Road & Transport Infrastructure

Engineered Remediation & Maintenance Solutions

mainmark

Introduction

Functional transportation infrastructure is a key component of a stable economy and plays an essential role in communities. Maintenance and improvement of aged infrastructure is crucial for public safety and reducing downtime for users. Mainmark offers practical and effective solutions to extend the life of existing infrastructure, proactively fortifying assets for future conditions.

Teretek® Resin Injection, pioneered by industry leader Mainmark, has been qualified, tested, and adopted by Road authorities across Australia for infrastructure maintenance.

With over 30 years of dedicated innovation and continuous development, Mainmark remains the foremost authority in Teretek® resin injection technology. Our unparalleled expertise is evidenced by the successful delivery of thousands of projects. This remarkable track record solidifies Mainmark's position as the trusted partner for non-invasive, fast, and economical void filling, level correction, and ground improvement solutions. Whether applied to planned maintenance projects or addressing emergent issues like flood damage, sinkholes, or unexpected settlement, Mainmark's proven technology offers a reliable and efficient approach to safeguarding and enhancing critical infrastructure assets.

The key advantage Teretek® offers is avoiding high costs and lengthy road closures associated with subgrade and pavement removal and replacement.

Some of the more common applications for the remediation of roadways and bridge infrastructure with Resin Injection are:

- The filling of voids directly beneath pavements to reconfirm support and limit deflection and deterioration.
- Raising subsided pavements to re-establish design levels, drainage or camber gradients and to restore a safe and comfortable ride for motorists.
- Void filling, re-supporting, and raising bridge approach and relieving slabs.
- To provide targeted ground improvement to weak subgrade soils.

Health, Safety & Environment

Mainmark is committed to ensuring the Health, Safety, and Well-Being of all our Employees, Subcontractors, Customers, and Stakeholders.

Our robust integrated system has successfully met rigorous assessment against international standards, demonstrating our dedication to Work Health and Safety, with critical focus areas on:

- **Risk management**
- **Training and competency**
- **Leadership**
- **Plant and equipment management**
- **Management of change**
- **Continuous improvement**

Experienced Personnel

At Mainmark, we take great pride in our team of experienced personnel. Each member is a subject matter expert in delivering our specialised technologies and has completed all the regulatory requirements, including Health Monitoring and Training Competencies. This ensures that our projects are completed to the highest standards of safety, quality, and in accordance with mine site requirements.

Plant and Equipment

Mainmark has built and developed a fleet of mine-specific plant and equipment tailored for mine site compliance and prioritises safety.

CERTIFIED ISO 9001 ADAPTIVE

CERTIFIED ISO 14001 ADAPTIVE

CERTIFIED ISO 45001 ADAPTIVE

Features & Benefits

Cost Effective
Compared to traditional methods Teretek® Resin Injection is a significantly more cost-effective solution.

Fast
Correction with Teretek® Resin Injection can be completed within a few hours rather than days.

Immediately Trafficable
As soon as the repair is completed, the roadway can be reopened to traffic and full use.

Minimally Invasive Technology
Repairs are performed without excavation, the need for extensive road closures or traffic disruption.

Accurate & Controllable
The process is accurate to within a few millimetres.

Lightweight
Teretek® materials do not add significant additional weight to the supporting soils (less than 200 kg / M3).

Environmentally Inert
Hardened material is environmentally inert and does not leach into the environment.

Self-Sealing
Treatment can be safely carried out near open edges, embankments, or waterways with no risk of unwanted material escape.

Closed Cell
The maximum water absorption of the tested systems and densities is less than 3% by volume. This water absorption does not affect the mechanical properties.

Re-Levelling Bridge Approaches

It is important to address any voiding or settlement issues with bridge approach slabs as soon as practical to ensure the safety of road users and to prevent further damage and significantly higher cost repairs.

Teretek® Resin Injection offers several advantages for the repair of bridge approach slabs that have lost support due to voiding, or have settled as a result of subsidence within the supporting soils.

Teretek® materials are specifically designed to provide a durable and long-lasting repair that can withstand heavy loads and constant traffic.

Some of the more common causes include:

- **Weak or unstable supporting soils due to poor compaction / subsidence.**
- **Soil erosion or moisture changes due to water ingress.**
- **Increasing traffic loads.**
- **Significant weather events such as rising water and flooding.**

Raised approach slab ready for profiling

Minimal road disruption during injection works

Teretek® treatment is faster and less invasive than traditional repair methods, which often involve significant disruption to traffic.

