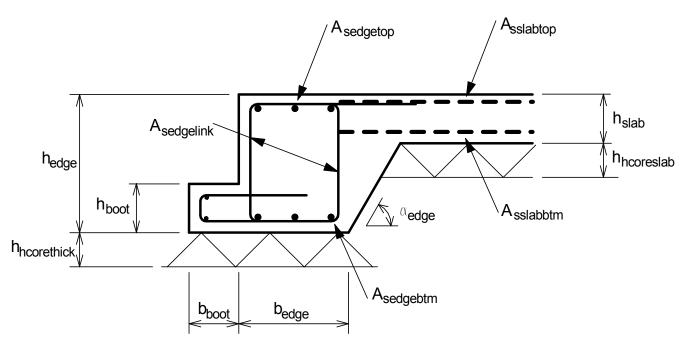
	Project Raft Foundatio		ypical 2 Storey ART 1 : 1997)	House Example	Job Ref.	
	Section				Sheet no./rev.	
GEODOMISI Ltd.		Civil & Geotech	nical Engineerir	ng		1
GEODOMISI Ltd Dr. Costas Sachpazis Civil & Geotechnical Engineering Consulting Company for	Calc. by	Date	Chk'd by	Date	App'd by	Date
Structural Engineering, Soil Mechanics, Rock Mechanics, Foundation Engineering & Retaining Structures.	Dr.C.Sachpazis	23/04/2013	-			
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RAFT FOUNDATION DESIGN (BS8110: PART 1: 1997)



Raft and soil definition

Soil	defin	ition

Allowable bearing pressure; $q_{allow} = 75.0 \text{ kN/m}^2$ No of types of soil; **Two or more types**; Soil density; **Firm to loose**; Design depres'n dia under slab; $\phi_{depslab} = 3350 \text{ mm}$; Design dep'n dia under thicks; $\phi_{depthick} = 3400 \text{ mm}$

Raft slab definition

 $I_{max} = 10.000 \text{ m};$ Max dim between joints; Slab thickness; h_{slab} = 200 mm Depth of h'core beneath slab; $h_{hcoreslab} = 150 \text{ mm};$ (Dispersal allowed for bearing pressure check); $f_{cu} = 35 \text{ N/mm}^2$; Poissons ratio of concrete; v = 0.2Concrete strength; $f_{yslab} = 500 \text{ N/mm}^2;$ Slab mesh reinft strength; Partial safety factor for reinft; $\gamma_{s} = 1.15;$ Min mesh for shrinkage (top); A142; Actual mesh adopted in top; 2 x A142;

Mesh adopted in bottom; A393;

Cover to top reinforcement; $c_{top} = 20 \text{ mm}$; Cover to btm reinforcement; $c_{btm} = 40 \text{ mm}$

Edge beam definition

Overall depth; $h_{\text{edge}} = 450 \text{ mm}$; Width; $b_{\text{edge}} = 450 \text{ mm}$ Depth of boot; $h_{\text{boot}} = 225 \text{ mm}$; Width of boot; $b_{\text{boot}} = 180 \text{ mm}$

Angle of chamfer to horizontal; $\alpha_{\text{edge}} = 60 \text{ deg}$

Strength of main bar reinf't; $f_y = 500 \text{ N/mm}^2$; Strength of link reinf't; $f_{ys} = 500 \text{ N/mm}^2$

Project Job Ref. Raft Foundation Design for a Typical 2 Storey House Example (BS8110: PART 1: 1997) Sheet no./rev. Section Civil & Geotechnical Engineering GEODOMISI Ltd. - Dr. Costas Sachpazis Date Chk'd by Date App'd by Date Calc. by Civil & Geotechnical Engineering Consulting Company for Structural Engineering, Soil Mechanics, Rock Mechanics, Dr.C.Sachpazis 23/04/2013 Foundation Engineering & Retaining Structures. Tel.: (+30) 210 5238127, 210 5711263 - Fax.:+30 210 5711461 Mobile: (+30) 6936425722 & (+44) 7585939944, c

