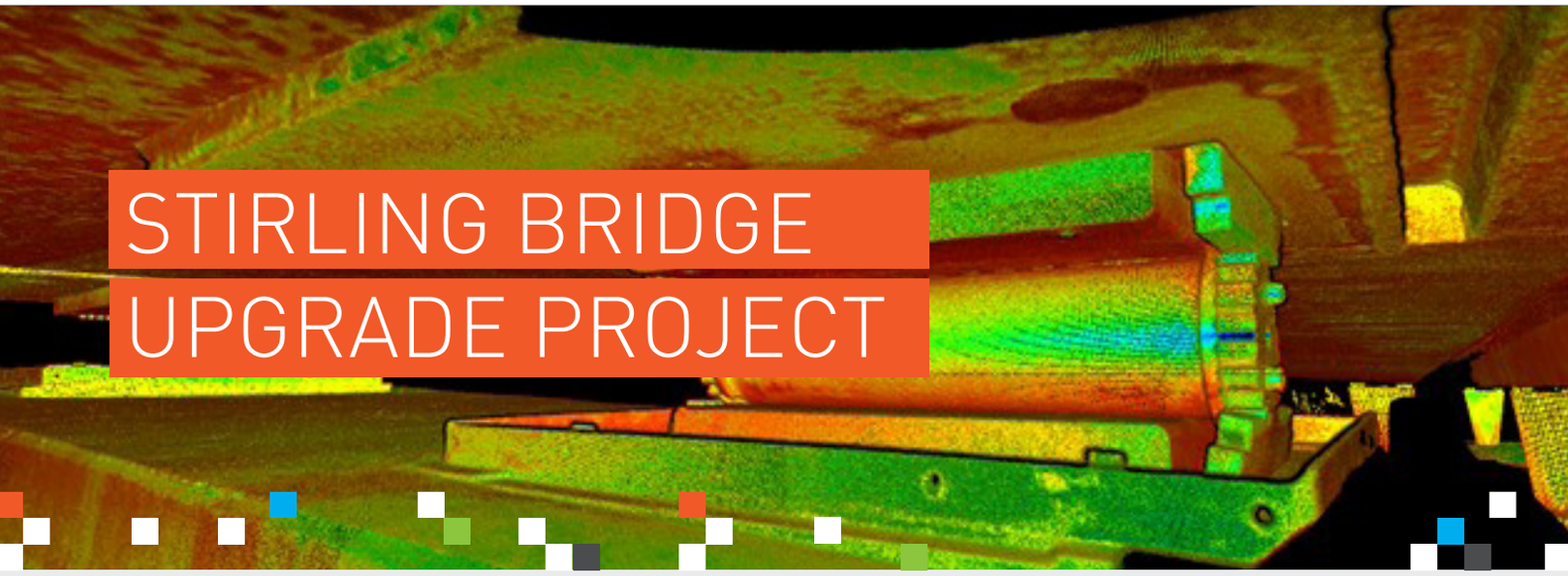
CASE STUDY

MNG.



STIRLING BRIDGE UPGRADE PROJECT

PROJECT Stirling Bridge upgrade project
CLIENT Main Roads Western Australia & AECOM

THE SITE

The Stirling Highway Bridge in Fremantle is the primary bridge connecting the southern and northern suburbs down the Western Australian coastline alongside Fremantle harbour. It also plays a pivotal role in connecting the port with inland freight distribution points.

The 415m concrete bridge spans the river at a height of almost 10m above the water and is supported by five piers, each with two columns, between the north and south abutments. The 15m wide structure sits on a set of steel roller bearings, atop of each column, with a finger joint in the north abutment to allow for expansion and contraction.

The Stirling Bridge is nearing 50 years since opening and handles over 5,000 trucks plus 30,000 cars per day. It is paramount to traffic and freight logistics in the greater Perth region as the old Fremantle Traffic Bridge located to the west has all but reached the end of life.

THE CHALLENGE

Due to its age, the differential shrinkage along the bridge had reached a point where the steel roller bearings were approaching their maximum extension across the bearing plates. In order to replace the bearings and plates it was imperative to have an accurate 3D model of each roller bearing, and respective bearing plates.

The challenge was to survey each bearing installation accurately and safely, without disrupting traffic movements across a main arterial highway.

