FOUNDTEST

TECHNICAL SPECIFICATION FOR SOIL INVESTIGATION

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1.0 GENERAL

1.1 Introduction

Foundtest Drilling Sdn Bhd is a professional engineering firm which specializes in construction testing services including Soil Investigation. The Boring Plant used was 'YWE D90R' which is capable of boring and drilling to the depth indicated in the Bill of Quantities and Drawings. These boring rigs are also suitable for advancing the borehole, sampling, in-situ testing and rock drilling in accordance with the relevant specifications of each of these operations

1.2 Purpose

The objective of the site investigation works was to obtain geotechnical engineering data needed for the cost estimation and design of the foundation for the proposed development

2.0 SCOPE OF WORKS

The scope of works involved in this investigation include the followings :-

1. To carry out exploratory borehole.
2. To carry out Standard Penetration Test and obtain disturbed samples.
3. To obtain Undisturbed Sample with thin wall sampling tubes.
4. To observe ground water table.
5. To carry out Laboratory Test on Soil Sample and rock core sample.

3.0 DESCRIPTION OF FIELD EXPLORATION WORKS

3.1 DEEP BORING

3.2 Deep Boring Plant

The Boring Plant used was 'YWE D90R' which is capable of boring and drilling to the depth indicated in the Bill of Quantities and Drawings.

These boring rigs are also suitable for advancing the borehole, sampling, in-situ testing and rock drilling in accordance with the relevant specifications of each of these operations.

3.3 Method of Advancing Boreholes

The methods for advancing the boreholes were rotary wash boring, continuous sampling rotary drilling or a combination of these methods. When undisturbed samples were taken, a reasonably clean hole was provided and the portion of the soil to be sampled was not unduly disturbed.

3.4 Size and Depth of Boreholes

The size of boreholes was such that all the requirements of the sizes in sampling, in situ testing, etc were satisfied

3.5 Rock Drilling

When rock is encountered, NMLC diamond core drilling shall be carried out into rock in accordance with ASTM D2113-99: "Standard Practice for Rock Drilling of Rock for Site Investigation". The Core Recovery Ration (CRR) and the Rock Quality Designation (RQD) as described below will be reported for each core run. The diameter of the core barrels used were such as to produce a rock core of 54.0mm diameter size i.e. NMLC core barrels.

Good quality core is defined as intact core having a fully circular circumference or in the case of broken rock fragments assembled to form cores with a fully circular circumference. The CRR shall mean the ratio of the total length of the good quality cores over the drilling, expressed to the nearest 5%. The RQD is the ratio of the total length of good quality cores each exceeding 100mm in length, over the drilling run, correct to the nearest 5%.

Drilling runs shall not exceed 1.5m length and the core barrel shall be withdrawn and core removed as often as may be necessary to secure the maximum possible amount of core recovery.

3.6 Sampling in Boreholes

Disturbed samples were obtained by means of split spoon samplers, which equipped with flap retainer or other attachments necessary for cohesion less soil. The maximum amount of soil sample obtained was such that the quantity is sufficient to carry out various classification tests.

Undisturbed samples were taken with thin-wall tube sampler described in BS 5930 or as directed. 50mmØ thin-wall tubes shall be used to collect undisturbed samples for laboratory testing to determine the physical (particularly triaxial strength tests) properties of various soil strata encountered in the boreholes.

3.7 Field Testing

Standard Penetration Tests (SPT) was carried in accordance with Test No. 19 BS 1377:1990. 'Determination of the penetration resistance using a split barrel sampler and a self tripping hammer of approved design".

Generally, is carried out in all types of soil except the very soft and soft clays, at 1.5m intervals or change of strata or as instructed by the S.O. representative.

The value of the N as defined in the B.S. method was reported together with the number of blow counts for each 75mm penetration of the sampling tube. The blow counts for the first 150mm penetration (the seating drive) which do not contribute the value of N was also included.

Two examples are 2,3,6,7,10,19 will give N=42 and 10,12,35 15/25mm will give N=50/100mm. When a penetration resistance of 50 blows for 25mm penetration was encountered in a seating drive the test would stop and the SPT value would be N*=50/25mm. The soil samples recovered from the split barrel were preserved as disturbed samples as disturbed samples for subsequent testing.

3.8 Borehole Termination Criteria

Generally, each site investigation job would have specific termination criteria of borehole that suits to the subsurface profile and design requirements of the consultant engineer. Therefore, we would follow up closely with the design engineer on the bore termination criteria that is required. If there is no specific decision from the design engineer, our termination criteria proposed will be as follow: -

Proposed Termination Criteria (General)

The borehole shall be terminated when:

(i) Standard Penetration Test 'N' value reaches 50 blows in 7 consecutive tests **OR**
(ii) On encountering rock and drilling for 3m length
(iii) On reaching a maximum depth of 40.0m whichever comes first.

3.9 Ground Water Observation

The observations of ground water level in the boreholes were done using either a tape rod diameter or rule or electric dip-meter as directed by the S.O. representative.

In cased borehole, before a day's work was completed, the casings were rolled up about 0.3m and the left in such a position overnight. The recordings were repeated daily while boring for that particular hole in progress and were taken at the following time intervals.

a) Before work commences in the morning.
b) At the end of the day's work.

The water levels recorded in the borehole logs were levels observed in these investigation holes during the period of the site investigation. Such observed levels may not necessarily be the actual groundwater levels that are subject to seasonal fluctuations from time to time.

For boreholes involving impervious stratum, the casing top was capped overnight to prevent entry of rainwater and subsurface water.

3.10 Preservation of Disturbed Samples

Disturbed samples were normally preserved immediately after being recovered in doubled layered heavy polyethylene bags sealed to form an airtight bag. Properly contained samples were stored under a shelter away from the sun and rain.

3.11 Preservation of Undisturbed Samples

About 40mm of the soil were removed from the top and bottom of the thin-wall sampling tube. Then the ends of the tubes were filled with non-shrinking microcrystalline wax.

3.12 Labeling of Soil Samples

Disturbed soil samples were labeled clearly and indelibly marked with the name of the project, borehole numbers, depth of sampling, date taken and the type of samples were placed inside the polyethylene bag.

The bags were also marked with the sample number, borehole number and the project number with the same legend used in the bore logs. As for undisturbed samples, additional information is required in the label includes the recovery ratio and the maximum hydraulic force/dynamic force used to secure the samples. The label was placed just below the cap at the top of the sample.

3.13 Storage and Transportation of the Soil Samples

All samples were stored orderly at the site in protective boxes in a dry place under cover until they are dispatched to the laboratory. The undisturbed samples were placed in wooden boxes with partitions and packed with sawdust, paper etc. to prevent damage during transit.

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3.14 Laboratory Testing

Soil samples that were collected during the fieldworks would be transported to the appointed geotechnical laboratory for testing. The following soil laboratory test is to be carried out upon receiving instruction from the consulting engineer:

a. Classification Test (MC, Atterberg Limits, PSD, Density, LS, etc)
b. Soil Strength Test (UCT, UU, 1-D Consolidation, CIU, Shear Strength, etc)
c. Chemical Test (pH, Sulphate, Chloride, Organic Matter, etc)
d. Rock Strength Test (UCT, Point Load Test, etc)