

Flat Slab Analysis and Design

Job:

Designed By:

Time: 2:52 PM 9/24/2008
Design 2.0

Checked By:

Program: Flat Slab Analysis and

D E S I G N D A T A

===== CONCRETE =====							
SUPPORT COVER	SPAN COVER	TENSILE STRENGTH	STRENGTH f'c	WEIGHT	STEEL YIELD	DESIGN METHOD	LOAD PATTERNS
In 1.500	In 1.500	K/In ^2 0.475	K/In ^2 4.000	Lb/Ft ^3 144.000	K/In ^2 60.000	Ultimate	Pattern Loading

S P A N I N P U T D A T A

SPAN NUMBER	SPAN LENGTH	SPAN THICKNESS
	Ft	In
1	24.000	8.000
2	15.000	8.000
3	20.000	8.000

S P A N L O A D S I N P U T D A T A

SPAN NUMBER	==== UNIFORM LOADS ===		===== PARTIAL LOADS =====			
	DEAD	LIVE	DEAD	LIVE	BEGIN	END
	Lb/Ft ^2	Lb/Ft ^2	Lb/Ft	Lb/Ft	Ft	Ft
1	-15.000	-100.000	0.000	0.000	0.000	0.000
2	0.000	-80.000	-425.000	-1200.000	3.000	6.000
3	0.000	-100.000	-950.000	0.000	10.500	11.500
			0.000	0.000	0.000	0.000

C O L U M N I N P U T D A T A

COLUMN NUMBER	===== COLUMN DIMENSIONS =====				STORY HEIGHT		SLAB WIDTH
	BELOW THICK.	WIDTH	ABOVE THICK.	WIDTH	BELOW	ABOVE	
	In	In	In	In	Ft	Ft	Ft
1	16.000	20.000	0.000	0.000	12.000	10.000	16.000
2	16.000	0.000	16.000	0.000	12.000	10.000	20.000
3	16.000	0.000	16.000	0.000	12.000	10.000	24.000
4	16.000	16.000	16.000	16.000	12.000	10.000	20.000

P A N E L / C A P I T A L I N P U T D A T A

COLUMN NUMBER	===== DROP PANEL =====				===== COLUMN CAPITAL =====	
	THICKNESS	WIDTH	LEFT LENGTH	RIGHT	DIAMETER	DEPTH

	In	Ft	Ft	Ft	In	In
1	4.000	7.000	0.670	4.000	0.000	0.000
2	4.000	7.000	4.500	3.500	30.000	9.000
3	4.000	8.000	3.500	4.000	0.000	0.000
4	0.000	0.000	0.000	0.000	0.000	0.000

CANTILEVER INPUT DATA

	LENGTH	WIDTH	= UNIFORM LOADS =		== LINE LOADS ==		===== PARTIAL LOADS =====			
			DEAD	LIVE	DEAD	LIVE	DEAD	LIVE	BEGIN	END
	Ft	Ft	Lb/Ft ^2	Lb/Ft ^2	Lb/Ft	Lb/Ft	Lb/Ft	Lb/Ft	Ft	Ft
LEFT	0.670	16.000	-15.000	-100.000	0.000	0.000	0.000	0.000	0.000	0.000
RIGHT	5.000	20.000	0.000	-100.000	-850.000	0.000	0.000	0.000	0.000	0.000

SPANDREL BEAM INPUT DATA

	SPANDREL WIDTH	CLEAR DEPTH	OFFSET FROM COL.
	In	In	In
LEFT	0.000	0.000	0.000
RIGHT	12.000	16.000	2.000

SPAN MOMENTS

COLUMN NUMBER	75% ADJACENT SPANS		75% ODD SPANS		75% EVEN SPANS		100% LL ALL SPANS	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
	Ft-Lb	Ft-Lb	Ft-Lb	Ft-Lb	Ft-Lb	Ft-Lb	Ft-Lb	Ft-Lb
1	-1121.532	-149600.408	-663.654	-153109.056	-1121.532	-74099.258	-1274.158	-169236.751
2	-321662.245	-247570.353	-292511.332	-183266.018	-191159.663	-168212.966	-357384.639	-257173.372
3	-172480.250	-203604.588	-104313.059	-160727.930	-99413.184	-100598.928	-163157.047	-211402.680
4	-193742.701	-185371.000	-187267.479	-153496.000	-125514.152	-185371.000	-215824.504	-195996.000

COLUMN MOMENTS

COLUMN NUMBER	75% ADJACENT SPANS		75% ODD SPANS		75% EVEN SPANS		100% LL ALL SPANS	
	BOTTOM	TOP	BOTTOM	TOP	BOTTOM	TOP	BOTTOM	TOP
1	-148478.876	0.000	-152445.402	0.000	-72977.726	0.000	-167962.593	0.000
2	34108.684	-39983.208	50291.790	-58953.524	10563.661	-12383.036	46132.908	-54078.359
3	-14328.291	16796.047	-25970.953	30443.919	-545.865	639.879	-22210.191	26035.442
4	3757.824	-4613.878	15159.077	-18612.402	-26868.073	32988.775	8900.464	-10928.041