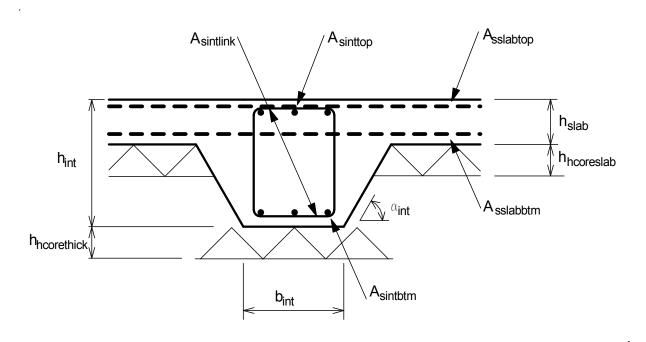
Reinf't provided in top; 3 T25 A_{sedgetop} = 1473 mm²; Reinf't provided in bottom; 2 T25 A_{sedgebtm}=982 mm²

Link reinf't provided; 2 T10 legs at 275 ctrs ($A_{sv}/s_v = 0.571$ mm);

Bottom cover to links; c_{beam} = **40** mm

Boot main reinforcement; T8 at 300 ctrs ($A_{sboot} = 168 \text{ mm}^2/\text{m}$);

Internal beam definition



Overall depth; $h_{int} = 450 \text{ mm}$; Width; $b_{int} = 450 \text{ mm}$

Angle of chamfer to horizontal; $\alpha_{int} = 60 \text{ deg}$

Strength of main bar reinf't; $f_v = 500 \text{ N/mm}^2$; Strength of link reinf't; $f_{vs} = 500 \text{ N/mm}^2$

Reinf't provided in top; 2 T20 (A_{sinttop} = 628 mm²); Reinf't provided in bottom; 2 T20 (A_{sinttop}=628 mm²);

Link reinft provided; 2 T10 legs at 225 ctrs ($A_{sv}/s_v = 0.698$ mm);

Bottom cover to links; $c_{beam} = 40 \text{ mm}$

Slab design checks

Basic loading

Slab self weight; $w_{slab} = 4.8 \text{ kN/m}^2$; Hardcore; $w_{hcoreslab} = 3.2 \text{ kN/m}^2$

Applied loading

Dead udl; $w_{Dudl} = 0.5 \text{ kN/m}^2$; Live udl; $w_{Ludl} = 2.0 \text{ kN/m}^2$

Slab bearing pressure check

Total uniform load at formation; $w_{udl} = 10.5 \text{ kN/m}^2$

Pass - w_{udl} <= q_{allow} - Applied bearing pressure is less than allowable;

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	Area of steel read in top: $A_{sslahtopred} = 260 \text{ mm}^2/\text{m}$		Siab bending check			•	•	•	•	•	•
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Internal slab deflection check

Allowable span to depth ratio; Ratio_{allow} = **52.000**; Actual span to depth ratio; Ratio_{actual} = **23.493**

Pass - Ratio_{actual} <= Ratio_{allow} - Slab span to depth ratio is adequate;

Edge beam design checks

Basic loading

Hardcore; $w_{hcorethick} = 2.1 \text{ kN/m}^2$; Edge beam self weight; $w_{edge} = 7.0 \text{ kN/m}$

Edge load number 1; Load type; Longitudinal line load

Dead load; $W_{Dedge1} = 13.2 \text{ kN/m}$; Live load; $W_{Ledge1} = 0.0 \text{ kN/m}$ Longitudinal line load width; $W_{Dedge1} = 102 \text{ mm}$; Centroid of load; $W_{Dedge1} = 51 \text{ mm}$

Edge load number 2; Load type; Longitudinal line load

Dead load; $w_{Dedge2} = 16.1 \text{ kN/m}$; Live load; $w_{Ledge2} = 5.6 \text{ kN/m}$ Longitudinal line load width; $b_{edge2} = 100 \text{ mm}$; Centroid of load; $x_{edge2} = 230 \text{ mm}$

