

Relationships between the Compressive Strength and the Testing Method for Cemented Soils

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ABSTRACT

The application of cemented soil is generally found in substrata within the deep ground, and hence, pressurized curing tests have not been regarded as very important. However, pressurized curing tests become an important research topic, from the viewpoint of design and construction, in terms of grasping the highly compressive characteristic of cemented soil in the depth direction under pressurized curing conditions which can be applied to cemented soil material in deep substrata in the future. A clarification of the difference between the compressive strength of a specimen obtained by core boring and the compressive strength of a specimen under pressurized curing conditions is necessary in order to accurately understand the compressive strength of cemented soil generated in its original state towards the direction of depth in the underground. In this research, three kinds of experiments, namely, "Non-pressurized", "Pressurized-pressure released", and "Pressurized-pressure un-released" tests, were carried out on cemented soil under pressurized curing conditions for the purpose of establishing the relationship among curing, the testing method, and the compressive strength.

Key words: cemented soil, compressive strength, sand, clay

INTRODUCTION

In general, cemented soil is used as construction material in most parts

of shallow foundations, but its application in pressurized curing tests is not so prevalent. Nevertheless, this application is an important research topic, from the viewpoint of design and construction, in terms of grasping the highly compressive characteristic of cemented soil in the depth direction under pressurized curing conditions which can be applied to cemented soil material in deep substrata in the future.

Whitfield (1953) reported on the mechanism of compressive strength, based on pressurized curing, whereby the compressive strength of mortar increases due to the infiltration of water into the cement particles when the cement paste is cured by pressurizing. Yoshimoto et al. (1976) suggested that the cause of this fluctuation in the compressive strength of mortar under high pressure is due to variations in the curing mechanism of the hydration pressure in the gel part and in the internal pore pressure in the specimens. These findings are of great significance to learning about the compressive strength characteristic of cemented soil. Tamano et al. (2004) illustrated the compressive strength characteristic of cemented soil by studying the case of a buried pile construction in which the compressive strength of a sample specimen obtained by core boring was found to increase with the depth of the sample which was composed of the same material as that taken from the underground pile. In addition, Consoli et al. (2000) reported that progressive consolidation leads to an increase in compressive strength.

However, it is necessary to accurately grasp the mechanism behind the difference in compressive strength between the sample collected from