

# Geo-electrical Evaluation of Compacted Sand-Bentonite Mix Characteristics

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## Extended Abstract

Recently, the electrical resistivity technique is gaining increasing application in soil investigation studies because it offers a wide range of advantages such as cost-effectiveness, time-saving, covering larger subsurface area, etc. over conventional geotechnical testing methods. Using electrical resistivity technique, correlations between electrical resistivity and geotechnical properties can be established which can be utilized to obtain the insights into in-situ soil properties through field resistivity measurements. The electrical resistivity of soil often depends upon its geotechnical properties [1- 4]. In the present study, sand-bentonite mixes were prepared with fine, medium, and coarse sand in proportions of 90:10, 80:20, 70:30, 60:40, and 50:50 in order to evaluate the effect of sand content and size of sand particles on electrical and geotechnical properties of the mixes. Thus, relating the resistivity of sand-bentonite mixes with geotechnical properties is of interest to enhance the reliability of the electrical resistivity method for various applications. The geotechnical properties of mixes were correlated with resistivity using a fabricated soil resistivity box and electrical resistivity was measured using four-electrode method. The comprehensive parametric study was carried out to relate the void ratio, degree of saturation, relative density, pore fluid and temperature with the electrical resistivity of unsaturated sand-bentonite samples.

The results show a reduction in electrical resistivity with water content, dry density, degree of saturation, and temperature. The percentage of sand content has a significant effect on electrical resistivity of mixes and the results show the increase in electrical resistivity with increase in sand content. Moreover, mixes with fine sand, medium sand, coarse sand show the different electrical resistivity values indicating the effect of particle size. The electrical resistivity of mixes with fine sand shows the least values (ranging between 220 and 3  $\Omega$ -m) followed by medium (300 to 4.5  $\Omega$ -m) and coarse-grained soil mixes (600-25  $\Omega$ -m). The electrical resistivity of sand-bentonite mixes was found to lie between the resistivity values of individual soil types used in the mix. The investigations from the present work can be helpful in assessing the characteristics of sand-bentonite mix used in earthen dam and liners in order to prevent leakages and failure condition.

## References

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