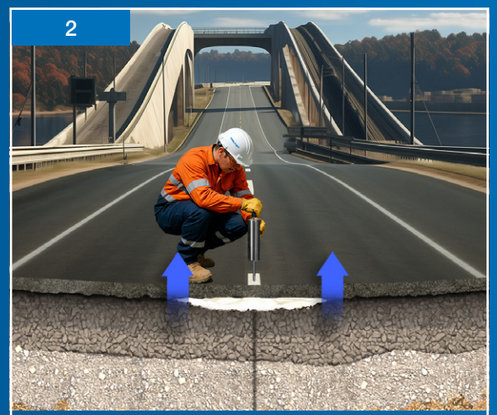
Concrete & Bitumen Pavements

The repair of both rigid and flexible pavements with Teretek® offers a host of benefits. Teretek® utilises a specialised plural component, expanding polyurethane resin, injected through small-diameter holes strategically drilled into the pavement or foundation of the target structure. The controlled expansion of the resin generates a lifting force, effectively restoring the pavement to its original level. This precision in material expansion enables targeted placement to fill voids, re-confirm support, and accurately raise subsided pavements. The use of Teretek® materials not only ensures a reliable and long-lasting repair but also provides a cost-effective and efficient solution for maintaining the integrity and functionality of roadways, whether they are rigid or flexible in nature.

1

Small holes are drilled through the roadway.

2



Teretek® resin is injected into the treatment zone filling voids and compacting weak soils.

3

Continued injection raises, and re-supports the roading.

4

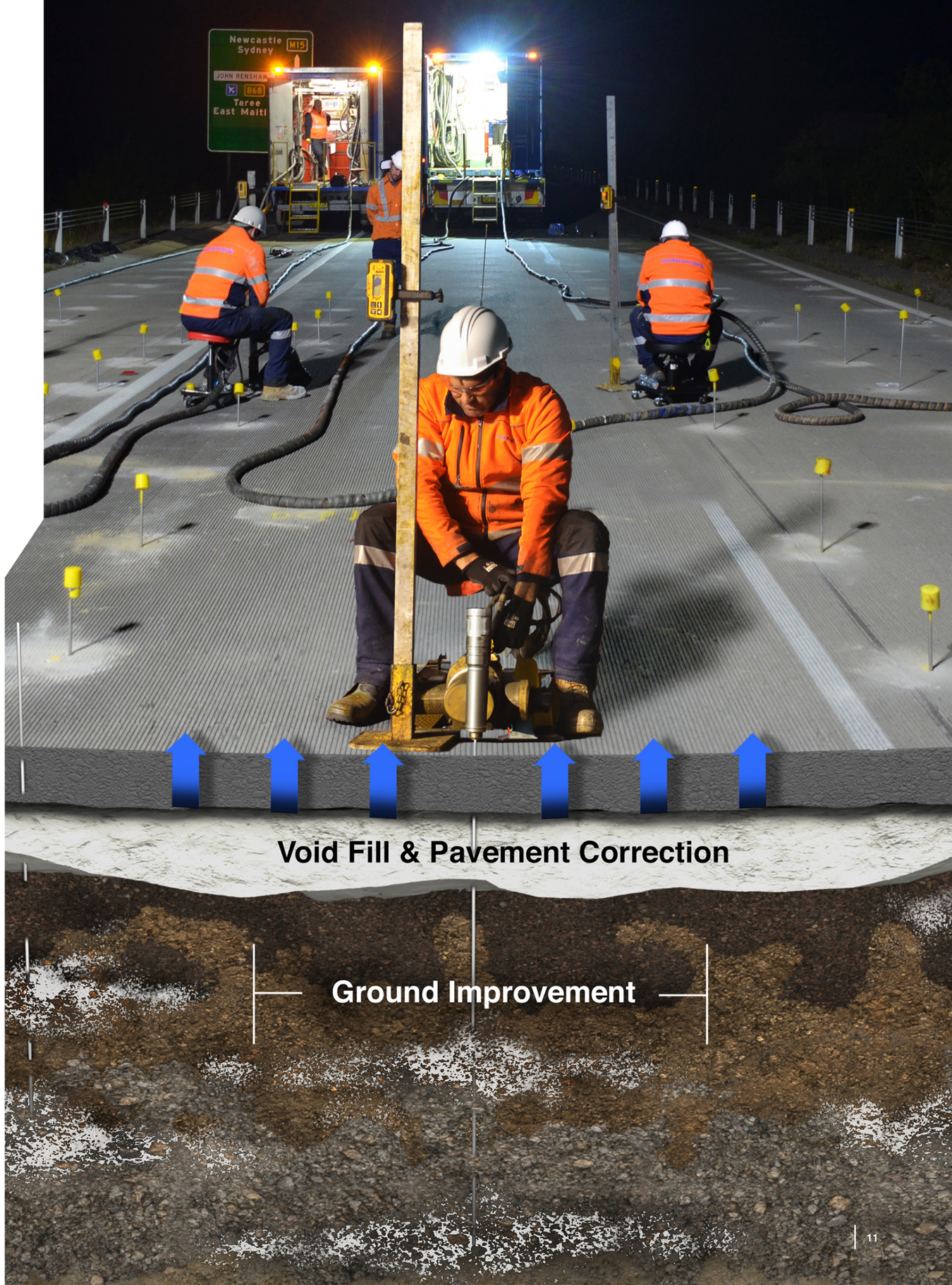
The treated roadway sections are returned to full operation immediately after the repair work, and no curing time is required.

