

Prediction of long-term settlement on soft clay using shear wave velocity and damping characteristics

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Abstract

This paper presents a method of calculating long-term settlement of a loaded pad on soft clay at Klang, Selangor, Malaysia where the soil model is treated as an anelastic material of viscoelastic property. Initially, an elastic shear modulus (G) value from shear wave velocity profiles of the seismic tests from spectral analysis of surface wave (SASW) and continuous surface wave (CSW) tests was obtained. A value of damping (D) at an equivalent elastic strain is then calculated from the hysteresis of the plate load tests corrected to equivalent strain using the Damping-Strain formula. The calculated elastic settlement and its equivalent damping is then used to calculate the long-term settlement by applying the generalised viscoelastic formula. Comparisons to traditional methods of settlement predictions were made and the viscoelastic formula has shown better agreement to the observed settlement. Further modification of the settlement formula is introduced to improve the settlement accuracy to 10%.

Highlights

► We predicted long-term settlement of soft clay by applying a viscoelastic formula. ► Elastic G was obtained from shear wave velocities of SASW and CSW seismic tests. ► Damping at equivalent elastic strain was calculated using Damping-Strain formula. ► The viscoelastic formula gave better results than traditional prediction methods. ► Modification of the settlement formula improved the settlement accuracy to 10%.

Keywords: Clay; Shear modulus; Damping; Settlement; Theoretical analysis; Time dependence

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