



CONDOMINIUM ON JALAN AYER JERNEH, SETAPAK, KUALA LUMPUR – MALAYSIA

MENARD VACUUM CONSOLIDATION (MVC)

Category:	Commercial and Residential Buildings
Developer:	Bennington Development Sdn Bhd
Consultant:	One Smart Engineering Sdn Bhd
Contractor:	-
Area / Quantity:	10,878 m ²
Year:	Sept 2015- Feb 2016



MENARD ASIA

PROJECT DESCRIPTION

The project consists of the preparation of a platform for the construction of high rise condominium and a parking block. The purpose of ground improvement works is to accelerate the primary consolidation due to the anticipated future permanent load thus ensuring the residual settlement is within tolerable limit. More importantly, the works aims to increase the bearing capacity of the platform to be able to support the loadings from a 600t jack-in pile rig.



Figure 1: Site preparation for ground improvement works

SOIL CONDITION / GEOTECHNICAL PROBLEM

For this project, the foundation of the structures is designed using piling. The ground consists of very soft silt and clay which are mainly found from the surface up to 14 m deep. The upper sensitive clay is having high water content of up to 80% as well as high liquid limit of more than 90%. Therefore, settlement is a concern as well as the effect of negative skin friction on piles. At depths of 10 m and below, sand is widely spread throughout the site.

Globally, the subsoil shows high variations in terms of consistency or compactness. A very soft layer of fine grained soil (mostly clay and silt mixtures) is encountered in most of the in-situ tests to a depth not exceeding 14 m.

Mobilization of machineries on the soft ground is an issue. Due to this condition, ground improvement was introduced to treat the soft ground prior to piling works.

MENARD SOLUTION

Menard Vacuum Consolidation (MVC) method is introduced to treat the soft ground prior to piling works. MVC method consists of installing an airtight impervious membrane over the soft saturated cohesive soil deposit to be consolidated where the vertical and horizontal vacuum transmission drains are installed. Vacuum pressure of 70-80 kPa is achieved throughout the pumping period.



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MVC perform similarly as Prefabricated Vertical Drain (PVD) with surcharge but with added advantages:

- Ensure stability of embankment during backfilling work
- Eliminate outward lateral movement of soil onto the surrounding area
- Immediate application of surcharge pressure up to 80 kPa upon vacuum pumping

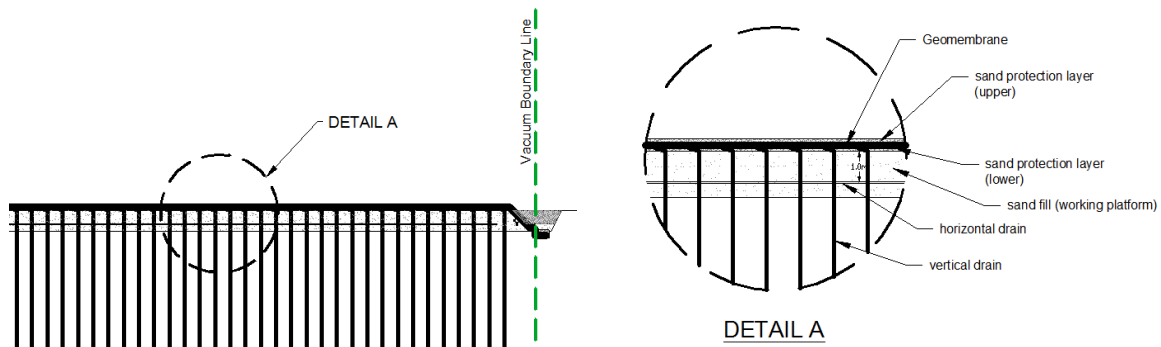


Figure 2: Cross-section of MVC works



Figure 3: MVC for ground improvement works

QUALITY CONTROL

The project is designed to achieve the following performance criteria:

- To induce at least 90% of the anticipated primary consolidation settlement.
- To increase the undrained shear strength c_u after MVC works.

Conventional PVD with surcharge method will induce lateral movement to the surrounding facilities and this is a concern to the client. Therefore, the MVC method is adopted to replace the conventional PVD with surcharge method to solve this issue. With MVC method, the ground improvement time is reduced from 12 months to 6 months.

Instrumentation monitoring devices installed and monitored by Menard are settlement plates, vibrating wire piezometers and pressure gauges.

At the end of the project, the undrained shear strength, c_u of the very soft silt and clay is more than doubled of the initial c_u due to an average c_u increase of about 15 kPa after MVC works. Besides that, the settlement monitoring analysis show that more than 90% of the anticipated primary consolidation settlement is induced during construction.