

STRUCTURAL CALCULATIONS

HULHUMALE SCHOOL, HULHUMALE PHASE - 2

AUGUST 2020

STRUCTURAL DETAILS				
Project details:	HULHUMALE SCHOOL-PHASE 2		Prepared by: Mariyam Samah	
Project number:	October 7, 2019			
Type:	Concrete	Beams, columns, slabs		
Slab no :	1		200	MM
Slab no :	2			MM
Slab no :	3			MM
Slab no :	0M CANTILEVER		0	MM
DETAILS				
No of floors:	6	GROUND	TO	GROUND FIRST TO FIFTH, TERRACE
Floor to floor height :	3.5	M		
GROUND TO GROUND FIRST TO FIFTH, TERRACE				
Type:	(CLASSROOM)(WALKWAYS AND STAIRCASE)(HALL)	FINISHE:	1.2	
Dead load 1:	6.0 kN/m ²	200 mm thk		
Dead load 2:	4.8 kN/m ²	150 mm thk		
Dead load 3:	0.0 kN/m ²	0 mm thk		
Dead load 4:	0.0 kN/m ²	0 mm thk		
Live load 1:	3.0 kN/m ²	BS6399 : PART 1 : 1996		(CLASSROOM)
Live load 2:	4.0 kN/m ²	BS6399 : PART 1 : 1996		(WALKWAYS AND STAIRCASE)
Live load 3:	5.0 kN/m ²	BS6399 : PART 1 : 1996		(HALL)
Live load 4:	kN/m ²	BS6399 : PART 1 : 1996		
Live on stairs, terrace, balcony and halflandings	4.0 kN/m ²			
Walls	7.0 kN/m	0.15 M THK		
Roof				
Type:				
Dead load:	4 kN/m ²	-		
Live load:	1.5 kN/m ²			
Live on stairs and halflandings	0 kN/m ²			
Walls	0 kN/m			
Analysis file : HULHUMALE SCHOOL-PHASE 2				

BEAM DESIGN HULHUMALE SCHOOL

BEAM DESIGN HULHUMALE SCHOOL

Clause	Date	10-Sep-19		Project No :	Clause	Date	10-Sep-19		Project No :
	Prepared	Mariyam Samah		Project Details :		Prepared	Mariyam Samah		Project Details :
	TYPE	C	TYPE	SLAB		TYPE	C	TYPE	SLAB
	E WIDTH	1650.00		DEAD		E WIDTH	983.00		DEAD
	L WIDTH	3200.00		ULT LOAD		L WIDTH	2000.00		ULT LOAD
	E WIDTH	1650.00		BEAM LOAD		E WIDTH	983.00		BEAM LOAD
	BW/BE	0.36		Check beam width		BW/BE	0.32		Check beam width
	BEAM DESIGN TO BS 8110 : 1997					BEAM DESIGN TO BS 8110 : 1997			
	SIMPLY SUPPORTED BEAM					CONTINUOUS BEAM			
	BEAM NO B9					BEAM NO B10			
	SPAN					SPAN			
	Material Properties					Material Properties			
	fcu	25.00	N/mm ²			fcu	25.00	N/mm ²	
	fy	400.00	N/mm ²			fy	400.00	N/mm ²	
	D1	1.00	1539.00	6.00	32.00	4826.11			
	D2	2.00	1482.00	6.00	32.00	4826.11			
	D3	3.00	1425.00	0.00	32.00	0.00			
	fyv	400.00	N/mm ²			fyv	400.00	N/mm ²	
	Curtailment	SS				Curtailment	CC		
	d/x	0.08	Support	Midspan		d/x	0.22	Support	Midspan
			4.500 m	12.750 m				2.520 m	6.720 m
3.4.4					3.4.4				
	Moment	4000.00				Moment	500.00		
	Shear	1800.00				Shear	300.00		
	Torsion	0.00				Torsion	0.00		
	k'	0.156				k'	0.156		
	k	0.043				k	0.075		
	arm	0.95				arm	0.91		
	d/x	0.08				d/x	0.22		
	As'	0.00				As'	0.00		
	As	8010.07				As	2852.59		
	As min	2496.00				As min	464.75		
	Asmax	38400.00				Asmax	7150.00		
	As reqd	8010.07				As reqd	3504.38		
	As Prov	9652.22				As Prov	4021.76		
	sion bars	0.00				sion bars	0.00		
	bars	10.00				bars	4.00		
3.4.4.4					3.4.4.4				
	SUPPORT 1					SUPPORT 1			
	MIDSPAN					MIDSPAN			
	SUPPORT 2					SUPPORT 2			
	4000.00					500.00			
	4000000000.00					500000000.00			
	1800.00					300.00			
	1800000.00					300000.00			
	0.00					0.00			
	0.00					0.00			
	0.156					0.156			
	0.043					0.075			
	0.95					0.91			
	0.95					0.91			
	0.08					0.22			
	0.00					0.00			
	8010.07					2852.59			
	2496.00					464.75			
	38400.00					7150.00			
	9458.36					3504.38			
	9652.22					4021.76			
	0.00					0.00			
	12.00					5.00			
3.4.5					3.4.5				
	Shear					Shear			
	v	1.99				v	1.97		
	Vc	0.65				Vc	0.87		
	vmax	4.00				vmax	4.00		
	1/4)	1.00				1/4)	1.00		
	d/ bd	1.07				d/ bd	2.64		
	Rings	3.00				Rings	1.00		
	Links	203.89				Links	181.84		
	Provided	150.00				Provided	150.00		
	spacing	1132.88				spacing	416.10		
3.4.5.4					3.4.5.4				
	CRACK	1478.00	4.00						
3.4.5.3					3.4.5.3				
	0.00					0.00			
	0.41					0.74			
	4.00					4.00			
	1.00					1.00			
	0.27					1.58			
	3.00					1.00			
	683.39					497.01			
	150.00					150.00			
	150.00					150.00			
	1132.88					416.10			
3.4.5.5					3.4.5.5				
	Deflection					Deflection			
	Deflection					Deflection			
	factor	1.39				factor	1.20		
	M/bd ²	1.24				M/bd ²	2.26		
	fs	261.31				fs	232.36		
	Condition	16.00				Condition	16.00		
	allowable	22.22				allowable	19.13		
	d actual	9.93				d actual	15.14		
	d					d			
	on bars	0.00				on bars	0.00		
	bars	10.00				bars	4.00		
	Provide					Provide			
	Compressio	6.00				Compressio	2.00		
	bars	12.00				bars	5.00		
	Links	3110 @ 150				Links	1110 @ 150		

Clause	Date	10-Sep-19		Project No :	Clause	Date	10-Sep-19		Project No :
	Prepared	Mariyam Samah		Project Details :		Prepared	Mariyam Samah		Project Details :
	TYPE	C	TYPE	SLAB		TYPE	C	TYPE	SLAB
	E WIDTH	980.00		DEAD		E WIDTH	970.00		DEAD
	L WIDTH	2000.00		ULT LOAD		L WIDTH	3200.00		ULT LOAD
	E WIDTH	886.00		BEAM LOAD		E WIDTH	870.00		BEAM LOAD
	BW/BE	0.34		Check beam width		BW/BE	0.32		Check beam width
	BEAM DESIGN TO BS 8110 : 1997					BEAM DESIGN TO BS 8110 : 1997			
	CONTINUOUS BEAM					SIMPLY SUPPORTED BEAM			
	BEAM NO B11					BEAM NO B12			
	SPAN					SPAN			
	Material Properties					Material Properties			
	fcu	25.00	N/mm ²			fcu	25.00	N/mm ²	
	fy	400.00	N/mm ²			fy	400.00	N/mm ²	
	D1	1.00	942.50	3.00	25.00	1472.81			
	D2	2.00	892.50	0.00	25.00	0.00			
	D3	3.00	842.50	0.00	25.00	0.00			
	fyv	400.00	N/mm ²			fyv	400.00	N/mm ²	
	Curtailment	CC				Curtailment	SS		
	d/x	0.12	Support	Midspan	6.720 m	d/x	0.19	Support	Midspan
									7.225 m
	Section Properties					Section Properties			
	h			1000.00	mm	h			750.00
	bw			300.00	mm	bw			275.00
	d			942.50	mm	d			654.80
	Cover			35.00	mm	Cover			35.00
	d'			57.50	mm	d'			61.00
	Bar size			25.00	mm	Bar size			32.00
	Link size			10.00	mm	Link size			10.00
	beam			8400.00	mm	beam			8500.00
3.4.4						3.4.4			
	Moment		SUPPORT 1	MIDSPAN	SUPPORT 2		Moment		SUPPORT 1
			381.02	300.00	0.00				650.00
			381024000.00	360000000.00	0.00				780000000.00
	Shear		265.44	0.00	0.00		Shear		0.00
			265440.00	0.00	0.00				0.00
	Torsion		0.00	0.00	0.00		Torsion		0.00
	k'		0.156	0.156	0.156		k'		0.156
	k		0.019	0.018	0.000		k		0.084
	arm		0.98	0.98	1.00		arm		0.90
			0.95	0.95	0.95				0.90
	d'/x		0.12	0.12	0.12		d'/x		0.19
	As'		0.00	0.00	0.00		As'		0.00
	As		1222.84	1155.36	0.00		As		3818.97
	As min		780.00	780.00	780.00		As min		536.25
	Asmax		12000.00	12000.00	12000.00		Asmax		8250.00
	As reqd		1222.84	1155.36	780.00		As reqd		3818.97
	As Prov		1472.81	1472.81	1472.81		As Prov		4021.76
	sion bars		0.00	0.00	0.00		sion bars		0.00
	bars		3.00	3.00	2.00		bars		5.00
3.4.5	Shear					3.4.5	Shear		
	v		0.94		0.00		v		2.85
	Vc		0.51		0.51		Vc		0.77
	vmax		4.00		4.00		vmax		4.00
	1/4)		1.00		1.00		1/4)		1.00
	d/ bd		0.52		0.52		d/ bd		1.79
	Rings		1.00		1.00		Rings		2.00
			423.54		455.59				190.47
	Links		150.00		150.00		Links		150.00
	Provided		150.00		150.00		Provided		150.00
	spacing		706.88		706.88		spacing		491.10
3.4.6	Deflection					3.4.6	Deflection		
	Deflection						Deflection		
	factor		2.00		1.17		factor		2.09
	M/bd ²		0.46		2.09		M/bd ²		253.22
	fs		209.19		16.00		fs		18.78
	Condition		16.00		16.00		Condition		12.98
	allowable		32.00		16.00		allowable		12.98
	d actual		8.91		0.00		d actual		0.00
	d						d		
	on bars		0.00		0.00		on bars		0.00
	bars		3.00		3.00		bars		4.00
	Provide						Provide		
	Compressio		3.00		3.00		Compressio		2.00
	bars		3.00		3.00		bars		5.00
	Links		1T10 @ 150		Beam no : B11		Links		2T10 @ 150
									Beam no : B12

BEAM DESIGN HULHUMALE SCHOOL

BEAM DESIGN HULHUMALE SCHOOL

Clause	Date	10-Sep-19		Project No :
	Prepared	Mariyam Samah		Project Details :
	TYPE	1	TYPE	1
	WIDTH	1650.00	SLAB	
	WIDTH	3200.00	DEAD	
	WIDTH	1650.00	ULT LOAD	
	SW/BE	0.36	BEAM LOAD	Check beam width
	BEAM DESIGN TO BS 8110 : 1997			
	SIMPLY SUPPORTED BEAM		BEAM NO B18	
			SPAN	
	Material Properties		Section Properties	
	fcu	25.00	N/mm ²	
	fy	400.00	N/mm ²	
	D1	1.00	1539.00	6.00
	D2	2.00	1482.00	6.00
	D3	3.00	1425.00	0.00
	fyv	400.00	N/mm ²	
	Curtailment	SS		
	d/x	Support	Midspan	
	0.08	4.500 m	12.750 m	
3.4.4				
	SUPPORT 1		MIDSPAN	SUPPORT 2
	Moment	4000.00	2000.00	0.00
		4000000000.00	2400000000.00	0.00
	Shear	1800.00	0.00	0.00
		1800000.00	0.00	0.00
	Torsion	0.00		0.00
	k'	0.156	0.156	0.156
	k	0.043	0.026	0.000
	arm	0.95	0.97	1.00
		0.95	0.95	0.95
	d/x	0.08	0.08	0.08
	As'	0.00	0.00	0.00
	As	8010.07	4806.04	0.00
	As min	2496.00	2496.00	2496.00
	Asmax	38400.00	38400.00	38400.00
	As reqd	8010.07	4806.04	2496.00
	As Prov	9652.22	4826.11	2413.06
	sion bars	0.00	0.00	0.00
	bars	10.00	6.00	4.00
3.4.5	Shear			
	v	1.99		0.00
	Vc	0.65		0.41
	vmax	4.00	CRACK 1478.00 4.00	4.00
	1/4)	1.00		1.00
	d/ bd	1.07		0.27
	Rings	3.00		3.00
		203.89		683.39
	Links	150.00		150.00
	Provided	150.00		150.00
	spacing	1132.88		1132.88
3.4.6	Deflection			
	Deflection			OK
	factor	1.70	6.00	Spacing 55.60
	M/bd ²	0.64		
	fs	265.56		
	Condition	16.00		
	allowable	27.14		
	d actual	9.93		
	d			
	on bars	0.00	0.00	0.00
	bars	10.00	6.00	4.00
	Provide			
	Compressio	6.00	6.00	3.00
	bars	12.00	6.00	3.00
	Links	3T10 @ 150		Beam no : B18