Ground Improvement

In addition to re-levelling and void filling, Teretek® is utilised for targeted ground improvement to restore or improve bearing capacity to weak of failing subgrades. The expansion of the injected material results in densification of the surrounding soils which increases its strength and stiffness characteristics. Several secondary benefits occur, including an increase in composite stiffness and particle cementation.

This means the injection process can also strengthen the subgrade soils beneath the pavements, increasing its load-bearing capacity, restoring and providing additional support. Injection of weakened or failing subgrade is often applied as an early intervention measure at the first signs of pavement failure, restoring or improving subgrade capacity to mitigate against further pavement deterioration that can lead to extensive demolition, excavation, and interruption to operations.

The process involves the installation of small injection tubes, spaced evenly within the target improvement zone. At each point, resin is injected into the ground.



Teretek® Technical

Compressive Strength

The applied density and correlated compressive strength of Teretek® materials is typically between 0.3 - 3 MPa.

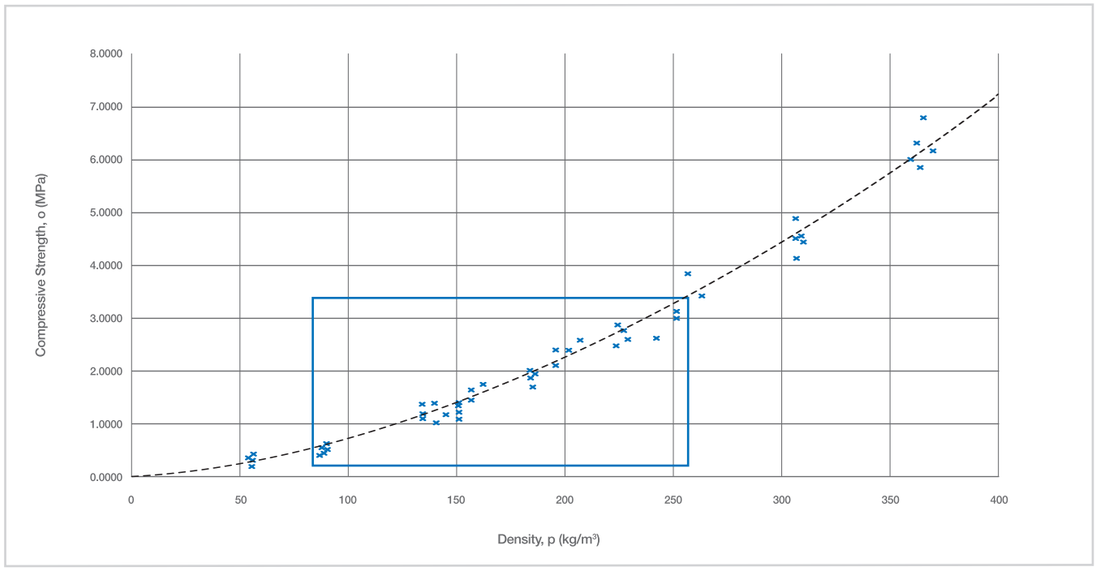


Fig 1. *Teretek® compressive strength and density.*

Durability

Based on extensive research and experience with Teretek® and in combination with accelerated ageing tests comprising mechanical stresses, heat, moisture, temperature cycling, and chemical, mechanical and biological degradation, it was concluded that Teretek® materials under geological conditions will maintain their mechanical properties for well in excess of 50 years.

