Tech that: A way to make space for underground Metro stations

METRO-3 MMRC will adopt European boring technology, apt for congested areas, to widen tunnels

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MUMBAI: To overcome the restrictions caused by the city's narrow roads and congested spaces, the Mumbai Metro Rail Corporation (MMRC) will adopt new technology for its tunnelling work for Metro-3 starting this January. The MMRC will use the New Austrian Tunnelling Method (NATM) to widen the tunnels underground, so as to create additional space for stations.

The 33.5-km fully underground Metro-3 corridor is from Colaba in South Mumbai to SEEPZ in the western suburbs—a route that passes through many narrow roads and congested spaces in the city.

The NATM is a modern tunnelling method appropriate for congested spaces and will be used for seven underground stations — Hutatma Chowk, Kalbadevi, Girgaum, Grant Road, Santacruz, Marol and Shitladevi.

Officials said the technology is being used on a large scale for the first time in the country given Mumbai's geographical conditions.

Ashwini Bhide, managing director, MMRC said, "The NATM technology was used for Delhi Metro for a least one station. In Mumbai, we are using this technology on a large scale for seven stations. This method is being used as the width of the road is narrower than what is required for the stations."

Bhide said the organisation recently held four conferences for co-ordinating the work among different contractors executing the project in seven different packages.

The MMRC has pressed 17 tunnel-boring machines into service for the city's first underground metro.

The boring machines have an outer covering of 6.4m. With NATM, it will be widened by another three metres to create space for the station platforms. The tunnels will be widened by using tools like breakers and also by undertaking controlled blasting in some areas.

The ₹23,136 crore project from South Mumbai to western suburbs is expected to change the face of public transportation in the city, once operational by 2021.

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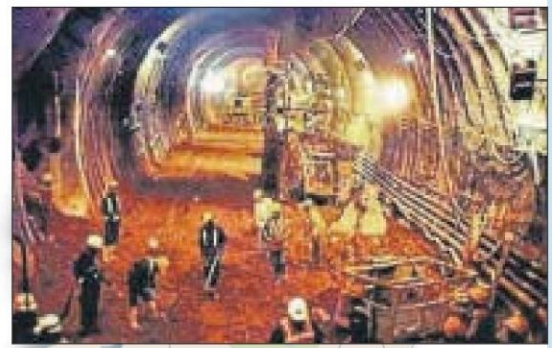
THE TUNNEL VISION FOR METRO-3

Metro-3 is the first and only fully-underground metro proposed for the city. After its completion, it will be the fifth largest underground tunnel in Asia

A construction site for the Metro-3 station, near the international airport . HT PHOTOS

According to the MMRC, the line will reduce daily vehicle trips by 4.5 lakh or 35% and save 2.43 lakh litres of fuel daily in 2021

At many places in the city, the MMRC is building temporary roads to allow smooth traffic flow even as the work continues underground



ABOUT THE NEW TUNNELLING METHOD

The New Austrian Tunnelling Method (NATM) is a modern tunnelling method appropriate for congested spaces.

It is a European method that was also used for the construction of the Delhi metro

In Mumbai, the technology will be used in seven stations, to widen the tunnels by using mining, equipment like breakers or low-intensity controlled blasting

THE ADVANTAGE OVER OTHER TUNNEL-BORING METHODS

For tunnels with variable geometry and in mixed ground conditions, NATM is more cost effective, flexible and safer

33.5 km Length

27 stations

Cuffe Parade, Vidhan Bhavan, Churchgate, Hutatma Chowk, CST Metro, Kalbadevi, Girgaum, Grant Road, Mumbai Central Metro, Mahalaxmi, Science Museum, Acharya Atre Chowk, Worli, Siddhivinayak, Dadar, Sitaladevi, Dharavi, BKC, Vidyanagari, Santacruz, Domestic Airport, Sahar Road, International Airport, Marol Naka, MIDC, SEEPZ and Aarey Depot

THE CITY CONNECT

6 business districts, many educational institutes, the domestic as well as the international airport will be connected by this Metro line

₹23,136 cr is the project cost

December 2021 Deadline

Status: Construction underway, 14% of the work has been completed

₹13,235 cr is the loan amount from the JICA (Japan International Co-operation Agency), which is partially funding the project.

Rest of the cost is being borne by the Centre and state government

13 lakh is the expected ridership, which is expected to shoot up to 17 lakh by 2030

17 BORING MACHINES USED

The heavily-mechanised Tunnel Boring Machine (TBM), which weighs around 700-800 tonnes, was transported to the launching site in different pieces.

It is divided in parts — front shield, middle shield, cutter head, erector, screw conveyor and tail-skin shield

17 TBMs deployed for tunnelling.

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>
> ASHWINI BHIDE, managing director, MMRC