SHEARS

COLUMN NUMBER	75% ADJACENT SPANS		75% ODD SPANS		75% EVEN SPANS		100% LL ALL SPANS	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
	Lb	Lb	Lb	Lb	Lb	Lb	Lb	Lb
1.00	-3347.856	53597.207	-1981.056	54958.022	-3347.856	29368.933	-3803.456	61766.955
2.00	-72613.993	49321.014	-71253.178	30045.537	-41762.267	48901.659	-82804.245	57093.762
3.00	-39923.986	61792.454	-20949.463	59972.383	-40343.341	31153.599	-44901.238	70711.602
4.00	-55593.946	50169.200	-57414.017	37419.200	-30132.801	50169.200	-65374.798	54419.200

SHEAR STRESSES

COLUMN NUMBER	PUNCHING STRESS	ECCENTRIC STRESS	TOTAL STRESS	ALLOWABLE STRESS	PUNCHING LOAD	UNBALANCED MOMENT	FLEXURAL MOMENT	GOVERNING PATTERN
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	Lb/In ^2	Lb/In ^2	Lb/In ^2	Lb/In ^2	Lb	Ft-Lb	Ft-Lb	
1	83.144	81.724	164.869	215.035	63800.044	129342.369	83072.112	4
2	102.456	27.260	129.717	215.035	136877.778	100211.266	68105.857	4
3	130.630	28.993	159.623	215.035	114189.546	48245.633	32788.830	4
4	80.963	14.672	95.635	215.035	47363.235	40060.768	24036.461	4

* Total Shear Stress Exceeds Allowable Stress

TOP REINFORCEMENT

COLUMN NUMBER	===== COLUMN STRIP =====			== CONCENTRATE ==		===== MIDDLE STRIP =====			GOVERNING PATTERN
	DESIGN MOMENT	STEEL AREA	STRIP WIDTH	STEEL AREA	STRIP WIDTH	DESIGN MOMENT	STEEL AREA	STRIP WIDTH	
	Ft-Lb	In ^2	Ft	In ^2	Ft	Ft-Lb	In ^2	Ft	
1	-129106.164	2.811	8.000	1.807	4.667	-216.806	1.382*	8.000	4
2	-202389.358	4.485	9.750			-67463.119	2.368	10.250	4
3	-128218.305	2.781	8.750			-42739.435	2.635*	15.250	4
4	-132625.732	4.794	10.000			-40971.469	1.728*	10.000	4

* Minimum Steel

** Overreinforced

BOTTOM REINFORCEMENT

SPAN NUMBER	===== COLUMN STRIP =====			===== MIDDLE STRIP =====			GOVERNING PATTERN
	DESIGN MOMENT	STEEL AREA	STRIP WIDTH	DESIGN MOMENT	STEEL AREA	STRIP WIDTH	
	Ft-Lb	In ^2	Ft	Ft-Lb	In ^2	Ft	
1	99771.384	3.571	9.000	66514.256	2.343	9.000	4
2	20295.278	1.296*	7.500	13530.185	2.506*	14.500	3
3	74078.449	2.610	10.000	49385.633	2.074*	12.000	4

* Minimum Steel

** Overreinforced

TOP BARS

COLUMN NUMBER	===== COLUMN STRIP =====				===== MIDDLE STRIP =====			
	BAR DESIGNATION	NUMBER OF BARS	LENGTH LEFT	LENGTH RIGHT	BAR DESIGNATION	NUMBER OF BARS	LENGTH LEFT	LENGTH RIGHT
			Ft	Ft			Ft	Ft
1	#4	8	0.670	8.001	#4	8	0.670	5.556
			0.670	5.112				
2	#5	8	8.443	8.317	#4	13	5.998	8.042
			5.554	5.554				
3	#4	8	8.149	6.776	#4	14	8.042	4.715
			4.340	4.340				
4	#5	8	6.859	5.000	#4	9	4.893	5.000
			4.795	5.000				

BOTTOM BARS

SPAN NUMBER	===== COLUMN STRIP =====			===== MIDDLE STRIP =====				
	BAR DESIGNATION	NUMBER OF BARS	LENGTH	BAR DESIGNATION	NUMBER OF BARS	LONG BAR LENGTH	NUMBER OF BARS	SHORT BAR LENGTH
			Ft			Ft		Ft
1	#5	12	20.833	#4	6	23.583	6	20.233
2	#4	7	11.250	#4	7	14.500	6	10.500
3	#4	14	17.333	#4	6	19.583	5	16.833

TOTAL MATERIAL QUANTITIES

WITH SLAB REINFORCED IN ONE DIRECTION

=====	STEEL	=====	=====	CONCRETE	=====
TOP	BOTTOM	STEEL	SURFACE		VOLUME
STEEL	STEEL	WEIGHT	AREA		
Lb	Lb	Lb/Ft ^2	Ft ^2		Ft ^3
932.270	896.902	1.393	1312.720		951.377