Design of top-to-down deep excavations for a metro-line in soft ground according to EC7 and German Recommendations

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Project particularity

- Single-cell structure with no central support; depths down to -45 m
- Seismic region
- Inhomogeneous soft soil with artesian water
- Settlement-sensitive structures in the vicinity

\[
V_d = \Sigma V_{d,j} \leq R_d
\]

\[
\gamma_G \cdot B_{Gh,k} + \gamma_Q \cdot B_{Qh,k} \leq E_{ph,k} \cdot \gamma_{Rce}
\]

\[
G_d + P_d \leq R_{v,d} + R_{gr,d}
\]

Pile load test

\[
A_k \cdot \gamma_{G,.dst} \leq G_{k,stab} \cdot \gamma_{G,stab} + G_{E,k} \cdot \gamma_{G,stab} + F_{S,k} \cdot \gamma_{G,stab}
\]