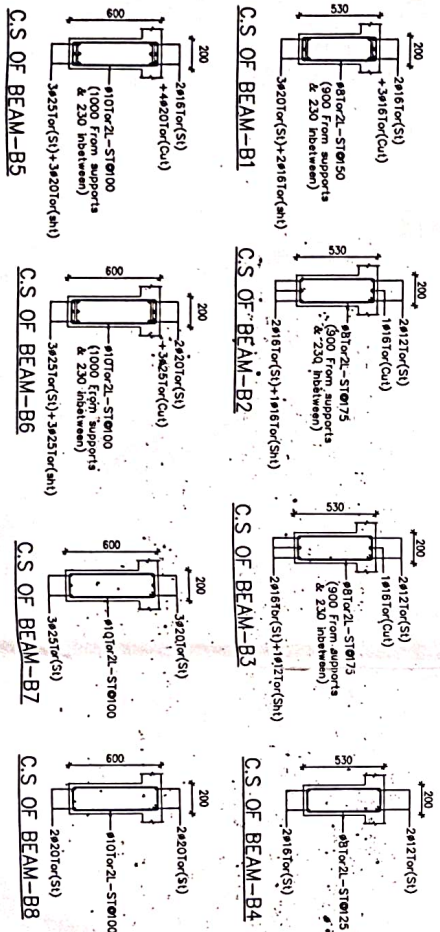


ALL SLAB THICKNESS IS 125MM, UNLESS SPECIFIED.

ALL SLAB THICKNESS IS 125MM, UNLESS SPECIFIED.



RI	-			
NO.	ADDITIONS	BY	DATE	
SCALE	1:100	DESIGN BY	-	
JOB NO	001	DRAWN BY	-	
DWG NO	S02	DATE	-	

SLAB BEAM LAYOUT

PROJECT TIME:

PLAN SHOWING THE PROPOSED CONSTRUCTION OF RESIDENTIAL CAN COMMERCIAL BUILDING STILLT FLOOR (PARKING) + 1ST AND 2ND FLOORS (OFFICE) + 3RD TO 5TH FLOORS (RESIDENTIAL), WITH 3 DWELLING UNITS AT OLD DOOR NO. 28, NEW DOOR NO. 44, JOBBEY ROAD AND THIRUVAIRY REDDY STREET, WEST MAMBALAY CHAVAN - 600 041 COMPRISED IN G.O.NO. 5-7 PART, T.S.NO. 54, BLOCK NO. 47 OF PULITUR VILLAGE, WITH IN THE LIMITS OF GREATLY ORCHANA CORPORATION.

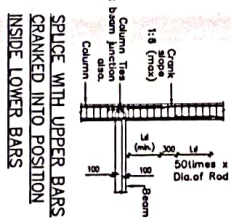
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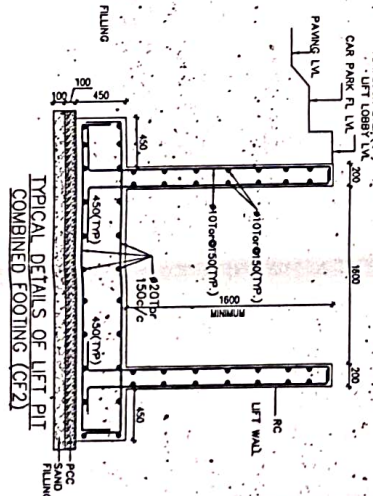
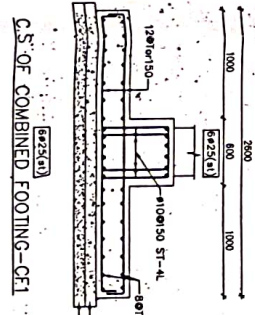
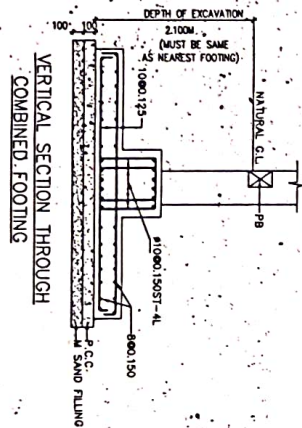
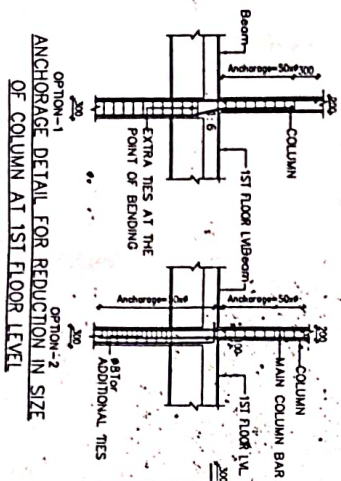