Edge beam bearing pressure check

Area of top steel regd in slab to distribute loads; $A_{sslabreg} = 89 \text{ mm}^2/\text{m}$

Pass - $A_{sslabreq}$ <= $A_{sslabtop}$ - Area of reinforcement provided to transfer moment into slab is adequate; The allowable bearing pressure under the edge beam will not be exceeded;

Edge beam bending and shear check

Area of steel reqd in top; $A_{\text{sedgetopreq}} = 604 \text{ mm}^2$

Pass - A_{sedgetopreq} <= A_{sedgetop} - Area of reinforcement provided in top of edge beams is adequate;

Area of steel reqd in bottom; $A_{\text{sedgebtmreq}} = 625 \text{ mm}^2$

Pass - $A_{\text{sedgebtmreq}}$ <= A_{sedgebtm} - Area of reinforcement provided in bottom of edge beams is adequate;

Applied shear stress; $v_{\text{edge}} = 0.565 \text{ N/mm}^2$; Design conc shear strength; $v_{\text{cedge}} = 0.607 \text{ N/mm}^2$

Link area/spacing ratio reqd; A_{sv} _upon_s_{vreqedge} = **0.534** mm Link area/spacing ratio prov; A_{sv} _upon_s_{vprovedge} = **0.571** mm

Pass - A_{sv_upon_svreqedge} <= A_{sv_upon_svprovedge} - Shear reinforcement provided in edge beams is adequate;

Boot design check

Area of reinforcement req; $A_{\text{sbootreq}} = 62 \text{ mm}^2/\text{m}$; Area of reinf't provided; $A_{\text{sboot}} = 168 \text{ mm}^2/\text{m}$

Pass - $A_{sbootreq}$ <= A_{sboot} - Area of reinforcement provided in boot is adequate for bending;

Applied shear stress; $v_{boot} = 0.174 \text{ N/mm}^2$; Design conc shear strength; $v_{cboot} = 0.390 \text{ N/mm}^2$

Pass - v_{boot} <= v_{cboot} - Shear capacity of the boot is adequate;

Corner design checks

Applied loading

Corner load number 1; Load type; Line load in x direction

Dead load; $w_{Dcorner1} = 13.2 \text{ kN/m}$; Live load; $w_{Lcorner1} = 0.0 \text{ kN/m}$

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Centroid of load; $y_{corner1} = 51 \text{ mm}$

Corner load number 2; Load type; Line load in x direction

Dead load; $W_{Dcorner2} = 16.1 \text{ kN/m}$; Live load; $W_{Lcorner2} = 5.6 \text{ kN/m}$

Centroid of load; $y_{corner2} = 230 \text{ mm}$

Corner load number 3; Load type; Line load in y direction

Dead load; $W_{Dcorner3} = 14.3 \text{ kN/m}$; Live load; $W_{Lcorner3} = 0.0 \text{ kN/m}$

Centroid of load; $x_{corner3} = 51 \text{ mm}$

Corner load number 4; Load type; Line load in y direction

Dead load; $W_{Dcorner4} = 11.7 \text{ kN/m}$; Live load; $W_{Lcorner4} = 0.0 \text{ kN/m}$

Centroid of load; $x_{corner4} = 230 \text{ mm}$

Corner bearing pressure check

Area of top steel regd in beam to distribute load; $A_{\text{scornerbp}} = 703 \text{ mm}^2$

Pass - A_{scornerbp} <= A_{sedgetop} - Area of reinforcement provided to resist eccentric moment is adequate;

The allowable bearing pressure at the corner will not be exceeded;

Corner beam bending and shear check

Area of top steel regd in beam; $A_{\text{scorner}} = 1255 \text{ mm}^2$

Pass - A_{scorner} <= A_{sedgetop} - Area of reinforcement provided in top of edge beams at corners is adequate;

