Mineralogy of Yanaizu's expansive soil was studied using X-ray diffraction analysis (XRD).

Furthermore, microlevel tests like cation exchange capacity (CEC), scanning electron microscopy (SEM), and energy dispersive spectroscopy (EDX) will also be used to determine the main microlevel governing improvements in the expansive soil. The result of XRD analysis identified the presence of Montmorillonite, Vermiculite, and Cristobalite in Yanaizu expansive soil (YES). SEM-EDX analysis will be made to discover the expansive soil particle rearrangement showed crushed, twisted, or flaked soil particle crystals in a joined pattern. Also, the contact among the particles is surface-to-surface or surface-to-edge. Therefore, the macro and micro level improvement study of YES due to DE and HL application is being studied.

Keywords: Yanaizu Expansive Soil, Diatomaceous Earth, Hydrated Lime, Macro and Micro Level Improvement

Experimental Evaluation of Geotechnical Characteristics of Pseudo-Expansive Soil Modified from Unsaturated Clay Soils

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Expansive soil is a typical problematic soil for geotechnical engineering applications; that is not broadly investigated outside of the region it exists. The fundamental problem of the expansive soil is associated with volume change behaviors mainly swell-shrinkage characteristics. The soil severely expands/swells during the wet season and shrinks during the dry season. These characteristics cause unprecedented damage to the lightly founded buildings and road subgrade constructed in this type of soil. The subject of this article is to manufacture artificial/pseudo-expansive soil from the combination of unsaturated clay soils such as kunigel-V1, kasaoka clay, and tochi clay soils. This article also aims to evaluate the geotechnical characteristics of pseudo-expansive soil modified from unsaturated clay soils. The numerous aspects of the combination of the soil (kunigel-V1, 21.8%, kasaoka clay 39.1 %, and tochi clay, 39.1%) by weight were experimentally tested based on standard geotechnical testing procedures. The chemical composition and mineralogical analysis were also carried out by using XRD, and SEM image analysis. The consistency limit values viz., liquid limit,plastic limit, linear shrinkage test, free swell ratio, and other various tests were performed to evaluate the characteristics of modified soil against the original soil. The test results provided that the pseudoexpansive soil modified from the unsaturated clay soil demonstrated similar geotechnical characteristics to the original expansive black cotton soil.

Keywords: pseudo-expansive soil, modified clay soil, geotechnical characteristics, microstructural analysis, shrink-swell behavior

Permeability of Soils Treated with Fine Shredded Paper (FSP)

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The hydraulic conductivity is one of the fundamental engineering properties of soft soils, as it has a crucial role during the settlement of the subgrade soils when it exposed for variation of moisture content.

Mostly the coefficient of permeability of the soil is highly related with its porosity. In addition, the shape of the pores and how they are interconnected influences the hydraulic conductivity.

Previously some improved characteristics of soft soil mixed with finely shredded paper (FSP) were investigated. In this paper our study is mainly focusing on the effect of FSP addition on the hydraulic conductivity properties of clays. As this additive has high water absorbing characteristics and clearly unknown its effect on the permeability of treated soils.

The specimen is prepared by dry mixing of Kasaoka clay with different amount of FSP and 1.2 liquid limit of the mix. Saturated slurry of the specimen assembled on odometer for consolidation process. From the results, the treated soil with large amount of FSP additive shows largest consolidation which indicates intrusion of FSP keeps the void ratio higher and makes the mix more compressible.

The hydraulic conductivity is obtained from the falling head permeability cell using modified triaxial cell setup for this experiment. From the permeability tests it obtained that, the soil treated with 20% FSP has the largest hydraulic conductivity with respect to pure clay which indicate the FSP additive increases flow of water across the specimen due to its (i.e., FSP) particle size and pervious nature.

Keywords: Permeability, Kasaoka clay, and finely shredded papers