Environmental

Based on several environmental impact studies of Teretek® materials to different soil and ground water conditions, it was concluded that the Teretek® materials are environmentally inert and do not generate leachate.

Chemical Resistance

The degree of volume change during the immersion has been used to measure the material's chemical resistance.

Chemical Resistance Rating	Volume Change
Excellent	<3%
Good	3-6%
Poor	>6%

Chemical resistance of the Teretek® resins according to DIN 53428 and ISO 2869.

Table 1. *Teretek® chemical resistance rating and volume change.*

Chemical Resistance

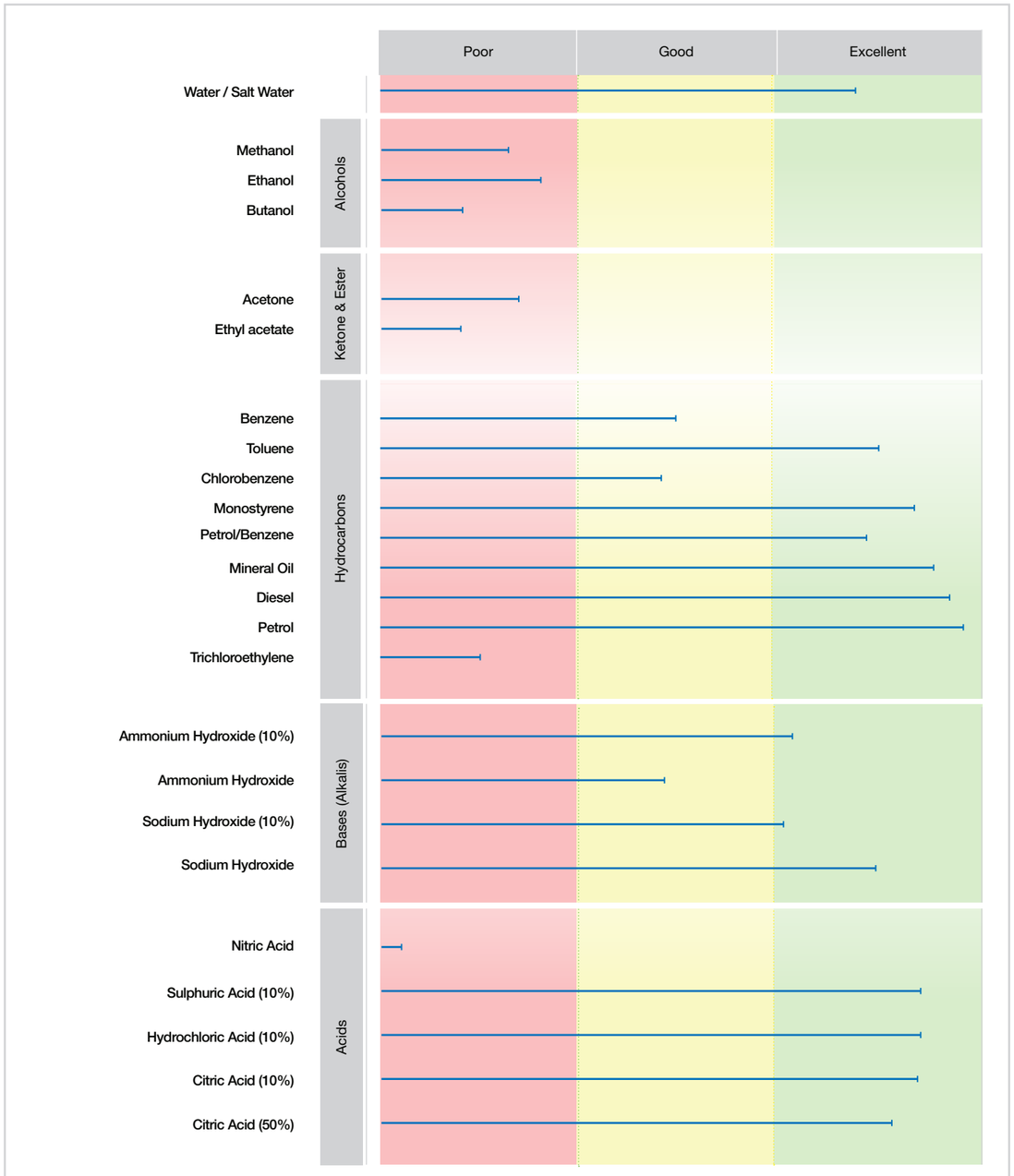


Table 2. *Teretek® chemical resistance performance.*

Case Studies

Sector
Infrastructure

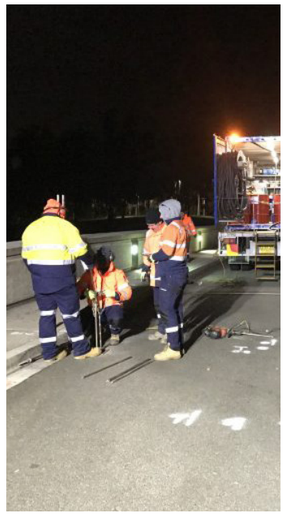
Structure
Bridge

Problem
Subsidence

Location
Capital Hill, ACT

Duration
5 Nights / 2019

Technology
Teretek®



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

Problem

During a routine inspection, Australian Government's NCA engineers found ground settlement beneath Federation Mall's approach slabs and roadways leading to Parliament House, Canberra. Built in 1988 for Australia's bicentennial, Federation Mall is a key ceremonial route and hosts major community events. The approach slabs on both sides of the Land Axis Bridges had settled by up to 50mm, causing surface cracks, dishing, and instability.

Forcecor engaged Mainmark, whose Teretek® resin injection was ideal for efficient, precise re-levelling and ground support through small, keyhole injections. This solution quickly restored the slabs and parapet walls, minimising traffic disruption and ensuring long-term access to Federation Mall.

Solution

Mainmark's first step was to assess ground conditions using DCP testing and rotary drilling. Based on these findings, they identified a suitable remediation method to fill voids, stabilise the structure, re-level the approach slabs, and reduce future settlement. The goal was to complete the work efficiently to minimise traffic disruption to the Parliament House access.