Applied shear stress; $v_{corner} = 0.690 \text{ N/mm}^2$; Design conc shear strength; $v_{ccorner} = 0.606 \text{ N/mm}^2$

Link area/spacing ratio reqd; A_{sv} _upon_s_{vreqcorner} = **0.534** mm Link area/spacing ratio prov; A_{sv} _upon_s_{vprovedge} = **0.571** mm

 $Pass - A_{sv_upon_s_{vreqcorner}} <= A_{sv_upon_s_{vprovedge}} - Shear reinforcement provided in edge beams at corners is adequate;$

Corner beam deflection check

Allowable span to depth ratio; Ratio_{allowcorner} = **7.719**; Actual span to depth ratio; Ratio_{actualcorner} = **6.488**

Pass - Ratioactualcorner <= Ratioallowcorner - Edge beam span to depth ratio is adequate;

Internal beam design checks

Basic loading

Hardcore; $w_{hcorethick} = 2.1 \text{ kN/m}^2$; Internal beam self weight; $w_{int} = 7.1 \text{ kN/m}$

Internal beam load number 1; Load type; Longitudinal line load

Dead load; $w_{Dint1} = 11.1 \text{ kN/m}$; Live load; $w_{Lint1} = 5.3 \text{ kN/m}$ Longitudinal line load width; $b_{int1} = 140 \text{ mm}$; Centroid of load from c-line; $x_{int1} = 0 \text{ mm}$

Internal beam bearing pressure check

Applied bearing pressure; $q_{int} = 42.1 \text{ kN/m}^2$

Pass - $q_{int} \le q_{allow}$ - Applied bearing pressure is less than allowable;

Area of top steel reqd due to dep'n under slab/to resist moment due to load eccentricity;

Asslabtopintreq = 58 mm²/m

PASS - $A_{sslabtopintreq}$ <= $A_{sslabtop}$ - Area of reinf't in top of slab is adequate to transfer moment due to load eccentricity; Area of btm steel regd to resist moment due to load eccentricity; $A_{sslabbtmintreq} = 0 \text{ mm}^2/\text{m}$

PASS - $A_{sslabbtmintreq} \leftarrow A_{sslabbtm}$ - Area of reinf't in bottom of slab is adequate to transfer moment due to load eccentricity;

Internal beam bending and shear check

Area of steel regd in top; $A_{sinttopreg} = 483 \text{ mm}^2$

Pass - $A_{\text{sinttopreg}} \leq A_{\text{sinttop}}$ - Area of reinforcement provided in top of internal beams is adequate;

,	Project Raft Foundatio	•	ypical 2 Storey ART 1 : 1997)	House Example		
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GEODOMISI Ltd Dr. Costas Sachpazis Civil & Geotechnical Engineering Consulting Company for Structural Engineering, Soil Mechanics, Rock Mechanics,	Calc. by Dr.C.Sachpazis	Date 23/04/2013	Chk'd by -	Date	App'd by	Date
Foundation Engineering & Retaining Structures. Tel.: (+30) 210 5238127, 210 5711263 - Fax.:+30 210 5711461 - Mobile: (+30) 6936425722 & (+44) 7585939944, costas@sachpazis.info		20/01/2010				

Area of steel reqd in bottom; $A_{sintbtmreq} = 505 \text{ mm}^2$

Pass - A_{sintbtmreq} <= A_{sintbtm} - Area of reinforcement provided in bottom of internal beams is adequate;

Applied shear stress; $v_{int} = 0.369 \text{ N/mm}^2$; Design conc shear strength; $v_{cint} = 0.423 \text{ N/mm}^2$

Link area/spacing ratio reqd; A_{sv} _upon_s_{vreqint} = **0.653** mm Link area/spacing ratio prov; A_{sv} _upon_s_{vprovint} = **0.698** mm

 $Pass - A_{sv_upon_s_{vreqint}} \leftarrow A_{sv_upon_s_{vprovint}} - Shear reinforcement provided in internal beams is adequate$