

## Design and Analysis of Deep Excavations

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**Abstract :** Excavations in urban developed area are generally supported by deep excavation walls such as; diaphragm wall, bored piles, soldier piles and sheet piles. In some cases, these walls may be braced by internal braces or tie back anchors. Tie back anchors are by far the predominant method for wall support, the large working space inside the excavation provided by a tieback anchor system has a significant construction advantage. This paper aims to analyze a deep excavation bracing system of contiguous pile wall braced by pre-stressed tie back anchors, which is a part of a huge residential building project, located in Turkey/Gaziantep province. The contiguous pile wall will be constructed with a length of 270 m that consists of 285 piles, each having a diameter of 80 cm, and a center to center spacing of 95 cm. The deformation analysis was carried out by a finite element analysis tool using PLAXIS. In the analysis, beam element method together with an elastic perfect plastic soil model and Soil Hardening Model was used to design the contiguous pile wall, the tieback anchor system, and the soil. The two soil clusters which are limestone and a filled soil were modelled with both Hardening soil and Mohr Coulomb models. According to the basic design, both soil clusters are modelled as drained condition. The simulation results show that the maximum horizontal movement of the walls and the maximum settlement of the ground are convenient with 300 individual case histories which are ranging between 1.2mm and 2.3mm for walls, and 15mm and 6.5mm for the settlements. It was concluded that tied-back contiguous pile wall can be satisfactorily modelled using Hardening soil model.

**Keywords :** deep excavation, finite element, pre-stressed tie back anchors, contiguous pile wall, PLAXIS, horizontal deflection, ground settlement

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