

E T A B S / C O N K E R

Concrete Frame Design Processor for ETABS

Version 6.22

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2 May 2008 10:30:35

DESIGN CODE TYPE-----	2 (ACI 318-89)
NUMBER OF FRAMES TO BE DESIGNED/CHECKED----	1
NUMBER OF LOAD COMBINATIONS-----	9
ETABS DEAD LOAD CONDITION NUMBER-----	1
ETABS LIVE LOAD CONDITION NUMBER-----	2
NUMBER OF REDEFINED MATERIAL PROPERTIES----	2
NUMBER OF COLUMN DESIGN PROPERTY SETS-----	3
NUMBER OF BEAM DESIGN PROPERTY SETS-----	7
NUMBER OF CURVES PER INTERACTION VOLUME----	7
NUMBER OF POINTS PER INTERACTION CURVE-----	21
CODE FOR PRINTING INTERACTION CURVES-----	0
CODE FOR UNITY PHI FACTOR OVER RIDE-----	0
TYPE OF UNITS (ENGLISH, MKS OR SI)-----	M
EXECUTION MODE-----	0
FLAG FOR MAP OF BEAM FLEXURAL STEEL-----	1
FLAG FOR MAP OF BEAM SHEAR STEEL-----	1
FLAG FOR MAP OF COLUMN DESIGN/CHECK-----	1
FLAG FOR MAP OF COLUMN SHEAR STEEL-----	1
FLAG FOR MAP OF JOINT SHEAR STRESS RATIOS--	1
FLAG FOR MAP OF B/C MOMENT CAPACITY RATIOS-	1

F BUILDING RC DESIGN

UNIT : KG-METER

T. H. CHENG STRUCTURAL ENGINEERING & ASSOCIATES

DESIGN LOADING COMBINATION DATA

[illegible]

MATERIAL PROPERTIES

ID	TYPE	ELASTIC MODULUS {Kg/sqm}	POISSONS RATIO	UNIT WEIGHT {Kg/cum}	UNIT MASS	COEFF OF EXPANSION
1	C	0.2100E+10	0.1700	0.2400E+04	0.0000E+00	0.0000E+00
2	C	0.2100E+10	0.1700	0.2400E+04	0.0000E+00	0.0000E+00
3	C	0.2100E+10	0.1700	0.0000E+00	0.0000E+00	0.0000E+00
4	O	0.2100E-01	0.1700	0.2400E+04	0.0000E+00	0.0000E+00

MATERIAL PROPERTIES FOR DESIGN

ID	TYPE	YIELD FY {Kg/sqm}	STRENGTH FC(FM) {Kg/sqm}	YIELD FYS {Kg/sqm}	STRENGTH FCS(FMS) {Kg/sqm}	ALLOWABLES FBMAJ {Kg/sqm}	FBMIN {Kg/sqm}
1	C	0.420E+08	0.210E+07	0.280E+08	0.210E+07		
2	C	0.420E+08	0.210E+07	0.280E+08	0.210E+07		
3	C	0.422E+08	0.281E+07	0.281E+08	0.281E+07		

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SECTION PROPERTIES FOR COLUMNS

SECT ID	SECTION TYPE	MAT ID	MAJOR DIM {m}	MINOR DIM {m}	CONCRETE COVER {m}	AREA OF BARS 1 {sqm}	AREA OF BARS 2 {sqm}
1	RR-3-5	1	0.3000	0.5000	0.07000	0.00000	0.00000
2	RR-3-3	1	0.5000	0.3000	0.07000	0.00000	0.00000
3	RR-3-3	1	0.3000	0.3000	0.07000	0.00000	0.00000

SECTION PROPERTIES FOR BEAMS

SECT ID	SECT TYPE	MAT ID	DEPTH BELOW {m}	DEPTH ABOVE {m}	BEAM WIDTH {m}	SLAB THICK {m}	SLAB WIDTH {m}	TOP COVER {m}	BOTTOM COVER {m}
1	RCB	1	0.5000	0.0000	0.3000	0.0000	0.0000	0.08000	0.08000
2	RCB	1	0.5000	0.0000	0.3000	0.0000	0.0000	0.08000	0.08000
3	RCB	1	0.5000	0.0000	0.3000	0.0000	0.0000	0.08000	0.08000
4	RCB	1	0.4000	0.0000	0.2500	0.0000	0.0000	0.08000	0.08000
5	RCB	1	1.2000	0.0000	0.3500	0.0000	0.0000	0.08000	0.08000
6	RCB	1	1.2000	0.0000	0.3500	0.0000	0.0000	0.08000	0.08000
7	RCB	1	0.4500	0.0000	0.3500	0.0000	0.0000	0.08000	0.08000

F BUILDING RC DESIGN

UNIT : KG-METER

T. H. CHENG STRUCTURAL ENGINEERING & ASSOCIATES

SECTION PROPERTIES FOR BEAMS

SECT	TOP STEEL	BOT STEEL	TOP STEEL	BOT STEEL
ID	END- I	END- I	END- J	END- J
	{ sqm}	{ sqm}	{ sqm}	{ sqm}
1	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
2	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
3	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
4	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
5	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
6	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
7	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00

F BUILDING RC DESIGN

UNIT : KG-METER

T. H. CHENG STRUCTURAL ENGINEERING & ASSOCIATES

FRAME NUMBER----- 1
FRAMING TYPE----- 3 (NON-SEISMIC)
COLUMN PROPERTY REASSIGNMENT FLAG----- 1
BEAM PROPERTY REASSIGNMENT FLAG----- 1
YIELD OVERSTRENGTH FACTOR----- 1.00

FRAME ID NUMBER----- 1
NUMBER OF STORY LEVELS----- 4
NUMBER OF COLUMN LINES----- 21
NUMBER OF BAYS----- 29
NUMBER OF BRACING ELEMENTS----- 0
NUMBER OF PANEL ELEMENTS----- 60
NUMBER OF COLUMN LATERAL LOAD PATTERNS----- 10
NUMBER OF BEAM SPAN LOAD PATTERNS----- 9
MAXIMUM NUMBER OF LOADS PER BEAM SPAN----- 4

REASSIGNED COLUMN PROPERTY ID*S

LEVEL	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
PF	0	0	0	0	0	0	3	3	0	0	0	0	0	0	0
RF	0	0	0	0	0	1	2	1	0	0	1	0	0	0	2
3F	1	1	0	0	0	1	2	1	0	0	1	1	0	1	2
2F	1	1	0	0	1	1	2	1	0	0	1	0	0	1	2

LEVEL	16	17	18	19	20	21
PF	3	3	0	0	0	0
RF	2	0	2	2	0	0

3F	2	0	2	2	0	0
2F	2	0	2	2	0	0

SPECIFIED COLUMN LIVE LOAD REDUCTION FACTORS

ALL ELEMENTS HAVE THIS OPTION SPECIFIED AS 1.000

SPECIFIED COLUMN MAJOR MM-FACTOR (SIDESWAY)

ALL ELEMENTS HAVE THIS OPTION SPECIFIED AS 0.000

SPECIFIED COLUMN MINOR MM-FACTOR (SIDESWAY)

ALL ELEMENTS HAVE THIS OPTION SPECIFIED AS 0.000

SPECIFIED COLUMN MAJOR MM-FACTOR (NO-SIDESWAY)

ALL ELEMENTS HAVE THIS OPTION SPECIFIED AS 0.000

SPECIFIED COLUMN MINOR MM-FACTOR (NO-SIDESWAY)

ALL ELEMENTS HAVE THIS OPTION SPECIFIED AS 0.000

REASSIGNED BEAM PROPERTY ID*S

LEVEL	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
PF	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0
RF	0	0	0	2	2	2	2	2	0	2	2	2	2	0	0
3F	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2F	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
LEVEL	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
PF	0	0	0	0	0	1	0	0	1	0	0	0	0	0	
RF	0	2	2	0	0	2	0	0	2	2	0	2	0	0	
3F	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
2F	1	1	1	1	1	1	1	1	1	1	1	1	0	1	

SPECIFIED BEAM LIVE LOAD REDUCTION FACTORS

ALL ELEMENTS HAVE THIS OPTION SPECIFIED AS 1.000

F BUILDING RC DESIGN

UNIT : KG-METER

T. H. CHENG STRUCTURAL ENGINEERING & ASSOCIATES

DESIGN OF BEAM ELEMENTS (ACI 318-89)

