Research on seismic performance of retaining walls situated on sloped subsoil

In the design practice of retaining walls for road embankment, the reduction of bearing capacity induced by inclination of subsoil has not been taken into account. For this reason, seismic performance of retaining walls on sloped subsoil may have been over-estimated. The damages to retaining walls on sloped subsoil were comparatively severer than those on horizontal subsoil in the Mid Niigata Prefecture Earthquake in 2004 and the Iwate-Miyagi Nairiku Earthquake in 2008. The seismic performance of retaining walls on sloped subsoil should be improved in order to maintain the function of road in the mountainside after earthquake. The purpose of this research is to develop the technologies of verification of seismic performance and seismic performance evaluation for retaining walls on sloped subsoil. For this purpose, on the stability of retaining walls on slope, 1) analyses of case histories by the Mid Niigata Prefecture Earthquake; and 2) numerical simulation and centrifuge model tests were conducted in the present study. Consequently, the following findings were obtained. 1) the stability of retaining walls on sloped subsoil is reduced as compared with that on horizontal subsoil, which becomes more remarkable when the slope inclination exceeds 15 ~ 30 degree; and 2) verification of seismic performance of retaining walls on sloped subsoil can be conducted by evaluating bearing capacity while taking into account the effect of inclination of subsoil.