

■ Exhaustive trials required since networking of signals crucial ■ Loco pilots sent to DMRC for training

K. KARTHIKEYAN | DC CHENNAI, FEB. 22

Chennaiites would be able to shuttle between Koyambedu and Alandur in a swanky air-conditioned metro train by December latest, if all goes according to the CMRL's (Chennai Metro Rail Limited) plan.

A minimum of nine months will be required from the start of the trial run to begin the commercial operations, R Ramanathan, Director (Projects) told *Deccan Chronicle*. He accompanied journalists on an embedded tour inside the 2 km long tunnel connecting Shenoy Nagar and Anna Nagar Tower stations.

Trial run of the first train, which started on January 30, would be extended till Alandur (Azar Khana), once track laying and electrification works get over. Track laying, till the Kathipara fly over, was completed by Friday evening.

After completing the minimum required trial run, a unit of Indian railways in Lucknow will invite RDSO (Research Design and Standards Organization) experts for a test run during which the experts will operate the trains at 90 kmph, 10 kmph above the maximum speed proposed by CMRL.

A report on this test will be sent to commissioner of rail safety in Bangalore, who would conduct the final trial run before certifying

5 trains arrived from Brazil, where France based Alstom produces nine of the 42 trains

it fit for commercial operations.

Nine months for the trial was only a minimum requirement. Jaipur metro took nearly a year for this process. About seven or eight trains would be required for the commercial operation on the Koyambedu-Alandur corridor while two trains would be kept as reserve, Ramanathan said, adding that all trains would undergo exhaustive trials. The entire operation will be automated and controlled from the control center in Koyambedu depot while a pilot on board the train will monitor and troubleshoot during emergencies.

Exhaustive trial would be required since the networking of signal among other networks between the train and control center should be proper. CMRL has already recruited a couple of loco pilots and sent them for training to DMRC (Delhi metro rail corporation), the prime consultant of CMRL.

Five trains have arrived from Sao Paulo in Brazil, where France based Alstom produces nine of the 42 trains (four car) required for CMRL. The rest is being produced at Alstom's factory at Sri City near Tada in Andhra.

METRO RAIL READY BY DEC '14



A view of the tunnel leading to Anna Nagar Tower station from Shenoy Nagar.

— Sampath

Emergency safety at metro

DC CORRESPONDENT CHENNAI, FEB. 22

Exiting the city's underground metro network during emergency should be very easy. A cross passage connecting the two parallel running tunnels will be available for every 250 meters throughout the entire length of the underground network. "In case of emergency, passengers can alight the train and reach the cross passage, which will be 125 meters away on either side," said V. K. Singh, general manager (underground), CMRL.

During emergency, the train will be stopped and electricity supply snapped on both lines for passengers to reach a safe distance away from the network. Every tunnel will have a narrow pathway (on one side) for passengers to walk out of the tunnel. Besides the eight-meter long and 2.7-meter diameter cross passage connecting two tunnels, emergency phones and fire extinguishers have been kept at every 100 meters and 500 meter.

At station platforms, all underground stations will have passenger screen doors synchronized with the train doors keep passengers away from the train until the train reaches the platform. Facilities would be provided to enable all mobile networks to function underground.

HIGHLIGHTS OF THE MUCH AWAITED TRANSPORT

- As soon as the cutters cut the earth, the soil would be conveyed to the rear of the machine from where the tunnel though battery operated wagons. Also, lining the walls with pre-cast concrete segments measuring 250mm and 275mm thickness and 1.2 to 1.4 meters width each would follow the cutting. Segments measuring 1.2meter would be used at curves. Temporary concrete segments would be removed once the boxes of UG stations are ready for construction

- About 10,000 workers are involved in the entire underground network construction. 1,500 of them are working between Shenoy Nagar-Anna Nagar Tower stretch alone, says Ron Mickell, deputy project director representing Aelom, one of the five companies that constitute the General Consultancy of CMRL

- Every station platform would be minimum 140meters long. Each coach runs to 22meters. Considering the launch of six-car trains, the platforms have been kept at 140meters. Shenoy Nagar and Anna Nagar station platforms would be 390 and 220 meters long respectively

