

A-Z Building Services A: Addlestone K115 E: hthuseqin@OBO9@men.com T: 01969925562		Project		Job no.	
		1 storey outbuilding - RAFT FOUNDATION - 150mm slab		2023-7459	
		Calcs for		Start page no./Revision	
		Wendover Lower Rochester Road Higham Rochester Kent ME3 7HD		2	
Calcs by	Calcs date	Checked by	Checked date	Approved by	Approved date
SB	13/08/2026				

Overall average effective depth

$$d_{slabav} = (d_{slabav} + d_{bslabav})/2 = \mathbf{113 \text{ mm}}$$

Minimum effective depth of top reinforcement

$$d_{slabmin} = d_{slabav} - \phi_{slabtop}/2 = \mathbf{115 \text{ mm}}$$

Minimum effective depth of bottom reinforcement

$$d_{bslabmin} = d_{bslabav} - \phi_{slabbtm}/2 = \mathbf{100 \text{ mm}}$$

Edge beam definition

Overall depth

$$h_{edge} = \mathbf{300 \text{ mm}}$$

Width

$$b_{edge} = \mathbf{300 \text{ mm}}$$

Depth of boot

$$h_{boot} = \mathbf{200 \text{ mm}}$$

Width of boot

$$b_{boot} = \mathbf{175 \text{ mm}}$$

Angle of chamfer to horizontal

$$\alpha_{edge} = \mathbf{60 \text{ deg}}$$

Strength of main bar reinforcement

$$f_y = \mathbf{500 \text{ N/mm}^2}$$

Strength of link reinforcement

$$f_{ys} = \mathbf{500 \text{ N/mm}^2}$$

Reinforcement provided in top

$$\mathbf{3 \text{ H12 bars } (A_{sedge\text{top}} = 339 \text{ mm}^2)}$$

Reinforcement provided in bottom

$$\mathbf{3 \text{ H12 bars } (A_{sedge\text{btm}} = 339 \text{ mm}^2)}$$

Link reinforcement provided

$$\mathbf{2 \text{ H12 legs at 300 ctrs } (A_{sv/s_v} = 0.754 \text{ mm})}$$

Bottom cover to links

$$C_{beam} = \mathbf{35 \text{ mm}}$$

Effective depth of top reinforcement

$$d_{edgetop} = h_{edge} - C_{top} - \phi_{slabtop} - \phi_{edgeline} - \phi_{edgetop}/2 = \mathbf{252 \text{ mm}}$$

Effective depth of bottom reinforcement

$$d_{edgebtm} = h_{edge} - C_{beam} - \phi_{edgeline} - \phi_{edgebtm}/2 = \mathbf{247 \text{ mm}}$$

Boot main reinforcement

$$\mathbf{H12 \text{ bars at 300 ctrs } (A_{sboot} = 377 \text{ mm}^2/\text{m})}$$

Effective depth of boot reinforcement

$$d_{boot} = h_{boot} - C_{beam} - \phi_{boot}/2 = \mathbf{159 \text{ mm}}$$

Internal slab design checks

Basic loading

Slab self weight

$$w_{slab} = 24 \text{ kN/m}^3 \times h_{slab} = \mathbf{3.6 \text{ kN/m}^2}$$

Hardcore

$$w_{hcoreslab} = \gamma_{hcore} \times h_{hcoreslab} = \mathbf{3.0 \text{ kN/m}^2}$$

Applied loading

Uniformly distributed dead load

$$w_{Dudl} = \mathbf{5.0 \text{ kN/m}^2}$$

Uniformly distributed live load

$$w_{Ludl} = \mathbf{5.0 \text{ kN/m}^2}$$

Slab load number 1

Load type

Two way line load

Dead load 1

$$w_{D11} = \mathbf{2.0 \text{ kN/m}}$$

Live load 1

$$w_{L11} = \mathbf{2.0 \text{ kN/m}}$$

Ultimate load 1

$$w_{ult11} = 1.4 \times w_{D11} + 1.6 \times w_{L11} = \mathbf{6.0 \text{ kN/m}}$$

Line load 1 width

$$b_{11} = \mathbf{600 \text{ mm}}$$

Dead load 2

$$w_{D21} = \mathbf{2.0 \text{ kN/m}}$$

Live load 2

$$w_{L21} = \mathbf{2.0 \text{ kN/m}}$$

Ultimate load 2

$$w_{ult21} = 1.4 \times w_{D21} + 1.6 \times w_{L21} = \mathbf{6.0 \text{ kN/m}}$$

Line load 2 width

$$b_{21} = \mathbf{500 \text{ mm}}$$

Internal slab bearing pressure check

Total uniform load at formation level

$$w_{udl} = w_{slab} + w_{hcoreslab} + w_{Dudl} + w_{Ludl} = \mathbf{16.6 \text{ kN/m}^2}$$

Bearing pressure beneath load number 1

Net bearing pressure available to resist line load

$$q_{net} = q_{allow} - w_{udl} = \mathbf{33.4 \text{ kN/m}^2}$$

Line load 1

Net 'ultimate' bearing pressure available

$$q_{netult1} = q_{net} \times w_{ult11}/(w_{D11} + w_{L11}) = \mathbf{50.1 \text{ kN/m}^2}$$

Loaded width required at formation

$$l_{req11} = w_{ult11}/q_{netult1} = \mathbf{0.120 \text{ m}}$$

Effective loaded width at u/side slab

$$l_{eff11} = \max(b_{11}, l_{req11} - 2 \times h_{hcoreslab} \times \tan(30)) = \mathbf{0.600 \text{ m}}$$

Effective net ult bearing pressure at u/side slab

$$q_{netulteff1} = q_{netult1} \times l_{req11}/l_{eff11} = \mathbf{10.0 \text{ kN/m}^2}$$