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Evaluating the engineering properties of loess soil using shear wave methods.

Pakawat Sriwangpon and Rungroj Arjwech
Khon Kaen university, Geotechnology, Thailand (sriwangpol1981@gmail.com)

Loess covers most areas of Khon Kaen University, located in Khon Kaen province, northeastern Thailand. Loess is identified as collapsible soil. This study aims to find the engineering properties of loess using MASW and downhole seismic, methods. In the MASW method, the shear wave velocity can be inverted from the surface wave's dispersion curve, and the velocity of the compressional wave can be derived from first break picking of the direct wave in the travel time curve. The travel time of body waves (shear and compressional waves) were derived using the downhole method to determine their velocities. The MASW results from 3 study sites show that the shear wave velocities of loess vary from 246 m/s to 329 m/s while velocities of compressional waves range between 355 m/s and 740 m/s. The elastic moduli indicates shear modulus ranges between 84 and 173 MPa while the bulk modulus ranges from 51 to 687 Mpa. The results obtained using the downhole method show that shear wave velocity ranges between 159 and 324 m/s, while the compressional wave velocity varies from 294 m/s to 771 m/s. The elastic moduli shows shear modulus ranges between 35 and 167 MPa and the MPa for bulk modulus ranges from 74 to 727. The derived body wave velocity from the MASW method varies from the data obtained using the downhole method by 22%. Considering that the MASW method is a relatively cost effective and more efficient method, it can be applied as an alternative when determining soil elastic properties.