

Why do engineers need to have a working knowledge of soils research paper example...

[Experience](#), [Failure](#)



Introduction

Expansive soils form a major challenge to many civil engineering structures. According to Al-Rawas and Goosen (507), expansive soils are major problem since they have a high potential to react to changes in the moisture content. Increase in moisture content causes the expansive soils to swell and when the moisture content decreases, the volume of the soil reduces.

Consequently, the alternate swelling and shrinkage causes cracking in lightly loaded civil engineering structures such as foundations. Additionally the cracking can be found in airports, pavements, and retaining walls.

A common foundation failure that is related to soils is cracking. Cracking affects the civil engineering structures in many different ways especially in altering the foundation and reducing the strength of the concrete structures. An example of such a failure caused by expansive soils was witnessed in Turkey in the City of Ankara, in 2009. The retaining wall located in the University of Gazi had toppled over. Based on the investigations conducted it was established that the failure of the retaining wall was linked to the presence of expansive soils in the foundation. Additionally light structures in the campus experienced cracking at the corners and the windows.

Figure 1: Cracking due to Expansive soil in the foundation

Mitigating the Problem of Cracking in Foundation of Expansive soils

Prior to establishing the foundation, tests need to be conducted to ensure that, the soil properties are clearly determined. If the tests reveal presence of expansive soils, chemical treatment can be applied. According to Al-Rawas

and Goosen, calcium chloride is a common treatment used in altering the swelling properties of soils. The calcium chloride absorbs moisture and prevents the development of cracks.

Additionally, engineers can excavate and replace the expansive soil with a non-expansive soil. The excavation is done up to the depth where seasonal fluctuations of moisture occur (Al-Rawas and Goosen 508). A common method used in this case is the sand cushion method. This involves replacing the expansive soil with a layer of sand, which is compacted to the required density and thickness. In cases of increasing moisture, the saturated sand will occupy a less volume thus provide room for any heaving that may occur from the expansive soil. In cases of shrinkage, the unsaturated sand bulks and occupies the extra space that may be due to shrinkage of the expansive soil. Additionally, granular pile anchors can be used to increase the load carrying capacity of expansive soils and reduce settlement (Al-Rawas and Goosen 515).

Knowledge on the behavior of soils is important for engineers. According to Al-Rawas and Goosen (508), the cost of repairs that are incurred due to damages caused by expansive soils is estimated to be over a billion US dollars. Having the knowledge of soils helps the engineer to use properly the principles of foundation engineering to design strong and stable foundations.

Works Cited

Rawas, Amer Ali, and Mattheus F. A. Goosen. Expansive soils: recent advances in characterization and treatment. London: Taylor & Francis, 2006. Print.

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