Result

With over 20 years of bridge remediation experience across Australia, Mainmark recommended Teretek® resin injection to improve ground support and re-level sunken approach slabs. This proprietary, environmentally safe solution filled voids, increased bearing capacity, and caused minimal disturbance.

Using up to 30 injection points per approach, small tubes injected resin beneath the slabs in a precise, keyhole-like process, restoring the structure's position as the resin expanded. Cold winter conditions were managed with special provisions. Continuous ground monitoring via DCP testing and rotary drilling ensured targeted treatment at various depths.

Compared to excavation or underpinning, Teretek® was more efficient and cost-effective, avoiding heavy machinery and reducing noise. Works were scheduled overnight on non-sitting days, allowing reopening each morning. The project was completed on time and within budget.

"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 minimized disruption in the area and ensured that the ground would be stabilized into the future. Mainmark worked collaboratively with all stakeholders in challenging conditions to complete the works in a tight timeframe. While we did not achieve as much movement as desired for the relieving slabs, we were able to stabilize 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 National Capital Authority NCA

SCAN HERE
TO VIEW ONLINE

Case Studies

Sector
Infrastructure

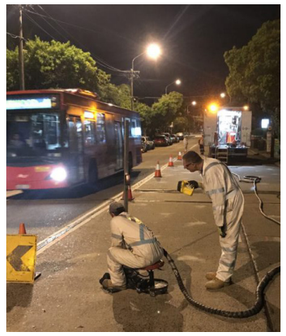
Structure
Roads

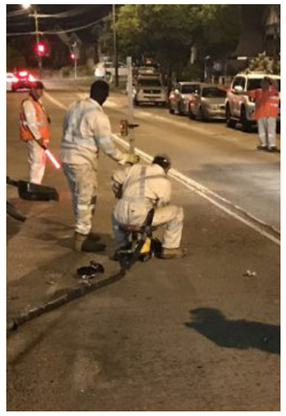
Problem
Concrete Slab Deterioration

Location
City of Canada Bay, NSW

Duration
6 Days / 2018

Technology
Teretek®





Teretek® Stabilises Concrete Roadway at the City of Canada Bay

Problem

The City of Canada Bay in Sydney's inner west manages a rare rigid pavement roadway of concrete slabs, which, after years of service, showed signs of deterioration, including cracking, sinking, and void formation. These issues posed hazards for traffic, cyclists, and pedestrians.