TYPICAL TIES ARRANGEMENT
IN COLUMN

SPLICE WITH UPPER BARS
CRANKED INTO POSITION
INSIDE LOWER BARS

SLAB	FOOTING TYPE	FOOTING REINFORCEMENT				COLUMN REINFORCEMENT						
		M1	N2	L	B	GROUND FLOOR	FIRST FLOOR	SECOND FLOOR	THIRD FLOOR	4TH FLOOR	5TH FLOOR	STAIRS
F1	2600x2600	230	600	ø16lcw/23	ø16lcw/23							
												
C1	COVERED FOOTING											
												

FOUNDADTION LAYOUT



CHINA

- [illegible]

PLAN showing the proposed construction of internal and external buildings, 1st floor (ground) + 1st and 2nd floors (attic) + 3rd to 5th floors (basement). WITH 3 SWELLING UNITS AT OLD DOOR NO. 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 8

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CALCULATION OF SEISMIC CO-EFFICIENT

Name of city	: Chennai
Type of Building	: Residential Building
Building Frame System	: Special RC-Moment resisting frame (SMRF)
Fundamental Natural Period (Ts)	: $(0.075)h^{3/4} = 0.489\text{sec.}$
Soil conditions	: medium
Zone Factor (Refer Table:2) (Z)	: 0.16 (moderate)
Importance Factor (Refer Table:6) (I)	: 1
Response Reduction (Refer Table:7)	: 5.0
Average response acceleration Co-efficient (Sa/g)	: 2.35

EARTH QUAKE ANALYSIS:

Horizontal Seismic Co-efficient (Ah)	$= (Z/2)(I/R)(Sa/g)$ $= (0.16/2)(1/5.0)(2.35)$ $= 0.038$
Design value of Ah	$= 0.038$
Type of Foundation	: Combined Strip and Isolated Foundation

1. GENERAL LOADING CONDITIONS:

(a) Imposed loads on Roof	- 1.50kN/m ²
(b) Imposed loads on Hall, Kitchen. & Bed, Residential	- 2.00kN/m ²
(d) Dead weight of R.C.C	- 25kN/m ³
(e) Dead weight of Brick Work	- 20kN/m ³


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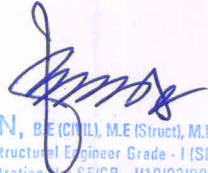
2. LOADING ON SLABS:

2.1 Loading on Roof slab:

Roof finished with lime concrete terracing	$= (0.10)(20)$	$= 2.000 \text{ kN/m}^2$
S/W of slab 125mm thick	$= (.125)(25)$	$= 3.125 \text{ kN/m}^2$
Dead load		$= 5.125 \text{ kN/m}^2$
Live load		$= 1.50 \text{ kN/m}^2$
Total load on Roof		$= 6.625 \text{ kN/m}^2$

2.2 Loading on Floor slabs:

Floor finish		$= 1.00 \text{ kN/m}^2$
S/w of slab 125mm thick		$= 3.125 \text{ kN/m}^2$
Dead load		$= 4.125 \text{ kN/m}^2$
Live load		$= 2.00 \text{ kN/m}^2$
Total load on Roof		$= 6.125 \text{ kN/m}^2$


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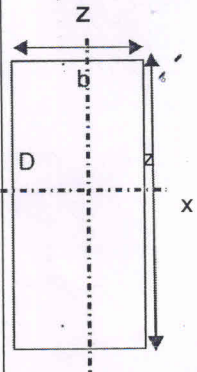
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3 DESIGN:

3.1 COLUMN DESIGN

Grade of Concrete			M 30	
Characteristic Strength of Reinf.		N/mm ²	500	
Width of Column	b	mm	300	
Depth of Column	D	mm	530	
Unsupported Length of Column	l_x	mm	3000	
Unsupported Length of Column	l_y	mm	3000	
Clear Cover to Reinf.		mm	40	
Diameter of Bar		mm	20	
Load		T		
Moment	M_{xx}	T.m		
Moment	M_{zz}	T.m		
Factored Load	P_u	kN	1637.000	1
Factored Moment	M_{ux}	kN.m	11.000	1
Factored Moment	M_{uz}	kN.m	56.000	1
Effective Length of Column	l_{ex}	mm	3600	1.2
	l_{ez}	mm	3600	1.2
	l_{ex}/D		6.7924528	0
			<12- Short Column	
	l_{ey}/b		12	0
			<12- Short Column	
Additional Moment due to Slender	M_{ax}	kN.m	0	
Additional Moment due to Slender	M_{az}	kN.m	0	
Percentage of Reinf.	p		2	
Gross Area of Cross Section	A_g	mm ²	159000	
Ultimate Axial Load	P_{uz}	kN	3181.113	
d'/D (about x-x axis)			0.095	0.1
d'/D (about y-y axis)			0.167	0.2
(Table 60)	k_1		0.207	



