

CHAPTER I

INTRODUCTION



1.1 The necessity for measuring the reliable undrained shear strength

Many methods for measuring the undrained shear strength of soft clay are available. In Soil Engineering history, they ranged from very sophisticated to a simple one, both in laboratory and in-situ field testing conditions. The triaxial apparatus can roughly simulate field conditions, and it is recognized as a versatile device in measuring the shear strength, while the direct shear test is a more simple in measuring the shear strength of soils in laboratory although it has problems with controlling drainage conditions and non-uniform stress distribution. Field vane test is an index in-situ strength test, while Dutch cone penetration results are needed to be correlated to some known strength values from other reliable tests e.g. Field vane test, Triaxial test. In general, the more simple test which can be applied to the real problems the more economic and worthwhile result.

1.2 Purpose of the research

Since in situ field testing has very complex stresses system, and results are very difficult to interpret, the main aims of this research are:

1.2.1 To give the correlation between the strengths from in situ field tests, Dutch Cone and Vane shear, to strength from the reliable laboratory tests which results can be more or less interpreted.

In this research, the consolidated undrained triaxial compression tests and consolidated undrained direct shear tests are considered as reliable tests, as effects of sample disturbance are reduced.

1.2.2 To provide some interpretation of field strength test data. The correlations between strengths in 1.2.1 will give the aid for the interpretation of field test results.

In addition, since in Bangkok area, the vane strengths with Bjerrum's correction factor has been used frequently in practice for stability analyses. For practical uses of the research the correlations will be made between the corrected vane strength with strengths from laboratory tests, and from Dutch Cone tests. For the aim of practical purpose, the laboratory tests will also include the quick direct shear tests, unconfined compression tests, consolidated undrained direct shear tests, and anisotropically consolidated undrained triaxial compression tests. In simple tests, ie. unconfined compression tests and quick direct shear tests, the application of the correlation may be limited, as method of taking soil sample and testing can affect the correlation resulting from sample disturbance.

1.3 Scope of the research

The scope of the research involves the measurement of the undrained shear strength in laboratory and field condition at two sites. The sites are at Memorial Bridge and Teves. To satisfy the purpose of the research, the following strength tests were performed or data were collected as list in table 1.1

Table 1.1 List of data involving in this thesis

Strength Tests	Memorial Bridge site	Teves site
Field Vane test	reported by THENCO and submitted to Norconsult PAE-MEC Joint Venture	reported by KEC.
Dutch Cone test	reported by THENCO and submitted to Norconsult PAE-MEC Joint Venture	Performed by Author
Unconsolidated Undrained Direct Shear Test	-	by Author
Consolidated Undrained Direct Shear Test	by Author	by Author
Unconfined Compression Test	reported by AIT and submitted to Norconsult PAE-MEC Joint Venture	reported by KEC.
Anisotropically Consolidated Undrained Triaxial	reported by AIT and Submitted to Norconsult PAE-MEC Joint Venture	reported by AIT and Submitted to KEC

Results of these tests are then compared to provide not only correlations between tests, but also some interpretation of the complicated field tests.

Other tests were also performed and collected to aid the interpretation of the strength tests. They are consolidation tests, moisture content, Atterberg limits tests. In situ pore pressure data

are also collected at both sites. These laboratory tests were performed by the author, while the in situ pore pressure determination were collected from two sources, at Memorial Bridge site the data was obtained from Norconsult-PAI-MEC Joint Venture and at Teves site data were obtained from piezometric reading station at Anan Throne, installed by AIT for deep well pumping project.

1.4 Application of this research

The outcomes of the research will provide some idea for the understanding of the vane shear tests, and Dutch cone tests. At least, it will yield the engineer what sort of strength these tests are provided. In addition, reliable correlations among strength values may lead to the economic way of obtaining good strength from simple tests. The data in this Thesis however provide only the initial correlations which are needed to be later confirmed with more laboratory tests taking only reliable types.

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