



Evening Talk on Considerations of Deep Excavation in Kenny Hill and Kuala Lumpur Limestone Formations

By Ir. Lee Peir Tien

Ir. Lee Peir Tien is currently the Deputy Chairman in the GeoTechnical Engineering Technical Division Session 2015/2016.

The Evening Talk on Considerations on Deep Excavation in Kenny Hill and Kuala Lumpur Limestone Formations was organised by the Geotechnical Engineering Technical Division on 27th April 2016 at the Tan Sri Prof. Chin Fung Kee Auditorium, Wisma IEM. The evening talk was delivered by Ir Tan Joon Gei from MMC-Gamuda KVMRT (T) Sdn Bhd. A total of 56 participants attended the evening talk.

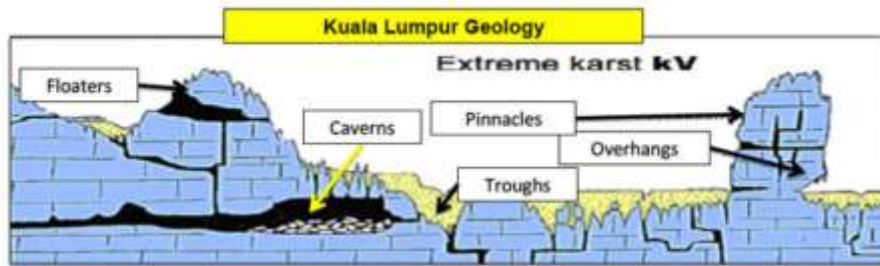
The speaker started his evening talk with a brief introduction to KVMRT – Sungai Buloh to Kajang Line. The first MRT line in Malaysia consisted a total of 31 stations and total length of 51km. There are total 7 underground stations with depths of between 22m to 44.5m bgl which are amongst the deepest excavation in Malaysia. Ir Tan further explained that the underground section alignment transverses through two major geological formations namely Kenny Hill formation and KL Limestone Formation as shown in the table below.

Station	Geological Formation	Excavation Depth (m)	Construction Sequence
KL Sentral (Muzium Negara)	Kenny Hills	21.5 - 25.2	Top-Down
Pasar Seni	Kenny Hills	22.8 - 24.5	Semi Top Down
Merdeka	Kenny Hills	31.1	Bottom up
Bukit Bintang	Kenny Hills	33.5	Top Down
Pasar Rakyat (TRX)	KL Limestone	44.5 *	Bottom up
Cochrane	KL Limestone	32	Bottom up
Maluri	KL Limestone	24	Bottom up

Subsequently, Ir Tan detailed the general considerations on deep excavation such as design requirement, ground condition, construction sequence, interfacing with tunneling works etc. Then, he highlighted the important to understand the geology formation and to identify key subsoil parameters in the deep excavation design. He also summarised the subsurface investigation (SI) works done for the MRT's underground station as follows:

	Kenny Hills Formation	KL Limestone Formations
Average no of BH in UG Stations	30	42
In-situ Tests	SPT, Pressuremeters, Permeabilities , SP Piezometers, Standpipes, Pumping Tests etc	SPT, Permeabilities, Lugeons, Point Loads, Standpipes & Rock Mapping
Specialised Tests (Field)	Trial Pits for Undisturbed Sample, Special Double Tube UD samplers,	MASW, 2D-Resistivity, Seismic Refraction, Microgravity, CrossHoles tomography, Dye Tracing , 2D- GPR
Specialised Tests (Lab)	Triaxials, Direct Shear Box, Cerchar, UCS , Chemical, Atterberg Limits, PSD etc	Cerchar, UCS, Point loads, Chemical, Atterberg Limits, PSD etc etc

The speaker then highlighted the design consideration on deep excavation in Kenny Hill formation. He mentioned that a commercial software was used to determine the effective stress shear strength for rock. He also mentioned that the behavior of soil with SPTN>200 need to be carefully assessed as the said material behavior is between soil and rock. He also shared with audience on the challenges in construction of diaphragm wall (e.g space constraints, stabilising fluid etc). Then, the speaker proceeded to present on the design consideration on deep excavation in notorious KL Limestone Formation, which karst features as shown in below figure are commonly encountered. As shallow bedrock was encountered, stereonet and wedges analyses were carried to determine type of rock slope stabilisation works.



Lastly, Ir Tan shared with the participants on the lesson learnt, Research & Development (R&D) and innovations such as better core sample retrieve method, undisturbed block sample for large scale direct shear box, suitable testing equipment for triaxial test, GPR Scanning for sinkhole detection, improved method to seal solution channel with grout etc. developed from his experience on deep excavations in Kenny Hill and Limestone Formations.

Before the end of the talk, Ir Tan fielded a number of questions from the audience. As a token of appreciation, a souvenir was presented by Geotechnical Engineering Technical Division to the speaker. The evening talk ended around 7.30 p.m. with applause from the floor.

