



Correlation of liquefaction potential index with the type of liquefaction-induced ground deformation

G. Papathanassiou (1), Sp. Pavlides (1), B. Christaras (1)

(1) Department of Geology, Aristotle University of Thessaloniki, Greece

Liquefaction potential index (LPI) is a parameter, proposed by Iwasaki et al. (1978), for predicting the occurrence of liquefaction. The LPI is proportional to the thickness, the depth of the liquefiable layer and the factor of safety. Iwasaki et al. (1982) and Toprak and Holzer (2003) using data from in-situ tests at liquefied and non-liquefied sites, triggered by earthquakes in Japan and in USA, concluded that when $LPI > 15$ severe liquefaction is likely to occur while for $LPI < 5$ no evidence of liquefaction is observed. The aim of our investigation is to correlate the LPI values with the type of liquefaction- surface effects using boreholes data from liquefied and non-liquefied sites. Initially, past-LPI data were reassessed according to the recommendations proposed by Seed et al. (2003), who concluded that the plasticity behavior of fine size particles of soils is more important than the percent clay size. Additionally, borings with SPT values from recent earthquakes (Chi-chi earthquake, Taiwan; Lefkada earthquake, Greece) were used in order to compute their LPI values. The factors of safety of the soil layers were calculated based on the “simplified procedure” (Seed and Idriss, 1971) and the recommendations suggested by Youd and Idriss (2001). The modifications proposed by Sonmez (2003), were also taken into consideration. This study suggests a modification to the proposed, by Iwasaki et al. (1982) and Toprak and Holzer (2003), correlation between the values of LPI and the severity of liquefaction-induced ground deformation. Analytically, the suggested value of the upper quartile (Box-Whisker plot method) for the non-liquefaction surface evidence group is $LPI = 10$ while the LPI's lower quartile value of the lateral-spreading group is 32. For LPI values between 10 and 32 sand boils and ground settlement should be expected, according to this statistical approach. This new values can be used in order to compile a liquefaction hazard map.