Chairman's Lecture No. 22

Geology vis-à-vis tunnelling in the Kuala Lumpur area

Tan Boon Kong

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Venue : Department of Geology, University of Malaya

Chairman's Lecture No. 22 – "Geology vis-à-vis Tunnelling in the Kuala Lumpur Area" was delivered by Sdr Tan Boon Kong on 12th Jan 2017 at the Dept of Geology, UM. An abstract of the lecture is attached below.

As usual, some lively discussions followed the lecture.

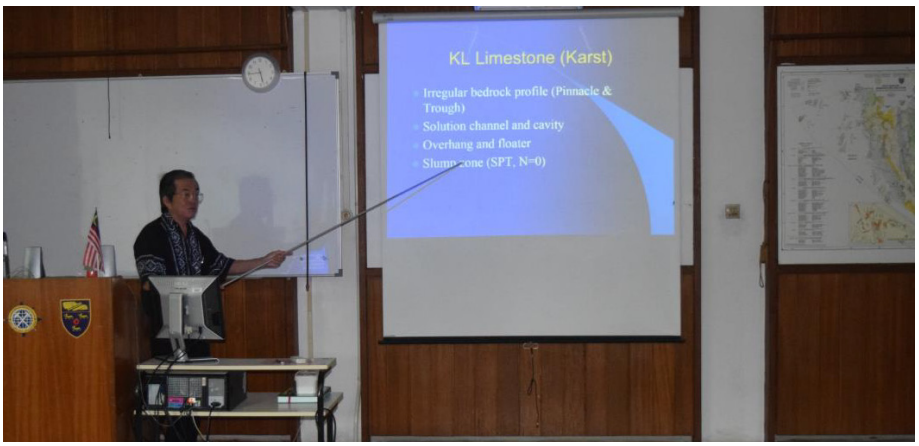
Tan Boon Kong,
Chairman, W/G on Engineering Geology, Hydrogeology & Environmental Geology

Abstract: Geology has a direct impact on tunnelling works. Risk assessment of potential geohazards due to various ground conditions (i.e. geology) is an important component in the planning and execution of tunnelling projects. This lecture discusses the geology of the Kuala Lumpur (KL) area and its impact on recent tunnelling works carried out in the area.

The rock formations encountered in recent tunnelling projects in the area include Granite, the Kenny Hill formation, and the KL Limestone. Since these rock formations have their own unique features and characteristics, they impact tunnelling works differently. For example, granite exhibits distinct weathering profiles with possible boulders in the grade IV zone; hence potential soil-rock mixed face with boulders for the Tunnel Boring Machine (TBM). The Kenny Hill formation comprises interbedded Quartzite and Phyllite, with the former having very high strength (Unconfined Compressive Strength, UCS of up to ~ 300 MPa) which impedes the progress of TBM. Quartzite is also highly abrasive to TBM cutters since its mineralogical composition is basically 100% quartz or silica (SiO_2). The KL Limestone is well known for its karstic features (irregular or pinnacled bedrock profile, cavities and solution channels, slump zone with Standard Penetration Test, SPT N = 0, etc.) which pose serious geohazards to tunnelling works.

In addition, superficial deposits such as Alluvium and Mine Tailings also pose potential problems since they are weak materials/soils. Mining slime deposits are particularly treacherous with SPT N = 0. The occurrence of mine tailings in the Limestone pinnacle zone can potentially trigger a sinkhole when intersected by a TBM.

Finally, geological structures such as major faults, quartz and granitic dykes which are prevalent in the KL area can also impact on tunnelling works. Tunnelling through major faults or fault zones would encounter highly crushed/brecciated rock weathered to soils (i.e. weak zones). Quartz dykes consisting of crystalline quartz would be highly abrasive to TBM cutters and impede TBM progress. Granitic dykes encountered tend to be weathered to weaker materials/soils. In any case, faults and dykes would serve as conduits for groundwater ingress into the tunnels.



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