

Interrelationship between borehole lithology and electrical resistivity for geotechnical site investigation

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ABSTRACT

In the modern era of geophysics, Electrical Resistivity Tomography (ERT) is an important tool to be used for early prediction of subsurface mapping. ERT acts to inject electric current to the ground to study the chargeability or the resistivity value of a material. Engineers, geologists and researchers can apply ERT for their subsurface investigation since ERT proves to be very efficient and effective for subsurface mapping in terms of cost, time and data coverage. 2D Electrical Resistivity Tomography survey was performed in Kuala Krau, Temerloh, Pahang to assist geotechnical site investigation. There are two available boreholes (BH 1 and BH 2) lithological data which can be correlated directly with the resistivity profile. One of the boreholes reports a hard rock layer at 9 m depth overlain by silt and clay. This hard layer was represented by a resistivity value higher than 600 Ω m and 10–70 Ω m low resistivity layer overlain the hard layer. The low resistivity layer is associated with saturated silt and clay. Another borehole shows the existence of weathered sandstone at depth 11 m–17 m also overlain by silt and clay. Resistivity profiles show the weathered region from the said borehole contacted edge side of sandstone boulder which is also represented by higher than 600 Ω m resistivity value. 3D voxel was also generated from inverted resistivity values. The 3D voxel has successfully shown the lateral distribution of the geotechnical target. In conclusion, from this study, it is proven that results from ERT can be verified with the results from borehole lithology since the results obtained were almost accurate.

KEYWORDS: Borehole, Electrical resistivity tomography, 3D voxel, Lateral resistivity distribution

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