

# TechSpan®

PRECAST CONCRETE SOLUTIONS

More than just reinforced earth

[www.geoquest-group.com.au](http://www.geoquest-group.com.au)



## Sydney Gateway





# Build Smarter with TechSpan®

TechSpan® is redefining how bridges, tunnels, underpasses, and crossings are built across Australia and New Zealand. Backed by Geoquest's 60 years of engineering expertise, it combines innovation, speed, and durability in one complete solution.

**Read on to discover more about this innovative precast concrete solution.**

**Explore our free design tool at [www.precastarches.com](http://www.precastarches.com) to visualise your TechSpan® arch and download CAD drawings.**

## Partner with Geoquest

Geoquest Australia combines civil engineering expertise with advanced precast concrete manufacturing capabilities nationwide.

From reinforced backfill applications, soil-structure interaction, precast concrete solutions, geosynthetics and environmental hazard protection, Geoquest's expansive portfolio of engineering techniques applies to a wide range of structures for an extended array of market segments, including; roads and motorways, environment, railways, hydraulic works, mining, industry, energy, commercial, housing or military.

Contact us today to learn more about our integrated portfolio of solutions.

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# Transforming Infrastructure with Efficiency and Durability

TechSpan® is a leading Australia and New Zealand precast concrete arch solution, developed and patented by Geoquest. Based on the principles of funicular curve design, each arch is custom-engineered for maximum efficiency, durability, and economy. Whether used in transport, mining, industrial or water infrastructure, TechSpan® delivers proven performance, fast installation, and long-term resilience.

## TechSpan®, the perfect arch, custom designed

TechSpan® is a funicular curve shaped arch, available as a three-pin, two-piece system or single piece arch. Each TechSpan® arch is carefully tailored and optimised, structurally and geometrically, to the individual needs of each project.

The system can be designed to accommodate high fills, heavy live loads, and altering loading conditions often associated with mining applications; and can be installed over existing roads, live rail, or other services with minimal disruption.

The design methodology utilises finite element analysis and funicular curve theory, resulting in minimum use of materials, maximum arch durability, and a cost-effective total solution that is simple and efficient to install.

## TechSpan® Overview

- A buried precast concrete arch system, designed as a three-hinged, two-piece funicular curve or single piece arch
- Available in spans from 4m to 22m and heights up to 10m
- Custom-engineered using finite element modelling (FEM) to optimise geometry and strength
- Minimises bending moments and tensile stresses for long-term durability
- Designed for up to 100-year service life or more, depending on project requirements







# Where is TechSpan® used?

TechSpan® technology has revolutionised construction with wide-ranging uses in transport, mining, industry, energy, water and military infrastructure. TechSpan® applications include:

- Road and rail tunnels
- Reclaim tunnels
- Bridges
- Culverts
- River crossings
- Conveyor tunnels
- Blast protection bunkers

TechSpan® arches are frequently used for the construction of rail and road tunnels beneath earthen embankments. They can be constructed over existing railway tracks without closing the line.

The arches are also widely used in the mining industry, with capabilities to support heavy live loads, and efficient and effective installation with minimal site disruption. The custom designed arch gives great flexibility to both designer and mine owner to optimise clearance envelopes.

Geoquest is able to design the arch for the high fills and live loads associated with bulk materials handling. Importantly, the reduced bending moments inherent in the funicular curved arch improves resistance to overload. TechSpan® arches have been widely used for reclaim conveyor tunnels below ore stockpiles, some up to over forty metres high.

TechSpan® also has applications in underpasses and culverts, and other water crossings. The adaptability of the arch shape allows optimisation of the section while respecting the anticipated water flow. TechSpan® is the solution of choice for these applications, as the prefabricated durable concrete units used are cost-effective and construction can take place without diverting the water flow.



North Kiama Bypass, New South Wales

# Project Highlights

## Rozelle Interchange

### Sydney, News South Wales

TechSpan® arches supported the development of the landmark WestConnex development, linking major motorways with over 24 km of tunnels. Contributing to the development of the Interchange's M4 section, Geoquest supplied integrated solutions for the project including;

- Two TechSpan arch tunnels
- Five MSE walls
- More than 100 precast road and bridge barriers
- Two wire walls and;
- Two precast bridge headstocks

## Quindanning Mine Enabling Infrastructure Project

### Boddington, Western Australia

Home to the largest precast concrete arch in the Southern Hemisphere, built with TechSpan® to enable safe and durable crossing of a public road beneath heavy loads. Spanning an impressive 21 meters and 37 metres in length, the precast concrete TechSpan® arch was installed in just two days.



