

An Experimental Study to Mitigate Swelling Pressure of Expansive Tabuk Shale, Saudi Arabia

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Abstract : In Kingdom of Saudi Arabia, there are several areas where expansive soil exists in the form of variable-thicknesses layers in the developed regions. Severe distress to infrastructures can be caused by the development of heave and swelling pressure in this kind of expansive shale. Among the various techniques for expansive soil mitigation, the removal and replacement technique is very popular for lightly loaded structures and shallow foundations. This paper presents the result of an experimental study conducted for evaluating the effect of type and thickness of the cushion soils on mitigation of swelling characteristics of expanded shale. Seven undisturbed shale samples collected from Al Qadsiyah district, which is located in the Tabuk town north Kingdom of Saudi Arabia, are treated with two types of cushion coarse-grained sediments (CCS); sand and gravel. Each type is represented with three thicknesses, 22%, 33% and 44% in relation to the depth of the active zone. The test results indicated that the replacement of expansive shale by CCS reduces the swelling potential and pressure. It is found that the reduction in swelling depends on the type and thickness of CCS. The treatment by removing the original expansive shale and replacing it by cushion sand with 44% thickness reduced the swelling potential and pressure of about 53.29% and 62.78 %, respectively.

Keywords : cushion coarse-grained sediments (CCS), expansive soil, Saudi Arabia, swelling pressure, Tabuk Shale

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