

CHAPTER 1

INTRODUCTION

1.1. Background

The base is the load-bearing layer positioned immediately below the pavement layers, and serves to provide strength and support to the overlying pavement. This layer is formed by spreading the aggregate in a layer of certain thickness and then compacting it with heavy equipment until the material forms a dense layer of interlocking aggregate. To perform well, base and aggregates must be strong and durable, and must meet very specific gradation requirements.

Traditionally, aggregates for base and subbase applications were composed of sand, gravel, crushed rock, quarry stone and other virgin mineral materials that provided the necessary strength and durability. The strength of the ground that would be used as the base layer is measured with parameter of the load bearing capacity.

Pavement designs require the basic method in determining the value of the soil's capacity in bearing the load above, whether the people or, mainly, the vehicles passing through the surface. This design trend is based on the mechanistic and empirical methods, where the methods use the value of elastic modulus of the ground, while the empirical ones use the values of CBR (California Bearing Ratio) of the soil.

Nowadays the estimation of moduli of the base soil using the weight deflectometer equipment is widely used. However on some cases, such as on assessing the base course, this device could be costly procedures. In this study, the test is run by using the DCP equipment or Dynamic Cone Penetrometer and the Lightweight Deflectometer (LWD). While the subgrade and base are very important part of the pavement road, these tools used to perform the tests are characterized as non-destructive and portable. Compared to the previous heavier version such as Falling Weight Deflectometer (FWD), these two equipments are rather easier to use. LWD and

the DCP are simply-designed and consume less time considering the capability of estimating quick result of modulus and other parameters related to the soil evaluation.

1.2. Objective

The aim of this study is to evaluate the using of Dynamic Cone Penetrometer and the Lightweight Deflectometer towards the base layer, by comparing and correlating the result of the test on sample of natural ground alongside the road area of Rajamangala University of Technology Thanyaburi, Thailand (RMUTT). Existing previous studies are provided to support the test performed in this study.

1.3. Scope of Study

The scopes of this study include :

1.3.1. Object of the study are tested points determined by the authors, in the area of RMUTT. The study is conducted on the side of Tscheikuna Road.

1.3.2. The Parameters include the modulus of elasticity (LWD) and CBR (DCPI);. From the LWD derived the E and deflection values, while the DCP index is used to calculate the value of the CBR of the soil.

1.3.3. Present project consists of field testing only (in-situ determination) without further laboratory test. For the selected sites, both the DCP and LWD test are performed at the same location allowing comparison between the results of these two devices.

1.4. Expected Result

Output of this study is expected to result in the relationship between DCP test with the LWD. The estimated in-situ CBR values obtained from the Penetration test with DCP is then plotted with the results of parameters derived from LWD test. The LWD results in the deflection (d) of the soil and shows the modulus of Elasticity (E) as well as the modulus of subgrade reaction (k). The penetration depth and CBR from the DCP are expected to have values where could correspond with the moduli showed by the LWD.