FRAME ID /MAIN FRAME/

LEVEL ID PF

BAY	BEAM SIZE	STRESS	/-FACTORED	LOADS &	COMBOS-//--REQUIRED	REBAR--/		
ID	WIDTH X DEPTH	POINT	-MOMENT	+MOMENT	SHEAR	M{ top}	M{ bot}	V {/m}
	{m} {m}		{T-m}	{T-m}	{T}	{sqcm}	{sqcm}	{sqcm}
5	0.30 X 0.50	END I	2 < 7>	3 < 6>	4 < 3>	4.22	4.22	0.00
		1/4-PT	1 < 7>	2 < 2>	3 < 3>	4.22	4.22	0.00
		MIDDLE	0 < 7>	2 < 1>	2 < 6>	4.22	4.22	0.00
		3/4-PT	1 < 7>	2 < 2>	3 < 2>	4.22	4.22	0.00
		END J	3 < 7>	3 < 6>	4 < 2>	4.22	4.22	0.00
11	0.30 X 0.50	END I	3 < 3>	2 < 6>	4 < 3>	4.22	4.22	0.00
		1/4-PT	1 < 7>	1 < 2>	4 < 3>	4.22	4.22	0.00
		MIDDLE	0 < 7>	1 < 2>	3 < 3>	4.22	4.22	0.00
		3/4-PT	1 < 7>	2 < 2>	3 < 2>	4.22	4.22	0.00
		END J	3 < 7>	3 < 6>	4 < 2>	4.22	4.22	0.00
21	0.30 X 0.50	END I	6 < 5>	1 < 8>	10 < 1>	4.22	4.22	1.71
		1/4-PT	0 < 9>	6 < 4>	6 < 1>	4.22	4.22	0.00
		MIDDLE	0 < 9>	9 < 1>	1 < 4>	4.22	5.78	0.00
		3/4-PT	0 < 9>	6 < 4>	6 < 1>	4.22	4.22	0.00
		END J	7 < 5>	1 < 8>	10 < 1>	4.38	4.22	1.87
24	0.30 X 0.50	END I	6 < 5>	1 < 8>	10 < 1>	4.22	4.22	1.90
		1/4-PT	0 < 9>	5 < 1>	6 < 1>	4.22	4.22	0.00
		MIDDLE	0 < 9>	9 < 1>	1 < 5>	4.22	5.77	0.00
		3/4-PT	0 < 9>	6 < 4>	5 < 1>	4.22	4.22	0.00
		END J	7 < 5>	2 < 8>	10 < 1>	4.35	4.22	1.68

F BUILDING RC DESIGN

UNIT : KG-METER

T. H. CHENG STRUCTURAL ENGINEERING & ASSOCIATES

DESIGN OF BEAM ELEMENTS (ACI 318-89)

FRAME ID /MAIN FRAME/

LEVEL ID RF

BAY	BEAM SIZE	STRESS	/-FACTORED		LOADS &	COMBOS-/-REQUIRED REBAR--/			
ID	WIDTH X DEPTH	POINT	-MOMENT	+MOMENT	SHEAR	M{ top }	M{ bot }	V { /m }	
	{m} {m}		{T-m}	{T-m}	{T}	{sqcm}	{sqcm}	{sqcm}	
4	0.30 X 0.50	END I	7 < 3>	4 < 6>	5 < 3>	4.78	4.22	0.00	
		1/4-PT	2 < 7>	4 < 2>	4 < 3>	4.22	4.22	0.00	
		MIDDLE	0 < 7>	3 < 1>	2 < 6>	4.22	4.22	0.00	
		3/4-PT	2 < 7>	4 < 2>	4 < 2>	4.22	4.22	0.00	
		END J	8 < 3>	4 < 6>	6 < 2>	5.37	4.22	0.00	
5	0.30 X 0.50	END I	9 < 3>	4 < 6>	6 < 3>	5.70	4.22	0.00	
		1/4-PT	5 < 3>	2 < 6>	6 < 3>	4.22	4.22	0.00	
		MIDDLE	2 < 3>	0 < 6>	5 < 3>	4.22	4.22	0.00	
		3/4-PT	3 < 3>	1 < 6>	4 < 7>	4.22	4.22	0.00	
		END J	5 < 3>	4 < 6>	5 < 6>	4.22	4.22	0.00	
6	0.30 X 0.50	END I	9 < 3>	0 < 6>	8 < 1>	6.17	4.22	0.00	
		1/4-PT	6 < 3>	1 < 6>	8 < 1>	4.22	4.22	0.00	
		MIDDLE	2 < 7>	2 < 2>	7 < 1>	4.22	4.22	0.00	
		3/4-PT	0 < 7>	4 < 2>	6 < 1>	4.22	4.22	0.00	
		END J	0 < 9>	6 < 1>	6 < 3>	4.22	4.22	0.00	
7	0.30 X 0.50	END I	0 < 7>	6 < 1>	2 < 3>	4.22	4.22	0.00	
		1/4-PT	0 < 9>	6 < 1>	2 < 3>	4.22	4.22	0.00	
		MIDDLE	0 < 9>	6 < 1>	2 < 2>	4.22	4.22	0.00	
		3/4-PT	0 < 7>	6 < 1>	2 < 2>	4.22	4.22	0.00	
		END J	0 < 7>	5 < 2>	3 < 2>	4.22	4.22	0.00	
8	0.30 X 0.50	END I	0 < 7>	5 < 2>	6 < 1>	4.22	4.22	0.00	
		1/4-PT	1 < 7>	4 < 2>	6 < 1>	4.22	4.22	0.00	
		MIDDLE	3 < 3>	3 < 6>	7 < 1>	4.22	4.22	0.00	

		3/4-PT	6 < 3>	2 < 6>	7 < 1>	4.22	4.22	0.00
		END J	9 < 3>	1 < 6>	8 < 1>	6.19	4.22	0.00
10	0.30 X	0.50						
		END I	8 < 3>	6 < 6>	5 < 3>	5.22	4.22	0.00
		1/4-PT	3 < 7>	4 < 2>	4 < 3>	4.22	4.22	0.00
		MIDDLE	0 < 7>	1 < 2>	3 < 2>	4.22	4.22	0.00
		3/4-PT	3 < 3>	3 < 6>	4 < 2>	4.22	4.22	0.00
		END J	8 < 3>	4 < 6>	5 < 2>	5.62	4.22	0.00
11	0.30 X	0.50						
		END I	11 < 3>	1 < 6>	10 < 1>	7.48	4.22	1.63
		1/4-PT	6 < 3>	2 < 6>	9 < 1>	4.22	4.22	0.98
		MIDDLE	1 < 7>	4 < 2>	8 < 3>	4.22	4.22	0.11
		3/4-PT	0 < 9>	7 < 1>	8 < 3>	4.22	4.45	0.00
		END J	0 < 9>	11 < 1>	7 < 3>	4.22	7.31	0.00

F BUILDING RC DESIGN

UNIT : KG-METER

T. H. CHENG STRUCTURAL ENGINEERING & ASSOCIATES

DESIGN OF BEAM ELEMENTS (ACI 318-89)

FRAME ID /MAIN FRAME/

LEVEL ID RF

BAY	BEAM SIZE		STRESS /-FACTORED	LOADS &	COMBOS-///--REQUIRED	REBAR--/			
ID	WIDTH	X DEPTH	POINT	-MOMENT	+MOMENT	SHEAR	M{top}	M{bot}	V {/m}
	{m}	{m}		{T-m}	{T-m}	{T}	{sqcm}	{sqcm}	{sqcm}
12	0.30	X 0.50	END I	0 < 9>	12 < 1>	13 < 2>	4.22	7.85	5.22
			1/4-PT	0 < 9>	6 < 1>	14 < 2>	4.22	4.23	5.51
			MIDDLE	2 < 7>	3 < 2>	14 < 2>	4.22	4.22	5.95
			3/4-PT	7 < 3>	2 < 6>	15 < 2>	4.94	4.22	6.42
			END J	14 < 3>	1 < 6>	15 < 2>	9.51	4.22	6.75
13	0.30	X 0.50	END I	8 < 3>	3 < 6>	6 < 3>	5.21	4.22	0.00
			1/4-PT	3 < 3>	2 < 6>	5 < 3>	4.22	4.22	0.00
			MIDDLE	1 < 3>	1 < 6>	4 < 3>	4.22	4.22	0.00
			3/4-PT	3 < 7>	3 < 6>	4 < 6>	4.22	4.22	0.00
			END J	7 < 3>	6 < 6>	4 < 2>	4.58	4.22	0.00
17	0.30	X 0.50	END I	11 < 5>	6 < 8>	8 < 5>	7.63	4.22	0.00
			1/4-PT	8 < 5>	6 < 8>	8 < 5>	5.52	4.22	0.00
			MIDDLE	6 < 9>	6 < 4>	8 < 5>	4.22	4.22	0.00
			3/4-PT	4 < 9>	7 < 4>	7 < 5>	4.22	4.43	0.00
			END J	1 < 9>	7 < 4>	7 < 5>	4.22	4.60	0.00
18	0.30	X 0.50	END I	1 < 9>	7 < 4>	4 < 4>	4.22	4.60	0.00
			1/4-PT	0 < 9>	4 < 4>	4 < 4>	4.22	4.22	0.00
			MIDDLE	0 < 9>	3 < 4>	5 < 4>	4.22	4.22	0.00
			3/4-PT	4 < 9>	4 < 8>	6 < 4>	4.22	4.22	0.00
			END J	9 < 5>	5 < 8>	7 < 4>	6.33	4.22	0.00
21	0.30	X 0.50	END I	11 < 5>	6 < 8>	8 < 5>	7.31	4.22	0.00
			1/4-PT	3 < 9>	6 < 4>	6 < 5>	4.22	4.22	0.00
			MIDDLE	0 < 9>	4 < 1>	3 < 4>	4.22	4.22	0.00

