Resource-efficient Excavation Pit Design and Construction with the Integration of Existing Structures

Grischa Dette, Szymon Sikora

Ed. Züblin AG, Central Engineering Division, Berlin, Germany

Contact: grischa.dette@zueblin.de

Abstract

Resource-efficient construction is a decisive factor for the development of sustainable economies and a sustainable way of life. In addition to material-saving technologies, the reactivation or conversion of existing structures is an effective approach to achieving resource efficiency. Particularly in densely built-up urban areas, there is the opportunity to reactivate elements of still existing but currently idle excavation pit structures, which belong to existing buildings. Also, permanent structural elements of existing buildings, such as basement-walls and base slabs, can be integrated into new excavation pit structures. The present paper reports on the experiences from construction projects, where elements of existing diaphragm walls as well as elements of existing buildings were integrated in the design and construction of new excavation pits.

Keywords: excavation pit, re-use of existing structures, sustainability in construction

1 Introduction

Resource-efficient construction is a decisive factor for the development of sustainable economies and a sustainable way of life. In addition to material-saving technologies, the reactivation or conversion of existing structures is an effective approach to achieving resource efficiency. Particularly in densely built-up urban areas, underground structures are required for a variety of purposes: they serve as structures for underground transportation, water supply and disposal, rainwater management, and underground car parks. Deep excavation pits are usually required for the construction of such structures.

Nowadays, often existing robust underground structures can be found at the sites of new projected buildings. On the one hand, they can be found in the form of relics of former excavation pits. These can be former retaining walls, such as diaphragm walls or remaining sheet pile walls. They can appear as remains of former horizontal cut-off layers, made for example by jet grouting or underwater concrete. On the other hand, they also can be found in the form of deep basement structures: The traditional single-storey basement in masonry construction has made way for the reinforced concrete basement, sometimes in the form of a multi-storey underground car park.

The question of resource efficiency inevitably arises with respect to excavation pits. As a rule, excavation pits are only temporarily used for the erection of permanent structures. After construction, they remain unused in the ground. For reasons of sustainability and economic efficiency, it makes sense to reactivate or reuse