UNIVERSITI TEKNOLOGI MARA

STUDY OF SHEAR STRENGTH ON SOIL USING STATIC STANDARD PENETRATION TEST (SSPT)

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the result of my own work, unless otherwise indicated or knowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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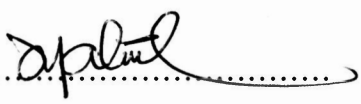
Signature of Student	:	
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ABSTRACT

In this study, a series of laboratory modeling testing is presented to study the shear strength of the soil using static load test performed in a prototype Static Standard Penetration Test (SSPT) tank. Static Standard Penetration Test (SSPT) is a new combination method of Standard Penetration Test (SPT) and Cone Penetration Test (CPT) to obtain an undisturbed sample. The difference is that SPT is driven by blows using the dynamic force to penetrate the sampler into the soil. SSPT is applying the measured force to the rod where the sampler is pushed into the soil continuously using static force at a uniform rate of penetration to collect sample. The transducer and the load cell will be connected to the computer to record every second of time, depth of penetration of the sampler and measured force for the sampler to penetrate into the soil. Subsequently, an analytical formula for determining the shear strength of soil has been developed from the result of unconfined compression test (UCT). It is shown that the formula to determine the shear strength of the soil can be reasonably used.

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CHAPTER ONE
INTRODUCTION

1.1 BACKGROUND

Geotechnical engineers are required to perform subsurface investigation to obtain information on the geotechnical properties of soil for designing earthwork and foundation for proposed structures. They realize that any construction will depend on the strength of soil for the foundation design. Besides, information on subsurface condition in an area of proposed construction is a critical requirement in order to help engineers plan the construction techniques with the help of data from subsurface investigation.

Subsurface investigation usually involves soil sampling and laboratory testing of the soil samples retrieved from their natural location in the ground by the utilization of special techniques and sampling equipment. According to Hettiarachchi and Brown (2009), soil sampling combined with laboratory testing is the most reliable method to determine shear strength properties of subsurface of soil. To develop information on subsurface conditions, it is necessary to establish practice to obtain samples that are sufficiently undisturbed to permit accurate classification of soil.

Readily available and commonly used field testing methods for subsurface investigation to identify the soil below the surface and determine the physical properties of soil are trial pits, borings, Mackintosh Probes, Cone Penetration Test (CPT) and Standard Penetration Test (SPT). Generally, CPT allows continuous recording of soil profile changes with depth without obtaining soil samples and it can measure the shear strength of the soil using the cone resistance (qc). This method has been widely used because it is faster than other subsurface investigation tests and most suitable for soft soil.

However, the Standard Penetration Test (SPT) is a soil sampling procedure that is well-established, quick, relatively inexpensive, rugged and unsophisticated method that was developed in United States around 1902 by the owner of the Gow Construction Company, Charles R. Gow. It has also undergone refinements with the respect to equipment and testing procedure (Massarsch, 1999). SPT is an in-situ