عنوان مقاله:

Bridge Bed Strengthening, Disaster Prevention due to Scouring

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خلاصه مقاله:

One of the major factors in deliberating the depth of foundations in structures adjacent to the water flow is the scouring phenomenon; the scouring is a phenomenon caused by the interactions between water flow and erodible bed materials, which causes the removal of sediments where hydraulic structures are located, including bridge piers. Every year, a great number of bridges are damaged as a result of local scoring of their piers and foundations. In this paper, the geotechnical study of Malahide viaduct failure due to scouring was carried out applying Plaxis ۲D software. For this purpose, the Malahide viaduct, which was damaged in ۲۰۰۹ due to bed scouring of one of its piers, was selected and the necessary simulations were carried out in consonance with the bridge specifications, and the conditions of the bridge underlying bed was investigated. Simulations results revealed that the cause of scouring in the bed of collapsed pier was the high shear strains of the bed, bed shear strength parameters (i.e. angle of internal friction and cohesion) reduction and as a result, reducing the bed resistance to the scouring. Moreover, it was found that by using the micropile group below the foundation of bridge pier as a solution to reduce the scouring effect, the bed maximum scour depth is significantly reduced compared to the shallow foundations without micropiles; Furthermore, by using the micropile group, the shallow foundation thickness can be reduced, provided that after foundation thickness reduction and micropiles application, the structure safety factor remains in the stable range.

کلمات کلیدی:

Local Scour, Bridge pier, Malahide viaduct, Shallow foundation, Micropile