

Cellular Storage 01 (CS01)

Assumptions

- Destabilising Forces Factor Applied = 1.10
- Resisting Forces Factor Applied = 0.90
- Assumed Ground Water Density = 1000 kg/m³
- Assumed Topsoil Density = 1600 kg/m³
- Assumed London Clay Density = 1800 kg/m³
- Assumed Concrete Density = 2400 kg/m³

Buoyancy Calculation

$0.80\text{m} \times 240\text{m}^2 = 192\text{m}^3$ (Volume removed from ground within water table)

$192\text{m}^3 \times 1000 \text{ kg/m}^3 = 192,000$

$192,000 \times 1.10 = \mathbf{212,200}$ (Total Upward Force)

Design Counter Action Calculation (Using Minimum of 500mm London Clay / Min. 250mm Topsoil)

$0.25\text{m} \times 240\text{m}^2 = 60\text{m}^3$ (Volume of Topsoil above cellular storage*)

$60\text{m}^3 \times 1600 \text{ kg/m}^3 = 96,000$

$96,000 \times 0.90 = \mathbf{86,400}$ (Total Downward Force)

$0.50\text{m} \times 240\text{m}^2 = 120\text{m}^3$ (Volume of London Clay above cellular storage)

$120\text{m}^3 \times 1800 \text{ kg/m}^3 = 216,000$

$216,000 \times 0.90 = \mathbf{194,400}$ (Total Downward Force)

Final Calculation

$212,200 - 86,400 - 194,400 = \mathbf{-68,600}$

CS01 Summary

Minimum of 500mm Thick London Clay / 250mm Topsoil above Cellular Storage*

*Where cellular storage sits under shared driveway, the drive construction will be of sufficient weight to counter-act the missing topsoil thickness.

Cellular Storage 02 (CS02)

Assumptions

- Destabilising Forces Factor Applied = 1.10
- Resisting Forces Factor Applied = 0.90
- Assumed Ground Water Density = 1000 kg/m³
- Assumed Topsoil Density = 1600 kg/m³
- Assumed London Clay Density = 1800 kg/m³

Buoyancy Calculation

$0.80\text{m} \times 54\text{m}^2 = 43.2\text{m}^3$ (Volume removed from ground within water table)

$43.2\text{m}^3 \times 1000 \text{ kg/m}^3 = 43,200$

$43,200 \times 1.10 = \mathbf{47,520}$ (Total Upward Force)

Design Counter Action Calculation (Using Minimum of 1000mm London Clay)

$1.00\text{m} \times 54\text{m}^2 = 54.0\text{m}^3$ (Volume of London Clay above cellular storage)

$54.0\text{m}^3 \times 1800 \text{ kg/m}^3 = 97,200$

$97,200 \times 0.90 = \mathbf{87,480}$ (Total Downward Force)

Final Calculation

$47,520 - 87,480 = \mathbf{-39,960}$

CS02 Summary

Minimum of 1000mm Thick London Clay above Cellular Storage