



Evaluation of Geotechnical Parameters using Geophysical Data

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Abstract. The financial implications and the time required for carrying out a comprehensive geotechnical investigation to characterize a site can discourage prospective private residential building developers, especially where a large area of land is to be investigated for construction purposes. Also, most of the geotechnical test procedures utilized during site investigation only provide information on points tested in the subsurface. This research method suggests an approach of investigating the subsurface condition of a site in order to obtain key subsoil geotechnical properties necessary for foundation design for proposed engineering facilities. Seismic wave velocities generated from near surface refraction were combined with percussion drilling and cone penetration tests to obtain a comprehensive geotechnical investigation. From the results of the seismic refraction method, the bulk density of the soil, Young's modulus, bulk modulus, shear modulus and allowable bearing capacity of a competent layer that can bear structural load at the particular study site were determined. The most competent layer was found within the depth observed by geotechnical methods. In addition, regression equations were developed in order to directly obtain the bulk density of the soil, Young's modulus, bulk modulus, shear modulus and allowable bearing capacity from the primary wave velocities.

Keywords: *characterization; environment; geophysical; geotechnical; seismic.*

1 Introduction

The expenses and time required to carry out the geotechnical investigation of a proposed construction site can discourage the building developer, especially if the construction site is a large expanse of land. These challenges have made many private developers carry out various construction projects without undertaking a proper site investigation. One of the implications of this is its significant contribution to the incessant building collapse experienced in many developing countries. An effort to reduce the cost and reliably estimate the geotechnical parameters needed for proper foundation design will bring a sigh of relief to geotechnical engineers and building developers. A combination of

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