			3/4-PT	3 < 9>	4 < 4>	6 < 4>	4.22	4.22	0.00
			END J	11 < 5>	4 < 8>	8 < 4>	7.62	4.22	0.00
24	0.30	X	0.50						
			END I	13 < 5>	5 < 8>	8 < 5>	8.65	4.22	0.00
			1/4-PT	4 < 9>	5 < 4>	6 < 5>	4.22	4.22	0.00
			MIDDLE	0 < 9>	5 < 4>	3 < 5>	4.22	4.22	0.00
			3/4-PT	0 < 9>	4 < 4>	5 < 4>	4.22	4.22	0.00
			END J	6 < 5>	3 < 8>	7 < 4>	4.22	4.22	0.00
25	0.30	X	0.50						
			END I	3 < 5>	2 < 8>	5 < 5>	4.22	4.22	0.00
			1/4-PT	0 < 9>	4 < 1>	3 < 5>	4.22	4.22	0.00
			MIDDLE	0 < 9>	5 < 1>	2 < 4>	4.22	4.22	0.00
			3/4-PT	2 < 9>	4 < 4>	5 < 4>	4.22	4.22	0.00
			END J	10 < 5>	1 < 8>	8 < 1>	6.76	4.22	0.00

F BUILDING RC DESIGN

UNIT : KG-METER

T. H. CHENG STRUCTURAL ENGINEERING & ASSOCIATES

DESIGN OF BEAM ELEMENTS (ACI 318-89)

FRAME ID /MAIN FRAME/

LEVEL ID RF

BAY	BEAM SIZE	STRESS	/-FACTORED LOADS &		COMBOS-//--REQUIRED REBAR--/			
ID	WIDTH X DEPTH	POINT	-MOMENT	+MOMENT	SHEAR	M{ top }	M{ bot }	V { /m }
	{m} {m}		{T-m}	{T-m}	{T}	{sqcm}	{sqcm}	{sqcm}
27	0.30 X 0.50							
		END I	11 < 5>	9 < 8>	6 < 5>	7.46	5.69	0.00
		1/4-PT	5 < 9>	6 < 8>	5 < 5>	4.22	4.22	0.00
		MIDDLE	0 < 9>	2 < 4>	4 < 9>	4.22	4.22	0.00
		3/4-PT	3 < 9>	4 < 4>	4 < 4>	4.22	4.22	0.00
		END J	9 < 9>	8 < 8>	5 < 4>	5.79	5.05	0.00

F BUILDING RC DESIGN

UNIT : KG-METER

T. H. CHENG STRUCTURAL ENGINEERING & ASSOCIATES

DESIGN OF BEAM ELEMENTS (ACI 318-89)

FRAME ID /MAIN FRAME/

LEVEL ID 3F

BAY	BEAM	SIZE	STRESS	/-FACTORED	LOADS &	COMBOS-//	--REQUIRED	REBAR--/	
ID	WIDTH	X DEPTH	POINT	-MOMENT	+MOMENT	SHEAR	M{top}	M{bot}	V{/m}
	{m}	{m}		{T-m}	{T-m}	{T}	{sqcm}	{sqcm}	{sqcm}
1	0.30	X 0.50	END I	9 < 3>	6 < 6>	8 < 3>	6.25	4.22	0.00
			1/4-PT	3 < 7>	5 < 2>	6 < 3>	4.22	4.22	0.00
			MIDDLE	0 < 9>	3 < 1>	4 < 7>	4.22	4.22	0.00
			3/4-PT	3 < 7>	5 < 2>	6 < 2>	4.22	4.22	0.00
			END J	8 < 3>	7 < 6>	7 < 2>	5.47	4.56	0.00
2	0.30	X 0.50	END I	1 < 3>	1 < 6>	2 < 1>	4.22	4.22	0.00
			1/4-PT	0 < 7>	1 < 2>	1 < 5>	4.22	4.22	0.00
			MIDDLE	0 < 9>	1 < 1>	1 < 4>	4.22	4.22	0.00
			3/4-PT	0 < 9>	1 < 4>	2 < 1>	4.22	4.22	0.00
			END J	2 < 5>	0 < 8>	4 < 1>	4.22	4.22	0.00
3	0.30	X 0.50	END I	1 < 7>	2 < 2>	3 < 3>	4.22	4.22	0.00
			1/4-PT	0 < 7>	3 < 1>	2 < 3>	4.22	4.22	0.00
			MIDDLE	0 < 7>	3 < 2>	3 < 2>	4.22	4.22	0.00
			3/4-PT	3 < 3>	2 < 6>	4 < 2>	4.22	4.22	0.00
			END J	9 < 3>	0 < 6>	7 < 1>	5.80	4.22	0.00
4	0.30	X 0.50	END I	14 < 3>	4 < 6>	9 < 3>	9.56	4.22	0.65
			1/4-PT	5 < 3>	3 < 6>	7 < 3>	4.22	4.22	0.00
			MIDDLE	0 < 7>	2 < 1>	4 < 3>	4.22	4.22	0.00
			3/4-PT	4 < 7>	6 < 2>	5 < 2>	4.22	4.22	0.00
			END J	11 < 3>	7 < 6>	7 < 2>	7.34	4.80	0.00
5	0.30	X 0.50	END I	13 < 3>	10 < 6>	10 < 3>	9.28	6.66	2.22
			1/4-PT	8 < 3>	6 < 6>	9 < 3>	5.04	4.22	1.08
			MIDDLE	3 < 3>	1 < 6>	9 < 2>	4.22	4.22	0.89

		3/4-PT	6 < 3>	2 < 6>	11 < 2>	4.22	4.22	2.47
		END J	12 < 3>	6 < 6>	12 < 2>	8.42	4.22	3.52
6	0.30 X	0.50						
		END I	19 < 3>	0 < 6>	18 < 1>	13.35	4.22	9.36
		1/4-PT	11 < 3>	0 < 6>	16 < 1>	7.54	4.22	8.25
		MIDDLE	4 < 3>	3 < 6>	15 < 1>	4.22	4.22	6.82
		3/4-PT	0 < 7>	6 < 2>	14 < 1>	4.22	4.22	5.56
		END J	0 < 7>	12 < 1>	13 < 1>	4.22	8.32	4.66
7	0.30 X	0.50						
		END I	0 < 7>	11 < 1>	3 < 7>	4.22	7.81	0.00
		1/4-PT	0 < 9>	12 < 1>	3 < 7>	4.22	7.94	0.00
		MIDDLE	0 < 7>	11 < 1>	3 < 2>	4.22	7.67	0.00
		3/4-PT	0 < 7>	10 < 1>	5 < 2>	4.22	6.87	0.00
		END J	0 < 7>	9 < 2>	5 < 2>	4.22	6.35	0.00

F BUILDING RC DESIGN

UNIT : KG-METER

T. H. CHENG STRUCTURAL ENGINEERING & ASSOCIATES

DESIGN OF BEAM ELEMENTS (ACI 318-89)