- Train will roughly pass beneath 1,000 buildings in the underground stretch

- About 20 to 30 engineers have been recruited and taught a one-year diploma course in metro rail management at IIT-Madras. The engineers would be involved in rail maintenance after commissioning

- The graph of the UG track would be such that there would be slope when a train starts from a station platform and elevation when it inches close to another station

- TN govt approved in principle extension of corridor-I from washermanpet to Tiruvottiyur via Wimco Nagar on October 15, 2010. It approved estimated completed cost of ₹3,001 crore recommended the extension to Gol, which is expected to sanction the same

- Temperature of the tunnel = 35 to 38degree Celsius

- Temperature within AC train = 22 to 26 degree Celsius

Promise of a cheaper and luxurious ride

DC CORRESPONDENT CHENNAI, FEB. 22

Imagine reaching Shenoy Nagar from Koyambedu market in around two minutes during peak hours. It might sound crazy, maybe impossible even if we rode an expensive sports bike during wee hours.

It will become a possibility by the end of 2015, at a cost of less than ₹100 or so. The important part is that the ride would be underground and that too in an AC four-car metro train. CMRL officials are confident that they can take the metro train underground for 4.5 km, up to Shenoy Nagar from the elevated corridor in Koyambedu.

CMRL project director R Ramanathan, who made this announcement, said that the entire underground network, including the stations, construction of which have come to a grinding halt owing to recession-hit contractors failing to meet the deadline, would be over and trains would crisscross between Airport and Washermanpet and Central to St Thomas Mount (45 km altogether) by the end of 2016.

After the commissioning of the Koyambedu-Shenoy Nagar stretch, which has Tirumangalam, Anna Nagar East, Anna Nagar tower stations in between, the rest of the underground network would be commissioned in a phased manner.

As on date, about 30 per cent of the entire 39 km underground network plus stations are ready, said Mr V K Singh, General Manager (Underground). Twelve tunnel boring machines (TBMs) are roaring beneath the city now, digging tunnels with a diameter of 5.7 meters, at a depth of minimum 9 metres and maximum 33 metres below the ground level. Two tunnels leading to Chennai Central from Government Estate and Egmore to Chennai Central would run beneath the Cooum River, for a distance of 200 meters, V Somasundaram, Chief General

Manager (Construction) said.

Be it beneath Cooum river or on a rocky terrain from Nehru Park to Egmore, where it took 18 months against the scheduled six months, TBM operation would not change much as it works purely under pressure to prevent the earth from caving and also to avoid disturbing the stability of the structures over ground, Ramanathan explained. He said that unlike Delhi, where the water table is low, tunneling was a challenge in Chennai, which has very high water table. About 600 wells falling within the metro's underground route network were closed.

