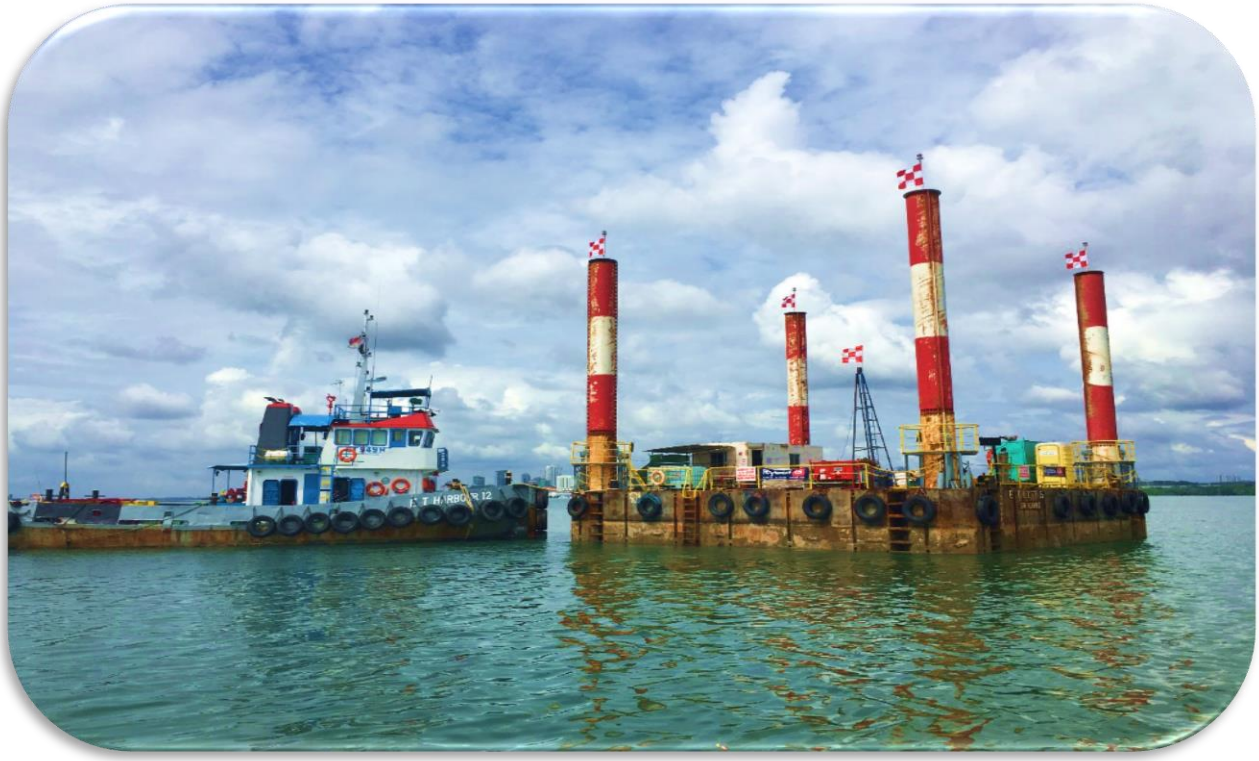


Soil Investigation

Soil investigation covering both land and marine exploration works remains one of the flagship services of Ryobi G. It identifies different soil/rock strata for the site of interest. Boreholes are usually drilled by our drilling rigs using Rotary Wash Boring Method for obtaining representative test data and good quality soil samples which are subsequently sent to our geotechnical laboratory accredited by SAC-SINGLAS for analysis.

Our team of engineers and laboratory personnel are highly trained in analyzing soil/rock samples to provide meaningful data. In addition, all of our laboratory tests are carried out in accordance with recognized international standards, e.g. British Standard (BS) and American Society for Testing and Materials (ASTM) for test compliance and quality assurance.

Since the characteristics of soil / rock varies from area to area and it affects the performance of foundation. Construction phase cannot commence until conclusive results from the field / lab investigations which are essential in ensuring safe and economical design are obtained.

In conclusion, our experience in soil investigation can help clients to anticipate potential problems before the construction phase. This will help our clients to save and manage their expenses accordingly to the project needs.

