

The selection of Supplemental Grouting Methods for Disaster Prevention in
Rapid Transit Underground Tunnel Excavation

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Abstract

In order to improve the quality of life, urban development in metropolitan areas has gone towards the sky or under the ground. The Taipei Metropolitan Rapid Transit underground system is one of such examples. Taipei basin has a several hundred meter thick sedimentary layer, in which the 60 meter thick Sung-Sun stratum at the earth surface is very soft and has a lot of scattered driftwood. Although having had ground improvement, the driftwood has caused many disasters in the connection passage tunnel construction. In order to prevent them from happening, the already grouted ground around the passage has to be grouted again before its excavation.

This research first investigates the supplemental grouting methods to be considered and determines the criteria and sub-criteria to be used in the initial assessing framework for ground improvement, and then it establishes the final assessing framework by using Delphi method. Furthermore, the Analytic Hierarchical Process is used to determine the relative weights of elements of each level in the hierarchical structure of assessed framework. Finally, the selection process is presented and verified by using two study cases in the Hsin-Chung line of the Taipei Metropolitan Rapid Transit system.

Keyword : Ground improvement; Grouting; Delphi method; AHP; Disaster prevention