Clause	Date	19-Jun-16		Project No :		
	Prepared by	Mariyam Samah		Project Details :		
	TYPE	L	LIVE			
	EFFECTICE WIDTH	1000.00	SLAB			
	ACTUAL WIDTH	3000.00	DEAD			
	FLANGE WIDTH	1000.00	ULT LOAD			
	BW/BE	0.50	BEAM LOAD			
	BEAM DESIGN TO BS 8110 : 1997					
	CONTINUOUS BEAM			BEAM NO: TB3		
				SPAN		
	Material Properties			Section Properties		
	fcu	25.00	N/mm ²	h	750.00	mm
	fy	400.00	N/mm ²	bw	500.00	mm
	D1	1.00	692.50	4.00	25.00	1963.75
	D2	2.00	642.50	4.00	25.00	1963.75
	D3	3.00	592.50	0.00	25.00	0.00
	fyv	400.00	N/mm ²			
	Curtailment	CC				
	d/x	0.17	Support	Midspan		
		1.500 m	4.000 m			
3.4.4						
		SUPPORT 1		MIDSPAN	SUPPORT 2	
	Moment	559.00		0.00	0.00	
		550000000.00		0.00	0.00	
	Shear	50.00		0.00	0.00	
		500000.00		0.00	0.00	
	Torsion	0.00			0.00	
	k'	0.156		0.156	0.156	
	k	0.099		0.156	0.000	
	z, lever arm	0.87		0.78	1.00	
	d/x	0.87		0.78	0.95	
	As'	0.17		0.17	0.17	
	As	0.00		0.00	0.00	
	As min	2707.42		0.00	0.00	
	Asmax	975.00		975.00	975.00	
	As reqd	15000.00		15000.00	15000.00	
	As Prov	2707.42		975.00	975.00	
	As Prov	3927.50		1963.75	1963.75	
	Compression bars	0.00		0.00	0.00	
	Tension bars	6.00		2.00	2.00	
3.4.5	Shear					
	v	0.15			0.00	
3.4.5.4	Vc	0.67			0.53	
	vmax	4.00			4.00	
	(400/d) ^{1/4}	1.00			1.00	
	100*Asreqd/bd	1.18			0.59	
3.4.5.3	Rings	1.00			1.00	
	Links	273.35			273.35	
	Provided	150.00			150.00	
3.4.5.5	max spacing	500.63			500.63	
3.4.6	Deflection					
	Deflection			OK		
3.4.6.5	Mod factor	2.00	4.00	Spacing	103.33	
	M/bd ²	0.00				
	fs	132.40		Extra @ SPAN	Extra @ SUPP	
3.4.6.3	Condition	20.00		φ	NOS	
3.4.6.5	d allowable	40.00		16.00	0	
	d actual	7.49		Area	0.00	
	Calculated					
	Compression bars	0.00	0.00	0.00		
	Tension bars	6.00	2.00	2.00		
	Provide					
	Compression bars	4.00	4.00	4.00		
	Tension bars	8.00	4.00	4.00		
	Links	1T10 @ 150				
				Beam no :	TB3	
	T	0.00				
	vt	0.00				
	Max v	0.15				
	v + vt	0.15				
	OK					
	y1	660.00				
	x1	410.00				
	Asv	157.10				
	Limit vMIN	0.34				
	Vtu	4.00				
	vmin is less than vt					
	v<vc<4					

Asv	>	T	=	1.05
sv		0.8 X1 Y1 (.87fy)		0.00
As	>	Asv Fyv (X1+Y1)	=	1120.65
1.00		Sv fy		OK

Project Client Location <div style="text-align: center; margin-top: 20px;"> SYMMETRICALLY REINFORCED RECTANGULAR COLUMN DESIGN, BENT ABOUT TWO AXES TO BS 8110:1997 <small>Originated from RCC53.xls v2.5 on CD © 1999-2004 BCA for RCC</small> </div>							
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">Made by M.SAMAH</td> <td style="width: 33%;">Date</td> <td style="width: 33%;">Page</td> </tr> <tr> <td>Checked</td> <td>Revision</td> <td>Job No</td> </tr> </table>	Made by M.SAMAH	Date	Page	Checked	Revision	Job No
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Checked	Revision	Job No					

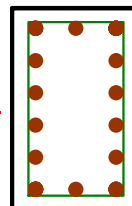
MATERIALS

fcu	25	N/mm ²	γm, steel	1.15	Cover to link	35	mm
fy	400	N/mm ²	γm, conc	1.5	h agg	25	mm

SECTION

h	650	mm
b	350	mm
with	3	bars per 350 face
and	6	bars per 650 face

ie. 650 x 350 columns with 14 bars



RESTRAINTS

	Lo (mm)	Top Condition	Btm Condition	Braced ?	β	Le (mm)	Slenderness	Status
X-AXIS	3000	1	1	Y	0.75	2250	Lex/h = 3.46	Column is SHORT
Y-AXIS	3000	1	1	Y	0.75	2250	Ley/b = 6.43	

LOADCASES

AXIAL N (kN)	TOP MOMENTS (kNm)		BTM MOMENTS (kNm)	
	M ix	M iy	M ix	M iy
2021	200.0	60.0	200.0	60.0
1609	250.0	60.0	250.0	60.0
1528	250.0	60.0	250.0	60.0
145	250.0		0.0	0.0
458	200.0		250.0	0.0
			200.0	0.0

BAR ARRANGEMENTS

Bar Ø	BAR CENTRES (mm)					Checks
	Asc %	Link Ø	350 Face	650 Face	Nuz (kN)	
R 40	7.73	10	110	104	0	Asc > 6 % (3.12.6.2)
R 32	4.95	8	116	106	6331	ok
R 25	3.02	8	120	108	4854	ok
R 20	1.93	6	124	110	4021	ok
R 16	1.24	6	126	110	3488	ok
R 12	0.70	6	128	111	3073	ok

DESIGN MOMENTS (kN)

	X AXIS			Y AXIS		COMBINED		REBAR	max V *
	K	M add	Mx	M add	My	Axis	M '		
0	0.000	0.0	200.0	0.0	60.0	X	270.1	14 R16	88.3
0	0.000	0.0	250.0	0.0	60.0	X	330.3	14 R16	88.1
0	0.000	0.0	250.0	0.0	60.0	X	332.3	14 R16	88.1
0	0.000	0.0	0.0	0.0	0.0	0.0	0.0	#N/A	#DIV/0!
0	0.000	0.0	250.0	0.0	0.0	X	250.0	14 R16	87.7
0	0.000	0.0	200.0	0.0	0.0	X	200.0	14 R12	72.7

SEE CHARTS ON NEXT SHEET

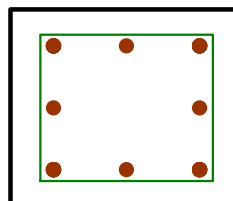
Project Client Location <div style="text-align: center; margin-top: 10px;"> REINFORCED CONCRETE COUNCIL </div>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">Made by M.SAMAH</td> <td style="width: 33%;">Date</td> <td style="width: 33%;">Page</td> </tr> <tr> <td>Checked</td> <td>Revision</td> <td>Job No</td> </tr> </table>	Made by M.SAMAH	Date	Page	Checked	Revision	Job No
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SYMMETRICALLY REINFORCED RECTANGULAR COLUMN DESIGN, BENT ABOUT TWO AXES TO BS 8110:1997 <small>Originated from RCC53.xls v2.5 on CD © 1999-2004 BCA for RCC</small>							

MATERIALS

fcu 25 N/mm² γ_m, steel 1.15 Cover to link 35 mm
 fy 400 N/mm² γ_m, conc 1.5 h_{agg} 25 mm

SECTION

h 350 mm
 b 350 mm
 with 3 bars per 350 face
 and 3 bars per 350 face
 ie. 350 x 350 columns with 8 bars



RESTRAINTS

	Lo (mm)	Top Condition	Btm Condition	Braced ?	β	Le (mm)	Slenderness	Status
X-AXIS	<u>3000</u>	<u>1</u>	<u>1</u>	<u>Y</u>	0.75	2250	Lex/h = 6.43	Column is SHORT
Y-AXIS	<u>3000</u>	<u>1</u>	<u>1</u>	<u>Y</u>	0.75	2250	Ley/b = 6.43	

LOADCASES

AXIAL N (kN)	TOP MOMENTS (kNm)		BTM MOMENTS (kNm)	
	M _{ix}	M _{iy}	M _{ix}	M _{iy}
<u>1551</u>	<u>20.0</u>	<u>20.0</u>	<u>20.0</u>	<u>20.0</u>
<u>1246</u>	<u>20.0</u>	<u>20.0</u>	<u>20.0</u>	<u>20.0</u>
<u>208</u>	<u>20.0</u>	<u>20.0</u>	<u>20.0</u>	<u>20.0</u>
<u>500</u>	<u>70.0</u>	<u>70.0</u>	<u>70.0</u>	<u>70.0</u>
			<u>0.0</u>	<u>0.0</u>
			<u>0.0</u>	<u>0.0</u>


BAR ARRANGEMENTS

Bar Ø	Asc %	Link Ø	BAR CENTRES (mm)		Nuz (kN)	Checks
			350 Face	350 Face		
R 40	8.21	10	110	110	0	Asc > 6 % (3.12.6.2)
R 32	5.25	8	116	116	3534	ok
R 25	3.21	8	120	120	2690	ok
R 20	2.05	6	124	124	2214	ok
R 16	1.31	6	126	126	1909	ok
R 12	0.74	6	128	128	1673	ok

DESIGN MOMENTS (kN)

	K	X AXIS		Y AXIS		COMBINED		REBAR	max V *
		M _{add}	M _x	M _{add}	M _y	Axis	M'		
0	0.000	0.0	27.1	0.0	20.0	X	35.3	8 R16	58.5
0	0.000	0.0	21.8	0.0	20.0	X	32.3	8 R12	48.4
0	0.000	0.0	20.0	0.0	20.0	X	38.4	8 R12	47.5
0	0.000	0.0	70.0	0.0	70.0	X	126.7	8 R20	66.2
0	0.000	0.0		0.0	0.0	0.0	0.0	#N/A	#DIV/0!
0	0.000	0.0		0.0	0.0	0.0	0.0	#N/A	#DIV/0!

SEE CHARTS ON NEXT SHEET

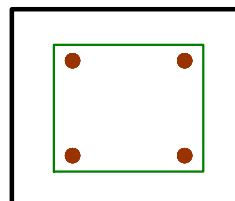
Project	HULHUMALE SCHOOL, HALL BLOCK			
Client			Made by	Date
Location			M.SAMAH	
SYMMETRICALLY REINFORCED RECTANGULAR COLUMN DESIGN, BENT ABOUT TWO AXES TO BS 8110:1997			Checked	Revision
<small>Originated from RCC53.xls v2.5 on CD © 1999-2004 BCA for RCC</small>				Job No

MATERIALS

fcu 25 N/mm² γ_m, steel 1.15 Cover to link 35 mm
 fy 400 N/mm² γ_m, conc 1.5 h_{agg} 25 mm

SECTION

h 250 mm
 b 250 mm
 with 2 bars per 250 face
 and 2 bars per 250 face
 ie. 250 x 250 columns with 4 bars



RESTRAINTS

	Lo (mm)	Top Condition	Btm Condition	Braced ?	β	Le (mm)	Slenderness	Status
X-AXIS	<u>3000</u>	<u>1</u>	<u>1</u>	<u>Y</u>	0.75	2250	Lex/h = 9.00	Column is SHORT
Y-AXIS	<u>3000</u>	<u>1</u>	<u>1</u>	<u>Y</u>	0.75	2250	Ley/b = 9.00	

LOADCASES

AXIAL N (kN)	TOP MOMENTS (kNm)		BTM MOMENTS (kNm)	
	M _{ix}	M _{iy}	M _{ix}	M _{iy}
<u>60</u>	<u>15.0</u>	<u>15.0</u>	<u>15.0</u>	<u>15.0</u>
	<u>20.0</u>	<u>20.0</u>	<u>20.0</u>	<u>20.0</u>
	<u>20.0</u>	<u>20.0</u>	<u>20.0</u>	<u>20.0</u>
	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>
	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>
	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>


BAR ARRANGEMENTS

Bar Ø	BAR CENTRES (mm)					Checks
	Asc %	Link Ø	250 Face	250 Face	Nuz (kN)	
R 40	8.04	10	120	120	0	Asc > 6 % (3.12.6.2) ok ok ok ok ok
R 32	5.15	8	132	132	1781	
R 25	3.14	8	139	139	1359	
R 20	2.01	6	148	148	1121	
R 16	1.29	6	152	152	969	
R 12	0.72	6	156	156	850	

DESIGN MOMENTS (kN)

	X AXIS			Y AXIS		COMBINED		REBAR	max V *
	K	M _{add}	M _x	M _{add}	M _y	Axis	M'		
0	0.000	0.0	15.0	0.0	15.0	X	29.3	4 R20	38.3
0	0.000	0.0	0.0	0.0	0.0	0.0	0.0	#N/A	#DIV/0!
0	0.000	0.0	0.0	0.0	0.0	0.0	0.0	#N/A	#DIV/0!
0	0.000	0.0	0.0	0.0	0.0	0.0	0.0	#N/A	#DIV/0!
0	0.000	0.0	0.0	0.0	0.0	0.0	0.0	#N/A	#DIV/0!
0	0.000	0.0	0.0	0.0	0.0	0.0	0.0	#N/A	#DIV/0!