THE SOLUTION

In consultation with Main Roads Western Australia and AECOM, MNG proposed laser scanning as the most efficient and accurate solution. MNG opted to use their Leica P30 high-definition laser scanner as it provides best in class capture for speed and accuracy, enabling an accurate 3D model to be created for each roller bearing.

In planning the project, it was decided to scan the bearing from multiple points around the top of each column and each scanning point would need to be accurately surveyed so that all scans could be consolidated to one model for each bearing.

STEEL BEARINGS ON NORTHERN ABUTMENT

CASE STUDY

In all, this required over 60 scanning points to capture all roller bearing installation points across all piers and abutments of the Stirling Bridge.

Access from the top of the bridge was not considered viable and this alleviated the need for any road closures and traffic disruptions. The logistical challenge of scanning at the top of each column was overcome with the provision of a barge equipped with an elevated work platform. The survey team utilised a prefabricated bracket to support the scanner, to ensure it was mounted securely at the top of each column. This provided a safe work environment for the surveyors and their support team. Boating movements along the river were controlled to minimise disruptions.

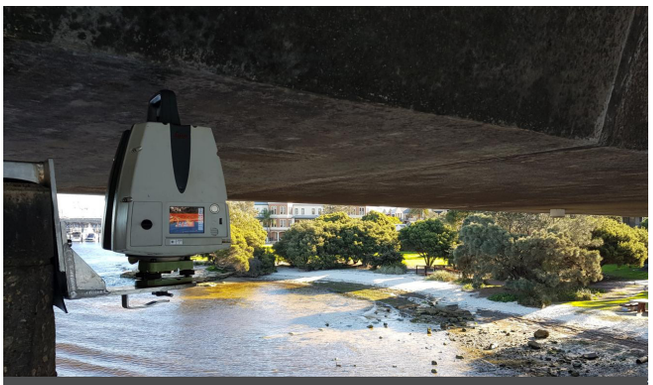
The methodology of using a high-definition scanner, secured atop of the piers above the river, enabled the survey to be completed over a two-day period with additional ground control also completed in this time.

BARGE WITH ELEVATED WORK PLATFORM

THE OUTCOME

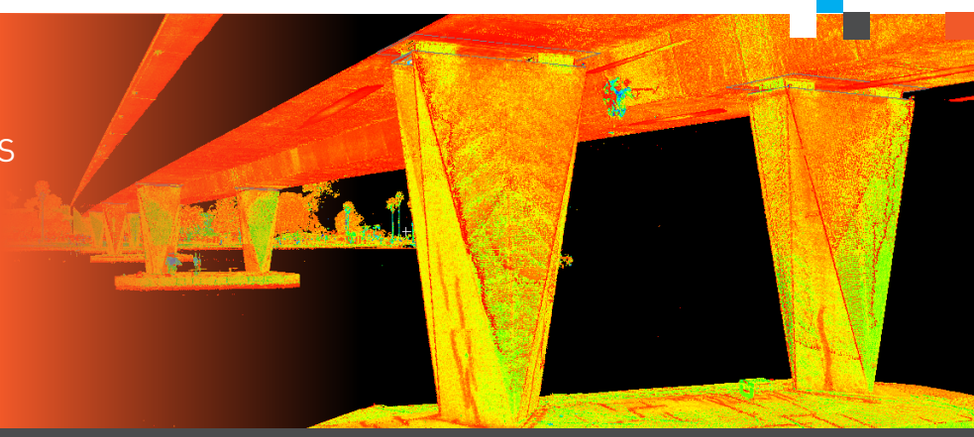
An accurate and comprehensive 3D model of all roller bearings, edge of all top and bottom bearing plates, bolt centres, outline of the top of piers, and the outline of soffit of the bridge deck directly above the bearings was produced.

The survey provided vital information for detail of the bearing installations, to millimetre tolerance, enabling the manufacture and machining of the new components. A critical aspect of the project was for the new components to be manufactured to exact tolerances ensuring that they fitted in position without any delays. The project was concluded with new bearings successfully installed without disruptions to traffic.



SCANNING BRIDGE AND BEARINGS

A KEY BENEFIT TO THE CLIENT WAS THE ABILITY TO UNDERTAKE THE PROJECT SAFELY WITHOUT ANY DISTURBANCE TO TRAFFIC.



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