DETERMINATION OF DYNAMIC SOIL PROPERTIES USING CYCLIC TRIAXIAL APPARATUS ALONG JAMRUD ROAD, PESHAWAR

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Abstract

The characterization of dynamic soil properties such as shear modulus and damping ratio is important for the seismic design and analysis of any geotechnical system that undergoes dynamic loading such as during the earthquakes, blasts, rail and traffic vibrations, wind, and ocean waves. In addition to the requirement of strict structural earthquake design guidelines, it is important to obtain the dynamic soil properties to study the soil-structure interactions, site response, and prediction of the ground motion. Earthquake-induced dynamic soil behaviour can be hysteretic, highly nonlinear and plastic. In this study, strain-controlled cyclic triaxial tests are carried out to obtain the dynamic response of subsoil along the Jamrud Road, Peshawar. Five boreholes were drilled at various locations to obtain the undisturbed soil samples using the Shelby tubes. Three samples of standard sizes from each tube were tested under the increasing confining pressures and strains rates. From the tests, stress-strain hysteresis loops are obtained and the values of shear modulus and damping ratio are calculated for each cycle. The results show that both the shear modulus and damping ratio decrease with increasing the number of cycles. Similarly, the shear modulus decreased with increasing strain level whereas, the damping ratio initially increased for strains 0.01 and 1%, and then decreased for strains 2, 2.5 and 5%. The plots of shear modulus and damping ratio vs. shear strain at different confining pressure suggest that the confining pressure has greater influence at strains 0.01 and 1% that progressively reduces at larger strains at 2 and 2.5%.