SEE CHARTS ON NEXT SHEET

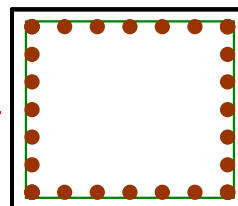
Project	HULHUMALE SCHOOL, HALL BLOCK				
Client	6C		Made by	Date	Page
Location	C5		M.SAMAH		
SYMMETRICALLY REINFORCED RECTANGULAR COLUMN DESIGN, BENT ABOUT TWO AXES TO BS 8110:1997 Originated from RCC53.xls v2.5 on CD © 1999-2004 BCA for RCC			Checked	Revision	Job No

MATERIALS

fcu 25 N/mm² γm, steel 1.15 Cover to link 35 mm
 fy 400 N/mm² γm, conc 1.5 h agg 25 mm

SECTION

h 750 mm
 b 750 mm
 with 7 bars per 750 face
 and 7 bars per 750 face
 ie. 750 x 750 columns with 24 bars



RESTRAINTS

	Lo (mm)	Top Condition	Btm Condition	Braced ?	β	Le (mm)	Slenderness	Status
X-AXIS	<u>3000</u>	<u>1</u>	<u>1</u>	<u>Y</u>	0.75	2250	Lex/h = 3.00	Column is SHORT
Y-AXIS	<u>3000</u>	<u>1</u>	<u>1</u>	<u>Y</u>	0.75	2250	Ley/b = 3.00	

LOADCASES

SHEAR 300

AXIAL N (kN)	TOP MOMENTS (kNm)		BTM MOMENTS (kNm)	
	M ix	M iy	M ix	M iy
<u>3200</u>	<u>150.0</u>	<u>50.0</u>	<u>150.0</u>	<u>50.0</u>
<u>2800</u>	<u>150.0</u>	<u>50.0</u>	<u>150.0</u>	<u>50.0</u>
<u>2700</u>	<u>1000.0</u>	<u>50.0</u>	<u>1000.0</u>	<u>50.0</u>
			<u>0.0</u>	<u>0.0</u>
			<u>0.0</u>	<u>0.0</u>
			<u>0.0</u>	<u>0.0</u>


BAR ARRANGEMENTS

Bar Ø	BAR CENTRES (mm)				Nuz (kN)	Checks
	Asc %	Link Ø	750 Face	750 Face		
R 40	5.36	10	103	103	16435	ok
R 32	3.43	8	105	105	12779	ok
R 25	2.09	8	107	107	10247	ok
R 20	1.34	6	108	108	8820	ok
R 16	0.86	6	109	109	7906	ok
R 12	0.48	6	109	109	7195	ok

DESIGN MOMENTS (kN)

	X AXIS			Y AXIS		COMBINED		REBAR	max V *
	K	M add	Mx	M add	My	Axis	M '		
SHEAR 300	0.000	0.0	150.0	0.0	50.0	X	186.7	24 R12	178.8
0	0.000	0.0	150.0	0.0	50.0	X	188.4	24 R12	178.6
0	0.000	0.0	1000.0	0.0	50.0	X	1038.8	24 R20	248.4
0	0.000	0.0	0.0	0.0	0.0	X	0.0	#N/A	#DIV/0!
0	0.000	0.0	0.0	0.0	0.0	X	0.0	#N/A	#DIV/0!
0	0.000	0.0	0.0	0.0	0.0	X	0.0	#N/A	#DIV/0!

SEE CHARTS ON NEXT SHEET

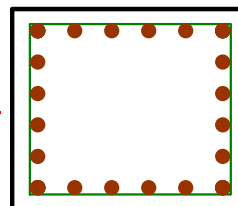
Project	HULHUMALE SCHOOL, HALL BLOCK			
Client	6B		Made by	Date
Location	C3		M.SAMAH	
SYMMETRICALLY REINFORCED RECTANGULAR COLUMN DESIGN, BENT ABOUT TWO AXES TO BS 8110:1997 <small>Originated from RCC53.xls v2.5 on CD © 1999-2004 BCA for RCC</small>			Checked	Revision
				Job No

MATERIALS

fcu 25 N/mm² γ_m, steel 1.15 Cover to link 35 mm
 fy 400 N/mm² γ_m, conc 1.5 h_{agg} 25 mm

SECTION

h 600 mm
 b 600 mm
 with 6 bars per 600 face
 and 6 bars per 600 face
 ie. 600 x 600 columns with 20 bars



RESTRAINTS

	Lo (mm)	Top Condition	Btm Condition	Braced ?	β	Le (mm)	Slenderness	Status
X-AXIS	<u>3000</u>	<u>1</u>	<u>1</u>	<u>Y</u>	0.75	2250	Lex/h = 3.75	Column is SHORT
Y-AXIS	<u>3000</u>	<u>1</u>	<u>1</u>	<u>Y</u>	0.75	2250	Ley/b = 3.75	

LOADCASES

AXIAL N (kN)	TOP MOMENTS (kNm)		BTM MOMENTS (kNm)	
	M _{ix}	M _{iy}	M _{ix}	M _{iy}
<u>2500</u>	<u>250.0</u>	<u>50.0</u>	<u>250.0</u>	<u>50.0</u>
<u>2200</u>	<u>250.0</u>	<u>50.0</u>	<u>250.0</u>	<u>50.0</u>
<u>2000</u>	<u>250.0</u>	<u>50.0</u>	<u>250.0</u>	<u>50.0</u>
<u>1500</u>	<u>250.0</u>	<u>50.0</u>	<u>250.0</u>	<u>50.0</u>
<u>1000</u>	<u>250.0</u>	<u>50.0</u>	<u>250.0</u>	<u>50.0</u>
<u>450</u>	<u>600.0</u>	<u>50.0</u>	<u>600.0</u>	<u>50.0</u>


BAR ARRANGEMENTS

Bar Ø	BAR CENTRES (mm)				Nuz (kN)	Checks
	Asc %	Link Ø	600 Face	600 Face		
R 40	6.98	10	94	94	0	Asc > 6 % (3.12.6.2)
R 32	4.47	8	96	96	9435	ok
R 25	2.73	8	98	98	7325	ok
R 20	1.75	6	100	100	6135	ok
R 16	1.12	6	100	100	5374	ok
R 12	0.63	6	101	101	4782	ok

DESIGN MOMENTS (kN)

	X AXIS		Y AXIS		COMBINED		REBAR	max V *
	K	M _{add}	M _x	M _{add}	M _y	Axis	M'	
0	0.000	0.0	250.0	0.0	50.0	X	283.8	20 R12 124.2
0	0.000	0.0	250.0	0.0	50.0	X	285.7	20 R12 124.1
0	0.000	0.0	250.0	0.0	50.0	X	287.0	20 R12 124.0
0	0.000	0.0	250.0	0.0	50.0	X	290.3	20 R12 123.9
0	0.000	0.0	250.0	0.0	50.0	X	293.5	20 R12 123.8
0	0.000	0.0	600.0	0.0	50.0	X	647.1	20 R25 199.5

SEE CHARTS ON NEXT SHEET

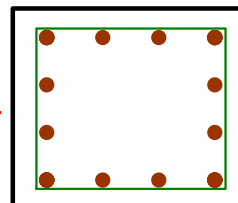
Project	HULHUMALE SCHOOL, HALL BLOCK				
Client	C7		Made by	Date	Page
Location	6F		M.SAMAH		
SYMMETRICALLY REINFORCED RECTANGULAR COLUMN DESIGN, BENT ABOUT TWO AXES TO BS 8110:1997 Originated from RCC53.xls v2.5 on CD © 1999-2004 BCA for RCC			Checked	Revision	Job No

MATERIALS

fcu 25 N/mm² γ_m, steel 1.15 Cover to link 35 mm
 fy 400 N/mm² γ_m, conc 1.5 h agg 25 mm

SECTION

h 450 mm
 b 450 mm
 with 4 bars per 450 face
 and 4 bars per 450 face
 ie. 450 x 450 columns with 12 bars



RESTRAINTS

	Lo (mm)	Top Condition	Btm Condition	Braced ?	β	Le (mm)	Slenderness	Status
X-AXIS	<u>3000</u>	<u>1</u>	<u>1</u>	<u>Y</u>	0.75	2250	Lex/h = 5.00	Column is SHORT
Y-AXIS	<u>3000</u>	<u>1</u>	<u>1</u>	<u>Y</u>	0.75	2250	Ley/b = 5.00	

LOADCASES

	AXIAL N (kN)	TOP MOMENTS (kNm)		BTM MOMENTS (kNm)	
		M ix	M iy	M ix	M iy
<u>6C</u>	<u>1200</u>	<u>200.0</u>	<u>50.0</u>	<u>200.0</u>	<u>50.0</u>
<u>6C</u>	<u>700</u>	<u>100.0</u>	<u>50.0</u>	<u>100.0</u>	<u>50.0</u>
<u>6C</u>	<u>400</u>	<u>100.0</u>	<u>50.0</u>	<u>100.0</u>	<u>50.0</u>
	<u>1200</u>	<u>120.0</u>	<u>180.0</u>	<u>120.0</u>	<u>180.0</u>
				<u>0.0</u>	<u>0.0</u>
				<u>0.0</u>	<u>0.0</u>

BAR ARRANGEMENTS

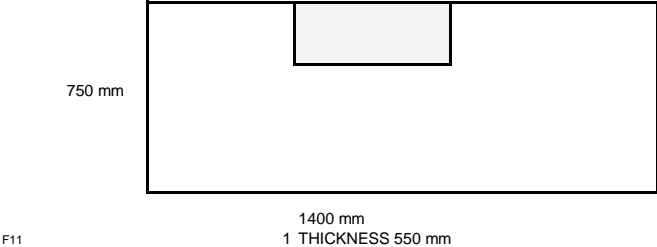
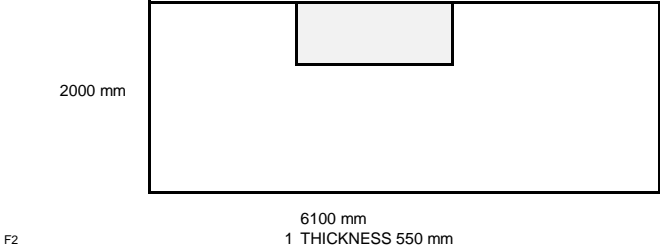
	BAR CENTRES (mm)					
Bar Ø	Asc %	Link Ø	450 Face	450 Face	Nuz (kN)	Checks
R 40	7.45	10	107	107	0	Asc > 6 % (3.12.6.2)
R 32	4.77	8	111	111	5510	ok
R 25	2.91	8	113	113	4244	ok
R 20	1.86	6	116	116	3530	ok
R 16	1.19	6	117	117	3074	ok
R 12	0.67	6	119	119	2718	ok

DESIGN MOMENTS (kN)

MOMENTS (kN		X AXIS		Y AXIS		COMBINED			
		K	M add	Mx	M add	My	Axis		
6C	0.000	0.0	200.0	0.0	50.0	X	236.2	12 R20	101.0
6C	0.000	0.0	100.0	0.0	50.0	X	141.9	12 R12	72.3
6C	0.000	0.0	100.0	0.0	50.0	X	145.4	12 R12	72.3
0	0.000	0.0	120.0	0.0	180.0	Y	266.8	12 R20	101.0
0	0.000	0.0		0.0	0.0	0.0	0.0	#N/A	#DIV/0!
0	0.000	0.0	0.0	0.0	0.0	0.0	0.0	#N/A	#DIV/0!

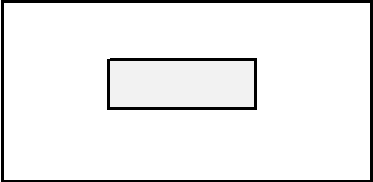
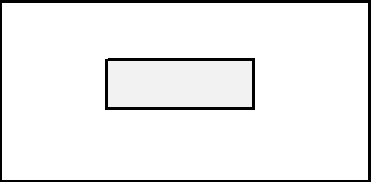
SEE CHARTS ON NEXT SHEET

TYPE : ACCENTRIC Project : HULHUMALE SCHOOL				Footing # F2 Prepared by : Mariyam Samah				TYPE : ACCENTRIC Project : HULHUMALE SCHOOL				Footing # F11 Prepared by : Mariyam Samah			
Footing design to BS 8110 : 1997								Footing design to BS 8110 : 1997							
Section Properties h (mm) 550 d (mm) 470 c 50 Column dimensions (mm) 350 350 Bars ϕ 20				Material Properties fy 400 N/mm ² fcu 25 N/mm ² Load REQD AREA 12.32734809 1.45 Ult Load 2222 kN Characteristic Load 1564.8 1725.828732 kN Bearing pressure 150 kN/m ² Earth Pressure 141.4613715 kN/m ² Base pressure 182.1311475 kN/m ²				Section Properties h (mm) 550 d (mm) 476 c 50 Column dimensions (mm) 350 350 Bars ϕ 16				Material Properties fy 400 N/mm ² fcu 25 N/mm ² Load REQD AREA 1.06982495 1.45 Ult Load 193 kN Characteristic Load 135.9 149.775493 kN Bearing pressure 150 kN/m ² Earth Pressure 142.6433266 kN/m ² Base pressure 183.8095238 kN/m ²			
2.5 4.9 Base area X Y Footing dimensions (m) 2 6.1 Footing dimensions (mm) 2000 6100 AREA 12.2								0.75 1.4 Base area X Y Footing dimensions (m) 0.75 1.4 Footing dimensions (mm) 750 1400 AREA 1.05							
Reinforcement Calculation Length x 1.825 m Bending moment 1850.16 kN.m k 0.05 Z, Lever arm 0.93 0.93 d As req 12101.92 mm ² Reinf provided 12568.00 mm ² No of Bars reqd 39 No Provided 40 SPACING 150 Calculated 20 mm bars @ 150 mm c/c Provided 20 mm bars @ 150 mm c/c				Direct Shear at 1.0d length x 1.18 m V 1310.98 kN v 0.46 N/mm ² vc 0.48 N/mm ² Shear check OK 100 As/bvd 0.44 400/d 1.00				Reinforcement Calculation Length x 0.575 m Bending moment 42.54 kN.m k 0.01 Z, Lever arm 0.99 0.95 d As req 270.33 mm ² Reinf provided 1809.79 mm ² No of Bars reqd 2 No Provided 9 SPACING 150 8.666666667 Calculated 16 mm bars @ 700 mm c/c Provided 16 mm bars @ 150 mm c/c				Direct Shear at 1.0d length x -0.08 m V -19.56 kN v -0.03 N/mm ² vc 0.41 N/mm ² Shear check OK 100 As/bvd 0.27 400/d 1.00			
Punching shear at column perimeter vmax 4 3.376899696 OK TB MOMENT 1549.140845				Perimeter ##### SERVICE ULT Moment 0 0 0.00 E 0 P/Max 141.4613715 182.1311475 182.1311475 D/E 0.333333333 P/Min 141.4613715 182.1311475 1850.162188 182.131 1310.98 2000 6100 550 1 20 mm bars @ 150 mm c/c				Punching shear at column perimeter vmax 4 0.289615846 OK TB MOMENT 32.61971831				Perimeter ##### SERVICE ULT Moment 0 0 0.00 E 0 P/Max 142.6433266 183.8095238 183.8095238 D/E 0.125 P/Min 142.6433266 183.8095238 42.54041667 183.810 -19.55733333 750 1400 550 1 16 mm bars @ 150 mm c/c			



