

Mainmark rectifies un-level service tunnels at WICET



INDUSTRY

Infrastructure

STRUCTURE

Wiggins Island Coal Export Terminal (WICET)

PROBLEM

Ground subsidence

LOCATION

Callemondah, QLD, Australia

DURATION / YEAR

12 days / August 2016

TECHNOLOGY

Resin injection

BUSINESS UNIT

Mainmark Australia

Summary

The Wiggins Island Coal Export Terminal (WICET) was experiencing weak ground under some of its critical service tunnels. The tunnels, which were approximately 2.6m in diameter, were made up of a number of pre-cast sections and were at risk of subsidence due to the weak ground conditions.

As part of the broader project schedule, WICET contracted John Holland to undertake proactive rectification works. Mainmark was sub-contracted by John Holland to improve ground compaction under the tunnels.

Site access was limited, with just 1676mm in width and 1942mm in height available for Mainmark to establish equipment in order for the project to be completed.

The Mainmark team customised a transportable rig that was small enough to fit in the confined space and facilitate the application of Mainmark's proprietary structural resin solution, without compromising the delivery mechanism or the end result.

Once the customised rig was finalised, Mainmark was able to access the site and successfully strengthen the ground beneath the tunnels.

Objectives

To preserve the integrity of the tunnels and support future operations, Mainmark needed to achieve improved ground compaction under the tunnels to limit any potential settlement.

Mainmark rectifies un-level service tunnels at WICET continued

If the tunnels had failed, the concrete sections may have had to be removed via excavation. This costly and time-consuming event needed to be avoided due to the operational and safety requirements of the Terminal.

Due to the small size of the tunnels, Mainmark needed to be able to transport all material and equipment into the tunnel via an access space of just 1676mm wide and 1942mm high.



Mainmark's customised rig

Solution

Mainmark recommended a unique structural resin solution, which is ideally suited for improving ground bearing capacity and re-supporting and re-levelling structures. The precise and controlled application of this solution would bring the service tunnels back into alignment with the main tunnels.

Mainmark injected the structural resin beneath the tunnels in sections to fill voids and increase ground support. Throughout the process laser levelling equipment was used to monitor the lift to realign the tunnel with the main tunnels. The ground strength was measured to ensure it would withstand heavy loads into the future.

Mainmark addressed the small access space by custom-making a rig in its workshop. The rig complied with the site's rigorous safety standards and, crucially, still allowed Mainmark's technicians to apply the structural resin solution according to specifications for a predictable, successful outcome.

As it was not possible to run a generator in the underground worksite due to potentially harmful emissions, developing the solution included calculating how far away from the worksite the compressed air could be while still maintaining pressure. Once the equipment was in the tunnel, the project proceeded without interruption.

The project was completed by Mainmark with no downtime and no excavation.

"In conjunction with John Holland, Mainmark was a cornerstone to the success of the tunnel injection solution," said John Holland Group senior project engineer, Cameron Pahor. *"Mainmark was able to provide a resolution to several challenges to deliver a successful project from design to construction, for us and our client, in tough operating conditions."*