FE-ANALYSIS OF DEEP EXCAVATIONS IN LACUSTRINE CLAY

COMPARISON OF DIFFERENT CONSTITUTIVE MODELS

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SUMMARY

Two finite element analyses of deep excavations in soft ground in the city of Salzburg, Austria are presented. The regional subsoil situation in Salzburg can be described as fully saturated soft clay (referred to as “Seetons”) overlain by a quaternary gravel fill. The poorly graded sand can be classified as fine silt or fine sand respectively and shows unfavourable soil properties with respect to the deformation behaviour of deep excavations. Common calculation methods for retaining structures based on failure criteria like Mohr-Coulomb cannot take into account this complex behaviour adequately. Therefore more advanced constitutive models have been used in analysing two different deep excavations in Salzburg. Firstly the Hardening Soil model, an isotropic double hardening model as implemented in the commercial version of the finite element code Plaxis and secondly a newly developed constitutive model based on the multilaminate concept. The comparison with in situ measurements showed that both models are capable of representing the behaviour of soft soils, at least for this type of problems.

SOIL PROPERTIES

The parameter determination is based on results of site investigations and laboratory experiments but also experience from back analyses of other deep excavations in Salzburg was considered. The silty gravel layer and the clayey silt are present at both construction sites, whereas the fine sand layer only appears in the project "AMV." The clayey silt layers have been assumed to behave as undrained material in all analyses.

PROJECT "HYPOBANK"

In this section the results of the project "Hyponbank," obtained from analyses with the two different models, the Hardening Soil model (HS) and the Multilaminate Model for Clay (MMC), are compared.

PROJECT "AMV"

The second example discussed here is project "AMV." In contrary to project "Hyponbank" the diaphragm wall is supported by struts rather than ground anchors. Again a berm is left and the centre part is excavated first when the final excavation depth is reached. A cross section of the excavation pit is plotted in Figure 4a while the finite element model is shown in Figure 4b.

REFERENCES


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