FRAME ID /MAIN FRAME/

LEVEL ID 3F

BAY	BEAM SIZE		STRESS	/-FACTORED	LOADS &	COMBOS-//	--REQUIRED	REBAR--/	
ID	WIDTH	X DEPTH	POINT	-MOMENT	+MOMENT	SHEAR	M{top}	M{bot}	V {/m}
	{m}	{m}		{T-m}	{T-m}	{T}	{sqcm}	{sqcm}	{sqcm}
8	0.30	X 0.50	END I	0 < 7>	10 < 2>	12 < 1>	4.22	6.42	3.88
			1/4-PT	2 < 7>	7 < 2>	13 < 1>	4.22	4.34	4.60
			MIDDLE	6 < 3>	4 < 6>	14 < 1>	4.25	4.22	5.45
			3/4-PT	12 < 3>	2 < 6>	15 < 1>	8.36	4.22	6.41
			END J	18 < 3>	0 < 6>	15 < 1>	13.14	4.22	7.22
9	0.30	X 0.50	END I	10 < 3>	6 < 6>	9 < 3>	6.57	4.22	0.60
			1/4-PT	3 < 7>	5 < 2>	7 < 3>	4.22	4.22	0.00
			MIDDLE	0 < 7>	4 < 1>	4 < 6>	4.22	4.22	0.00
			3/4-PT	4 < 7>	6 < 2>	7 < 2>	4.22	4.22	0.00
			END J	12 < 3>	7 < 6>	10 < 2>	8.20	4.43	1.29
10	0.30	X 0.50	END I	14 < 3>	6 < 6>	9 < 3>	9.33	4.22	0.31
			1/4-PT	5 < 3>	5 < 6>	7 < 3>	4.22	4.22	0.00
			MIDDLE	0 < 7>	2 < 1>	4 < 3>	4.22	4.22	0.00
			3/4-PT	4 < 7>	6 < 2>	6 < 2>	4.22	4.22	0.00
			END J	11 < 3>	8 < 6>	7 < 2>	7.55	5.38	0.00
11	0.30	X 0.50	END I	15 < 3>	7 < 6>	10 < 3>	10.18	4.40	1.77
			1/4-PT	9 < 3>	6 < 6>	9 < 3>	5.76	4.22	0.81
			MIDDLE	4 < 7>	5 < 2>	8 < 3>	4.22	4.22	0.00
			3/4-PT	0 < 7>	4 < 2>	7 < 3>	4.22	4.22	0.00
			END J	0 < 7>	5 < 2>	6 < 3>	4.22	4.22	0.00
12	0.30	X 0.50	END I	0 < 7>	5 < 1>	8 < 2>	4.22	4.22	0.00
			1/4-PT	2 < 7>	5 < 2>	9 < 2>	4.22	4.22	0.43
			MIDDLE	5 < 7>	6 < 6>	9 < 2>	4.22	4.22	1.18

			3/4-PT	10 < 3>	6 < 6>	10 < 2>	6.68	4.22	2.02
			END J	15 < 3>	6 < 6>	11 < 2>	10.35	4.22	2.70
13	0.30	X	0.50						
			END I	13 < 7>	11 < 6>	10 < 3>	9.19	7.46	2.07
			1/4-PT	6 < 7>	6 < 2>	9 < 3>	4.22	4.22	0.71
			MIDDLE	0 < 7>	2 < 2>	8 < 6>	4.22	4.22	0.00
			3/4-PT	7 < 7>	7 < 6>	9 < 2>	4.31	4.56	0.99
			END J	15 < 3>	12 < 6>	10 < 2>	10.22	7.99	2.22
14	0.30	X	0.50						
			END I	0 < 9>	1 < 4>	3 < 2>	4.22	4.22	0.00
			1/4-PT	0 < 7>	0 < 6>	4 < 2>	4.22	4.22	0.00
			MIDDLE	2 < 3>	0 < 6>	4 < 2>	4.22	4.22	0.00
			3/4-PT	3 < 3>	0 < 6>	5 < 1>	4.22	4.22	0.00
			END J	5 < 3>	0 < 6>	5 < 1>	4.22	4.22	0.00

F BUILDING RC DESIGN

UNIT : KG-METER

T. H. CHENG STRUCTURAL ENGINEERING & ASSOCIATES

DESIGN OF BEAM ELEMENTS (ACI 318-89)

FRAME ID /MAIN FRAME/

LEVEL ID 3F

BAY	BEAM	SIZE	STRESS	/-FACTORED	LOADS	&	COMBOS-//	--REQUIRED	REBAR--/	
ID	WIDTH	X DEPTH	POINT	-MOMENT	+MOMENT		SHEAR	M{top}	M{bot}	V{/m}
	{m}	{m}		{T-m}	{T-m}		{T}	{sqcm}	{sqcm}	{sqcm}
15	0.30	X 0.50	END I	10 < 9>	13 < 4>		7 < 8>	6.86	8.59	0.00
			1/4-PT	5 < 9>	7 < 4>		8 < 4>	4.22	4.56	0.01
			MIDDLE	1 < 5>	0 < 8>		10 < 4>	4.22	4.22	1.59
			3/4-PT	8 < 5>	2 < 8>		11 < 4>	4.99	4.22	3.17
			END J	16 < 5>	4 < 8>		13 < 4>	11.60	4.22	4.34
16	0.30	X 0.50	END I	9 < 1>	0 < 6>		8 < 1>	6.15	4.22	0.00
			1/4-PT	6 < 1>	0 < 6>		7 < 1>	4.24	4.22	0.00
			MIDDLE	4 < 1>	0 < 8>		6 < 1>	4.22	4.22	0.00
			3/4-PT	2 < 1>	0 < 8>		5 < 1>	4.22	4.22	0.00
			END J	0 < 9>	0 < 4>		5 < 1>	4.22	4.22	0.00
17	0.30	X 0.50	END I	17 < 5>	5 < 8>		15 < 5>	11.96	4.22	6.35
			1/4-PT	12 < 5>	6 < 8>		14 < 5>	7.95	4.22	5.71
			MIDDLE	7 < 9>	7 < 8>		13 < 5>	4.52	4.68	4.89
			3/4-PT	3 < 9>	9 < 4>		12 < 5>	4.22	5.65	4.07
			END J	0 < 9>	10 < 4>		12 < 5>	4.22	6.60	3.52
18	0.30	X 0.50	END I	1 < 9>	10 < 4>		5 < 4>	4.22	6.72	0.00
			1/4-PT	0 < 9>	6 < 1>		6 < 4>	4.22	4.22	0.00
			MIDDLE	1 < 9>	4 < 4>		8 < 4>	4.22	4.22	0.08
			3/4-PT	8 < 5>	4 < 8>		11 < 4>	5.55	4.22	2.52
			END J	18 < 5>	3 < 8>		12 < 4>	12.86	4.22	4.14
19	0.30	X 0.50	END I	10 < 1>	0 < 6>		8 < 1>	6.73	4.22	0.00
			1/4-PT	7 < 1>	0 < 6>		7 < 1>	4.61	4.22	0.00
			MIDDLE	4 < 1>	0 < 6>		6 < 1>	4.22	4.22	0.00

		3/4-PT	2 < 1>	0 < 8>	5 < 1>	4.22	4.22	0.00
		END J	0 < 5>	0 < 8>	5 < 1>	4.22	4.22	0.00
20	0.30 X	0.50						
		END I	1 < 9>	2 < 4>	2 < 1>	4.22	4.22	0.00
		1/4-PT	2 < 5>	1 < 8>	3 < 1>	4.22	4.22	0.00
		MIDDLE	4 < 5>	0 < 8>	5 < 1>	4.22	4.22	0.00
		3/4-PT	7 < 5>	0 < 8>	6 < 1>	4.46	4.22	0.00
		END J	11 < 1>	0 < 8>	8 < 1>	7.15	4.22	0.00
21	0.30 X	0.50						
		END I	16 < 5>	5 < 8>	11 < 5>	11.26	4.22	2.81
		1/4-PT	4 < 9>	5 < 4>	8 < 5>	4.22	4.22	0.06
		MIDDLE	0 < 9>	4 < 1>	4 < 9>	4.22	4.22	0.00
		3/4-PT	4 < 9>	6 < 4>	7 < 4>	4.22	4.23	0.00
		END J	14 < 5>	7 < 8>	10 < 4>	9.90	4.74	1.50

F BUILDING RC DESIGN

UNIT : KG-METER

T. H. CHENG STRUCTURAL ENGINEERING & ASSOCIATES

DESIGN OF BEAM ELEMENTS (ACI 318-89)

