TUNNEL BORING MACHINE

Surface level

35 metres
Average tunnel depth

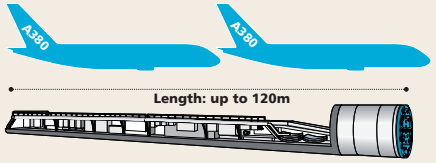
58 metres
Maximum tunnel depth

5 tunnel boring machines (TBMs), including one specialised TBM for tunnelling under Sydney Harbour

15.5 kilometres of twin tunnels from Chatswood to Sydenham

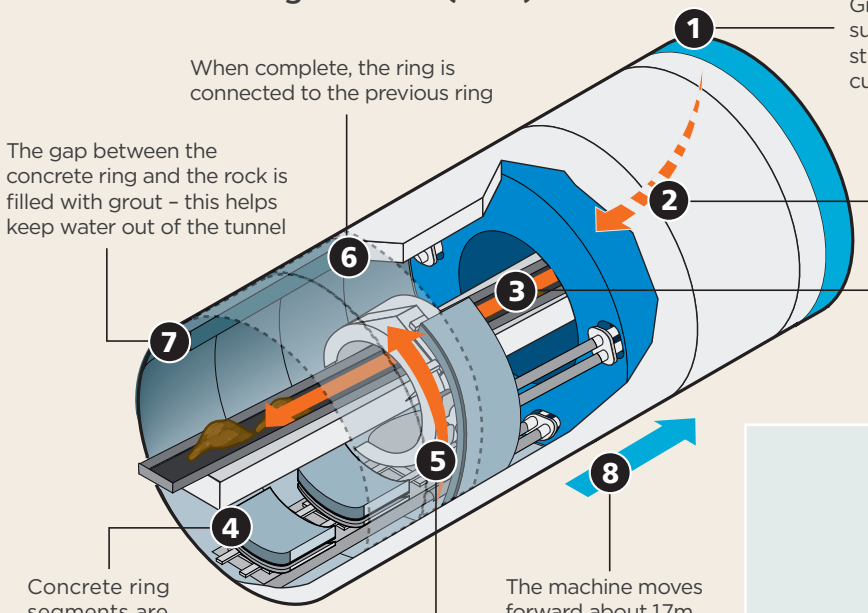
October 2015: Size and scale of a TBM in action at Castle Hill

HOW BIG IS IT?

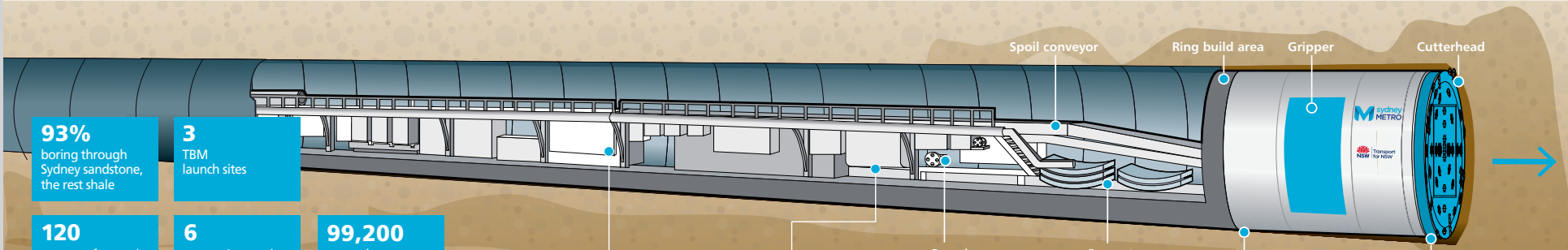


>900 tonnes weight
= **570** Holden Commodores

How a tunnel boring machine (TBM) works



1. Grippers extend out to the rock surface. Rock is crushed by high strength alloy steel discs on the cutterhead
2. Crushed rock is scooped into the machine's head and on to a conveyor belt
3. The conveyor moves the rock through the machine and out of the tunnel behind it
4. Concrete ring segments are delivered to the ring building area
5. Concrete ring is built by putting together the segments using a special vacuum lifting device
6. When complete, the ring is connected to the previous ring
7. The gap between the concrete ring and the rock is filled with grout – this helps keep water out of the tunnel
8. The machine moves forward about 1.7m and then the process starts again



