

Application Note - Setting up and solving problems in LimitState:GEO

1 Recommended Procedure

1. Draw or import geometry (from .dxf).
2. Create materials and assign to **Zones**.
3. Consider if there are any modified properties on e.g. soil/structure interfaces (including tension **Cutoff**). Create materials as appropriate and assign to relevant **Boundaries**.
4. Assign boundary conditions (e.g. *Fixed, Symmetry*).
5. Set external loads and assign values. If partial factors are to be used then assign loads as *Permanent/Variable/Accidental* and set **Loading Type** to *Favourable/Unfavourable/Neutral*.
6. Set **Loading Type** for **Solids** to *Favourable/Unfavourable/Neutral* if required . (Default is *Neutral*).
7. Assign **Adequacy** to external loads and/or material self weight and/or seismic acceleration according to requirements (normally to one or more unfavourable loadings).
8. Set required **Scenario** (i.e. define Partial Factors on actions and strengths). For simple use, select *Unity*.
9. Set required **Nodal Density** (check using **Analyse - Preview Nodes**).
10. Solve.
11. Check that identified mechanism does not intersect domain boundaries. If this is the case, modify the domain dimensions as appropriate and re-run.
12. The solution **Adequacy factor** is the factor by which the loads/acceleration defined in Step 7. must be multiplied to cause collapse by the mechanism identified. An *Unstable* result indicates collapse will occur without the applied load. A *Locked* result indicates that collapse will not occur for any value of the loads/accelerations.
13. If required, re-run the analysis using a higher nodal density to check convergence of solution. A higher nodal density can be set using **Nodal Density**, by adjusting the **Baseline Nodal Spacing** in individual **Solids/Boundaries**.

2 Performing specific design checks

Find factor on applied load

- Apply adequacy to the relevant load (set load to a value of 1.0 if actual collapse load required).
- Choose *Unity* scenario.
- Solve.
- The **Adequacy factor** is the factor on the specified load.

Find factor on strength

- Apply adequacy to any unfavourable action (load, self weight and/or acceleration) relevant to the stability problem to be studied.
- Set partial factors on strength to initial guessed value F .
- Solve.
- If the **Adequacy factor** = 1.0 , F is the factor on strength.
- If the **Adequacy factor** > 1.0 , increase F and repeat.
- If the **Adequacy factor** < 1.0 , decrease F and repeat.

N.B. Multiple scenarios can be used to semi-automate this process.

Check design to a code e.g. Eurocode DA1/2

- Apply adequacy to any unfavourable action (load, self weight and/or acceleration) relevant to the stability problem to be studied.
- In the **Scenario Manager** select or set appropriate Partial Factor set for the Code in question.
- Solve.
- If the **Adequacy factor** \geq 1.0 , the design is safe.
- If the **Adequacy factor** < 1.0 , the design is unsafe.

Note: in this process partial factors are pre-applied before solve.

For more information: www.limitstate.com/geo