FRAME ID /MAIN FRAME/

LEVEL ID 3F

BAY	BEAM SIZE	STRESS	/-FACTORED		LOADS &	COMBOS-/-REQUIRED REBAR--/			
ID	WIDTH X DEPTH	POINT	-MOMENT	+MOMENT	SHEAR	M{ top }	M{ bot }	V { /m }	
	{m} {m}		{T-m}	{T-m}	{T}	{sqcm}	{sqcm}	{sqcm}	
22	0.30 X 0.50	END I	18 < 5>	10 < 8>	12 < 5>	13.06	6.51	3.74	
		1/4-PT	10 < 5>	9 < 8>	11 < 5>	7.05	5.84	2.69	
		MIDDLE	4 < 9>	8 < 4>	10 < 5>	4.22	5.03	1.29	
		3/4-PT	0 < 9>	6 < 4>	8 < 5>	4.22	4.22	0.00	
		END J	0 < 9>	7 < 4>	7 < 5>	4.22	4.78	0.00	
23	0.30 X 0.50	END I	0 < 9>	6 < 1>	8 < 4>	4.22	4.22	0.00	
		1/4-PT	2 < 9>	6 < 4>	9 < 4>	4.22	4.22	0.56	
		MIDDLE	7 < 9>	7 < 8>	10 < 4>	4.41	4.50	1.72	
		3/4-PT	13 < 5>	8 < 8>	11 < 4>	8.66	4.98	3.06	
		END J	19 < 5>	8 < 8>	12 < 4>	14.12	5.12	4.15	
24	0.30 X 0.50	END I	14 < 5>	1 < 8>	11 < 1>	9.87	4.22	2.56	
		1/4-PT	5 < 9>	5 < 4>	7 < 1>	4.22	4.22	0.00	
		MIDDLE	0 < 9>	8 < 4>	3 < 5>	4.22	5.05	0.00	
		3/4-PT	0 < 9>	6 < 4>	3 < 4>	4.22	4.22	0.00	
		END J	0 < 9>	0 < 9>	6 < 1>	4.22	4.22	0.00	
25	0.30 X 0.50	END I	3 < 5>	2 < 8>	7 < 5>	4.22	4.22	0.00	
		1/4-PT	0 < 9>	5 < 1>	4 < 5>	4.22	4.22	0.00	
		MIDDLE	0 < 9>	7 < 4>	4 < 4>	4.22	4.64	0.00	
		3/4-PT	6 < 9>	6 < 8>	8 < 4>	4.22	4.22	0.00	
		END J	17 < 5>	2 < 8>	11 < 1>	12.46	4.22	2.77	
26	0.30 X 0.50	END I	15 < 5>	6 < 8>	7 < 5>	10.46	4.22	0.00	
		1/4-PT	7 < 5>	7 < 8>	5 < 5>	4.47	4.28	0.00	
		MIDDLE	1 < 9>	5 < 4>	4 < 5>	4.22	4.22	0.00	

			3/4-PT	0 < 9>	3 < 1>	4 < 4>	4.22	4.22	0.00
			END J	4 < 9>	3 < 8>	6 < 4>	4.22	4.22	0.00
27	0.30	X	0.50						
			END I	18 < 5>	15 < 8>	10 < 5>	12.85	10.45	1.69
			1/4-PT	8 < 9>	9 < 4>	8 < 5>	5.10	6.34	0.00
			MIDDLE	0 < 9>	2 < 4>	7 < 8>	4.22	4.22	0.00
			3/4-PT	7 < 9>	8 < 8>	8 < 4>	4.55	5.06	0.25
			END J	18 < 5>	13 < 8>	10 < 4>	12.60	8.97	1.69
28	0.30	X	0.50						
			END I	7 < 3>	2 < 6>	8 < 1>	4.74	4.22	0.00
			1/4-PT	1 < 7>	5 < 2>	5 < 3>	4.22	4.22	0.00
			MIDDLE	0 < 7>	5 < 1>	2 < 3>	4.22	4.22	0.00
			3/4-PT	0 < 7>	4 < 1>	4 < 2>	4.22	4.22	0.00
			END J	3 < 3>	1 < 6>	6 < 1>	4.22	4.22	0.00

F BUILDING RC DESIGN

UNIT : KG-METER

T. H. CHENG STRUCTURAL ENGINEERING & ASSOCIATES

DESIGN OF BEAM ELEMENTS (ACI 318-89)

FRAME ID /MAIN FRAME/

LEVEL ID 3F

BAY	BEAM SIZE	STRESS	/-FACTORED LOADS &		COMBOS-//--REQUIRED REBAR--/			
ID	WIDTH X DEPTH	POINT	-MOMENT	+MOMENT	SHEAR	M{ top }	M{ bot }	V { /m }
	{m} {m}		{T-m}	{T-m}	{T}	{sqcm}	{sqcm}	{sqcm}
29	0.30 X 0.50	END I	1 < 3>	0 < 6>	5 < 1>	4.22	4.22	0.00
		1/4-PT	0 < 7>	3 < 1>	3 < 1>	4.22	4.22	0.00
		MIDDLE	0 < 7>	5 < 1>	0 < 2>	4.22	4.22	0.00
		3/4-PT	0 < 7>	3 < 1>	3 < 1>	4.22	4.22	0.00
		END J	2 < 3>	1 < 6>	5 < 1>	4.22	4.22	0.00

F BUILDING RC DESIGN

UNIT : KG-METER

T. H. CHENG STRUCTURAL ENGINEERING & ASSOCIATES

DESIGN OF BEAM ELEMENTS (ACI 318-89)

FRAME ID /MAIN FRAME/

LEVEL ID 2F

BAY	BEAM SIZE	STRESS	/-FACTORED		LOADS &	COMBOS-/-REQUIRED REBAR--/			
ID	WIDTH X DEPTH	POINT	-MOMENT	+MOMENT	SHEAR	M{ top }	M{ bot }	V { /m }	
	{m} {m}		{T-m}	{T-m}	{T}	{sqcm}	{sqcm}	{sqcm}	
1	0.30 X 0.50	END I	15 < 3>	11 < 6>	11 < 3>	10.67	7.59	2.50	
		1/4-PT	6 < 7>	7 < 2>	9 < 3>	4.22	4.54	1.02	
		MIDDLE	0 < 9>	2 < 1>	7 < 7>	4.22	4.22	0.00	
		3/4-PT	6 < 7>	8 < 2>	8 < 2>	4.22	5.10	0.04	
		END J	14 < 7>	13 < 6>	10 < 2>	9.40	8.57	1.40	
2	0.30 X 0.50	END I	1 < 3>	1 < 6>	2 < 3>	4.22	4.22	0.00	
		1/4-PT	0 < 7>	1 < 2>	2 < 3>	4.22	4.22	0.00	
		MIDDLE	0 < 9>	1 < 1>	1 < 2>	4.22	4.22	0.00	
		3/4-PT	0 < 9>	1 < 4>	2 < 2>	4.22	4.22	0.00	
		END J	2 < 5>	0 < 8>	4 < 1>	4.22	4.22	0.00	
3	0.30 X 0.50	END I	11 < 3>	9 < 6>	8 < 3>	7.78	6.00	0.00	
		1/4-PT	5 < 7>	6 < 2>	6 < 3>	4.22	4.22	0.00	
		MIDDLE	0 < 7>	2 < 2>	5 < 6>	4.22	4.22	0.00	
		3/4-PT	4 < 7>	4 < 6>	7 < 2>	4.22	4.22	0.00	
		END J	11 < 3>	7 < 6>	8 < 2>	7.71	4.36	0.03	
4	0.30 X 0.50	END I	13 < 3>	6 < 6>	9 < 3>	8.58	4.22	0.60	
		1/4-PT	4 < 7>	4 < 2>	7 < 3>	4.22	4.22	0.00	
		MIDDLE	0 < 7>	3 < 2>	4 < 7>	4.22	4.22	0.00	
		3/4-PT	5 < 7>	7 < 2>	7 < 2>	4.22	4.51	0.00	
		END J	14 < 3>	9 < 6>	9 < 2>	9.33	5.73	0.38	
5	0.30 X 0.50	END I	18 < 3>	16 < 6>	13 < 7>	12.83	10.95	4.70	
		1/4-PT	11 < 3>	9 < 6>	12 < 6>	7.19	5.83	3.87	
		MIDDLE	4 < 3>	1 < 6>	14 < 2>	4.22	4.22	5.34	

		3/4-PT	8 < 3>	2 < 6>	15 < 2>	5.11	4.22	6.91
		END J	17 < 3>	8 < 6>	16 < 2>	12.03	5.27	7.96
6	0.30 X	0.50						
		END I	20 < 3>	0 < 6>	18 < 1>	14.41	4.22	9.84
		1/4-PT	12 < 3>	0 < 6>	17 < 1>	8.16	4.22	8.73
		MIDDLE	5 < 3>	3 < 6>	16 < 1>	4.22	4.22	7.29
		3/4-PT	0 < 7>	6 < 2>	14 < 1>	4.22	4.23	6.04
		END J	0 < 9>	13 < 1>	13 < 1>	4.22	8.58	5.14
7	0.30 X	0.50						
		END I	0 < 7>	12 < 1>	4 < 7>	4.22	7.97	0.00
		1/4-PT	0 < 9>	12 < 1>	3 < 7>	4.22	8.19	0.00
		MIDDLE	0 < 7>	12 < 1>	4 < 2>	4.22	8.00	0.00
		3/4-PT	0 < 7>	11 < 2>	5 < 2>	4.22	7.39	0.00
		END J	0 < 7>	11 < 2>	6 < 2>	4.22	7.57	0.00

