kaiwharawhara Bridge stub successfully demonstrates the benefits of reusing an existing asset, resulting in cost and time savings, less disruption to road users, and a more resource efficient outcome for the project.

Keen to reproduce the success of the overbridge upgrade, the project team are exploring if the future southbound four-laning stage presents an opportunity to reuse another redundant bridge stub structure.

TAKE HOME MESSAGE

Glen Prince, smart motorway project manager says, 'Always consider how construction projects can reuse or modify existing assets to serve the required purpose before demolishing and replacing these. Keeping good records of assets is also key to ensuring their reuse can be based on a sound understanding of their

CONTACT DETAILS

For further information on the Transport Agency's resource efficiency objectives or if you have a great example to share please visit the resource efficiency space on HIP or contact **environment@nzta.govt.nz**