Use of Time-Domain Reflectometry for Quality Control of Soil-Nailing Works

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Abstract

Soil nailing is an effective and practical means for stabilizing slopes and supporting excavations. It has been used extensively in slope improvement works in Hong Kong since the mid-1990s. However, once a soil nail has been installed, it is difficult to check its quality, such as the length of the steel bar and the integrity of cement grout annulus. To enhance the quality control of soil-nail installation works, the Geotechnical Engineering Office (GEO) of the Civil Engineering and Development Department in Hong Kong has carried out a study to identify and develop nondestructive means for checking the quality of installed soil nails. Among the various techniques tried, time-domain reflectometry (TDR) was found to be the simplest, quickest, and least expensive. Since then, a large number of field measurements have been taken to gain experience on the practicality and reliability of this technique. In mid-2004, the GEO introduced TDR to its soil-nailing works under the Landslip Preventive Measures Programme for pilot use during independent site audits. In 2007, an independent review was carried out that supports the continual use of TDR in the program and suggests further enhancement of the sampling strategy of the assurance program. This paper gives an overview of the use of TDR in assessing the quality of steel soil nails with preinstalled wires. The sources of uncertainty in relation to the test are discussed. It also describes cases in which TDR has identified anomalies and the corresponding follow-up actions. DOI: 10.1061/(ASCE)GT.1943-5606.0000549.

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