TYPE : ACCENTRIC Project : HULHUMALE SCHOOL				Footing # f12 Prepared by : Mariyam Samah				TYPE : ACCENTRIC Project : HULHUMALE SCHOOL				Footing # F6 Prepared by : Mariyam Samah																											
Footing design to BS 8110 : 1997																Footing design to BS 8110 : 1997																							
Section Properties h (mm) 550 d (mm) 476 c 50 Column dimensions (mm) 350 350 Bars ϕ 16								Material Properties fy 400 N/mm ² fcu 25 N/mm ² Load REQD AREA 2.466290946 1.45 Ult Load 447 kN Characteristic Load 314.8 345.2807324 kN Bearing pressure 150 kN/m ² Earth Pressure 149.4721785 kN/m ² Base pressure 193.5064935 kN/m ²								Section Properties h (mm) 550 d (mm) 476 c 50 Column dimensions (mm) 350 350 Bars ϕ 16								Material Properties fy 400 N/mm ² fcu 25 N/mm ² Load REQD AREA 8.608269618 1.45 Ult Load 1552 kN Characteristic Load 1093.0 1205.157746 kN Bearing pressure 150 kN/m ² Earth Pressure 141.7832643 kN/m ² Base pressure 182.5882353 kN/m ²															
1.1 2.1 Base area X Y Footing dimensions (m) 1.1 2.1 Footing dimensions (mm) 1100 2100 AREA 2.31																2.05 4 Base area X Y Footing dimensions (m) 1.7 5 Footing dimensions (mm) 1700 5000 AREA 8.5																							
Reinforcement Calculation Length x 0.925 m Bending moment 173.85 kN.m k 0.01 Z, Lever arm 0.98 0.95 d As req 1104.74 mm ² Renf provided 2815.23 mm ² No of Bars reqd 6 No Provided 14 SPACING 150 Calculated 16 mm bars @ 350 mm c/c Provided 16 mm bars @ 150 mm c/c										Direct Shear at 1.0d length x 0.27 m V 111.34 kN v 0.11 N/mm ² vc 0.41 N/mm ² Shear check OK 100 As/bvd 0.28 400/d 1.00										Reinforcement Calculation Length x 1.525 m Bending moment 1061.58 kN.m k 0.04 Z, Lever arm 0.96 0.95 d As req 6745.94 mm ² Renf provided 6836.99 mm ² No of Bars reqd 34 No Provided 34 SPACING 150 Calculated 16 mm bars @ 125 mm c/c Provided 16 mm bars @ 125 mm c/c										Direct Shear at 1.0d length x 0.87 m V 797.91 kN v 0.34 N/mm ² vc 0.42 N/mm ² Shear check OK 100 As/bvd 0.29 400/d 1.00									
Punching shear at column perimeter vmax 4 0.670768307 OK TB MOMENT 141.6549296				Perimeter ##### SERVICE ULT Moment 0 0 0.00 E 0 PMAx 149.4721785 193.5064935 193.5064935 D/E 0.183333333 PMIN 149.4721785 193.5064935 173.8474432 193.506 111.3436364 1100 2100 550 1 16 mm bars @ 150 mm c/c												Punching shear at column perimeter vmax 4 2.328931573 OK TB MOMENT 885.2957746				Perimeter ##### SERVICE ULT Moment 0 0 0.00 E 0 PMAx 141.7832643 182.5882353 182.5882353 D/E 0.283333333 PMIN 141.7832643 182.5882353 1061.579412 182.588 797.9105882 1700 5000 550 1 16 mm bars @ 125 mm c/c T&b																			



TYPE : Square Project : Hulhumale school		DATE 44003	Footing # Prepared by : Mariyam Samah		F1	TYPE : Square Project : Hulhumale school		Footing # Prepared by : Mariyam Samah		F3	
Footing design to BS 8110 : 1997						Footing design to BS 8110 : 1997					
Section Properties h (mm) 550 d (mm) 476 d (mm) in shear c 50 Column dimensions (mm) 200 200 Bars ϕ 16			Material Properties h (mm) 350 f _{cu} 25 N/mm ² f _y 400 N/mm ²			Section Properties h (mm) 550 d (mm) 476 d (mm) in shear c 50 Column dimensions (mm) 200 200 Bars ϕ 16			Material Properties h (mm) 350 f _{cu} 25 N/mm ² f _y 400 N/mm ²		
1.725225225 1.438843379 Base area X Y			Ult Load 383 kN Characteristic Load 264.1 kN Bearing pressure 150 kN/m ²			1.785830112 Base area X Y			Ult Load 590 kN Characteristic Load 408.3 kN Bearing pressure 150 kN/m ²		
Footing dimensions (m) 1.8 1.2 Footing dimensions (mm) 1800 1200 AREA 2.16			Earth Pressure 133.7100792 kN/m ² Base pressure 177.3148148 kN/m ²			Footing dimensions (m) 1.8 1.8 Footing dimensions (mm) 1800 1800 AREA 3.24			Earth Pressure 137.4439069 kN/m ² Base pressure 182.0987654 kN/m ²		
Reinforcement Calculation Length x 0.8 m Bending moment 102.13 kN.m k 0.01 Z, Lever arm 0.99 0.95 d As req 741.74 mm ² Renf provided 2211.97 mm ² No of Bars reqd 4 No Provided 11 Spacing 175 10.28571429 Calculated 16 mm bars @ 450 mm c/c Provided 16 mm bars @ 150 mm c/c			Direct Shear at 1.0d length x 0.32 m V 68.94 kN v 0.08 N/mm ² vc 0.40 N/mm ² Shear check OK 100 As/bvd 0.26 400/d 1.00			Reinforcement Calculation Length x 0.8 m Bending moment 104.89 kN.m k 0.01 Z, Lever arm 0.99 0.95 d As req 761.75 mm ² Renf provided 2211.97 mm ² No of Bars reqd 4 No Provided 11 Spacing 175 10.28571429 Calculated 16 mm bars @ 450 mm c/c Provided 16 mm bars @ 150 mm c/c			Direct Shear at 1.0d length x 0.32 m V 106.20 kN v 0.12 N/mm ² vc 0.40 N/mm ² Shear check OK 100 As/bvd 0.26 400/d 1.00		
Punching shear at column perimeter v _{max} 1.005777311 OK			Perimeter SERVICE Moment 0 P _{min} 133.7100792 177.3148148 177.3148148 D/B 0.3 P _{max} 133.7100792 177.3148148 68.08888889 177.315 68.94			Punching shear at column perimeter v _{max} 1.549369748 OK			Perimeter SERVICE Moment 0 P _{min} 137.4439069 182.0987654 182.0987654 D/B 0.3 P _{max} 137.4439069 182.0987654 104.8888889 182.099 106.2		
TYPE : Square			1800 1200 550 F1			TYPE : Square			1800 1800 550 F3		
16 mm bars @ 150 mm c/c						16 mm bars @ 150 mm c/c					
			1200 mm THICKNESS 550 mm						1800 mm THICKNESS 550 mm		
TYPE : Square			F1			TYPE : Square			F3		

TYPE : Square Project : Hulhumale school		Footing # Prepared by : Mariyam Samah		F5	
Footing design to BS 8110 : 1997		Footing design to BS 8110 : 1997		F4	
Section Properties h (mm) 550 d (mm) 476 d (mm) in shear c 50 Column dimensions (mm) 200 200 Bars ϕ 16		Material Properties h (mm) 350 d (mm) 25 fcu fy 400 N/mm ²		Section Properties h (mm) 550 d (mm) 476 d (mm) in shear c 50 Column dimensions (mm) 200 200 Bars ϕ 16	
2.266083656 Base area X Y		Load REQD AREA 4.883485758 1.445 Ult Load 950 kN Characteristic Load 657.4 kN Bearing pressure 150 kN/m ² Earth Pressure 135.7036685 kN/m ² Base pressure 179.584121 kN/m ²		2.731201102 Base area X Y	
Footing dimensions (m) 2.3 2.3 Footing dimensions (mm) 2300 2300 AREA 5.29				Footing dimensions (m) 1.5 5 Footing dimensions (mm) 1500 5000 AREA 7.5	
Reinforcement Calculation Length x 1.05 m Bending moment 227.69 kN.m k 0.02 Z, Lever arm 0.98 0.95 d As req 1653.58 mm ² Renf provided 2815.23 mm ² No of Bars reqd 9 No Provided 14 Spacing 175 13.14285714 Calculated 16 mm bars @ 250 mm c/c Provided 16 mm bars @ 150 mm c/c		Direct Shear at 1.0d length x 0.57 m V 237.09 kN v 0.22 N/mm ² vc 0.40 N/mm ² Shear check OK 100 As/bvd 0.26 400/d 1.00		Reinforcement Calculation Length x 0.65 m Bending moment 58.31 kN.m k 0.01 Z, Lever arm 0.99 0.95 d As req 423.44 mm ² Renf provided 1809.79 mm ² No of Bars reqd 3 No Provided 9 Spacing 175 8.571428571 Calculated 16 mm bars @ 500 mm c/c Provided 16 mm bars @ 150 mm c/c	
Punching shear at column perimeter vmax 2.494747899 OK		Perimeter SERVICE Moment 0 Pmin 135.7036685 Pmax 135.7036685		Punching shear at column perimeter vmax 3.62394958 OK	
		ULT 0 0.00 e 0		ULT 0 0.00 e 0	
		D/B 0.3833333333		D/B 0.25	
		2300 2300 550 F5		1500 5000 550 F4	
		16 mm bars @ 150 mm c/c		16 mm bars @ 150 mm c/c	
2300 mm				1500 mm	
TYPE : Square F5		2300 mm THICKNESS 550 mm		TYPE : Square F4	
				5000 mm THICKNESS 550 mm	

TYPE : Square Project : Hulhumale school		Footing # Prepared by : Mariyam Samah		F7	
Footing design to BS 8110 : 1997					
Section Properties h (mm) 550 d (mm) 476 d (mm) in shear c 50 Column dimensions (mm) 200 200 Bars ϕ 16		Material Properties h (mm) 350 fy 400 N/mm ² d (mm) 25 N/mm ² f _{cu} Load REQD AREA 2.565459872 1.445 Ult Load 500 kN Characteristic Load 346.0 377.1226012 kN Bearing pressure 150 kN/m ² Earth Pressure 138.5206983 kN/m ² Base pressure 183.6547291 kN/m ²			
1.643989873 Base area X Y Footing dimensions (m) 1.65 1.65 Footing dimensions (mm) 1650 1650 AREA 2.7225					
Reinforcement Calculation Length x 0.725 m Bending moment 79.64 kN.m k 0.01 Z, Lever arm 0.99 0.95 d As req 578.38 mm ² Renf provided 2010.88 mm ² No of Bars reqd 3 No Provided 10 Spacing 175 9.428571429 Calculated 16 mm bars @ 550 mm c/c Provided 16 mm bars @ 150 mm c/c		Direct Shear at 1.0d length x 0.25 m V 75.45 kN v 0.10 N/mm ² vc 0.40 N/mm ² Shear check <input checked="" type="checkbox"/> OK 100 As/bvd 0.26 400/d 1.00			
Punching shear at column perimeter v _{max} 1.31302521 4 OK		Perimeter ##### SERVICE ULT Moment 0 0 0.00 e 0 P _{min} 138.5206983 183.6547291 183.6547291 D/B 0.275 P _{max} 138.5206983 183.6547291 79.64015152 183.655 75.45454545			
TYPE : Square 1650 1650 550 F7 16 mm bars @ 150 mm c/c					
1650 mm TYPE : Square F7 1650 mm THICKNESS 550 mm					

