Flat Slab Analysis and Design

Job:

Designed By:

Checked By:

Time: 2:52 PM 9/24/2008

Program: Flat Slab Analysis and Design 2.0

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	In	K/In ^2	K/In ^2	Lb/Ft ^3	K/In ^2		
1.500	1.500	0.475	4.000	144.000	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
			-950.000	0.000	10.500	11.500
3	0.000	-100.000	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 BELOW		ABOVE		STORY HEIGHT		SLAB
	THICK.	WIDTH	THICK.	WIDTH	BELOW	ABOVE	WIDTH
	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 THICKNESS	DROP PANEL WIDTH	DROP PANEL LENGTH LEFT	DROP PANEL LENGTH RIGHT	COLUMN CAPITAL DIAMETER	COLUMN CAPITAL 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

C A N T I L E V E R I N P U T D A T A

	LENGTH	WIDTH	= UNIFORM LOADS = DEAD	LIVE	== LINE LOADS == DEAD	LIVE	========== PARTIAL LOADS ========== 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

S P A N D R E L B E A M I N P U T D A T A

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

S P A N M O M E N T S

COLUMN NUMBER	75% ADJACENT SPANS LEFT	RIGHT	75% ODD SPANS LEFT	RIGHT	75% EVEN SPANS LEFT	RIGHT	100% LL ALL SPANS 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

C O L U M N M O M E N T S

COLUMN NUMBER	75% ADJACENT SPANS BOTTOM	TOP	75% ODD SPANS BOTTOM	TOP	75% EVEN SPANS BOTTOM	TOP	100% LL ALL SPANS 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

S H E A R S

COLUMN NUMBER	75% ADJACENT SPANS LEFT	RIGHT	75% ODD SPANS LEFT	RIGHT	75% EVEN SPANS LEFT	RIGHT	100% LL ALL SPANS 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

S H E A R S T R E S S E S

COLUMN NUMBER	PUNCHING STRESS	ECCENTRIC STRESS	TOTAL STRESS	ALLOWABLE STRESS	PUNCHING LOAD	UNBALANCED MOMENT	FLEXURAL MOMENT	GOVERNING PATTERN

	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

T O P R E I N F O R C E M E N T

	========= COLUMN STRIP =========			== CONCENTRATE ==		========= MIDDLE STRIP =========			
COLUMN NUMBER	DESIGN MOMENT	STEEL AREA	STRIP WIDTH	STEEL AREA	STRIP WIDTH	DESIGN MOMENT	STEEL AREA	STRIP WIDTH	GOVERNING PATTERN
	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

B O T T O M R E I N F O R C E M E N T

	========= COLUMN STRIP =========			========= MIDDLE STRIP =========			
SPAN NUMBER	DESIGN MOMENT	STEEL AREA	STRIP WIDTH	DESIGN MOMENT	STEEL AREA	STRIP WIDTH	GOVERNING PATTERN
	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

T O P B A R S

	============== COLUMN STRIP ==============				============== MIDDLE STRIP ==============			
COLUMN NUMBER	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
		7	0.670	5.112				
2	#5	8	8.443	8.317	#4	13	5.998	8.042
		7	5.554	5.554				
3	#4	8	8.149	6.776	#4	14	8.042	4.715
		7	4.340	4.340				
4	#5	8	6.859	5.000	#4	9	4.893	5.000
		8	4.795	5.000				

B O T T O M B A R S

	========= COLUMN STRIP =========			========== MIDDLE STRIP ==========				
SPAN NUMBER	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

T O T A L M A T E R I A L Q U A N T I T I E S

WITH SLAB REINFORCED IN ONE DIRECTION

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