93% boring through Sydney sandstone, the rest shale

3 TBM launch sites

120 metres of tunnel cut every week, on average

6 metres internal tunnel diameter

99,200 concrete segments will line the tunnels

940 Olympic swimming pools or 5.9 million tonnes of crushed rock

15 people work on each TBM at any one time

24/7 around-the-clock operation underground

sydney METRO | city & southwest

John Holland · CPB Contractors · Ghella

TSE WORKS

TUNNELLING UNDER SYDNEY HARBOUR

Specialised tunnelling technology

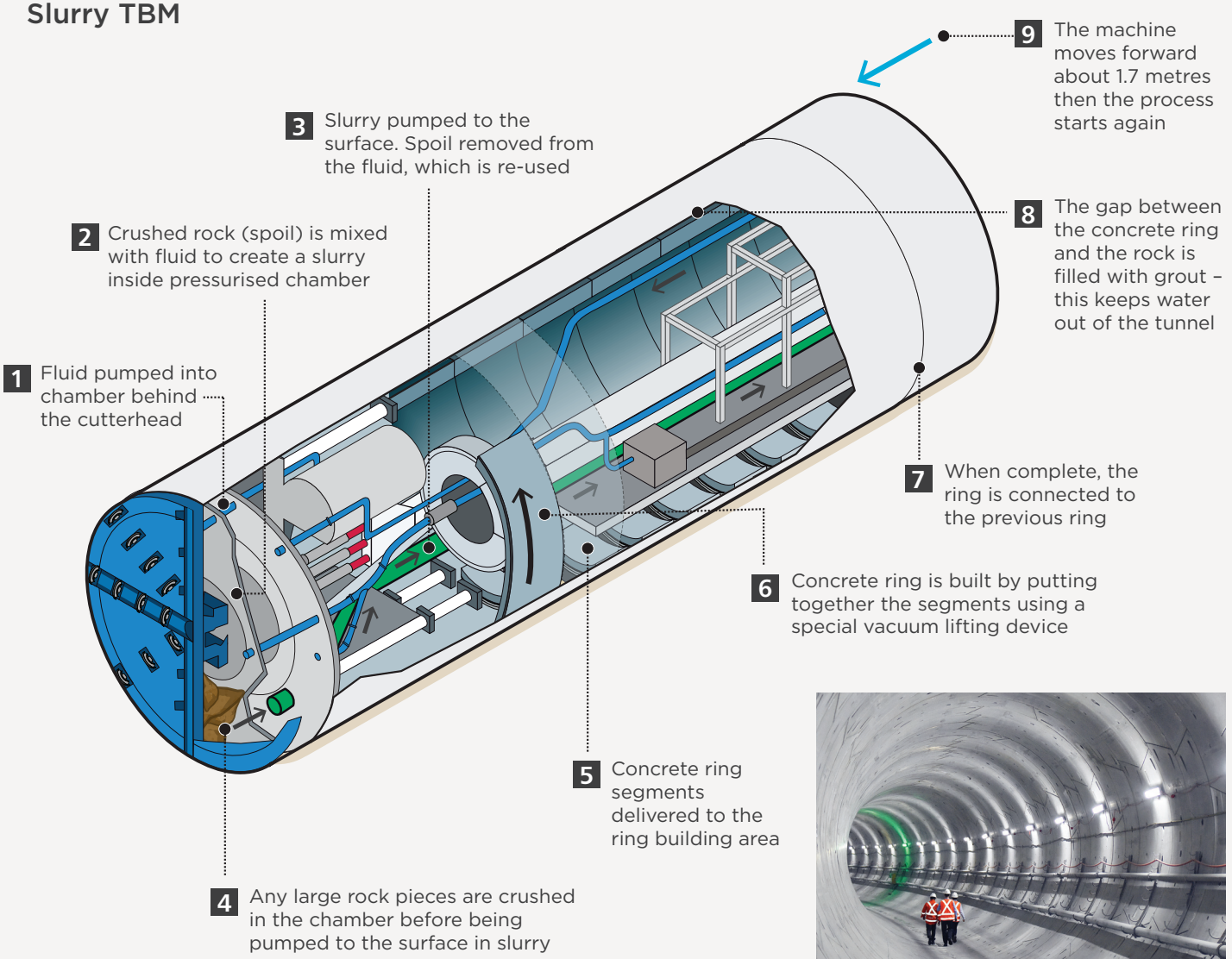
A slurry TBM will be used to tunnel through different ground conditions under Sydney Harbour.

The slurry TBM uses pipes and fluid to control the pressure in the machine, by turning the excavated material into a slurry and pumping it out.

Tunnelling under Sydney Harbour

Inside TBM4 Maria, January 2015

Slurry TBM



The finished Sydney Metro Northwest tunnels

17096 6/2017

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