

都會區開挖案例壁體變位量之控制及預估

黃玟崧 吳立華 謝旭昇
三力技術工程顧問股份有限公司

葛宇甯 張智博
台灣大學土木工程學系

摘 要

現今於都會區深開挖中，為增加開挖安全性與降低開挖時之壁體變位，基地內常設置地中壁與扶壁。而部份基地考量施工機具調度問題，更以壁樁取代圓形基樁作為大樓基礎，利用連續壁之施工機具施作壁樁，降低連續壁施工與基樁之施工介面。本文中案例基地位置位於捷運新店線與中和線之潛盾隧道限建範圍內，同時基地東側緊鄰8層樓高之建築物，故於基地開挖中如何控制變位量為一重要課題。案例基地配置地中壁及扶壁以降低開挖時之壁體側向變位，並將壁樁、地中壁及扶壁配置整合共構，達到最佳之設計及施工效率。

本基地壁體變位量因受到三向度效應影響，各傾度管監測結果皆顯示壁體變位量明顯低於設計值。本文期望以此深開挖之壁體變位監測資料為例，建立以一維分析程式(TORSA)搭配平面應變比(PSR)或扶壁觀念之簡易模型，將三向度效應納入開挖壁體變形量之評估，以期應用於類似都會區深開挖案例之壁體變位量評估。

關鍵字：地中壁、扶壁、三向度效應、壁體變位。

Control and Prediction of Wall Movement in an Urban Excavation

Wen-Sung Huang Li-Hua Wu Hsii-Sheng Hsieh Louis Ge Chi-Po Chang

Trinity Foundation and Engineering Consultants, Co. Ltd. Dept. of Civil Engr., National Taiwan University

Abstract

In recent years, cross walls and buttress walls are extensively used in deep excavations in an effort to reduce the lateral deformation of diaphragm wall. This paper presents a deep excavation case, which is close to MRT Xindian line and Zonghe line, that is very sensitive to excavation induced deformation. In this case, diaphragm walls, cross walls, buttress walls and barrette piles are all incorporated to optimize the design in minimizing the excavation induced deformation and foundation settlement. As indicated by inclinometer readings, the displacements of diaphragm walls are well within the design values. Since this site was heavily affected by 3D effect, we tried to establish a simplified approach that use 1D FEM program (TORSA) in conjunction with Plane Strain Ratio (PSR) chart or the corner effect to estimate the displacement of diaphragm at various locations. It is hoped that this approach can be used in similar urban excavation cases to better predict the possible wall deformation.

Key Words : cross wall, buttress wall, three-dimensional effect, wall displacement.

一、前 言

近年來地中壁(cross wall)及扶壁(buttress wall)已廣泛被採用作為都會區深

開挖支撐擋土系統之一部分，用以增加開挖安全性與降低可能之壁體變位。部份基地為考量施工機具調度問題，更將傳統之圓形基樁以壁樁(barrette)取代，利用連續壁施工機具施作