



# PROJECT SHEET

## QR CULVERT STRENGTHENING AND REPAIR

### PROJECT SUMMARY

**Client:** Queensland Rail

**Location:** South East Queensland

**Duration:** Annual Contract since 2019

#### Major Challenges Overcome:

- Weather - access
- De-watering/ Water diversion – water quality
- Tight spaces – confined spaces
- Fauna



Some precast box culverts had deteriorated to a point where new ones had to be built inside the existing culvert to replace the structure. All works were completed within confined space. The culverts are assessed for safe entry prior to the development of strengthening design.

#### Program

The works started in July 2019 and the works are ongoing.

#### Project Scope

The project included the following:

- De-watering and creation of water diversions to allow access to the culverts.
- Structural repairs to culverts in the QR Corridor.
- Durability improvements to culverts.
- In-situ strengthening of defective culverts.

#### Completed Works

Since 2019 we have remediated over 70 culverts in the rail corridor.

#### The Project

Dynaciv was engaged by Queensland Rail (QR) to provide structural remediation solutions for the many concrete culverts in South-East Queensland. The remediation works started in 2019 and are ongoing.

The sizes of the culverts range from 600mm to 1600mm in height. The remedial works comprised of in-situ strengthening, concrete repairs, crack injection, screeding, joint rehabilitation, erosion protection, durability improvements and in-situ culvert reconstructions.

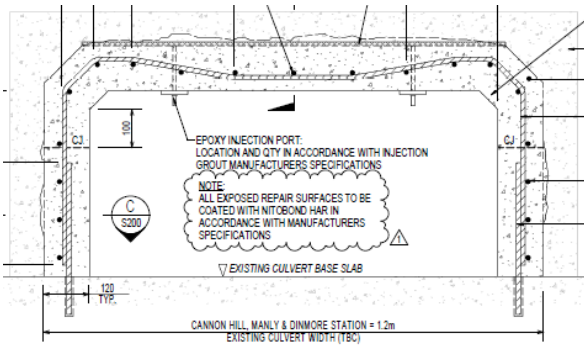
Dynaciv identified defects by de-watering and pressure-washing all culverts.

Most of the work was performed in low-lying areas, which presented many project challenges including issues with flooding, access, ground conditions and environment. The culverts are in the railway corridor underneath the railway tracks and vary in length between 20m and 65m.

## In-situ Strengthening Design

### Box section strengthening

New box sections were designed and constructed for 19 culverts segments at Dinmore Station. Detailed concept design was completed by our designer. This comprised of a specially shaped reinforcing cage that was grouted using a high strength cementitious grout. See drawing below.



The internal support is built in two stages: first the walls and then the soffit. It comprises of 12mm high tensile steel bars and high-strength cementitious grout.

### Other general remedial work

Other remedial work completed:

- ✓ High pressure washing
- ✓ Screeding and Slab reinstatement
- ✓ Concrete repairs
- ✓ Crack injection
- ✓ Joint Remediation
- ✓ Environmental – assisted in bat relocation

### Site Activities/Defects:

<p style="text-align: center;"><b>Confined Space Access</b></p>  <p style="text-align: center;">Some of the culverts were as small as 600 mm diameter.</p>	<p style="text-align: center;"><b>Bat Surveys and Investigation Works</b></p>  <p style="text-align: center;">Wildlife identified and safely relocated to allow construction to continue</p>
<p style="text-align: center;"><b>Water Diversions</b></p> 	<p style="text-align: center;"><b>De-watering</b></p> 

Flooding often occurs where we worked.  
Water was diverted in a safe and environmentally acceptable manner

In flooded areas strategic water management strategies were adopted to allow safe entry

**Concrete Repairs (high build method)**



Repairs to soffit

**Concrete Repairs (form & pour method)**



Reinforcement repairs to the walls

**Culvert Structural Failing**



Severely damaged soffit that required extra strengthening

**New Re-constructed Culvert**



Strengthened culvert section as per design provided

**Crack Injection**



Structural crack injection

**Screeding works (durability/safe access)**



Floor screeding to provide improved flow and easier access

**Epoxy Wall Render**



Badly eroded culvert walls reinstated with epoxy render material

**Epoxy Coatings**



Epoxy coating in low steel reinforcement areas.



Joint remediation works



Filling voids behind the culvert walls