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Good news in lockdown times: Metro completes India's deepest air shaft

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Kolkata: India's deepest Metro ventilation shaft, 43.5m deep, equalling a 15-storey building, will be completed on Monday. The engineering marvel has been achieved for East-West Metro despite extremely challenging geological conditions, including two aquifers linked to the river Hooghly, that posed risks of water ingress.

The base slab — 43.5m below ground level — will be cast on Monday. Kolkata Metro Rail Corporation (KMRC) and Afcons have already presented the country's first underwater twin rail transportation tunnels and the deepest underground Metro station at Howrah station. The ventilation shaft will add another feather in their cap.

"Completing the 43.5m ventilation shaft, India's deepest, on the banks of the Hooghly, was a marvellous achievement for our team," Satya Narayan Kunwar, project manager, Afcons, told TOI on Sunday.

Built on a 8,000sqm plot where there once stood a Kolkata Port Trust warehouse, the 10.3m-diameter escape shaft is located right between the Metro tunnels. It had to match the Metro tunnels' depth, which is nearly 40m from the surface of the river. Such shafts not only provide ventilation but are also used for evacuation. At Howrah Metro station, the 520m-long twin tunnels plunge 30m into the river. From there, they go deeper, till 37m, crossing the river bed. So the shaft had to go as deep as 43.5m. It has been built with innovative engineering techniques to navigate geological challenges and overcome any impact on the Circular Railway line that runs along the river bank. The shaft has a 10.3m inner diameter wall with a 500mm thickness. There is a 1m-thick concrete diaphragm wall around it as well.

Negotiating the weak soil and two strong aquifers connected to the river were the biggest challenges while building the shaft. A large amount of bore-hole investigation data was analyzed to generate soil profiles in the Gangetic plains and a detailed study of the geological formations helped determine construction sequences keeping in mind structural safety and security during the excavation.

“The proximity to the river threw up surprises due to ancient alluvial deposition, river course transformations and varying foundations of old buildings across the road,” Kunwar said.

“To understand the erratic subsoil deposition, we did a detailed soil-mapping study. A lot of precautions had to be taken while building the diaphragm wall because the twin tunnels were already completed,” he added.

There is another evacuation shaft coming at Raja Subodh Mullick Square, about 1km from Esplanade. However, this one will be just 13.5m deep.