

天母地區侷限安山岩塊層單井抽降水試驗暨地下水理研析

鄭文杰^[1] 倪至寬^[2]

摘 要 在台北盆地周圍進行大規模深開挖工程時，常遭遇蘊含大量受壓水系之破碎、風化岩層，對於地下室開挖時上方不透水層（黏土層）恐有上舉破壞（uplift failure）之虞，因此，工址勢必配置抽水井，在大規模開挖時進行抽降水，達到降低水壓的目的。正式開始進行抽降水之前，爲了配合不同開挖階段因應之降水措施，而有先期抽降水試驗（pilot pumping test），包括單井分級試水、定量抽水試驗以及單井復水試驗，可進一步瞭解地下水位洩降情形，便於作爲開挖階段設計抽降水的重要依據，並且可由抽降水試驗推估工址內水井配置、數量，達到符合基礎解壓之需求。本研究依據抽降水試驗結果，可充分掌握地盤土壤之水理特性（aquifer properties），如導水係數 T （transmissivity）和儲水係數 S （coefficient of storage）等水理參數，同時評估抽水井之薄壁因子 S_k 、井儲因子 α_w 以及觀測井井儲因子 α_o ，進而檢討水井之解壓成效，亦由三維有限差分軟體 MODFLOW 之水井套件（well package），藉抽水試驗所推估之地盤水理參數分析水位洩降可能引致地表沉陷影響範圍。

關鍵詞：抽水試驗，復水試驗，導水係數，儲水係數，薄壁因子，井儲因子。

Groundwater Hydraulic Analyses of Confined Andesite Deposits in Tien-Mou Area under Constant Rate Pumping

Wen-Chieh Cheng^[1] Chin-Kuan Ni^[2]

ABSTRACT Performing a large scale ground excavation project at Taipei basin usually involves several problems, including uplift failure due to the confining bed suffering high uplift pressure from the confined aquifer. Therefore, the single well pumping test and the recovery test are conducted in-situ to evaluate aquifer properties before the excavating stages. Besides, it can evaluate the well skin factor (S_k) and the wellbore storage factor (α_w) of pumping wells, as well as determine the wellbore storage factor (α_o) of observation wells. Understanding the well skin factor (S_k) and the wellbore storage factor (α) is beneficial to estimate the well efficiency N (%). Last, but not least this study employs the quasi 3-D finite difference element code, well package of MODFLOW, to analyze the drawdown $h(r,t)$ data during excavating stages and to evaluate the drawdown extent. The numerical results are good enough to match the in-situ monitored data.

Key Words: pumping test, recovery test, transmissivity, coefficient of storage, wellskin factor, wellbore storage factor.

[1] 台北科技大學工程科技研究所土木與防災組博士生(通訊作者)
Doctoral student, College of Engineering, National Taipei University of Technology, Taiwan 106, R.O.C. (Corresponding Author)
E-mail: s2428030@gmail.com

[2] 台北科技大學土木與防災研究所 副教授
Associate professor, Department of Civil Engineering, National Taipei University of Technology, Taiwan 106, R.O.C.