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Thesis Title: A Study of Load-Deformation behaviour of
coarse aggregate blended sandy soil.

ABSTRACT

The structures of all types i.e. buildings / bridges/ high ways & other structures, rest directly on the soil beneath them, hence proper analysis of soil and the design of foundation become necessary to ensure that these structures remain stable and safe against collapse due to unequal settlement

In order to assess the bearing capacity of soil, shear strength is the most important parameter. All stability analysis whether they are related to foundation of structures, slopes, embankments, pavements etc. involves the basic knowledge of the shearing resistance of the soil. There is hardly any problem in the engineering field which does not involve the shear properties of the soil in some form or the other.

There are many portions of the country where stratum consists of soil- coarse aggregate composition . The construction of foundations really involves intricate problems at these sub soil system. The observation of shearing resistance of such composite mass is essential.

In the present investigation, direct shear test was carried out on the sand blended with coarse aggregate of different sizes and proportions. For this reason, shear box test has been preferred. The direct shear tests has been carried out on the sand blended with coarse aggregate of various sizes and proportions. To strengthen the sub soil strata, coarse aggregates of 10mm and 20mm sizes were mixed in the sand in various proportions. The bearing capacity of composite sand mass is analyzed as per IS 6403-1981. It is observed that the bearing capacity so obtained is increased from 102.85 % to 350.46% for aggregate mixes of 5 % to 30% of 10 mm size, where as it increases from 129.69% to 501.09% for aggregate mixes of 5 % to 30% of 20 mm size. At any level of percentage mix of ggregates, the bearing capacity of blended composite mass is more than unblended sandy material.

In order to find the active earth pressure, Coulomb's equation has been used. The co-efficient of active earth pressure has been estimated for sandy soil with and without blended with coarse aggregate. It was observed that the co-efficient of active earth pressure reduced considerably and the reduction factor ranges from 15.28% to 24.09 % for the aggregate mixes of 5% to 30% of 10 mm size, where as it ranges from 17.88% to 29.03% for aggregate mixes of 5% to 30% of 20 mm size.

In the present investigation, CBR test was carried under similar condition as in direct shear test. It was observed that the percentage improvements in the CBR values ranges from 20.99 % to 115.83% for aggregate mixes of 5% to 30% of 10 mm size where as it increased from 31.30% to 151.94% for aggregate mixes of 5% to 30% of 20mm size at optimum moisture contents (OMC).

In the present investigation, the plate load tests were conducted to study the behaviour of sand blended with coarse aggregate of various sizes and proportions under similar condition as in Direct shear test & CBR Test.

. To strengthen the sub soil strata, coarse aggregates of 10mm and 20mm sizes were mixed in the sand in various proportions. The sand samples were prepared and tested first without mixing coarse aggregates, then by mixing coarse aggregates in varying percentages by weight starting from 5% to 30%. The plate load tests were conducted on 100mm, 150mm and 200mm diameters mild steel plates which indicate that with the increase in the size of the bearing plate, the bearing capacity of sand bed decreased (for plate settlement of 25 mm). There is reduction in the footing settlement with the percentage increase of coarse aggregate in sandy soil. The improvement in the bearing capacity was measured up to 160.71% to 302.68%, 148.08% to 291.12% and 146.40% to 284.40% due to aggregate mixes of 5% to 30% of 10 mm sizes for 100 mm, 150 mm and 200 mm dia plate. The bearing capacity improvement factor of 161.84% to 247.56%, 166.19% to 236.75% and 148.23% to 245.92% due to aggregate mixes of 5% to 30% of 20 mm sizes for 100 mm 150 mm and 200 mm dia plate were achieved. The reduction in settlement of plates has been recorded for the above mixes ranging from 48% to 93%, 56% to 96% and 67% to 96% for 10 mm sizes aggregate where as 61% to 97%, 81% to 99% and 91% to 98% for 20 mm sizes aggregates.