F BUILDING RC DESIGN

UNIT : KG-METER

T. H. CHENG STRUCTURAL ENGINEERING & ASSOCIATES

DESIGN OF BEAM ELEMENTS (ACI 318-89)

FRAME ID /MAIN FRAME/

LEVEL ID 2F

BAY	BEAM SIZE		STRESS /-FACTORED	LOADS &	COMBOS-//	--REQUIRED		REBAR--/	
ID	WIDTH	X DEPTH	POINT	-MOMENT	+MOMENT	SHEAR	M{top}	M{bot}	V {/m}
	{m}	{m}		{T-m}	{T-m}	{T}	{sqcm}	{sqcm}	{sqcm}
8	0.30	X 0.50	END I	0 < 7>	11 < 2>	12 < 2>	4.22	7.49	3.87
			1/4-PT	3 < 7>	9 < 2>	13 < 2>	4.22	5.69	4.41
			MIDDLE	7 < 3>	6 < 6>	13 < 1>	4.86	4.22	5.05
			3/4-PT	13 < 3>	5 < 6>	14 < 1>	9.18	4.22	6.01
			END J	20 < 3>	3 < 6>	15 < 1>	14.23	4.22	6.82
9	0.30	X 0.50	END I	15 < 3>	11 < 6>	12 < 3>	10.75	7.52	3.61
			1/4-PT	5 < 7>	8 < 2>	10 < 3>	4.22	5.01	1.37
			MIDDLE	0 < 7>	4 < 1>	7 < 6>	4.22	4.22	0.00
			3/4-PT	6 < 7>	8 < 2>	10 < 2>	4.22	5.07	1.97
			END J	17 < 3>	11 < 6>	13 < 2>	12.24	7.34	4.37
10	0.30	X 0.50	END I	16 < 3>	10 < 6>	10 < 3>	11.52	7.07	1.50
			1/4-PT	6 < 7>	7 < 6>	8 < 3>	4.22	4.31	0.00
			MIDDLE	0 < 7>	2 < 1>	6 < 7>	4.22	4.22	0.00
			3/4-PT	7 < 7>	7 < 6>	7 < 2>	4.27	4.50	0.00
			END J	16 < 3>	11 < 6>	9 < 2>	10.98	7.56	0.69
11	0.30	X 0.50	END I	18 < 3>	10 < 6>	12 < 3>	12.73	6.82	3.29
			1/4-PT	11 < 3>	9 < 6>	11 < 3>	7.37	5.72	2.33
			MIDDLE	5 < 7>	7 < 2>	9 < 3>	4.22	4.40	1.08
			3/4-PT	0 < 7>	5 < 2>	8 < 3>	4.22	4.22	0.00
			END J	0 < 7>	6 < 2>	7 < 3>	4.22	4.22	0.00
12	0.30	X 0.50	END I	0 < 9>	6 < 4>	10 < 2>	4.22	4.22	1.41
			1/4-PT	2 < 7>	6 < 2>	10 < 2>	4.22	4.24	2.00
			MIDDLE	7 < 7>	7 < 6>	11 < 2>	4.51	4.83	2.76

		3/4-PT	12 < 3>	8 < 6>	12 < 2>	8.13	5.61	3.59
		END J	18 < 3>	9 < 6>	13 < 2>	12.53	6.21	4.28
13	0.30 X	0.50						
		END I	19 < 3>	15 < 6>	14 < 3>	13.73	10.61	5.69
		1/4-PT	8 < 7>	8 < 6>	13 < 3>	5.32	5.22	4.33
		MIDDLE	0 < 7>	2 < 2>	11 < 7>	4.22	4.22	2.71
		3/4-PT	10 < 7>	10 < 6>	12 < 2>	6.52	6.97	3.66
		END J	20 < 7>	18 < 6>	13 < 2>	14.55	12.98	4.89
14	0.30 X	0.50						
		END I	17 < 5>	9 < 8>	25 < 5>	11.82	5.95	16.29
		1/4-PT	9 < 5>	8 < 8>	24 < 5>	6.30	5.03	15.87
		MIDDLE	3 < 9>	7 < 4>	24 < 5>	4.22	4.43	15.37
		3/4-PT	0 < 9>	7 < 1>	23 < 5>	4.22	4.77	14.88
		END J	0 < 9>	12 < 4>	23 < 5>	4.22	8.06	14.45

F BUILDING RC DESIGN

UNIT : KG-METER

T. H. CHENG STRUCTURAL ENGINEERING & ASSOCIATES

DESIGN OF BEAM ELEMENTS (ACI 318-89)

FRAME ID /MAIN FRAME/

LEVEL ID 2F

BAY ID	BEAM SIZE WIDTH X DEPTH {m} {m}	STRESS POINT	/-FACTORED -MOMENT {T-m}	LOADS & +MOMENT {T-m}	COMBOS-//--REQUIRED SHEAR M{top} M{bot} V {/m} {T} {sqcm} {sqcm} {sqcm}	REBAR--/
15	0.30 X 0.50	END I	0 < 9>	16 < 4>	11 < 4>	4.22 11.49 2.30
		1/4-PT	0 < 9>	9 < 1>	12 < 4>	4.22 5.76 3.47
		MIDDLE	2 < 9>	5 < 4>	13 < 4>	4.22 4.22 5.05
		3/4-PT	11 < 5>	4 < 8>	15 < 4>	7.79 4.22 6.63
		END J	23 < 5>	4 < 8>	16 < 4>	17.16 4.22 7.79
16	0.30 X 0.50	END I	11 < 1>	0 < 6>	9 < 1>	7.28 4.22 0.63
		1/4-PT	8 < 1>	0 < 6>	8 < 1>	5.02 4.22 0.00
		MIDDLE	5 < 1>	0 < 6>	7 < 1>	4.22 4.22 0.00
		3/4-PT	2 < 1>	0 < 8>	6 < 1>	4.22 4.22 0.00
		END J	0 < 7>	0 < 6>	6 < 1>	4.22 4.22 0.00
17	0.30 X 0.50	END I	17 < 5>	9 < 8>	13 < 5>	11.76 5.80 5.00
		1/4-PT	12 < 5>	9 < 8>	13 < 5>	8.13 5.96 4.36
		MIDDLE	8 < 9>	9 < 8>	12 < 5>	5.15 5.98 3.53
		3/4-PT	5 < 9>	10 < 4>	11 < 5>	4.22 6.52 2.72
		END J	2 < 9>	10 < 4>	10 < 5>	4.22 6.93 2.17
18	0.30 X 0.50	END I	2 < 9>	10 < 4>	5 < 4>	4.22 6.93 0.00
		1/4-PT	0 < 9>	6 < 1>	7 < 4>	4.22 4.22 0.00
		MIDDLE	2 < 9>	4 < 4>	9 < 4>	4.22 4.22 0.48
		3/4-PT	9 < 5>	4 < 8>	11 < 4>	6.04 4.22 2.92
		END J	19 < 5>	4 < 8>	13 < 4>	13.71 4.22 4.54
19	0.30 X 0.50	END I	11 < 1>	0 < 6>	9 < 1>	7.78 4.22 0.81
		1/4-PT	8 < 1>	0 < 6>	8 < 1>	5.30 4.22 0.00
		MIDDLE	5 < 1>	0 < 6>	7 < 1>	4.22 4.22 0.00

			3/4-PT	2 < 1>	0 < 8>	6 < 1>	4.22	4.22	0.00
			END J	0 < 7>	0 < 6>	6 < 1>	4.22	4.22	0.00
20	0.30	X	0.50						
			END I	1 < 9>	2 < 4>	2 < 2>	4.22	4.22	0.00
			1/4-PT	2 < 5>	1 < 8>	3 < 1>	4.22	4.22	0.00
			MIDDLE	5 < 5>	0 < 8>	5 < 1>	4.22	4.22	0.00
			3/4-PT	7 < 5>	0 < 8>	6 < 1>	4.89	4.22	0.00
			END J	11 < 5>	0 < 8>	8 < 1>	7.38	4.22	0.00
21	0.30	X	0.50						
			END I	17 < 5>	6 < 8>	11 < 5>	11.69	4.22	3.06
			1/4-PT	5 < 9>	6 < 4>	9 < 5>	4.22	4.22	0.32
			MIDDLE	0 < 7>	5 < 1>	5 < 9>	4.22	4.22	0.00
			3/4-PT	4 < 9>	7 < 4>	8 < 4>	4.22	4.50	0.00
			END J	14 < 5>	8 < 8>	10 < 4>	9.99	5.19	1.77

