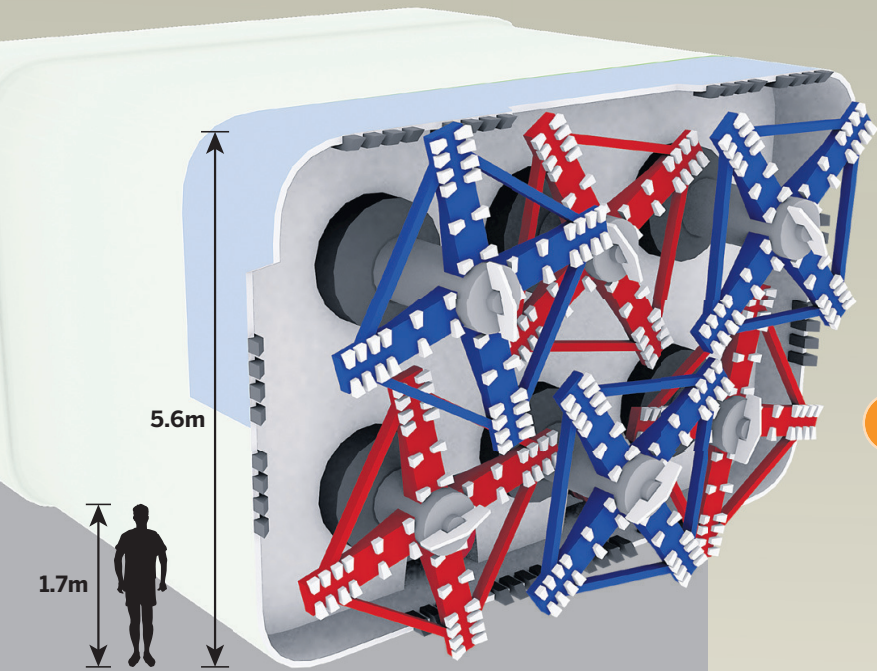
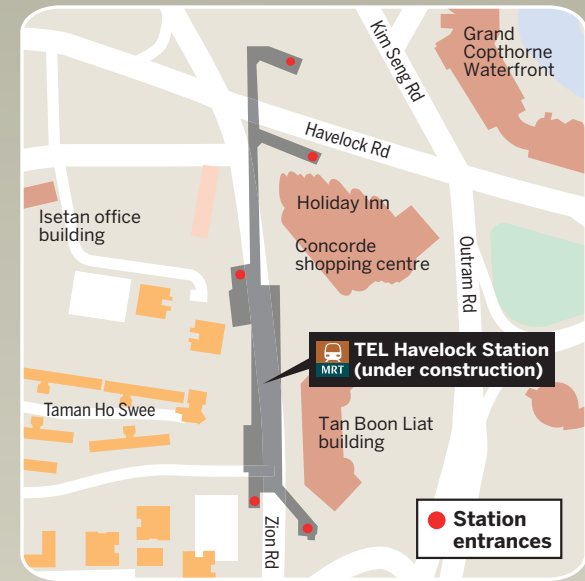
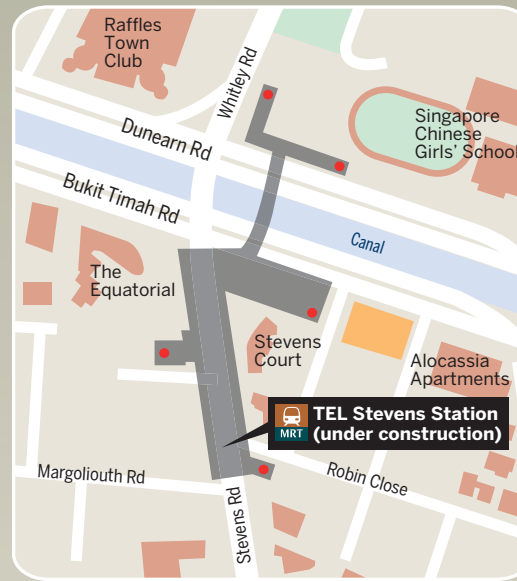


TUNNEL MISSION

Two pedestrian underpasses on the Thomson-East Coast Line (TEL) – a 60m one at Stevens station and a 160m passage at Havelock station – will be built using a new tunnel boring machine that is rectangular, unlike regular circular tunnel boring machines. **Danson Cheong** and **Bryandt Lyn** takes a look at the Land Transport Authority's new \$10 million machine, which will be operational from January next year.