The Council sought a cost-effective, minimally disruptive repair solution, especially for a busy arterial and bus route. Mainmark's Teretek® Resin Injection was chosen, as cyclic testing proved resin-based grouting superior to traditional cementitious options.

Resin's ductility and resilience under dynamic load make it ideal for extending the life of the road while minimising disruption and noise.

Solution

The City of Canada Bay tasked their main contractor with overseeing all aspects of the project, including service location, resident notification, traffic management, and supplying a ground remediation solution to raise and re-level sunken slabs.

To stay within budget and minimise disruption, the work had to be completed after hours, between 8pm and 5am, ensuring continued operation of local traffic and bus routes without diversions.

Result

Mainmark's Teretek® resin injection was chosen to improve the lifespan of approximately 1500m^2 of roadway slabs, offering a durable alternative to traditional cement grout, which can become brittle under dynamic loads.

Teretek's expanding resin fills voids, stabilizes, and re-levels the road quickly, within 15 minutes, allowing the roadway to remain open without diverting traffic or bus routes.

The project involved a complex underground service location, requiring three shifts to map and avoid existing utilities like gas, water, electrical, and telecommunications. Despite these challenges, the work was completed in four shifts and under budget, with prior communication to local residents and businesses.

This approach provided significant cost savings and minimised disruption in a busy area near Burwood and Parramatta Roads.

"Mainmark's solution provided great value for money and given our experience with working with the company we were very confident in their ability to deliver this project. We would recommend Mainmark for similar jobs."

- *Mohamed Aliyar, Co-ordinator Infrastructure Planning*

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Case Studies

Sector
Infrastructure

Structure
Bridge

Problem
Subsidence

Location
Sarina Range, QLD

Duration
1 Day / 2018

Technology
Teretek®

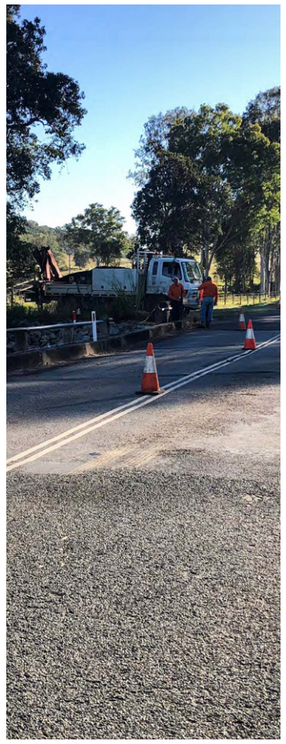
Queensland Bridge Re-levelled with Teretek®

Problem

The two-lane concrete bridge over a creek in the Sarina Range, Queensland, became un-level because one pier subsided, causing the deck to sink by 130mm. The bridge is vital for accessing nearby properties with no alternative routes. The foundation is shallow, about 400mm to bedrock, and exposed to water from the creek, with one pier on the north side had settled over 1800 meters.

Solution

Rebuilding the bridge was costly and disruptive, so Mainmark was engaged to carry out Teretek® Resin Injection to re-level the structure. Their work involved re-supporting the bridge pier and rectifying ground settlement to ensure the bridge could safely bear the ongoing weight of traffic, including heavy vehicles, and maintain its structural integrity and longevity.



Result

Mainmark used its proprietary Teretek® resin injection to address ground settlement causing the bridge pier to subside. This environmentally inert, water-resistant solution provides both ground improvement and re-levelling.

Applied through small, precise injection points—similar to keyhole surgery—880kg of Teretek® was injected to maximize lift and ground strengthening. Hydraulic jacks supported the small pad footings (1200x1800mm) during the process, ensuring stability and safety. The project, scheduled for two days, was completed in just 8 hours, bringing the bridge within 13mm of its original level and allowing it to reopen ahead of schedule, with traffic managed throughout.

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TO VIEW ONLINE

Celebrating Over 35 YEARS
Excellence - Innovation - Success

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As a global ground engineering and asset preservation company, we draw on over three decades of experience and knowledge in leading, developing and delivering the most advanced and accurate ground improvement, re-levelling and void-filling solutions across residential, commercial, infrastructure and mining sectors.

With an extensive portfolio of completed projects across Australia, New Zealand, Japan, and the United Kingdom we have achieved a global reputation for delivering innovative solutions to some of the most iconic projects worldwide, earning us international recognition as an award-winning ground engineering organisation.

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