

# Tunnelling

## & TRENCHLESS CONSTRUCTION

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### Focus on North America



Call of the wild: open-cut utility scores in Colorado  
Dentistry in Nevada's mountains  
Canadian rail hub heralds model pipe-bursting

### Equipment

Toughest tools for the task: bits, rods and HDD systems

### Cover story

A fast finish on Contract 220 of the CTRL





enough width for two trucks to pass each other inside the tunnel.

The Dux trucks were chosen early on in the project planning phase because of their shape and hauling capacity. The Dux drivers dump their load of concrete into a large skid as fast as possible. A 13 t excavator, with a shortened boom to work in the tight tunnel conditions loaded the concrete into the hopper in front of the Commander III.

The maintenance walkway itself is 800 mm wide and 1,203 mm tall. Its high production exceeded everyone's expectations. "We've achieved up to 600 m in a 12-hour shift on the smaller wall," Mr Crouch said. The rate of paving increased as the end of the tunnel was neared.

The walkway was poured in 3,000 m sections with a 1,500 m stagger in between. The walkway has to be slipformed in these shorter segments to accommodate the ramps and concrete delivery. Once one walkway is in place, there is no room to place the crossing ramps.

Finishing work behind the paver was kept to a minimum. No joints or curing compound were required because the tunnel is the perfect drying environment for concrete. It maintains a steady temperature and a dry environment.

Mr Brundan said: "Production was fantastic. We

put down a phenomenal amount of concrete in a 24-hour period. If we had gone the traditional hand-forming method, we would have perhaps managed outputs of about 50-100 m/d, at best. There's really no comparison. The time we've saved and also the manpower we've saved has been considerable."

Another time-saving area of the project involved use of the Leica stringless guidance system instead of traditional stringline. Tunnel conditions do not favour normal stringline use, plus the manpower needed to set up the line would have been considerable.

Mr Brundan continued: "We couldn't use stringline because we wouldn't have had enough surveyors to set it and get it all ready in time. We used a 3-D system when we were boring the tunnels and it was a natural step to use a stringless 3-D system on the paver. Leica manufactures a very good system and I don't think we could have done it any other way."

Sitting just outside the two tunnel entrances is Davidson's twin-shaft mixer, Compactor batch plant. It can produce up to 157 yd<sup>3</sup> (120 m<sup>3</sup>) of concrete per hour.

"It mixes the dry concrete that a lot of other plants would have struggled with," Mr Brundan said. "It's a plant that has plenty of capacity and it gives us high outputs and high production."

The mix design itself is very dry with both 0.4 in and 0.8 in (10 and 20 mm)-sized limestone, two types of sand, a super-plasticiser and an air-entrainment agent.

"It's a very dry concrete and very hard to handle," Mr Brundan said. "You couldn't handle it by hand or with shovels, but the Commander III is obviously ideal for it. The machinery that we selected for this project has all been unbelievable," Davidson said. "The Commander III has run the last six months, seven days a week, 24 hours per day. It just keeps going and going. The production we're getting right now is just out of this world."

The tunnel work that, despite its challenges, Davidson and his crew are ready to take on again.

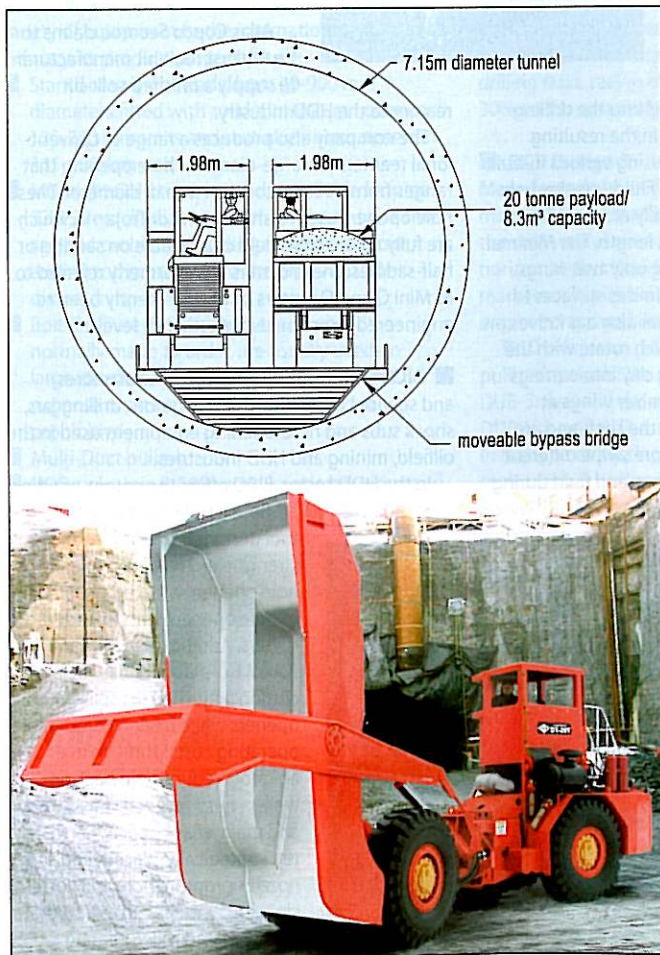
"We'd go anywhere in the world to work on another tunnel," Mr Crouch said without hesitation. "It's interesting work, you can plan your jobs and you don't have to worry about the weather. Once you're set up, you just go."

Slipforming was completed in the September quarter of 2004, finishing this part of the CTRL contract two months ahead of schedule. In under six months, Davidson and his crew slipformed almost 75 km of tunnel railbed and walkways.

## "The tracks on the Commander III had to be built to tilt up to 35° to accommodate the tunnel's curvature"

### Acknowledgements

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## Break Records with DUX DT-20T Dump Trucks

That's right. With speeds averaging 25 km/hr, a narrow chassis for moveable bypass bridges and 90° dumping angle for clean and rapid discharge cycles, six DUX DT-20T dump trucks operated 24/7 on London's Channel Tunnel Rail Link transporting a record breaking 208 700 tonnes of concrete in just under 6 months. The project was completed two months ahead of schedule!

To learn about the DUX trucks used on the Channel Tunnel Rail Link project, visit [www.duxmachinery.com/ctrl.htm](http://www.duxmachinery.com/ctrl.htm)

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