**ELECTRICAL RESISTIVITY TOMOGRAPHY (ERT) SURVEY FOR FOUNDATION STUDY OF SUSPENSION BRIDGE ON BLUE NILE RIVER, ETHIOPIA**

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**Abstract**

Traditionally the use of core drilling method has been used for several decades in order to investigate the conditions of the subsurface formation as an input for the design of different engineering structures. However, nowadays geophysical techniques are routinely used as part of geotechnical investigations to provide vivid information on site parameters. These methods help in identifying local areas of concern which have no surface expression. Towards this end, the ERT technique shall be primarily devised to obtain vivid pictures of the subsurface for better understanding of the soil rock conditions at depth.

We employed a static 2D ERT survey mode for this specific project, since the floating electrode survey system is not accessible in the country. Pertaining to this we re-designed the static survey mode to suit the underwater survey mode.

The 2D ERT Survey was carried out across the Blue Nile River connecting the two abutments including the water body/200 m span river. The area covered by the water body is the main concern of the study as it is not easy to do core drilling.

The layer below the water body 3 to 7m thickness is characterized by moderate resistivity values less than 36Ωm is attributed to silt deposits. The second layer below the silt deposit is characterized resistivity values between 36~86Ωm is attributed to moderately to highly weathered and fractured basalts in the area.The third layer characterized by resistivity values greater than 100Ωm is attributed to slightly weathered and fractured basalts in the area. The zero layers designated as a water body characterized by resistivity values less than 20Ωm and has average thickness of 7m from the water level.

Therefore it is highly recommended to dig the top 12m soft geologic formations at each abutment during the bridge design. It is also worthwhile to put the piers on average 20m from the water level during the design process of the piers on the water body.