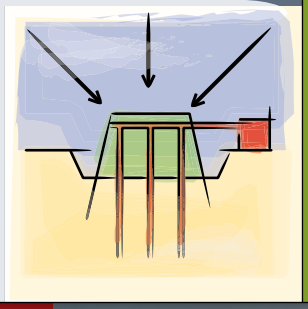
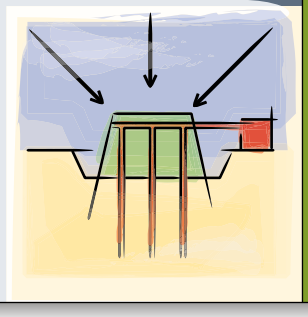


Menard Vacuum™

The Menard Vacuum™ consolidation method is an atmospheric consolidation system used for preloading soft saturated fine-grained soils (clay, silt, peat).
The procedure consists of installing a vertical and horizontal draining and vacuum pumping system under an airtight impervious membrane. The area is sealed by scealing the membrane into a network of peripheral trenches.
These trenches are continuously recharged and filled with water to maintain full saturation of the soils and to avoid a general lowering of the ground water table within the treatment area.

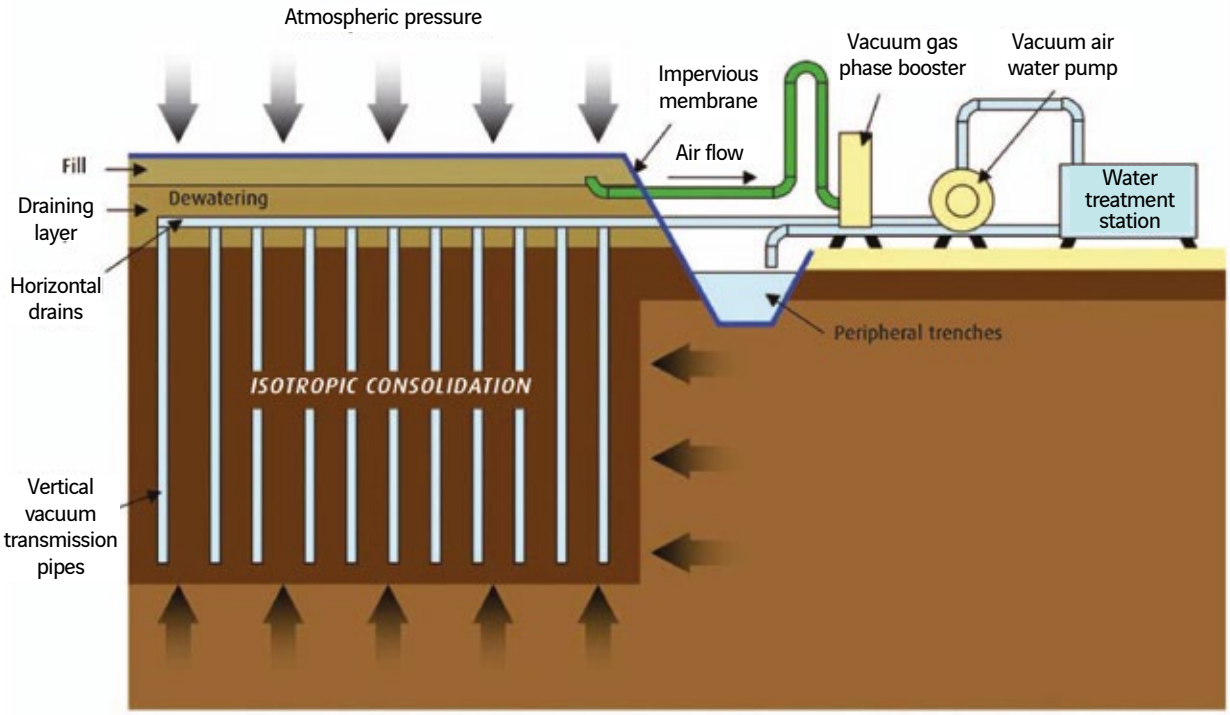
The Menard Vacuum™ consolidation method has been successfully applied since the late 80's to very various types of structures and applications (power plants, sewage treatment plants, highway embankments, airport runways,...).

