

潛盾隧道遭遇地中障礙物之處理案例

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摘 要

潛盾隧道遭遇地中障礙物處理的方式會依發現的時機、周圍環境、工期、費用及施工風險等因素而有不同，並無定論。本文舉潛盾機遭遇三種不同障礙物之例，分別是地錨、堅硬岩盤及PC樁，說明各案例之處理方式及考慮因素。其中又以捷運文湖線潛盾隧道穿越基隆河北岸堤防，遭遇堤防的群樁，其處理方式最為複雜。為維護堤防安全，兼顧潛盾隧道施工順利，經研究後採堤防先建後拆原則，以分階段破除堤防，俾清除其下方與潛盾隧道有衝突的PC樁，並將原有樁徑80cm深度39m之PC樁，改為樁徑100cm深度16m之場鑄基樁，其周圍並予以地盤改良，增加樁周承載力，以保證其承載力足以承受堤防的外力，並使潛盾機能順利通過而不會引起過大的沉陷，最後再復原舊有堤防。各施工階段均須進行堤防結構安全分析，以確保堤防安全。

關鍵字：潛盾機、隧道、地錨、岩盤、基樁、堤防、障礙物。

Case Study on Removing Obstacles for Shield Tunnels

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Abstract

For removing underground obstacles for tunnel boring machines (TBMs) operating on tunnel routes, many methods depend on the time, site environment, construction schedule, cost, and risk of treatment. This paper presents the methods and factors that must be considered for three obstacles: anchors, hard rocks, and PC piles of dikes. The case in which a TBM struck a PC pile group while tunneling underneath the north dike of the Keelung River at the Wen-Hu Line of the Taipei MRT Project was the most sophisticated. To ensure the safety of the dike and enable a smooth procession of the tunnel work, the dike was broken step by step to remove the PC pile group according to the principle that, to prevent flooding, an existing dike cannot be dismantled until a temporary dike is built. After removing the PC piles, which were 80 cm in diameter and 39 m in length, 100-cm-diameter and 16-m-long cast-in-situ piles were constructed using ground treatment within the piling zone to increase their bearing capacity so that the TBM could smoothly pass and the settlement of the dike could be controlled within an allowable value. Finally, the original structure of the dike body was completely restored. The results showed that structural analysis should be performed for each construction step during the breaking of dikes and PC piles to ensure the safety of dikes.

Key Words : tunnel boring machine (TBM), tunnel, anchor, rock, pile, dike, obstacle.