TYPE : Square Project : Hulhumale school		Footing # Prepared by : Mariyam Samah		F8	
Footing design to BS 8110 : 1997					
Section Properties h (mm) 550 d (mm) 476 d (mm) in shear c 50 Column dimensions (mm) 200 200 Bars ϕ 16		Material Properties h (mm) 350 fy 400 N/mm ² d (mm) 25 N/mm ² f _{cu} Load REQD AREA 5.390788018 1.445 Ult Load 1050 kN Characteristic Load 726.6 792.4458386 kN Bearing pressure 150 kN/m ² Earth Pressure 137.5774025 kN/m ² Base pressure 182.2916667 kN/m ²			
2.382367662 Base area X Y Footing dimensions (m) 2.4 2.4 Footing dimensions (mm) 2400 2400 AREA 5.76					
Reinforcement Calculation Length x 1.1 m Bending moment 264.69 kN.m k 0.02 Z, Lever arm 0.98 0.95 d As req 1922.28 mm ² Renf provided 2815.23 mm ² No of Bars reqd 10 No Provided 14 Spacing 175 13.71428571 Calculated 16 mm bars @ 225 mm c/c Provided 16 mm bars @ 150 mm c/c		Direct Shear at 1.0d length x 0.62 m V 273.00 kN v 0.24 N/mm ² vc 0.40 N/mm ² Shear check <input checked="" type="checkbox"/> OK 100 As/bvd 0.25 400/d 1.00			
Punching shear at column perimeter v _{max} 2.757352941 4 OK		Perimeter ##### SERVICE ULT Moment 0 0 0.00 e 0 P _{min} 137.5774025 182.2916667 182.2916667 D/B 0.4 P _{max} 137.5774025 182.2916667 264.6875 182.292 273			
TYPE : Square 2400 2400 550 F8 16 mm bars @ 150 mm c/c					
2400 mm TYPE : Square F8 2400 mm THICKNESS 550 mm					

TYPE : Square Project : Hulhumale school		Footing # Prepared by : Mariyam Samah		F9	
TYPE : Square Project : Hulhumale school		Footing # Prepared by : Mariyam Samah		F10	
Footing design to BS 8110 : 1997					
Section Properties h (mm) 550 d (mm) 476 d (mm) in shear c 50 Column dimensions (mm) 200 200 Bars ϕ 16		Material Properties h (mm) 350 fy 400 N/mm ² f _{cu} 25 N/mm ² Load REQD AREA 6.8863224 1.445			
2.650854018 Base area X Y Footing dimensions (m) 2.7 2.7 Footing dimensions (mm) 2700 2700 AREA 7.29		Ult Load 1300 kN Characteristic Load 899.7 kN Bearing pressure 150 kN/m ² Earth Pressure 134.833325 kN/m ² Base pressure 178.3264746 kN/m ²			
Reinforcement Calculation Length x 1.25 m Bending moment 376.16 kN.m k 0.02 Z, Lever arm 0.97 0.95 d As req 2731.82 mm ² Renf provided 3217.41 mm ² No of Bars reqd 14 No Provided 16 Spacing 175 15.42857143 Calculated 16 mm bars @ 175 mm c/c Provided 16 mm bars @ 150 mm c/c		Direct Shear at 1.0d length x 0.77 m V 372.67 kN v 0.29 N/mm ² vc 0.40 N/mm ² Shear check OK 100 As/bvd 0.25 400/d 1.00			
Punching shear at column perimeter v _{max} 3.413865546 4 OK		Perimeter SERVICE Moment 0 0 0.00 e 0 P _{min} 134.833325 178.3264746 178.3264746 D/B 0.45 P _{max} 134.833325 178.3264746 376.1574074 178.326 372.6666667			
TYPE : Square 2700 16 mm bars @ 150 mm c/c		TYPE : Square 2700 2700 550 F9 16 mm bars @ 150 mm c/c			
2700 mm TYPE : Square F9 2700 mm THICKNESS 550 mm		2700 mm THICKNESS 550 mm			
Footing design to BS 8110 : 1997					
Section Properties h (mm) 550 d (mm) 476 d (mm) in shear c 50 Column dimensions (mm) 200 200 Bars ϕ 16		Material Properties h (mm) 350 fy 400 N/mm ² f _{cu} 25 N/mm ² Load REQD AREA 18.46571565 1.445			
4.411287733 Base area X Y Footing dimensions (m) 3.15 6.2 Footing dimensions (mm) 3150 6200 AREA 19.53		Ult Load 3600 kN Characteristic Load 2491.3 kN Bearing pressure 150 kN/m ² Earth Pressure 138.9892576 kN/m ² Base pressure 184.3317972 kN/m ²			
Reinforcement Calculation Length x 1.475 m Bending moment 631.63 kN.m k 0.04 Z, Lever arm 0.96 0.95 d As req 4587.19 mm ² Renf provided 4625.02 mm ² No of Bars reqd 23 No Provided 23 Spacing 175 18 Calculated 16 mm bars @ 125 mm c/c Provided 16 mm bars @ 125 mm c/c		Direct Shear at 1.0d length x 1.00 m V 570.00 kN v 0.38 N/mm ² vc 0.43 N/mm ² Shear check OK 100 As/bvd 0.31 400/d 1.00 NOTE : COMBINED 2 F10 3150X6200			
Punching shear at column perimeter v _{max} 9.453781513 4 fail		Perimeter SERVICE Moment 0 0 0.00 e 0 P _{min} 138.9892576 184.3317972 184.3317972 D/B 0.525 P _{max} 138.9892576 184.3317972 1243.214286 184.332 1141.714286			
TYPE : Square 3150 6200 550 F10 16 mm bars @ 125 mm c/c		TYPE : Square 3150 6200 550 F10 16 mm bars @ 125 mm c/c			
3150 mm TYPE : Square F10 6200 mm THICKNESS 550 mm		3150 mm THICKNESS 550 mm			
COMBINED FOOTINGS					
3150 mm THICKNESS 550 mm					

Clause	Date :	Project No :	Clause	Date :	Project No :
	Prepared by : Mariyam Samah	Project Details :		Prepared by : Mariyam Samah	Project Details :
FOUNDATION BEAM DESIGN TO BS 8110 : 1997			FOUNDATION BEAM DESIGN TO BS 8110 : 1997		
SPAN : CONTINUOUS Material Properties fcu 25.00 N/mm ² fy 400.00 N/mm ² COL 200.00 1.00 20.00 6.00 1885.2 ## 2.00 20.00 4.00 1256.8 ## 3.00 16.00 0.00 0 ## fyv 400.00 N/mm ² Curtailment C END COND SUPPORT1 SUPPORT2 Midspan C 1.1 mm S 2.7 mm Depth of foundation 550 mm Distributed load 300.00 kN/m			BEAM NO : FB14 Section Properties h 1200.00 mm bw 800.00 mm d 1106.00 mm Cover d' 50.00 mm Bar size beam d' 70.00 mm raft 20.00 mm Link size 16.00 mm Link length 10.00 mm Total length 3200.00 mm Length of beam 650.00 mm		
3.4.4	Moment		3.4.4	Moment	
3.4.4.4	Shear		3.4.4.4	Shear	
3.4.5	SHEAR		3.4.5	SHEAR	
3.4.5.4	Vc		3.4.5.4	Vc	
3.4.5.5	vmx		3.4.5.5	vmx	
3.4.5.6	(400/d) ^{1/4}		3.4.5.6	(400/d) ^{1/4}	
3.4.5.7	100*Asrqd/ bd		3.4.5.7	100*Asrqd/ bd	
3.4.5.8	Rings		3.4.5.8	Rings	
3.4.5.9	Links		3.4.5.9	Links	
3.4.5.10	max spacing		3.4.5.10	max spacing	
EXTRA BAR AT SPAN Dia. Nos 16 0.00 AREA 0			EXTRA BAR AT SUPP Dia. Nos 16 0.00 AREA 0		
Calculated Compression bars 0.00 Tension bars 7.00 Provide Compression bars 6.00 Tension bars 10.00 Links 3T 10 @ 300 Spacing 104.00			Calculated Compression bars 0.00 Tension bars 9.00 Provide Compression bars 6.00 Tension bars 10.00 Links 3T 10 @ 275 Spacing 104.00		
Arrangement tension steel 6 NOS 20 4 NOS 20 2.7 mm EXTRA @ SPAN 3T 10 @ 300 4 NOS 20 6 NOS 20 EXTRA @ SUPP 1.1 mm			Arrangement tension steel 6 NOS 20 4 NOS 20 2.7 mm EXTRA @ SPAN 3T 10 @ 275 6 NOS 20 6 NOS 20 EXTRA @ SUPP 1.1 mm		
LENGTH 1200.00 FB14 WIDTH 800.00 RAFT 550 650.00 BAR SUPPORT SPAN LAYER 1 6 NOS 20 6 NOS 20 LAYER 2 4 NOS 20 4 NOS 20 LINK 3T 10 @ 300 CRACK 1 Span 2.7 mm Support 1.1 mm			LENGTH 1200.00 FB15 WIDTH 800.00 RAFT 550 650.00 BAR SUPPORT SPAN LAYER 1 6 NOS 20 6 NOS 20 LAYER 2 6 NOS 20 4 NOS 20 LINK 3T 10 @ 275 CRACK 1 Span 2.7 mm Support 1.1 mm		

	Date		Project No :				
	Prepared by		Mariyam Samah		Project Details :		
SHEAR CHECK TO BS 8110 : 1997							
Material Properties			Section Properties				
fcu	25.00		N/mm ²	H	550.00	mm	
fy	400.00		N/mm ²	Beam width		mm	
Slab	3100.00	Y	4200.00	d	476.00	mm	
ly/lx	1.36	BOTH WAY		Cover	50.00	mm	
fyv	400.00		N/mm ²	Bar size raft	16.00	16.00 mm	
BAR SPACING		150.00		Discont. support		Cont. supp	
ULT PRESSURE		180.00		Shear coeff		0.428	
Width considered		1000.00		Shear @ 1.0 d		165.48192	
L		3100.00					
SPACING			300 300 mm				
As PROVIDED			1340.41 mm ²		NOTE: - BOTH WAY		
100As/bvd ^{1/3}			0.66		SHEAR OK		
400/d			1		0 0 COEFF FOR ONE WAY		
vc			0.41 n/mm ²		MIN REINFORCEMENT		
v			0.35 n/mm ²		1.3 1.4 1.36		
SHEAR CAPACITY			197.18 Kn		0.41 0.44 0.428		
			200 MM		TWO SHORT EDGES CONT		

Project CLASS ROOM SLAB 2		REINFORCED CONCRETE COUNCIL		REINFORCED CONCRETE COUNCIL	
Client Location		2 to 3: B1 to		Made by Mariyam Samah	Date
2-WAY SPANNING INSITU CONCRETE SLABS to BS 8110:1997 (Table 3.14) <small>Originated from RCC94.xls v2.1 © 1999-2003 BCA for RCC</small>				Checked 	Revision -
				Page 130	
				Job No 	

DIMENSIONS short span, lx m 6.40 long span, ly m 8.50 h mm 200 Top cover mm 25 Btm cover mm 30		MATERIALS fcu N/mm ² 25 $\gamma_c = 1.50$ fy N/mm ² 400 $\gamma_s = 1.15$ Density kN/m ³ 24 (Normal weight concrete)		STATUS VALID DESIGN	
LOADING <small>characteristic</small> Self weight kN/m ² 4.80 Extra dead kN/m ² 2.00 Total Dead, gk kN/m ² 6.80 Imposed, qk kN/m ² 3.00 Design load, n kN/m ² 14.32		EDGE CONDITIONS Edge 1 C C = Continuous Edge 2 C D = Discontinuous Edge 3 C Edge 4 D			

MAIN STEEL	SHORT SPAN x	LONG SPAN y	EDGE 1 Continuous	EDGE 2 Continuous	EDGE 3 Continuous	EDGE 4 Free	
β_s	0.040	0.028	0.053	0.037	0.053	0.000	BS8110 Reference Table 3.14
M kNm/m	23.2	16.1	30.9	21.5	30.9	0.0	
d mm	165.0	155.0	170.0	160.0	170.0	160.0	
k'	0.156	0.156	0.156	0.156	0.156	0.156	
k	0.034	0.027	0.043	0.034	0.043	0.000	3.4.4.4
Z mm	156.8	147.3	161.5	152.0	161.5	152.0	
As req mm ² /m	425	315	551	407	551	0	
As min mm ² /m	480	480	480	480	480	480	Table 3.25
As deflection mm ² /m	425	315	~	~	~	~	
\emptyset mm	10	10	10	10	10	10	
Layer	B1	B 2	T1	T 2	T 1	T 2	
@ mm	150	150	125	150	125	150	
As prov mm ² /m	524	524	628	524	628	524	
= %	0.317	0.338	0.370	0.327	0.370	0.327	%
S max mm	505	475	520	490	520	490	Clause
Subclause	(a)	(a)	(a)	(a)	(a)	(a)	3.12.11.2.7
DEFLECTION							
fs	217	160	234	207	234	0	Eqn 8
Mod factor	1.788						Eqn 7
Perm L/d	46.49	Actual L/d	38.79	<i>Asx enhanced 0.0% for deflection control</i>			Table 3.10

TORSION STEEL	BOTH EDGES DISCONTINUOUS		ONE EDGE DISCONTINUOUS		
\emptyset mm	10				
As req mm ² /m	480		480		3.5.3.5
As prov T mm ² /m	5000	5000	628	524	
Additional As T req mm ²	0	0	0	0	
As prov B mm ² /m	524	524	524	524	

Bottom steel not curtailed in edge strips at free edges

SUPPORT REACTIONS (kN/m char uno) (See Figure 3.10)					
EDGE 1	EDGE 2	EDGE 3	EDGE 4		
B1, 2-3	3, -B1	2-3	2, -B1		
0.441	0.360	0.441	0.240	Sum $\beta_v x = 0.882$	
19.18	15.67	19.18	10.44	Sum $\beta_v y = 0.600$	
8.46	6.91	8.46	4.61		
40.4	33.0	40.4	22.0		

equations 19 & 20

OUTPUT/SUMMARY						
PROVIDE MAIN STEEL	SHORT SPAN	LONG SPAN	EDGE 1	EDGE 2	EDGE 3	EDGE 4
	R10 @ 150 B1	R10 @ 150 B2	R10 @ 125 T1	R10 @ 150 T2	R10 @ 125 T1	R10 @ 150 T2
ADDITIONAL TORSION STEEL						
	CORNER 1	CORNER 2	CORNER 3	CORNER 4		
	2B1	3B1	3	2		
X direction						
Y direction						

placed in edge strips

CHECKS	BAR \emptyset	SINGLY REINFORCED	MIN SPACING	MAX SPACING	DEFLECTION	GLOBAL STATUS
Lx > Ly OK	< COVER OK	OK	OK	OK	OK	VALID DESIGN

