The Flexible Concrete Arch

A new version of the traditional masonry arch
Method of construction

(a) Construction of arch unit using precast individual voussoir concrete blocks

(b) Monolithic Construction of arch unit using precast wedges
Polymer Reinforcement

Longitudinal layer

Transverse layer
Prototype skew arch
Case study - Tievenameena Bridge
Load testing

- Cabin: 7t
- Front axle: 10t
- Back axle: 6.4t, 5.8t, 5.8t
- Length: 3.85m, 4.30m, 2.64m
= transducers
- = vibrating wire gauges
● = fibre optic sensors
to measure strains
between joints

centre of axle
load moved to
critical
locations

+ 1m        0m     -1m

clear span = 5.00m
Testing results

• No cracking occurred
• Spandrel wall was monitored during the test
• Very low strain values in the arch ring
• Maximum change in deflection occurred in 4th arch ring under Test Load 5 (Truck 3 @ 2nd and 4th arch rings)
• Maximum deflection of 0.21mm, occurred when back axle at the midspan
• 0.21mm is equivalent to effective span / 23433