J Geol Geophys 2018, Volume 7
DOI: 10.4172/2381-8719-C1-018

Geo-electrical and geotechnical characterization of shallow subsurface soil from the campus of University of Peshawar, Khyber Pakhtunkhwa

Ihtisham Islam
Faculty of Geology Departments, Shaheed Benazi BhuttoUniversity, Pakistan

The stability of engineered and natural structures like roads, buildings, tunnels, bridges, dams and slopes is the most important aspect of geotechnical engineering. A proper design and successful construction of any structure needs precise determination of engineering properties of soil. These engineering properties are conventionally obtained by geotechnical laboratory investigations performed on soil samples collected from construction site. Sampling from these traditional techniques is generally expensive and time consuming and extraction of an undisturbed soil sample is very difficult. Furthermore, soil properties are subjected to wide temporal and spatial variations and accurate evaluation of soil properties require high density sampling. Geophysical techniques (electric resistivity, seismic refraction, ground penetrating radar etc.) on the other hand have got much attention recently and are commonly practiced in engineering site analysis as they are rapid, cost effective and non-destructive. Among all these techniques, geo-electric survey is an attractive tool for evaluating subsurface properties without any soil disturbance. The study area, university campus is located in Peshawar district. It is comprised of the western part of the Peshawar basin and lies about 10 km of Peshawar city on the main GT road, Khyber Pakhtunkhwa. It is situated at latitude 34°01'09.85" and longitude 71°28'33.48" and about 1177 ft. above mean sea level. Construction of residential flats and research laboratories is proposed by the national centre of excellence in geology and the University of Agriculture, Khyber Pakhtunkhwa. Geo-electrical resistivity survey was conducted to obtain data in the study area and an undisturbed soil sample from boreholes at different depths was collected during the drilling for geotechnical analysis in the laboratory. The results of geo-electrical resistivity data were correlated with geotechnical analysis performed on soil samples and it concludes that electrical resistivity readings and moisture content shows good correlation with regression coefficient R^2=0.716 and that is electrical resistivity reading is increasing with decreasing moisture content because if moisture content value is less there will be less ionic mobility of electrons and higher will be the resistance. Another correlation is made between soil strength parameters i.e. cohesion (C) and angle of internal friction (ϕ) and electrical resistivity data it concludes that angle of internal friction shows good correlation with regression coefficient R2=0.8441 and that is with increasing (ϕ) resistivity also increases while weak correlation has been observed between cohesion and electrical resistivity with regression coefficient R^2=0.4272. Correlation between SPT (N) and electrical resistivity is also observed which is good with regression coefficient R^2=0.80. The results concluded that soil resistivity increases with increasing SPT (N) and angle of internal friction while it decreases with increasing moisture content and cohesion.

ihtisham.islam2463@gmail.com

Notes: