

## Advisory Notes on PLAXIS 3D CE 2022 for ELS Analysis

1. Check on the capacity of structural elements
  - 1.1. PLAXIS does not carry out design checks of structural elements used in the model. Users must check the adequacy of these elements using relevant design codes accepted by the Hong Kong Building Authority. If the design indicates stronger elements are required, the PLAXIS model must be revised and re-analysis accordingly.
2. Wall/Soil Interface
  - 2.1. The wall/soil interface ratio  $R_{inter}$  should not be unrealistically low to avoid numerical instability leading to non-convergence. The limiting values for  $R_{inter}$  should use values in Table 13 of Geoguide I (GEO, 1993).
3. Effects of Mesh Size on Accuracy of Results
  - 3.1. The mesh/element size to be adopted in the analysis should be suitably fine so that further refinement of the mesh/element size would not generate a significant change in the analysis results. A finer mesh/element size may also be required at the areas of stress/flow concentration or zones of large deformation/hydraulic gradient. Despite a more accurate result can be achieved with excessive fine mesh, it should be noted that the computation time would also be greatly increased. Users should consider the balance between result accuracy and computation time before carrying out the analysis.
4. Selection of Soil Models
  - 4.1. This application is restricted to the analysis of the stage construction of excavation and lateral support design for cantilever/strutted shaft walls and associated strutting system under hydrostatic groundwater pressure condition all on linear elastic Mohr-Coulomb soil model only. Other advanced soil models are not included.
  - 4.2. For drained analysis, users should use effective stress shear strength parameters in the linear elastic perfectly plastic model with Mohr-Coulomb failure criteria to model soil behaviours.
5. Requirement for Convergence
  - 5.1. Excavation is an unloading problem. Hence, the PLAXIS calculation for ELS works is a load-controlled analysis. Users should use the default setting where the "Arc-length control" function for iteration of calculation is activated. Under special circumstances of large shear strains and significant plasticity developing in the mesh elements, the user may deactivate the "Arc-length control" function to force the analysis to convergence (see PLAXIS manual under Iterative Procedure Control Parameters). In such a case, the user must check whether the shear strains generated in the mesh indicate the development of a global failure mechanism. If the analysis has predicted a global failure mechanism, the user should re-activate the "Arc-length control" function and re-run the analysis. If there is no convergence, then the wall embedment depth should be increased.
6. "Integrated Structural Modelling" and "Plaxis Coupling Tool"
  - 6.1. "Integrated Structural Modelling" and "Plaxis Coupling Tool" are excluded in the Plaxis 3D (Version CE V22).