

How metro double-fortified twin tunnels under Cooum

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When Chennai's largest underground station at Central gets operational, trains will plunge into the dark depths of the city and dart under the historic Cooum river at a depth of nearly 30 metres through long, thick and sturdy tunnels that prevent water seepage.

Chennai Metro Rail Limited (CMRL) through its contractor Afcons Infrastructure has taken additional measures to build the tunnels to withstand the pressure of the soil and the river running above. In times of emergency, commuters can also walk from one tunnel to the other under the river through a cross passage.

The tunnels will connect Washermenpet to Chennai Airport via Central Metro and Anna Salai. It is part of corridor one of phase-1 of the project, which is expected to be ready by end of 2018.

Afcons officials said the tunnels were built, through a rocky soil strata under the Cooum, with heavy reinforced concrete slabs and additional grouting to seal the surface to ensure no water seepage. The same process was followed when two tunnels were built across Buckingham Canal under Poonamallee High Road at a depth of 18metre. These tunnels will connect Central to Koyambedu.

"Special tunnel rings with heavy reinforcement were designed and installed to counter the load from the top overburden crust and canal water," an Afcon official said. "Under Buckingham canal, tunnelling was carried out nearly 11metre below its bed."

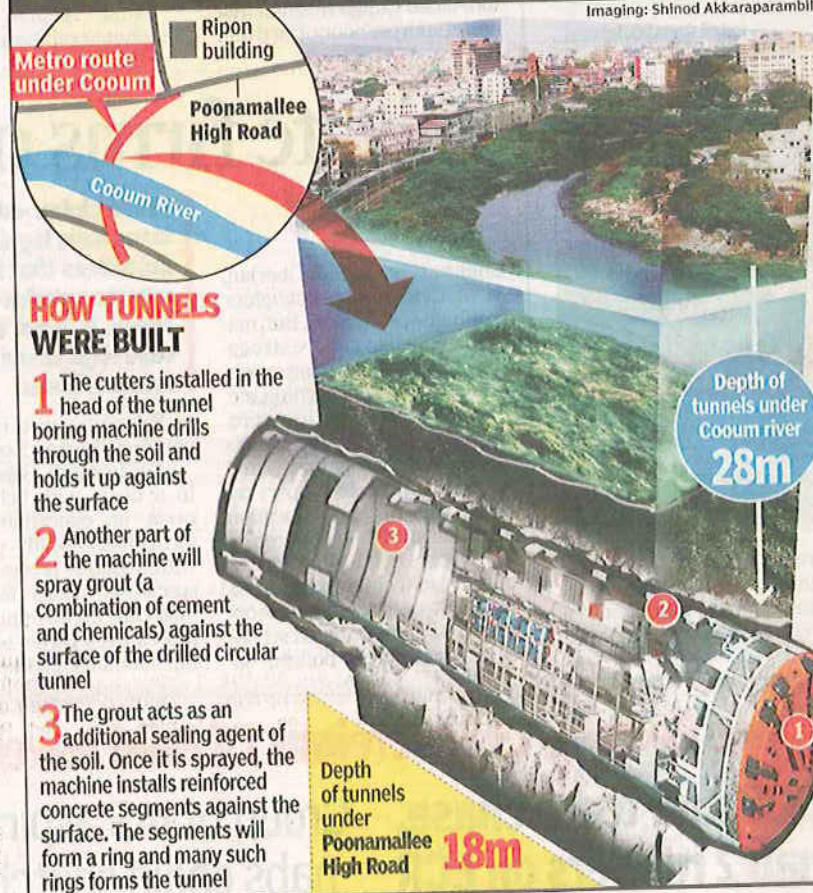
The twin tunnels running under the Cooum take a deep left turn opposite Ripon Building. The longest tunnel under the river is nearly 270metre.

CMRL uses an 'earth pressure balance' tunnel boring machine (TBM). The cutters in the heads of the machine usually excavates the soil and applies pressure to hold up a portion of the soil against the surface. As the machine moves forward, a part of it instals curved precast slabs

FOR SMOOTH FLOW UNDER RIVER

There are 2 tunnels for corridor 1 (Washermenpet to Airport) at about 28m below the ground. From Central metro, the tunnels turn left to go under Cooum and proceed towards May Day Park in Chintadripet before reaching Anna Salai

Imaging: Shlnod Akkaraparambil



HOW TUNNELS WERE BUILT

1 The cutters installed in the head of the tunnel boring machine drills through the soil and holds it up against the surface

2 Another part of the machine will spray grout (a combination of cement and chemicals) against the surface of the drilled circular tunnel

3 The grout acts as an additional sealing agent of the soil. Once it is sprayed, the machine installs reinforced concrete segments against the surface. The segments will form a ring and many such rings forms the tunnel

against the surface. Such slabs form a ring and many such rings form the tunnel.

"Certain provisions were incorporated for extensive grouting around the tunnel below the canal," an Afcons official said.

Several measures were taken to ensure the riverbed was intact while tunnelling.

An official said the water table of Buckingham Canal and the bed of Cooum was monitored, as the tunnelling was carried out. The pressure applied by the drilling machine was also calculated and carefully maintained till the tunnels were built.