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3.2 FOUNDATION DESIGN

3.2.1 ISOLATED FOOTING DESIGN

1 Footing Size Design

Load	Pu	1474 KN
Design Load	P	1081 KN
Moment in x dir	Mux	2 KN-m
Moment in y dir	Muy	4 KN-m
Column size	cx	300 mm
	cy	530 mm
SBC	q	120 KN/sqm
Footing Size required	A req	3.60 sqmm
Footing Size Provided	L	2.50 meters
	B	2.50 meters
Area Provided	A prvd	6.25 meters
	Zx	2.03
	Zy	2.03
Net upward pressure	Nup	273 KNm2

Footing Size OK

2 Slab Design

	lx	0.850
	ly	0.735
Bending Moment in x dir	Mx	148 KN-m
Bending Moment in y dir	My	111 KN-m
Concrete	fck	30 MPa
Steel	fy	500 MPa
Minimum Depth Required	dmin	193
Depth Provided	D	600 mm


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Clear Cover	c	50 mm
Effective Cover	d'	56 mm
Effective Depth	d'	544 mm

Area of Steel	Spacing c/c in mm			
	10#	12#	16#	20#
653 sqmm	120 c/c	173 c/c	308 c/c	481 c/c
653 sqmm	120 c/c	173 c/c	308 c/c	481 c/c

Minimum Ast required across x direction

Minimum Ast required across y direction

Ast across x direction	12 mm dia @ 125 mm c/c	905 sqmm
Ast across y direction	12 mm dia @ 125 mm c/c	905 sqmm

3 One Way Shear along x direction

Vu1	251 KN
ζ_v	0.231 MPa
ζ_c	0.265 MPa
Vc1	288 KN

One Way Shear Check OK

4 One Way Shear along y direction

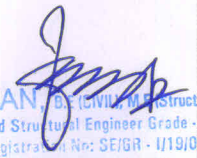
Vu1	157 KN
ζ_v	0.144 MPa
ζ_c	0.265 MPa
Vc1	288 KN

One Way Shear Check OK

5 Two Way Shear

Vu2	1268 KN
ζ_v	0.608 MPa
$ks^*\zeta_c$	1.369 MPa
Vc1	2857 KN

Two Way Shear Check OK


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3.3 BEAM DESIGN

Beam Data

width	200 mm
depth	530 mm
clear cover to main reinf.	25 mm
Slab Thickness	125 mm

d'	43 mm	$= cc + sdia + mdia/2$
eff depth	487 mm	$= d - d'$

Material Grades

Concrete	30 MPa
Steel	500 MPa

Span Moment	155 KN-m
-------------	----------

Support Moment	128 KN-m	128 KN-m
		0 KN-m

Mu/bd ²	2.84	2.35
xumax	222	222
Mulim	218	218
Mulim/bd ²	3.99	3.99

Span Reinforcement

Beam is designed as Singly Reinforced Beam

Area of Steel	Tension (Ast)	Compr (Asc)
Percentage	0.747 %	-----
Area of Steel	836 sqmm	

Refer Table 2 SP 16 pg 48

283 KN-m

Tension Reinforcement

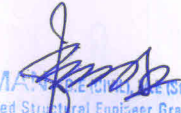
Type	Bar dia	Nos	Area of Steel
Layer 1	20 mm	3	942 sqmm
Layer 2	25 mm	0	0 sqmm
Layer 3	20 mm	0	0 sqmm
Total Steel Provided			942 sqmm
Provided Steel OK			

1602 sqmm

0.841 %

Compression Reinforcement

Type	Bar dia	Nos	Area of Steel
Layer 1	16 mm	2	
Layer 2	25 mm	0	
Layer 3			

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Total Steel Provided

#VALUE!

Support Reinforcement

Beam is designed as Singly
Reinforced Beam

Area of Steel	Tension (Ast)	Compr (Asc)
Percentage	0.600 %	-----
Area of Steel	672 sqmm	

Refer Table 2 SP 16 pg
48

Tension Reinforcement

Type	Bar dia	Nos	Area of Steel
Layer 1	20 mm	4	1257 sqmm
Layer 2	25 mm	0	0 sqmm
Layer 3	12 mm		0 sqmm
Total Steel Provided			1257 sqmm
Provided Steel OK			

1.122 %

1.96332011205504
-0.375320891489092

0.146914433817085

1392 sqmm
1033 sqmm

Compression Reinforcement

Type	Bar dia	Nos	Area of Steel
Layer 1	20 mm	3	
Layer 2	25 mm	0	
Layer 3			
Total Steel Provided			

#VALUE!

