EUROCODE 7 DESIGN APPROACH 1
Basic procedure (incorporates some simplifications)

START
Assess design scenario

List all possible limit states:
ULS & SLS

For each limit state
Assess worst credible scenario (e.g. water pressures)

Choose appropriate calculation model

Select characteristic actions (e.g. loads):
- \( F_k \)
- \( X_k \) relevant to calculation model

Assess worst credible scenario (e.g. water pressures)

Ground properties
- SI
- Lab testing
- Experience

Assess design scenario

Statistics
Judgement
Construction process

Calculate design actions:
- \( F_d = \gamma_F F_k \)
- \( X_d = X_k / \gamma_m \)

Calculate design action effect (e.g. load):
- \( E_d \)
- \( R_d \)

Ensure \( E_d \leq R_d \)

Calculate design action effect (e.g. settlement):
- \( E_d \)
- \( C_d \)

Ensure \( E_d \leq C_d \)

Combination 1: Typically governs failure in the structure

Combination 2: Typically governs failure in the ground

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Factor</th>
<th>Combination 1</th>
<th>Combination 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partial load factors (( \gamma_F ))</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permanent unfavourable action ( \gamma_G )</td>
<td>1.35</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Variable unfavourable action ( \gamma_Q )</td>
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<td>1.30</td>
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<tr>
<td>Permanent favourable action ( \gamma_G )</td>
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<td>1.00</td>
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</tr>
<tr>
<td>Partial material factors (( \gamma_m ))</td>
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</tr>
<tr>
<td>( \tan\phi' )</td>
<td>( \gamma_m )</td>
<td>1.00</td>
<td>1.25</td>
</tr>
<tr>
<td>Effective cohesion ( c' )</td>
<td>( \gamma_c' )</td>
<td>1.00</td>
<td>1.25</td>
</tr>
<tr>
<td>Undrained shear strength ( c_u )</td>
<td>( \gamma_c' )</td>
<td>1.00</td>
<td>1.40</td>
</tr>
<tr>
<td>Unit weight of ground ( \gamma )</td>
<td>( \gamma_g )</td>
<td>1.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>