## Correlation of Unconfined Compressive Strength of Soil with Size of the Test Specimen*

*by*

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**1. R.J. Dave****

The writer appreciates the efforts of the author for developing the relation between water content, unconfined compressive strength and the diameter of specimen. The following Points are projected for discussion :—

1. It is given that the strength of the specimen is dependent on various factors such as :—size, water content etc. and that the strength measured by unconfined compression test depends on the geometric proportion of the specimen. The author has established the relationship of strength with the diameter of the specimen without mentioning for its length. This needs justification.

2. Having observed that the strength varies with the diameter of the specimen, it is interesting to know whether any suggestion is made for specific diameter i.e. geometric proportion to get the standard strength.

3. It is observed generally that the instrumental as well as observed accuracy is constant irrespective of the size of the specimen. Hence, the resultant strength of the larger size specimen will be affected least and the smaller size will be affected more.

4. It may recalled that Mohan (1957) has correlated the liquidity index ($IL$) and shear strength ($\tau_f$) of remoulded specimens of Black cotton soil. The relationship is

$$\log_{10} (\tau_f) = (-)0.053—2.45\ I_L; \qquad \ldots (4)$$

Where, shear strength (kg/cm$^2$) is assumed half of the unconfined compressive strength.

He has further clarified that there is no appreciable difference in strengths of undisturbed and remoulded specimens because of the sensitivity characteristics of Black-cotton soil. Now, the liquidity index ($IL$) being a function of water content, liquid limit and plasticity index, the writer desires to know whether the Equation (1) given by the author can any way be compared with the above relationship ?

5. The author has plotted the experimental data on semilogarithmic graph paper (Figure 2). It appeared that there is discrepency in writing

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* Published in Indian Geotechnical Journal, Vol. 4 No. 4. October, 1974, pp. 362-368.

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the figures Y—ordinate in the graph. It starts with 0.30 units and then 0.33 units are shown at a distance of 0.02 units only instead of 0.03 units (0.33—0.30=0.03 units). This is carried over up to the end. It may be checked whether this has any impact on the observations and conclusion drawn.

6. It appears that the experiment is carried out on the Black cotton soil samples and then the conclusion is drawn for general implementation. Being aware of the fragile characteristics of the Black cotton soil how far it is reasonable to apply these observations to other similar soil group ?

2. Dinesh Mohan***

The author has made two significant conclusions in his paper. The firts regarding the relationship between the strength of cohesive soils and the water content of the specimen is well known and has been forward by a number of other workers also. But the second relationship according to which the compressive strength decreases with the increase in specimen size at the given water content needs some further justification. If it is mainly due to disturbance in smaller size samples it is not fair to generalise it. The discontinuity also does not appear to be a possible reason since the difference in fissures, etc., over the small difference in areas would not be substantial. The strength also cannot go on increasing indefinitely with the size of the specimen. It would have been worthwhile to make a field vane shear test and compare the values obtained with lobaratory unconfined compression. The author has mentioned the diameter of the specimen but their height has not been mentioned. It is presumed that height-diameter ratio was the same in all cases.

3. S. K. Shukla*

The author deserves appreciations for establishing relationship among unconfined compressive strength, size of specimen and water content for black cotton soil. Following points are raised for elucidation.

1. According to the title, the paper is supposed to deal with the size of the specimen, whereas the effect of varying specimen diameter has only been studied. Heights of specimens have not been mentioned in the paper. Height to diameter ratio of specimen will affect the test results significantly. It would be interesting to know if this affect was also studied.

2. It is seen from Figures 1 and 2 of the paper, that in case of samples having diameters 3.81 and 6.0 cm, the water content has been varied in a very small range from 40 to 45 percent. In case of 7.62 cm diameter sample, the variation is only from 42 to 45 percent. This may not confirm the trend of the curve as drawn.

3. It is not clear as to how many specimens were tested in each case and how their results varied, that is, what was the coefficient of variation and standard deviation in each case.

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4. In the regression analysis for statistical equations, mention of the values of coefficient of correlation and standard error of estimate could have given a better picture of the test values.

5. The unconfined compressive strength values differ according to the diameter and water content of specimens. Now, the question arises, what value of unconfined compressive strength should actually be adopted for design purposes.

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