

PV C2a or C2b @Setapak

Bored Pile in Limestone Formation at Taman Danau Kota, Setapak, Kuala Lumpur

(by Mr. Perkin Chin, General Manager (Operations) (2010 Apr-Jun)

It has been a great pleasure for me to be given the opportunity to contribute to Geohan Newsletter Issue 14, more so when it is done at this most opportune time.

For the pass 4-1/2 months (and still counting) of my involvement in the Proposed Bored Piling Works for 2 blocks Service Apartment in Taman Danau Kota, Setapak, Kuala Lumpur, more and more construction challenges were unveiled during the course of bored pile construction in terms of pile design, construction techniques and geotechnical problems related to ground stability and inclined rock occurrence.

The project site is situated in an ex-mining land, i.e. typical Kuala Lumpur limestone formation well known for its highly erratic karstic features. Though much have been said and covered elsewhere concerning bored pile construction in limestone formation in Kuala Lumpur, it still looks a little while for the team to begin to understand and be within the grasp of dealing with the unexpected situations as pile boring proceeded.



Construction Site

As early as from the design desk, internal Site Investigation results after the award indicated that the rock levels were much deeper than anticipated by approximate 10m in average. Though at certain part of the site rock levels were as shallow as 10m deep, it was not uncommon to hit rock at 40m in most of the piles. In fact, rock core qualities were poorer in RQD values with intermediate multi-layered weathered material in comparison to the originally furnished Soil Investigation Data. The overburden soil was mainly heterogeneous nature from sand to clayey remnants with very low SPT count range from 0 to 10.



Concreting

As a result, the pile design was revised to certain extent to take into account of this thick and multi-layered weathered material (limestone) in which SPT counts were taken reflecting the high degree of rock weathering phenomenon. In some design cases, true friction pile design was adopted (ignoring completely the end bearing contribution) especially when the pile toe were formed near or on this materials (this option was available for at least one SI borehole was sunken at each pile point to facilitate the individual pile geotechnical design).

As a whole, pile construction in this job site posed great challenge for the team and it took sheer determination and effort to overcome the karstic occurrences of limestone in inclined and erratic rock levels and ground instability (long casing was not favored and in many instances unachievable due to multi-layered rock). The following alternatives were adopted either alone or in combination to enable successful pile installation;

- a) Alternative stabilizing fluid using polymer

- b) Pre and post treatment of slump zone (pre-determined from SI or from pile boring observation) by either of the followings:
- c) Backfilling with lean concrete
- d) Carrying out jet grouting (in more sever situation especially at the clayey contact zone between soil and rock interface)



BG20-Dia.1800mm Auger

As rock levels are going to hit 45m (phase C2a) and almost certain beyond 60m especially in phase C2b, the geotechnical challenge will not end here. Instead, it will continue and perhaps with the likely inclusion of BG36 on site, the adventure will be more tantalizing than ever. Rock on BG!