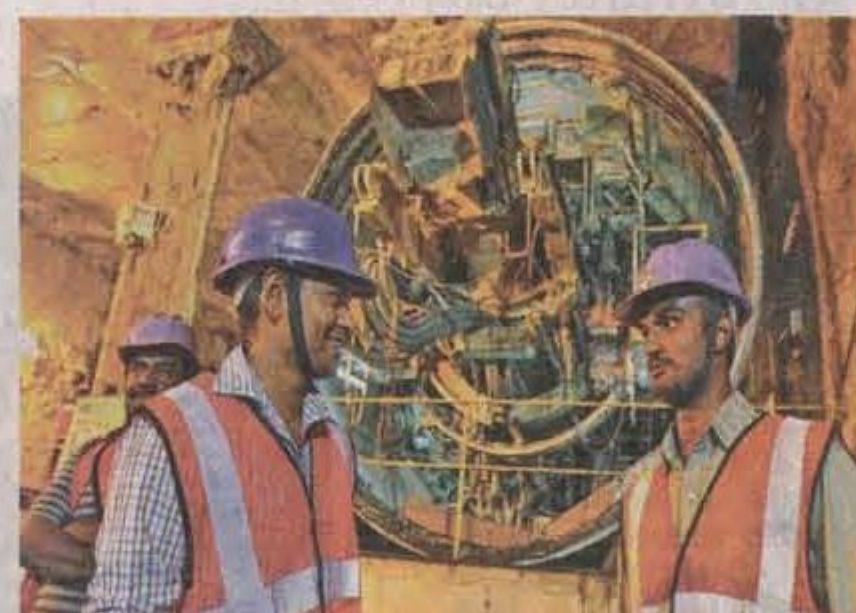
Andhra grads tunnel city's metro tubes

K. KARTHIKEYAN | DC CHENNAI, FEB. 22

It was not just anonymous engineers from abroad who tamed the 85-90 meter long and 850 tonne tunnel boring machines (TBMs) that have done one-third of the job in getting the city's first metro train run underground.

Two diploma grads from nondescript Andhra villages, Pawan Kumar of Vijayawada and Srikanth of Guntur, are among the few domestic unsung heroes. The duo was part of the team that managed to dredge the 2 km long tunnel from Shenoy Nagar to Anna Nagar Tower in six months.

Working inside a tunnel at temperatures ranging from 35 to 38 degree Celsius, with oxygen pumped into the tunnel through air blowers, the duo kept the TBM running between 0.5 rpm and 2 rpm, tunneling an



Operators Pawan and Srikanth share a word as the gigantic TBM they ran during the last six months came to a halt after the breaking of the diaphragm wall at Anna Nagar Tower station.

average of 10 meters per day from the control room of the TBM.

In fact, the duo was close to breaking the record of 54 meters per day set by operators on the Washermanpet-Manandi route. "We completed 17 rings in the first 12-

hour shift and 15 rings (1.4 meters per ring) in the second," they said with pride. They also said that they had to change the cutters of the TBM twice between Shenoy Nagar and Anna Nagar Tower, where they were dislodging the TBM

to be moved elsewhere.

The TBM exerts a pressure up to 1.4 bar while cutting through solid rock. The pressure keeps the earth from caving in and also prevents the structure over ground from suffering structural instability. While hydraulic liquid lubricates the cutter, large volumes of foam are sprayed at high pressure before cutting to detect loose soil or holes/un-closed wells/borewells, CMRL Director (Projects) R Ramanathan said.

He further said that any borewell/well or leakage would be filled before proceeding with further tunneling. Likewise, state-of-art cushioning with rubber and plastic would be done while laying tracks so that people living over ground would not feel the vibrations when trains pass beneath their buildings.



Two tunnels leading to Chennai Central from Government Estate and Egmore to Chennai Central will run beneath the Cooum, for a distance of 200 meters — V. SOMASUNDARAM, Chief General Manager (Construction)



Trains will criss-cross between airport and Washermanpet and Central to St Thomas Mount (45 km altogether) by the end of 2016 — R. RAMANATHAN, CMRL project director

TOTAL NETWORK LENGTH = 45KMS

Corridor	Underground	Elevated
Washermanpet to Airport	14.3km	8.7km
Central to Mount	9.7km	12.3km

Total number of stations = 32

- Underground = 19
- Elevated = 13

Logistics involved in UG corridor

- Concrete for station construction = 35lakh cubic meter
- Steel bar = 6lakh metric ton
- Structural steel for station construction = 4,000 metric ton
- Muck from station excavation = 21lakh cubic meter
- Muck from tunneling = 13,20 lakh cubic meter
- Both tunnels completed on Nehru Park-Egmore (950 meters) and Shenoy Nagar-Anna Nagar Tower (2kms each)

The Capacity of each coach and trains is given below:

The peak hour peak director passenger traffic capacity for the year 2016 is estimated at 24,968 in a four car train with a headway of 3.5mins for corridor-I (W'pet to Airport) and 24,324 for Corridor-II (Central to Mount)

4 Car Train: 1276 persons

6 Car train: 1,913 persons

Total project cost = ₹14,600 crore

Spent so far = ₹6,500 crore

Central and state governments contribute 20% funds each and rest would be provided by Japanese international cooperation agency at a low interest of 1.75% per annum.

Duration of travel from Central to Airport = 20 minutes

Total number of trains required = 42

Nine from Brazil

Remaining 33 from Alstom factory in Tada