CASE STUDY

Morwell Tunnels

Latrobe Valley, VIC, Australia

Conveyor Tunnels
TechSpan®

Owner:	Yallourn Mine
Consultants:	SMEC
Contractor:	Roche Thiess Linfox Joint Venture
Construction:	June 2002

Background

In June 2000, Yallourn Energy (now TRUenergy) issued a tender for the diversion of the Morwell River in Victoria.

At the time, the Yallourn Energy Power Station was sourcing coal from its East Field Coal Mine. With coal supplies expected to exhaust by 2007, an alternative coalfield had to be identified so the power station could continue to provide 22% of Victoria's electricity supply.

The nearby Maryvale Coalfield was identified as the preferred future source, but the Morwell River was running between it and the power station.

Numerous diversion designs were presented to Yallourn Energy, but it was the innovative nature of, and advantages offered via, the Roche Thiess Linfox (RTL) design and construct approach that saw RTL awarded the contract.

Challenge

The diversion design required a 40m high embankment to be constructed to divert the river. The problem arose where the embankment would cross four operating conveyor belts. For the conveyors to remain operational they would need to be sheltered and covered with 40m of fill. To complicate matters, the foundation conditions for the approximately 1.3km total length of tunnels was extremely variable with layers of coal overlain with loose and dense fill. Very high differential settlements were expected once the embankments reac hed their full height.

Solution

The Reinforced Earth Company (RECO) successfully tendered for the design and supply of the tunnels with a precast concrete arch design based on the TechSpan® system. The contract required the design of a complete system, i ncluding raft foundations and waterproofing, with a 50-year design life. In addition to very high fill loads the design was required to allow for very high settlements and the possible presence of acidic soils.

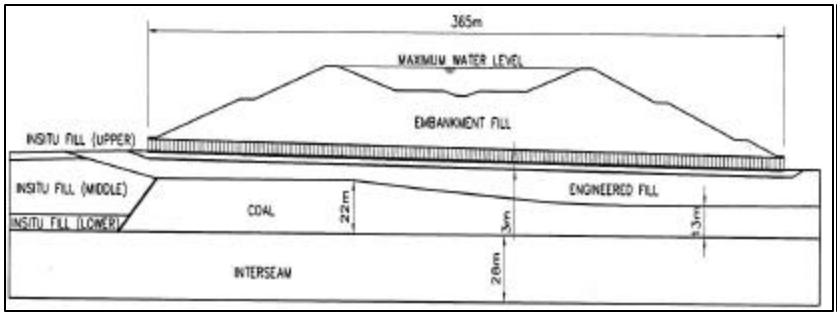
RECO developed an arch shape that was able to meet the clearance requirements of the tunnels and could also carry the very high embankment loads. Two arch thicknesses were used, one for where the embankment heights reached their highest and another for where the loading fell away as the embankment battered down towards the arch entrance.

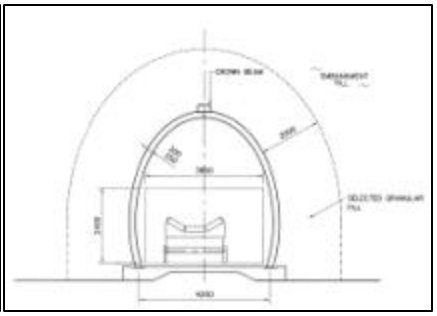
Due to the anticipated high differential settlements expected within the embankment, the arch footing design was particularly complex and footing sections needed to be able move in a

Main Picture: Construction of TechSpan® conveyor tunnel
Top: Waterproofing TechSpan® Arch
Middle: TechSpan® Arch unit interlock
Above: 40mm movement joint

Reinforced Earth

Sustainable Technology





Above Left: Geotechnical Long section of conveyor tunnel
Above right: Conveyor tunnel cross section

predictable way as the tunnels underwent backfilling. Several footing designs were developed, each for specific locations along the lengths of tunnels. Footings were constructed with movement joints every 12m and the arches were similarly detailed with matching movement joints to allow hogs and sags to develop along the line of the tunnel as necessary.

Special features/benefits

- The cross section profile of the arch was optimised to minimise bending moments and shear forces in the finished structure. As a result, long-term reinforcement stresses are very low, minimising crack widths and aiding durability.
- This very complex structure required arches and footings to be designed in conjunction to carry the very high embankments whilst accommodating the very poor foundations.
- Culvert erection was carried out with minimum disruption to the operation of the conveyors.

Project specifications

System	TechSpan®
Arch Type	TSR/TSS
Span	3.5m
Height	4.80m
Length	1230m
Thickness	250/200mm
No. Units	588/530

Reinforced Earth
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