Project CLASS ROOM				REINFORCED CONCRETE COUNCIL	
Client		2 to 3: B1 to		Made by	Date
Location		2-WAY SPANNING INSITU CONCRETE SLABS to BS 8110:1997 (Table 3.14)		Mariyam Samah	
Originated from RCC94.xls v2.1		© 1999-2003 BCA for RCC		Checked	Revision
				Job No	

DIMENSIONS short span, lx m 6.40 long span, ly m 8.50 h mm 200 Top cover mm 25 Btm cover mm 30	MATERIALS fcu N/mm ² 25 $\gamma_c = 1.50$ fy N/mm ² 400 $\gamma_s = 1.15$ Density kN/m ³ 24 (Normal weight concrete)	STATUS VALID DESIGN
--	--	--

LOADING <i>characteristic</i> Self weight kN/m ² 4.80 Extra dead kN/m ² 2.00 Total Dead, gk kN/m ² 6.80 Imposed, qk kN/m ² 3.00 Design load, n kN/m ² 14.32	EDGE CONDITIONS Edge 1 C C = Continuous Edge 2 C D = Discontinuous Edge 3 D Edge 4 D <i>See Figure 3.8 and clauses 3.5.3.5-6</i>	Plan
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	SHORT SPAN x	LONG SPAN y	EDGE 1 Continuous	EDGE 2 Continuous	EDGE 3 Free	EDGE 4 Free	
MAIN STEEL							
β_s	0.053	0.034	0.070	0.045	0.000	0.000	BS8110 Reference Table 3.14
M kNm/m	30.8	19.9	41.1	26.6	0.0	0.0	
d mm	165.0	155.0	170.0	160.0	170.0	160.0	
k'	0.156	0.156	0.156	0.156	0.156	0.156	
k	0.045	0.033	0.057	0.042	0.000	0.000	3.4.4.4
Z mm	156.2	147.3	158.5	152.0	161.5	152.0	
As req mm ² /m	567	389	746	503	0	0	Table 3.25
As min mm ² /m	480	480	480	480	480	480	
As deflection mm ² /m	612	420	~	~	~	~	
\emptyset mm	10	10	10	10	10	10	
Layer	B1	B2	T1	T2	T1	T2	
@ mm	125	150	100	150	150	150	
As prov mm ² /m	628	524	785	524	524	524	
= %	0.381	0.338	0.462	0.327	0.308	0.327	%
S max mm	505	475	520	490	520	490	Clause 3.12.11.2.7
Subclause	(a)	(a)	(a)	(a)	(a)	(a)	
DEFLECTION							
fs	241	198	253	256	0	0	Eqn 8
Mod factor	1.518						Eqn 7
Perm L/d	39.48	Actual L/d	38.79	Asx enhanced 7.8% for deflection control			Table 3.10

TORSION STEEL \emptyset mm 10 As req mm ² /m As prov T mm ² /m Additional As T req mm ² As prov B mm ² /m	BOTH EDGES DISCONTINUOUS <table border="1" style="margin: auto;"> <tr> <th>X</th> <th>Y</th> </tr> <tr> <td>480</td> <td></td> </tr> <tr> <td>524</td> <td>524</td> </tr> <tr> <td>0</td> <td>0</td> </tr> <tr> <td>628</td> <td>524</td> </tr> </table>	X	Y	480		524	524	0	0	628	524	ONE EDGE DISCONTINUOUS <table border="1" style="margin: auto;"> <tr> <th>X</th> <th>Y</th> </tr> <tr> <td>480</td> <td></td> </tr> <tr> <td>524</td> <td>524</td> </tr> <tr> <td>0</td> <td>0</td> </tr> <tr> <td>628</td> <td>524</td> </tr> </table>	X	Y	480		524	524	0	0	628	524
X	Y																					
480																						
524	524																					
0	0																					
628	524																					
X	Y																					
480																						
524	524																					
0	0																					
628	524																					

Bottom steel not curtailed in edge strips at free edges

SUPPORT REACTIONS (kN/m char uno) (See Figure 3.10)	Sum $\beta_v x = 0.836$ Sum $\beta_v y = 0.660$																														
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th></th> <th>EDGE 1</th> <th>EDGE 2</th> <th>EDGE 3</th> <th>EDGE 4</th> </tr> <tr> <td></td> <td>B1, 2-3</td> <td>3, -B1</td> <td>2-3</td> <td>2, -B1</td> </tr> <tr> <td>β_v</td> <td>0.502</td> <td>0.396</td> <td>0.335</td> <td>0.264</td> </tr> <tr> <td>Dead kN/m</td> <td>21.84</td> <td>17.23</td> <td>14.56</td> <td>11.49</td> </tr> <tr> <td>Imposed kN/m</td> <td>9.64</td> <td>7.60</td> <td>6.42</td> <td>5.07</td> </tr> <tr> <td>Vs kN/m</td> <td>46.0</td> <td>36.3</td> <td>30.7</td> <td>24.2</td> </tr> </table>		EDGE 1	EDGE 2	EDGE 3	EDGE 4		B1, 2-3	3, -B1	2-3	2, -B1	β_v	0.502	0.396	0.335	0.264	Dead kN/m	21.84	17.23	14.56	11.49	Imposed kN/m	9.64	7.60	6.42	5.07	Vs kN/m	46.0	36.3	30.7	24.2	
	EDGE 1	EDGE 2	EDGE 3	EDGE 4																											
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OUTPUT/SUMMARY	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>SHORT SPAN</th> <th>LONG SPAN</th> <th>EDGE 1</th> <th>EDGE 2</th> <th>EDGE 3</th> <th>EDGE 4</th> </tr> <tr> <td>R10 @ 125 B1</td> <td>R10 @ 150 B2</td> <td>R10 @ 100 T1</td> <td>R10 @ 150 T2</td> <td>R10 @ 150 T1</td> <td>R10 @ 150 T2</td> </tr> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>CORNER 1</th> <th>CORNER 2</th> <th>CORNER 3</th> <th>CORNER 4</th> </tr> <tr> <td>2B1</td> <td>3B1</td> <td>3</td> <td>2</td> </tr> </table> <table style="width: 100%;"> <tr> <td style="width: 50%;"> ADDITIONAL TORSION STEEL X direction Y direction </td> <td style="width: 50%; text-align: center;"> <i>placed in edge strips</i> </td> </tr> </table>	SHORT SPAN	LONG SPAN	EDGE 1	EDGE 2	EDGE 3	EDGE 4	R10 @ 125 B1	R10 @ 150 B2	R10 @ 100 T1	R10 @ 150 T2	R10 @ 150 T1	R10 @ 150 T2	CORNER 1	CORNER 2	CORNER 3	CORNER 4	2B1	3B1	3	2	ADDITIONAL TORSION STEEL X direction Y direction	<i>placed in edge strips</i>
SHORT SPAN	LONG SPAN	EDGE 1	EDGE 2	EDGE 3	EDGE 4																		
R10 @ 125 B1	R10 @ 150 B2	R10 @ 100 T1	R10 @ 150 T2	R10 @ 150 T1	R10 @ 150 T2																		
CORNER 1	CORNER 2	CORNER 3	CORNER 4																				
2B1	3B1	3	2																				
ADDITIONAL TORSION STEEL X direction Y direction	<i>placed in edge strips</i>																						

CHECKS Lx > Ly OK	BAR \emptyset < COVER OK	SINGLY REINFORCED OK	MIN SPACING OK	MAX SPACING OK	DEFLECTION OK	GLOBAL STATUS VALID DESIGN
---	--	--	--	--	---	--

Project		REINFORCED CONCRETE COUNCIL		REINFORCED CONCRETE COUNCIL	
Client	HALL	Made by	Mariyam Samah	Date	
Location	Slab 01	Checked		Revision	
2 to 3: B1 to				Page	130
2-WAY SPANNING INSITU CONCRETE SLABS to BS 8110:1997 (Table 3.14)				Job No	
Originated from RCC94.xls v2.1				© 1999-2003 BCA for RCC	

DIMENSIONS

short span, lx m 3.20

long span, ly m 8.50

h mm 150

Top cover mm 25

Btm cover mm 30

MATERIALS

fcu N/mm² 25 $\gamma_c = 1.50$

fy N/mm² 400 $\gamma_s = 1.15$

Density kN/m³ 24

(Normal weight concrete)

STATUS

VALID DESIGN

LOADING

Self weight kN/m² 3.60

Extra dead kN/m² 2.00

Total Dead, gk kN/m² 5.60

Imposed, qk kN/m² 5.00

Design load, n kN/m² 15.84

EDGE CONDITIONS

Edge 1 C C = Continuous

Edge 2 C D = Discontinuous

Edge 3 C

Edge 4 D

See Figure 3.8 and clauses 3.5.3.5-6

	SHORT SPAN x	LONG SPAN y	EDGE 1 Continuous	EDGE 2 Continuous	EDGE 3 Continuous	EDGE 4 Free	
BS	0.055	0.028	0.074	0.037	0.074	0.000	BS8110 Reference Table 3.14
M kNm/m	9.0	4.5	12.0	5.9	12.0	0.0	
d mm	115.0	105.0	120.0	110.0	120.0	110.0	
k'	0.156	0.156	0.156	0.156	0.156	0.156	
k	0.027	0.016	0.033	0.020	0.033	0.000	
Z mm	109.3	99.8	114.0	104.5	114.0	104.5	3.4.4.4
As req mm ² /m	237	129	303	164	303	0	
As min mm ² /m	360	360	360	360	360	360	Table 3.25
As deflection mm ² /m	237	129	~	~	~	~	
Ø mm	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>10</u>	
Layer	<u>B 1</u>	B 2	<u>T 1</u>	T 2	T 1	T 2	
@ mm	200	200	200	200	200	200	
As prov mm ² /m	393	393	393	393	393	393	
= %	0.341	0.374	0.327	0.357	0.327	0.357	%
S max mm	355	325	370	340	370	340	Clause 3.12.11.2.7
Subclause	(a)	(a)	(a)	(a)	(a)	(a)	
DEFLECTION							
fs	161	87	206	111	206	0	Eqn 8
Mod factor	2.000						Eqn 7
Perm L/d	52.00	Actual L/d	27.83	Asx enhanced 0.0% for deflection control			Table 3.10

TORSION STEEL

Ø mm 10

As req mm²/m

As prov T mm²/m

Additional As T req mm²

As prov B mm²/m

BOTH EDGES DISCONTINUOUS

X	Y
	360
5000	5000
0	0
393	393

ONE EDGE DISCONTINUOUS

X	Y
	360
393	393
0	0
393	393

Bottom steel not curtailed in edge strips at free edges

SUPPORT REACTIONS (kN/m char uno)

(See Figure 3.10)

	EDGE 1	EDGE 2	EDGE 3	EDGE 4
BS	B1, 2-3	3, -B1	, 2-3	2, -B1
Dead	0.554	0.360	0.554	0.240
Imposed	9.92	6.45	9.92	4.30
VS	8.86	5.76	8.86	3.84
VS	28.1	18.2	28.1	12.2

Sum Bvx = 1.107

Sum Bvy = 0.600

Table 3.15
equations 19 & 20

OUTPUT/SUMMARY

	SHORT SPAN	LONG SPAN	EDGE 1	EDGE 2	EDGE 3	EDGE 4
PROVIDE MAIN STEEL	R10 @ 200 B1	R10 @ 200 B2	R10 @ 200 T1	R10 @ 200 T2	R10 @ 200 T1	R10 @ 200 T2
ADDITIONAL TORSION STEEL	CORNER 1	CORNER 2	CORNER 3	CORNER 4		
X direction	2B1	3B1	3	2		
Y direction						

placed in edge strips

CHECKS	BAR Ø	SINGLY REINFORCED	MIN SPACING	MAX SPACING	DEFLECTION	GLOBAL STATUS
Lx > Ly	< COVER	OK	OK	OK	OK	VALID DESIGN

Project		REINFORCED CONCRETE COUNCIL		REINFORCED CONCRETE COUNCIL		
Client		2 to 3: B1 to 2-WAY SPANNING INSITU CONCRETE SLABS to BS 8110:1997 (Table 3.14) <small>Originated from RCC94.xls v2.1 © 1999-2003 BCA for RCC</small>		Made by	Date	Page
Location LAB 5.2M SLAB				Mariyam Samah		130
		Checked	Revision	Job No		
				-		

DIMENSIONS		MATERIALS		STATUS VALID DESIGN	
short span, lx	m 5.20	fcu N/mm²	25	γc =	1.50
long span, ly	m 8.50	fy N/mm²	400	γs =	1.15
h	mm 200	Density	kN/m³ 24		
Top cover	mm 25	(Normal weight concrete)		Plan	
Btm cover	mm 30				
LOADING <small>characteristic</small>		EDGE CONDITIONS			
Self weight	kN/m² 4.80	Edge 1	C C = Continuous		
Extra dead	kN/m² 2.50	Edge 2	c D = Discontinuous		
Total Dead, gk	kN/m² 7.30	γf =	1.40	Edge 3	D
Imposed, qk	kN/m² 4.00	γf =	1.60	Edge 4	D
Design load, n	kN/m² 16.62	<small>See Figure 3.8 and clauses 3.5.3.5-6</small>			

