

Prediction of additional embankment settlement part caused by weathering of fill material

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SUMMARY

Main degradation processes caused by weathering are presented for an argillaceous marl, as the example of soft rocks. The causes of the weathering processes are not discussed in the paper. If this kind of material is used as a fill material for an embankment, unexpected settlement is registered after weathering processes. The prediction of an additional settlement, which is not directly caused by the stress field, is derived by modelling a particulated mass as a random packing of equal spheres, based on the microstructural continuum approach. Since a general solution for all stress conditions is difficult to obtain, a calculation is performed for stress conditions corresponding to one-dimensional consolidation of a horizontally layered mass. The degradation process is modelled as exfoliation of the surface degraded layer of particles. It is assumed that material from the surface degraded layer fills the interparticle voids. The calculation presented in the paper is compared with the results of a laboratory experiment, made on the sample of a uniformly graded gravel. The gravel used in the experiment was made by crushing a sample of argillaceous marl. The weathering process is simulated in laboratory conditions with a wetting-drying process. The numerically derived prediction of additional settlement is in good accordance with experimental results.
