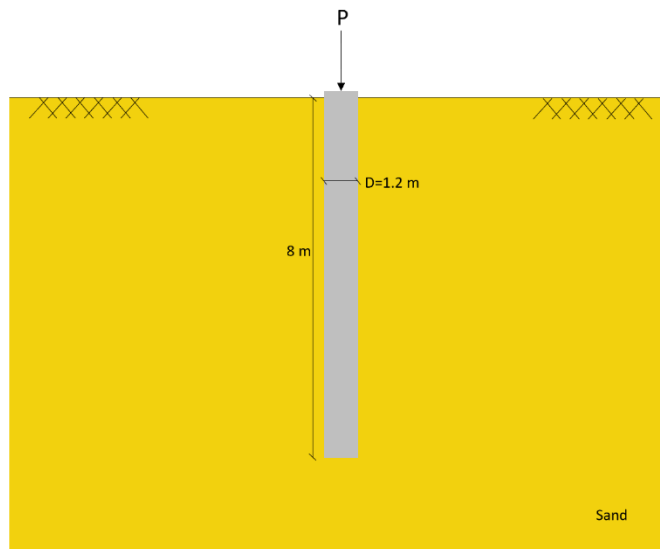


Challenge of geotechnical dimensioning

Our aim is to evaluate current practice and promote dialogue. In particular, young engineers should be encouraged to develop and refine their engineering judgement.

The following task is based on a static pile test. The answers of the challenge participants will be compared with the measured values of the pile test. The answers that come closest to the measured value are rewarded. More information about the terrain and the pile is given on the next page.



The 3 participants with the best answers will receive a 3-year free membership in our GS Society. In addition, an iPad will be raffled off among all participants.

Deadline for submitting the answers of the challenge participants: 15 February 2025. We recommend that participants enter their contact details in the form so that we can contact the winners.

Task:

This task deals with a fully cased bored pile.

Main question to be considered in the assessment:

1. what settlement is to be expected at the pile head for a pile load of $P=3$ MN?

Additional questions that are not considered in the assessment:

2. what is the external bearing resistance of the bored pile at failure (failure is defined by a pile settlement of 100 mm in the present case)?
3. what proportion of the bearing load (in %) is transferred by the pile tip resistance at failure (pile settlement of 100 mm)?

The way to solve these questions is absolutely free and can - if desired - be given in short form. It can be based on estimates, empirical values, simplified considerations, calculations using classical methods or numerical methods. As a guide, the problem should be solved in a short time (approx. 15 - 60 minutes).

General information:

The fully cased bored pile has a length of 8 metres and a diameter of 1.2 metres. It has the compressive strength class C 20/25 and has a reinforcement cage consisting of 17 longitudinal reinforcement bars ($\varnothing=28$ mm) and a spiral reinforcement stirrup ($\varnothing=10$ mm) with a spacing of 20 cm.

The subsoil consists of densely compacted fine and medium-grained sand. The groundwater is located at a greater depth and has no influence on the load-bearing capacity. The figure below shows the grain size distribution of the sand at different levels. The average probing resistance (CPT pressure probing) is approx. 9.8 MN/m^2 in the area of the pile shaft. In the area of the pile tip, the probing resistance (CPT pressure probing) is approx. 21 MN/m^2 .