LOCATIONS



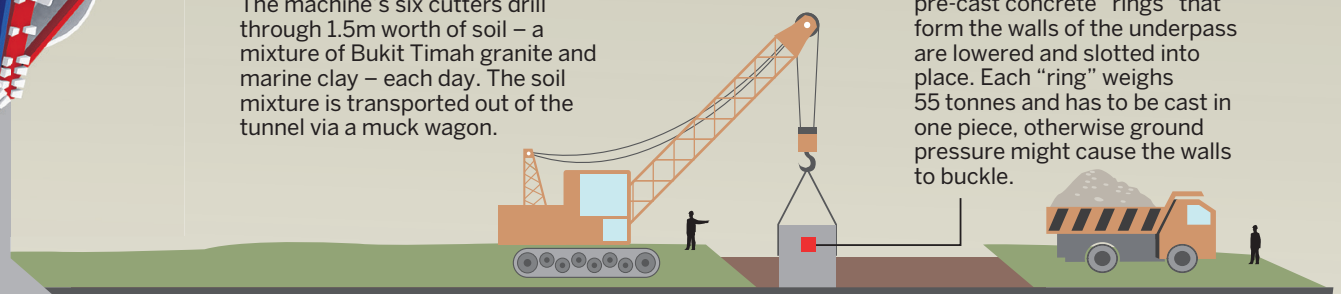
HOW IT WORKS

1 Boring through the ground

The machine's six cutters drill through 1.5m worth of soil – a mixture of Bukit Timah granite and marine clay – each day. The soil mixture is transported out of the tunnel via a muck wagon.

2 Building the tunnel

Once the soil is removed, pre-cast concrete "rings" that form the walls of the underpass are lowered and slotted into place. Each "ring" weighs 55 tonnes and has to be cast in one piece, otherwise ground pressure might cause the walls to buckle.



SPECIFICATIONS

6 steel cutters armed with tungsten carbide cutting tools

Requires **14** people to operate

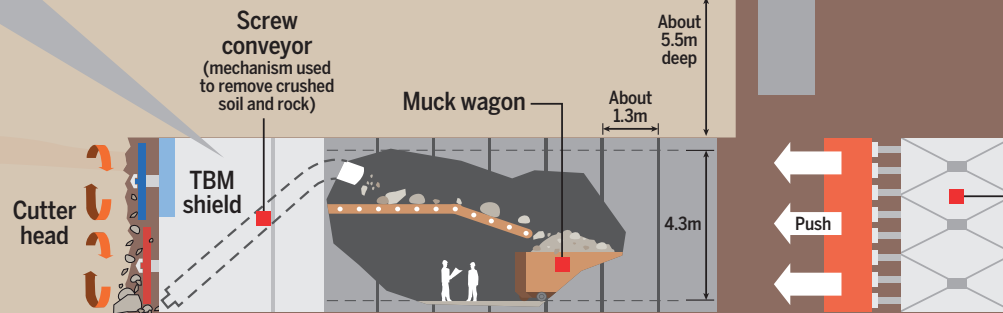
Weights about **300** tonnes

Drills a **7.6m by 5.6m** tunnel

Using this machine, surface activities can be left untouched – saving **30 per cent** of manpower and time

3 Moving forward

Hydraulic jacks thrust the concrete rings and tunnel boring machine forward. They exert about 7,200 tonnes of force, equivalent to the weight of about 1,300 African elephants.



4 Completing the tunnel

It will take about 100 days to complete the underpass at Havelock, and 40 days for the one at Stevens. After the tunnels are completed, the steel shield of the machine – that encases the other working parts – is left in place while the rest of the machine, including the cutters, is dismantled and removed.