

# M VERTICA @ CHERAS

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## Project Introduction

M Vertica is a redevelopment of existing badminton stadium to 5 blocks of 54 storey suite apartment and 10 storey car park in podium level by Cordova Land (Mah Sing Group). It is located approximately 400m to LRT and MRT stations in Taman Maluri, Cheras. The building foundation system is under 'Contractor's Alternative Design' which consists of 747 numbers of bored pile with sizes ranging from 600mm to 2200mm diameter.



Figure 1: Overview of Project Site

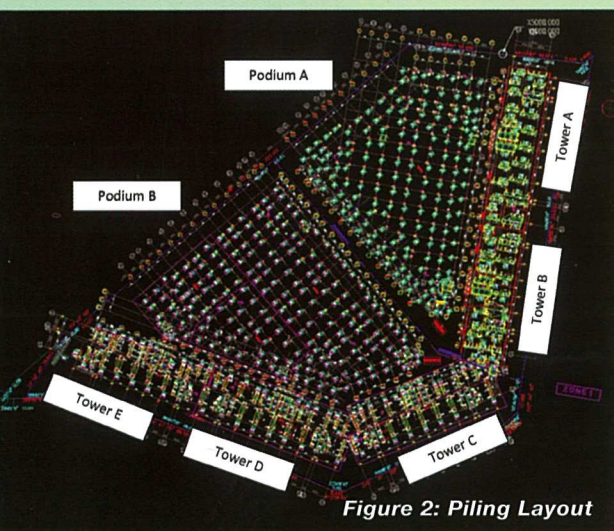


Figure 2: Piling Layout



## Alternative Design Proposal

Referring to the available soil investigation (SI) information in Figure 3, the project site is underlain with KL Limestone formation where typical karstic features such as erratic bedrock level and cavity are expected. However, this project site had undergone cavity treatment works using compaction grouting prior to commencement of foundation works and this had eliminated some of the challenges due to subsurface uncertainties.

Generally, the design rock socket length of bored pile was optimized from 3 times pile diameter (i.e 3D) to 2.5D in our alternative design. The design parameter has successfully justified from instrumented maintained load test (MLT) where the pile settlement was 10.28mm at test load of 300% working load.

The most challenging task during the design process is to determine the termination criteria of pile toe level at Tower B & C where sudden variation of rock level with multiple cavity layers were encountered. There are substantial numbers of additional rock probing points that need to be done to identify the sequence of pile point construction. Based on Consultant's requirement, piles located at rock sloping area must be terminated at 45° from the deepest adjacent pile toe level (an example is shown in Figure 4).

Therefore, pile with deepest bedrock level must be installed first to avoid any strengthening works later due to downgraded of original geotechnical capacity at the higher pile toe level. This rock socket requirement is important to ensure the pile was terminated and socketed into sound bedrock and to avoid the pile was terminated at the rock cliff.

Another challenge that we faced is the pilecap construction with deep level at Tower area which is required high stump (clearance) for accommodate the M&E services. Therefore, deep excavation is required for pilecap construction. Soldier pile wall was proposed as a temporary shoring to control the soil movement and collapse during deep pilecap excavation. Also, shear stud design is required for pilecap depth more than 2.5m for 2 sequence casting purpose, in order to control the unfavourable hydration heat during concreting.



## Construction Challenge

Firstly, before the start of the piling works we had to plan for the concrete supplies and deliveries. As the project is situated along the infamous Jalan Cheras, traffic congestion is unavoidable. Couple with the limited approved working hours by DBKL, accurate and constant communication with the concrete suppliers is required.

However, traffic is something we couldn't really have control on, any plan would fail. And as with many other concreting works, hiccups and late deliveries are as common as dirt. Each time we had a hiccup or late delivery, the complaints from the nearby residents will ensure, without fail. We collected a few summonses along the construction period, at the same time had mastered the skill to put up a *muka tembok* while meeting the DBKL officer.

During the site possession, we are sure that this project will have many obstacles. The project site is located on the former Cheras Badminton hall, neighbouring a surau, a *Kompleks Belia* and a few residential flats. As we started our bored pile work, the whole site was not readily handed over to us. There were TNB substation, existing surau and *Kompleks Belia* were still in used and occupied another 60% area of the whole project site. We could only construct at partially on Tower A, Podium A and partial Tower B.