F BUILDING RC DESIGN

UNIT : KG-METER

T. H. CHENG STRUCTURAL ENGINEERING & ASSOCIATES

DESIGN OF BEAM ELEMENTS (ACI 318-89)

FRAME ID /MAIN FRAME/

LEVEL ID 2F

BAY	BEAM SIZE		STRESS /-FACTORED	LOADS &	COMBOS-///-REQUIRED	REBAR--/			
ID	WIDTH	X DEPTH	POINT	-MOMENT	+MOMENT	SHEAR	M{ top }	M{ bot }	V { /m }
	{m}	{m}		{T-m}	{T-m}	{T}	{ sqcm }	{ sqcm }	{ sqcm }
22	0.30	X 0.50	END I	23 < 5>	14 < 8>	13 < 5>	17.13	10.07	5.22
			1/4-PT	14 < 5>	12 < 8>	12 < 5>	9.77	8.41	4.17
			MIDDLE	7 < 9>	10 < 4>	11 < 5>	4.49	6.59	2.77
			3/4-PT	0 < 9>	7 < 4>	9 < 5>	4.22	4.58	1.18
			END J	0 < 9>	7 < 4>	8 < 5>	4.22	4.33	0.00
23	0.30	X 0.50	END I	0 < 7>	5 < 1>	10 < 4>	4.22	4.22	1.46
			1/4-PT	3 < 9>	6 < 4>	11 < 4>	4.22	4.22	2.27
			MIDDLE	8 < 9>	8 < 8>	12 < 4>	5.62	5.21	3.43
			3/4-PT	15 < 5>	9 < 8>	13 < 4>	10.84	6.31	4.76
			END J	23 < 5>	10 < 8>	14 < 4>	17.54	7.07	5.86
24	0.30	X 0.50	END I	16 < 5>	4 < 8>	10 < 1>	11.50	4.22	2.22
			1/4-PT	5 < 9>	6 < 4>	8 < 5>	4.22	4.22	0.00
			MIDDLE	0 < 9>	7 < 4>	4 < 5>	4.22	4.55	0.00
			3/4-PT	0 < 9>	5 < 1>	5 < 4>	4.22	4.22	0.00
			END J	5 < 5>	3 < 8>	7 < 4>	4.22	4.22	0.00
25	0.30	X 0.50	END I	3 < 5>	2 < 8>	7 < 5>	4.22	4.22	0.00
			1/4-PT	0 < 9>	5 < 1>	4 < 5>	4.22	4.22	0.00
			MIDDLE	0 < 9>	8 < 4>	4 < 4>	4.22	5.06	0.00
			3/4-PT	6 < 9>	6 < 8>	8 < 4>	4.22	4.22	0.00
			END J	17 < 5>	3 < 8>	11 < 1>	12.08	4.22	2.52
26	0.30	X 0.50	END I	19 < 5>	9 < 8>	8 < 5>	13.85	6.14	0.00
			1/4-PT	10 < 5>	9 < 8>	6 < 5>	6.47	5.69	0.00
			MIDDLE	3 < 9>	6 < 4>	5 < 5>	4.22	4.22	0.00

		3/4-PT	0 < 7>	3 < 1>	4 < 4>	4.22	4.22	0.00
		END J	5 < 9>	4 < 8>	6 < 4>	4.22	4.22	0.00
27	0.30 X	0.50						
		END I	21 < 9>	19 < 8>	11 < 5>	15.83	13.40	2.93
		1/4-PT	10 < 9>	12 < 4>	9 < 5>	6.49	7.92	1.04
		MIDDLE	0 < 9>	3 < 4>	8 < 8>	4.22	4.22	0.00
		3/4-PT	8 < 9>	9 < 8>	10 < 4>	5.06	5.79	1.45
		END J	20 < 5>	16 < 8>	11 < 4>	14.37	10.93	2.89
29	0.30 X	0.50						
		END I	2 < 3>	1 < 6>	6 < 1>	4.22	4.22	0.00
		1/4-PT	0 < 7>	4 < 1>	3 < 1>	4.22	4.22	0.00
		MIDDLE	0 < 7>	5 < 1>	1 < 7>	4.22	4.22	0.00
		3/4-PT	0 < 7>	4 < 1>	3 < 1>	4.22	4.22	0.00
		END J	2 < 3>	1 < 6>	6 < 1>	4.22	4.22	0.00

F BUILDING RC DESIGN

UNIT : KG-METER

T. H. CHENG STRUCTURAL ENGINEERING & ASSOCIATES

DESIGN OF COLUMN ELEMENTS (ACI 318-89)

FRAME ID /MAIN FRAME/

LEVEL ID PF

COL	COLUMN	SIZE	STR	/-----MOMENT INTERACTION-----/				/-----SHEAR DESIGN-----/			
ID	MAJOR	X MINOR	PT	PU	MMAJ	MMIN	COMBO REBAR	DIRN	VU	COMBO A	{/m}
	{m}	{m}		{T}	{T-m}	{T-m}	{sqcm}		{T}		{sqcm}
7	0.30	X 0.30						MAJOR	0	< 0>	0.00
	RR-3-3							MINOR	0	< 0>	0.00
			TOP	8	0	5	< 4> 16.06				
			BOT	10	0	4	< 5> 9.83				
8	0.30	X 0.30						MAJOR	0	< 0>	0.00
	RR-3-3							MINOR	0	< 0>	0.00
			TOP	8	0	5	< 4> 15.92				
			BOT	6	0	2	< 9> 9.00				
16	0.30	X 0.30						MAJOR	0	< 0>	0.00
	RR-3-3							MINOR	0	< 0>	0.00
			TOP	11	0	5	< 5> 16.77				
			BOT	8	0	4	< 4> 10.98				
17	0.30	X 0.30						MAJOR	0	< 0>	0.00
	RR-3-3							MINOR	0	< 0>	0.00
			TOP	10	0	5	< 5> 17.20				
			BOT	8	1	5	< 4> 16.70				

F BUILDING RC DESIGN

UNIT : KG-METER

T. H. CHENG STRUCTURAL ENGINEERING & ASSOCIATES

DESIGN OF COLUMN ELEMENTS (ACI 318-89)

FRAME ID /MAIN FRAME/

LEVEL ID RF

COL	COLUMN SIZE	STR	/-----MOMENT INTERACTION-----/					/-----SHEAR DESIGN-----/		
ID	MAJOR X MINOR {m} {m}	PT	PU {T}	MMAJ {T-m}	MMIN {T-m}	COMBO {sqcm}	REBAR	DIRN	VU {T}	COMBO A {sqcm}
6	0.30 X 0.50 RR-3-5							MAJOR	0 < 0>	0.00
								MINOR	0 < 0>	0.00
		TOP	9	0	4	< 9>	15.00			
		BOT	9	0	8	< 9>	15.00			
7	0.50 X 0.30 RR-3-3							MAJOR	0 < 0>	0.00
								MINOR	0 < 0>	0.00
		TOP	17	0	3	< 9>	15.00			
		BOT	17	1	4	< 9>	15.00			
8	0.30 X 0.50 RR-3-5							MAJOR	0 < 0>	0.00
								MINOR	0 < 0>	0.00
		TOP	18	8	3	< 2>	22.36			
		BOT	27	8	2	< 3>	21.56			
11	0.30 X 0.50 RR-3-5							MAJOR	0 < 0>	0.00
								MINOR	0 < 0>	0.00
		TOP	9	7	0	< 3>	17.00			
		BOT	7	6	1	< 2>	15.70			
15	0.50 X 0.30 RR-3-3							MAJOR	0 < 0>	0.00
								MINOR	0 < 0>	0.00
		TOP	9	0	7	< 5>	18.30			
		BOT	2	0	6	< 4>	15.35			
16	0.50 X 0.30 RR-3-3							MAJOR	0 < 0>	0.00
								MINOR	0 < 0>	0.00
		TOP	24	0	6	< 9>	15.00			
		BOT	24	2	2	< 9>	15.00			
18	0.50 X 0.30 RR-3-3							MAJOR	9 < 2>	0.18
								MINOR	0 < 0>	0.00
		TOP	23	6	8	< 5>	26.28			
		BOT	15	4	6	< 4>	16.38			