	SHORT SPAN x		LONG SPAN y		EDGE 1 Continuous		EDGE 2 Continuous		EDGE 3 Free		EDGE 4 Free					
	βs	M	d	k'	k	Z	As req	As min	As deflection	Ø	Layer	@		As prov	=	S max
MAIN STEEL	0.062	28.0	165.0	0.156	0.041	156.8	513	480	513	10	B 1	150	524	0.317	505	(a)
	0.034	15.3	155.0	0.156	0.025	147.3	298	480	298	10	B 2	150	524	0.338	475	(a)
	0.083	37.3	170.0	0.156	0.052	159.6	672	480	~	10	T 1	100	785	0.462	520	(a)
	0.045	20.4	160.0	0.156	0.032	152.0	385	480	~	10	T 2	150	524	0.327	490	(a)
	0.000	0.0	170.0	0.156	0.000	161.5	0	480	~	10	T 1	150	524	0.308	520	(a)
	0.000	0.0	160.0	0.156	0.000	152.0	0	480	~	10	T 2	150	524	0.327	490	(a)
	261	152	228	196	0	0										
DEFLECTION	1.482	38.52	Actual L/d	31.52	Asx enhanced 0.0% for deflection control											

	BOTH EDGES DISCONTINUOUS		ONE EDGE DISCONTINUOUS		
	X	Y	X	Y	
TORSION STEEL	524	524	524	524	
Ø mm	10				
As req	mm²/m	480	480		
As prov T	mm²/m	0	0	0	
Additional As T req	mm²	524	524	524	
As prov B	mm²/m				

Bottom steel not curtailed in edge strips at free edges

SUPPORT REACTIONS (kN/m char uno)		(See Figure 3.10)				Sum βvx = 0.930 Sum βvy = 0.660		
		EDGE 1	EDGE 2	EDGE 3	EDGE 4			
βv		B1, 2-3	3, -B1	2-3	2, -B1			
Dead	kN/m	0.558	0.396	0.372	0.264			
Imposed	kN/m	21.17	15.03	14.11	10.02			
Vs	kN/m	11.60	8.24	7.73	5.49			
		48.2	34.2	32.1	22.8			

OUTPUT/SUMMARY		(See Figure 3.10)						
PROVIDE MAIN STEEL		SHORT SPAN	LONG SPAN	EDGE 1	EDGE 2	EDGE 3	EDGE 4	
		R10 @ 150 B1	R10 @ 150 B2	R10 @ 100 T1	R10 @ 150 T2	R10 @ 150 T1	R10 @ 150 T2	
ADDITIONAL TORSION STEEL		CORNER 1	CORNER 2	CORNER 3	CORNER 4			
		2B1	3B1	3	2			
X direction		placed in edge strips						
Y direction								

CHECKS		BAR Ø	SINGLY REINFORCED	MIN SPACING	MAX SPACING	DEFLECTION	GLOBAL STATUS
Lx > Ly	OK	< COVER	OK	OK	OK	OK	VALID DESIGN

Project BACKSTAGE		REINFORCED CONCRETE COUNCIL	
Client HALL		Made by Mariyam Samah	Date
Location Slab 01		Checked	Revision
2 to 3: B1 to		Page 130	
2-WAY SPANNING INSITU CONCRETE SLABS to BS 8110:1997 (Table 3.14)		Job No	
Originated from RCC94.xls v2.1		© 1999-2003 BCA for RCC	

DIMENSIONS

short span, lx m **4.56**

long span, ly m **8.50**

h mm **200**

Top cover mm **25**

Btm cover mm **30**

MATERIALS

fcu N/mm² **25** $\gamma_c = 1.50$

fy N/mm² **400** $\gamma_s = 1.15$

Density kN/m³ **24**

(Normal weight concrete)

STATUS

VALID DESIGN

LOADING

Self weight kN/m² 4.80

Extra dead kN/m² **3.50**

Total Dead, gk kN/m² 8.30

Imposed, qk kN/m² **4.00**

Design load, n kN/m² 18.02

EDGE CONDITIONS

Edge 1 **C** C = Continuous

Edge 2 **C** D = Discontinuous

Edge 3 **d**

Edge 4 **D**

See Figure 3.8 and clauses 3.5.3.5-6

	SHORT SPAN x	LONG SPAN y	EDGE 1 Continuous	EDGE 2 Continuous	EDGE 3 Free	EDGE 4 Free	
BS	0.067	0.034	0.090	0.045	0.000	0.000	BS8110 Reference Table 3.14
M kNm/m	25.2	12.7	33.6	16.9	0.0	0.0	
d mm	165.0	155.0	170.0	160.0	170.0	160.0	
k'	0.156	0.156	0.156	0.156	0.156	0.156	
k	0.037	0.021	0.047	0.026	0.000	0.000	
Z mm	156.8	147.3	160.7	152.0	161.5	152.0	3.4.4.4
As req mm²/m	463	248	602	321	0	0	
As min mm²/m	480	480	480	480	480	480	Table 3.25
As deflection mm²/m	463	248	~	~	~	~	
Ø mm	10	10	10	10	10	10	
Layer	B1	B 2	T1	T 2	T 1	T 2	
@ mm	150	150	125	150	150	150	
As prov mm²/m	524	524	628	524	524	524	
= %	0.317	0.338	0.370	0.327	0.308	0.327	%
S max mm	505	475	520	490	520	490	Clause
Subclause	(a)	(a)	(a)	(a)	(a)	(a)	3.12.11.2.7
DEFLECTION fs	236	126	255	163	0	0	Eqn 8
Mod factor	1.651						Eqn 7
Perm L/d	42.91	Actual L/d	27.61	Asx enhanced 0.0% for deflection control			Table 3.10

TORSION STEEL

Ø mm **10**

As req mm²/m

As prov T mm²/m

Additional As T req mm²

As prov B mm²/m

BOTH EDGES DISCONTINUOUS

X	Y
	480
524	524
0	0
524	524

ONE EDGE DISCONTINUOUS

X	Y
	480
524	524
0	0
524	524

Bottom steel not curtailed in edge strips at free edges

SUPPORT REACTIONS (kN/m char uno)

(See Figure 3.10)

	EDGE 1	EDGE 2	EDGE 3	EDGE 4
fv	B1, 2-3	3, -B1	, 2-3	2, -B1
Dead kN/m	0.588	0.396	0.392	0.264
Imposed kN/m	22.22	14.97	14.81	9.98
Vs kN/m	10.71	7.22	7.14	4.81
	48.2	32.5	32.2	21.7

Sum fv x = 0.980

Sum fv y = 0.660

Table 3.15 equations 19 & 20

OUTPUT/SUMMARY

	SHORT SPAN	LONG SPAN	EDGE 1	EDGE 2	EDGE 3	EDGE 4
PROVIDE MAIN STEEL	R10 @ 150 B1	R10 @ 150 B2	R10 @ 125 T1	R10 @ 150 T2	R10 @ 150 T1	R10 @ 150 T2

	CORNER 1	CORNER 2	CORNER 3	CORNER 4
ADDITIONAL TORSION STEEL	2B1	3B1	3	2
X direction				
Y direction				

placed in edge strips

CHECKS

Lx > Ly **OK**

BAR Ø < COVER **OK**

SINGLY REINFORCED **OK**

MIN SPACING **OK**

MAX SPACING **OK**

DEFLECTION **OK**

GLOBAL STATUS

VALID DESIGN

Project		REINFORCED CONCRETE COUNCIL		REINFORCED CONCRETE COUNCIL	
Client WATER TANK		2 to 3: B1 to		Made by Mariyam Samah	Page 130
Location		2-WAY SPANNING INSITU CONCRETE SLABS to BS 8110:1997 (Table 3.14)		Checked	Revision
Originated from RCC94.xls v2.1		© 1999-2003 BCA for RCC		Job No	

DIMENSIONS short span, lx m 4.50 long span, ly m 4.50 h mm 250 Top cover mm 25 Btm cover mm 30	MATERIALS fcu N/mm² 25 $\gamma_c = 1.50$ fy N/mm² 400 $\gamma_s = 1.15$ Density kN/m³ 24 (Normal weight concrete)	STATUS VALID DESIGN
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LOADING <i>characteristic</i> Self weight kN/m² 6.00 Extra dead kN/m² 1.50 Total Dead, gk kN/m² 7.50 Imposed, qk kN/m² 20.00 Design load, n kN/m² 42.50	EDGE CONDITIONS Edge 1 C C = Continuous Edge 2 D D = Discontinuous Edge 3 D Edge 4 D <i>See Figure 3.8 and clauses 3.5.3.5-6</i>	
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	SHORT SPAN x	LONG SPAN y	EDGE 1 Continuous	EDGE 2 Free	EDGE 3 Free	EDGE 4 Free	
MAIN STEEL							
β_s	0.043	0.044	0.057	0.000	0.000	0.000	BS8110 Reference Table 3.14
M kNm/m	36.8	37.4	49.1	0.0	0.0	0.0	
d mm	215.0	205.0	220.0	210.0	220.0	210.0	
k'	0.156	0.156	0.156	0.156	0.156	0.156	
k	0.032	0.036	0.041	0.000	0.000	0.000	3.4.4.4
Z mm	204.3	194.8	209.0	199.5	209.0	199.5	
As req mm²/m	518	553	676	0	0	0	
As min mm²/m	600	600	600	600	600	600	Table 3.25
As deflection mm²/m	518	553	~	~	~	~	
\emptyset mm	10	10	10	10	10	10	
Layer	B1	B2	T1	T2	T1	T2	
@ mm	125	125	100	125	125	125	
As prov mm²/m	628	628	785	628	628	628	
= %	0.292	0.306	0.357	0.299	0.286	0.299	%
S max mm	655	625	670	640	670	640	Clause
Subclause	(a)	(a)	(a)	(a)	(a)	(a)	3.12.11.2.7
DEFLECTION							
fs	220	235	229	0	0	0	Eqn 8
Mod factor	1.812						Eqn 7
Perm L/d	47.11	Actual L/d	20.93	<i>Asx enhanced 0.0% for deflection control</i>			Table 3.10

TORSION STEEL \emptyset mm 10 As req mm²/m As prov T mm²/m Additional As T req mm² As prov B mm²/m	BOTH EDGES DISCONTINUOUS <table border="1" style="margin: auto;"> <tr> <th>X</th> <th>Y</th> </tr> <tr> <td>600</td> <td></td> </tr> <tr> <td>628</td> <td>628</td> </tr> <tr> <td>0</td> <td>0</td> </tr> <tr> <td>628</td> <td>628</td> </tr> </table>	X	Y	600		628	628	0	0	628	628	ONE EDGE DISCONTINUOUS <table border="1" style="margin: auto;"> <tr> <th>X</th> <th>Y</th> </tr> <tr> <td>600</td> <td></td> </tr> <tr> <td>785</td> <td>628</td> </tr> <tr> <td>0</td> <td>0</td> </tr> <tr> <td>628</td> <td>628</td> </tr> </table>	X	Y	600		785	628	0	0	628	628
X	Y																					
600																						
628	628																					
0	0																					
628	628																					
X	Y																					
600																						
785	628																					
0	0																					
628	628																					

Bottom steel not curtailed in edge strips at free edges

SUPPORT REACTIONS (kN/m char uno) (See Figure 3.10)	Sum $\beta_v x = 0.753$ Sum $\beta_v y = 0.580$																														
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th></th> <th>EDGE 1</th> <th>EDGE 2</th> <th>EDGE 3</th> <th>EDGE 4</th> </tr> <tr> <td>β_v</td> <td>B1, 2-3</td> <td>3, -B1</td> <td>2-3</td> <td>2, -B1</td> </tr> <tr> <td>Dead kN/m</td> <td>0.452</td> <td>0.290</td> <td>0.301</td> <td>0.290</td> </tr> <tr> <td>Imposed kN/m</td> <td>15.26</td> <td>9.79</td> <td>10.17</td> <td>9.79</td> </tr> <tr> <td>Vs kN/m</td> <td>40.68</td> <td>26.10</td> <td>27.12</td> <td>26.10</td> </tr> <tr> <td></td> <td>86.4</td> <td>55.5</td> <td>57.6</td> <td>55.5</td> </tr> </table>		EDGE 1	EDGE 2	EDGE 3	EDGE 4	β_v	B1, 2-3	3, -B1	2-3	2, -B1	Dead kN/m	0.452	0.290	0.301	0.290	Imposed kN/m	15.26	9.79	10.17	9.79	Vs kN/m	40.68	26.10	27.12	26.10		86.4	55.5	57.6	55.5	
	EDGE 1	EDGE 2	EDGE 3	EDGE 4																											
β_v	B1, 2-3	3, -B1	2-3	2, -B1																											
Dead kN/m	0.452	0.290	0.301	0.290																											
Imposed kN/m	15.26	9.79	10.17	9.79																											
Vs kN/m	40.68	26.10	27.12	26.10																											
	86.4	55.5	57.6	55.5																											

OUTPUT/SUMMARY	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>SHORT SPAN</th> <th>LONG SPAN</th> <th>EDGE 1</th> <th>EDGE 2</th> <th>EDGE 3</th> <th>EDGE 4</th> </tr> <tr> <td>R10 @ 125 B1</td> <td>R10 @ 125 B2</td> <td>R10 @ 100 T1</td> <td>R10 @ 125 T2</td> <td>R10 @ 125 T1</td> <td>R10 @ 125 T2</td> </tr> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>CORNER 1</th> <th>CORNER 2</th> <th>CORNER 3</th> <th>CORNER 4</th> </tr> <tr> <td>2B1</td> <td>3B1</td> <td>3</td> <td>2</td> </tr> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>X direction</th> <th>Y direction</th> </tr> <tr> <td></td> <td></td> </tr> </table>	SHORT SPAN	LONG SPAN	EDGE 1	EDGE 2	EDGE 3	EDGE 4	R10 @ 125 B1	R10 @ 125 B2	R10 @ 100 T1	R10 @ 125 T2	R10 @ 125 T1	R10 @ 125 T2	CORNER 1	CORNER 2	CORNER 3	CORNER 4	2B1	3B1	3	2	X direction	Y direction		
SHORT SPAN	LONG SPAN	EDGE 1	EDGE 2	EDGE 3	EDGE 4																				
R10 @ 125 B1	R10 @ 125 B2	R10 @ 100 T1	R10 @ 125 T2	R10 @ 125 T1	R10 @ 125 T2																				
CORNER 1	CORNER 2	CORNER 3	CORNER 4																						
2B1	3B1	3	2																						
X direction	Y direction																								

placed in edge strips

CHECKS Lx > Ly OK	BAR \emptyset < COVER OK	SINGLY REINFORCED OK	MIN SPACING OK	MAX SPACING OK	DEFLECTION OK	GLOBAL STATUS VALID DESIGN
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STRIP FOOTINGS

