

下水道潛盾施工遭遇礫石層案例探討與防災對策研究

The investigation of sewer construction by shield tunneling method in gravel
stratum and the precautions taken against disasters.

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摘 要

本研究依據下水道潛盾施工技術之經驗回顧與理論基礎，可瞭解在不同的地質條件與地下水位情況下，如何去慎選較佳的潛盾機型式及輔助工法來降低施工中可能遭遇之風險；並收集國外(美、日、英)潛盾施工及新竹科學工業園區污水處理廠放流管潛盾工程等實際案例，分析探討其遭遇礫石地層的問題及災害發生的原因，提出施工實務之管理及防災對策。

其中下水道潛盾施工成功與否之關鍵，最重要是規劃設計完成路線後之地質鑽探與地下水位調查的正確性，將影響施工者潛盾機型式選擇以及實際每天施工的進度。在遭遇礫石地層時，必需選擇適用於礫石地層之潛盾機，在機頭做設計上的改良和採具有二次破碎功能之密閉型潛盾機配合適當之輔助工法，將可有效的解決遭遇礫石層及湧水的問題，雖然各潛盾路線的地質條件皆不盡相同，仍可參考以往施工案例之研究結果做出有利現場施工的判斷。

本研究歸納國內外潛盾施工遭遇礫石地層問題解決與處理對策之施工案例資料，並提出自創實施於竹科潛盾工程之潛盾放流管施工(含安衛)流程，使日後潛盾施工遭遇類似問題時能得到最佳處理方式並縮短施工時程，並於潛盾施工過程中降低職災事故的發生。

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ABSTRACT

This research is based on the theory and experience of using shield tunneling method in sewer construction. We focus on how to choose the best type of shield machine and suitable construction method under different geological conditions and groundwater levels to reduce the potential risk during construction. By analyzing the issues in gravel stratum and the causes of disasters from cases of different countries (including United States, Japan, and United Kingdom) and from the case of the sewer construction by shield machine of the wastewater treatment plant of Hsinchu Science Park, we propose several practical management skills and disaster prevention strategies .

The keys to successful sewer construction by shield machine are the precise of geological drilling and groundwater level investigation after route planning and designing, they will have huge impact on the choice of shield machine and the daily progress of the construction. In gravel stratum,we should adopt the suitable shield

machine that improve design on cutter head and have the re-breaking capability of close-type shield machine,with the suitable construction method to slove the problems efficiently when encountering gravel stratum and water flood. Although each route with different geological conditions,we still can refer all construction cases to judge and pick the best way to build.

This research provides the solutions and working strategies from the cases of using shield tunnelling method in gravel stratum in internal and overseas,and establish the working standard operating procedures (including safety and health facilities) of sewer construction by shield machine of Hsinchu Science park, expect it can be referenced in the future to find the best way when encountering similar programs and to shorten the construction period of using shield tunneling method,and lower the possibility of work related injuries.

