

Bespoke Teretek® Solution Stabilises Prestigious Federation Mall Bridges at Australia's Parliament House

PROJECT PROFILE

N19A097

mainmark



INDUSTRY

Infrastructure

STRUCTURE

Bridges

PROBLEM

Subsidence

LOCATION

Capital Hill, Canberra,
Australian Capital
Territory

DURATION / YEAR

5 nights / 2019

TECHNOLOGY

Teretek®

BUSINESS UNIT

Mainmark Australia

Summary

During a routine bridge inspection, engineers from the Australian Government's National Capital Authority (NCA) infrastructure consultants, Forcecor, identified ground settlement issues beneath the bridge approach slabs and adjacent roadways on Federation Mall that lead to the iconic Parliament House, Canberra.

Federation Mall is one of the most prestigious locations in the nation's capital, providing a ceremonial and symbolic link between Parliament House and Old Parliament House. It was constructed for Australia's bicentennial celebrations in 1988 and continues to host some of Canberra's largest community activities.

The Mall features two parallel roads with bridges that span Canberra's famous State Circle highway surrounding the area known as Capital Hill. The roads serve as the main traffic artery providing road access in and out of Parliament House.

The approach slabs on both sides of the so-called Land Axis Bridges had settled by up to 50mm, resulting in cracks appearing in the surface of the road leading up to the bridges, pedestrian walkway walls, relieving slabs and approach parapets. This settlement had also caused dishing and undesirable movement in the roadways on either side of the bridges.

Forcecor contacted Mainmark to devise and deliver an efficient and cost-effective remediation solution to improve the ground bearing capacity and re-level the approach slabs and parapet walls in order to preserve the functionality of the access to Federation Mall for many years to come. Mainmark's Teretek® engineered resin injection proved the ideal solution to achieve the scope of work, re-leveling and re-supporting the bridge approach slabs and roadway quickly and accurately through tiny keyhole injections, ensuring minimal disruption to traffic access in to or out of Parliament House.

Bespoke Teretek® Solution Stabilises Prestigious Federation Mall Bridges at Australia's Parliament House continued

Objectives

The first objective was to accurately assess ground conditions in the affected areas which Mainmark addressed using Dynamic Core Penetration (DCP) testing and rotary hammer drilling. Once a clear understanding of ground conditions had been established, an appropriate remediation solution needed to be identified that would address the settlement issues affecting the Federation Mall bridge approach slabs and roadway.

The solution was required to fill underground voids in order to re-support the structure and minimise future settlement from occurring and, if possible, to re-level the bridges' approach slabs and address the dishing in the roadway. Works needed to be completed as efficiently as possible to minimise disruption to traffic accessing Parliament House.

Solution

Drawing on more than 20 years of experience remediating bridges and bridge approaches throughout Australia, Mainmark recommended Teretek engineered resin injection, a proprietary solution that can help deliver both ground improvement and re-leveling, as well as increasing ground bearing capacity, filling voids, while causing no detrimental effects on the environment.

Mainmark technicians selected up to 30 injection points at each bridge approach, targeting the ground beneath sunken sections of the approach slabs to fill underground voids and maximise ground support. Applied in a process similar to keyhole surgery, Teretek was injected through very small tubes into the ground beneath the approach slabs, allowing the structure to return towards its correct position as the resin expanded.

As the project was undertaken during winter with sub-zero temperatures, special provisions were made to prevent the extreme cold from impacting the resin solution.

DCP testing and rotary hammer drilling was conducted throughout project works to continually assess and monitor ground conditions, before, during and after

the injection process. From this, weak layers were specifically targeted at various depths.

When compared with traditional excavation or underpinning methods, Teretek provides a far more efficient and cost-effective solution, avoiding the need to dig up the ground, or to bring heavy equipment or machinery onsite, thereby minimising disruption and noise.

To reduce impact on traffic and access to Parliament House, remediation works were scheduled on Parliamentary non-sitting days and carried out over 5 consecutive night shifts, allowing the Land Axis Bridges to re-open to traffic at 6am each day.

The entire project was completed within specified timelines and budget.

Overall, The National Capital Authority NCA were very happy with the project outcome:

"The bridge abutments had settled significantly, causing damage to the footpath and resulting in trip hazards. The movement of the relieving slabs of the bridges also caused significant movement in the bridge joints and parapet walls. The solution presented by Mainmark minimised disruption in the area and ensured that the ground would be stabilised into the future. Mainmark worked collaboratively with all stakeholders in challenging conditions to complete works in a tight timeframe. While we did not achieve as much movement as desired for the relieving slabs, we were able to stabilise the ground around the abutments. This has allowed us to repair the footpaths and stormwater drainage in the area and create a safe area for pedestrians."



The Mall bridges' subsidence was most clearly seen in the variation of levels on the pedestrian walkway walls.