TYPE : MID										DATE :										STRIP DETAILS										TYPE : MID										DATE :										STRIP DETAILS										FB1																													
Project : HULHUMALE SCHOOL										Project : HULHUMALE SCHOOL										Project : HULHUMALE SCHOOL										Project : HULHUMALE SCHOOL										Project : HULHUMALE SCHOOL										Project : HULHUMALE SCHOOL										Project : HULHUMALE SCHOOL										Project : HULHUMALE SCHOOL																			
Design to BS 8116 : 1987										Design to BS 8116 : 1987										Design to BS 8116 : 1987										Design to BS 8116 : 1987										Design to BS 8116 : 1987										Design to BS 8116 : 1987										Design to BS 8116 : 1987										Design to BS 8116 : 1987																			
Prepared by : Marivan Samah										Prepared by : Marivan Samah										Prepared by : Marivan Samah										Prepared by : Marivan Samah										Prepared by : Marivan Samah										Prepared by : Marivan Samah										Prepared by : Marivan Samah										Prepared by : Marivan Samah																			
Foundation design to BS 8116 : 1987										Foundation design to BS 8116 : 1987										Foundation design to BS 8116 : 1987										Foundation design to BS 8116 : 1987										Foundation design to BS 8116 : 1987										Foundation design to BS 8116 : 1987										Foundation design to BS 8116 : 1987																													
Material										Section										Factor										Material										Section										Factor										Material										Section										Factor									
f _{cu} 25.00 N/mm ²										h 1500.00 mm										Load 1 Service 1.45 Ultimate 21220.00										f _{cu} 25.00 N/mm ²										h 1500.00 mm										Load 1 Service 1.45 Ultimate 21220.00										f _{cu} 25.00 N/mm ²										h 1500.00 mm										Load 1 Service 1.45 Ultimate 21220.00									
f _y 1.00 25.00 7.00 400.00 1407.50 3436.56										b _w 900.00 mm										2 1.4685 12 0.00										f _y 1.00 25.00 7.00 400.00 1407.50 3436.56										b _w 900.00 mm										2 1.4685 12 0.00										f _y 1.00 25.00 7.00 400.00 1407.50 3436.56										b _w 900.00 mm										2 1.4685 12 0.00									
2.00 25.00 7.00 1377.50 3436.56										Cover 50.00 mm										3 0.00 0.00										2.00 25.00 7.00 1377.50 3436.56										Cover 50.00 mm										3 0.00 0.00										2.00 25.00 7.00 1377.50 3436.56										Cover 50.00 mm										3 0.00 0.00									
3.00 16.00 0.00 400.00 N/mm ²										d' 72.50 mm										4 0.00 0.00										3.00 16.00 0.00 400.00 N/mm ²										d' 72.50 mm										4 0.00 0.00										3.00 16.00 0.00 400.00 N/mm ²										d' 72.50 mm										4 0.00 0.00									
Curtailment										d 25.00 mm										5 0.00 0.00										Curtailment										d 25.00 mm										5 0.00 0.00										Curtailment										d 25.00 mm										5 0.00 0.00									
Support AREA REQD 117.888889 Midspan										Bar size main 16.00 mm										ATDL										Support AREA REQD 117.888889 Midspan										Bar size main 16.00 mm										ATDL										Support AREA REQD 117.888889 Midspan										Bar size main 16.00 mm										ATDL									
SUPPORT 1 0 200 450										Bar size distribution 16.00 mm										SUPPORT 1 0 200 450										SUPPORT 1 0 200 450										Bar size distribution 16.00 mm										SUPPORT 1 0 200 450										SUPPORT 1 0 200 450										Bar size distribution 16.00 mm										SUPPORT 1 0 200 450									
volumes 0 200 450										Link size 10.00 mm										volumes 0 200 450										volumes 0 200 450										Link size 10.00 mm										volumes 0 200 450										volumes 0 200 450										Link size 10.00 mm										volumes 0 200 450									
2.1 mm 0 520 5.4 mm										Length of beam 6400.00 mm										2.1 mm 0 520 5.4 mm										2.1 mm 0 520 5.4 mm										Length of beam 6400.00 mm										2.1 mm 0 520 5.4 mm										2.1 mm 0 520 5.4 mm										Length of beam 6400.00 mm										2.1 mm 0 520 5.4 mm									
Distributed load 512.5603865 kN/m										Width of footing 3 m										Distributed load 512.5603865 kN/m										Distributed load 512.5603865 kN/m										Width of footing 3 m										Distributed load 512.5603865 kN/m										Distributed load 512.5603865 kN/m										Width of footing 3 m										Distributed load 512.5603865 kN/m									
Ultimate Load 21220.00 kN										Depth 550 mm										Ultimate Load 21220.00 kN										Ultimate Load 21220.00 kN										Depth 550 mm										Ultimate Load 21220.00 kN										Ultimate Load 21220.00 kN										Depth 550 mm										Ultimate Load 21220.00 kN									
Service load 14685.12 kN										Base Pressure 576.6304348 N/mm ²										Service load 14685.12 kN										Service load 14685.12 kN										Base Pressure 576.6304348 N/mm ²										Service load 14685.12 kN										Service load 14685.12 kN										Base Pressure 576.6304348 N/mm ²										Service load 14685.12 kN									
Total length of beam 41400 mm										CANT LENGTH 1000.00 mm										Total length of beam 41400 mm										Total length of beam 41400 mm										CANT LENGTH 1000.00 mm										Total length of beam 41400 mm										Total length of beam 41400 mm										CANT LENGTH 1000.00 mm										Total length of beam 41400 mm									
Earth Pressure 138.28										Area reqd 758.84										Earth Pressure 138.28										Earth Pressure 138.28										Area reqd 758.84										Earth Pressure 138.28										Earth Pressure 138.28										Area reqd 758.84										Earth Pressure 138.28									
Analysis Method										Analysis Method										Analysis Method										Analysis Method										Analysis Method										Analysis Method										Analysis Method										Analysis Method										Analysis Method									
Moment										Shear										Moment										Moment										Shear										Moment										Moment										Shear										Moment									
SUPPORT 1 0 200 450										SUPPORT 1 0 200 450										SUPPORT 1 0 200 450										SUPPORT 1 0 200 450										SUPPORT 1 0 200 450										SUPPORT 1 0 200 450										SUPPORT 1 0 200 450										SUPPORT 1 0 200 450										SUPPORT 1 0 200 450									
21220.00 14685.12 41400										21220.00 14685.12 41400										21220.00 14685.12 41400										21220.00 14685.12 41400										21220.00 14685.12 41400										21220.00 14685.12 41400										21220.00 14685.12 41400										21220.00 14685.12 41400										21220.00 14685.12 41400									
1969.23										1969.23										1969.23										1969.23										1969.23										1969.23										1969.23										1969.23										1969.23									
0.00 0.156 0.003 0.04 0.94 0.95 380.00 0.00 0.00 3705.82 2700.00 54000.00 5097.82 6873.13 0.00 11.00										0.00 0.156 0.003 0.04 0.94 0.95 380.00 0.00 0.00 3705.82 2700.00 54000.00 5097.82 6873.13 0.00 11.00										0.00 0.156 0.003 0.04 0.94 0.95 380.00 0.00 0.00 3705.82 2700.00 54000.00 5097.82 6873.13 0.00 11.00										0.00 0.156 0.003 0.04 0.94 0.95 380.00 0.00 0.00 3705.82 2700.00 54000.00 5097.82 6873.13 0.00 11.00										0.00 0.156 0.003 0.04 0.94 0.95 380.00 0.00 0.00 3705.82 2700.00 54000.00 5097.82 6873.13 0.00 11.00										0.00 0.156 0.003 0.04 0.94 0.95 380.00 0.00 0.00 3705.82 2700.00 54000.00 5097.82 6873.13 0.00 11.00										0.00 0.156 0.003 0.04 0.94 0.95 380.00 0.00 0.00 3705.82 2700.00 54000.00 5097.82 6873.13 0.00 11.00																													
K 0.156 0.003 0.04 0.94 0.95 380.00 0.00 0.00 3705.82 2700.00 54000.00 5097.82 6873.13 0.00 11.00										K 0.156 0.003 0.04 0.94 0.95 380.00 0.00 0.00 3705.82 2700.00 54000.00 5097.82 6873.13 0.00 11.00										K 0.156 0.003 0.04 0.94 0.95 380.00 0.00 0.00 3705.82 2700.00 54000.00 5097.82 6873.13 0.00 11.00										K 0.156 0.003 0.04 0.94 0.95 380.00 0.00 0.00 3705.82 2700.00 54000.00 5097.82 6873.13 0.00 11.00										K 0.156 0.003 0.04 0.94 0.95 380.00 0.00 0.00 3705.82 2700.00 54000.00 5097.82 6873.13 0.00 11.00										K 0.156 0.003 0.04 0.94 0.95 380.00 0.00 0.00 3705.82 2700.00 54000.00 5097.82 6873.13 0.00 11.00										K 0.156 0.003 0.04 0.94 0.95 380.00 0.00 0.00 3705.82 2700.00 54000.00 5097.82 6873.13 0.00 11.00																													
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K'''' 380.00 0.00 0.00 3705.82 2700.00 54000.00 5097.82 6873.13 0.00 11.00										K'''' 380.00 0.00 0.00 3705.82 2700.00 54000.00 5097.82 6873.13 0.00 11.00										K'''' 380.00 0.00 0.00 3705.82 2700.00 54000.00 5097.82 6873.13 0.00 11.00										K'''' 380.00 0.00 0.00 3705.82 2700.00 54000.00 5097.82 6873.13 0.00 11.00										K'''' 380.00 0.00 0.00 3705.82 2700.00 54000.00 5097.82 6873.13 0.00 11.00										K'''' 380.00 0.00 0.00 3705.82 2700.00 54000.00 5097.82 6873.13 0.00 11.00										K'''' 380.00 0.00 0.00 3705.82 2700.00 54000.00 5097.82 6873.13 0.00 11.00																													
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TYPE : MID										DATE										STRIP DETAILS										FB1									
Project : HSIJUMAILE SCHOOL										Prepared by : Mariyam Samah										Foundation design to BS 8116 : 1987										Project : HSIJUMAILE SCHOOL									
Design to BS 8116 : 1987										Prepared by : Mariyam Samah										Foundation design to BS 8116 : 1987										Project : HSIJUMAILE SCHOOL									
Material										Section										Factor										Material									
f _{cu}										h										Load										f _{cu}									
25.00										N/mm ²										1.45										25.00									
400.00										mm										1										400.00									
1427.50										N/mm ²										2										1427.50									
3436.56										mm										3										3436.56									
50.00										mm										4										50.00									
0.00										mm										5										0.00									
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25.00										mm										5										25.00									
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TYPE : MID										DATE :										STRIP DETAILS										FB3									
Project : HULHIMALE SCHOOL										Prepared by : Mariyam Samah										Foundation design to BS 8116 : 1987										Project : HULHIMALE SCHOOL									
Design to BS 8116 : 1987										Prepared by : Mariyam Samah										Foundation design to BS 8116 : 1987										Project : HULHIMALE SCHOOL									
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STRIP FOOTINGS

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Project : HULHUMALE SCHOOL										Foundation design to BS 8116 : 1987										Prepared by : Mariyam Samah										Foundation design to BS 8116 : 1987										Project : HULHUMALE SCHOOL										Foundation design to BS 8116 : 1987										Prepared by : Mariyam Samah										STAGE AREA																																																	
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Total length of beam										CANT LENGTH										618.75										Total length of beam										CANT LENGTH										618.75										Total length of beam										CANT LENGTH										618.75										Total length of beam										CANT LENGTH										618.75									
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TYPE : MID				DATE				STRIP DETAILS				FB9			
Project HULHMALE SCHOOL				Prepared by : Mariyam Samah				STAGE AREA							
Design to BS 8110 : 1997															
Material				Section				Factor				1.45			
f _{cu}				25.00				N/mm ²							
f _y				400.00				N/mm ²							
1.00				20.00				7.00							
2.00				20.00				1085.00				2199.40			
3.00				16.00				0.00				0.00			
f _{cr}				400.00				N/mm ²							
Curtailment				Bar size beam				20.00				mm			
Support AREA REQD				21.11111111				Midspan							
SUPPORT 1				SUPPORT 2				MIDSPAN							
0				0				200				450			
volumes				0				200				450			
1.1 mm				2550				2.7 mm							
				Length of beam				3000.00				mm			
				650.00				2.000							
				Width of footing				4				m			
Distributed load				716.9811321				kN/m							
Ultimate Load				3800.00				kN							
Service Load				2020.69				kN							
Total length of beam				21.2				CANT SECTION				1433.962264			
Earth Pressure				530.94				mm				2000.00			
				193.94				193.94				4.00			
				0				179.25				179.25			
				Moment				Shear				Shear			
				0				193.94				193.94			
				179.25				179.25				179.25			
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