Flat Slab Analysis and Design

Job:
Description:
Time: 10:00 AM 6/20/2022

Designed By:
Checked By:
Program: Flat Slab Analysis and Design 3.0

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	SPAN MINIMUM INT. THICKNESS	SPAN MINIMUM EXT. THICKNESS
	Ft	In	In	In
1	24.000	8.000	7.200	8.000
2	15.000	8.000	4.500	5.000
3	20.000	8.000	6.000	6.667

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	4.000
			-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	28.000	0.000	0.000	12.000	10.000	20.000
2	16.000	0.000	16.000	0.000	12.000	10.000	16.000
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		LENGTH		COLUMN CAPITAL	
	THICKNESS	WIDTH	LEFT	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

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

			= UNIFORM LOADS =		== LINE LOADS ==		========== PARTIAL LOADS ==========			
	LENGTH	WIDTH	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

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	75% ADJACENT SPANS		75% ODD SPANS		75% EVEN SPANS		100% LL ALL SPANS	
NUMBER	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	-1206.194	-171703.111	-710.160	-175452.585	-1206.194	-87326.795	-1371.539	-195981.483
2	-292737.708	-212545.369	-268129.971	-155281.930	-172099.839	-143365.089	-324421.653	-216088.601
3	-164381.424	-198510.487	-103345.688	-160119.461	-92535.062	-96272.640	-155845.386	-206803.700
4	-194321.470	-185371.000	-187455.793	-153496.000	-126853.082	-185371.000	-217247.829	-195996.000

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

COLUMN	75% ADJACENT SPANS		75% ODD SPANS		75% EVEN SPANS		100% LL ALL SPANS	
NUMBER	BOTTOM	TOP	BOTTOM	TOP	BOTTOM	TOP	BOTTOM	TOP
1	-170496.917	0.000	-174742.425	0.000	-86120.601	0.000	-194609.944	0.000
2	36917.064	-43275.274	51950.329	-60897.712	13228.229	-15506.521	49871.824	-58461.227
3	-15711.536	18417.527	-26136.175	30637.598	-1720.618	2016.960	-23458.991	27499.323
4	4017.617	-4932.853	15243.606	-18716.187	-26267.064	32250.853	9539.355	-11712.475

S H E A R S

COLUMN	75% ADJACENT SPANS		75% ODD SPANS		75% EVEN SPANS		100% LL ALL SPANS	
NUMBER	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
	Lb	Lb	Lb	Lb	Lb	Lb	Lb	Lb
1.00	-3726.942	60249.742	-2189.292	61431.292	-3726.942	33200.640	-4239.492	69461.176
2.00	-65961.458	39964.603	-64779.908	24763.090	-37930.560	40142.342	-75110.024	45920.888
3.00	-37938.397	61508.811	-21009.910	59932.543	-37760.658	30870.338	-42692.112	70410.487
4.00	-55877.589	50169.200	-57453.857	37419.200	-30416.062	50169.200	-65675.913	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	83.945	72.754	156.699	215.035	71465.943	147415.237	98555.805	4
2	88.334	29.470	117.804	215.035	118010.682	108333.052	73625.608	4
3	127.758	30.624	158.382	215.035	111679.304	50958.313	34632.430	4
4	81.168	14.206	95.374	215.035	47483.360	38787.981	23272.789	4

* Total Shear Stress Exceeds Allowable Stress

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

COLUMN NUMBER	COLUMN STRIP DESIGN MOMENT	COLUMN STRIP STEEL AREA	COLUMN STRIP STRIP WIDTH	CONCENTRATE STEEL AREA	CONCENTRATE STRIP WIDTH	MIDDLE STRIP DESIGN MOMENT	MIDDLE STRIP STEEL AREA	MIDDLE STRIP STRIP WIDTH	GOVERNING PATTERN
	Ft-Lb	In ^2	Ft	In ^2	Ft	Ft-Lb	In ^2	Ft	
1	-150991.634	3.305	10.000	2.146	5.333	-230.476	1.728*	10.000	4
2	-183483.791	4.047	8.000			-61161.264	2.157	8.000	4
3	-124902.615	2.708	8.750			-41634.205	2.635*	15.250	4
4	-133779.599	4.838	10.000			-41040.183	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

SPAN NUMBER	COLUMN STRIP DESIGN MOMENT	COLUMN STRIP STEEL AREA	COLUMN STRIP STRIP WIDTH	MIDDLE STRIP DESIGN MOMENT	MIDDLE STRIP STEEL AREA	MIDDLE STRIP STRIP WIDTH	GOVERNING PATTERN
	Ft-Lb	In ^2	Ft	Ft-Lb	In ^2	Ft	
1	101625.300	3.641	9.000	67750.200	2.388	9.000	4
2	15944.464	1.296*	7.500	10629.643	2.160*	12.500	3
3	75075.569	2.646	10.000	50050.379	2.074*	12.000	4

* Minimum Steel ** Overreinforced

T O P B A R S

COLUMN NUMBER	COLUMN STRIP BAR DESIGNATION	COLUMN STRIP NUMBER OF BARS	COLUMN STRIP LENGTH LEFT	COLUMN STRIP LENGTH RIGHT	MIDDLE STRIP BAR DESIGNATION	MIDDLE STRIP NUMBER OF BARS	MIDDLE STRIP LENGTH LEFT	MIDDLE STRIP LENGTH RIGHT
			Ft	Ft			Ft	Ft
1	#4	9	0.670	8.001	#4	9	0.670	5.556
		8	0.670	5.112				
2	#5	7	8.443	8.317	#4	11	5.998	8.042
		7	5.554	5.554				
3	#4	7	8.156	6.776	#4	14	8.042	4.715
		7	4.340	4.340				
4	#5	8	6.840	5.000	#4	9	4.881	5.000
		8	4.782	5.000				

B O T T O M B A R S

SPAN NUMBER	COLUMN STRIP BAR DESIGNATION	COLUMN STRIP NUMBER OF BARS	COLUMN STRIP LENGTH	MIDDLE STRIP BAR DESIGNATION	MIDDLE STRIP NUMBER OF BARS	MIDDLE STRIP LONG BAR LENGTH	MIDDLE STRIP NUMBER OF BARS	MIDDLE STRIP SHORT BAR LENGTH
			Ft			Ft		Ft
1	#5	12	20.833	#4	6	23.583	6	20.233
2	#4	7	11.250	#4	6	14.500	5	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
909.864	892.829	1.404	1284.060	932.270