



# Pile type selection and design of permanent-temporary synthesis structures for underground urban complexes in soft soil foundation site

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## Abstract

With the continuous acceleration of urbanization, the development of underground space is becoming more and more widespread. In response to the high cost of underground engineering in soft soil foundation complexes, engineering designers have proposed a design concept of combining the temporary support system for excavations during the construction phase with the permanent and temporary main structural system during the use phase. This paper introduces the composition of the permanent and temporary combination system of the pile foundation engineering of the soft soil foundation complex and the selection and design method of the permanent and temporary combination pile foundation, determines the joint design criteria of the temporary column pile and the permanent engineering pile of the foundation pit, and carries out the joint selection, joint layout and pile body design of the pile foundation. Taking the X102 plot complex project of Shanghai West Railway Station as an example, this paper summarizes the permanent and temporary combination of pile foundation, which can be used as a reference for similar projects. Engineering practice has proved that the permanent-temporary combination of pile foundation in underground engineering of soft soil foundation complex can greatly reduce the engineering cost and meet the social demand of energy saving and carbon reduction.

**Keywords:** soft soil foundation site; pile type selection ; excavation column pile ; pile foundation layout ; permanent-temporary synthesis

## 1 Introduction

In the process of underground space development of urban complex projects, soft soil foundation cities are facing the challenges of deep foundation and deep foundation pit design and construction technology. In order to shorten the construction

period, reduce the project cost and protect the surrounding environment, the reverse construction method is often used in underground engineering [ 2,3,9 ], that is, the horizontal support of the foundation pit in the construction stage is combined with the horizontal floor of the main structure in the use stage, and the vertical support