

Evaluation of Collapsibility Potential in Soil Layers Based on Practical Methods (Case study: Hir City-Ardabil Province)

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(Date of received: 15/08/2018, Date of accepted: 21/02/2019)

ABSTRACT:

Collapsible soils is one of the problematic soil because of complex mechanism collapse in them, the recognizing and analyzing effective parameters on phenomenon is so important. Collapsible soil is non- saturate soil, due to moisture and specifically loading, connection between soil particles become loose and finally suddenly destroying happen in soil layer. In this study, collapsible potential in soil layers of Hir city based on practical methods were evaluated. 16 specimens were collected in study area. Practical methods were divided to qualitative and quantitative criterions. In quantitative procedure, double oedometer test based on ASTM were performed. Results of this study showed that between qualitative methods there is not good agreement. Although, quantitative procedure proposed high risk in terms of collapsibility in soil layer.

Keywords: Soil collapsibility, Quantitative methods, Qualitative methods, Hir city, Ardebil.

1- Introduction

Collapsible soil is one of the problematic soil in construction projects and civil engineering. These soils can cause asymmetric settlement in soil layers under foundations and other damages in buildings and life lines. Collapsible soils in natural moisture condition have suitable strength and bearing capacity. While, saturation degree in collapsible soils because of increasing moisture go up, reducing in volume and void happen quickly between soil particles. Collapsible phenomenon occur due to losing connection strength between particles [1]. During to collapsibility, absorption of water and moisture by soil particles molecular force between aggregates because of difference mechanism such as softening, loss of capillarity force between particles for saturation decreases. This phenomenon can be occurred in soil layers with loose particle skeleton such as silty, fine sandy, sandy clay soils [2]. Properties of collapsible soil is including: high void ratio (more than 40%), low saturation degree (less than 60%), high silt content (between 30% and 90%) and quickly softening in soil particles (less than 1 minute) [3]. Collapsible soils can be observed in Aeolians (such as dune sand with low silt or clay content and high void ratio), residual soils and sediments due to muddy floods. Loess soils have collapsibility potential can be founded in desert areas in Iran, South of Kashan, Kerman province, Agh Ghala in Gorgan province, Masjid Soleiman city and Sivand in Fars province [4]. Nowadays, extensive researches have been performed for identifying collapsibility in soil layers. Clevenger in 1959 proposed a method based on maximum dry weigh [5], Gibbs and Bara in 1962 [6], Denisov in 1964 [7], Feda in 1966 [8] prepared a new