Suction Pressure -Water Content Relationship for a Laboratory Compacted MH Soil

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Abstract: In this study, relationships between the soil suction pressure with moisture content and dry density for a compacted (Standard Proctor) MH soil was investigated. The Suction pressure reached a stable value in 24 hours and it linearly decreased with increase in moisture content for the soil investigated.

1- Introduction

Soil suction is one of the most important parameters describing the moisture condition of unsaturated soils. The measurement of soil suction is crucial for applying the theory behind the unsaturated soils. Therefore studying the behavior of the soil in the active zone based on the suction pressure gives better understandings of the soil behavior (Bulut, 1996).There are several reasons to compact soil including increases the load-bearing capacity and reducing soil settlement. Many studies have used tensiometer suction measurement to monitor the soil suction at various sites (Cui, and Laure, 2007; Jeong, 2008).

2- Objectives

The objective of this study was to investigate the soil suction pressure in the compacted MH soil (standard proctor method) at various moisture contents.

3- Methods and Materials

The properties of soil used in this study are summarized in Table 1. Based on the index a property of the soil it was characterized as a MH soil.

Table 1. Index and Compacted Properties of Soil

Soil Type	% Passing Sieve #200	Natural Water Content %	L.L %	P.I %	O.M.C %	Max. Dry Density (pcf)
MH	97	38.6	82	38	29.2	77.4

The 2100F Soilmoisture probes were calibrated before using for suction measurements. Five compacted soil samples with different water contents (10, 15, 20, 25and 30) %, above and below the optimum moisture content, were tested. The soilmoisture probes were installed horizontally in the middle of the compacted samples which were placed and sealed in plastic bags. Suction pressures are measured with time for over three days.

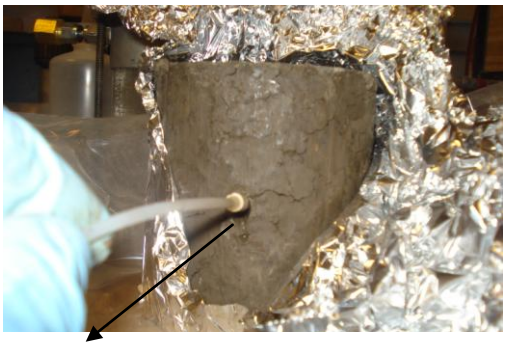
4- Results and Analysis

Suction pressures in the compacted soil samples reached a limiting value in a day. The suction pressure decreased linearly with increasing amount of water content. The suction pressure - moisture content relationship was as follows:

……. (1)

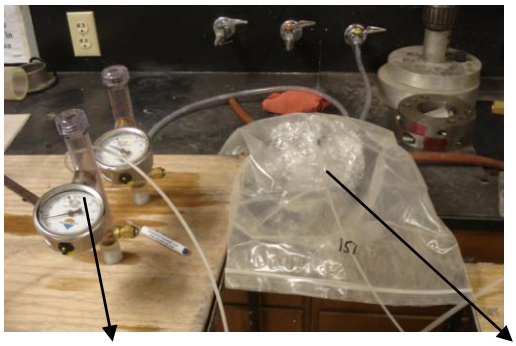
Where:

Ua = Suction pressure (psi), WC% = Percentage of moisture content, Coefficient of correlation (R) =0.97



Installation of probe in the sample

Figure 1(a)



Suction Dial Gage *Compacted Soil*

Figure 1 (b)

Figure 1. Tensiometer Suction Probe Setup

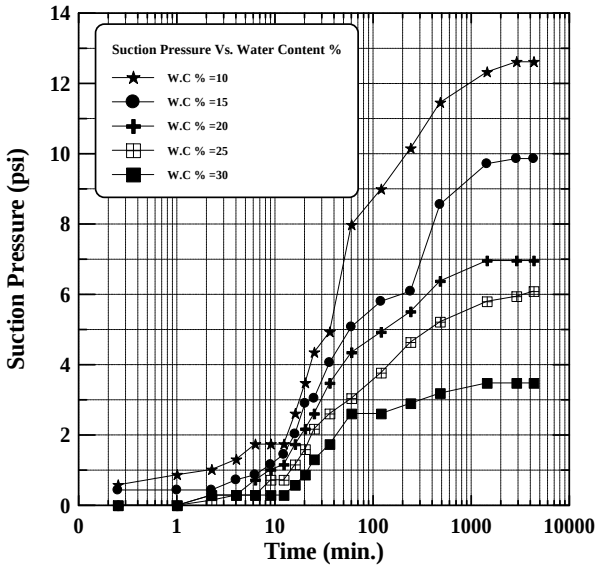


Figure 2.Suction Pressure vs. Time

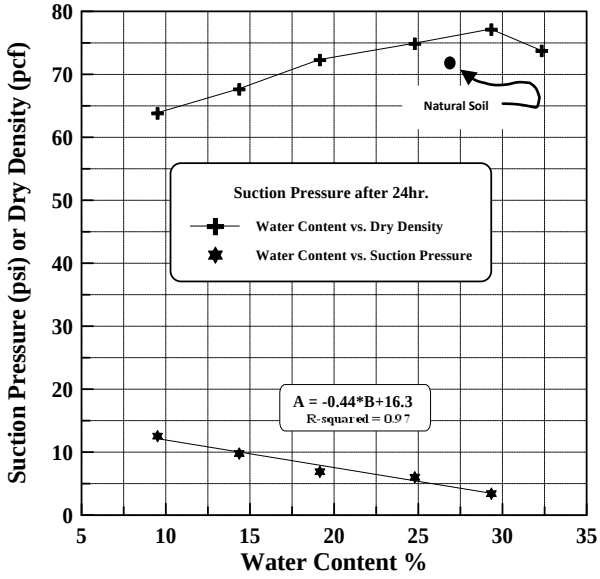


Figure 3. Relationships between Suction Pressures, Water Content and Dry Density

5- Conclusions

Based on this study on a MH soil, the soil suction pressure linearly decreased with increasing amount of water content. Also the soil suction pressure stabilized at the end of 24 hours.

6- Acknowledgements

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7- References

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