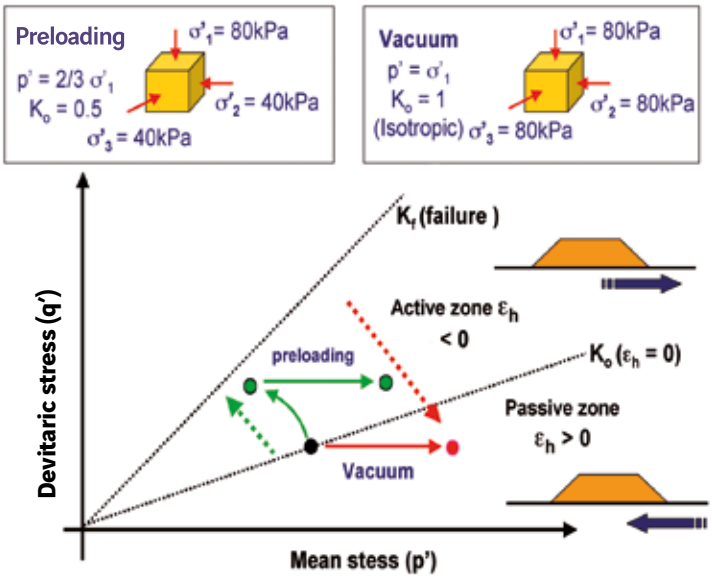


Menard Vacuum™

Means and methods

An air and water pumping system is installed and creates a vacuum in the soils below the impervious membrane equivalent to a depression of between 60 and 80 kPa, depending on the global efficiency of the system – (this pressure is similar to the stress observed under a 3 to 4 m high embankment).

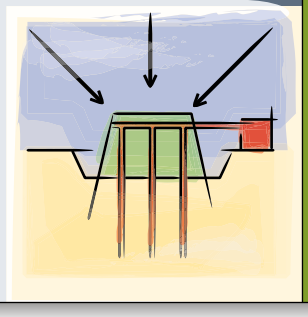




Classical preloading compared with Menard Vacuum™ in p'/q' diagram

This preloading through the application of an atmospheric pressure creates an isotropic accelerated consolidation of the compressible soils which eliminates or reduces the need for long-term surcharge loads. The consolidation time is also greatly reduced with very limited long term residual settlements.

Stations de pompage pour le procédé Menard Vacuum™ – Powerplant - Camau (Vietnam).



Menard Vacuum™

Advantages

Main advantages of Menard Vacuum™ consolidation:

- Significant time savings over other classical consolidation methods with surcharge and wick drains;

- Elimination or reduction of importing and transporting large quantities of surcharge fill material (a load of 70% of the atmospheric pressure is equivalent to a 3.5 m high embankment);

- Elimination of the risk of slope failure during the placement of the surcharge embankment;

- Isotropic consolidation allows the subsequent phases of construction to proceed quickly, without any requirement to observe a surcharge consolidation period to occur and to gain enough shear strength to proceed with construction of the embankment or structure.

While under vacuum consolidation (consolidation period usually ranges between 4 and 6 months), no activity that could result in puncture of the membrane is allowed on the vacuum area without proper protection. However, heavy equipment traffic and fill operations can usually proceed and work is usually not restricted in any way in the areas surrounding the vacuum zones. A monitoring and instrumentation system is usually installed and monitored for the duration of the consolidation. The critical geotechnical parameters are surveyed on a regular basis (settlement, excess pore water pressure, horizontal displacements...) to check the ongoing consolidation process as well as the global stability of the embankments.

By comparing the actual data with the predictions of the design, this monitoring data is also used to back-calculate critical geotechnical parameters used in the design and validate the settlement targets and consolidation objectives.

22 rue Jean Rostand - 91400 Orsay, France
Tel: +33 1 69 01 37 38 www.menard-group.com