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Shear strength of naturally cemented calcrete soil compared to artificially cemented and un-cemented sand

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Statement of the problem: Cemented calcrete soil is commonly present in semi-arid areas and can form a good construction material as road bases, however wetting can cause distress problems. Such a calcrete deposit is available in North Jordan and has not been characterized for angle of internal friction and cohesion under dry and wet conditions.

Methodology & Theoretical Orientation: Direct shear tests were carried out on naturally cemented calcrete soil and artificially cemented sand following multi stage test procedure to determine their angle of internal friction and cohesion. Both undisturbed and reconstituted samples of the calcrete soil have been tested. Un-cemented sand is also tested to obtain reference strength parameters for comparison purposes. Each sample was sheared until failure, at an initial normal load which then increased incrementally for three additional stages.

Findings: The first peaks of the multistage testing on naturally cemented calcrete soil showed a friction angle between 31o and 63^{o} and cohesion between 10 to 150 KPa, while artificially cemented sand gave values between 32^{o} and 70^{o} and cohesion ranging from 7 kPa to 200 kPa. Later peaks of artificially cemented sand and naturally cemented calcrete soil gave angle of internal friction of 35^{o}, like those of un-cemented sand and reconstituted calcrete due to the breakdown of the bonding after the first stage of shearing.

Conclusion & Significance: The naturally cemented calcrete proved to possess high shear strength that makes them good foundation soils and suitable as road bases; however, they lose a considerable percentage of their strength upon reworking and wetting. Recommendations are made to determine the compaction characteristics and consider the influence of wetting on the shear strength of calcrete deposit.

Biography

Shaqour F has completed his PhD in Engineering Geology from Leeds University of UK. He has many years of experience in teaching undergraduate and post graduate students in Australian Universities and overseas with proven research track record and management of research and engineering projects. He has published high standard research articles in reputed international journals. Currently his research is on improvement of clay soils using cement dust, lime and geopolymerization. He has strong technical background on Engineering Geology, Hydrogeology, Engineering Materials and, with excellent written and oral communication skills. He has reviewed many articles to the *Journal of Engineering Geology* and other journals on various geotechnical aspects including soft soils and clays.

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