Challenges in MRT underground works

Negotiating karstic limestone formation key to successful completion

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THE key towards the successful completion of the Klang Valley Mass Rapid Transit (KVMRT) underground works by October would be the negotiation of the 2.5km stretch from Cochrane station towards the underground sector of the Pavillion shopping mall.

Touching on its ground geological conditions, MMC-Gamuda KVMRT (T) Sdn Bhd project director Satpal S. Bhogal said they are working in two different geological formations. The first part is the Kenny Hill formation and the second half of the underground alignment, from Bukit Bintang to Maluri, is of karstic limestone formation," he said.

"The Kenny Hill formation is relatively easier to bore through and we will be using the earth pressure balance (EPB) type of tunnel boring machines (TBMs).

"For the second half of the underground alignment, we have extreme karstic formation, which is a type of geology that is riddled with cavities (voids) and mining that has to be carefully undertaken.

"Among the challenges we have to manage with the underground works is tunnelling through karstic limestone ground. Karstic limestone has soil of varying densities from hard rock to water-filled caverns.

"The other challenges are underground pipes and traffic density in the city. A lot of the pipes in the city are located underground, but there is no detailed map to indicate their location or alignment. Hence, we have to constantly find out what is underneath and relocate the pipes where necessary.

"The high density of traffic in Kuala Lumpur, such as Bukit Bintang, makes it challenging for traffic management and to transport materials."

Satpal said that for this particular geology, contractors are using the variable density machine (VD), a type of slurry machine with modifications to alter the density of the slurry used.

The machine, the first of its kind in the world, uses sophisticated technology and will reduce the risk of sinkholes, subsidence and settlement on the ground.

"The last thing we need is any significant delays to current works. It is very important for the works around the karstic formation area to be done without causing any disruption to the surface," he said.

Commeting on other risks, Satpal said the TBMs have to run 24 hours, as the machines must complete the tunnel boring at its targeted length or risk getting stuck and unrecoverable.

"We currently have two shifts for workers manning the machines which bore through at 15m per day although it can go at 20 to 25m. We choose to be more cautious in dealing with this particular sector," he said.

Four tunnel boring machines are being deployed for the underground tunnelling works, with two TBMs from Cochrane to Pasar Rakyat, and two from Semantan to KL Sentral.

The KVMRT underground works package includes tunnelling of the seven underground stations as well as their exits and entries and ventilation shafts.

Ten tunnel boring machines will be used to excavate the twin-bored tunnels for the MRT Sungai Buloh-Kajang Line. All these machines will be running simultaneously.

The progress of the KVMRT underground works stood at 50% at year-end.

The tunnelling period will be from May until October and the entire KVMRT project is expected to be completed by July 2017.

The seven underground stations of the MRT Sungai Buloh-Kajang Line are KL Sentral, Pasar Seni, Merdeka, Bukit Bintang, Pasar Rakyat, Cochrane and Maluri.

HIDDEN WORKS: Tunnelling and boring are being done underneath the MMC-Gamuda KVMRT (T) Sdn Bhd's worksite in Jalan Bukit Bintang