2074 sqmm

Shear Force (Vu)

107 KN

ζ_v

0.921

$=V_u / (b * d)$

ζ_c

0.613

Refer Table 61 SP 16 pg 179

ζ_{cmax}

3.5

Refer Table J SP 16 pg 175

or

$$= (0.85 * \sqrt{(0.8 * f_{ck}) * \sqrt{(1 + 5\beta - 1)})} / (6\beta)$$

Type	Bar Dia	Nos	Area of Steel
Layer 1	25 mm	0	0 sqmm
Layer 2	25 mm	0	0 sqmm
Layer 3	20 mm	0	0 sqmm
			0 sqmm

0.000 %

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Sectional Dimensions OK
 Shear Reinforcements required

Steel	415 MPa
Type of stirrup	2 legged
Stirrup diameter	8 mm
Spacing	300 c/c

Vus/d

0.787 kN/cm

1.458

Safe

3.4 TWO WAY SLAB DESIGN

Slab thickness	t	125 mm
Concrete	fck	30 MPa
Steel	fy	500 MPa

Sunken
Depth

0 mm

Loading

Slab Load

Dead Load	DL	3.125 KN/m
Live Load	LL	2.000 KN/m
Finishes Load	WL	1.000 KN/m
Total Load	Ws	6.125 KN/m
Factored Load	Wsu	9 KN/m

Sunken Slab Load

Dead Load	DL	3.125 KN/m
Filler Load	FL	0 KN/m
Live Load	LL	3.0 KN/m
Finishes Load	WL	1.0 KN/m
Total Load	Wsk	7.13 KN/m
Factored Load	Wsku	11 KN/m

Slab Data

Slab Type	Regular
Load	9 KN/m
Longer Span (ly)	4.3 m
Shorter Span (lx)	3.5 m

ly/lx ratio	1.22
Slab type	+

Loading on edges

	one way	two way
W_{longer}	12 KN/m	$=(w \cdot lx/2) + (1 - (1/3) \cdot (lx/ly)^2)$

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W_{shorter}	10 KN/m	$= w \cdot l_x / 3$	
Moments		<i>one way</i>	<i>two way</i>
Mx	7 KN-m	$= w \cdot l_x^2 / 8$	$= \alpha_x \cdot w \cdot l_x^2$
My	6 KN-m		$= \alpha_y \cdot w \cdot l_x^2$
Thickness Check	OK	$= M_{ulim} > M_{ux} \text{ or } M_{uy}$	
Deflection	6 mm	$= \frac{5 \cdot W \cdot l^4}{384 E I}$	

Area of Steel	Astx	Asty	Refer Chart 4 SP 16 pg 21 Refer Table 5-44 SP 16 pg 51-80
	162 sqmm	133 sqmm	

or

Spacing required in mm

8#		10#		12#		16#	
x	y	x	y	x	y	x	x
311 c/c	378 c/c	486 c/c	590 c/c	699 c/c	850 c/c	#####	1511 c/c

$= \text{ast of bar} \cdot 1000 / \text{ast req}$

Final Ast provided	x	y
	10# @ 150c/c	8# @ 150c/c

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	k2		0.328	
	P _{bx}	kN	1081.264	
	k1		0.184	
	k2		0.028	
	P _{bz}	kN	885.694	
	k _x		0.735	
	k _y		0.673	
Minimum Eccentricity	e _x	mm	23.666667	
	e _y	mm	16	
Moments due to min. eccentricity	M _{ex}	kN.m	38.74	>
			11.000	kN.m
Moments due to min. eccentricity	M _{ez}	kN.m	26.19	<
			56.000	kN.m
Total Moments for which the column is to be designed are				
	M _{ux}	kN.m	38.742	
	M _{uz}	kN.m	56.000	
The section is to be checked for biaxial bending				
	P _u /f _{ck} bD		0.343	
	p/f _{ck}		0.06	
Referring (d'/D is 0.1)	M _u /f _{ck} bD ²		0.11	
	M _{ux1}	kN.m	278.091	
Referring to (d'/D = 0.2)	M _u /f _{ck} bD ²		0.100	
	M _{uy1}	kN.m	143.100	
	M _{ux} /M _{ux1}		0.139	
	M _{uy} /M _{uy1}		0.391	
	P _u /P _{uz}		0.515	
	a		1	1.525
				< 1
M _{ux} /M _{ux1} + M _{uy} /M _{uy1}			0.289	OK
Area of Reinforcement	A _s	mm ²	2862	
Minimum no of to be provided			6	
No of Bars to be provided	Nos.		10	
Provide 12 Nos of 20 Diameter				

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