Rock samples collected at different depth

Scope of In-situ Testing Services:

1. Standard Penetration Test (SPT)
2. Vane Shear Test (VST)
3. Prebored Pressuremeters Test (20MPa Automatic PMT)
4. Packer Test (Single/Double Packers)
6. Field Permeability Test (Rising Head/ Falling Head Methods)
7. Dilatometer Test (30MPa DT)
8. Acoustic Televiewer Survey / Optical Televiewer Survey
8. Hydraulic Fracturing Test
10. Cone Penetration Test (20tons CPT)
11. Plate Loading Test (PLT)
12. Downhole Seismic Survey
13. PS Suspension Logging

Commonly used In-situ Testing:

It is important to know that In-situ soil testing can help us to understand better the field characteristics of soil/rock and to obtain more representative data which can not be covered completely by laboratory tests.

SPT and VST are the most common types of in-situ tests adopted in the site investigation works for the determination of soil resistance of sandy and clayey soils, respectively in view of its common availability, wide application and experience gained in local practice. Besides undrained shear strength, the sensitivity of Clay is also determined by VST.

Cone Penetrating Test

CPT is another popular method for soil profiling in reclaimed land or marine deposits including the measurement or porewater pressure dissipation in clay layers, e.g. marine clay, organic clay or fluvial clay. The main advantage it has over borehole is the continuous profile and quick process. However, it can only be used to supplement the borehole profile due to its limitations, e.g. unable to penetrate into hard soil and unable to recover soil samples for index tests and soil classification.



From left to right: Packer Test, Dilatometer Test readout, Lowering of Dilatometer probe into borehole

Borehole Logging In-situ Testing

Packer test also known as “Lugeon Test” is widely used to estimate the average hydraulic conductivity of rock mass. It tests for the formation permeability performed by quantifying the volume of water taken in a section of test hole under different pressurized periods. The Packer Test is primarily used in variably permeable formations under fracture evaluation.



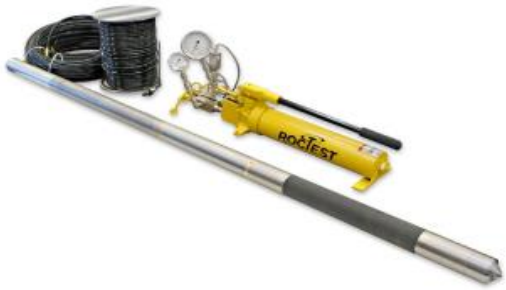
From left to right: Vane Shear Test, Downhole Seismic survey, PS Suspension Logging

Geophysical Techniques

Ryobi G offers more than just the conventional Borehole Logging and In-situ Testing. We have a combination of conventional SI works as well as geophysical tests, for instance; Downhole Seismic Survey and PS Suspension Logging. Both of these techniques employ the uses of seismic waves to analyse the foundation and soil profiling relative to seismic velocity. These geophysical techniques are also gaining prominence in the recent years as techniques that could be used to cross-check the results from the borehole exploration works in addition to its main purpose for the determination of special parameters required for seismic design.

Our specialty

Ryobi G is proud to be the only service provider in Singapore to have the high capacity Dilatometer Test. This test is able to determine the strength and lateral stiffness of rock under high pressure up to 30MPa. Dilatometer test is gaining prominence in the local context due to the growing demands from many deep underground works in rock formation.



Sampling

Drilling rigs, hand augers and collection tools are usually gather to collection soil samples from the ground. There are 2 main types of soil samples for collection in the local SI practice, i.e. disturbed samplings and undisturbed samplings.

Undisturbed soil samples retain the structural integrity of the in-situ soil and can be used for the both index tests and mechanical tests (e.g. shear strength, permeability and compressibility, etc.).

Disturbed soil samples can only be used for soil classification and index tests to determine the soil physical / chemical properties (e.g. grain size distribution, Atterberg Limits, particle density and chemical contents, etc.)

Sampling:

1. Undisturbed Soil Sampling:

a. Thin-walled Tube Sample
b. Piston Sample
c. Mazier Sample
d. Block Sample

2. Disturbed Soil Sampling

a. Thick-walled Tube Sample
b. Split Spoon Sample
c. Bulk Sample

3. Rock Sampling

Triple diamond core barrel for cores in NQ, HQ, PQ sizes.

Undisturbed soil sampling : Mazier Sample

Undisturbed soil sampling: Thin-walled Tube Sample