We are to plan and manage our bored pile resources carefully to suit and avoid discontinuation of work due to the termination of TNB sub station, on-going demolition work of the existing surau and *Kompleks Belia*. Some bored pile machines were deployed to work on other non critical area – podium while the demolition work continues. After the surau and *Kompleks Belia* being demolished, we need to deal with the relocation and terminating another TNB live cable. Although, these risks have been considered in our work programme, the delay is imminent.

We were readily to source for additional bored pile machines to work on the newly possessed area which then becomes very critical to handover to the building contractor. We had at one period deployed up to 6 unit of boring rigs. We had to catch back the delay. It was on this critical area that we encountered the erratic Karst formation.

Thanks to the earlier planning by the technical team to carried out additional rock probing, the sequencing of the bored pile on sloping bedrock zone could be executed smoothly as planned. The challenge now is to core the limestone formation as deep as 23m for some piles, to meet the 45 termination criteria and the cavity zone.

Luck was on our side this time, as we had embarked on Geohan Transformation Programme, we had in our inventory a few newly purchased Bauer rock coring tools with 19mm RSC ranging from 1200mm – 2500mm diameter. Our initial rock coring rate of around 2.0 – 2.5m a day for 1500 - 2200mm diameter piles had increased one-fold to almost 5.0m a day. These had enabled us to overcome the 23m rock socket piles in 4 days. An impressive record for our team.

Lastly, we had to drive the RC work to deliver. Due to the earlier obstructions and delay, our bored piles were completed at Tower C & Tower D simultaneously. These had stretched our RC resources to its limit. Every available area was being excavate. At Tower C, sheet pile shoring was installed. At Tower D, we used concrete blocks as passive berm. At Podium B, excavation was done gridline by gridline. Every corner, the RC work seems slow.

It was almost literally like a Chinese saying, 'fire erupts everywhere', and in return we too, worked like firemen – red helmet, fire proof ouqit, sweating our pants.

After 18 months of sweat and blood, feud and quarrel we had it completed – piling and sub-structure works for M VERTICA. Bravo to team M Vertica.

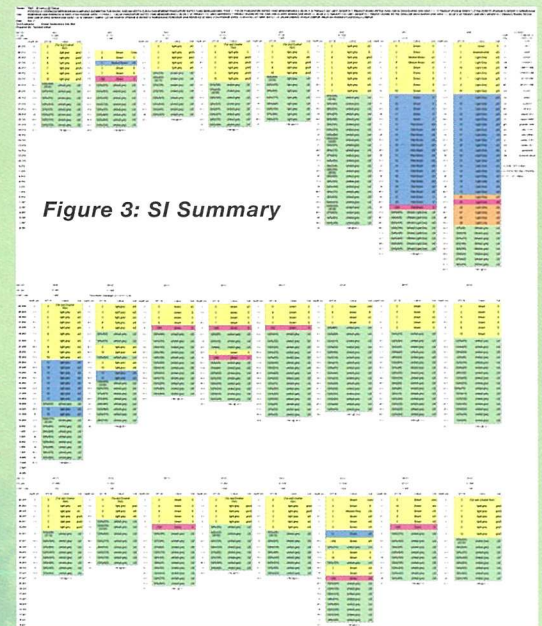


Figure 3: SI Summary

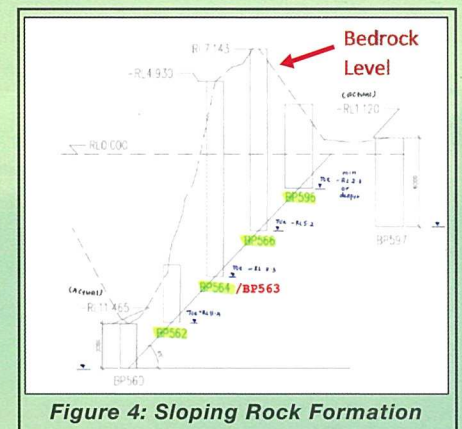


Figure 4: Sloping Rock Formation