19	0.50	X	0.30						MAJOR	0	< 2>	0.00
	RR-3-3								MINOR	0	< 0>	0.00
		TOP		7	1	7	< 9>	16.67				
		BOT		7	0	4	< 9>	15.00				

F BUILDING RC DESIGN

UNIT : KG-METER

T. H. CHENG STRUCTURAL ENGINEERING & ASSOCIATES

DESIGN OF COLUMN ELEMENTS (ACI 318-89)

FRAME ID /MAIN FRAME/

LEVEL ID 3F

COL	COLUMN	SIZE	STR	/-----MOMENT INTERACTION-----/				/-----SHEAR DESIGN-----/	
ID	MAJOR	X MINOR	PT	PU	MMAJ	MMIN	COMBO REBAR	DIRN	VU COMBO A {/m}
	{m}	{m}		{T}	{T-m}	{T-m}	{sqcm}		{T} {sqcm}
1	0.30	X 0.50						MAJOR	0 < 2> 0.00
	RR-3-5							MINOR	10 < 5> 0.95
			TOP	3	4	15	< 4> 29.13		
			BOT	18	3	11	< 5> 18.55		
2	0.30	X 0.50						MAJOR	0 < 2> 0.00
	RR-3-5							MINOR	0 < 5> 0.00
			TOP	14	7	4	< 3> 19.34		
			BOT	7	6	3	< 2> 15.97		
6	0.30	X 0.50						MAJOR	0 < 2> 0.00
	RR-3-5							MINOR	0 < 5> 0.00
			TOP	34	7	3	< 3> 17.01		
			BOT	34	7	4	< 3> 16.75		
7	0.50	X 0.30						MAJOR	9 < 6> 0.20
	RR-3-3							MINOR	0 < 5> 0.00
			TOP	35	2	6	< 9> 15.00		
			BOT	35	1	4	< 9> 15.00		
8	0.30	X 0.50						MAJOR	0 < 6> 0.00
	RR-3-5							MINOR	0 < 5> 0.00
			TOP	46	12	1	< 2> 38.85		
			BOT	67	12	2	< 3> 41.00		
11	0.30	X 0.50						MAJOR	0 < 6> 0.00
	RR-3-5							MINOR	0 < 5> 0.00
			TOP	33	7	12	< 5> 35.20		
			BOT	16	7	9	< 4> 26.73		
12	0.30	X 0.50						MAJOR	0 < 6> 0.00
	RR-3-5							MINOR	10 < 4> 1.88
			TOP	17	1	14	< 5> 20.59		
			BOT	1	0	14	< 8> 21.58		

14	0.30 X 0.50 RR-3-5					MAJOR	0	< 6>	0.00
						MINOR	0	< 4>	0.00
		TOP	12	9	0	< 2>	23.59		
		BOT	22	8	0	< 3>	18.80		
15	0.50 X 0.30 RR-3-3					MAJOR	9	< 6>	0.07
						MINOR	0	< 4>	0.00
		TOP	25	13	0	< 7>	15.23		
		BOT	30	1	4	< 9>	15.00		
16	0.50 X 0.30 RR-3-3					MAJOR	0	< 6>	0.00
						MINOR	0	< 4>	0.00
		TOP	42	1	6	< 9>	15.00		
		BOT	42	3	3	< 9>	15.00		
18	0.50 X 0.30 RR-3-3					MAJOR	10	< 6>	0.80
						MINOR	0	< 4>	0.00
		TOP	40	14	4	< 3>	25.06		
		BOT	31	2	9	< 4>	25.28		

F BUILDING RC DESIGN

UNIT : KG-METER

T. H. CHENG STRUCTURAL ENGINEERING & ASSOCIATES

DESIGN OF COLUMN ELEMENTS (ACI 318-89)

FRAME ID /MAIN FRAME/

LEVEL ID 3F

COL	COLUMN SIZE	STR	/-----MOMENT INTERACTION-----/					/-----SHEAR DESIGN-----/			
ID	MAJOR X MINOR	PT	PU	MMAJ	MMIN	COMBO	REBAR	DIRN	VU	COMBO	A {/m}
	{m}	{m}	{T}	{T-m}	{T-m}		{sqcm}		{T}		{sqcm}
19	0.50 X 0.30							MAJOR	0	< 6>	0.00
	RR-3-3							MINOR	0	< 4>	0.00
		TOP	25	2	9	< 5>	28.70				
		BOT	8	2	9	< 4>	27.68				

F BUILDING RC DESIGN

UNIT : KG-METER

T. H. CHENG STRUCTURAL ENGINEERING & ASSOCIATES

DESIGN OF COLUMN ELEMENTS (ACI 318-89)

FRAME ID /MAIN FRAME/

LEVEL ID 2F

COL	COLUMN	SIZE	STR	/-----MOMENT INTERACTION-----/				/-----SHEAR		DESIGN-----/	
ID	MAJOR	X MINOR	PT	PU	MMAJ	MMIN	COMBO	REBAR	DIRN	VU	COMBO A {/m}
	{m}	{m}		{T}	{T-m}	{T-m}		{sqcm}		{T}	{sqcm}
1	0.30	X 0.50							MAJOR	0 < 6>	0.00
	RR-3-5								MINOR	0 < 4>	0.00
			TOP	7	7	2	< 6>	18.38			
			BOT	40	3	17	< 5>	35.74			
2	0.30	X 0.50							MAJOR	0 < 6>	0.00
	RR-3-5								MINOR	9 < 9>	0.04
			TOP	19	2	4	< 9>	15.00			
			BOT	25	2	19	< 5>	36.61			
5	0.30	X 0.50							MAJOR	0 < 6>	0.00
	RR-3-5								MINOR	10 < 5>	1.32
			TOP	2	2	16	< 4>	26.78			
			BOT	28	1	16	< 5>	25.06			
6	0.30	X 0.50							MAJOR	0 < 6>	0.00
	RR-3-5								MINOR	0 < 5>	0.00
			TOP	33	8	2	< 6>	21.56			
			BOT	38	9	1	< 7>	25.81			
7	0.50	X 0.30							MAJOR	12 < 6>	2.92
	RR-3-3								MINOR	0 < 5>	0.00
			TOP	26	14	0	< 6>	17.63			
			BOT	26	21	1	< 6>	32.97			
8	0.30	X 0.50							MAJOR	0 < 6>	0.00
	RR-3-5								MINOR	11 < 8>	0.61
			TOP	72	12	2	< 2>	37.60			
			BOT	110	11	3	< 3>	42.48			
11	0.30	X 0.50							MAJOR	0 < 6>	0.00
	RR-3-5								MINOR	10 < 8>	1.54
			TOP	48	8	1	< 3>	18.53			
			BOT	27	3	21	< 4>	43.93			

14	0.30	X	0.50						MAJOR	0	< 6>	0.00
			RR-3-5						MINOR	0	< 8>	0.00
				TOP	16	7	0	< 6>	15.39			
				BOT	16	7	4	< 6>	19.52			
15	0.50	X	0.30						MAJOR	12	< 6>	1.88
			RR-3-3						MINOR	0	< 8>	0.00
				TOP	44	15	1	< 7>	16.58			
				BOT	41	20	1	< 6>	31.61			
16	0.50	X	0.30						MAJOR	11	< 7>	1.15
			RR-3-3						MINOR	0	< 8>	0.00
				TOP	62	1	6	< 9>	15.00			
				BOT	43	19	1	< 6>	29.38			
18	0.50	X	0.30						MAJOR	13	< 6>	3.15
			RR-3-3						MINOR	0	< 8>	0.00
				TOP	64	17	3	< 3>	27.29			
				BOT	35	22	1	< 6>	36.42			

F BUILDING RC DESIGN UNIT : KG-METER

T. H. CHENG STRUCTURAL ENGINEERING & ASSOCIATES

DESIGN OF COLUMN ELEMENTS (ACI 318-89)

FRAME ID /MAIN FRAME/

LEVEL ID 2F

COL	COLUMN SIZE	STR	/-----MOMENT INTERACTION-----/					/-----SHEAR DESIGN-----/			
ID	MAJOR X MINOR	PT	PU	MMAJ	MMIN	COMBO	REBAR	DIRN	VU	COMBO	A {/m}
	{m}	{m}	{T}	{T-m}	{T-m}		{sqcm}		{T}		{sqcm}
19	0.50 X 0.30							MAJOR	10	< 6>	1.89
	RR-3-3							MINOR	0	< 8>	0.00
		TOP	35	2	8	< 9>	19.80				
		BOT	12	2	10	< 4>	32.33				