Boddington Mine, Western Australia

# Supply of materials and service

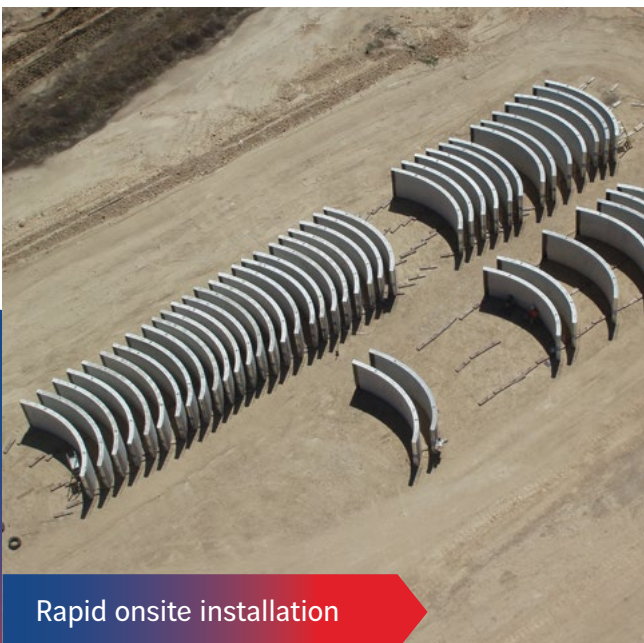
## Geoquest supplies the following:

- Design and certification of the concrete TechSpan® arch
- Manufacture and supply of the TechSpan® arch elements
- Supply of the vertical and longitudinal impermeable joining material
- Delivery of construction materials to the job site FOT (Free On Truck)
- On-site technical advice and guidance

The contractor is responsible for the installation of the arch, and supplying the recommended equipment for arch element lifting, earth backfilling and compaction. The client and contractor should refer to the comprehensive TechSpan® construction manual for a complete list of equipment, tools and miscellaneous items recommended to be used to aid the installation of the TechSpan® arches.

## Why TechSpan®

- Enhanced concrete durability at competitive cost due to:
  - Reduced tensile stresses
  - Reduced shear forces
  - Minimised bending moments in the completed structure which improves resistance to overload.
- Lower footing costs due to reduced horizontal reactions at the arch base
- Rapid installation
- Open to through traffic or waterflow during construction
- Optimised traffic clearance envelopes
- Any practical arch span and height
- Increased load-bearing capacity – high fills, high live loads, steep slopes
- Design for special geometric requirements





# TechSpan® specification

The precast concrete arches can be designed to suit state transport authority specifications.

## TechSpan® arch system components

### 1. Cast in place concrete footing

### 2. Precast concrete elements

Arch elements may be specifically sized according to their intended location within the structure. Lifting anchors are cast into each unit for handling and lifting purposes.

Full width elements; Female and male galvanized steel baring plates are cast into the top edge of each TechSpan® element to form the pin joint between opposite elements at the crown of the structure.

Half width elements; These are commonly used to complete the spaces left at the start and end of the structure as a result of the staggered arrangement of full width units.

### 3. Geotextile and impermeable membrane

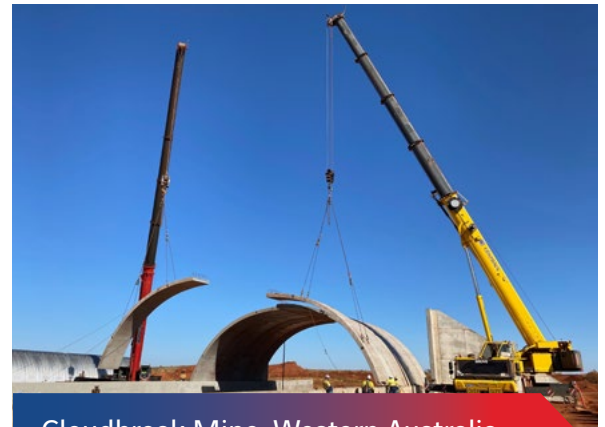
An impermeable membrane and a layer of geotextile may be applied to all vertical joints between adjacent elements and along the longitudinal joint at the crown of the structure. Complimentary Geoquest provided solutions include TerraTextile™, TechRevetment™ form concrete mattresses and DRAINTUBE.

### 4. Crown and footing joints

Cast-in-place, reinforced concrete longitudinal beams at the crown, and grout at the footing keyway of the structure.

### 5. Backfill

Backfill complying with the Geoquest specification shall be used within the prescribed zones as shown on the project drawings.



Cloudbreak Mine, Western Australia



Available in spans 4m to 22m



South Flank Mine, Western Australia







# Summary: Key Benefits of TechSpan® arches

## **Strength and Capacity**

- Withstands high fills, steep slopes, and heavy live loads
- Suitable for rail, road, and mining operations

## **Efficiency**

- Rapid installation (10–20 linear metres per shift)
- Minimal disruption to live roads, rail, and waterways

## **Customisation**

- Tailored to specific clearance envelopes and geometric requirements
- Optimised reinforcement through FEM analysis

## **Durability**

- Exceptional resistance to overload
- Resilient in aggressive environments

## **Economy**

- Reduced footing costs
- Efficient use of materials
- Lifecycle savings

## **Sustainability**

- Narrow footprint
- Minimal onsite waste
- Factory-precast quality control





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