CASE STUDY

Tom Price Reclaim & Escape Tunnels

Pilbara Region, WA, Australia

Reclaim Tunnels
TechSpan®

Owner: Rio Tinto
Consultants: Aker Kvaerner
Contractor: Civmec
Construction: November 2006

Background

Mount Tom Price is Pilbara's oldest and largest operation and started production in 1966, four years after the discovery of the iron ore potential of the region.

This mine is located on a massive ore body eight kilometers long and more than one kilometer wide. The ore from this mine is outstanding in both its chemical and physical quality. Mining at Mount Tom Price yields about 19-20 million tonnes of ore each year.

The operation involves mining, crushing and dry processing of high-grade iron ore to produce lump and fines ore. The site has a concentrator (beneficiation wet processing plant) that upgrades lower grade material and an associated tailings dam.

Challenge

In response to the huge demand for iron ore from China, Rio Tinto decided to increase the output from the existing Tom Price mine with a so-called "Brownfield" extension to their train load-out facility. A new stockpile and reclaim vault was an essential part of this extension.

The Reinforced Earth Company (RECO) was approached to design and supply precast concrete tunnels for the reclaim conveyor and the emergency escape route to the new cast-in-place, reinforced concrete reclaim vault.

The vault and tunnels were to be constructed in the middle of a very congested, fully operational, working mine facility. And, at 1000km North of Perth and 300km inland from the nearest port, very remote.

An important challenge for RECO's design team was the conical shaped iron ore stockpile above the tunnels. The stockpile of iron ore, reaching up to 30m in height and very heavy at 2.5t/m³, is deposited by an overhead conveyor and moved around by a Caterpillar D10 dozer with a gross vehicle weight of 67 tonnes. The tunnels had to be designed for both the live load of the dozer and the dead load of a stockpile. However, the shape of the stockpile is always changing as the ore is reclaimed for export and the dozer or conveyor deposit more iron ore.

Consequently several unbalanced load cases were carefully considered by RECO. The unbalanced load cases often control the design and may cause the tunnel to fail if the designer does not consider all possible load cases.

In addition there was only one possible location for the escape tunnel for safe egress of personnel in an emergency. This meant that the escape tunnel joined the

Main Picture: · TechSpan® construction in the middle of a very congested, fully operational, Tom Price mine facility
Top: Reclaim Tunnel
Above: Escape Tunnel

Mining infrastructure

REINFORCED EARTH
SUSTAINABLE TECHNOLOGY

Left: Completed TechSpan® reclaim tunnel.
Above: Installation of TechSpan® unit.

reclaim vault at an acute angle, providing special challenges for designer, detailer, manufacturer, transporter and installer.

Solution

RECO designers developed two specific TechSpan® arch shapes using a proprietary finite element software program. Shop drawings were prepared and moulds mobilized to allow the manufacture of the precast concrete panels to close tolerances. Special attention was paid to detailing the specially tapered units to form the acute angled junction with the vault. RECO's services extended to on-site assistance during the installation of the TechSpan® tunnels.

Special features / benefits

- Construction in the middle of a very congested, fully operational, working mine facility.
- Remote site location.
- Tunnel design to accommodate dynamic dead and live loads associated with continuously changing stockpile dimensions and mine vehicles, respectively.
- Tunnel design to accommodate extreme loads associated with dense iron ore stockpiles up to 30m in height.
- Acute angle between escape tunnel and reclaim vault.
- On-site assistance during TechSpan® construction.

Project specifications

System	TechSpan®	
Tunnel	Escape	Reclaim
Arch Type	TSV	TSW
Span	4.75m	8.61m
Height	4.20m	5.63m
Length	35.840m	42.895m
Thickness	250mm	300mm
No. Units	34	46

REINFORCED EARTH
SUSTAINABLE TECHNOLOGY

Reinforced Earth Pty Limited
Level 4, 20 George Street
Hornsby NSW 2077 Australia
Ph +61 2 9910 9910
Fax +61 2 9910 9999
www.reco.com.au

Reinforced Earth Limited
PO Box 72 734
Papakura Auckland New Zealand
Ph +64 9 236 3385
Fax +64 9 236 3385
www.reco.com.au